Chapter revisions may be published from time-to-time before another complete revision of this *Handbook* is made. If you have a specific interest and wish to make sure that the chapter you want is the latest available, please check with the nearest BLS Regional Office listed on the inside back cover of this bulletin.
Preface

The *BLS Handbook of Methods for Surveys and Studies* is a well-established tradition in the Bureau of Labor Statistics. The first edition, BLS Bulletin 993, issued in 1950, was a compendium of articles culled from the *Monthly Labor Review*. Its popularity, however, soon dictated that it become a publication in its own right. Subsequent editions — Bulletin 1168 in 1955, Bulletin 1458 in 1966, and Bulletin 1711 in 1971 — broadened the coverage and refined the explanations of the methods the Bureau uses in its many programs of collecting, analyzing, and presenting its statistical data.

This edition carries on in that tradition. During the few years since the fourth edition was published, new series have been added and surveys undertaken to widen our understanding of the Nation’s economy and its changing composition. The new series explained in this *Handbook* include measures of unemployment in States and local areas, employment and wages data for workers covered by unemployment insurance laws, occupational employment statistics collected under the Federal-State cooperative program, international prices, an employment cost index, and workers covered by employment benefit plans. In addition, many of the chapters for the “older” series have been updated to reflect the continuing improvements in the Bureau’s methods and statistical techniques.

For each major program there is a brief account of how it came into being and what it attempts to do. Where the basic data come from is noted, terms are defined, and the concepts adopted are outlined. Occasionally, for further clarification a form, a table, or a mathematical formulation is shown. Sources of additional information, some more technical, some more popular, are listed at the end of most chapters. The purpose is always to give the reader a clear understanding of the nature of the statistical data the Bureau produces.

BLS statistics are used for many purposes, and sometimes the data well suited to one purpose may have limitations for another. The chapters in this *Handbook* contain the information necessary for the user to evaluate the suitability of the statistics for the various uses to which they may be put.

The chapters for the *Handbook* were written by members of the staffs of the various program offices of the Bureau and prepared for publication in the Office of Publications, Division of Special Publications, under the direction of Eugene H. Becker.

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Introduction

The country is hungry for information; everything of a statistical character, or even of a statistical appearance is taken up with an eagerness that is almost pathetic; the community have not yet learned to be half skeptical and critical enough in respect to such statements.

With these words Gen. Francis A. Walker greeted Carroll Wright in 1873, as Dr. Wright assumed charge of the Massachusetts Bureau of Statistics and Labor. And when, as U.S. Commissioner of Labor, he issued his first annual report in March 1886, Carroll Wright established the policy of explaining his statistical methods to his readers and of seeking to avoid misinterpretation of the figures presented. For example, he said:

In stating the facts as they have been found by the agents of the Bureau, many terms are used which are capable of varied application—some even are of doubtful meaning when considered metaphysically, but all such terms are used in this report in their common acceptation; as, for instance, the term "overproduction" is used to indicate that condition of a locality, state, or country when more goods have been produced than are sufficient to meet the ordinary demand . . . .

In the same report there are statements on testing the validity of figures (p. 141), problems of nonresponse (p. 90), and restrictions on coverage (headnotes to tables). Warnings as to inadequacies of available information occur frequently. During the 90 years which followed the initial report, the definitions, methods, and limitations of the data published by the Bureau of Labor and its successor, the Bureau of Labor Statistics, have been explained again and again. The reason for this is not merely to make the readers "skeptical," "critical," and aware of the known limitations of the statistics, but also to instruct them in the proper use of the information and to assure them that proper standards have been observed. Furthermore, whereas one might expect to breed a certain amount of doubt about a statistical survey by revealing its lack of perfection, frankness about unavoidable defects more often has the opposite effect, and public confidence in the work is reinforced in the process. The most grave doubts arise when things crying for explanation are not explained.

The Committee on Government Statistics and Information Services emphasized 39 years ago that the Central Statistical Board "should urge on each collecting agency the importance of publication by agencies of frank appraisals of the extent of incomparability, incompleteness, and inaccuracy which may be inherent in their reports at any given time. This candid policy should enhance and not diminish the scientific prestige of the collecting agency."

Full understanding of the statistical series and studies of the Bureau of Labor Statistics is not to be gained solely from detailed descriptions of them, but also from appraisal of the philosophy and approach of the Bureau and of the manner in which it functions.

Background

The history of the Federal Bureau of Labor dates to 1884. Before the creation of the cabinet post of Secretary of Labor, the Bureau for a time was known as the Department of Labor. From the Bureau's beginnings in the administration of President Arthur until it became a part of a cabinet department under President Wilson, it accumulated nearly 3 decades of experience in collecting, interpreting, and presenting facts crucial to the welfare of workers. Details of early Bureau history and of developments of later years are to be found elsewhere. However, in describing the various statistical programs in this volume, some of the events which led to the development of particular statistical measures are recounted. Against this historical background emerges the philosophy and posture of the Bureau of Labor Statistics as the impartial observer and interpreter of trends important to the welfare of work-

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2 Committee on Government Statistics and Information Services, Government Statistics, April 1937, p. 53. Recommendation #16 of the Committee states: "Continued criticism and analysis should be made of (a) statistical definitions, specifications, and classification; (b) coverage of supposedly complete surveys and of samples used for current reporting; (c) timing of periodic surveys and current reports, component items and weighting systems of index numbers; and (f) methods and practices in the presentation of data. . . . Frank appraisals of comparability, completeness, and accuracy should be published." (pp. 48-49).

3 See, for example, the Secretary of Labor's First Annual Report, 1913, for history 1884-1913; and U.S. Department of Labor, The Anvil and the Plow, 1964; pages 4-5, 19-20, 49-51 (1913-30); pp. 63-64, 87-90, 117-119, 136-137, and 155 (1930-48); pp. 172-173, 187, 206-207, and 230-234 (1949-63).

4 For a handy reference to BLS programs, showing their principal characteristics, see U.S. Department of Labor, Bureau of Labor Statistics, Major BLS Programs (issued annually).
Voluntary Reporting and Confidentiality

In the 91-year history of the Bureau’s operation, it has asked hundreds of thousands of firms and individuals to provide information closely related to their daily affairs and personal lives. To some of them who have supplied the desired information, the Bureau has gone back a second time, a third time, and perhaps dozens of times, for later information on the same subject or for new types of information. The response has been remarkable in its generosity, even when it is remembered that a sustained effort has been made to keep the requests reasonable. In no small measure, the cooperation received is due to the great care taken to avoid identifying the firm or the person supplying the information. The fact that Bureau employees pledge themselves to protect these data is less important than that they have a deep understanding of the adverse longrun consequences of even a single lapse. They are aware of the greater worth, in terms of pure statistical validity, of the information provided voluntarily as compared with that supplied under legal sanctions. The only inducement employed is to tell the respondent that their contributions are important to the ultimate success of the survey and that they may find the survey results useful in their own pursuits. The policy of not identifying respondents is implemented by combining the data reported by the different sources and issuing the findings in summary form.

Another assurance given respondents is that their reports will be used for statistical purposes only. Attempts to “break” this policy, by organizations or individuals who wanted access to data in our possession and were willing to go to the courts to secure it, have been successfully resisted. Another form this problem takes is the case in which an administrative agency of government seeks court action to compel a company to release its file copy of information provided in confidence to a statistical agency.

While it cannot be proved that these policies result in more reliable statistics, Bureau Commissioners and their staffs over the years have been convinced from their experience that it is so. It is notable that some other Federal agencies (especially the Bureau of the Census), well-equipped with authority to compel the submittal of certain reports, rarely if ever invoke this power. Rather, they choose to rely upon forms of submission similar to our own. The Bureau of Labor Statistics, while its functions as a statistical agency as prescribed by law, has always relied upon voluntary cooperation of respondents in collecting information.

BLS Role, Staff, and Organization

Among Federal agencies collecting and issuing statistics, the Bureau of Labor Statistics has been termed a “general-purpose statistical collection agency.” The Bureau’s figures are prepared to serve the needs of business, labor, Congress, the general public, and especially the administrative and executive agencies, for information on economic and social trends and situations. While the data serve some administrative purposes, they are free from the constraints which sometimes result from the close ties normally existing between operations and operational statistics. BLS statistics are often quite specialized, yet they meet general economic and social data requirements. As the needs of users are likely to differ from each other and also over time, no statistic is ideal for all. This makes it important that the characteristics of the measures and their possible limitations be well understood.

Staff

The Bureau’s work extends beyond the initial collection and processing of data. Its activities frequently influence, and sometimes are crucial to, the determining and shaping of public policy. Over the years, it has developed a staff of professional analysts, trained in the disciplines of economics and other social sciences, to search out the implications of survey findings for the welfare of workers and to present them as cogently and as promptly as possible in written and oral form. How successfully this can be accomplished depends greatly upon the competence of the analysts and of their supporting personnel.

In BLS, analytical and statistical work is performed by economists, statisticians, and mathematical statisticians with the aid of an experienced corps of programmers, systems analysts, and other professionals, as well as statistical clerks. For analytical work, economists at even the lowest grade level must meet Civil Service Commission requirements roughly equivalent to a college major in economics. There are comparable requirements for other professionals. The
greatest effort is made to locate the best of graduating seniors, Master's, Ph.D. degree holders, and those having research experience, in colleges, State agencies, business organizations, and labor unions. The Bureau provides training needed for on-the-job skills, as background to special assignments, to keep professionals abreast of changes in their fields, and to aid higher level and executive professionals in obtaining the best results from their staffs.

In training staff, a special effort is made to impart detailed knowledge of the techniques used in collecting and compiling the statistics, so that maximum application of the data to current problems can be made without a risk of exceeding the limits of their significance.

Organization

The statistical programs of the Bureau were developed, for the most part, independently of each other, taking on characteristics suited to the requirements of the subject under observation. As a result, the Bureau was organized according to subject-matter areas, an arrangement which has proved efficient and has been continued over the years. Expertise in techniques, economic analysis, and other staff activities across subject-matter lines was added to provide better use of the Bureau's resources.

As the Bureau's collection activities increased, regional offices were established in 1943 to provide administration of the field programs and staff. Another function of the offices was to disseminate data to local users and to furnish technical advice and assistance to State agencies and other cooperating organizations. An important aspect of the work of the regional staffs has been the function of explaining the concepts and techniques which the Bureau uses in compiling the statistics.

Special recognition of the competence of the Bureau in the field of statistics was given by the Secretary of Labor in 1955 when he delegated to the Commissioner of Labor Statistics the responsibility for continuously reviewing all of the statistical programs of the Department of Labor and of making recommendations for their improvement.

Consultation and Advice on Statistical Programs

A statistical program too much detached from the uses of its data may fail in its principal mission. To avoid sterility and stagnation, the Bureau continuously invites advice and ideas from users and experts in business, labor, and academic organizations and from individual members of the public. Over the years, the advice the Commissioner of Labor Statistics has received on policy and technical matters from responsible parties, relating to the collection and analysis of our statistics, has usually been sound and therefore very helpful. Of course, decisions on statistical policy have always been the final responsibility of the Commissioner.

In order to keep in touch with the current and anticipated needs of business and labor groups and to seek advice on technical problems, the Commissioner first established standing research advisory committees in 1947. These groups, now called the Business Research Advisory Council and the Labor Research Advisory Council, serve in an advisory capacity with respect to technical problems, consult on Bureau programs, and provide perspectives on Bureau programs in relation to needs of their members. The councils accomplish their work in general sessions and also through committees designated to subject-matter fields on a more specialized basis. Committee memberships are augmented by other persons in industry or labor who, although not council members, have special competence. The councils may take formal action through resolutions or recommendations on matters regarded as appropriate for such action, but such resolutions are merely advisory. Members of the councils and the subcommittees serve in their individual capacities, not as representatives of their organizations.

The members of the Labor Research Advisory Council are designated by the Commissioner of Labor Statistics under authorization by the Secretary of Labor, from nominations by the Director of Research, AFL—CIO. All research directors of international unions represented in the AFL—CIO, the Railway Labor Executives' Association, and the railroad operating unions are invited to attend the general meetings of the council. The council provides general direction to the advisory activities of trade union research directors in relation to the Bureau.

The members of the Business Research Advisory Council are designated by the Commissioner under authorization of the Secretary of Labor, after consultation with the National Association of Manufacturers, the U.S. Chamber of Commerce, and other organizations broadly representative of American business. Members serve in their individual capacities, not as representatives of their companies.

The Bureau often seeks the advice of professional economists, statisticians, social scientists, educators, and others, either in their individual capacities or as members of professional organizations. This is most likely to occur when a conceptual or theoretical question arises which is considered fundamental to the work of the Bureau in a specialized field, and where professional acceptance of the Bureau's work in that field may be reinforced by the findings of an independent analyst.

It is a fundamental objective of the Bureau that its statistical practice be built soundly upon established statistical theory. The objective can be realized only if BLS practitioners are trained in statistics and if they keep their knowledge up to date. For this reason the
Bureau encourages their participation in activities of the professional societies, their efforts to improve their education in statistics, and continuing contacts with other experts in their disciplines. The efforts of other statistical organizations, public and private, are studied unremittingly so that BLS may reap benefits from the experiences of others.

**Standard Definitions**

Where related statistics cut across program lines or across Government bureaus, the Bureau of Labor Statistics cooperates to the maximum extent possible in the Office of Management and Budget's (formerly, the Bureau of the Budget) effort to obtain adherence to standard definitions of terms for maximum comparability. The use of the definition of establishment is a case in point.

The business establishment has been found to be the most satisfactory source of data for most industrial statistics because it is the first level of business organization for which complete records — i.e., production, employment, purchases, sales, wages, inventories, etc. — are generally maintained. The establishment is the primary unit of organization in the business economy and is the first integrated level, or combination, of employees devoted to the production of a related group of products or services. In BLS programs in which it is applicable, the standardized definition of the establishment is used.  

The Bureau also follows the Office of Management and Budget's definition of "production and related workers," and uses the "standard payroll period." The reader is referred to appendixes B and C for descriptions of the standards followed with respect to industrial classification and geographic classification.

9 See app. B.

10 *Standard Definitions of Types of Workers, Bureau of the Budget, November 7, 1944.* "Production and related workers are defined to include working foremen and all nonsupervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, packing, warehousing, shipping, maintenance, repair, janitorial, watchman services, product development, auxiliary production for plant's own use (e.g., powerplant) and record-keeping and other services closely associated with the above production operations. Excluded are supervisory employees (above the working foremen level) and their clerical staffs."

11 *Standard Definition of Payroll Periods for Employment Reports, Bureau of the Budget, March 28, 1952.* "In order to maintain a coordinated system of employment reports and to reduce the reporting burden on respondents, requests made to employing establishments for statistical information from their payroll records on the number of employees, payrolls, hours worked, or related items, should refer to the payroll period containing the 12th of the month."
Current Employment Analysis

Chapter 1. Labor Force, Employment, and Unemployment

Background

Each month, the Bureau analyzes and publishes statistics on the labor force, employment, unemployment, and persons not in the labor force, classified by a variety of demographic, social, and economic characteristics. These statistics are derived from the Current Population Survey (CPS), which is conducted by the Bureau of the Census for the BLS. This monthly survey of the population is conducted using a scientifically selected sample of households, representative of the civilian noninstitutional population of the United States.

Specific concepts of the labor force, employment, and unemployment were introduced in the latter stages of the depression of the 1930's, chiefly to arrive at more objective measurements of unemployment and employment than were previously available. Before the 1930's, aside from attempts in some of the decennial censuses, no direct measurements were made of the number of jobless persons. The development of mass unemployment in the early 1930's increased the need for statistics, and widely conflicting estimates based on a variety of indirect techniques began to appear. Dissatisfied with these methods, many research groups, as well as State and municipal governments, began experimenting with direct surveys of the population or samples of the population. In these surveys, an attempt was made to classify the population as employed, unemployed, or out of the labor force by means of a series of questions addressed to each individual. In most of the surveys, the unemployed were defined as those who were not working but were "willing and able to work." This concept, however, did not meet the standards of objectivity that many technicians felt were necessary to measure either the level of unemployment at a point in time or changes over periods of time. The criterion "willing and able to work," when applied in specific situations, appeared to be too intangible and too dependent upon the interpretation and attitude of the persons being interviewed.

Out of this experimentation, a set of precise concepts was developed in the late 1930's to meet these various criticisms. According to the new concepts, the classification of an individual depended principally on his actual activity within a designated time period, i.e., was he working, looking for work, or engaged in other activities? These concepts were adopted for the national sample survey of households initiated by the Works Progress Administration (WPA) in 1940.

Originally termed the Monthly Report on Unemployment when the WPA was responsible for the collection of labor force statistics, the household survey was transferred to the Bureau of the Census in late 1943. Its name was changed at that time to the Monthly Report on the Labor Force. The survey title was changed once more — in 1948 — to the present "Current Population Survey" in order to reflect more accurately its expanding role as a source for a wide variety of demographic, social, and economic characteristics of the population. In 1959, responsibility for analyzing and publishing the CPS labor force data was transferred to the BLS, although the Census Bureau continues to collect and tabulate the statistics.

Description of Survey

The CPS provides statistics on the civilian noninstitutional population 16 years of age and over. Figures on the Armed Forces (obtained monthly from the Department of Defense) are added to the CPS estimates to derive estimates of the "total labor force" and the "total noninstitutional population." Persons under 16 years of age are excluded from coverage in the survey because child labor laws, compulsory school attendance, and general social custom prevent most of these children in the United States from working. (Separate statistics are collected and published for 14 and 15 year olds). The institutional population, which is also excluded from coverage, consists of inmates of penal and mental institutions, tuberculosis sanitariums, and homes for the aged, infirm, and needy.

The CPS is collected each month from a probability sample of approximately 47,000 households. Beginning in July 1975, the sample was enlarged by 11,000 households in order to provide annual labor force data for all 50 States and the District of Columbia. However, these households will not be used for national estimates until
January 1977. Respondents are assured that all information obtained is completely confidential and is used only for the purpose of producing statistical totals. Although the survey is conducted on a strictly voluntary basis, refusals to cooperate have averaged about 2 percent or less since its inception.

The time period covered in the monthly survey is a calendar week. A calendar week was selected as the survey reference period because the period used must be short enough so that the data obtained are “current” but not so short that the occurrence of holidays or other accidental events might cause erratic fluctuations in the information obtained. A calendar week fulfills these conditions as well as being a convenient and easily defined period of time. Since July 1955 the calendar week, Sunday through Saturday, which includes the 12th day of the month has been defined as the reference week. The actual survey is conducted during the following week, which is the week containing the 19th day of the month.

Concepts

The criteria used in classifying persons on the basis of their labor force activity are as follows:

Employment. Employed persons comprise (1) all those who, during the survey week, did any work at all as paid employees, or in their own business, profession, or on their own farm, or who worked 15 hours or more as unpaid workers in a family-operated enterprise and (2) all those who did not work but had jobs or businesses from which they were temporarily absent due to illness, bad weather, vacation, labor-management dispute, or various personal reasons — whether or not they were paid by their employers for the time off and whether or not they were seeking other jobs. Each employed person is counted only once. Those who held more than one job are counted in the job at which they worked the greatest number of hours during the survey week. Included in the total are employed citizens of foreign countries, temporarily in the United States, who are not living on the premises of an Embassy. Excluded are persons whose only activity consisted of work around their own home (such as housework, painting, repairing, etc.) or volunteer work for religious, charitable, and similar organizations.

Unemployment. Unemployed persons include those who did not work at all during the survey week, were looking for work, and were available for work during the reference period except for temporary illness. Those who had made specific efforts to find work within the preceding 4-week period — such as by registering at a public or private employment agency, writing letters of application, canvassing for work, etc. are considered to be looking for work. Also included as unemployed are those who did not work at all during the survey week, were available for work, and (a) were waiting to be called back to a job from which they had been laid off or (b) were waiting to report to a new wage or salary job scheduled to start within the following 30 days.

Duration of unemployment represents the length of time (through the current survey week) during which persons classified as unemployed had been continuously looking for work. For persons on layoff, duration of unemployment represents the number of full weeks since the termination of their most recent employment. A period of 2 weeks or more during which a person was employed is considered to break the continuity of the present period of seeking work. Average duration is an arithmetic mean computed from a distribution by single weeks of unemployment.

Unemployment may be categorized according to the status of persons at the time they began to look for work. These “reasons” for unemployment are divided into four major groups. (1) Job losers are persons whose employment ended involuntarily and who immediately began looking for work, including those on layoff. (2) Job leavers are persons who quit or otherwise terminated their employment voluntarily and immediately began looking for work. (3) Reentrants are persons who previously worked at a full-time job lasting 2 weeks or longer but who were out of the labor force prior to beginning to look for work. (4) New entrants are persons who never worked at a full-time job lasting 2 weeks or longer.

Labor Force. The civilian labor force comprises the total of all civilians classified as employed and unemployed. The total labor force, in addition, includes members of the Armed Forces stationed either in the United States or abroad.

Unemployment Rate. The unemployment rate represents the number of unemployed as a percent of the civilian labor force. This measure is also computed for various worker groups such as by sex, age, race, industry, occupation, etc., or for combinations of these characteristics. However, because there is no comparable labor force, the job-loser, job-leaver, reentrant, and new entrant rates are each calculated as a percent of the total civilian labor force, the sum of the rates for the four groups thus equals the overall unemployment rate.

Not in Labor Force. All civilians 16 years of age and over who are not classified as employed or unemployed are defined as “not in the labor force.” These persons are further classified as “engaged in own housework,” “in school,” “unable to work” because of long-term physical or mental illness, “retired,” and “other”. The “other” group includes the voluntarily idle, seasonal workers for whom the survey week fell in an “off” season and who were not reported as looking for work,
and persons who did not look for work because they believed that no jobs were available because of personal factors — age, lack of education or training, etc. — or because of the prevailing job market situation. Persons doing only incidental unpaid family work (less than 15 hours during the survey week) are also classified as not in the labor force.

In addition to students with no current interest in labor force activity, the category “not in labor force — in school” includes persons attending school during the survey week who had new jobs to which they were scheduled to report within 30 days. It also includes students looking for jobs for some period in the future, such as the summer months. All persons — whether or not attending school — who had new jobs not scheduled to begin until after 30 days (and who were not working or looking for work) are also classified as not in the labor force.

For persons not in the labor force, detailed questions are asked about previous work experience, intentions to seek work, desire for a job at the time of interview, and reasons for not looking for work. These questions are asked only in those households that are in the fourth and eighth months of the sample, i.e., the “outgoing” rotation groups, those which had been in the sample for 3 previous months and would not be in for the subsequent month. Prior to 1970, the detailed not-in-labor force questions were asked of persons in the first and fifth months in the sample, i.e. the “incoming” groups. (See Sampling.)

Sampling

The Survey Design

The CPS national sample is located in 461 areas comprising 923 counties and independent cities with coverage in every State and the District of Columbia. In all, about 57,000 housing units and other living quarters are designated for the sample each month, of which about 47,000, containing 100,000 persons 16 years and over, are occupied by households eligible for interview. Not reflected in these counts are the sample areas and households added beginning July 1975 to produce annual estimates for all 50 States and the District of Columbia. The remainder are units found to be vacant, converted to nonresidential use, containing persons who reside elsewhere, or ineligible for other reasons. Of the occupied units eligible for enumeration, about 3 to 5 percent are not interviewed in a given month because the residents are not found at home after repeated calls, are temporarily absent, refuse to cooperate, or are unavailable for other reasons.

Selection of Sample Areas. The entire area of the United States consisting of 3,146 counties and independent cities is divided into 1,931 primary sampling units (PSU’s). With some minor exceptions, a PSU consists of a county or a number of contiguous counties. Each of the 238 standard metropolitan statistical areas (SMSA’s)1 in existence at the time of the 1970 Census constituted a separate PSU. Outside SMSA’s, counties normally are combined, except where the geographic area of the single county is excessive. By combining counties to form PSU’s, greater heterogeneity is accomplished. Moreover, another important consideration is to have the PSU sufficiently compact in area so that, with a small sample spread throughout, it can be efficiently canvassed without undue travel cost. A typical primary sampling unit, for example, includes both urban and rural residents of both high and low economic levels and encompasses, to the extent feasible, diverse occupations and industries.

The PSU’s are grouped into 376 strata. Among these PSU’s, 146 of the largest SMSA’s (including all those having over 250,000 inhabitants) and 10 other areas (not SMSA’s) are separate strata representing themselves. In general, however, a stratum consists of a set of PSU’s as much alike as possible in various characteristics such as geography, population density, rate of growth in the 1960—70 decade, proportion of blacks and other minorities, principal industry, number of farms, and so on.

Except for the 156 areas mentioned above, each of which is a complete stratum, the strata are established so that their sizes in terms of 1970 population are approximately equal. From each stratum a single PSU is selected to represent the entire stratum. In the 156 strata in which there is only a single PSU (the 146 SMSA’s and 10 special cases), the single PSU automatically falls in the sample. When the stratum has more than one PSU, the sample PSU is selected in a random manner in such a way that its probability of selection is proportionate to its 1970 population. For example, within a stratum the chance that a PSU having a population of 50,000 would be selected is twice that for a unit having a population of 25,000.

Selection of Sample Households. The sample design calls for a sampling ratio which depends on the predetermined total sample size. For 1976, it is roughly 1 household for every 1,500 households in each stratum. The sampling ratio is modified slightly each month, as the size of the sample is held relatively constant despite the overall growth of the population. The sampling ratio used within each sample PSU depends on the proportion that the population of the sample area was of the stratum population at the time of the 1970 Census. In a sample area which was one-tenth of the stratum, the within-PSU sampling ratio that results is 1 in 150.0, thereby achieving the desired ratio of 1 in 1,500 for the

1See appendix C.
enumeration districts (ED's), which are administrative. The first step is the selection of a sample of census fixed quotas of households or persons based on the population at an earlier date.

Within each designated PSU, several stages of sampling may be used in selecting the units to be enumerated. The first step is the selection of a sample of census enumeration districts (ED's), which are administrative units used in the 1970 Census and contain, on the average, about 300 households. These are selected systematically from a geographically arranged listing, so that the sample ED's are spread over the entire PSU. The probability of selection of any one ED is proportionate to its 1970 population.

The next step is to select a cluster of approximately four households to be enumerated within each designated ED. This selection is made wherever possible from the list of addresses for the ED compiled during the 1970 Census or, if the addresses are incomplete or inadequate, by area sampling methods. The address lists are used in about two-thirds of the cases, primarily in urban areas, and area sampling is applied in the remainder. In using the census lists an effort is made to have all small multiunit addresses (2-4 units) included within the same segment. This improves the ability of the interviewer to cover all units designated for the sample. Subject to this restriction, clusters consist of as geographically contingent addresses as possible.

This list sample is supplemented by a selection of the appropriate proportion of units newly constructed in the PSU since the census date. The addresses of these units are obtained mainly from records of building permits maintained by the offices responsible for issuing permits in that area. A special procedure is also followed to include units in the sample that had been missed in the Census. In those enumeration districts where area sampling methods are used — mainly rural areas — the ED's are subdivided into segments, that is, small land areas having well-defined boundaries and in general an expected "size" of about 8 to 12 housing units or other living quarters. For each subdivided ED, one segment is designated for the sample; the probability of selection is proportionate to the estimated "size" of the segment. When a selected segment contains about 4 households, for example, all units are included in the sample. In cases where the "size" of the segment is several times 4 units, an interviewer does not conduct interviews at all housing units in the segment but uses a systematic sampling pattern so as to achieve the equivalent of a 4-household cluster which is canvassed completely. The remaining housing units in the segment are then available for future samples.

Rotation of Sample. Part of the sample is changed each month. A primary reason for rotating the sample is to avoid the problems of uncooperativeness which arise when a constant panel is interviewed indefinitely. Another reason for replacing households is to reduce the cumulative effect of biases in response that sometimes occur when the same persons are interviewed indefinitely. To accomplish this rotation of the sample on a gradual basis, maps and other materials for several samples are prepared simultaneously. For each sample, eight systematic subsamples (rotation groups) of segments are identified. A given rotation group is interviewed for a total of 8 months, divided into two equal periods. It is in the sample for 4 consecutive months one year, leaves the sample during the following 8 months, and then returns for the same 4 calendar months of the next year. In any 1 month, one-eighth of the sample segments are in their first month of enumeration, another eighth are in their second month, and so on; the last eighth are in for the eighth time, the fourth month of the second period of enumeration. Under this system, 75 percent of the sample segments are common from month to month and 50 percent from year to year. This procedure provides a substantial amount of month-to-month and year-to-year overlap in the panel, thus reducing discontinuities in the series of data, without burdening any specific group of households with an unduly long period of inquiry.

Collection Methods

Each month, during the calendar week containing the 19th day, interviewers contact some responsible person in each of the sample households in the CPS. At the time of the first enumeration of a household, the interviewer visits the household and prepares a roster of the household members, including their personal characteristics (date of birth, sex, race, marital status, educational attainment, veteran status, origin or descent, etc.) and their relationship to the household head. This roster is brought up to date at each subsequent interview to take account of new or departed residents, changes in marital status, and similar items. The information on personal characteristics is thus available each month for identification purposes and for cross-classification with economic characteristics of the sample population.

Personal visits are required in the first, second, and fifth month that the household is in the sample. In other months, the interview may be conducted by telephone if the respondent agrees to this procedure. Also, if no
one is at home when the interviewer visits, the respondent may be contacted by telephone after the first month. Approximately 50 percent of the households in any given month are interviewed by telephone.

At each monthly visit, a questionnaire is completed for each household member 16 years of age and over. The interviewer asks a series of standard questions on economic activity during the preceding week, the calendar week containing the 12th day of the month, called the “survey week.” The primary purpose of these questions is to classify the sample population into the three basic economic groups — the employed, the unemployed, and those not in the labor force. (See facsimile of the CPS standard questionnaire on page 13 of this bulletin.)

Additional questions are asked each month to help clarify the information on labor force status. For the employed, information is obtained on hours worked during the survey week, together with a description of the current job. For those temporarily away from their jobs, the enumerator records their reason for not working during the survey week, whether or not they were paid for their time off, and whether they usually work full or part time. For the unemployed, information is obtained on (1) method(s) used to find work during the 4 weeks prior to the interview, (2) the reasons the unemployed persons had started to look for work, (3) the length of time they had been looking for work, (4) whether they were seeking full- or part-time work and (5) a description of their last full-time civilian job. For those outside the labor force, their principal activity during the survey week — whether keeping house, going to school, or doing something else — is recorded. In addition, for all households in the outgoing rotation groups, questions on the work history, reasons for nonparticipation, and jobseeking intentions of individuals not in the labor force are asked.

The questionnaires containing the information obtained for each person in the sample are subjected to a field edit by clerks in each of the 12 regional offices of the Census Bureau. The field edit serves to catch omissions, inconsistencies, illegible entries, and errors at the point where correction is still possible. Many of the error corrections made in the field edit prevent delays in further processing of the questionnaires in Washington.

After the field edit, the questionnaires are forwarded to the Jeffersonville, Indiana office of the Census Bureau. All of the questionnaires are received in Jeffersonville by the end of the week after enumeration. Here the raw data are transferred to computer tape and transmitted by wire to the computers in the Census Bureau’s Washington office where they are checked for completeness and consistency.

The interviewers on the CPS are chiefly part-time workers, although most of the staff at any time consists of persons who have had several years experience on the survey. They are given intensive training when first recruited and have either direct or home study training each month, before the survey. Moreover, through editing of their completed questionnaires, repeated observation during enumeration, and a systematic re interviewing of part of their assignments by the field supervisory staff, the work of the interviewers is kept under control and errors or deficiencies are brought directly to their attention.

### Estimating Methods

To increase the reliability of the labor force statistics derived from the sample, the estimation procedure uses two stages of ratio estimates and a “composite estimate.” Achievement of this rather complicated procedure is made rapidly and automatically because of the availability of high-speed electronic digital computers. The principal steps involved are as follows:

#### Adjustment for Households Not Interviewed

The weights for all households interviewed are adjusted to the extent needed to account for units occupied by persons eligible for interview but for which no interview was obtained because of absence, impassable roads, refusals, or other reasons. This adjustment is made separately by groups of PSU’s and, within these, for each race (white or black and other) and residence group of households (urban, rural nonfarm, rural farm). The adjustment is made separately within each individual rotation group. The proportion of sample households not interviewed for the above stated reasons ranges from 3 to 5 percent.

#### Ratio Estimates

The distribution of the population selected for the sample may differ somewhat, by chance, from that of the Nation as a whole in such basic characteristics as age, race, sex, and farm-nonfarm residence, among other things. These particular population characteristics are closely correlated with labor force participation and other principal measurements made from the sample. Therefore, some of the sample estimates can be improved substantially when, by appropriate weighting of the original returns, the sample population is brought as closely into agreement as possible with the known distribution of these characteristics in the entire population. Such weighting is accomplished through two stages of ratio estimates:

1. **First Stage.** The first stage of ratio estimates takes into account differences in the distribution at the time of the last Census, by race and residence of the population, estimates from the sample PSU’s and that of the total population in each of the four major regions of the country. However, independent distributions of the total population by residence, cross-classified by race, are not available on a current basis. Instead, using 1970
census data, estimated population totals by race and residence for a given region are computed from population counts for PSU’s in the CPS sample. Ratios are then computed between these estimates (based on sample PSU’s) and the actual population totals for the region as shown by the 1970 census. Such a ratio estimate does not imply that the ratio existing in 1970 would be unchanged at a current date. In deriving these ratios, PSU’s that made up entire strata and were selected with certainty (usually referred to as “self-representing” PSU’s) are excluded from the computations, since they represent only themselves. In tabulations of the monthly results from the CPS, the weights for all sample households from non-self-representing PSU’s in a given region are multiplied by the population ratio for that region for the appropriate race-residence group.

2. Second Stage. The second stage of ratio estimates takes account of current differences between the population distributions of the sample and that of the Nation as a whole by age, race, and sex. Independent estimates of the entire population, by these characteristics, are prepared each month. Prior to January 1974 they were calculated by carrying forward the most recent census data (1970) to take account of subsequent aging of the population, births, mortality, and migration between the United States and other countries.

Beginning in 1974, the “inflation-deflation” method of deriving independent population controls was introduced into the CPS estimation procedures. In this procedure, the most recent census population adjusted to include estimated net census undercount by age, race, and sex (i.e., “inflated”) is carried forward to each subsequent month and later age by adding births, subtracting deaths, and adding net migration. These post-censal population estimates are then “deflated” to census level to reflect the pattern of net undercount in the most recent census by age, race, and sex. The actual percent change over time in the population in any age group is preserved. The CPS sample returns (taking into account the weights determined after the first stage of ratio estimates) are, in effect, used to determine only the percent distribution within a given age-race-sex group by employment status and other characteristics. In developing statistics, these sample distributions are multiplied by the ratio of the independent population estimate for the appropriate age-race-sex group.

Presentation and Uses

The CPS provides a large amount of detail on the economic and social characteristics of the population. It is the source of monthly estimates of total employment, both farm and nonfarm; of nonfarm self-employed persons, domestics and unpaid helpers in nonfarm family enterprises, as well as wage and salaried employees; and of total unemployment, whether or not covered by unemployment insurance. It is a comprehensive source of information on the personal characteristics such as age, sex, race, origin or descent, educational attainment, and the marital and family status of the total civilian population (not in institutions 16 years of age and over) and of the employed, the unemployed, and those not in the labor force.

It provides distributions of workers by the number of hours worked, as distinguished from aggregate or average hours for an industry, permitting separate analyses of part-time workers, workers on overtime, etc. The survey is a comprehensive current source of information on the occupation of workers, whether teacher, stenographers, engineers, laborers, etc. It also provides limited statistics on the industries in which they work.

Information is available from the survey not only for persons currently in the labor force but also for those who are outside of the labor force, some of whom may be considered to be a “labor reserve.” The characteristics of such persons — whether married women with or without young children, disabled persons, students, retired workers, etc. — can be determined. Also, through special inquiries, it is possible to obtain information on their skills and past work experience, if any.

Each month, a significant amount of basic information about the labor force is analyzed and published in Employment and Earnings. The detailed tables in this report provide information on the labor force, employment, and unemployment by a number of characteris-
tics, such as age, sex, race, marital status, industry, and occupation. Estimates of the labor force status of selected population groups not published on a monthly basis, such as persons of Spanish origin, poverty and nonpoverty residents of the Nation's metropolitan and nonmetropolitan areas, special data for Vietnam-era veterans, etc., are published every quarter. Approximately 300 of the most important estimates from the CPS are presented each month on a seasonally adjusted basis. Since 1973, the Census Bureau's X-11 method has been used to seasonally adjust labor force data.2

The CPS is used also for a program of special inquiries to obtain detailed information from particular segments, or for particular characteristics of the population and labor force. Approximately 8 to 10 such special surveys are made each year. The inquiries are repeated annually in the same month for some topics, including the earnings and total incomes of individuals and families (published by the Census Bureau), the extent of work experience of the population during the calendar year, the extent of overtime work at premium pay, usual weekly earnings of wage and salary workers, and the prevalence of multiple job-holding. They also include marital and family characteristics of workers, the employment of school age youth, the employment of high school graduates and dropouts, the employment of recent college graduates, and the educational attainment of workers. Surveys have been made periodically on subjects such as job mobility, job tenure, job-search activities of the unemployed, and the intensity of the job search.

Generally, the persons who provide information for the monthly CPS questions also answer the supplemental questions. Occasionally, the kind of information sought in the special survey requires the respondent to be the person about whom the questions are asked.

Information obtained through the supplemental questions is combined with data in the regular schedule to provide tabulations of all the desired personal and economic characteristics of the persons in the special survey. Reports on these special surveys are first published in the Monthly Labor Review. Reprints of the articles, together with technical notes and additional tables, are published as Special Labor Force Reports.

Limitations

Geographic. The CPS is designed to produce reliable national estimates. It is not designed to produce monthly estimates for States and areas. A sample which could produce State estimates as reliable as those now published for the Nation would have to be approxi-

Sources of Errors in the Survey Estimates. The estimates from the survey are subject to sampling errors, that is, errors arising from the fact that the estimates each month are based on information from a sample rather than the whole population. In addition, as in any survey work, the results are subject to errors made in the field and to errors that occur in the process of compilation.

Classification errors in labor force surveys may be particularly large in the case of persons with marginal attachments to the labor force. These errors may be caused by interviewers, respondents, or both, or may arise from faulty questionnaire design. In spite of a continuous quality control program, interviewers may not always ask the questions in the prescribed fashion. To the extent that varying the wording of the question causes differences in response, errors or lack of uniformity in the statistics may result. Similarly, the data are limited by the adequacy of the information possessed by the respondent and the willingness to report accurately.

The estimates from the survey are subject to various other types of errors beyond those already mentioned. Some of these are:

1. Nonresponse. About 3 to 5 percent of occupied units are not interviewed in a typical month because of temporary absence of the occupants, refusals to cooperate, or various other reasons. Although an adjustment is made in weights for interviewed households to account for noninterviews, they still represent a possible source of bias. Similarly, for a relatively few households, some of the information is omitted because of lack of knowledge on the part of the respondent or because the interviewer forgot to ask certain questions or record the answers. In processing the completed questionnaires, entries usually are supplied for omitted items on the basis of the distributions in these items for persons of similar characteristics.

2. Independent Population Estimates. The independent population estimates used in the estimation procedure may also provide a source of error although, on balance, their use substantially improves the statistical reliability of many of the important figures. (See discussion under "Ratio Estimates.") Errors may arise in the independent population estimates because of underenumeration of certain population groups or errors in age reporting in the last census (which serves as the base for the estimates) or similar problems in the comp-

ponents of population change (mortality, immigration, etc.) since that date.

3. Processing Errors. Although there is a quality control program on coding and a close control on all other phases of processing and tabulation of the returns, some processing errors are almost inevitable in a large statistical operation of this type. However, the net error arising from processing is probably fairly negligible.

Measuring the Accuracy of Results. Modern sampling theory provides methods for estimating the range of errors due to sampling where, as in the case of the CPS sample, the probability of selection of each member of the population is known. Methods are also available for determining the effect of response variability in the CPS. A measure of sampling variability indicates the range of differences that may be expected because only a sample of the population is surveyed. A measure of response variability indicates the range of difference that may be expected as a result of compensating types of errors arising from practices of different interviewers and the replies of respondents; these would tend to cancel out in an enumeration of a large enough population. In practice, these two sources of error-sampling and response variability, as defined above — are estimated jointly from the results of the survey. The computations, however, do not incorporate the effect of response bias, that is, any systematic errors of response — for example, those that would occur if, by and large, respondents tended to overstate hours worked. Response biases occur in the same way in a complete census as in a sample, and, in fact, they may be smaller in a well-conducted sample survey because for the relatively small sample it is feasible to pay the price necessary to collect the information more skillfully.

Estimates of sampling and response variability combined are provided in Employment and Earnings and in other reports based on CPS data, thus permitting the user to take this factor into account in interpreting the data. In general, the smaller figures and small differences between figures are subject to relatively large variation and should be interpreted with caution. The availability of high-speed electronic computers makes possible considerably more detailed estimates than were possible earlier.

Estimation of response bias is one of the most difficult aspects of survey and census work. Systematic studies on this subject are now an integral part of the CPS, but in many instances available techniques are not sufficiently precise to provide satisfactory estimates of response biases. Considerable experimentation is in progress with the aim of developing more precise measurements and improving the overall accuracy of the series.

Technical References

   A review of all Federal statistical series on employment and unemployment and a comparison of the sources and uses of each series. The discussion of labor force statistics includes a brief history of their development, an evaluation of current concepts and techniques, and recommendations for further research and improvements, several of which were inaugurated in January 1967.


   A brief history of the Current Population Survey (CPS) from its inception (1940) to the present. A detailed description is given for both the sample design and survey procedures. Also included is a detailed discussion of the various modifications in design and procedures and the resultant gain in precision.

   A concise description of the methodology used in obtaining labor force information from sample households. Labor force concepts and definitions are set forth. The adequacy of labor force data and quality controls are discussed, and major improvements in the Current Population Survey are listed chronologically.

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<thead>
<tr>
<th>INTERVIEWER CHECK ITEM</th>
<th>FORM CPS-1</th>
<th>CONTROL NUMBER</th>
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<tbody>
<tr>
<td>Only CPS-1 for household</td>
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<td>First CPS-1 of continuation held</td>
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<td>Second CPS-1 of continuation held</td>
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<td>Third, fourth, and 5th CPS-1</td>
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LINE NO. OF H'HOLD RESP.

NON H'HOLD RESPONDENT □

(Specify and send intercom)

INTERVIEW

ANY ENTRY OTHER THAN
"NEVER WORKED IN ITEMS ____________" IN THIS CPS-1 □

No □

NONINTERVIEW

TYPE A □

TYPE B □

TYPE C □

CURRENT POPULATION SURVEY

NOVEMBER 1975
<table>
<thead>
<tr>
<th>25. LINE NO.</th>
<th>26. RELATIONSHIP TO HEAD OF HOUSEHOLD</th>
<th>27. AGE (Mark one circle only)</th>
<th>29. RACE</th>
<th>25. LINE NO.</th>
<th>26. RELATIONSHIP TO HEAD OF HOUSEHOLD</th>
<th>27. AGE (Mark one circle only)</th>
<th>29. RACE</th>
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<td>FIRST CHILD</td>
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<td>THIRD CHILD</td>
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<td>FOURTH CHILD</td>
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<td>Nonrelative -- own relatives in household</td>
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26. RELATIONSHIP TO HEAD OF HOUSEHOLD (Control Card Item 14b)

Child ........................................................

Other relative ........................................

Nonrelative -- own relatives in household

---

27. AGE (Mark one circle only)

0  7  8  9  10  11  12  13

---

29. RACE

White ........................................

Negro ........................................

Other ........................................

---

30. SEX

Male ........................................

Female ........................................

---

25. LINE NO. | 26. RELATIONSHIP TO HEAD OF HOUSEHOLD | 27. AGE (Mark one circle only) | 29. RACE | 25. LINE NO. | 26. RELATIONSHIP TO HEAD OF HOUSEHOLD | 27. AGE (Mark one circle only) | 29. RACE |
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30. SEX

Male ........................................

Female ........................................

---

Digitized for FRASER
http://fraser.stlouisfed.org/
Federal Reserve Bank of St. Louis
36. INTERVIEWER CHECK ITEM
SAMPLE

37. What is . . . 's hourly rate of pay on this job, before deductions of any kind?

38. How is . . . paid on this job, for example, is . . . paid at a daily rate, weekly rate, every two weeks, once a month, or at some other rate?

39. What is . . . 's (monthly in some area) rate of pay before deductions of any kind?

40. In addition to this amount, does . . . receive any other earnings on this job, such as tips, commissions, or bonuses?

41. How much does . . . usually earn in tips, commissions, or bonuses?

42. How much does . . . usually earn per week at this job before deductions of any kind?

43. How many months per year does . . . usually work at this job?

44. How many hours per week does . . . usually work at this job?

45. Would . . . receive overtime pay, like time and a half or double time, for working over a certain number of hours per week?

46. After how many hours of work per week would . . . receive overtime pay on this job?

47. Would . . . receive overtime pay, like time and a half or double time, for working over a certain number of hours per day?

48. After how many hours of work per day would . . . receive overtime pay on this job?

51. INTERVIEWER CHECK ITEM
Who reported item 36-50 for this person?

Self . . .
Other . . .
### LABOR FORCE, EMPLOYMENT, AND UNEMPLOYMENT

**36. INTERVIEWER CHECK ITEM**

**SAMPLE** (Control Card line 11)

- Rotation group 3, 7, 8, or 9
- **(DO NOT ASK** items 36-39.)
- Rotation group 1, 2, 3, or 4
- **(DO NOT ASK** items 36-38.)
- **(DO NOT ASK** items 36-37.)
- **(DO NOT ASK** items 36-38.)
- **(DO NOT ASK** items 36-38.)
- **(DO NOT ASK** items 36-38.)

**40. In addition to this amount, does . . . receive any other earnings on this job, such as tips, commissions, or bonuses?**

- **(Do not interview in time 32.)**
- **(Do not interview in time 32.)**
- **(Do not interview in time 32.)**
- **(Do not interview in time 32.)**

**41. How much does . . . usually earn in tips, commissions, or bonuses?**

**42. How much does . . . usually earn per week at this job before deductions of any kind?**

**43. How many months per year does . . . usually work at this job?**

**44. How many hours per week does . . . usually work at this job?**

**45. Would . . . receive overtime pay, like time and a half or double time, for working over a certain number of hours per week?**

**46. After how many hours of work per week would . . . receive overtime pay on this job?**

**47. Would . . . receive overtime pay, time and a half or double time, for working over a certain number of hours per day?**

**48. After how many hours of work per day would . . . receive overtime pay on this job?**

**49. Is . . . a member of a labor union on this job?**

**50. Is . . . pay rate set by a contract between a labor union and . . . ’s employer?**

**51. INTERVIEWER CHECK ITEM**

**Who reported items 36-39 for this person?**

**Sell:**

**Other:**
### BLS HANDBOOK OF METHODS

#### 18. LIKE NUMBER

**20. Did . . . do any work at all LAST WEEK?**
- No
- Yes

**21. Did . . . have a job or business from which he was temporarily absent or on furlough LAST WEEK?**
- No
- Yes

**22. (If LK in 19, skip to 23.1)**
- No
- Yes

**22A. What happened during the last 4 weeks to find work? (Check all that apply and read list.)**
- School
- Other
- Retirement or old age
- Seasonal job completed
- Other reason...

**22B. More than the reason . . . worked FIVE days or more a week at this job? (If under 30 days, check boxes.)**
- Yes
- No

**22C. Is there any reason why . . . wanted a regular job now, either full- or part-time?**
- Yes
- No

**23. Age**

**23A. MARRITAL STATUS**
- Married
- Widowed
- Never married

**23B. RELATIONSHIP TO HEAD OF HOUSEHOLD**
- Nonrel. of head
- Spouse
- Other relative of head

**23C. RACE**
- White
- Black
- Other

**23D. SEX AND VETERAN STATUS**
- Male
- Female

**23E. HIGHEST GRADE ATTENDED**
- Some college
- completed

**23F. GRADE COMPLETED**
- No

**24. INTERVIEW CHECK ITEM**
Unit in consistent group:
- (For example: MDTA)
- (For example: WPA)
- (For example: Welfare)

**25. LIKE NUMBER**

**26. CONCLUSION**
- Yes
- No

---

### OFFICE USE ONLY

**INDUSTRY**
- Finance
- Manufacturing
- Retail trade
- Services

**OCCUPATION**
- Business
- Professional
- Administrative
- Clerical

---

### 21. DESCRIPTION OF JOB OR BUSINESS

**21A. What kind of business or industry is this?**
- For example: TV and radio mfg., retail shoe store, State Labor Dept., farm.
- Other

**21B. What kind of work was . . . doing?**
- For example: electrical engineer, retail clerk, typesetter, farmer.
- Other

**21C. What were . . . most important activities or duties?**
- For example: types, keeps accurate books, files, sells cars, operates pressing press, feeds loom, or sets tables.
- Other

---

### 22. INTERVIEW CHECK ITEM
Unit in consistent group:
- (For example: MDTA)
- (For example: WPA)
- (For example: Welfare)

**22A. What happened during the last 4 weeks to find work? (Check all that apply and read list.)**
- School
- Other
- Retirement or old age
- Seasonal job completed
- Other reason...

**22B. More than the reason . . . worked FIVE days or more a week at this job? (If under 30 days, check boxes.)**
- Yes
- No

**22C. Is there any reason why . . . wanted a regular job now, either full- or part-time?**
- Yes
- No

---

### 23. LIKE NUMBER

**23A. MARRITAL STATUS**
- Married
- Widowed
- Never married

**23B. RELATIONSHIP TO HEAD OF HOUSEHOLD**
- Nonrel. of head
- Spouse
- Other relative of head

**23C. RACE**
- White
- Black
- Other

**23D. SEX AND VETERAN STATUS**
- Male
- Female

**23E. HIGHEST GRADE ATTENDED**
- Some college
- completed

**23F. GRADE COMPLETED**
- No

---

### 24. INTERVIEW CHECK ITEM
Unit in consistent group:
- (For example: MDTA)
- (For example: WPA)
- (For example: Welfare)

---

### 25. LIKE NUMBER

**25A. MARRITAL STATUS**
- Married
- Widowed
- Never married

**25B. RELATIONSHIP TO HEAD OF HOUSEHOLD**
- Nonrel. of head
- Spouse
- Other relative of head

**25C. RACE**
- White
- Black
- Other

**25D. SEX AND VETERAN STATUS**
- Male
- Female

**25E. HIGHEST GRADE ATTENDED**
- Some college
- completed

**25F. GRADE COMPLETED**
- No

---

### 26. CONCLUSION
- Yes
- No
Chapter 2. Projections of the Labor Force

Background and Uses

Projections of the future size of the labor force are needed for a variety of planning purposes. They provide a basis for establishing the amount of employment growth the economy must generate to maintain high levels of employment. They serve as the basis for one approach in setting goals for a general economic growth rate consistent with full utilization of human resources. Projections help to gain insight into the characteristics and numbers of workers who will be available for industry, and to see what this implies for education, training, and personnel policies. In addition, labor force projections, together with population projections, are used to estimate demand for products, develop marketing plans, and evaluate expansion programs. The U.S. Department of Labor is particularly concerned with the relationship between the expected labor supply and the need for various skills and training created by our changing technology.

Method

Projections of the labor force as a whole and of the separate age-sex groups are made for quinquennial dates usually for about 15 years ahead. The schedule for preparing the projections has been irregular owing, in part, to the timing of new projections of the population of working age. Labor force projections for 1980, 1985, and 1990 were published in July 1973. Work on a new round of projections was begun in late 1975.

Because social and economic factors affect the supply of labor, certain assumptions need to be made about conditions surrounding any set of labor force projections. Generally, projections have been made on the basic assumptions that past trends in labor force participation would continue into the future, and that the economy would continue to expand and maintain high levels of employment opportunity consistent with an unemployment rate of about 4 percent. Another usual assumption is that there would be no major war or significant change in the size of the Armed Forces which might substantially alter the previous work patterns of the population. It also presupposes that the trend toward increased school enrollment beyond the high school level, which has a direct bearing on labor force activity of young persons, would continue, supported by adequate school facilities, staff, and aid to students.

The general approach used in preparing the Bureau's labor force projections is to project the proportion of the population in each age-sex group or subgroup that is expected to be in the labor force, i.e., the labor force participation rate at the specified future date, and to apply these rates to the expected population in each group.

In making projections for a given age-sex group or its subgroup, the standard procedure is to fit a line or curve to a series of points representing the labor force participation rates for that group for the years since 1947, and to extrapolate the line or curve into the period covered by the projection. The procedure is modified, as appropriate, to discount the temporary effect of factors judged to be operative for only short periods.

The population projections used in projecting the labor force are prepared by the Bureau of the Census on the basis of analyzing past trends in birth rates, death rates, and net immigration and projecting these trends. Since the birth rates pose the most uncertainty in projecting the population, the Bureau of the Census prepares several series of population projections on the basis of varying assumptions with respect to birth rates. The uncertainty of projecting birth rates does not directly affect the level of the labor force projections 15 years ahead, since everyone of working age (16 years and over) at that future date has already been born when the projections are made. However, the birth rates do have a bearing on projections of the labor force participation rates of younger married women, because mothers of young children are less likely to work. Because of this indirect effect, it was necessary to select the one series of population projections which seemed most reasonable on the basis of an independent evaluation of past trends in birth rates. For recent labor force projections, series “E” of the population projections published in the Census Bureau’s Current Population Reports, P-25, No. 493 was chosen as the base series. Alternate estimates of the total labor force of women 16 to 49 years of age were made on the basis of the series “D” and “F.”

The overall size of the labor force is built up by age and sex, not only because the composition is needed for many of the purposes noted earlier, but also because the degree of labor force participation varies among the different age-sex groups, and the historical trends in these rates also vary. Some of the factors which help to explain the behavior of the labor force participation rates which affect particular groups include school attendance, marital status, birth rates, and the availability
of social security benefits, and the expansion of private pension plans. The method of projecting the labor force participation rates for the various age-sex groups takes into account the influence of the more important of these specific demographic and social factors. For example, the population of married women in ages 20 to 49, is grouped by those who are expected to have children of preschool age and those with no children under 5, on the basis of projected trends in fertility and child spacing.

For each of the demographic subgroups, the projected labor force participation rates are applied to their respective future populations and the resulting labor force summed to provide the total labor force for each age-sex group and for all ages.

**Sources of Data**

The source of the basic historical data on labor force participation rates by age and sex used to project the labor force is the monthly statistics on the labor force. These data are published by the Bureau of Labor Statistics and are based on the Current Population Survey of the Bureau of the Census. Historical data on labor force activity by various categories within several of the age-sex groups are obtained from the recurring supplementary labor force surveys also based on the Current Population Survey. These include information from the October surveys of the employment of school-age youth and the March surveys of the marital and family characteristics of workers.

The population projections are the latest available projections made by the Bureau of the Census and published in their *Current Population Reports*, Series P-25. Data used in projecting the proportion of women in each age group who will have children under age 5 years include published and unpublished data on birth rates, by age of mother and order of birth, from the Division of Vital Statistics of the Public Health Service; fertility and marriage data from reports of the Bureau of the Census, *Current Population Reports*, Series P-20, and data from the decennial censuses of population.

**Technical References**


Employment Structure and Trends

Chapter 3. Employment, Hours, and Earnings

Background

The first monthly studies of employment and payrolls by the Bureau of Labor Statistics (BLS) began in October 1915 and covered four manufacturing industries. Before that year, the principal sources of employment data in the United States were the census surveys — the decennial Census of Population, and beginning in 1899, the quinquennial Census of Manufactures. No regular employment data had been compiled between the Census dates.

By November 1916, the BLS program had been expanded to cover 13 manufacturing industries, and this number remained unchanged until 1922. The depression of 1921 directed attention to the importance of current employment statistics, and in 1922 Congress granted additional funds to provide for program expansion. By June 1923, the number of manufacturing industries covered by the monthly employment survey had increased to 52. In 1928, concern over increasing unemployment induced Congress to provide additional appropriations for the program. In the next 4 years, 38 manufacturing and 15 nonmanufacturing industries were added to the list of industries for which the Bureau published monthly information on employment and payrolls.

The onset of the Great Depression in 1930 and the deepening economic crisis impelled President Hoover to appoint an Advisory Committee on Employment Statistics to study the need for expanded data in this field. The Committee made its report in the spring of 1931 with a number of recommendations for extension of the program. The most important of these called for the development of series on hours and earnings. For the fiscal year 1932, Congress granted the Bureau a substantial increase in the appropriation of the program. In January 1933, average hourly earnings and average weekly hours for the first time were published for all manufacturing, for 90 manufacturing industries, and for 14 nonmanufacturing categories.

During the Great Depression when mass unemployment threatened to become a continuing aspect of American life, there was much controversy among various authorities concerning the actual number of the unemployed. These discussions pointed up the fact that no reliable measures of either unemployment or employment existed. In the early years of the Roosevelt administration, the Secretary of Labor frequently referred to the value of the Bureau's employment estimates as an indirect measure of unemployment. This interest stimulated efforts to develop comprehensive estimates of total wage-and-salary employment in nonagricultural industries, and in 1936, the Bureau first published such a figure.

The preparation of these estimates of overall employment totals on a monthly basis was contingent on the development of benchmark data. It was recognized, even in the 1920's, that month-to-month employment trends derived from a sample of establishments might be fairly accurate for short periods, but over long intervals of time the series would not represent the true movement of employment, unless they were adjusted periodically to reasonably complete counts of employment, called benchmarks. The first such adjustment was made in 1935, when the Bureau's employment series in manufacturing were adjusted to totals from the Census of Manufactures for 1923, 1925, 1927, 1929, and 1931. These series were subsequently adjusted to the successive biennial Censuses of Manufacturers, through that of 1939. For nonmanufacturing industries, benchmarks were developed from various sources, including the Censuses of Business taken at intervals from 1929 on.

From 1915 to the beginning of World War II, interest in employment statistics for States and areas was growing constantly. Even before the Bureau of Labor Statistics entered the field in 1915, three States (Massachusetts, New York, and New Jersey) were preparing employment statistics. As early as 1915, New York and Wisconsin had entered into "co-operative" agreements with the Bureau, whereby sample data collected by the State agency were to be used jointly with the Bureau of Labor Statistics for the preparation of State and national series. By 1928, five other States had entered into such compacts, and another five were added by 1936. Over the years, the amount of published data on employment and payrolls for States and areas underwent a constant expansion. In 1940, estimates of total nonagricultural employment for all 48 States and the District of Columbia were published for the first time.

The onset of World War II in 1939, followed by the entry of the United States after the assault on Pearl Harbor in December 1941, placed additional demands upon the Bureau's Employment Statistics program. The added responsibilities pointed up the need for greater uniformity among the various programs of establishment statistics on employment and related subjects which were being prepared by the BLS, the Bureau of the Census, and the agencies administering the emerg-
Descriptions of the Survey

The Bureau of Labor Statistics cooperates in collecting data each month on employment, hours, and earnings from a sample of establishments in all nonagricultural activities including government. In 1975, this sample included over 160,000 reporting units. From these data a large number of series on employment, hours, and earnings in considerable industry detail are prepared and published monthly for the United States as a whole, for each of the 50 States and the District of Columbia, and for most of the metropolitan areas. The data include series on total employment, production or nonsupervisory worker employment, women employed, average hourly earnings, average weekly hours, and average weekly overtime hours (in manufacturing). For many series, seasonally adjusted data also are published.

Concepts

An establishment is defined as an economic unit which produces goods or services, such as a factory, mine, or store. It is generally at a single physical location and it is engaged predominantly in one type of economic activity. Where a single physical location encompasses two or more distinct and separate activities these are treated as separate establishments, provided that separate payroll records are available and certain other criteria are met.¹ In the collection of data on employment, payrolls, and hours, the BLS usually requests separate reports by establishment. However, when a company has more than one establishment engaged in the same activity in a geographic area, these establishments may be covered by a combined report.

Industry employment statistics published by BLS and the cooperating State agencies represent the total number of persons employed either full-time or part-time in nonagricultural establishments during a specified payroll period. In general, data refer to persons who worked during, or received pay for, any part of the pay period that includes the 12th of the month. However, at the national level, data for Federal Government establishments generally refer to civilian personnel who worked on, or received pay for, the last day of the month, plus intermittent employees who worked any time during the month (e.g., Christmas temporary employees of the postal service).

Employed persons include both permanent and temporary employees and those who are working either full- or part-time. Workers on an establishment payroll who are on paid sick leave (when pay is received directly from the employer), on paid holiday or paid vacation, or who work during only a part of the specified pay period are counted as employed. Persons on the payroll of more than one establishment during the pay period are counted in each establishment which reports them, whether the duplication is due to turnover or dual jobholding. Persons are considered employed if they receive pay for any part of the specified pay period, but are not considered employed if they receive no pay at all for the pay period. Since proprietors, the self-employed, and unpaid family workers do not have the status of "paid employees," they are not included. Domestic workers in households are excluded from the data for nonagricultural establishments. Government employment statistics refer to civilian employees only.

The figure which includes all persons who meet these specifications is designated "all employees." Major categories of employment are differentiated from this overall total, primarily to ensure the expeditious collection of current statistics on hours and earnings; these groups of employees are designated production workers, construction workers, or nonsupervisory workers, depending upon the industry.

In manufacturing industries, data on employment, hours, and payrolls are collected for production workers. This group, in general, covers those employees, up through the level of working supervisors, who are engaged directly in the manufacture of the product of the establishment. Among the exclusions from this category are persons in executive and managerial positions, and persons engaged in activities such as accounting, sales, advertising, routine office work, professional and technical functions, and force account construction.²

²Force-account construction is construction work performed by an establishment, primarily engaged in some business other than construction, for its own account and use by its own employees.
Production workers in mining are defined in a similar manner. A more detailed description of the classes of employees included in the production and non-production workers categories in manufacturing is shown on the facsimile of the BLS 790 C schedule on p. 37 and 38 of this bulletin.

In contract construction, the term construction workers covers workers, up through the level of working supervisors, who are engaged directly on the construction project either at the site or working in shops or yards at jobs ordinarily performed by members of construction trades. Exclusions from this category include executive and managerial personnel, professional and technical employees, and routine office workers.

Data on the employment, hours, and payrolls of non-supervisory workers are collected from establishments in the transportation, communication, and public utility industries, in retail and wholesale trade, in finance, insurance, and real estate, and the service industries. Nonsupervisory workers include most employees except those in top executive and managerial positions. (See facsimile of BLS 790 E, the reporting form for wholesale and retail trade, p. 39 and 40.)

The series on hours and earnings is based on reports of gross payrolls and corresponding paid hours for production workers.3 To derive these series, BLS collects the following data: (See facsimile of BLS 790 C on p. 37 and 38.)

1. The number of full- and part-time production workers who worked during, or received pay for, any part of the pay period including the 12th of the month.

2. Total gross payrolls for production workers before deductions for old-age and unemployment insurance, group insurance, withholding tax, bonds, and union dues. The payroll figures also include pay for overtime, shift premiums, holidays, vacations, and sick leave paid directly by the firm to employees for the pay period reported. They exclude bonuses (unless earned and paid regularly each pay period) or other pay not earned in the pay period concerned (e.g., retroactive pay). Tips and the value of free rent, fuel, meals, or other payment in kind are not included.

3. Total hours worked (including overtime hours) during the pay period, hours paid for standby or reporting time, and equivalent hours for which employees received pay directly from the employer for sick leave, for holidays, vacations, and other leave paid to these employees. Overtime or other premium paid hours are not converted to straight-time equivalent hours.

4. Overtime hours for which premiums were paid because the hours worked were in excess of the number of hours of either the straight-time workday or workweek. Saturday and Sunday hours (or 6th and 7th day hours) are included as overtime only if overtime premiums were paid. Holiday hours worked as overtime are not included unless they are paid for at more than the straight-time rate. Hours for which only shift differ-

3 Unless otherwise indicated, the references in this chapter to production workers apply likewise to the construction worker and nonsupervisory categories.

Industrial Classification

All national, State, and area employment, hours, and earnings series data are classified in accordance with the Standard Industrial Classification Manual, Office of Management and Budget, 1967. (See appendix B of this bulletin for a detailed description of this system.)

Reporting establishments are classified into significant economic groups on the basis of major product or activity as determined by the establishments' percent of total sales or receipts for the previous calendar year. This information is collected once each year on an "Industry Class Supplement" to the monthly report form. (See p. 41 for a facsimile of this form.) All data for an establishment making more than one product or engaging in more than one activity are classified under the industry of the most important product or activity, based on the percentages reported.

Time Period

Employment, hours, and earnings are measured for the pay period including the 12th of the month, which is standard for all Federal agencies collecting employment data on an establishment basis.

Data Sources

Sample Data

Each month the State agencies cooperating with the Bureau collect data on employment, payrolls, and hours from a sample of establishments. The respondent extracts these figures from his payroll records. These data are readily available as the employers must maintain such records for a variety of tax and accounting purposes. A response analysis survey of the reporting practices of a scientifically selected sample of reporting establishments in manufacturing industries showed that the reports were made out almost exclusively from their payroll records. The survey also showed that while a number of employers did not report precisely the data requested on the schedule for all items, these deviations were not all in the same direction. On balance, they tended to offset each other, and the net effects of incorrect reporting were quite insignificant.4

Participation in the industry employment statistics program is entirely voluntary on the part of the reporters. However, in many industries, particularly in manufacturing, employers who have a high percentage of total employment in the industry supply reports regularly, and many have done so over a long period of years.

Benchmark Data

An employment benchmark is defined as a reasonably complete count of employment. The estimates are adjusted periodically, annually if possible, to new benchmark levels. Since 1939, the basic sources of benchmark information for “all employees” have been periodic tabulations of employment data by industry and, beginning with 1959, by size of establishment. These are compiled by State employment security agencies, according to uniform procedures specified by the BLS from reports of establishments covered under State unemployment insurance laws. The State employment security agencies receive quarterly reports, from each employer subject to the laws, showing total employment in each month of the quarter, and total quarterly wages for all employees. If the employer has more than 50 employees and operates more than one establishment in a State, he is required to make separate reports for each area (e.g., county) in which he operates and for each establishment in different industries. Employment is reported for the pay period of the month including the 12th, and reports are classified industrially according to the Standard Industrial Classification. The State employment security agencies cooperate closely with the Bureau of Labor Statistics in the assignments of industry classifications, so there is a high degree of uniformity in this respect between the benchmark and sample data.

With the expansion of UI coverage in 1972, 97 percent of employees on payrolls of private nonagricultural establishments were included in the UI tabulations. For the few remaining industries exempt from mandatory UI coverage, the Bureau of Labor Statistics uses other sources for benchmark information. Data on employees covered under social security laws as published by the Bureau of the Census in County Business Patterns, are used to augment the UI data for nonoffice insurance sales workers and private educational services. Data for interstate railroads are obtained from the Interstate Commerce Commission; benchmarks for private elementary and secondary schools are derived from data obtained from the U.S. Office of Education and the National Catholic Welfare Association. These sources have been used for benchmarking for a number of years.

Employment figures for religious organizations are obtained from data provided by the National Council of Churches and recent surveys of churches conducted by several State agencies.

In benchmarking the government sector, the Bureau has for many years used the monthly employment data compiled by the U.S. Civil Service Commission (Federal Government) and the Censuses and Surveys of Governments conducted by the Bureau of the Census (State and local governments). Data on State and local government are based on surveys and censuses conducted by the Bureau of the Census. However, since about 80 percent of State government employees are currently covered by unemployment insurance and several States are in the process of expanding coverage further, it is expected that UI contributions data will be used as a benchmark source for the State government portion in the near future. Since UI data are available for each month, the quality of the benchmark data will be greatly improved.

Special efforts are made to classify establishments into the same industrial groupings for benchmark purposes as they are for monthly reporting. Wherever possible, employment for the standard midmonth pay period for March is used as the benchmark.

Collection Methods

The primary collection of the current sample data is conducted by State agencies which have cooperative agreements with the BLS. In most States, this is the employment security agency, affiliated with the Employment and Training Administration (formerly, the Manpower Administration), the organization which administers the State unemployment insurance program. In a few cases the State department of labor acts as the agency. The agencies mail schedules to a sample of establishments in the States each month. A “shuttle” schedule is used (BLS form 790 series); that is, one cycle is submitted each month in the calendar year by the respondent, edited by the State agency, and returned to the respondent for use again the following month. The State agency uses the information provided on the forms to develop State and area estimates of employment, hours, and earnings, and then forwards the data, either on the schedules themselves or in ma-
chime readable form, to the Washington, D.C., office of the Bureau of Labor Statistics, where they are used to prepare estimates at the national level.

The shuttle schedule has been used in this program since 1930, but there have been substantial changes in its design and in the data collected over the period. All aspects of the schedule, its format, the wording of the requested items and definitions, and the concepts embodied therein have been subjected to a continuing and intensive review over the entire period, not only by the staff of BLS and of the State agencies, but also by other government agencies and by numerous persons in private business and labor organizations. The report forms are not exactly alike for every industry, but most of them request data on total employment, number of women employees, number of production workers (in manufacturing and mining), construction workers (in contract construction industries), or nonsupervisory workers (in other nonmanufacturing industries), and, for these workers, data on payroll, paid hours, and for manufacturing, overtime hours. The schedule contains detailed instructions and definitions for the reports. There are several variants designed to meet the specific problems of different industries. (See facsimiles of BLS 790 C and BLS 790 E, pp. 37, 38, and 39.)

The technical characteristics of the shuttle schedule are particularly important in maintaining continuity and consistency in reporting from month to month. The design exhibits automatically the trend of the reported data during the year covered by the schedule, and therefore, the relationship of the current figure to the data for the previous month. The schedule also has operational advantages; for example, accuracy and economy are obtained by entering identifying codes and the address of the respondent only once a year.

All schedules are carefully edited by the State agencies each month to make sure that the data are correctly reported and that they are consistent within themselves, with the data reported by the establishment in earlier months, and with those reported by other establishments in their industry. This editing process is carried out in accordance with a detailed manual of instructions prepared by the Bureau of Labor Statistics. When the reports are sent to Washington, they are screened by use of a computer to detect processing errors and reporting errors which may have escaped the first editing. Questionable cases discovered at any stage of the editing process are returned, if necessary, to the respondent for review and correction.7

Sampling

Sampling is used by BLS in its industry employment statistics program for collecting data in most industries, since full coverage would be prohibitively costly and time consuming. The sampling plan for the program must: (a) provide for the preparation of reliable monthly estimates of employment, hours of work, and weekly and hourly earnings which can be published promptly and regularly; (b) through a single general system, yield considerable industry detail for metropolitan areas, States, and the Nation; and (c) be appropriate for the existing framework of operating procedures, administrative practices, resource availability, and other institutional characteristics of the program.

In developing the sample design, the universe of establishments was stratified first by industry and within each industry by size of establishment in terms of employment, using six standard size classes. Within each industry, an optimum allocation design was obtained by sampling with probability proportionate to average size of establishment within each of the strata. A total size of sample necessary to produce satisfactory estimates of employment had to be distributed among the size-class cells on the basis of average employment per establishment in each cell. In practice, this is equivalent to distributing the predetermined total number of establishments required in the sample among the cells on the basis of the ratio of employment in each cell to total employment in the industry. Within each stratum, the sample members are selected at random.

Under this type of design, large establishments fall into the sample with certainty. In nearly all industries, establishments with 250 or more employees are included in the sample with certainty and in many industries the cutoff is lower. The sizes of the samples for the various industries were determined empirically on the basis of experience and of cost considerations. In a manufacturing industry in which a high proportion of total employment was concentrated in a relatively few large establishments, a high percentage of total employment had to be included in the sample. Consequently, the sample design for such industries provides for a complete census of the larger establishments with only a few chosen from among the smaller establishments, or none at all if the concentration of employment in the larger establishments is great enough. On the other hand, in an industry where a large proportion of total employment is in small establishments, the sample design calls for inclusion of all large establishments, and also for a substantial number of the smaller establishments. Many industries in the trade and service divisions fall into this category. In order to keep the sample to a size which can be handled with available resources, it is necessary to accept samples in these divisions with a smaller proportion of universe employment than is the case for most manufacturing industries. Since individual establishments in these nonmanufacturing industries generally show less fluctuation from regular cyclical or seasonal patterns than establishments in manufacturing industries, these smaller samples (in terms of employment) generally produce reliable estimates.

This sample design, although aimed primarily at meeting the needs of the national program, provides a technical framework within which State and area sample designs can be determined. Since the estimates for States and areas generally are not prepared at the same degree of industry detail as the national estimates, the national design usually provides sufficient reports for the preparation of State and area estimates.  

Estimating Procedures

Employment

The “all employee” estimates by industry are based on reasonably complete employment counts or “benchmarks.” To obtain employment estimates for the individual estimating cells, the following three steps are necessary:

1. A total employment figure (benchmark) for the estimating cell, as of a specified month, is obtained from sources which provide a reasonably complete count of employment for the cell.
2. For each cell, the ratio of employment in one month to that in the preceding month (i.e., the link relative) is computed for sample establishments which reported in both months.
3. Beginning with the benchmark month, the estimate for each month is obtained by multiplying the estimate for the previous month by the link relative for the current month.

Application of the estimating procedure in preparing a series is illustrated by the following example: Assume that total employment for a given series was 50,000 in July. The reporting sample, composed of 60 establishments, had 25,000 employees in July and 26,000 in August, a 4-percent increase. To derive the August estimate, the change for identical establishments reported in the July-August sample is applied to the July estimate:

\[
50,000 \times \frac{26,000}{25,000} = 52,000
\]

This procedure for estimating current employment is known as the benchmark and link-relative technique. It is an efficient technique, taking advantage of a reliable complete count of employment and of the high correlation between levels of employment in successive months in identical establishments.

In addition to estimates of total employment by industry, the Bureau publishes data on production, construction, or nonsupervisory worker employment. For this purpose, the sample ratio for the current month of production workers to total employment is used. For example, the 60 sample firms which had 26,000 employees in August, reported an August production-worker figure of 19,500 resulting in a ratio of \( \frac{19,500}{26,000} = .750 \). Using this ratio, production-worker employment in August is estimated to be 39,000 (52,000 multiplied by \(.750 = 39,000\)). A similar ratio method is used to estimate the number of women employed.

The estimates for each type of series (all employees, production workers, and women employees) for individual estimating cells are summed to obtain the corresponding totals for broader industry groupings and divisions.

Appropriate revisions, based on new benchmarks, are introduced into the employment series as required to correct for classification changes and for deviations resulting from the use of sample trends. In general, the benchmark month is March. The employment estimates which had been published previously for that month are compared with the new benchmark data. The amount of adjustment in the published employment information is indicated by this comparison. The all employee series, for months between the current and the last preceding benchmark, are adjusted by wedging or tapering out the difference between the current benchmark and the estimate for the benchmark month back from the current benchmark to the last previous benchmark. This difference is assumed to have accumulated at a regular rate. The series for months subsequent to the benchmark month are revised by projecting the level of the new benchmark by the trend of the unadjusted series.

A comparison of the revisions made in recent years is presented in table 1.

Table 1. Nonagricultural payroll employment estimates, by industry division, as a percent of the benchmark for 1971, 1973, and 1974

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100.2</td>
<td>98.4</td>
<td>99.9</td>
</tr>
<tr>
<td>Mining</td>
<td>99.8</td>
<td>96.5</td>
<td>97.0</td>
</tr>
<tr>
<td>Contract construction</td>
<td>96.9</td>
<td>90.4</td>
<td>100.6</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>100.4</td>
<td>98.9</td>
<td>99.9</td>
</tr>
<tr>
<td>Transportation and public utilities</td>
<td>100.9</td>
<td>99.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Wholesale and retail trade</td>
<td>100.3</td>
<td>97.8</td>
<td>100.1</td>
</tr>
<tr>
<td>Finance, insurance, and real estate</td>
<td>100.2</td>
<td>99.5</td>
<td>98.9</td>
</tr>
<tr>
<td>Services</td>
<td>100.4</td>
<td>99.1</td>
<td>99.3</td>
</tr>
<tr>
<td>Government</td>
<td>100.0</td>
<td>99.5</td>
<td>100.6</td>
</tr>
</tbody>
</table>

12-year revision.

Hours and Earnings

Independent benchmarks are not available for the hours and earnings series. Consequently, the levels shown are derived from the BLS reporting sample.

If permanent changes in the composition of the sample take place, the “production-workers, all employee” ratios and the “women” ratios calculated from the sample are modified by a wedging technique described in this chapter under “Hours and Earnings.”
Since 1959, when benchmark data stratified by employment size became available through the employment security system, estimates of employment, hours, and earnings have been prepared by a cell structure which makes use of size and in some cases regional stratification. Experience in the preparation of current estimates shows that the six size classes as described under the sampling design can be combined into a maximum of three size classes for the purposes of preparing current estimates of hours and earnings, when stratification by size is needed. Whenever a new national benchmark becomes available, national estimates of average weekly hours and average hourly earnings using eight size strata and four regional strata (Northeast, North Central, South, and West) are prepared. These estimates are used as a standard against which the published averages are compared. In some cases, this comparison indicates that some modification of the pattern of stratification is needed. If this is the case, a change is introduced into the estimating structure at the time of the next benchmark revision.

a. Average weekly hours and gross hourly earnings. To obtain average weekly hours for an individual estimating cell, the sum of the hours reported by the plants classified in that cell is divided by the total number of production workers reported for the same establishments. Similarly, in computing average hourly earnings, the reported payroll is divided by the reported hours.

The first ratio estimates of average hourly earnings and average weekly hours are modified at the estimating cell level by a wedging technique designed to compensate for changes in the sample arising mainly from the voluntary character of the reporting.

For example, a first estimate of average hourly earnings for the current month, \( U_1 \), is obtained from aggregates from a matched sample of establishments reporting in the current and previous month. Similarly an estimate of average hourly earnings, \( U_0 \), for the previous month is calculated from the same matched sample. Hence, \( U_1 - U_0 \) is a measure of absolute change between the 2 months.

Note is then taken of the published estimate of average hourly earnings for the previous month, say \( V_0 \). Because the panel of establishments reporting in the sample is not absolutely fixed from month to month, there may be differences between \( V_0 \) and \( U_0 \). A final figure for the current month is obtained by making use of both pieces of information; the estimate is

\[
V_1 = (0.9 V_0 + 0.1 U_0) + (U_1 - U_0)
\]

The procedure, reflected in this last equation, accepts the advantage of continuity from the use of the matched sample, and at the same time tapers or wedges the published estimate toward the level of the latest sample average. The same procedure is used to adjust the production-worker all employee-ratio and the ratios for women with regard to changes in the composition of the sample between successive months.

Weekly hours and hourly earnings for industries and groups above the basic estimating cell level are weighted averages of the figures for component cells and industries. The average weekly hours for each estimating cell are multiplied by the corresponding estimate of production-worker employment, to derive aggregate hours. Payroll aggregates are the product of aggregate hours and average hourly earnings. Payroll and hour aggregates for industry groups and divisions represent the sum of aggregates for component industries.

Average weekly hours for industry groups are obtained by dividing the hour aggregates by the corresponding production-worker employment estimates. Average hourly earnings for groups are computed by dividing the payroll aggregates by the hour aggregates. This method is equivalent to weighting weekly hours by estimated universe production-worker employment and hourly earnings by estimated universe hours.

10 These combinations of size classes have been made because of operational economies. In particular, the preliminary estimates are based on less than full samples, and if the estimation of preliminary estimates was attempted using the full stratification pattern, there would be a number of cells for which there were no samples. Experiments and tests over several years indicate that estimates of hours and earnings prepared from the BLS sample using a maximum of three size strata generally do not differ significantly from those computed with four size strata or more.

11 If the difference between the estimate and the average computed from the sample \( (V_1 - U_0) \), is too great, the sample average is accepted once it has been established that the difference is due to a permanent change in the composition of the sample, and the series is regarded as discontinuous at that point. In general, a difference greater than 3 percent is considered as defining a discontinuity or "break."

<table>
<thead>
<tr>
<th>Industry division</th>
<th>All employees</th>
<th>Production workers¹</th>
<th>Women</th>
<th>Hours and earnings²</th>
<th>Average overtime hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>419</td>
<td>363</td>
<td>402</td>
<td>366</td>
<td>196</td>
</tr>
<tr>
<td>Goods-producing</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Mining</td>
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<td>11</td>
<td>9</td>
<td>11</td>
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</tr>
<tr>
<td>Contract construction</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
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<td>278</td>
<td>277</td>
<td>192</td>
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</tr>
<tr>
<td>Transportation and public utilities</td>
<td>25</td>
<td>16</td>
<td>21</td>
<td>19</td>
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</tr>
<tr>
<td>Trade</td>
<td>36</td>
<td>32</td>
<td>35</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Finance, insurance and real estate</td>
<td>15</td>
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<td>15</td>
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</tr>
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<td>Government</td>
<td>15</td>
<td>1</td>
<td>1</td>
<td>4</td>
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</tr>
<tr>
<td>Total private</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Total non-agriculture</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Production workers in manufacturing and mining; construction workers in contract construction; nonsupervisory workers, all other divisions.
² Average hourly earnings, average weekly hours, and average weekly earnings.
For all levels, from individual estimating cells to major industry divisions, average weekly earnings are computed by multiplying average hourly earnings by average weekly hours.

b. Overtime Hours. To obtain average weekly overtime hours in manufacturing industries, the sum of the overtime hours reported is divided by the number of production workers in the same establishments.

c. Spendable Average Weekly Earnings. (For workers who earn the average weekly earnings.) Before the majority of workers in lower income brackets were subject to Federal income and social security taxes, gross average weekly earnings were a satisfactory measure of trends in weekly earnings available for spending. After Federal income taxes began to affect the spendable earnings of an appreciable number of workers, a method was developed for approximating spendable earnings by deducting these taxes from gross earnings. The amount of individual income tax liability depends on the number of dependents supported by a worker as well as on the level of his gross income. Spendable earnings for workers by major industry division are computed and published for a worker who earns the average amount and has no dependents or who has three dependents.

Gross and spendable weekly earnings also are computed and published in terms of 1967 dollars, to give an approximate measure of changes in "real" gross and spendable weekly earnings, that is, in purchasing power since that base period. This series is computed by dividing the weekly earnings average (in current dollars) by the BLS Consumer Price Index for the same month.

d. Average hourly earnings, excluding overtime, in manufacturing are computed by dividing the total production-worker payroll for the industry group by the sum of total production-worker hours and one-half of total overtime hours, which is equivalent to payrolls divided by straight-time hours. This method excludes overtime earnings at 1½ times the straight-time rates; no further adjustment is made for other premium payment provisions.

e. Indexes of aggregate hours and payrolls are prepared by dividing the current month's aggregates by the average for 1967.

f. Indexes of diffusion of changes in the number of employees on nonagricultural payrolls measure the percent of industries which posted increases in employment over the specified time span. The indexes are calculated from 172 unpublished seasonally adjusted employment series (two-digit nonmanufacturing industries and three-digit manufacturing industries) covering all nonagricultural payroll employment in the private sector. A more detailed discussion of these indexes appears in "Introduction of Diffusion Indexes," in the December, 1974 issue of Employment and Earnings.

Reliability of Estimates

Although the relatively large size of the BLS establishment sample assures a high degree of accuracy, the estimates derived from it may differ from the figures that would be obtained if it were possible to take a complete census using the same schedules and procedures. As discussed previously a link relative technique is used to estimate employment. This requires the use of the previous month's estimate as the base in computing the current month's estimate. Thus, small sampling and response errors may cumulate over several months. To remove this accumulated error, the estimates are adjusted annually to new benchmarks. In addition to taking account of sampling and response errors, the benchmark revision adjusts the estimates for changes in the industrial classification of individual establishments (resulting from changes in their product which are not reflected in the levels of estimates until the data are adjusted to new benchmarks). In fact, at the more detailed industry levels, particularly within manufacturing, changes in classification are the major cause of benchmark adjustments. Another cause of differences, generally minor, arises from improvements in the quality of the benchmark data.

One measure of the reliability of the employment estimates for individual industries is the root-mean-square error (RMSE). The measure is the standard deviation adjusted for the bias in estimates.

\[
RMSE = \sqrt{(\text{Standard Deviation})^2 + (\text{Bias})^2}
\]

If the bias is small, the chances are about 2 out of 3 that an estimate from the sample would differ from its benchmark by less than the root-mean-square error. The chances are about 19 out of 20 that the difference would be less than twice the root-mean-square error.

The hours and earnings estimates for cells are not subject to benchmark revisions, although the broader groupings may be affected slightly by changes in employment weights. The hours and earnings estimated, however, are subject to sampling errors which may be expressed as relative errors of the estimates. (A relative error is a standard error expressed as a percent of the estimate.) Measures of root-mean-square errors for employment estimates and relative errors for hours and earnings estimates are provided in the "Technical Note" of Employment and Earnings.

Seasonally Adjusted Series

Many economic statistics, including employment and average weekly hours, reflect a regularly recurring sea-
sonal movement which can be measured on the basis of past experience. By eliminating that part of the change which can be ascribed to usual seasonal variation, it is possible to observe the cyclical and other nonseasonal movements in these series. Seasonal adjusted series are published regularly for selected employment, hours, and earnings series.

The seasonal adjustment method used for these series is an adaptation of the standard ratio-to-moving average method, with a provision for "moving" adjustment factors to take account of changing seasonal patterns. A detailed description of the method is given in appendix A of this bulletin.

The seasonally adjusted series on gross average weekly hours, average overtime hours and average hourly earnings are computed by applying factors directly to the corresponding unadjusted series, but seasonally adjusted employment totals for all employees and production workers by industry divisions are obtained by summing the seasonally adjusted data for component industries. Selected seasonally adjusted series also are prepared for aggregate weekly hours.

**Presentation and Uses**

At the national level, the program produces each month a total of over 2,600 separate published series. Tables 2, 3, and 4 provide a summary of the detail which is published currently. Table 2 describes the "primary" series produced by the program, that is, those computed directly from the sample and benchmark data.

Table 3 indicates the "special" series which are obtained from the primary series by application of special adjustments, while table 4 lists the seasonally adjusted series by type and industry division.

In addition to the series published on a current monthly basis, a single annual figure for employment in March of each year (based on benchmarks) is published for a number of industries for which monthly estimates do not currently meet established standards for publication. In 1975, following revision to the 1974 benchmark, data for 239 such industries were published.

In June 1975, employment, and hours and earnings statistics were available for 50 States, the District of Columbia, and 220 areas. Approximately 8,700 employment series and hours and earnings series for about 3,400 industries were published for these States and areas by the State agencies. The employment series usually covered total nonagricultural employment, major industry divisions (e.g., contract construction, manufacturing), and major industry groups (e.g., textile, mill products, transportation equipment, retail trade) for each State and area. Additional industry detail frequently is provided for the larger States and areas, particularly for industries which are locally important in the various jurisdictions.

The series on employment, and hours and earnings appear in several BLS publications. The summary data are first published each month in a press release which contains preliminary national estimates of nonagricultural employment, weekly hours, and gross average weekly and hourly earnings in the preceding month, for major industry categories. The release also includes seasonally adjusted data on employment, average weekly hours, and average overtime hours. The preliminary estimates are based on tabulations of data for less than the full sample to permit early release of figures. This release normally is issued 3 weeks after the week of reference for the data. The press release also includes a brief analysis of current trends in employment, hours, and earnings, pointing up current developments as compared with those for the previous month and the same month in the preceding years.

National estimates in the detail described in tables 2, 3, and 4 are published in the monthly report Employment and Earnings. This publication is issued about 5 weeks after the week of reference. Employment data for total nonagricultural employment and for the major industry divisions, as well as hours and earnings for all manufacturing, are published for States and areas in Employment and Earnings 1 month later than those for the Nation. Special articles analyze long-term economic movements or describe technical developments in the program. Many of the national series are republished in the Monthly Labor Review with data shown for each series for the most recent 13 months.

Following each benchmark revision, an historical volume called Employment and Earnings, United States is published. This provides historical data, monthly and annual averages, from the beginning date of each series, in a few instances as far back as 1909. A companion volume, Employment and Earnings, States and Areas, provides historical data (annual averages) on all employees and on production-worker hours and

**Table 3. Number of industries for which special series are published under the BLS Industry Employment Statistics Program—employment, hours, and earnings, January 1975**

<table>
<thead>
<tr>
<th>Industry division</th>
<th>Index of aggregate weekly hours</th>
<th>Index of aggregate weekly payrolls</th>
<th>Spendable average weekly earnings</th>
<th>Gross weekly earnings (1967 dollars)</th>
<th>Average hourly earnings (excluding overtime)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total private</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Goods-producing</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contract</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Transportation and public utilities</td>
<td>24</td>
<td>24</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Service-producing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finance, insurance, and real estate</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
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</tr>
<tr>
<td>Services</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

1 In current and 1967 dollars.
The data are disseminated also through the publications of many other Federal agencies; e.g., the Department of Commerce, the Board of Governors of the Federal Reserve System and the Council of Economic Advisors republish all or part of the data. They are also regularly republished in summary form or for specific industries in many trade association journals, the labor press, and in general reference works.

These series are used by labor unions, business firms, universities, trade associations, private research organizations, and many government agencies. Research workers in labor unions and industry, as well as others responsible for analyzing business conditions, use the trends reflected in these particular statistics as economic indicators. The average weekly hours series are utilized as lead indicators of swings in the business cycle. Labor economists and other social scientists find these series to be an important indicator of the Nation's economic activity, as well as a measure of the wellbeing of the millions of Americans who depend on salaries and wages. Industrial growth and progress may be assessed by using the employment and hours series in conjunction with other economic data to yield measures of productivity.

Analysts study employment trends to detect changes in industrial structure, and to observe growth and decline proclivities of individual industries. They also are used in the Bureau's Occupational Outlook program as a basis for projection of future trends.

Executives use the employment, earnings, and hours data for guidance in plant location, sales, and purchases. Also, firms negotiating long-term supply or construction contracts often utilize series on average hourly earnings as an aid in reaching an equitable agreement; "escalation clauses" may be included in the contracts, which permit an increase or a lowering of the settlement price depending on the movement of average hourly earnings in a selected industry. Wide need has been demonstrated by both labor and business for industry series on hourly earnings and weekly hours, to provide a basis for labor-management negotiations. They not only furnish current and historical information on a given industry but provide comparative data on related industries.

**Limitations**

**Employment**

Total employment in nonagricultural establishments from the "payroll" survey is not directly comparable with the Bureau's estimates of the number of persons employed in nonagricultural industries, obtained from the monthly "household" survey.¹³ The "payroll" series excludes unpaid family workers, domestic servants in private homes, proprietors and other self-employed persons, all of whom are covered by the household survey. Moreover, the "payroll" series counts a person employed by two or more establishments at each place of employment, while the "household" survey counts him only once, and classifies him according to his single major activity. Certain persons on unpaid leave are counted as employed under the "household" survey, but are not included in the employment count derived from the "payroll" series. In addition to these differences in concept and scope, the surveys employ different collection and estimating techniques. Therefore, although each survey measures changes in employment, direct comparability should not be expected. However, over time, the trends are similar. The household survey places its primary emphasis on the

¹³ See ch. 1 for a description of this survey.
employment status of individuals and also provides a great deal of information on the demographic characteristics (e.g., sex, age, race) of the labor force. The survey is not well suited to providing detailed information on the industrial and the geographic distribution of employment. The establishment survey, while providing limited information on personal characteristics of workers, is an excellent vehicle for obtaining these detailed industrial and geographic data, and in addition, it provides hours and earnings information which is directly related to the employment figures. The payroll and household surveys therefore may be regarded as complementary.

Employment estimates derived by the Bureau of the Census from its quinquennial censuses and from the annual sample surveys of manufacturing establishments may differ from BLS employment statistics. The most important reason for difference stems from the degree to which multiproduct establishments file separate or combined reports in one survey but not the other, which may result in different industrial classification of employment. There is also a significant difference at the more detailed industry levels, since Census classifies auxiliary units and central and district administrative units on the basis of the most appropriate 2-digit major group, while BLS codes these units to the most appropriate 4-digit industry. For broad categories, however, the two surveys do show similar levels and trends.

Hours and Earnings

The workweek information relates to average hours paid for, which differ from scheduled hours or hours worked. Average weekly hours reflect the effects of such factors as absenteeism, labor turnover, part-time work, and strikes.

The gross average hourly earnings series reflect actual earnings of workers, including premium pay. They differ from wage rates, which are the amounts stipulated for a given unit of work or time. Gross average hourly earnings do not represent total labor costs per hour for the employer, for they exclude retroactive payments and irregular bonuses, various welfare benefits, and the employer’s share of payroll taxes. Earnings for those employees not covered under the production worker and nonsupervisory-employee categories are, of course, not reflected in the estimates.

The series on spendable weekly earnings measure the net earnings of workers who earn the average gross weekly earnings, have the specified number of dependents, and take the standard deductions for Federal income tax purposes. Spendable earnings reflect deductions only for Federal income and social security taxes (calculated on the basis of total annual liabilities), and thus represent only a rough approximation of disposable earnings. They do not take into account payroll deductions for such purposes as State income taxes, union dues, or group insurance, and they do not reflect such factors as total family income or tax deductions above the standard amount.

The “real” earnings data (those expressed in 1967 dollars), resulting from the adjustment of gross and spendable average weekly earnings by means of the Bureau’s Consumer Price Index, indicate the changes in the purchasing power of money earnings as a result of changes in prices for consumer goods and services. These data cannot be used to measure changes in living standards as a whole, which are affected by other factors such as total family income, the extension and incidence of various social services and benefits, and the duration and extent of employment and unemployment.

To approximate straight-time average hourly earnings, gross average hourly earnings are adjusted by eliminating only premium pay for overtime at the rate of time and one-half. Thus, no adjustment is made for other premium payment provisions such as holiday work, late-shift work, and premium overtime rates other than at time and one-half.

The ultimate goal of the program is to provide current estimates of employment, hours, and earnings for all nonagricultural industries in the Nation as a whole, and also for all significant industries in all States and all Standard Metropolitan Statistical Areas, as defined by the Office of Management and Budget. While very substantial progress toward this objective has been made over the years, and particularly since the end of World War II, there remain some important areas where the goal is yet to be realized. Efforts constantly are being directed toward strengthening the sample so that series for employment, hours, and earnings for additional industries may be published, and also toward developing series for additional standard metropolitan areas.

The term "production and related workers" excludes employees engaged in the following activities: Executive, purchasing, finance, accounting, legal, personnel, cafeterias, medical, professional, and technical activities, sales, sales-delivery (e.g., delivery and route workers), advertising, credit, collection, and in installation and servicing of own products, routine office function, factory supervision (above the working supervisors' level); and force account construction employees on your payroll engaged in construction of major additions or alterations to the plant who are utilized as a separate work force. (Employees in the above activities should be excluded from column 9 but included in column 7, All Employees.)

Column 10. PAYROLL.—Enter amount of pay earned during the pay period by the production and related workers reported in column 9. Payrolls should be reported before deductions for old-age and unemployment insurance, group insurance, withholding tax, bonds, and union dues. Include pay for overtime and for holidays, vacations, and sick leave paid directly by your firm to employees for the pay period reported.

Exclude bonuses (unless earned and paid regularly each pay period), or other pay not earned in pay period reported (e.g., retroactive pay), and value of free rent, fuel, meals, or other payment in kind.

Column 11. TOTAL HOURS.—Enter the sum of (1) hours worked (including overtime hours) during the pay period by the production and related workers reported in column 9, (2) hours paid for stand-by or reporting time, and (3) equivalent hours for which employees received pay directly from the employer for holidays, vacations, sick leave, or other leave paid to these workers. Do not convert overtime or other premium paid hours to straight-time equivalent hours.

Column 11Y. OVERTIME HOURS.—Enter the number of hours included in column 11, for which premiums were paid because the hours were in excess of the number of hours of either the straight-time workday or workweek. Include Saturday and Sunday hours (or 6th and 7th day hours) only if overtime premiums were paid. Holiday hours worked by employees should be included only if payment for these hours is at more than the straight-time rate. Exclude hours for which only shift differential, hazard, incentive, or other similar types of premiums were paid. If none, enter "0" in column 11Y.
**LOCATION OF ESTABLISHMENT(S) COVERED IN THIS REPORT**

(Num ber of establishments) (City) (County) (State)

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The Bureau of Labor Statistics and the State agencies cooperating in its statistical programs will hold all information furnished by the respondent in strict confidence.

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Before entering data see explanations on other side

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**PAY PERIOD**

Enter beginning and ending dates of pay period which includes the 12th of the month.

- **YEAR AND MONTH**
  - **From**
  - **Through**
  - **During the entire pay period**
  - **Do not use**
  - **Both sexes**
  - **Women only**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MONTH</th>
<th>From</th>
<th>Through</th>
<th>During the entire pay period</th>
<th>Do not use</th>
<th>Both sexes</th>
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</thead>
<tbody>
<tr>
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<td>Dec.</td>
<td></td>
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<tr>
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<td>Mar.</td>
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</tr>
<tr>
<td></td>
<td>Dec.</td>
<td></td>
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</tr>
</tbody>
</table>

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**ALL EMPLOYEES**

Enter the number of days worked plus paid holidays and paid vacation days for majority of production workers. (Nearest 1/4 day)

- **NUMBER**
  - Include all persons who worked during or received pay for any part of the period regardless of type of work performed.

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MONTH</th>
<th>From</th>
<th>Through</th>
<th>During the entire pay period</th>
<th>Do not use</th>
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<th>Women only</th>
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</thead>
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<tr>
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<td></td>
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**PRODUCTION AND RELATED WORKERS**
Enter in columns 9, 10, and 11 the number of production and related workers who worked during or received pay for any part of the period reported, the pay earned (before deductions), and all hours worked or paid for, include paid and hours for overtime, sick leave, holidays, and vacations. Enter in column 11 Y the total number of hours for which overtime premiums were paid.

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<th>YEAR</th>
<th>MONTH</th>
<th>From</th>
<th>Through</th>
<th>During the entire pay period</th>
<th>Do not use</th>
<th>Both sexes</th>
<th>Women only</th>
<th>Number of production workers</th>
<th>Total production worker payroll including overtime pay (Omit cents)</th>
<th>Total production worker hours including overtime hours (Omit fractions)</th>
<th>Overtime production-worker hours included in column 11 (Omit fractions)</th>
<th>Do not use</th>
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**YOUR COMMENTS**
Enter in column 13 the main factors responsible for significant month-to-month changes in employment, average hours worked (col. 11 ÷ col. 9), average hourly earnings (col. 10 ÷ col. 11), etc., as indicated by this report. Examples are:

- More business
- Overtime
- Wage rate increase
- Strike
- Temporary help
- Weather
- Layoff for retooling

If any general wage-rate changes (not individual changes for length of service, merit, or promotion) have occurred since last month's report, note the amount of increase or decrease (as +2%, —5%), the effective date of the change, and the approximate number of production workers affected.

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<th>During the entire pay period</th>
<th>Do not use</th>
<th>Both sexes</th>
<th>Women only</th>
<th>Number of production workers</th>
<th>Total production worker payroll including overtime pay (Omit cents)</th>
<th>Total production worker hours including overtime hours (Omit fractions)</th>
<th>Overtime production-worker hours included in column 11 (Omit fractions)</th>
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(Person to be addressed if questions arise regarding this report) (Position) (Telephone No.)
Columns 2 and 3. PAY PERIOD DATES.—Enter the beginning and ending dates of your pay period which includes the 12th of the month.

Columns 4 and 5. PAY PERIOD—NUMBER OF DAYS.—Enter in column 4 for the entire pay period reported the number of days on which the majority of nonsupervisory employees reported work plus the number of holidays and vacation days during the period for which the majority were paid. When the period is longer than a week, enter in column 5 the number of such reported days worked or paid for during the 7 consecutive day period which includes the 12th of the month and falls entirely within the period reported in columns 2 and 3.

Column 7. ALL EMPLOYEES—BOTH SEXES.—Enter the total number of persons on the payroll(s) covered by this report who worked full- or part-time or received pay for any part of the period reported. Include salaried officers of corporations and executives and their staffs, but exclude proprietors, members of unincorporated firms, and unpaid family workers. Include persons on vacations and sick leave for which they received pay directly from your firm for the period reported but exclude persons on leave without company pay the entire period and pensioners and members of the Armed Forces carried on the rolls but not working during the period reported.

Column 8. ALL EMPLOYEES—WOMEN ONLY.—Report number of women employees included in column 7.

Column 9. NUMBER OF NONSUPERVISORY EMPLOYEES.—Enter the number of nonsupervisory employees, both full- and part-time on your payroll(s), whether wage or salaried, who worked during or received pay for any part of the pay period reported. Include persons on vacations or on sick leave when paid directly by your firm.

The term "nonsupervisory employees" includes employees such as salespersons, shipping and receiving clerks, stock clerks, general office clerks, office-machine operators, cashiers, waiters, waitresses, bartenders, kitchen help, dining room attendants, entertainers, parking lot attendants, drivers, installation and repairers, elevator operators, janitors and guards, and other employees below the supervisory level, whose services are closely associated with those of employees listed above. Included in the nonsupervisory category are employees who may be "in charge" of a group of employees but whose supervisory functions are only incidental to their regular work.

The term "nonsupervisory employees" excludes officers of corporations, principal executives such as buyers, department heads, managers and others who are primarily engaged in planning and directing the work of subordinates. (Employees listed above should be excluded from column 9 but included in column 7, All Employees.)

Column 10. PAYROLL.—Enter amount of pay earned during the pay period by the nonsupervisory employees reported in column 9. Payrolls should be reported before deductions for old-age and unemployment insurance, group insurance, withholding tax, bonds, and union dues. Include pay for overtime and for holidays, vacations, and sick leave paid directly by your firm to employees for the pay period reported.

Exclude commissions reported in column 10A. Exclude bonuses (unless earned and paid regularly each pay period) or other pay not earned in pay period reported (e.g., retroactive pay). Exclude tips contributed by the customer, value of free meals, rent, fuel, or other payment in kind, or traveling or other expenses of salesmen.

Columns 10A, 10B, and 10C. COMMISSIONS OF NONSUPERVISORY EMPLOYEES.—Enter commissions (not drawing accounts or basic guarantees) paid to nonsupervisory employees reported in column 9. If commissions are paid monthly or for a shorter period, enter in column 10A the amount of commissions earned during a period as close to the pay period reported as possible, and in columns 10B and 10C, the beginning and ending dates of the period during which the commissions were earned. If commissions are paid at longer intervals, enter the total commissions paid since the last report and the beginning and ending dates of the period during which they were earned.

Column 11. HOURS.—Enter the sum of (1) hours worked (including overtime hours) during the pay period by the nonsupervisory employees reported in column 9, (2) hours paid for standby or reporting time, and (3) equivalent hours for which employees received pay directly from the employer for holidays, vacations, sick leave, or other leave paid to these workers. Do not convert overtime hours or other premium paid hours to straight-time equivalent hours.
### LOCATION OF ESTABLISHMENT(S) COVERED IN THIS REPORT

<table>
<thead>
<tr>
<th>Number of establishments</th>
<th>City</th>
<th>County</th>
<th>State</th>
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**PAY PERIOD**

- Enter beginning and ending dates of pay period which includes the 12th of the month
- Enter the number of days worked plus paid holidays and paid vacation days for majority of nonsupervisory employees. (Nearest 1/2 day)

<table>
<thead>
<tr>
<th>Year and month</th>
<th>From</th>
<th>Through</th>
<th>During the entire pay period</th>
<th>L/P</th>
<th>Both sexes</th>
<th>Women only</th>
<th>Number of nonsupervisory employees</th>
<th>Non-supervisory employee payroll (excluding commissions)</th>
<th>Total non-supervisory employee hours</th>
<th>Commissions of nonsupervisory employees</th>
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**ALL EMPLOYEES**

- Enter in these columns the number of nonsupervisory employees who worked during or received pay for any part of period regardless of type of work performed.
- Enter beginning and ending dates of pay period which includes the 12th of the month

**NONSUPERVISORY EMPLOYEES**

- Commissions of nonsupervisory employees
- Enter beginning and ending dates of pay period which includes the 12th of the month

- **DO NOT USE**
  - Amount of commissions (Omit cents)
  - Period in which earned
  - P.R.
  - H.
  - Expl. code

**YOUR COMMENTS ON CHANGES IN EMPLOYMENT, PAYROLL, OR WAGE RATES**

Enter in column 13 the main factors responsible for significant month-to-month changes in the report above. Examples are: Wage rate increase, more business, fire, temporary summer help, overtime, strike, weather.

If any GENERAL WAGE-RATE CHANGES (not individual changes for length of service, merit, or promotion) have occurred since last month's report, note the amount of increase or decrease (as +2%, -5%), the effective date of the change, and the approximate number of nonsupervisory employees affected.

### BLS HANDBOOK OF METHODS

[Digitized for FRASER](http://fraser.stlouisfed.org/)
**STATEMENT OF PRODUCTS**

Return this form as soon as possible in the enclosed envelope which requires no postage.

---

**SAMPLE COPY**

The Bureau of Labor Statistics and the State agencies cooperating in its statistical programs will hold all information furnished by the respondent in strict confidence.

**LOCATION**

(City) (County) (State)

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**BLS CODES**

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This report will be used to insure the proper industrial classification of your regular MONTHLY REPORT ON EMPLOYMENT, PAYROLL, AND HOURS and should cover the entire activity of the same establishment.

Classification will be by industry on the basis of the principal product or activity of your establishment during the calendar year 1975. Describe your processes or goods produced in your own words, making the distinctions requested on the list of special characteristics provided on the enclosed sheet. This list is not complete but represents the kind of information which should be reported.

**PRINCIPAL PRODUCTS OR ACTIVITIES DURING 1975**

(List items separately)

1A. Manufacturing (Specify below)

<table>
<thead>
<tr>
<th>Percent of total sales value or receipts during 1975</th>
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1B. Nonmanufacturing (Specify below)

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<th>Percent of total sales value or receipts during 1975</th>
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**PRINCIPAL MATERIALS USED**

(For each product listed in column (a))

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<th>Was material used produced in this establishment?</th>
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<tr>
<td>Yes</td>
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4. Is the establishment primarily engaged in performing services for other units of the company?

□ Yes □ No

If "Yes," indicate nature of activity of this establishment:

1. □ Central administrative office
2. □ Research, development, or testing
3. □ Storage (warehouse)
4. □ Other (Specify: powerplant, etc.)

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**TYPE OF OWNERSHIP**

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<th>□ Private</th>
<th>□ Government</th>
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<tr>
<td>□ Corporate</td>
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2. (Check one)

5. Union Status: Are the majority of production workers in this establishment covered by collective-bargaining agreements?

□ Yes 1 □ No 2

6. Space for your comments.

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(Person to be addressed if questions arise regarding this report) (Position) (Telephone No.)
Technical References

Chapter 4. Labor Turnover

Background

Labor turnover, as used by the Bureau of Labor Statistics, refers to the gross movement of wage and salary workers into and out of employment status with respect to individual establishments during the month.

The labor turnover program has been in existence for many years. In January 1926, the Metropolitan Life Insurance Co. began the collection of labor turnover data from a small sample of manufacturing establishments. By February 1927, the sample included 175 establishments with 800,000 employees, which was estimated to be about 8 to 10 percent of total manufacturing employment at the time. The original purpose of this series was to provide personnel managers with national figures on labor turnover rates for manufacturing industries against which they could measure the experience of their own plants. Between November 1927 and July 1929, the Metropolitan Life Insurance Co. published labor turnover rates for total manufacturing. By the latter date, the company felt the project was sufficiently successful and well established to warrant turning it over to the Bureau of Labor Statistics for further development. A decade later, in December 1939, series on labor turnover rates were being published for 30 manufacturing industries, and the sample upon which the rates for all manufacturing were based contained 5,500 establishments and nearly 2,600,000 employees.

For a number of years, State employment security agencies affiliated with the Employment and Training Administration had collected labor turnover information for use in job market analysis and as a guide for the operations of the State employment services. Cooperative arrangements between these agencies and the Bureau of Labor Statistics for the joint collection of labor turnover data began with an agreement with Connecticut in 1954. By 1964, the cooperative program had been extended to cover all 50 States and the District of Columbia. By 1975, however, three States — California, New Mexico, and West Virginia — were no longer participating in the cooperative program, and labor turnover information for sample establishments in these three States was being collected by the BLS.

In June 1975, these agencies published about 8,700 labor turnover series in manufacturing and mining industries for States and areas. These rates were based on a sample of approximately 37,000 reports in manufacturing and about 800 in mining.

Description of the Survey

Labor turnover actions are divided into two broad groups: accessions or additions to employment, and separations or terminations of employment. These two broad groups are further divided; accessions into new hires, recalls, and other accessions, and separations into quits, discharges, layoffs, and other separations. Labor turnover is expressed in the BLS series as a monthly rate per 100 employees. Separate rates are computed for each of the component items.

The primary difference between types of separations is whether action is initiated by the employee or employer, i.e., whether it is voluntary on the employee’s part or involuntary. Voluntary actions—quits—are initiated by the employee for an almost unlimited variety of reasons, financial, personal, or social, (e.g., lack of housing and transportation, poor community facilities, etc.). Involuntary actions either may be initiated by the employer or be beyond the control of both employer and employee; these actions may arise from economic causes such as business conditions, physiological reasons such as aging, or performance reasons such as incompetence.

Concepts

Separations are terminations of employment of persons who have quit or been taken off the rolls for reasons such as layoff, discharge, retirement, death, military service expected to last more than 30 consecutive calendar days, physical disability, etc. Since January 1959, transfers of employees to other establishments of the same company also have been classified as separations.

Quits are terminations of employment initiated by employees for any reason except retirement, transfer to another establishment of the same firm, or service in the Armed Forces. Included as quits are persons who failed to report after being hired (if previously counted as accessions), and unauthorized absences which, on the last day of the month, have lasted more than 7 consecutive calendar days.

Layoffs are suspensions from pay status (lasting or expected to last more than 7 consecutive calendar days), initiated by the employer without prejudice to the worker, for reasons such as lack of orders, model change-over, termination of seasonal or temporary
employment, inventory-taking, introduction of labor saving devices, plant breakdown, or shortage of materials.

Discharges are terminations of employment initiated by the employer for such reasons as incompetence, violation of rules, dishonesty, laziness, absenteeism, insubordination, failure to pass probationary period, etc.

Other separations include terminations of employment for military duty lasting or expected to last more than 30 days, retirement, death, permanent disability, failure to meet the physical standards required, and transfers of employees to another establishment of the company.

Accessions are all permanent and temporary additions to the employment roll, whether of new or rehired employees. Transfers from another establishment of the same company also are counted as accessions (beginning with January 1959).

New hires are permanent and temporary additions to the employment roll of persons who have never before been employed by the establishment, and former employees rehired although not specifically recalled by the employer. This category excludes transfers from other establishments of the same company and employees returning from military service or unpaid leaves of absence.

Recalls are permanent or temporary additions to the employment roll of persons specifically recalled to a job in the same establishment of the company following a period of layoff lasting more than 7 consecutive days (beginning with 1976).

Other accessions include all additions to the employment roll other than new hires and recalls.

Industry Classification

The classification system used for compiling and publishing rates is that described in the 1967 Standard Industrial Classification Manual issued by the Office of Management and Budget. (See appendix B of this bulletin for a detailed description of this system.)

Reporting establishments are classified on the basis of major product or activity as determined by annual sales data for the previous calendar year. Most establishments in the labor turnover sample also report employment, hours, and earnings under the Bureau’s industry employment statistics program, and are assigned the same industry classification in both programs. Further discussion of industry classification in the two programs is given under the heading, Industrial Classification in chapter 3 of this bulletin.

Data Sources

Each month cooperating State employment security agencies collect data on labor turnover actions from a sample of establishments drawn from a list of those subject to State unemployment insurance programs. (See chapter 3 p. 26 of this bulletin.) The respondent extracts the figures largely from his personnel records, though some smaller establishments which do not maintain special personnel records use their payroll records in making out the reports. Response analysis surveys, which analyzed the reporting practices of a scientifically selected sample of the establishments in the labor turnover panel, showed that while some employers did not report the figures for all items precisely as requested on the schedule, the effect of these deviations on the published data appeared to be quite insignificant, particularly for the broader classes, such as total accessions and total separations.

Collection Methods

Labor turnover data are collected primarily at the State level by employment security agencies from cooperating employers via the medium of a mailed “shuttle” schedule, U.S. Department of Labor form 1219. (See pp. 45 and 46 for a facsimile of this schedule.) The same form is returned to the respondent each month of the year for the entry of current data. The respondent reports the number of actions for each turnover item during the calendar month and total employment. These employment figures, which are the bases used to compute the rates, represent the number of persons who worked or received pay for any part of the pay period (usually 1 week) which includes the 12th of the month.

The State agency uses the information provided on the schedule to develop labor turnover rates for the States and for metropolitan areas, and forwards the data to Washington, where they are used by the Bureau of Labor Statistics to prepare rates at the national level.

Sampling

Sampling is used by BLS for collecting data in its labor turnover statistics program, since full coverage would be prohibitively costly and time consuming. The sampling plan for the program must: (a) Provide the preparation of reliable monthly estimates of labor turnover rates which can be published promptly and regularly; (b) through a single general system, yield considerable industry detail for metropolitan areas, States, and the Nation; and (c) be appropriate for the existing framework of operating procedures, administrative practices, resource availability, and other institutional characteristics of the program.

In developing the sample design, the universe of establishments was stratified first by industry and within each industry by size of establishment in terms of employment. Within each industry, an optimum alloca-
MONTHLY REPORT ON
LABOR TURNOVER

Enter the data requested and return in the enclosed envelope as soon as the information is available each month.

(Change name and mailing address if incorrect—include ZIP code)

The Bureau of Labor Statistics, the Manpower Administration, and the State agencies cooperating in their statistical programs will hold all information furnished by the respondent in strict confidence.

Before entering data see explanations on other side

<table>
<thead>
<tr>
<th>YEAR AND MONTH</th>
<th>PERIOD COVERED (Col. 4 through 12)</th>
<th>SEPARATIONS (during calendar month)</th>
<th>ACCESSIONS (during calendar month)</th>
<th>TOTAL NUMBER who worked during or received pay for any part of the pay period which includes the 12th of the month</th>
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<td>Total separations (sum of cols. 5 thru 8) (4)</td>
<td>Quits — (5) Discharges (6) Layoffs — (7) Other separations — (8) Total accessions (sum of cols. 10 — 12) (9) New hires (10) Recalls (11) Other accessions (12) (13)</td>
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III. YOUR COMMENTS
Enter main factors responsible for any significant month-to-month changes in SECTIONS I and II. Examples are: more business, strike, fire, weather, temporary summer help, seasonal increases, etc.


Person to be addressed if questions arise regarding this report Position Telephone no.
INSTRUCTIONS FOR COMPLETING THIS FORM

I. LABOR TURNOVER

PERIOD COVERED — Information on labor turnover, columns 4 through 12, is requested for the most recent entire calendar month specified in column 1, or, if this is not possible, for a period which most closely covers that calendar month. In either case, enter in column 2 and 3 the beginning and ending dates for the monthly period for which turnover data are reported.

SEPARATIONS (ALL EMPLOYEES)

Column 4 TOTAL SEPARATIONS — Enter the sum of columns 5 through 8.

Column 5 QUITS — A quit is a termination of employment initiated by the employee for any reason except to retire, to transfer to another establishment of the same firm, or for service in the Armed Forces. Include a person who fails to report after being hired (if previously counted as an accession) and an unauthorized absence if on the last day of the month the person has been absent more than 7 consecutive calendar days.

Column 6 DISCHARGE — A discharge is a termination of employment initiated by the employer for such reasons as incompetence, violation of rules, dishonesty, laziness, absenteeism, insubordination, failure to pass probationary period, etc. Inability to meet organization's physical standards should be reported in other separations, column 8.

Column 7 LAYOFFS — A layoff is a suspension from pay status (lasting or expected to last more than 7 consecutive calendar days without pay) initiated by the employer without prejudice to the worker for such reasons as: lack of orders, model changeover, termination of seasonal or temporary employment, inventory-taking, introduction of labor saving devices, plant breakdown, shortage of materials, etc.; include temporarily furloughed employees and employees placed on unpaid vacations.

Column 8 OTHER SEPARATIONS — Include only terminations of employment for military duty lasting or expected to last more than 30 calendar days, retirement, death, permanent disability, failure to meet required physical standards, and transfers of employees to another establishment of the company. NOTE: If you include any other types of separations in this column, mention the number and type under Comments. Employees involved in labor-management disputes should not be counted as separations.

ACCESSIONS (ALL EMPLOYEES)

Column 9 TOTAL ACCESSIONS — An accession is any permanent or temporary addition to the employment roll whether of new or former employees, or transfers from another establishment of the company. Enter in column 9 the sum of columns 10 thru 12. Employees involved in labor-management disputes should not be counted as accessions when they return to work.

Column 10 NEW HIRES — New hires are temporary and permanent additions to the employment roll of (1) anyone who has never before been employed in this establishment, or (2) former employees you did not call back. Persons transferred from other establishments of the company should be reported in "other accessions."

Column 11 RECALLS — Recalls are permanent or temporary additions to the employment roll of persons specifically recalled to a job in the same establishment of the company following a period of layoff lasting more than seven consecutive days. Employees called from a layoff in a different establishment of the company are to be classified as a transfer and reported in column 12 — OTHER ACCESSIONS.

Column 12 OTHER ACCESSIONS — Include all additions to the employment roll other than new hires and recalls. This includes transfers from other establishments of the company, and former employees returning from military leave or other absences without pay who have been counted as separations. Employees involved in labor-management disputes should not be counted as accessions when they return to work.

II. EMPLOYMENT

PERIOD COVERED — Employment information, column 13 is requested for one pay period (preferably one week) which includes the 12th of the calendar month for which labor turnover data are reported.

Column 13 TOTAL NUMBER — Enter the total number of persons on the payrolls of the establishment(s) covered in this report who worked full- or part-time or received pay for any part of the pay period (preferably one week).

Include salaried officers of corporations, executives and their staffs, and employees engaged in force-account construction but exclude proprietors, members of unincorporated firms, and unpaid family workers. Include persons on vacations and sick leave if they received pay directly from your firm for the pay period covered.

Exclude persons on leave without company pay the entire period and pensioners and members of the Armed Forces carried on the rolls but not working during the pay period covered.

III. COMMENTS

Column 15 YOUR COMMENTS — Enter the main factors responsible for significant month-to-month changes in Labor Turnover (columns 4 through 12) and Employment (column 13).
Estimating Procedures

Labor turnover rates are estimates of ratios. For individual industries, turnover rates are computed by dividing the number of turnover actions of each type, as reported by the sample establishments, by the total number of employees reported by those establishments. The result is multiplied by 100. In an industry sample, for example, 623 employees quit between January 1 and 31, while 30,062 employees worked or received pay during the week of January 11-17. The January quit rate for the industry is:

\[
\frac{623}{30,062} \times 100 = 2.1
\]

Turnover rates for industry groups are computed by weighting the rates for the component industries by the estimates of total employment, prepared by the BLS industry employment statistics program. These estimates, which cover the pay period including the 12th of the month, are described in chapter 3 of this bulletin. Rates for “all manufacturing” and for the durable and nondurable goods subdivisions of manufacturing are weighted by employment in the major industry groups.

Seasonally Adjusted Series

Many economic statistics, including labor turnover rates, reflect a regularly recurring seasonal movement which can be measured on the basis of past experience. By eliminating that part of the change which can be ascribed to usual seasonal variation, it is possible to observe the cyclical and other nonseasonal movements in these series. Seasonally adjusted labor turnover rates are published at the all manufacturing industry level.

Labor turnover rates are seasonally adjusted by applying appropriate seasonal factors to the rate. These factors are derived by the Census X-11 method using the trading day option. As a result, these series are adjusted for the number of times each day of the week occurs in a given month, as well as for the month of the year.

Presentation

The BLS publishes, on a national basis, monthly series of labor turnover rates for selected industries. These series are currently published for the manufacturing division, the durable and nondurable goods subdivisions, 21 major industry groups in manufacturing, 191 individual manufacturing industries, and 7 categories in mining and communications. Rates are available for all manufacturing from January 1930 and for telephone and telegraph from 1943. For industry groups and individual industries in the manufacturing and mining divisions, all series begin with January 1958. Rates for certain highly seasonal industries, for example canning and preserving, are not now published separately but are included in the computation of rates for the major manufacturing groups. Before 1958, these industries and the printing, publishing and allied industries major group were not included in the rates for all manufacturing. The rates for all manufacturing for years prior to 1958 were revised, however, to reflect the influence of these industries.

Monthly rates for total accessions, new hires, total separations, quits, and layoffs are shown for manufacturing and mining industries. Except for the new hire rates, the same items are published for the telephone and telegraph industries.

Preliminary turnover rates for the 21 major industry groups in manufacturing are published monthly in a BLS press release about a month after the reference month, and in the Monthly Labor Review 3 months after the reference month. Preliminary turnover rates for both detailed industries and broad categories are published in Employment and Earnings about 2 months after the month of reference.

Labor turnover rates for all manufacturing for selected States and metropolitan areas are published each month in Employment and Earnings. More de-
tailed information is available in releases issued by the cooperating State agencies.

National labor turnover rates (monthly data and annual averages) back to the beginning of each series are published in the annual volume called Employment and Earnings, United States. New editions of this volume are published annually, following each adjustment of the Bureau’s industry employment statistics series to new benchmark levels.

## Uses and Limitations

The two major causes of change in labor turnover rates are industrial expansion and contraction. In prosperous times, quit rates and new hires are high because of job availability; in periods of economic recession, high layoff rates are coupled with low quit and accession rates. Turnover rates are, therefore, regarded as good economic indicators and are widely used by economic analysts in both government and private industry.

Labor turnover rates by industry are also valuable for personnel planning and analysis. Employers use these rates as a yardstick against which to measure the performance of their plants. For example, they consider low quit rates to be an indication of efficient operations and good labor-management relations. A consideration of turnover is essential for scheduling production and for planning the orderly recruitment and maintenance of an adequate manpower supply. Labor turnover rates are also widely used by State employment services to plan and appraise their operations.

The use of turnover rates to interpret changes in the BLS monthly employment series is limited for the following reasons: (1) The labor turnover series measures changes during the calendar month, while the employment series measures changes from midmonth to midmonth; and (2) employees on strike are not counted as turnover actions, although such employees are excluded from the employment estimates if the work stoppage lasts throughout the report period including the 12th of the month.

The Bureau publishes annual averages of labor turnover rates, which are computed as the arithmetic means of the 12 monthly rates. These can provide a useful measure if a 1-month rate is not suitable for some purposes, as for example when the rate for a specific month is considered to be unusual or affected strongly by seasonal influences.²

² Because they are liable to misinterpretation, the Bureau does not prepare cumulative annual rates of labor turnover. For example, an annual quit rate could be obtained by dividing the total number of quits during the year by average employment during the year. An approximation of this figure can be obtained by cumulating the 12 monthly rates. Suppose the annual rate thus obtained amounted to 50 per 100 employees. This might seem to imply that 50 percent of all employees in January voluntarily left their jobs by the end of December. However, many jobs in a given establishment are vacated and refilled more than once during the year. The Bureau does not have information on the number of employees who remained with the establishment during the entire year. Over short periods of time, labor turnover rates probably include relatively little repetitive counting of employees who have held the same jobs, while over a period of as long as a year there is considerable duplication.
Chapter 5. Occupational Outlook

Background

The occupational outlook program stems from a report of the Advisory Committee on Education appointed by President Roosevelt. In 1938, the committee recommended that an occupational outlook service be set up in the Bureau of Labor Statistics to conduct employment studies and provide career guidance information for individuals and for the use of those responsible for planning education and training programs. In 1941, the Occupational Outlook Service was organized under a specific authorization of the Congress. Although preliminary studies were begun in 1941, it was not until after World War II that the occupational outlook staff was able to focus its efforts on the preparation of occupational reports for use in career guidance. In mid-1946, a manual of occupational outlook information was prepared for use in the Veterans Administration (VA) counseling and rehabilitation program.

The first edition of the Occupational Outlook Handbook was published in 1949 in response to a formal resolution by the National Vocational Guidance Association, as well as the requests of other groups and private individuals calling upon the Congress to authorize the development of career guidance information for sale. The public reacted favorably to the first Handbook and the Bureau decided to issue in 1951 a revised and enlarged edition with the backing of the Veterans Administration.

After the end of hostilities in Korea, there was a sharp increase in public recognition of the key role of vocational guidance in channeling workers into essential occupations and effectively using the Nation’s labor resources. As a result, in 1955, Congress provided for publication of the Occupational Outlook Handbook and its related materials on a regular, continuing, up-to-date basis. In 1957, the third edition of the Occupational Outlook Handbook was published; also in that year, the Occupational Outlook Quarterly was introduced as a companion piece to the Handbook to report on the employment outlook in emerging occupations and to describe changes in the employment situation in established career fields.

The current, 1976–77 Handbook is the twelfth edition of this major product of the occupational outlook program.

Description of Program

Through the occupational outlook program, the Bureau of Labor Statistics conducts research in, and produces information on, future occupational and industrial employment requirements and resources. The program provides information on employment opportunities by occupation for use by counselors, educators, and others helping young people choose a field of work. It also provides information for local and national training authorities for use in developing programs of education and training. The results of the research are published in the Occupational Outlook Handbook, the Occupational Outlook Quarterly, and special bulletins, reports, and pamphlets.

Through the years, the occupational outlook program systematically has accumulated, analyzed, and distributed considerable information about changing industry and occupational needs. Research topics have included assessments of employment trends in major industries and occupations, as well as investigations into the employment effects of a great number of long-term programs of government agencies, including those for defense, highways, mass transit, scientific research, pollution abatement, space technology, medical care, and education.

The program’s major function of anticipating and reporting on the nature of tomorrow’s job market includes developing projections of employment requirements for broad industry and occupational groups. These data are published regularly, and when combined with the examinations of more detailed job areas presented in the Occupational Outlook Handbook, constitute a fairly thorough labor force coverage.

Most career descriptions published in the Occupational Outlook Handbook include information on: Nature of work, places of employment, education and training requirements, employment outlook for about 10 years ahead, and earnings and working conditions. The outlook statements for industries give information on the nature and location of each industry as well as a discussion of the industry’s major occupations.

In presenting the employment outlook for an occupation, information is weighted on the demand for workers and also on potential supply. Persons enter the job market from many sources—schools and other training institutions, transfers from other occupations, and reentries to the labor force. It is the balance between supply and demand that determines the nature of job competition facing young people in the years ahead.

In addition to overall labor force and detailed industry and occupational projections developed for the Handbook, special employment and training studies are prepared as part of the occupational outlook program. These provide information, generally narrower in scope and greater in depth than in the Handbook on such labor force topics as the demand for workers with a Ph.D. degree and analyses of the current and projected employment situations for scientists and engineers, technicians, and workers in library and computer occupations. Other special studies provide technical information to assist employment researchers in other agencies and outside of government, or are offered as guidance to those establishing training programs in both the public and private sectors. A prime topic of such studies is the supply of skilled labor for particular occupations. The occupational outlook program has issued a special report on the status of labor supply research methods and regularly publishes data on training completions by field of study.

Sources of Data

The occupational outlook staff uses a variety of data sources in developing employment projections and other employment information. The basic statistics on current and past employment in occupations are from the Bureau of Labor Statistics Current Population Survey (CPS). These data, collected monthly by the Census Bureau for BLS, outline employment with occupational definitions used in decennial censuses. This relationship between CPS and Census data concepts allows one series to complement the other. The Census provides reliable benchmark estimates each 10 years, while occupational movement in the intervals between censuses are gauged through the CPS program.

The Bureau of Labor Statistics also produces the major source of industry employment data used in the occupational outlook program. The Bureau’s Current Employment Statistics program reports on industry employment levels in Employment and Earnings, a monthly BLS publication. When these industry data are systematically combined with CPS/Census occupational data as well as data from a number of alternate sources for selected industries and occupations, the result is a comprehensive set of data on industry-occupational relationships or patterns. (These patterns are the subject matter of the Bureau’s Industry-Occupational Matrix program described later under Methods of Analysis and also the subject of chapter 6 in this Handbook.)

A number of alternate data sources also are used to measure employment. The Occupational Employment Survey, initiated by the Bureau in 1971, obtains wage and salary establishment employment data by occupation. (See chapter 7 for a description of this program.) Scientific and technical personnel surveys conducted by the Bureau contain detailed information on scientists, engineers, and technicians. The Censuses of Business and Manufacturing published by the Commerce Department provide additional industry detail. Information from the Civil Service Commission is used for data on Federal Government workers. These sources of occupational and industry employment statistics are further augmented by data from Federal regulatory agencies, such as the Federal Aviation Administration and Interstate Commerce Commission. In some cases, employment and other data are obtained from unions, industrial firms, trade associations, and professional societies. In general, however, these statistics serve to estimate employment in fields not covered by government surveys.

In developing analyses of past and projected changes in employment requirements — which will be described later — the outlook program uses statistics of output, hours of work, and output per worker hour. The major sources of these data are Bureau of Labor Statistics studies of productivity and technological development, Federal Reserve Board production indexes, and U.S. Department of Commerce output data from the Annual Survey of Manufactures and the Census of Manufacturers. Industry associations and unions also may provide similar statistics.

Estimates of the past and probable future supply of workers use different sources of information. U.S. Office of Education data on graduates from high schools, junior or community colleges, and 4-year colleges and universities, as well as Bureau of Apprenticeship and Training statistics on apprenticeship, provide input into the supply analysis. However, there are many gaps in the available data. The outlook program uses information from a number of other sources, often research of a one-time nature, to study the supply of trained workers. Among these sources are the occupational mobility studies and tables of working life developed by the Bureau of Labor Statistics. Further, the program has begun to collect data on training in private industry, where large numbers of workers historically have received job skills.

Earnings information that appears in many of the outlook publications is drawn primarily from wage and earnings surveys conducted by the Bureau of Labor Statistics. These data are supplemented with information from Federal regulatory agencies, studies of union

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3 Occupational Supply: Concepts and Sources of data for Manpower Analysis, BLS Bull. 1816; Occupational Manpower and Training Needs, BLS Bull. 1824.

4 These surveys, funded by the National Science Foundation (NSF) but discontinued in 1970, are being resumed by the Bureau of the Census again with NSF support.

Methods of Analysis

The projections of requirements and resources developed for the occupational outlook program rely, as indicated above, on input from a wide variety of data sources and are derived as part of a multi-program effort to provide a comprehensive view of tomorrow's economy and its industrial and occupational employment requirements. A broad systematic method of analysis is used to provide an overall economic framework for the occupational and industry projections. However, extensive in-depth studies also are prepared both to supplement and to check this more global type of analysis since many sectors of the economy are better studied independently, particularly industries and occupations that operate under special conditions or are affected by their own complex set of factors.

Construction of the projection framework begins with the statistics developed by the Bureau of the Census of total population in the target year, and its composition by age, sex, and color. These, in term, are used to develop projections of the labor force by age, sex, and color on the basis of changing labor force participation rates for each of these groups. The changes reflect a variety of factors, including changing educational standards, retirement practices, and size of families. (See "Projections of the Labor Force," chapter 2.)

Labor force projections then are translated into the level of gross national product (GNP) that can be produced by a fully employed labor force. GNP is derived by subtracting unemployment from the labor force and multiplying the result by an estimate of output per worker in the target year (of the projection.) Allowances are made for productivity growth and expected changes in hours of work.

The next step is to distribute this potential growth in real GNP among the major components of GNP: Consumer and government expenditures, business investment, and net foreign demand. Projections are then developed for each of the major demand categories, such as the amount spent by consumers for food, clothing, rent, automobiles, drugs, cosmetics, trips abroad, medical expenses, and other goods and services.

Once estimates are developed for the product or service to be purchased, the production load is allocated to the various industries which make the final product and to the intermediate and basic industries which provide new materials, components, transportation, electric power, and other goods and services required in making final products. This is done by means of an input-output table, developed by the Department of Commerce, that shows transactions and effects of such transactions among industries.

Estimates of production in each industry are then translated into employment requirements by projecting changes in output per employee hour in each industry and dividing this figure into output. Changes in output per employee are developed through studies of productivity and technological trends in all industries. These studies provide inputs to assess such things as potential competition among products, potential employment and economic effects of new technologies and inventions, and the effect of technological change on the occupational structure of industries.

As an independent check and to develop more detailed industry employment projections than allowed for by input-output tables, a regression analysis is conducted relating production and employment in various industries to the levels of final demand and other key variables. In addition, the occupational outlook staff conducts detailed in-depth studies for a selected number of industries. These result in projections of requirements based on a regression analysis of a variety of economic variables. Results of the regression analysis and input-output model are evaluated along with detailed industry analyses to develop final industry employment projections.

Projections of industry employment requirements are then translated into occupational requirements. The calculations are made through the use of occupational composition patterns for all industries in the United States, which are summarized in an industry-occupational matrix. This matrix, which is divided into 201 industry sectors, shows the composition of employment in about 420 occupations. These patterns are applied to current employment estimates and to projected requirements by industry to estimate current employment and future requirements by occupation. In developing these projections, allowance is made for changing occupational structures based on studies of the way each industry has changed in the past and is likely to change in the future. To arrive at a total for the economy, future employment requirements for each occupation are aggregated across all industries. (See The National Industry-Occupational Matrix, chapter 6.)

For many occupations, requirements are projected on the basis of relationships to certain independent variables rather than on proportional representation in each industry. This more narrow focus of analysis is particularly useful when projecting employment re-

requirements for an occupation that is affected by its own complex set of factors. For example, employment requirements for automobile mechanics are projected on the basis of the expected stock of motor vehicles and their maintenance requirements, and elementary school teachers on trends in pupil-teacher ratios applied to projected school attendance. Information is collected on changes in law, buying patterns, technology, government policy, employer hiring practices, and other factors and an assessment is made of how these changes may affect the demand for workers in various occupations. Employment projections then are developed by a method tailored to best fit the available data and the nature of the occupation under study. Projections developed through these independently conducted studies are then meshed with other occupational data in the matrix.

Projections of changes in employment requirements by occupation and industry provide only one part of the needed information on job openings to be filled in the years ahead. In most occupations the majority of job opportunities arise either as a result of experienced workers transferring to other occupations, or because of retirements and deaths.

To estimate the total number of openings likely to arise in a field, the occupational outlook staff has developed a number of working tools that help to describe general patterns of labor force separations. For example, tables of working life, which are similar to the actuarial tables of life expectancy used by insurance companies, provide a basis for estimating future rates of replacements needs resulting from deaths and retirements. These in turn are affected by differences in the sex and age distribution of workers in a given occupation.

To appraise the future employment situation in an occupation, estimates also must be made of the supply of personnel. This type of analysis is limited to those fields where the supply is identifiable. Statistics on high school and college enrollments and graduations are the chief source of information on the potential supply of personnel in many professions and in occupations requiring extensive formal education. Data on numbers of apprentices and graduates of vocational and technical training programs provide some information on new entrants into skilled trades. However, in many occupations, workers learn on the job, through company training programs. Special studies of training in industry are now being conducted to account for this source of skilled workers.

Not all persons who complete formal training or education in a particular field enter that field upon completion of their courses. As a result, special surveys also are used to provide additional information on the actual net supply of workers from a training program or a field of study. These include studies of employment plans of college seniors, job placements of college graduates, and jobs entered after completion of government training programs, as well as other types of training.

The net effects of interoccupational transfers are not known in any systematic fashion. Except for a few occupations where limited data are available, transfers out of an occupation are assumed to equal transfers in. Estimates of the future demand in an occupation then are compared to estimates of future supply to develop insights into the employment outlook for various fields of work. This information is provided to policy makers, educators, and others along with descriptions of the implications of these relationships.

**Presentation**

The *Occupational Outlook Handbook* is the major publication of the occupational outlook program. Oriented toward career guidance, the *Handbook* is a basic reference source, published every other year, which includes comprehensive and non-technical job information on approximately 850 occupations and 35 major industries, covering the entire spectrum of white-collar, blue-collar, and service occupations. An occupational outlook report series provides reprints of individual statements from the *Handbook*.

The *Occupational Outlook Quarterly* provides a continuous flow of current occupational and job information between editions of the *Handbook*, together with the most recent information available on earnings, training requirements, and other related topics.

The *Occupational Outlook for College Graduates* contains information, excerpted from the regular *Handbook*, on more than 100 jobs for which an education beyond high school is necessary or useful.

*Occupational Manpower and Training Needs*, which is published on a regular basis, presents both general and detailed information on the relationship between occupational requirements and training needs.

Two other sets of regularly published materials are a series of five *Education and Job Leaflets* that list jobs that require specific levels of education, and a series of 10 *Motivational Leaflets*, each of which discusses the types of jobs that may be available to persons having an interest or proficiency in a particular academic subject or field. In addition to these publications, developed mainly for use in vocational guidance and/or education planning, the occupational outlook program conducts technical and detailed studies on specific occupations and industries in order to furnish information to employment experts, educational planners, personnel departments, and others interested in the more technical aspects of the Nation's future employment needs.

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9 Work to develop more comprehensive estimates of occupational mobility currently is being conducted by the BLS using data collected in the 1970 Decennial Census.

10 Forthcoming issues of this publication will be titled *Occupational Projections and Training Data*.

Background

The Bureau of Labor Statistics has developed a comprehensive set of data on the occupational employment composition of all industry sectors in the economy. Presently, industry-occupational matrices are available for 1970, 1974 and 1985. These data are set up to form a matrix, or table showing estimated employment in specific occupations, plus groupings of occupations, cross-classified by industry sector. Thus, the occupational pattern of each industry sector is shown, i.e., the proportion of each occupation to total employment in an industry. Looked at another way, the tabulation shows how total employment in an occupation is distributed by industry.

Initially, work on the Industry-Occupational Matrix grew out of concern by the Department of Defense for anticipating the economic problems that might arise from various defense programs. The first set of tables related to 1950 and were prepared by the Bureau as a part of the inter-industry program sponsored by the U.S. Department of the Air Force. That program was terminated in 1953, but the 1950 matrix and its successors continue to provide the basic information for emergency employment planning, now carried on by the Federal Preparedness Agency. In recent years, a strong interest has developed in determining occupational needs for other purposes including training new workers, retraining workers displaced by automation, and providing State and sub-State occupational information to high school counselors, employment counselors, students, and other persons making career decisions. The Industry-Occupational Matrix provides a systematic approach to developing the desired information.

Sources of Data

Data for the Industry-Occupational Matrices are brought together from a wide variety of sources. A major source for the development of the 1970 matrix was the Occupation by Industry report from the 1970 Census of Population. The Current Population Survey (CPS) is the source for data on total employment, employment for broad occupational groups, and for a few large, specific occupations. Other sources of occupational employment data included the Bureau of Labor Statistics's annual surveys of occupational wage rates in metropolitan areas and selected industries; regulatory agency statistics on employment by occupation in the telephone, railroad, and air transportation industries; U.S. Civil Service Commission statistics on employment by occupation in the Federal Government; statistics on selected professional occupations based on licensing data and membership records of professional societies; and surveys of employers by the Bureau and other agencies to obtain estimates of employment in a limited number of highly important occupations such as scientists, engineers, teachers, and police officers.

Specific estimates from sources other than the Census were incorporated into the cells of the matrix; the remaining details in the matrix were derived by forcing 1970 population census estimates for detailed cells (published in Occupation by Industry) into agreement with control totals for occupational groups and industries from sources other than the Census. The occupational control totals were average annual employment by occupational group taken from the CPS. Most of the industry employment totals were based on BLS estimates of private wage- and salary-workers adjusted to include the self-employed, unpaid family workers, and government workers, and to exclude the secondary jobs of dual job holders. Total employment in agriculture and private households was based on CPS estimates. The adjustments of the matrix to consistency with CPS estimates of total employment and industry employment estimates, derived as described above, brings the matrix for 1970 into agreement with data used as the basis for the Bureau's projections of total employment and occupational employment by industry. The Bureau's occupational projections are reflected in, and developed in part through, matrix techniques. (See section on analysis and uses.) The 1985 matrix was developed by examining a variety of historical statistics on the changing occupational structure of industries including data from the 1950, 1960 and 1970 Censuses, and evaluating the factors likely to influence changes in the future such as expected new technology, changes in product mix, and the general organization of industries.

The 1970 matrix provided the base for the 1974 and 1985 matrices. Where available occupational data from other sources, such as those cited above, were incorporated into the updated matrices as fixed cells. For the remaining cells, first approximations of the occupational patterns for 1974 were made by interpolating between the patterns of the 1970 and the 1985 matrices. The resulting patterns (in mining and manufacturing) were then brought into consistency with data on production worker trends available from the Bureau's Current Employment Statistics program. The patterns
were then applied to individual industry employment controls and summed to arrive at occupational totals. These occupational control totals were then compared to data from the CPS and other sources of information. When necessary, certain occupations (except for fixed cells) were then forced on a prorated basis to predetermined occupational control levels. This iterative forcing procedure was repeated until the internal matrix cells were consistent with both the industry and the occupational controls. Thus, both the 1974 and the 1985 industry-occupational matrices were consistent with (a) national employment by industry, (b) broad occupational employment levels from the CPS, (c) trends in production (and nonproduction) worker employment by industry, (d) anticipated trends in occupational structure within industries, and (e) reliable estimates of detailed occupational employment available from the CPS and other sources.

Analysis

A basic objective of the project is to have available a comprehensive set of data on national industry-occupational relationships that can be used in projecting employment requirements by occupation. Although statistics on employment by occupation are relatively thin, particularly between decennial censuses, there is a great deal of information on total employment in detailed industries. Each industry uses a unique combination of occupational skills, together with other factors of production, in its efforts to achieve least cost for its output. Occupational patterns may be markedly different from one industry to another. For example, employment in the insurance industry is primarily of white-collar workers such as insurance agents, clerical workers, actuaries, and others. In contrast, the work force in restaurants is largely made up of food service workers, cooks, and owner-managers. Over periods of 5 years or less, the occupational structure of many industries remain relatively stable. Consequently, if good information is available on the occupational composition of individual industries for a base period, it can be used together with the available statistics on changing employment in each industry to develop estimates of current employment by occupation for later periods. Further, if projections of output and employment are available by industry, the base period occupational ratios applied to the industry employment projections will yield initial estimates of employment requirements by occupation for future periods.

Although the occupational patterns of many industries are relatively stable over periods of less than 5 years, it is clear that occupational patterns change with the advance of technology and changes in the supply of workers in each occupation. Hence, information on how technology and labor supply are changing the occupational pattern in each industry is used to modify the initial estimates. This improves the estimates of current employment by occupation and of future employment requirements by occupation developed by applying base period industry-occupational ratios to industry employment estimates. Changing technology and other factors that affect skill requirements are constantly being studied to estimate the future occupational structure of each matrix industry. The adjusted occupational patterns are then used, together with projections of employment by industry, to prepare estimates of future employment requirements to 1985.

Uses and Limitations

The National Industry-Occupation Matrix is a key tool used in the development of national occupational employment estimates and projections. The output of this project is reflected in the Bureau's Occupational Outlook Program, which is designed to provide information for use in the field of career counseling. It has proved to have many other uses, including studies of the changing utilization of workers by industry over time, the analysis of changing occupational skills by industry, the analysis of occupational skill requirements resulting from the impact of establishing new industries in specific geographic areas, and market research. Recently, the industry-occupational matrix has been used in various impact studies designed to measure the occupational effects of changes in the level of expenditures by the Federal Government for specific programs. In these studies, the indirect effects of various expenditure levels are traced throughout the economy using the Bureau's input-output table. Employment levels in each industrial sector are then specified by using the appropriate input-output coefficients. Staffing patterns derived from the industry-occupational matrix are then applied to the estimates of total employment in each industry, and summed up to determine the indirect occupational effects of the changes in expenditures.

The data included in the industry-occupation matrices are derived from several sources including the Census of Population, specifically data for a sample of the respondents; surveys conducted by the Bureau of Labor Statistics and others covering occupational employment, as well as licensing, and data enrollments in professional societies. The information obtained from the CPS and other surveys is subject to the response and sampling limitations typical of surveys (See, for example, the section on limitations of the Current Population Survey in chapter 1 of this Bulletin.) In addition, since, in some cases, the occupational definitions and concepts of the surveys frequently differ, data stemming from surveys must be adjusted and are subject to error resulting from analytical adjustments. The matrix data then indicates the general level and position the estimates hold in relation to the other occupational estimates within each major industry group. Consequently, the occupational estimates in the matrices
should be used with caution and should not be viewed as precise measurements. In general, the smaller the occupational estimates the less the reliability. In terms of data use, the current National Industry-Occupation Matrix is limited in scope to about 420 specific occupations and 201 industry sectors.
Chapter 7. Occupational Employment Statistics

Background

The Occupational Employment Statistics (OES) Program is a Federal-State cooperative program designed to produce State and area data on current and projected occupational employment for use in planning education and training activities. It provides a systematic, conceptually and methodologically consistent approach for the development of these data among the cooperating State employment security agencies and is an important element in the system of labor market information being developed by the Employment and Training Administration (formerly the Manpower Administration).

For many years the Bureau of Labor Statistics has been receiving requests, on a recurring basis, to provide current, reliable national and local data on job skills in industry. However, the magnitude and significance of the need for this data was not fully realized until the President’s Committee to Appraise Employment and Unemployment Statistics (the Gordon Committee,’ 1962) met to evaluate all the available statistical data collected at that time. The results of the committee’s efforts were published in its report, Measuring Employment and Unemployment. This report describes both the specific data needs and the possible applications these data would have for ascertaining and performing intelligent labor market analysis.

The complete lack of substantive and comprehensive occupational data at the time the Gordon Committee report was prepared is aptly described in the following excerpt from the Committee report:

"Except in a general way, we know relatively little about current changes in the number of workers employed in each important occupation and in the occupational structure of industry as a whole. It is apparent that the economy is undergoing changes that are significantly affecting the occupational structure of the labor force. Available job opportunities are diminishing for unskilled workers and even for many types of skilled workers. At the same time there is a rapid increase in the number of young people coming into the labor market each year. One-third of the labor force of a decade hence is now in school. Data on the numbers employed and trends in employment for specific occupations can provide a basis for estimating future occupational requirements and job opportunities and thus greatly aid in planning educational and training programs and in vocational counseling."

Interest in the collection and use of occupational employment data increased very rapidly following the Gordon Committee’s report. In fact, legislation soon followed that enhanced the need for gathering detailed occupational data by industry because it called for training programs to reflect the needs for trained workers, an objective that recognized human resources as the Nation’s most valuable asset. Section 103 of the Manpower Development and Training Act of 1962, as amended, for example, stipulates that "The Secretary of Labor shall develop, compile, and make available, in such manner as he deems appropriate, information regarding skill requirements, occupational outlook, job opportunities, labor supply in various skills and employment trends on a national, State, area, or other appropriate basis which shall be used in the education, training, counseling, and placement activities performed under this Act." In addition, the implementation procedures for the Vocational Education Act of 1963, as amended, called for the development of State vocational education plans that take into consideration projections of occupational requirements. Finally, the Comprehensive Employment and Training Act of 1973 called for the development of a comprehensive system of labor market information.

As a result of these legislative acts and as an effort to meet the needs of government planners and researchers in the field of employment and industrial management, the Bureau of Labor Statistics and the Employment and Training Administration initiated the Occupational Employment Statistics Program, in cooperation with the State employment security agencies.

Program Description

The OES program has three elements, which are described in detail further in this chapter. Briefly, they are as follows:

1. The Occupational Employment Statistics Survey — a mail survey designed to collect current data on wage and salary employment by occupation and industry from nonfarm establishments.

2. The National/State Industry-Occupation Matrix System—a set of tables (one for each State and the District of Columbia) that, for a specific period of time, show total employment in specific occupational categories, cross-classified by industrial sectors and class of worker categories, which are used as a principle tool in preparing estimates of current employment and projections of occupational requirements for States and sub-State areas.
Uses of the Data

The OES program is designed to produce occupational information for use by State employment security agencies and the Employment and Training Administration. It is, however, a program that provides many of the information needs of other data users, including individuals and organizations interested in planning vocational education programs, and the requirements in occupations where higher education or technical training is needed. Estimates of current and projected occupational employment developed in the program also are used in preparing information for use in career counseling, estimating the implications on occupational requirements of changing expenditures for Government programs, and to aid in job placement activities performed at employment security offices. Furthermore, the information produced provides a basis for the analysis of State and sub-State occupational employment, including changing employment use patterns by industry, the impact of technological and other changes on occupational requirements, and the location and number of occupational skills within and among States, including changes over time. A main benefit of the program is that it provides continuity and a basis for all States to have occupational projections to meet their program needs.

The OES program is a Federal/State cooperative program in which the Bureau has primary responsibility for the technical development and adequacy of the program; the Employment and Training Administration is responsible for funding, administration, and the use and application of the data generated by the program in planning and other activities concerning programs within its scope of responsibility; and State employment security agencies are responsible for the collection of current occupational employment data from employers, the incorporation of these data into the matrix system, the development of industry employment projections, and the final projections of occupational requirements developed for States and areas.

I. Occupational Employment Statistics Survey

Background

In the Fall of 1971, questionnaires were sent out to 50,000 manufacturing establishments throughout the United States, marking the beginning of a survey designed specifically to collect statistics on employment by detailed occupation and industry. This survey was conducted in cooperation with the Employment and Training Administration and 10 State Employment Security Agencies. It was designed to obtain occupational estimates for the Nation and for the cooperating States agencies. In 1973, a similar survey was inaugurated in most nonmanufacturing industries (excluding trade). In this survey the collection was done entirely by 22 State agencies. Between 1973 and 1975, surveys were conducted in trade and State and local government industries; subsequent surveys of manufacturing and nonmanufacturing industries also have taken place. Currently, 35 State agencies (including the District of Columbia) are cooperating in this effort.

Program Description

The OES Survey is a periodic mail survey conducted by State employment security agencies of a sample of nonfarm establishments to obtain wage and salary employment by occupation. The survey is conducted over a 4-year cycle (manufacturing industries one year; nonmanufacturing, except trade the second year; and trade industries the third year). These data are used to estimate total employment by occupation and by industry for each State and for areas within each State. Employment information is currently being collected for between 2,000 and 2,500 occupations.

A specially prepared list of occupations has been designed for each industry or for each group of industries surveyed that, in general, employ the same kinds of occupations.

Two types of survey questionnaires — one long and one short — have been developed. The short form concept was developed in the attempt to increase respondent cooperation by reducing the reporting burden in smaller establishments. Both formats include instruction and file copies and have occupational titles and accompanying definitions. The forms include establishment identification information and several questions concerning nature of business, status of activity, and auxiliary/non-auxiliary unit status. In addition, provision is made to provide on the questionnaire three-digit SIC descriptions to reduce industry misclassifications. The forms also include supplemental sheets for the long form respondents to report significant occupations that they could not place under specific titles, and thus reported in the “all other” residual data line. Experience with previous surveys has shown that the supplemental sheets can be a valuable tool in improving the occupational lists and definitions, as well as clarify-
ing and correcting reported data.

The long format specifies an extensive list of occupations specifically selected for each industry. Occupations are grouped under broad headings such as Clerical Occupations, Professional and Technical Occupations, and Service Occupations. At the end of each grouping, residual categories are included to allow for jobs that cannot be slotted into a specific occupational title on the questionnaire. As mentioned above, the respondents are requested to use the supplemental sheets to identify significant jobs in the residual categories.

The short formats include abbreviated occupational lists with accompanying definitions. No broad groups are specified. Those establishments' jobs that cannot be matched to the occupations listed on the forms are identified and briefly described by the respondents in the blank spaces following the job lists. When the questionnaires are returned, these additional occupations are coded according to the corresponding long form preparatory to making estimates of employment by occupation.

Concepts

An establishment is an economic unit which processes goods or services, such as a factory, mine, or store. It is generally at a single physical location and it is engaged predominately in one type of economic activity. Where a single physical location encompasses two or more distinct and separate activities, these are treated as separate establishments, provided that separate payroll records are available and certain other criteria are met.

Unit total employment includes full or part-time workers; workers on paid vacations or other types of leave; workers on unpaid short-term absences (i.e., illness, bad weather, temporary layoff, jury duty); salaried officers, executives and staff of incorporated firms; employees temporarily assigned to other units; and employees for whom this unit is their permanent (home) duty station, regardless of whether this unit prepares their paycheck. Unit total employment excludes proprietors, owners and partners of unincorporated firms; unpaid family workers; and workers on extended leave (i.e., pensioners and members of the Armed Forces).

Employees are reported in the occupation in which they are working, not in an occupation for which they may have been trained, if that is different. For example, an employee trained as an engineer but working as a drafter is reported as a drafter.

Working supervisors (those spending 20 percent or more of their time at work similar to that performed by workers under their supervision) are reported in the occupations which are most closely related to their work duties.

Part-time workers, learners, and apprentices are reported in the occupation in which they ordinarily perform.

Industrial Classification

The classification system currently used for compiling and publishing data is that described in the 1967 Standard Industrial Classification Manual. (See appendix B of this bulletin for a detailed description of this system.) Industries surveyed beginning in 1976 will be classified according to the 1972 Standard Industrial Classification Manual.1

Reporting establishments are classified on the basis of major product or activity data for the previous calendar year.

Occupational Classification

The OES occupational classification system is a combination of two widely used systems. Titles and descriptions of occupations used for data collection are derived primarily from the Dictionary of Occupational Titles, third edition, published in 1965 by the Department of Labor's United States Employment Service. The Census of Population, published by the Department of Commerce, Bureau of the Census, is the other major source used for occupational classification. The census is made up of about 400 categories reflecting broad occupational coverage without definitions. The Dictionary of Occupational Titles, on the other hand, is a more detailed classification system with definitions of each occupation and organized to meet the operating needs of the public employment service. These two systems, plus information compiled from industry officials and other sources, contributed to the OES occupational classification system. This system is organized to allow for the constant state of change that occupational terminology and classification undergo. This flexibility permits integration of the feedback gained from each successive round of OES surveys.

Time Period

Occupational employment data are requested for the pay period including the 12th of the month, which is standard for all Federal agencies collecting employment data.

Data Source

Sources of occupational data reported by respondents are personnel records and, especially for the small reporting units, personal knowledge of persons completing the reports.

Employment benchmarks for this survey are derived from employment data tabulated from the reports of the unemployment insurance program. In some non-

1 Standard Industrial Classification Manual (Office of Management and Budget, Executive Office of the President, 1972.)
manufacturing industries, supplemental sources are used to obtain lists of establishments that are not covered by unemployment insurance laws.

Collection Method

Data are collected from respondents primarily by mail, but personal visits are made to many large employers and to other respondents who indicate particular difficulty in completing the questionnaires. Normally two mailings follow the initial mailing and a subsample of residual non-respondents are contacted further by telephone.

Sampling

The OES sample is designed to yield reliable industry occupational estimates for the participating States and areas within those States. The sample members are selected primarily from the lists of establishments reporting to the State unemployment insurance program.

The sample design initially stratifies the universe of establishments by industry. All establishments employing 100 employees or more are included in the sample. In some industries and States the level of employment for establishments included with certainty is less than the 100 employees or more level. For establishments not included in the sample with certainty, an optimum allocation design is obtained by stratifying the industry by size classes and sampling the size classes with probability proportionate to the amount of employment contained in those size classes. Within each industry size stratum, the sample members are randomly selected.

Estimating Procedure

The occupational distribution of the reporting respondents in each industry by size class is determined by deriving the ratio of the sum of the employment in each occupation to the sum of the total employment of the corresponding reporting establishments. These distributions then are multiplied by the corresponding benchmark estimates of total employment in that size class. Estimates for occupations in each industry group are derived by summing all the occupational size class estimates within that industry group. Similarly, the estimates of combined industry groups are derived by summing the individual industry components.

Presentation

A report on the results of each OES Survey is published by the cooperating State employment security agencies. Each report consists of an analytical interpretation of the findings, and is supported by a statistical table showing estimates of occupational employment and measurements of the sampling error associated with the estimates.

Uses and Limitations of the Data

The collection and analysis of occupational composition patterns of industries show how different industries and different plants in the same industry employ workers in the various skills, the factor affecting occupational composition, and trends over time, which reflect technological and other changes. Such information is essential in projecting employment requirements by occupation (the needs for which are specified in education and training legislation) and for vocational and educational guidance purposes. The occupational composition of various industries is also needed to estimate the employment implications of proposed new Government programs, such as those in the fields of energy, pollution control, health, or urban mass transit. Local employment service offices use information on the occupational patterns of industries to locate employment opportunities for applicants. Finally, occupational employment and patterns data have many uses in analysis within and outside the firm, and in industrial management.

All surveys are subject to possible response and processing errors although these are reduced as much as possible through reviewing, editing, and screening procedures and through contact with reporters whose data are internally inconsistent or appear to involve misinterpretation of definitions or other instructions. In addition, estimates derived from sample surveys are subject to sampling error. In this program, sampling errors for occupational employment estimates are calculated and normally published with the estimates.

II. The National/State Industry-Occupation Matrix System

Background

Early in 1972, BLS inaugurated a new program called the National/State Industry-Occupation Matrix System. The purpose of the program, which is being developed in cooperation with the Employment and Training Administration and State employment security agencies, is to assist in the development of estimates of current occupational employment and projections of occupational requirements at the State and local levels. Currently, matrices, which are basically tabulations that distribute total employment by occupa-
tion and by industry for a specific period of time, are available for each State for 1970, 1974, and 1985.

The National/State Matrix System was developed in response to the employment and educational legislation of the past decade, which has continuously underscored the need for more and better information concerning current and future local labor market conditions. Recent moves to decentralize the responsibility for employment planning and training activities to State and local jurisdictions should add even further to the demands for the information produced through this system.

Program Description

The National/State Industry-Occupation Matrix System is basically an extension of the national matrix program (see chapter 6). The system is designed to provide a set of 51 (all States and the District of Columbia) individual matrices, or tables, that present total occupational employment, cross-classified by industrial sectors, for a specific period of time. These matrices are consistent in format, concept, and data base with the BLS national matrix. The system further provides for the development of matrices for sub-State areas, usually Standard Statistical Metropolitan Areas. It also includes occupation-specific death and retirement rates for each State, which are used to estimate total occupational openings. These rates were developed using special census tabulations of occupational employment distributed by age and the BLS standard working life tables. A flexible, multi-purpose computer system will permit cooperating State employment security agencies to update their matrices as required, prepare sub-State matrices, incorporate data from the Occupational Employment Statistics (OES) Survey into the matrix system, and develop projections of occupational requirements by industry sector.

The Matrix System provides a uniform and integrated set of State occupational matrices that show employment by industry and class of worker and are comparable in scope, coding, and structure with the National Industry-Occupation Matrix. Currently, each State matrix provides employment estimates for about 420 occupations and for 201 industry sectors. By integrating the occupational employment estimates derived from the OES Survey into the matrix system, the States have the most detailed occupational employment data base ever available to all States.

Uses and Limitations

The basic output of the National/State Industry Occupational Matrix System is the availability of current estimates and projections of occupational employment for States and sub-State areas, developed through standardized procedures, concepts, and definitions. This output allows for the analysis of occupational employment by industry on a comparable basis for areas within States, regions, SMSA's that cross State boundaries, and State and national data analyses. It allows for program evaluation, the study of geographical movement of occupational employment among and within States. It provides the State agencies with a basic tool for employment analyses, including the impact of technological and demographic changes on occupational employment requirements; the location and number of workers by occupation, and the impact of new industries or plant closings on employment in a State or an area within a State. Because the system uses a standard approach to employment concepts and occupational definitions, it provides an improved basis for relating occupational supply and demand data at the subnational level. In addition, the availability of State and sub-State matrices, and the projections of occupational requirements derived through the matrix system, provide basic occupational employment information for use in vocational guidance and counseling at the State and sub-State level. At the same time, the system produces occupational data needed for planning education and training programs at these levels.

The current State matrices available to State agencies are based on data derived from several sources including the Census of Population, industry employment data collected directly from employers, occupational data obtained from regulatory and licensing agencies, and other sources of occupational information. The data obtained from surveys are subject to the typical response and sampling problems of surveys. Data from the various sources frequently differ in employment concept and definition; hence, the employment estimates are subject to the problems associated with analysis and adjustment. The data then indicate the relative importance of an occupation to other occupations within each industry group. Consequently, the occupational estimates in the matrices should be used with caution, and should not be viewed as precise measurements. In addition, while the current matrices are restricted to about 420 occupations, the additional detail to be provided by the OES survey data will increase the utility of the system and reliability of many estimates, particularly those for relatively small occupations.
III. State and Area Occupational Projections

Background

The OES program is aimed toward the development of reliable estimates of current and projected occupational requirements data at the State and area levels and, ultimately, for the Nation. To aid in the development of this important information, the Bureau of Labor Statistics and the Employment and Training Administration, in cooperation with the State employment security agencies, are developing and making available systematic, standardized procedures for the State agencies to use in the development of occupational employment information for the States and areas within the States.

Program Description

This Federal/State cooperative program places the responsibility for preparation of State and area occupational projections in the State employment security agencies. These agencies are the source of essential State employment statistics and have knowledge of current and prospective State and area economic conditions that are needed to make reliable industry and occupational projections. The program is broad in scope in that it covers basic research leading to the development and improvement of standardized procedures for making current estimates and projections of occupational demand and supply at the State and sub-State levels; guidance to State agency staff concerning the use of the occupational demand and supply data in the planning and implementation of training and other manpower and employment service activities; preparation and dissemination of technical procedures and materials for use by the State agencies, as well as training of State agencies personnel by BLS regional office staff in implementing the procedures; computer systems that permit the State agencies to carry out the work related to the development of occupational employment data; and a communications network that permits State to express their data needs, review and comment on technical and other matters, and access a centralized data processing service.

In this program, each of the principal organizations have certain responsibilities. The Employment and Training Administration is responsible for the utilization of State and area occupational projections in training and employment service programs. The State employment security agencies have responsibility for the preparation, review, and publication of their respective State and area occupational estimates and projections. The Bureau’s responsibilities include the conduct of basic research leading to the development and improvement of standardized procedures for making current estimates and projections of occupational supply and demand; the development and updating of technical manuals; the publication of national projections and other information needed as tools in the development of State and area projections; and the development of computer programs, including a centralized data processing service.

To further the objectives of the program, research is done by the State agencies that is incorporated into the system, as is their insight concerning the needs of data users.

The State and area projections produced through this program provide a measurement of the magnitude of change in occupational employment requirements over the projection period. They are not intended to be precise measurements of future occupational employment levels. No attempt is made to adjust the projections for cyclical movements in the economy.

The projections are updated frequently to reflect the latest available data and the knowledge of economic conditions, including plant closings and openings; technological innovations; and other factors necessary to produce the most reliable projections possible. To further this end, the State agencies responsible for the projections are encouraged to consult representatives of industry, labor, and other government agencies during the developmental process to incorporate the widest possible knowledge concerning the economic area for which the projections are being developed.

Uses of the Data

Although the program is designed to meet the occupational data needs of the Employment and Training Administration and the State employment security agencies, the resulting State and area occupational information is useful to other data users as well. Major users, for example, are the State and local vocational education personnel involved in planning training programs. Because the output covers the full spectrum of occupational skills, State and regional personnel interested in the outlook for occupations requiring college education have begun to use the data to assess the supply of and demand for college graduates. As the data from the Occupational Employment Statistics surveys (conducted by the State employment security agencies) are used in the projections process, the program will have additional benefits. The survey covers, for example, many entry occupations and these data can be used in job development studies, as well as in preparing career guidance information. The survey detail will also facilitate the study of training needs and analysis of the changing use of workers by specific industries.
Chapter 8. Measurement Of Unemployment in State And Local Areas

Background

Unemployment estimates for States and local areas are developed by State employment security agencies to measure local labor market imbalance and hence are a key indicator of local economic conditions. These estimates are used by State and local governments for planning and budgetary purposes and as an indication of the need for local employment and training services and programs.

Under the Federal-State cooperative program, the Department of Labor develops the concepts, definitions and technical procedures which are used by State agencies for the preparation of labor force and unemployment estimates. Federal agencies use local area unemployment estimates to determine the eligibility of an area for benefits in various Federal assistance programs, such as the Comprehensive Employment and Training Act (CETA), the Public Works and Economic Development Act (PWEDA), the Concentrated Employment Program (CEP), and others.

Unemployment estimates have been developed for labor market areas for over 30 years. The program began during WW II under the auspices of the War Manpower Commission. The emphasis was to identify areas where labor market imbalance was created as a result of an inadequate labor supply, material shortages, and transportation difficulties. After WW II, emphasis was placed on identifying areas of labor surplus, and the program of classifying areas in accordance with the severity of unemployment was established.

In 1950, the Department of Labor's Bureau of Employment Security (now Employment and Training Administration) published a handbook on "Techniques for Estimating Unemployment" in order that comparable estimates of the unemployment rate could be produced among the States. During the late 1950's, the Handbook was improved by incorporating the experiences gained since the beginning of the decade. This research led to the formulation of the "70-step method" described in the "Handbook on Estimating Unemployment", published in 1960 by the Bureau of Employment Security. (See Technical Reference 1.) This method, also referred to as the "Handbook method," is a series of computational steps designed to produce total employment and unemployment estimates.

In November 1972, the Bureau of Labor Statistics was assigned the responsibility for developing the concepts and methods used by States to estimate labor force, employment, and unemployment. In late 1973, after extensive research, a new system for developing labor force estimates was introduced. It combined the main features of the Handbook method, including its concepts and definitions, as well as the estimation controls from the national survey for measuring the labor force status of individuals.

Handbook Method. During the development of the Handbook method, a effort was made to establish a set of procedures that would derive an estimate of unemployment for an area comparable to the estimate that would be produced by a random sample of households in the area, as in the Current Population Survey. On the assumption that comparability could be achieved, the Handbook presents a series of estimating “building blocks” where categories of unemployed workers are classified by their previous status. Three broad categories of unemployed persons are identified: (1) those who were last employed in industries covered by State Unemployment Insurance (UI) laws; (2) those who were last employed in noncovered industries; and (3) those who were either entering the labor force for the first time, or were reentering the labor force after a period of separation.

In the current month, the estimate of unemployment is an aggregate of the estimates for each of the three building block categories. An estimate for the covered category was derived from a count of current (UI) claimants and estimates of claimants whose benefits have been exhausted, persons who were disqualified from receiving benefits, and persons who filed claims late, or not at all. The estimates of persons who have exhausted their benefits and those in a disqualified status are based on the number actually counted in the current period, plus an estimate of those expected still to be unemployed from previous periods.

For the noncovered category, an estimate of unemployment is developed for each industry or class of worker subgroup. These estimates are based primarily on the “State covered unemployment rate” (the ratio of covered unemployment to covered employment), and the estimate of employment for the subgroup. For some subgroups, special scaling factors, based on relationships derived from national industry data, are used to control the size of the final estimate.

The third category, new entrants and reentrants into the labor force, could not be estimated directly from the UI system statistics because unemployment for these persons was not immediately preceded by a period of employment. Instead, an equation was developed to estimate total entrants into the labor force on the basis of the historical relationship of entrants to the experienced unemployed and the experienced labor force. At
a given moment in time, the Handbook estimate of entrants into the labor force is a function of: (1) the particular month of the year; (2) the level of the experienced unemployed; (3) the level of the experienced labor force, and (4) the proportion of the working age population that is considered “youth”. The estimate of total entrants for a given month is a composite estimate defined as:

\[ U = A(X + E) + BX, \]

where

- \( U \) = total entrant unemployment
- \( E \) = total employment
- \( X \) = total experienced unemployment
- \( A, B \) = synthetic factors incorporating seasonal variation, and an assumed relationship between the proportion of youths in the working age population and the historical relationship of entrants to either the experienced unemployed (B factor) or the experienced labor force (A factor).

The total employment estimate is based on data from several sources. The primary source is a survey of establishments which is designed to produce an estimate of the total number of employees on payrolls in nonagricultural industries. Estimates of agricultural workers, the self-employed, unpaid family workers, and domestics are developed synthetically.

**Concepts And Definitions**

There are several major conceptual and definitional differences between the Handbook method and the Current Population Survey (CPS). For example, in the Handbook, employment estimates are based primarily on establishment payroll data and hence are place-of-work estimates. By contrast, the CPS estimates are based on a survey of households in the area and hence are place-of-residence estimates. In the Handbook method, a person on an unpaid absence is excluded from the payroll estimate, but is considered employed in the CPS. Also, a person holding two jobs in covered industries within the reference week is counted twice in the payroll estimate, but only once in the CPS estimate.

The conceptual differences between the Handbook and CPS estimates of unemployment are more difficult to reconcile. Based on UI concepts, a person may be eligible for benefits, and hence be counted as unemployed, even if the person had earnings during the reference week because the State UI laws allow for some earnings below a fixed level, the so-called “forgiveness level.” In the CPS, persons having any earnings are counted as employed. The Handbook does not count (or estimate) the number of persons in covered industries who do not have sufficient time on the job or earnings to qualify for benefits. And since UI laws vary from State to State, the “forgiveness level” earnings, the criteria for the determination of eligibility for benefits and the treatment of persons who fail to qualify for benefits for nonmonetary reasons (quits, discharges, etc.), also vary from State to State.

**Methodological Improvements**

In 1973 and 1974, several modifications to the procedures used by the States for estimating employment and unemployment were introduced. These were designed to establish uniform labor force concepts and definitions in all States and areas, consistent with those used in the national labor force survey. The major thrust of the improvements has been in two areas: (1) Modifying the methods previously used by States and areas to estimate employment and unemployment, and (2) benchmarking (or controlling) State prepared estimates to annual average totals from the Current Population Survey.

**Procedural Modification.** One of the major modifications introduced was a procedure for adjusting the place-of-work employment estimates used in the Handbook to place-of-residence estimates, as in the Current Population Survey. Adjustment factors for the major categories of employment in the Handbook were developed on the basis of employment relationships which existed at the time of the 1970 decennial Census. These factors are applied to the preliminary employment estimates for the current period to obtain the adjusted estimates which are then used in the 70-step method. Each adjustment factor is defined as follows:

\[ \hat{E}_t^i = \left( \frac{C}{E} \right)^j E_t^i, \]

where

- \( C \) = Census estimate for the ith employment category
- \( E \) = Handbook estimate at time of Census for the jth employment category
- \( E_t^i \) = Preliminary estimate for the ith employment category during time period \( t \)
- \( \hat{E}_t^i \) = Adjusted employment estimate which replaces \( E_t^i \) in the derivation of the final estimate of total employment from the Handbook

**Benchmark Adjustment.** The benchmark method adjusts successive pairs of years in three general phases. First, the monthly Handbook estimates in each year are corrected for scale, creating a preliminary series. Second, the perturbation between the CPS and Handbook series is wedged into the relevant pair of years to produce a smooth preliminary series. Third, the adjustment error in a given year caused by developing the preliminary time series is forced into that year, yielding the final time series.

In the first phase, each pair of years is divided into mutually exclusive 4-month and 8-month periods. In the 4-month period of each year, May through August, preliminary estimates are produced by multiplying each Handbook estimate by the ratio of the CPS and Hand-
book annual averages for that year. This is an adjustment to the trend-cycle component of the Handbook series. In the final year, preliminary estimates for May through December are also produced in this manner.

The second phase consists of a combined trend-cycle and wedging or smoothing adjustment. The wedging process is necessary to produce a preliminary time series adjusted for differences between successive pairs of ratios of annual averages, caused by random variation. This phase replaces each Handbook estimate in the 8-month period, September-April, by a weighted composite estimate which is determined by multiplying the Handbook estimate for that month by the CPS/Handbook annual average ratios in each of the pair of years and then adding together a predetermined proportion of each product. The proportions used are, in effect, the weights. The generalized composite formulation is:

\[ \hat{E}_i = E_i R_i W^i + E_i R_{i-1} W^{i-1}, \quad i = 1, 8; \text{ where} \]
\[ E_i = \text{actual Handbook estimate for the ith month} \]
\[ R_i = \text{ratio of annual averages in the earlier year of pair} \]
\[ W_k = \text{the weights or proportions, where} \ K = 1 \text{ and } 2 \]

In September, for example, the composite estimate equals the sum of one-eighth of the product of the CPS/Handbook ratio of annual averages in year (t) and the September Handbook estimate in year (t-1), plus seven-eighths of the product of the CPS/Handbook ratio of annual averages in year (t-1) and the September Handbook estimate in (t-1). Since the sum of the weights equals 1, the weights are easily computed.

<table>
<thead>
<tr>
<th>Month</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$W_1$</td>
</tr>
<tr>
<td>September</td>
<td>$\frac{1}{8}$</td>
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<tr>
<td>October</td>
<td>$\frac{1}{4}$</td>
</tr>
<tr>
<td>November</td>
<td>$\frac{1}{6}$</td>
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<tr>
<td>December</td>
<td>$\frac{1}{2}$</td>
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<tr>
<td>January</td>
<td>$\frac{1}{2}$</td>
</tr>
<tr>
<td>February</td>
<td>$\frac{3}{8}$</td>
</tr>
<tr>
<td>March</td>
<td>$\frac{1}{4}$</td>
</tr>
<tr>
<td>April</td>
<td>$\frac{1}{8}$</td>
</tr>
</tbody>
</table>

Identical weights are used for December and January to preserve the relationship between these months during the adjustment process.

In the third phase, the preliminary monthly estimates are forced to the CPS annual average to produce the final time series. This is accomplished by multiplying the monthly estimates for each year by the ratio of the CPS annual average to the annual average of the preliminary estimates for the same year. In the last year of adjustment, however, a special procedure is used. The difference between the preliminary annual average and the CPS annual average is spread over the 11-month January-November period using special weights, thereby causing the December benchmarked and Handbook estimates to be in the same multiplicative relationship as are the annual averages. This lag adjustment is made in order to minimize the potential error in "predicting" the trend in the current year, implicit in the forcing process. Any prediction error would ultimately surface as an error in the extrapolated estimates, since the December estimate is the benchmark that is extrapolated forward.

**Extrapolation Procedures.** In the current year, the benchmarked estimates are extrapolated forward by applying the latest relevant correction factor to the current Handbook estimates of employment and unemployment. The employment factor used in year (t) is the quotient of the December employment benchmarked and Handbook estimates in year (t-1). The unemployment factor for year (t) is the algebraic difference between the December unemployment benchmarked and Handbook estimates in year (t-1). The preliminary benchmarked estimate for any month in the current year is then the result of applying the appropriate correction factor by multiplication (for employment), or by addition (for unemployment) to the current monthly Handbook estimate.

### Uses And Limitations

Estimates of unemployment and the unemployment rate are used by Federal agencies to determine the eligibility of an area for benefits in various Federal area assistance programs. Each month, the Department of Labor classifies 150 major labor market areas according to the degree of imbalance in the local labor market, as measured by the unemployment rates. These classifications are used by other Federal agencies for programmatic purposes, for example, to determine eligibility for grants under the Public Works and Economic Development Act, or for preference for local area firms in Federal contracts awards under Defense Manpower Policy No. 4.

The Employment Training Administration of the Department of Labor uses unemployment data to determine whether an area is eligible to receive funds under the Comprehensive Employment and Training Act (CETA) of 1973 and for allocation of these funds. For example, units of general local government of a specified minimum population size are eligible to receive funds under Titles II and VI of the Act, if the unemployment rate in the area is at least 6.5 percent for 3 consecutive months, as determined by the Secretary of Labor. The amount of funds received by the area is prorated on the basis of the levels of unemployment in the eligible areas. For larger units of local government, called prime sponsors, 37.5 percent of the funds allocated to an area under Title I of the Act, is based on the unemployment level.

The CPS annual average estimates used to control labor force estimates at the State level and for large metropolitan areas are based on a random sample of households and hence are subject to sampling error. BLS does not accept sample estimates as controls un-
less the coefficient of variation (standard error divided by the mean) of the estimate is 10 percent or less at 1 standard error. The monthly estimates prepared using the modified Handbook method are synthetic estimates, not subject to sampling variability. Yet other types of nonsampling errors and biases do occur. The BLS has not determined the mean square errors of these monthly estimates.

Technical References

Number


   This report presents an overview of the new procedures used to estimate unemployment in States and local areas. The new method is designed to produce estimates that are more comparable from State to State and are consistent with the national unemployment estimates.


   This chapter provides definitions of the labor force concepts used in the Current Population Survey (CPS), as well as a brief description of the sample design.


   This chapter describes the procedures used to estimate nonagricultural wage and salary employment.
Chapter 9. Employment and Wages Covered by Unemployment Insurance Laws

Background

Employment and wage data for workers covered by State unemployment insurance laws and for Federal civilian workers covered by the program of Unemployment Compensation for Federal Employees (UCFE) are compiled from quarterly tax reports submitted to State employment security agencies by employers subject to the State unemployment insurance laws and Federal installations subject to the UCFE programs. This program of compiling employment and wage data is commonly referred to as the ES-202, the Federal report which summarizes data from the quarterly tax reports.

The Federal Unemployment Insurance Tax Act provisions first became effective in January 1938. The Act applied only to firms employing at least eight persons in 20 weeks in a calendar year and excluded certain categories of workers. Amendments to Title XV of the Social Security Act — The Program of Unemployment Compensation for Federal Employees — extended coverage to Federal civilian employees on January 1, 1955, and to workers in firms employing from four to seven workers on January 1, 1958.

In 1958, the Unemployment Compensation for Ex-servicemen (UCX) program became effective, bringing under coverage a significant portion of men and women who had served in the armed forces. (The programs for ex-military personnel which existed prior to 1958 were of a temporary nature.)

Over the years many States have, through changes in State legislation, provided unemployment insurance protection to additional categories of workers above the base established through Federal legislation.

Federal legislation embodied in the Employment Security Amendments of 1970 effective January 1, 1972, extended coverage of State unemployment insurance systems to firms employing one or more workers in 28 States (the remaining States had already expanded coverage for these small employers prior to the passage of the Federal minimum requirement) and expanded some of the statutory coverage provisions. These amendments as well as additional changes in State legislation have broadened the base of workers protected by unemployment insurance to more than three-fourths of all workers. Special provisions for railroad workers are made through the Railroad Unemployment Insurance Act.

Data on employment and wages of workers covered by unemployment insurance have been published quarterly in Employment and Wages since the first quarter of 1950. Before that time reports were issued semiannually and annually beginning with 1938. In 1972, publication and technical responsibilities for the ES-202 program were transferred to the Bureau of Labor Statistics from the Employment and Training Administration (formerly Manpower Administration) of the Department of Labor. Prior to that time, the Bureau performed the data processing functions of the ES-202 under contract from Employment and Training.

Description of the Program

As of 1974, more than 3.8 million reporting units of employers in private industry were subject to State unemployment insurance laws. These units submit to State agencies quarterly contribution (tax) reports which contain data on monthly employment, and quarterly total and taxable wages, and contributions. Similarly, reports of monthly employment and quarterly wages are submitted by approximately 33,000 reporting units of the Federal Government. These reports, summarized each quarter by State agencies, provide a virtual census of workers (and their wages) of private nonagricultural employers and the Federal Government. In addition almost 80 percent of State government employees are covered. Only 15 percent of local government employees and 4 percent of workers engaged in agricultural production activities are in covered employment.

Summarized employment and wage data obtained from the contribution reports are transmitted quarterly to the Bureau of Labor Statistics by the employment security agencies of the 50 States, the District of Columbia, and Puerto Rico. The Virgin Islands report only employment and wage data for Federal workers. These data are in turn summarized by BLS and published in the quarterly Employment and Wages.

Concepts

The employment and wage data represent the number of workers earning wages during the pay period including the 12th of the month. These data are reported
EMPLOYMENT AND WAGES COVERED BY UNEMPLOYMENT INSURANCE LAWS

on the quarterly reports of employers and supplemented by statistical reports from multieestablishment employers engaged in more than one industrial activity or geographic location. The pay period will vary, in both date and length from employer to employer. For most employers, the payroll period is a 7-day period, not necessarily a calendar week. An employer who pays on more than one basis (such as production employees weekly and office employees semimonthly) reports a figure that is the sum of the number of workers on each type of payroll for the appropriate period.

The employment count of workers includes all corporation officials, executives, supervisory personnel, clerical workers, wage earners, persons on paid vacation, piece workers, and part-time workers. Since the employment count is based on individual establishments, the workers are reported as working in the State of the physical location of their job.

Persons on paid sick leave, paid holiday, paid vacation, and so forth, are included, but those on leave without pay for the entire payroll period are excluded. Persons on the payroll of more than one establishment during the period are counted each time reported. Workers are counted even though, in the latter months of the year, their wages may be nontaxable for unemployment insurance purposes. The employment count excludes the following: (1) Workers who earned no wages during the entire applicable pay period because of strikes or work stoppages, temporary layoffs, illness, or unpaid vacations; (2) workers who earned wages during the month without earning any during the applicable pay period; and (3) proprietors, the self-employed, unpaid family workers, most farmworkers, and most domestics in private households.

Federal legislation, according to provisions of PL 91-373, now requires the States to cover employees in State owned and operated hospitals and State institutions of higher education. In addition, the UI laws of 42 States provide coverage for some portion of the State and/or local government employees, although in some States these laws are not implemented. In 24 States, coverage is mandatory for all State employees and in 6 States, coverage of both State and local government workers is mandatory. In the remaining States, coverage is elective, so that only 80 percent of State government and 15 percent of local government employees are actually covered. (Details on coverage laws are provided in Comparisons of State Unemployment Insurance Laws, available on request from the Employment and Training Administration, UI Service, Washington, D.C. 20212).

Employment data reported for Federal civilian employees are a by-product of the operations of State employment security agencies in administering the provisions of title XV of the Social Security Act—the program of Unemployment Compensation for Federal Employees. The data are based on reports of monthly employment and quarterly wages submitted each quarter to State agencies for all installations of Federal agencies having employees covered by the act, except the Central Intelligence Agency and the National Security Agency, which are omitted for security reasons. A Federal installation is a single physical location at which an organizational unit of a Federal department or agency has civilian employment.

The Department of Defense (except units paid from nonappropriated funds) submits these data under a special arrangement. In lieu of quarterly reports, installations of the Departments of Army, Navy, Air Force, and other Defense units submit monthly reports to the State agencies covering each installation having 101 employees or more. Quarterly data for all installations including those having fewer than 101 employees are reported directly to the Bureau of Labor Statistics, which then transmits the figures to the States for inclusion in the Department of Defense totals.

The Federal agencies currently report data separately by installation, except where they exercise the option to combine small installations in a single "statewide" report. Installation reporting permits grouping the data by political subdivision below the State level, i.e., county metropolitan areas, etc.

The employment count for any given month for all agencies (except the Department of Defense) is based on the number of persons on the payroll for the period including the 12th of the month. The employment count in installations of the Department of Defense includes persons employed on the last workday of the month plus all intermittent employees during the month. As used here, intermittent workers are occasional workers who were employed at any time during the month.

Total wages are in most States the total amount of compensation paid by the employer to employees during the calendar quarter for services performed, regardless whether the services were performed during the calendar quarter. A few State laws specify that the wages reported shall be on a payable basis, i.e., for services performed during the quarter. Under most State laws or regulations, wages include bonuses, the cash value of meals and lodging when supplied, and tips and other gratuities.

Employer contributions for old-age and survivors insurance, for unemployment insurance, for workmen's compensation, and for private pension and welfare funds, although generally considered supplementary to wages and salaries, are not included in wages of workers in private industry for the purposes of reporting to State agencies. On the other hand, employee contributions for the same purposes, money withheld for income taxes, union dues, etc., are included as wages even though they are deducted from the worker's gross pay.

For Federal workers, wages represent the gross amount of all payrolls for all pay periods ending within the quarter. This gross amount includes cash allowances and the cash equivalent of any type of remunera-
tion. It includes all payments for sick leave, lump-sum payments for terminal leave, withholding taxes, and civil service retirement deductions. Federal employee remuneration generally covers the same type of services as those for workers in private industry. Depending on the method used by the Federal agency in preparing its quarterly summary balance (cash or accrual basis), the gross amount of payrolls is either paid or payable.

**Taxable Wages and Contributions**

Taxable wages, which are that part of wages subject to the State unemployment insurance tax, and the contributions paid on such wages also are reported on quarterly contribution reports from covered employers.

Under provisions of Federal law, certain units of State and local government after 1942 and certain non-profit establishments of the private sector after the 1972 expansion of coverage could elect to reimburse the State under which they were liable for any claims that may have been filed against them. These reimbursable accounts are not subject to the quarterly assessment for the insurance funds. For these accounts and, of course, those accounts under UCX and UCFE programs, the taxable wage and contribution items would not be reported on their quarterly report.

An employer pays contributions on only the first $4,200 of an employee’s annual wage in all but five States. The portion of wage subject to taxation is determined by State law and has varied substantially over time. In 25 States, employers may obtain lower tax rates by making voluntary contribution to the unemployment fund.

Three States—Alabama, Alaska, and New Jersey—also accept contributions from employees. Such contributions are included without separate identification.

**Industrial Classification of Data — 1938 to Date**

Employment and wage data have been classified by industry beginning with 1938. (See table.)

From 1938 through 1941, quarterly and annual data were classified in the 80 two-digit industry groups shown in the 1939 edition of the Social Security Board Industrial Classification Code.

From 1942 through 1946, the annual data were classified into 402 three-digit industry groups and the quarterly data into 77 two-digit groups provided in the 1942 edition of the Social Security Board Industrial Classification Code.

For 1947 and 1948, the annual data were classified into 406 three-digit groups and the quarterly data into 77 two-digit groups provided by the 1942 edition of the Social Security Board Industrial Classification Code for nonmanufacturing industries and in the 1945 edition of the Standard Industrial Classification Manual for manufacturing industries.

From 1949 through 1957, the quarterly data continued to be classified into two-digit groups and, in addition, by three-digit groups on the same basis as in the 1947-48 period. The reporting of annual data by the States was discontinued.

Data for the years 1958 through 1963 were classified into 384 three-digit and 79 two-digit industry groups based on the classifications established in the Standard Industrial Classification Manual, 1957 edition. From 1964 through 1967, the series were classified as
amended by the 1963 Supplement to the Manual.

Beginning with data for the January-March 1968 period, 384 three-digit and 78 two-digit industry groups were used for classifying the data. These groupings are based on the 1967 edition of the Standard Industrial Classification Manual. Conversion of the employment and wage series to the 1972 edition will take effect beginning with data for the first quarter 1975.

Employment and wage reports submitted by State agencies do not carry industry detail beyond the three-digit level except for manufacturing industries. For manufacturing, four-digit classifications are required in the reports for the first quarter of each year, beginning with those for the January-March 1956 period. Most States, however, classify all reporting units for all industry sectors in their records with four-digit industry codes, and some have tabulated data available for these industries.

The objective in industry classification is to have each place of business coded on the basis of its principal activity. If a firm in private industry or a government agency conducts different activities at its various establishments or installations, separate industry codes are assigned to the extent possible to each establishment. Industry codes are assigned by State agencies to each reportable establishment or installation based on “nature-of-business” information submitted for them.

Classification of Data by Employment Size-of-Reporting Unit

For the first quarter of each year from 1959 to the present, with the exception of the 3-year period from 1964 through 1966, tabulations showing employment and wage data by size-of-reporting unit are included. Reporting units are, for the most part, individual establishments of employers. An establishment is generally defined as a single physical location at which one, or predominantly one, type of economic activity is carried on. Most employers covered under the State UI laws operate only one place of business. In such instances, the establishment, the reporting unit, and the employer are identical. Employers who operate at two or more locations and have employment of more than 50 workers in all of their secondary locations combined are requested by the State agencies to identify separately the employment and payrolls of each location. To the extent that State agencies have been successful in obtaining employer cooperation in this regard, the reporting units and establishments of such employers are identical. When multiestablishment employers do not furnish this breakdown, the employment and payrolls for the secondary locations are combined and reported with the primary location as one reporting unit. Also, particularly in industries characterized by small branch establishments (e.g., food stores, drug stores, banks), employers are allowed to group all branch establishments in a single county and report the combination as a single reporting unit.

In the government industry division, the equivalent of a reporting unit is termed an “installation” and the governmental organization of which it is a part — i.e., the department, agency, or instrumentality responsible for an activity of government is the employer (firm equivalent). Federal agencies are requested to follow slightly different criteria from private employers in breaking down their reports by installation. They are permitted to combine as a single statewide reporting unit (a) all installations with 10 workers or fewer or (b) all installations which have a combined total in the State of fewer than 50 workers. Also, when there are fewer than 25 workers in all secondary installations in a State, they may be combined and reported with the major installation.

As the result of the above-mentioned procedures, the number of reporting units is always larger than the number of subject employers (or government agencies) but smaller than the number of establishments (or installations).

Nine employment-size intervals are used in the size-of-reporting unit distributions. Subject only to the limitations of industry coverage, all but one of these class intervals represent the actual business population in the given size classes.

In some States, nonprofit organizations having under four employees are not required to be covered. In almost all of these States, however, employers can voluntarily participate in the State unemployment insurance program and the data from these establishments are included in the tabulations.

Limitations

The employment and wage data for quarters may be affected by strikes, by bonus payments (usually in the October-December quarter), by retroactive payments, and by the influx of young summertime workers in the July-September quarter. Employed covered workers, covered workers, and covered jobs are considered synonymous because of the close approximation of jobs and employed workers in the employment counts. The employment figures overstate to some extent the number of individuals who were at work and receiving pay during the week including the 12th of the month. Contributing to the overstatement are the dual or multiple jobholders — those workers appearing on more than one payroll for the same period. The overstatement due to multiple job holding is to a large degree offset by the underreporting of workers due to turnover and unpaid absences occurring in weeks other than the one being measured.

Coverage may vary from State to State for those industry sectors for which there are no Federal requirements such as local government, part of State government, agriculture, self-employed, and domestic workers.
When UI-covered private industry employment data are compared directly with other employment series, the industry exclusions should be taken into account. During January-March 1974, there were excluded from coverage approximately 1.2 million agricultural workers; 1.8 million self-employed farmers; 5.5 million self-employed nonagricultural workers; 1.4 million domestic workers; 1.2 million employees of nonprofit religious, charitable, medical, scientific and educational institutions; and 0.8 million unpaid family workers. In addition to the above private industry employees, 8.1 million State and local government workers were not protected by unemployment compensation laws. Also excluded from the data are 2.3 million members of the Armed Forces and 0.6 million workers covered by the railroad unemployment insurance system.

Since the data are secured as an incident to the collection of UI taxes and comprise a universe count of employees covered by those taxes, the report is not subject to sampling variability. Error sources do of course exist. One of the most important is caused by the need to include an estimate for delinquent accounts. The number of estimations made varies from 2 to 10 percent of total reporting units in each State resulting in employment estimates for about 1 percent of total employment. No uniform estimating procedures exist among the States; however, estimates are usually prepared for the individual reporting unit based on data reported for the preceding quarter taking into account seasonal variations and the trends in employment reported by employers and installations in the same industry cell. Other sources of error include industry and location coding errors for single unit establishments and aggregation errors from multi-industry and multi-location employers from which separate reports for each unit are not provided.

The unemployment insurance reporting system is capable of producing data at all levels of aggregation down to the county and four-digit industry basis. The quality of data at the lowest levels of aggregation and distributions by size of firms are subject to the control each State maintains in its location and industrial coding and, to a great extent, its success at soliciting establishment data from multi-unit firms. With this caveat, data for detailed industries and locations (usually county or labor market areas) may be obtained from the relevant State agencies. To preserve the anonymity of establishments in private industry and of government installations, the BLS withholds publication of employment and wage data from any State or the National industry level in which there are fewer than three reporting units. At the request of a State, data also are withheld for any industry level in that State where (1) there is any reason to believe that the “fewer than three” rule would not assure against disclosure of information relating to an individual reporting unit or otherwise violate the State’s disclosure provisions and (2) where the employment of a single installation or establishment accounts for over 80 percent of the industry.

With the expansion of coverage in 1972 to include the great percentage of those persons that are considered “employed,” and recent improvements in data processing procedures at State and national levels, these data series have become a timely and accurate indication of the present state of the labor market in both industry and geographic cross-sectional detail.

**Comparison of UI-Covered Employment Data With Other Series**

**County Business Patterns (CBP) Data.** The differences between UI-covered employment data and employment covered by the Federal Insurance Contributions Act (Social Security) as published in *County Business Patterns*, are due primarily to (1) provisions in a number of State unemployment insurance laws excluding selected groups from UI coverage; (2) differences in industrial classifications that arise because of differences in what constitutes the reporting unit that is to be classified and in the treatment of central administrative offices and auxiliary units; (3) differences in the coverage of nonprofit organizations; (4) other factors, such as differences in reports submitted by employers to Federal and State agencies and differences in methods of processing and adjusting the data.

**Employment and Payroll Data in the Economic Censuses.** For complete censuses, such as the Census of Manufacturers, the Census of Mineral Industries, and the Census of Business, the information is obtained from establishments and the concepts of employment for industries in these censuses are similar to those in the unemployment insurance reports. However, employment totals will differ due to (1) exclusions from coverage in the UI program, (2) differences in industrial classification particularly of central administrative offices and auxiliary units, and (3) differences in pay periods to which the data relate; for example, employment data for the most recent censuses for retail trade, wholesale trade, selected services, and public warehouses, represent counts for the pay period including March 12 for the year 1972. For manufacturing and mineral industries, employment represents an average of all production workers on the payroll during the pay periods including the 12th of March, May, August, and November plus all other employees on the payroll during the pay period including March 12. The employment for the construction industry represents estimates of the average number of employees on the payroll for the pay periods including the 12th of March, May, August and November.
**Current Population Survey (CPS).** The UI-covered count of both private and government employment contains some duplication resulting from workers who appear on two payrolls because they have changed jobs or worked at two or more jobs simultaneously during the reporting payroll period. Such workers are counted only once for the Current Population Survey (information obtained from a sample of households), which classifies the workers according to the job at which they worked the greatest number of hours in the survey week. CPS figures on total civilian employment also differ from payroll count figures in that they include farmworkers, self-employed persons, domestics, and unpaid family workers who worked 15 hours or more in the survey week, etc. The UI-covered count does not include as employed certain persons "with a job but not at work" — those persons who earned no wages during the pay period because they were temporarily absent from their jobs due to unpaid vacations, taking time off, illness, industrial dispute, or bad weather. Such persons are counted as employed by the household survey if they were not looking for work during the survey week. The UI-covered employment series includes all individuals in covered employment regardless of age. In 1966 and earlier years persons under 14 years of age were excluded from the CPS labor force statistics. Subsequent to 1966 persons under 16 are excluded.

**Current Employment Statistics (CES) Program.** The Bureau of Labor Statistics, the Employment and Training Administration, and, in 47 States and the District of Columbia, State employment security agencies cooperate in the operation of the Current Employment Statistics program. In the remaining States, the program is operated by other State agencies in cooperation with the BLS. The program was extended to Puerto Rico and Guam in 1975. In the CES program, the State agencies have responsibility for the preparation of current estimates of employment for the State and for the major labor market areas in the States, while the BLS has responsibility for national estimates. The current monthly nonagricultural employment estimates by industry for the nation and States are benchmarked to the UI-covered employment data supplemented by employment data not covered by UI obtained from various sources including County Business Patterns. The current estimates of employment, average weekly and hourly earnings, and average weekly hours are derived from payroll reports submitted by a sample of 160,000 establishments.

**Civil Service Commission (CSC) Data.** The Civil Service Commission publishes a statistical series on Federal employment and payrolls which provide information on employing agencies, types of positions and appointments, and characteristics of employees. The Federal employment data covered by UCFE provide industry and local area detail not available in the CSC series, as well as an actual count of monthly employment by State which is available in the CSC series only for December of each year. Both the UCFE and CSC counts of the employed exclude: (1) Members of the Armed Forces, (2) temporary emergency workers in cases of fire, flood, earthquake, etc., and (3) officers or crew members of an American vessel (a) owned by or bareboat-chartered to the United States, and (b) whose business is conducted by a general agent of the Secretary of Commerce, if there is liability for the payment of payroll taxes to an unemployment compensation fund under a State UI law.

Certain Federal workers are in the UCFE count who are not in the CSC count and vice versa. For example, included in the UCFE count but excluded from the CSC count are Defense Department workers paid from nonappropriated funds, employees of County Agricultural Stabilization and Conservation Committees, State and Area Marketing Committees, and the Agricultural Extension Service. Excluded from the UCFE count but included in the CSC count are workers employed outside of the United States and its territories, workers paid on a contract or fee basis, paid patients or inmates of Federal homes, hospitals or institutions, and certain interns, nurses, and student employees of Federal hospitals. The UCFE employment count relates to the payroll period including the 12th of the month; whereas the CSC count represents the number of persons employed on the last workday of the month plus all intermittent employees during the month.

**Presentation and Uses of the Data**

**Employment and Wages,** a quarterly publication by BLS-Washington contains national totals of all covered employment and wage data by the broad industry divisions, major industry groups, and three-digit industry groups. The data also are distributed by State for all industry divisions, most major industry groups, and selected three-digit industry groups. Publications for the first quarter of each year also include national totals for four-digit manufacturing industries.

Employment and wage data for Federal workers also are tabulated by agency for the country as a whole. In addition, data are shown by State for the largest agencies.

For the first quarter of each year from 1959 to the present except for three years (1964-66), the publication includes tabulations showing the distribution of employment and wages by size-of-reporting unit for each major industry division within each State and for two-, three-, and four-digit (manufacturing) reporting units for the United States as a whole.

State agencies publish their ES-202 data in a similar...
manner, providing some county breakdowns and labor area totals. Many States issue their publications only once a year or in combination with the relevant data.

The private employer contribution reports and the government reports provide data necessary for administering the employment security program in the States. The private industry employment data reflect the extent of unemployment insurance coverage of the individual State laws, and the corresponding wage data provide a basis for estimating the future flow of income into State unemployment insurance funds. The revenue for these funds is derived from a tax on payrolls of covered private employers. Analyses of covered employment and payroll data are fundamental to the development of estimates of tax yield. Actuarial studies and evaluation of the financial solvency of State unemployment insurance funds must take into account employment and payroll fluctuations, the State's industrial composition, and the degree to which there is concentration in industries particularly sensitive to economic changes.

Listings of private employers and government agencies are used to select the major establishments and installations located in the area actively served by local employment offices. Such information frequently serves as panels for sample selection and provides control totals for research on occupational patterns in labor areas, the place of work and place of residence of workers, and special studies of other facets of labor.

The data produced by this program represent the largest universe of monthly employment and quarterly wage information by industry and by State regularly available in the country. As such, they have broad economic significance in evaluating labor trends and major industry developments both for the Nation as a whole and for individual States. In addition to the basic uses in the Federal-State employment security system, these wage data are used by other organizations, either independently or in cooperation with the BLS and the State agencies, in the preparation of other statistical series. Two of these uses are detailed below:

1. National Income: The Bureau of Economic Analysis, Department of Commerce, uses the State unemployment insurance wage data as the major wage and salary component of the national income estimates and the State distributions of wage and salary payments which it prepares each year. In addition, State unemployment insurance data are used to estimate that part of the wage and salary supplementation which is accounted for by employer contributions to State unemployment insurance funds, as well as the Federal employer taxes paid for old-age and survivors insurance purposes.

2. Current Employment Estimates: Since 1939, the basic source of benchmark information for "all employees" in the Current Employment Statistics program by industry has been covered employment data for private industry and, beginning with 1959, by size of establishment. Beginning in 1972, unemployment insurance data account for about 86 percent of the total benchmark. The notable exceptions are private elementary and secondary schools, religious organizations, and State and local governments.

The UI-covered employment figures are useful in time series analysis and industry comparisons. The distribution of data by size-of-reporting unit are useful in measuring the impact of the extension of coverage to small firms, analyzing wages by size of firms, and benchmarking hours, earnings and labor turnover statistics.

**Average Earnings**

Data on wages and average employment of both private and Federal workers are used for calculating, with reasonable accuracy, average weekly earnings of covered workers. The average weekly wage is computed by dividing total wages for the year by 52 to derive a figure on wages paid during the average week of the year, which is then divided by the corresponding figure on average monthly employment. Similarly, quarterly wages are divided by 13. This procedure assumes that "average monthly employment" is approximately the same in an average week, an assumption justified by the fact that the pay periods for which employment is reported are in most cases single weeks. Caution should be exercised in using these average weekly earnings particularly those developed from quarterly total wages. The wage data for quarters may be affected by strikes, by bonus payments (usually in the October-December quarter), retroactive payments, and by the influx of young summertime workers in the July-September quarter.

The average weekly wage per covered worker computed by the above procedure cannot be used to calculate average annual or quarterly wages of workers, since such averages would be overstated due to the effects of labor turnover, short-time jobs, etc. The number of different workers employed at one time or another during an entire quarter or year, and hence sharing in the wages paid for the quarter or year, is substantially larger than the average number counted as employed in the pay periods including the 12th of each month of the quarter or year. Also, the incidence of multiple job holding and part-timers among locations, industries, and time periods in the year would affect comparisons of different earnings series. More extensive data on annual per capita earnings of workers can be obtained from individual continuous work history tabulations prepared by the Bureau of Old-Age and Survivors Insurance and from special studies prepared by some State employment security agencies from their employee wage record files.
Technical References


3. Interstate Conference of Employment Security Agencies, The


Chapter 10. Characteristics of the Insured Unemployed

Background

The survey to measure the characteristics of the insured unemployed was initiated in 1959 by the Unemployment Insurance Service of the U.S. Department of Labor as an aid in evaluating its programs. Since the number of persons being served by the UI system had been expanded considerably during the 1950's, there was a need to provide insight and understanding of their characteristics. In recent years, as unemployment insurance was expanded to cover about three-fourths of all workers, increasing interest in the data was expressed by economists and other social analysts, particularly during periods of economic decline. In 1972, when it was recognized that these data were useful as general purpose statistics, responsibility for the survey was transferred from the UI Service to the Bureau of Labor Statistics.

Description of the Program

Characteristics of the insured unemployed are obtained as a by-product of the operations of the State unemployment insurance programs which are administered by State employment security agencies. Statistics on insured unemployment are based on the claims filed by individuals eligible for unemployment insurance benefits.

Under cooperative arrangements between the State employment security agencies and the Bureau of Labor Statistics, the State agencies select each month a sample of records of continued claims filed by individuals seeking benefits through regular State unemployment insurance programs. The selected records are transmitted to BLS-Washington where they are summarized. Estimates are then compiled on characteristics such as claimant's age, sex, color, occupation, industry attachment, and duration of unemployment. The data are available monthly by State and for the Nation as a whole.

Concepts

Insured unemployment represents a count of persons who certify a week of unemployment in order to obtain unemployment insurance benefits under State unemployment programs. The count includes some persons who work part-time for economic reasons and are entitled to partial unemployment insurance benefits. Excluded are unemployed persons claiming benefits under the Program of Unemployment Compensation for Federal Employees (UCFE), the Program of Unemployment Compensation for Ex-servicemen (UCX), the Railroad Unemployment Insurance Program, the Supplemental Unemployment Assistance Program, and persons who have exhausted their benefits under regular State programs and are claiming benefits under various Federal and State extended benefits provisions.

Also excluded are unemployed persons who have no recent work experience (new entrants and reentrants) or who have insufficient work experience to qualify for unemployment benefits. In addition, most State laws do not cover certain categories of workers, such as some State and local government workers, employees of private elementary and secondary schools and religious organizations, and the self-employed. Laws may differ markedly from State to State regarding the eligibility of workers, the length of time eligible workers may receive benefits, the amount of weekly benefits, and the procedures under which the programs are operated.

Details on coverage laws are provided in Comparisons of State Unemployment Insurance Laws, BES No. U-141, available on request from the Employment and Training Administration - UI Service, Washington, D. C. 20212.

Sampling

Unlike the counts of total insured unemployed, which are based on administrative records, the characteristics data are based on a sample of claimants. Each month the State agencies draw a sample of records from the claimant files. The selected records are transmitted to BLS-Washington where they are summarized. Estimates are then compiled on characteristics such as claimant's age, sex, color, occupation, industry attachment, and duration of unemployment. The data are available monthly by State and for the Nation as a whole.
have certified a continued week of unemployment. A total count of claims is reported weekly by the State employment security agencies. Generally, a continued claim filed in a given week certifies to unemployment in the preceding week. The sample of claimants is selected from official State records of persons eligible for unemployment benefits during the week including the 19th of the month in order to reflect unemployment during the earlier week including the 12th.

**Estimating Procedures**

The characteristics (e.g., age, sex, color, occupation, industry attachment, and duration of unemployment) as reported on the claimants' records are tabulated and proportions calculated. For example, if the total sample reported on the claimants' records are tabulated and industry attachment, and duration of unemployment) as weekly report of the insured unemployed (ES-210 Re­port):  

14,000 × 900 / 1500 = 8,400 men

The results thus derived for each State are summed to obtain the national estimate of number of male claim­ants. The same procedure is used in estimating the other characteristics.

**Reliability of the Estimates**

Since a sample is used the figures derived from the survey are subject to sampling variability. The range of sampling error to be expected depends particularly upon the size of the characteristic being analyzed and tends to be relatively larger for small groups in the population. The range of variation which may be expected can be judged roughly from table 2. The chances are about two out of three that a sample estimate of the proportion of the population would differ from the corresponding figure derived by an equally careful complete enumeration, by less than the relative error in the table.

The accuracy of the final results depends upon many things besides the degree of variability inherent in a random sample. Errors in processing, interviewer or respondent bias, and failure to achieve a fairly random sample, are all examples of factors affecting the accu­racy of the final results that are not measured in the errors of estimate shown in table 2.

**Seasonal Movements**

Insured unemployment, like total unemployment, is characterized by fairly regularly recurring fluctuations at certain times of the year. The seasonal pattern in insured unemployment corresponds closely to that in total unemployment except for a notable divergence in the summer months.

On a seasonal basis, both total and insured unemployment usually reach their highest level during the year in the winter months, reflecting the slack periods in economic activity in general and in outdoor work in particular. After declining gradually through April, total unemployment spurs upward in May and June, as jobseeking students and recent graduates enter the labor market. Insured unemployment, however, does not reflect this midyear expansion in the labor force, since it excludes students looking for summer jobs, newly graduated students, and other new entrants into the labor force. During the first half of July, insured joblessness normally shows a moderate rise due to claims filed by persons ineligible for pay during plant shutdowns for vacation periods. Following their midyear increases, both total and insured unemployment decline, reaching their annual low points in Oc­tober. Thereafter, both series usually begin to rise.

---

**Table 1. Expected sample size of claimant records.**

<table>
<thead>
<tr>
<th>Lowest volume of expected continued claimants, week including 19th of the month</th>
<th>Size of sample of continued claimants</th>
<th>minimum sample</th>
<th>minimum resultant sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000 or more</td>
<td>1</td>
<td>1,000 or more</td>
<td></td>
</tr>
<tr>
<td>50,000 to less than 100,000</td>
<td>2</td>
<td>1,000 to 2,000</td>
<td></td>
</tr>
<tr>
<td>40,000 to less than 50,000</td>
<td>3</td>
<td>1,200 to 1,500</td>
<td></td>
</tr>
<tr>
<td>30,000 to less than 40,000</td>
<td>4</td>
<td>1,200 to 1,600</td>
<td></td>
</tr>
<tr>
<td>20,000 to less than 30,000</td>
<td>5</td>
<td>1,000 to 1,500</td>
<td></td>
</tr>
<tr>
<td>10,000 to less than 20,000</td>
<td>10</td>
<td>1,000 to 2,000</td>
<td></td>
</tr>
<tr>
<td>5,000 to less than 10,000</td>
<td>20</td>
<td>1,000 to 2,000</td>
<td></td>
</tr>
<tr>
<td>2,500 to less than 5,000</td>
<td>30</td>
<td>750 to 1,500</td>
<td></td>
</tr>
<tr>
<td>Less than 2,500</td>
<td>100</td>
<td>Less than 2,500</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2. Relative error of estimate for selected universe sizes and proportion of characteristics being estimated.**

<table>
<thead>
<tr>
<th>Universe size</th>
<th>Proportion being estimated</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Total number of claimants)</td>
<td>.01</td>
</tr>
<tr>
<td>State level</td>
<td></td>
</tr>
<tr>
<td>2,500</td>
<td>41.4</td>
</tr>
<tr>
<td>10,000</td>
<td>53.9</td>
</tr>
<tr>
<td>50,000</td>
<td>56.8</td>
</tr>
<tr>
<td>100,000</td>
<td>51.0</td>
</tr>
<tr>
<td>200,000</td>
<td>44.3</td>
</tr>
<tr>
<td>U.S. level</td>
<td></td>
</tr>
<tr>
<td>1,000,000</td>
<td>6.0</td>
</tr>
<tr>
<td>2,000,000</td>
<td>4.9</td>
</tr>
<tr>
<td>3,000,000</td>
<td>4.3</td>
</tr>
<tr>
<td>5,000,000</td>
<td>3.9</td>
</tr>
</tbody>
</table>

1. Characteristics which are estimated to be less than 5 percent of State insured unemployment are not published at State level but are shown at national level only.
Limitations

The characteristics data produced from the survey are not comparable with the Bureau’s estimates of the characteristics of all unemployed persons obtained from the monthly “household” survey. The insured unemployed survey relates to persons eligible for unemployment insurance under State programs only and excludes many categories of workers which are included in the count of the total unemployed. Excluded from the insured unemployment count but included in the household survey count are unemployed persons who have no recent work experience (new entrants) or who have insufficient work experience to qualify for unemployment benefits; agricultural workers, domestic workers, unpaid family workers, some State and local government workers, employees of private elementary and secondary schools and religious organizations, and the self-employed. In addition, persons eligible for unemployment benefits under other than State programs are excluded from the characteristics survey. Among such other programs are the Program of Unemployment Compensation for Federal Employees (UCFE), the Program of Unemployment Compensation for Ex-servicemen (UCX), the Railroad Unemployment Insurance Program, and various Federal and State temporary extended benefit programs. On the other hand, the insured unemployed survey includes some persons who work part-time for economic reasons and are entitled to partial unemployment insurance benefits. These workers are counted as employed in the household survey. Also, unemployed insured workers in Puerto Rico are included in the characteristics survey but excluded in the household survey.

Presentation and Uses

The program provides information, by State and for the Nation as a whole, about the insured unemployed, (e.g., age, sex, color, occupation, industrial attachment and length of current spell of insured unemployment.) The data are published monthly for the Nation and by State in the Employment and Training Administration publication Unemployment Insurance Statistics. Annual averages are published in the Handbook of Labor Statistics and the Manpower Report of the President.

Information on the characteristics of the insured unemployed is of vital interest to analysts and policy makers alike. The data are needed to evaluate the effectiveness of unemployment benefits in alleviating the financial hardship of unemployment. Since the insured unemployed are “experienced workers,” it is important to know their characteristics such as occupation and industry attachment in order to guide effective employment policies through improved utilization of labor resources. Those concerned with programs for women are interested in the figures on women among claimants. The data by State are useful for guidance in plant locations and effective regional employment policies. Analysts use the characteristics of the insured unemployed to detect changes in industrial structure and to observe changes in the experienced work force, in order to study the causes of unemployment. The data are of particular interest during periods of economic downturn when they are needed for guiding emergency employment and unemployment benefit provisions. In addition, the Unemployment Insurance Service and others concerned with insurance programs need the information for actuarial studies.
Prices and Living Conditions

Chapter 11. Consumer Expenditures and Income

Background

Consumer expenditure surveys are specialized family living studies in which the primary emphasis is on collecting data relating to family expenditures for goods and services used in day-to-day living. Expenditure surveys of the Bureau of Labor Statistics also collect information on the amount and sources of family income, on changes in savings or debts, and on major demographic and economic characteristics of family members.

The Bureau's studies of family living conditions rank among its oldest data-collecting functions. The purpose of the first nationwide expenditure survey in 1888-91, in line with the legislation creating the Bureau, was to study the worker's spending patterns as elements of production costs, with special reference to competition in foreign trade. It emphasized the worker's role as a producer, rather than as a consumer. Purposes and coverage changed in successive surveys, and problems caused by higher prices led to the second survey, in 1901. The index of prices of food purchased by working men, with weights based on 1901 data, was used generally as a deflator for workers' incomes and expenditures for all kinds of goods until World War I. The third major survey, spanning 1917-19, provided weights for computing a "cost-of-living" index, now known as the Consumer Price Index (CPI). (See chapter 13.) The next major study was made for 1934-36 primarily to revise these index weights and covered only urban wage and clerical workers.

In the economic depression of the 1930's, interest in consumer surveys expanded from study of the welfare of selected groups to general economic analysis. Almost simultaneously with its 1934-36 investigation, the Bureau cooperated with four other Federal agencies in a fifth survey, the Study of Consumer Purchases, in 1935-36, which presented consumption estimates for all segments of the population, both urban and rural. The sixth survey, for 1950, covered only urban consumers. The seventh survey, Survey of Consumer Expenditures, 1960-61, included both urban and rural families. It, like the 1950 survey, provided the basis for revising the CPI and also supplied abundant material for broader types of economic, social and market analysis. The remainder of this chapter deals with the 1972-73 survey—the latest in the series describing the consumption behavior of the American people.

Design of the 1972–73 Survey

The 1972-73 Consumer Expenditure Survey is the eighth major survey of this type, and the first since 1960-61. Unlike previous surveys, the collection of data was carried out by the U.S. Bureau of the Census under contract with the Bureau of Labor Statistics. The 1972-73 survey was undertaken in part to revise the weights and associated pricing samples for the CPI, and in part to help meet the need for timely, accurate, and detailed information on American consumer spending patterns. Satisfying these two objectives is particularly important in periods of inflation and rapid economic change. The 1972-73 survey consisted of two separate surveys, each with a different data collection technique and sample: (1) a quarterly panel survey in which each consumer unit 1 in the sample was visited by an interviewer every 3 months over a 15 month period, and (2) a diary or recordkeeping survey completed at home by the respondent family for two 1-week periods.

This design differed markedly from that of previous surveys, including the 1960-61 survey. In that survey, data were collected at a single point in time with the BLS interviewer asking detailed questions as members of the respondent family reconstructed the previous year's receipts and disbursements. A detailed supple-

1 A consumer unit is defined as “(1) a family of two persons or more usually living together who pool their income and draw from a common fund for their major items of expense, or (2) a single consumer who is financially independent of any family group. The single consumer (or one-person family) may be living either by himself in a separate housing unit; as a roomer in a private home, lodging house, or hotel; or sharing a unit.” The 1972-73 Consumer Expenditure Survey represented all non-institutional consumer units living in the United States. All persons residing at a selected sample address were eligible for the survey except for periods in the survey year that they resided in military posts, camps, or reservations (except for periods of 45 days or less for training with National Guard or reserve units); in homes for the aged, asylums, jails, and similar “long-stay” institutions; or in foreign countries (except on vacations or business trips). (See Technical Reference No. 7, pp. 15-16.)
mental questionnaire, covering one week’s purchases of food and other frequently purchased items, was also completed. (See Technical Reference 7 for a description of collection methods and list of published results.)

Acting as agent for the BLS, the Census Bureau conducted the first year of the 1972-73 quarterly survey between January 1972 and March 1973. Interviewing for the second year ran from January 1973 to March 1974. The first year of the diary survey covered the period from the last week in June 1972 through the third week of June 1973. The second year diary covered the period from the middle of 1973 through the middle of 1974.

It is estimated that the quarterly survey obtained detailed data for 60 to 70 percent of total family expenditures. Aggregate estimates, for example, of food and beverages, were obtained for an additional 20 to 25 percent of total expenditures. The detail by item for these aggregate estimates was collected in the diary survey as was the balance of total expenditures for inexpensive and frequently purchased items not included in the quarterly survey.

All data collected were subject to the confidentiality requirements of the Bureau of the Census and the Bureau of Labor Statistics which protect against the disclosure of respondents’ identities.

Collection Methods

Field Organization

Data collection was under the direction of the Census Bureau’s permanent professional field staff, which operated through 12 data collection centers throughout the United States. In addition to these offices, 26 local program offices were established for a period of about 2½ years. Each local office was directed by an area supervisor with a staff consisting of about six interviewers and an editor-clerk. Interviewers, whenever possible, were selected from the most experienced and best qualified of those who worked on the Decennial Census or on post-censal and evaluation projects. The total number of interviews for each phase was approximately 200.

Staff members were thoroughly trained prior to beginning their work on the survey. Interviewers received about 7 days of classroom training plus self-study training materials. Additional home study materials and classroom training was conducted prior to beginning each quarter of the survey. Formal training was supplemented by on-the-job training sufficient to insure job performance at the level of established standards. Quality control measures, such as editing returns, observing interviews, and reinterviewing selected sample family units, were employed throughout the survey.

Data Collection

Some testing of collection methods was performed by the Bureau of Labor Statistics and by the Survey Research Laboratory of the University of Illinois. These tests and the experience of other countries indicated that high quality data could be obtained in a consumer expenditure survey if the survey design was tailored so that information on larger and more easily recalled expenditures was collected by periodic recall interviews and small, less expensive items by day-to-day record-keeping (diaries). This led to the creation of quarterly and diary collection vehicles. Furthermore, the quarterly design took account of the notion that some items are easily recalled over long periods while others are accurately remembered only over relatively short periods.

Quarterly Survey

The initial quarterly survey interview for each year provided socio-economic characteristics of the consumer unit, an inventory of major durable items, with indication of when obtained, and data covering a great variety of regularly purchased items bought since the first of the year.

Subsequent quarterly interviews continued the collection of detailed expenses. In addition, in quarters two through five, global estimates for food and beverages were obtained, as an aid in possible integration with detailed food item reports collected by diary. Also, at the second quarter, a global estimate of consumer unit income for the previous year was collected.

The fifth and final interview yielded information on housing expenses, work experience, changes in assets and liabilities, expenses for most goods and services previously requested, and estimates of consumer unit income. Data on the latter involved highly detailed income queries, ranging from wage and salary earnings by each member of the unit to consumer unit totals of rents, interest, dividends, etc.

A mere listing of the broad areas of expenditures surveyed would provide only cursory insight into the vast amount of detail collected. In the clothing section of the questionnaire, for example, not only were the items of apparel narrowly defined (dress shirts, sport shirts, work shirts, blouses or tops, other shirts), but age and sex codes were assigned for both purchases of clothing for family members and gifts of clothing purchased for others. Data collected on housefurnishings and home appliances included indications of whether items purchased were new or used, and whether or not purchases were financed in part by trade-ins. In addition, the quarterly survey collected detailed information pertaining to out-of-town trips and vacations.
**Diary Survey**

The diary, completed by the respondent family, was designed primarily to obtain expenditure information which was either not collected in the quarterly survey or was collected only as a global estimate in that survey. Expenditures for individual items of food, beverages, personal care and housekeeping operation products and services are considered to be poorly recalled by respondents for long periods of time. The diary survey, however, was not limited to those types of expenditures, but, rather, included all expenses which the family incurred during the survey week, except for expenses for family members while away from home overnight and for credit and installment plan payments.

Prior to leaving a diary with a consumer unit, the interviewer first collected information on selected socio-economic characteristics of members of the household in order to establish the composition of the consumer unit and to classify the unit for analysis. This information also would permit the diary to be linked to similarly classified data covered in the quarterly or other surveys. Each reporting unit in the diary survey was then requested to maintain a daily record of all expenditures for two 1-week periods.

The diary reporting form was divided by day of purchase and broad classifications of goods and services—meat, fish, and poultry; laundry and diaper service, beauty and barber shop; household help, babysitters, and so on. This breakdown was used to aid the respondent in recalling items when recording daily purchases. It also facilitated the coding of individual purchases, so that meaningful aggregates and sub-aggregates of individual purchases could be presented in statistical tables. The respondent was instructed to record a detailed description of the goods or services purchased, for example, milk: Whole, skim, half and half, chocolate, condensed, and so forth. This detail was required in order for items to be represented in the Consumer Price Index according to their relative importance.

Within the category food and beverages for home consumption, information was requested on the number of units purchased, net weight or volume per unit, type of packaging (fresh, frozen, canned, packaged), and total cost. For meals and snacks purchased at a restaurant, carryout, and so on, information was requested on kind of purchase, type of outlet, and total cost including tips.

For drugs or medical supplies, the respondent was requested to indicate whether the item purchased was prescribed by a physician. Information was requested regarding the age and sex of individual members of the consumer unit for whom clothing purchases were made. Rent, utility, fuel, telephone, and insurance expenses were collected in relation to the period covered by the expense. All gift purchases were specially noted.

The data collected by the diary survey were subject to detailed classification by the computer. More than 1,700 separate codes were developed to differentiate purchases by class and description.

**Sampling**

**Design**

The sample for each survey was a self-weighting, multi-stage, national probability sample modified slightly to provide for a designated minimum sample size in 26 selected areas. The samples included 216 primary sampling units (PSU’s), of which 54 were selected with certainty and the remaining 162 selected on a basis of a probability proportionate to size from about 1,000 PSU’s in about 145 strata of approximately equal size. PSU’s included both urban and rural territory and were either an entire Standard Metropolitan Statistical Area (SMSA), a single county, or a group of counties.

The samples were selected from the 1970 Census 20-percent tape file and stratified on the basis of the following characteristics: Housing tenure, size of primary family and family money income. Separate samples were drawn within 55 strata (5 size of family classes x 5 income classes x 2 tenure classes for housing units plus 4 classes of vacant housing units plus group quarters). No other variables were included in the sample selection procedure.

**Quarterly Sample**

Approximately 23,000 addresses were selected for the quarterly survey sample. Of these, 10 percent were expected to be vacant or demolished at the time of the survey, and another 15 percent were expected to decline to participate or otherwise be unavailable for the survey. On the basis of these assumptions, the survey would yield 17,000 complete interviews. Should the anticipated 17,000 interviews not be realized from the original 23,000 unit sample, a matched sample was to be drawn upon to achieve the level required nationally and also for each of the 26 designated PSU’s.

The survey was conducted over a 2-year period. The sample of 23,000 units was divided into two representative subsamples of approximately 11,500 units for each survey year. Division of the sample was made on the following basis with each subsample being designated for inclusion in one of the two survey periods:

1. The 30 largest certainty PSU’s were included in both survey periods with one-half of the units being included in each survey period.
2. The remaining 186 PSU’s were paired into two groups of 93 PSU’s each. One group was designated for the 1972 survey and the other group for the 1973 survey.
Diary Sample

A separate panel of households was selected for the diary survey. The sample design was identical with that used for the quarterly survey, including the same variables for stratification. The number of units selected was expected to yield completed diaries from 17,000 households, assuming a 30 percent noninterview rate for occupied units. As in the quarterly survey, the diary sample was divided into two equal parts with one part being included in each survey year. The sample was divided further into 52 subsamples in order that each week of the year be represented in the survey.

Response Rates

The cooperation of respondents was excellent. Preliminary response rates for the quarterly survey indicate that 88 percent of eligible sample units responded in 1972 and about 90 percent in 1973. The percentages represented 9,869 consumer units interviewed in 1972 and 10,106 in 1973. For the diary survey, response rates were 80 percent in 1972-73 and 90 percent in 1973-74 with the percentages representing 21,367 completed 1-week diaries in the first year and 23,355 in the second year.

Data Dissemination

Information from the 1972-73 Consumer Expenditure Survey will be made available in bulletins, statistical reports, and on computer tapes. Some preliminary results from the first-year diary survey were made available in April and May 1975 in news releases: USDL 75-212 and 75-276. These may be obtained from the information office of the BLS Office of Publications (202/523-1221).

The bulletins will present combined year data from the diary and quarterly separately. Data will include mean expenditures for all families and single consumers in the United States as well as for each of four regions of the Nation. In each of these areas, expenditure data will be tabulated by a set of family characteristics in one-way and cross-classified arrays. The diary survey will be the primary source for detailed data on food, housekeeping supplies, personal care items and services, selected energy expenses and non-prescription drugs and medical supplies. In excess of 100 expenditure categories will be displayed in the one-way tables. Some collapsing of the detail appearing in the one-way tables may be necessary to support the cross-classified tables.

The quarterly survey will be the source of expenditure information on housing, utilities, clothing, major and minor equipment, housefurnishings, transportation, trips and vacations, insurance, medical services, education, reading, global food estimates as well as data on income, assets and liabilities. The classifying characteristics and tables will be similar to those produced for the diary.

The second general form of release will be through Consumer Expenditure Survey Series reports. These will include individual year estimates for diary and quarterly data.

For the diary, the detailed expense classification established for the combined year estimates will be collapsed into more general groupings for both tabular forms of the single year estimates. An initial issue of this report series was published in November of 1975, BLS Report 448-1, presenting selected weekly expenditures cross-classified by family characteristics. The report series will also serve as the dissemination vehicle for background articles on the survey, presenting such information as definitions, cooperation rates, mean expenditure variances as well as periodic analytic studies.

The third form of dissemination will be public-use computer tapes. These tapes will contain micro-data from each survey, subject to the confidentiality policies of BLS.

Publications and tapes are scheduled for release periodically throughout 1976 and early 1977.

Uses and Limitations

Uses

As in past consumer expenditure surveys conducted by the Bureau, the revision of the Consumer Price Index market basket and weights remains as a primary reason for undertaking such an extensive survey. The results of the survey have been used to select a new basket of goods and services for the index and to determine the relative importance of the items selected.

The data from the survey will be of value to government and private agencies interested in studying the welfare of particular segments of the population, such as the aged, low-income families, urban families, and those receiving food stamps. As in the past, the Internal Revenue Service expects to use data from the survey as the basis for revising the average State sales tax tables which taxpayers may use in filing Federal income tax returns. The Bureau of Labor Statistics uses the survey results to revise its Family Budgets estimates. (See chapter 12.) The survey data will be of use to economic policy makers interested in the affects of policy changes on levels of living among diverse socio-economic groups. Econometricians will find the data useful in constructing economic models. Market researchers will find it valuable in analyzing the demand for a group of goods and services. The Department of Commerce will use the survey data as a source of information for revis-
ing its benchmark estimates of some of the Personal Consumption Expenditure components of the Gross National Product.

Limitations of the Data

The results of the quarterly and diary surveys are subject to several types of error. These include sampling, reporting and processing errors, and errors due to the inability or refusal of some consumer units to give the information requested. All data were reviewed and edited to minimize reported and processing errors. Inaccurate reporting is a source of error in any survey. Thorough training of interviewers and careful attention to collection vehicle design helps to minimize such errors insofar as possible.

Technical References

Number

   Survey of applications of models of consumer behavior, with some coverage of related consumer demand theory and methods of family expenditure analysis methods. Extensive nine-page bibliography.

   Summary of purpose, scope, uses, and methods of surveys.

   Survey of currents of thought on determinants of total consumption, including history, development, general consumption function theory and discussions of various groupings of factors affecting consumption. Extensive nine-page bibliography.

   Identifies basic methodological problems encountered and considers their magnitude and possible solutions.

   Comprehensive statement of purposes, procedures, and reliability of data of 1950 survey, with summaries of BLS surveys from 1888–89 to 1950. Includes facsimiles of data collection forms.

   Review and evaluation of survey methodology, with emphasis on households, covering use, design, sampling, collection, analysis, and administration.

   Documents methodology of the Survey of Consumer Expenditures, comparisons with related data, evaluations and analyses of sample returns. Contains glossary and facsimiles of data collection forms.

   Summary of various methods used, proposal for continuing surveys, and 25 pages of appendices describing expenditure survey methods used in various countries.

   Survey of analysis of family expenditure survey data, with some coverage of consumer demand theory, data collection and limitations of data.

    Listing of references to published and unpublished papers, articles, reports, etc., on methodological aspects of design and conduct of surveys, other than sample design and methods, statistical theory and data processing.

    Popular-style book, dovetailing various studies to yield a picture of changes in consumption habits of the American people between 1875 and 1950. Includes chapter of technical comments on consumption statistics and an 11-page bibliography.

    Definitive analysis of family expenditure studies, with pertinent tabular materials, and discussions of psychological, social, and economic concepts and theories of consumption.
Chapter 12. Family Budgets

Background

"Standards of living" refer to the goals of consumers and workers in their consumption of goods and services, use of leisure time, and conditions of work. Standard budgets, also described as family budgets, measure the total costs or amounts of income required to achieve the levels and manner of living implicit in one set of hypothetical goals. Cost estimates are developed by translating the generalized concept of a living standard into a list of commodities and services which can be priced. Thus, standard budgets are normative, or benchmark, estimates of living costs. They do not represent the ways in which family incomes should be spent, or the ways average families actually spend their incomes.

The first standard budgets prepared by the Bureau of Labor Statistics were developed for the specific purpose of evaluating living conditions of cotton-mill workers in Fall River, Mass, and in the South in 1908-09. These budgets described two standards of living—a minimum, including only bare necessities; and a fair standard, including some allowance for comfort. Another budget defining a standard of health and decency was developed in 1919. In the late 1930's, BLS cooperated with the Works Progress Administration in pricing two budgets: A maintenance budget, described as above the minimum subsistence level but approaching a satisfactory American standard of living; and an emergency budget, derived by cutting the maintenance budget for emergency conditions "with the least harm to the individuals and the social group." The information available at the time concerning the requirements for nutritionally adequate diets and healthful housing was incorporated into the definitions of the living standard in each of these budgets. For other components of family living, the "requirements" were formulated primarily on the basis of the personal judgment of the budget makers.

In 1946, the Bureau compiled the City Worker's Family Budget for a "modest but adequate" standard of living. The procedures used standards of adequacy that reflected the judgments of scientists and experts where these were available; for other components, they depended on statistical analyses of consumer choices. The same method, with some refinements, was used in 1959, in the interim revisions of the City Worker's Family Budget and the Budget for a Retired Couple. These procedures were used again, with additional refinements, in the mid-1960's to develop the "intermediate" budgets (initially described as "moderate" budgets) for a four-person family and a retired couple. Subsequently, the costs of the intermediate level budgets were scaled downward and upward by a variety of techniques to produce a "lower" and a "higher" budget for each family type. Procedures for the intermediate budgets of the 1960's and the scaling techniques are described in the remainder of this chapter.

Description of the Budgets

All normative estimates of living costs must be based on specific family situations. The construction of a family budget, therefore, requires a set of assumptions which must be formulated explicitly by the budget maker at the outset. These relate to the age, size, and type of family; the manner of living appropriate for the specified family composition and the locality in which the family resides.

Family composition has a significant effect on spending patterns, manner of living, and family needs. The budgets for a younger, four-person family, specifies that the family consists of an employed husband, age 38, who has a wife not employed outside the home, and two children, a girl of 8 and a boy of 13. This family type represents a middle stage in the life cycle, and it has been widely used as the unit for other budgets compiled for earlier periods. The family in the budgets for a retired couple consists of a husband and wife, age 65 or over, who are assumed to be self-supporting, in reasonably good health, and able to take care of themselves. This unit, which has a markedly different pattern of living and needs than the younger family, has been the subject of special concern in national policy formation.

In 1954, at the request of the United Nations Economic and Social Council, a committee of experts from six different countries (including the United States) recommended that the following distinction be maintained between the terms "level" and "standard" of living: The "level of living" relates to the actual living conditions of a people. The "standard of living" relates to the aspirations or expectations of a people, that is, the living conditions which they seek to attain or regain, or which they regard as fitting and proper for themselves to enjoy. However, laymen and the general public frequently refer to the "high levels of living" actually achieved by the average American worker as the "high standard" of American living.

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3See Technical Reference No. 18. For description of a companion budget for an elderly couple, see Technical Reference No. 19.

4See Technical Reference Nos. 7 and 10.

5See Technical Reference Nos. 11, 14, 15, and 16.
over the last three decades. Budget quantities and budget component cost estimates for other family types cannot be derived as fractions or multiples of the quantities or cost estimates for food, shelter, clothing, transportation, etc. for the four-person family or the retired couple.⁶

Both types of families were assumed to live in an urban area. Assumptions also were made concerning the living arrangements and tenure of the families; inventories of housefurnishings, household equipment, and clothing; means of transportation; ownership of life insurance; provisions for medical care; savings positions, etc. In making these assumptions, the budget makers were guided by data on the prevalence of ownership of particular types of assets in the urban metropolitan population, and the availability of goods and services provided by governments for collective consumption or provided under collective bargaining agreements between employers and unions.

All three budgets provide for the maintenance of physical health and social well-being, and participation in community activities. Within this broad framework, different levels were obtained by varying the assumptions concerning the manner of living and by providing different quantities and qualities of the necessary goods and services.

The content of the budgets is based on the manner of living and consumer choices in the 1960's. The lower budget differs from the intermediate and higher budgets in several specifications: The family lives in rental housing without air conditioning, (except for a proportion of retired couples who may own their own homes), relies heavily on public transportation, supplemented, where necessary, by the use of an older car, performs more services for itself, and utilizes free recreation facilities in the community. Compared with the intermediate budget, the life style in the higher budget is marked by more homeownership, high levels of new-car ownership, more household appliances and equipment, and more paid-for services. For most items common to all budgets the quantities are greater and the qualities higher in the intermediate than in the lower budget, and in the higher than in the intermediate budget.⁷

Data Sources

Budget quantities and pricing specifications were derived from two sources: (1) Scientific or technical judgments concerning the requirements for physical health and social well-being; and (2) analytical studies of the choices of goods and services made by consumers in successive income groups, as reported in the Bureau's surveys of consumer expenditures,⁸ to determine the income class whose spending pattern would be assumed as the "norm" for a specified budget level.

Scientific standards for nutritionally adequate diets for individuals in different sex-age groups have been developed by the Food and Nutrition Board of the National Research Council, and translated by the U.S. Department of Agriculture into food plans at different cost levels. These food plans were used as the basis for the food-at-home component of the budgets.

Housing standards established by the American Public Health Association and the U.S. Public Housing Administration were adopted for the budgets. These standards relate to sleeping space requirements, essential household equipment (including plumbing facilities), adequate utilities and heat, structural condition, and neighborhood location of the dwelling units. Fuel requirements were derived by analyzing actual fuel purchases of families in the specified types of dwellings in relation to degree-days to provide an adjustment for differences in climate. Estimates of electricity and utility services provided for the appliances specified for the budgets were furnished by utility companies and associations.

The widespread use of insurance to cover the cost of major illness was accepted as a basis for a standard for medical care, and a family membership in a group health insurance plan (Medicare for the retired couple) was specified. Quantities of medical care services not covered by insurance were derived from data on utilization rates provided by the 1963-64 U.S. National Health Survey and the 1960-61 Consumer Expenditures Survey. Major medical provisions were specified for the higher budget.

No generally accepted scientific standards are available for other components of the budgets (clothing, housefurnishings, transportation, personal care, household operation, reading, recreation, tobacco, education, gifts and contributions, and miscellaneous expenses). Therefore, for most of these components a technique was developed which relied on the choices of consumers as the basis for a standard. Purchases were examined at successive income levels to determine the income level in which the point of maximum income elasticity occurred. The average numbers and kinds of items purchased at this income level became the quantities and qualities specified for the intermediate level budget. In general, income classes below and above the classes used for the intermediate level were specified as

⁶Extensive analyses of consumption data dating back over more than a century have provided a variety of measures of general welfare; e.g., the relative adequacy of diets, the proportion of income spent for various categories of goods, or the proportion of income saved. These measures, either singly or in combination, have been used as the basis for determining scales of equivalent income for families of different size. One such scale is described in Technical Reference No. 12. The scale is based on the assumption that families spending the same proportion of income on food have attained equal levels of living. Although the scale is useful in estimating equivalent costs of goods and services, or net income requirements after income taxes and occupational expenses, it cannot be applied to individual items or major components of budget costs.

⁷For a discussion of the relativity of living standards, see Technical Reference Nos. 5 and 6.

⁸For a description of the Bureau's surveys of consumer expenditures, see chapter 11.
the source of quantities for the lower and higher budgets, respectively.

For the transportation component, quantities for the intermediate and higher budgets were based on the average consumption pattern of families of each budget type. For the lower budget, average patterns of renter families were used. Except for the higher budget where costs include a car for all families, automobile ownership was specified in inverse relationship to the availability of mass public transportation. Mileage allowances were adjusted by the use of automobiles for work.

In determining budget costs, levels of prices paid for items are as important as the numbers of items bought. Items in the intermediate budget were priced in the types of stores and professional and service establishments customarily patronized by urban families. Prices, pricing procedures, reporting stores and service establishments, and price calculation methods were those used by the BLS for the Consumer Price Index, except that additional quotations were obtained in some cases to calculate averages and different qualities were priced in other cases to represent the intermediate budget level. For some items in the lower and higher budgets, special prices were collected directly from stores and establishments. In the main, however, prices for those two levels were estimated in a variety of ways.

Since spring 1969, the costs of the consumption components of the budgets have been derived by applying price changes reported in the Consumer Price Index for individual areas to the appropriate previous period's costs for each main class of goods and services.

Uses and Limitations

In the methods described, a family budget is the end result of a multitude of decisions by the budget maker, based on standards formulated by scientists or experts or on analyses of data on consumption patterns from a variety of sources. The budgets are not simply the products of a survey of ways families at particular income levels actually spend their money. The judgment of the budget maker is involved in selecting among the family types and manners and levels of living to be represented; in determining the most appropriate sources of data to be used in deriving budget quantities; and in interpreting actual family consumption in terms of norms or benchmarks. The appropriateness of the operating assumptions can be evaluated only by the budget users in relation to the purposes to be served.

Budget estimates may be analyzed in four ways: (1) Costs are compared with income. However, costs for a specific family type should be compared only with average incomes, or income distributions, for families of the same type. This kind of analysis has been restricted, therefore, by the availability of cost estimates for only two family types. However, family equivalence scales may be used to develop estimates for comparable benchmark levels for families of other types. (2) Budget costs in one place are compared with costs in another, i.e., the budgets provide a basis for calculating an index of locality differences in "living costs." The Bureau has provided this type of analysis in conjunction with its published reports. (3) Costs are compared over time to measure changes in living standards. The sporadic character of the Bureau's family budget research program imposes serious limitations on this type of analysis. Also the judgment factor in developing budgets introduces a serious bias for evaluating changes in the levels and living standards of families from decade to decade. (4) Finally, budget estimates of different levels are compared to provide a measure of the aggregate addition to income required to raise consumption to particular levels. The development of budgets for three different levels facilitates this type of analysis.

Family budgets are used in economic research to appraise the economic condition of the population and to evaluate the need for, and the effect of, specific laws and programs. For example, normative living costs are used to measure the extent to which social security or unemployment insurance benefits provide income sufficient to purchase the manner and content of living used to define a specified budget level; to estimate aggregate costs of consumer goods as a basis for developing public policies; or to prepare estimates of the number of families living below the specified budget level. Budgets also provide benchmarks for administrative determinations, as required by a number of existing laws or policies of social, welfare, and educational agencies; e.g., to establish criteria of eligibility for public assistance, public housing, support services for individuals in job development programs, subsidized medical or mental health, guidance services, or college scholarship aid.

In addition to their primary use as tools in evaluating income adequacy, family budgets are used to measure place-to-place differences in living costs, as a basis for family counseling, in wage negotiations, and as an aid in consumer education.

Locality indexes based on the BLS budgets reflect differences in costs of established residents in a community. Rental costs, for example, are based on the averages for occupied dwellings and are not a valid measure of the costs of vacant units available to new residents. Similarly, the costs of maintaining a home purchased 7 years ago, while an appropriate measure

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9 For a description of the Consumer Price Index, see chapter 13.
10 Technical Reference Nos. 13, 15, and 16 provide additional details on the methods, as well as lists of goods and services priced. Dollar cost estimates are provided in these reports and also in Technical Reference No. 9.
11 For a discussion of the uses of family budgets, see Technical Reference Nos. 2, 4, 8, and 17.
12 For a discussion of the interarea indexes calculated with the family budget cost estimates, see Technical Reference No. 9.
for an established, budget-type family, does not provide 
information on the relative costs of purchasing homes in 
current markets. The cost of food reflects not only 
differences in price levels but also, and more important, 
differences in regional preference patterns in the choice 
of food to meet nutritional standards. The indexes, 
therefore, are more appropriate as research tools in 
analyses of the relationship between income and costs 
of established residents in different locations than as 
measures of differences in costs for families moving 
from one location to another.

For a measure of the effect on food costs of price-level differences versus regional differences in the choice of foods, see Technical Reference No. 1.

### Technical References

   - An analysis of the effects on food budget cost estimates of using for all cities a single set of weights representing urban U.S. food patterns, or different weights for each city reflecting the food preferences of the region in which the city is located.

   - Provides a nontechnical description of the concepts and procedures used to develop the budgets for a four-person family at three levels of living, a summary of the spring 1967 cost estimates and locality indexes, and a discussion of the appropriate uses of the budgets.

   - Presents a representative cross-section of budgets compiled in this country during the 20th century. Shows average dollar cost figures for the total and for the major components of each budget.

   - Includes estimates of the costs of budgets for three levels of living for a retired couple in spring 1967 and budget-based locality indexes. Describes uses of these budgets as tools in determining eligibility for various programs and in helping older couples to evaluate their own spending habits.

   - An analysis of the relationship over time between actual levels of living in the United States and the goals or standards of living which have been accepted in different historical periods and for different purposes.

   - Discusses the standard budget approach to the evaluation of income adequacy for different family types and in different geographical locations and estimation of the extent of poverty in the United States.

   - Estimates the cost of a "modest but adequate" standard of living for a husband, wife, and two children (living in rented housing), at autumn 1959 prices, in 20 large cities and their suburbs. Includes the detailed list of the goods and services used to define the living standard for the 1950's, and describes the way this list was developed and priced.

   - A summary report on "The BLS Interim Budget for a Retired Couple." (See Reference No. 10.) Includes a discussion of various conceptual problems encountered in developing normative living costs estimates for a retired couple, and some limitations of this particular budget.

   - Discusses the geographic variations in the family budget market baskets and the assumptions that must be made to use the interarea indexes as "living costs" indexes.

    - Describes changes in this budget over the last two decades, and gives autumn 1966 costs for urban United States and costs and comparative indexes for 39 metropolitan areas, and 4 nonmetropolitan regions.

    - Includes scale values for selected family types which can be used to approximate total costs of consumption for the three budget levels. Also includes a summary and discussion of the status of research on family equivalence scales.

    - Reports on pricing methodology used in the intermediate budget and includes U.S. urban average prices and averages for five metropolitan areas for selected items priced for the budget.

    - Describes changes in this budget over the last two decades, and gives autumn 1966 costs for urban United States and costs and comparative indexes for 39 metropolitan areas and four nonmetropolitan regions.

Technical References—Continued

Number


Describes budgets for a four-person family at three levels of living. Explains in detail the concepts, procedures, data sources, and estimating methods, and provides lists of goods and services priced. Includes spring 1967 costs and locality indexes.


Describes budgets for a retired couple at three levels of living. Explains in detail the concepts, procedures, data sources, and estimating methods, and provides lists of goods and services included. Includes spring 1967 costs and locality indexes. (A supplement to this Bulletin provides costs and indexes for 1969-70.)


Recommendations formulated by a committee of experts with extensive experience in using standard budgets on the needs for various types of budgets, general concepts of the standards of living to be described by the budgets, and methodological and other problems associated with estimating and publishing budget costs. Includes a selected bibliography on the major uses of standard budgets.


Concepts, definitions, and techniques used in developing the original City Worker's Family Budget for a four-person family, detailed list of goods and services priced, and 1946-47 cost estimates for 34 cities. Also an historical survey of family budgets, and summary data on State budgets for single women workers.


Estimates of the cost of a "modest but adequate" standard of living for a couple age 65 or older, at March 1946 and June 1947 prices, in eight large cities. (Concepts and techniques used to compile this budget were parallel to those employed in developing the original BLS City Worker' Budget. See Reference No. 18.)
Chapter 13. Consumer Prices

Much of the following description of methodology, sampling, compilation, and presentation of the Consumer Price Index will be superseded by the Revised CPI scheduled to be introduced with the release of the index for April 1977.1

Background

The Consumer Price Index was initiated during World War I when rapid changes in living costs, particularly in shipbuilding centers, made such an index essential in wage negotiations. To provide appropriate weighting patterns for the index, studies of family expenditures were conducted in 92 industrial centers in 1917–19. The Bureau of Labor Statistics began publication of indexes for 32 individual cities in 1919. Regular publication of U.S. city average indexes was not begun until 1921, but indexes were estimated back to 1913.2 Since that time the weighting factors, the list of items included in the market basket, and the cities in which price data were collected for calculating the index have been updated several times.

Because people's buying habits had changed substantially by the mid-1930's, a new study was made covering expenditures in the years 1934–36 which provided the basis for a comprehensively revised index introduced in 1940 with retroactive calculations back to 1935.3

During World War II, when many commodities were scarce and goods were rationed, the index weights were adjusted temporarily to reflect these shortages. Again in 1950, the Bureau made interim adjustments, based on surveys of consumer expenditures in seven cities between 1947 and 1949, to reflect the most important effects of immediate postwar changes in buying patterns.4 This adjustment was followed by the first comprehensive postwar revision of the index, which was completed in January 1953.4 At that time, not only were the weighting factors, list of items, and sources of price data updated, but many improvements in pricing and calculation methods were introduced. Also, coverage of the index was extended to small cities so as to represent all urban wage-earner and clerical-worker families. The most recent revision was completed in 1964, with the introduction of new expenditure weights based on spending patterns in 1960–61, and updated samples of cities, goods and services, and retail stores and service establishments.

The manner in which the index has been used and its acceptance by the public have changed from time to time. It has seen many appraisals, criticisms, and investigations. Perhaps the most far-reaching study was conducted during World War II by the President's Committee on the Cost of Living.5 The House Committee on Education and Labor conducted a detailed examination of the index in 1951.6 The most recent study was made by the Price Statistics Review Committee, appointed by the National Bureau of Economic Research, at the request of the Office of Statistical Standards of the Bureau of the Budget, to review all government price statistics.7

As a result of these investigations and the Bureau's continuing efforts to improve the index, changes in coverage, collection, and calculation procedures have been introduced at various times. Examples of these changes include the addition of medium and small cities to the city sample in 1953, the extension of coverage to include single workers in 1964, and institution of direct pricing of restaurant meals in 1953.

Concept and Scope.8 The Consumer Price Index (CPI) is a statistical measure of changes in prices of goods and services bought by urban wage earners and cli-

2Collection of food prices back to 1890 had been initiated in 1903. During the course of the 1917–19 expenditure survey, retail prices for other articles were collected in 19 cities for December of each year back to 1914 and in 13 other cities back to December 1917 only. Retail prices of food and wholesale prices of other items were used to estimate price change from 1914 back to 1913.
3See Interim Adjustment of Consumers' Price Index (BLS Bulletin 1039, 1951).
The definition of wage earners and clerical workers is based on the occupational classification used by the Bureau of the Census for the 1960 Census of Population and listed in the Alphabetical Index of Occupations and Industries. The group includes craftsmen, foremen, and kindred workers, such as carpenters, bookbinders, etc.; operatives and kindred workers, such as apprentices in the building trades, deliverymen, furnacemen, smelters, and pourers, etc.; clerical and kindred workers; service workers, except private household, such as waitresses, practical nurses, etc.; sales workers; and laborers, except farm and mine. It excludes professional, technical, and kindred workers, such as engineers and teachers; farmers and farm managers; managers, officials and proprietors; private household workers; and farm laborers and supervisors. A consumer unit included in the 1960–61 Survey of Consumer Expenditures was classified in the index group if more than half the combined income of all family members was obtained in a wage-earner and clerical-worker occupation and at least one family member was a full-time earner (i.e., worked 37 weeks or more during the survey year).

The index represents price change for everything people buy for living—food, clothing, automobiles, homes, housefurnishings, household supplies, fuel, drugs, and recreational goods; fees to doctors, lawyers, beauty shops; rent, repair costs, transportation fares, public utility rates, etc., including all taxes directly associated with the purchase of an item and its continued ownership. It deals with prices actually charged to consumers, including sales and excise taxes, since these are an inherent part of the market price the consumer must pay for goods and services subject to such taxes. It also includes real estate taxes on owned homes which are part of the price of homeownership. However, it does not include income or other personal taxes, since they are not associated with prices of specific goods and services although they may have an indirect impact. Since 1953, it has treated the purchase of a home in the same way as the purchase of such durable goods as automobiles, refrigerators, etc.

In the 1964 revision, the index coverage was extended to include single consumer units in addition to families of two or more. The average size of families represented in the index is about 3.7 persons, and their average family income in 1960–61 was about $6,230 after taxes. The average income after taxes of single persons represented in the index was about $3,560.

Weighting Structure. The annual consumption patterns represented in the index since January 1964 were determined in the Survey of Consumer Expenditures (CES) in 66 Standard Metropolitan Statistical Areas (SMSA's) and smaller cities covering the period 1960–61, except for Anchorage, Alaska, which was surveyed for 1959. Expenditure records were obtained from the 4,343 urban families of two or more persons and from the 517 single workers included in the survey who were classified as wage earners or clerical workers.

Sixteen cities in the smallest size class which were included in the 1960–61 survey are not included in the CPI sample for pricing. However, in the weight derivation, expenditures by consumer units in these small cities were included with those for the 16 small cities priced for the index, so that the resulting weights are based on the total sample of 32 small cities.

In establishing index weights from the detailed expenditure data, about 400 items were selected objectively to compose the "market basket" for current pricing, beginning with the January 1964 "new series" indexes. Not all items are priced in every SMSA or city. In order to make possible estimates of sampling error, two subsamples of items have been established. These are priced in different areas and in different outlet samples, as indicated in table 1. The population weights

For a more detailed discussion, see "Taxes and the Consumers' Price Index," Monthly Labor Review, January 1958, pp. 53–57. A person living alone or in a household with others from whom he was financially independent; i.e., his income and expenditures were not pooled. Terms such as "single persons, single workers, singles, etc." used subsequently refer to single consumer units and not to unmarried persons.

The Survey of Consumer Expenditures is discussed in ch. 11 of this bulletin. The selection of the expenditure survey and CPI city samples is described in detail in an article by Marvin Wilkerson. "The Revised City Sample for the Consumer Price Index," Monthly Labor Review, October 1960, pp. 1078–1083.
Table 1. Cities, population weights, and pricing schedule for the revised consumer price index

<table>
<thead>
<tr>
<th>City and size stratum</th>
<th>Population weight¹</th>
<th>Food²</th>
<th>Other items Schedule³</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Standard metropolitan statistical areas of 1,400,000 or more in 1960:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baltimore, Md.</td>
<td>1.402</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Boston, Mass.</td>
<td>1.930</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Chicago-Northwestern Indiana¹</td>
<td>5.552</td>
<td>1A, 1B, 2A, 2B</td>
<td>X</td>
</tr>
<tr>
<td>Cleveland, Ohio</td>
<td>1.325</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Detroit, Mich.</td>
<td>2.896</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Los Angeles-Long Beach, Calif.</td>
<td>5.017</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>New York-Northeastern New Jersey¹</td>
<td>12.577</td>
<td>1A, 2B</td>
<td>X</td>
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<tr>
<td>Philadelphia, Pa.</td>
<td>2.703</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Pittsburgh, Pa.</td>
<td>1.565</td>
<td>1A, 2B</td>
<td></td>
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<tr>
<td>St. Louis, Mo.</td>
<td>1.428</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>San Francisco-Oakland, Calif.</td>
<td>2.372</td>
<td>1A, 1B, 2A, 2B</td>
<td>X</td>
</tr>
<tr>
<td>Washington, D.C.</td>
<td>1.255</td>
<td>1A, 1B, 2A, 2B</td>
<td>X</td>
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<tr>
<td>B. Standard metropolitan statistical areas of 250,000 to 1,399,999 in 1960:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlanta, Ga.</td>
<td>2.934</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Buffalo, N.Y.</td>
<td>2.347</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Cincinnati, Ohio-Ky.</td>
<td>.740</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Dallas, Tex.</td>
<td>2.934</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Dayton, Ohio</td>
<td>1.096</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Denver, Colo.</td>
<td>1.838</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Hartford, Conn.</td>
<td>2.348</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Honolulu, Hawaii</td>
<td>.354</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Houston, Tex.</td>
<td>.999</td>
<td>1A, 2B</td>
<td></td>
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<tr>
<td>Indianapolis, Ind.</td>
<td>1.095</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Kansas City, Mo.-Kans.</td>
<td>.710</td>
<td>1A, 2B</td>
<td></td>
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<tr>
<td>Milwaukee, Wis.</td>
<td>.550</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Minneapolis-St. Paul, Minn.</td>
<td>1.042</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Nashville, Tenn.</td>
<td>2.933</td>
<td>1A, 2B</td>
<td></td>
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<tr>
<td>San Diego, Calif.</td>
<td>.672</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Seattle, Wash.</td>
<td>1.837</td>
<td>1A, 2B</td>
<td></td>
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<tr>
<td>Wichita, Kans.</td>
<td>1.096</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>C. Standard metropolitan statistical areas of 50,000 to 249,999 in 1960:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Austin, Tex.</td>
<td>1.250</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Bakersfield, Calif.</td>
<td>1.233</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Baton Rouge, La.</td>
<td>1.250</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Cedar Rapids, Iowa</td>
<td>1.284</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Champaign-Urbana, Ill.</td>
<td>1.284</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Durham, N.C.</td>
<td>1.250</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Green Bay, Wis.</td>
<td>1.284</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Lancaster, Pa.</td>
<td>1.803</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Orlando, Fla.</td>
<td>1.250</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Portland, Maine</td>
<td>1.803</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>D. Urban places of 2,500 to 49,999 in 1960:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchorage, Alaska</td>
<td>.065</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Crookston, Minn.</td>
<td>1.352</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Devils Lake, N. Dak.</td>
<td>1.352</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Findlay, Ohio</td>
<td>1.352</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Florence, Ala.</td>
<td>1.227</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Kingston, N.Y.</td>
<td>1.171</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Klamath Falls, Oreg.</td>
<td>1.338</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Logansport, Ind.</td>
<td>1.352</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Mangum, Okla.</td>
<td>1.227</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Martinsville, Va.</td>
<td>1.227</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>McAllen, Tex.</td>
<td>1.227</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Millville, N.J.</td>
<td>1.171</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Niles, Mich.</td>
<td>1.351</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Green, Utah</td>
<td>1.339</td>
<td>1A, 2B</td>
<td></td>
</tr>
<tr>
<td>Southbridge, Mass.</td>
<td>1.170</td>
<td>1A, 2B</td>
<td></td>
</tr>
</tbody>
</table>

See footnotes at end of table.
shown in the table are used to combine price data for the 56 individual areas in the CPI sample into a U.S. city average. They were derived from the 1960 Census of Population but adjusted to represent the wage-earner clerical-worker coverage of the CPI. For the 18 largest SMSA’s, which are included in the sample with certainty, the weights are based on their respective populations only. For the remaining cities, which were selected by probability sampling methods to represent all other urban places, the weights represent not only the specific city population, but also the population of all cities in the same region and size class. Thus, every city in the same region and size class (other than the 18 largest) has identical population weights.\textsuperscript{14}

The list of items priced includes all the most important goods and services and a sample of the less important ones. In combination, these represent all items purchased. Table 4 contains a complete list of the items priced for the index. The content of this market basket in terms of items, quantities, and qualities is kept essentially unchanged\textsuperscript{15} in the index calculation between major revisions so that any movement of the index from one month to the next is due solely to changes in prices. A comparison of the total cost of the market basket from period to period yields the measure of average price change.

In the selection of the item sample for the revised CPI, except for the choice of the particular quality or variety of the item to be priced (specification), probability sampling techniques were used, as described later. The more important items are included in the sample with certainty. The remaining items within a given expenditure class were selected with probability. The relative importance of a certainty item represents consumer spending for that item only. "Probability" items represent all other items within the expenditure class. The total weight of these items is divided equally among the probability items within an expenditure class. Table 2 shows relative importances in the national index as of December 1963. Individual relative importances are not shown in the table for probability items; rather their combined importance is shown as "other priced items" in each expenditure class.

Data Sources and Collection Methods

Prices are obtained in the 56 area CPI sample by personal visit to a representative sample of nearly 18,000 stores and service establishments where wage and clerical workers buy goods and services, including chain stores, independent grocery stores, department and specialty stores, restaurants, professional people, and repair and service shops.\textsuperscript{16} Rental rates are obtained from about 40,000 tenants. Reporters are located both in the city proper and in suburbs of each urban area. Cooperation is completely voluntary.

Prices are collected in each urban location at intervals ranging from once every month to once every 3 months, as indicted in table 1, with a few items surveyed semiannually or annually. Because food prices change frequently, and because foods are a significant part of total spending, food pricing is conducted every month in each urban location. Prices of most other goods and services are collected every month in the five largest urban areas and every 3

\textsuperscript{14}Six additional B size Standard Metropolitan Statistical Areas were added to the national index in January 1966. Since they were selected outside the probability framework, they were assigned only their own population weight which was subtracted from that of other stratum B cities in the same region.

\textsuperscript{15}Minor weight revisions are introduced by linking.

### Table 2. Consumer price index (new series)\(^1\) relative importance of major groups, special groups and individual items selected with certainty\(^2\) December 1963

<table>
<thead>
<tr>
<th>Components</th>
<th>Percent of all items December 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td>All items</td>
<td>100.00</td>
</tr>
</tbody>
</table>

#### MAJOR GROUPS

<table>
<thead>
<tr>
<th>Components</th>
<th>Percent of all items December 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>22.43</td>
</tr>
<tr>
<td>Housing</td>
<td>33.23</td>
</tr>
<tr>
<td>Transportation</td>
<td>10.63</td>
</tr>
<tr>
<td>Health and recreation</td>
<td>19.45</td>
</tr>
<tr>
<td>Medical care</td>
<td>5.70</td>
</tr>
<tr>
<td>Personal care</td>
<td>2.75</td>
</tr>
<tr>
<td>Reading and recreation</td>
<td>9.94</td>
</tr>
<tr>
<td>Other goods and services</td>
<td>5.56</td>
</tr>
</tbody>
</table>

#### SPECIAL GROUPS

<table>
<thead>
<tr>
<th>Components</th>
<th>Percent of all items December 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td>All items less shelter</td>
<td>79.85</td>
</tr>
<tr>
<td>All items less food</td>
<td>77.57</td>
</tr>
<tr>
<td>Commodities</td>
<td>65.97</td>
</tr>
<tr>
<td>Nondurables</td>
<td>47.19</td>
</tr>
<tr>
<td>Durables</td>
<td>18.78</td>
</tr>
<tr>
<td>Services</td>
<td>34.03</td>
</tr>
<tr>
<td>Commodities less food</td>
<td>43.54</td>
</tr>
<tr>
<td>Nondurables less food</td>
<td>24.76</td>
</tr>
<tr>
<td>Apparel commodities</td>
<td>9.16</td>
</tr>
<tr>
<td>Apparel commodities less footwear</td>
<td>6.56</td>
</tr>
<tr>
<td>Nondurables less food and apparel</td>
<td>9.50</td>
</tr>
<tr>
<td>Household durables</td>
<td>4.82</td>
</tr>
<tr>
<td>Housefurnishings</td>
<td>2.36</td>
</tr>
<tr>
<td>Services less rent</td>
<td>28.53</td>
</tr>
<tr>
<td>Household services less rent</td>
<td>13.47</td>
</tr>
<tr>
<td>Transportation services</td>
<td>4.86</td>
</tr>
<tr>
<td>Medical care services</td>
<td>4.56</td>
</tr>
<tr>
<td>Other services</td>
<td>5.64</td>
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</tbody>
</table>

#### INDIVIDUAL ITEMS

<table>
<thead>
<tr>
<th>Components</th>
<th>Percent of all items December 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>22.43</td>
</tr>
<tr>
<td>Food at home</td>
<td>17.89</td>
</tr>
<tr>
<td>Cereals and bakery products</td>
<td>2.45</td>
</tr>
<tr>
<td>Cereals</td>
<td>.80</td>
</tr>
<tr>
<td>Bakery products</td>
<td>1.55</td>
</tr>
<tr>
<td>White bread</td>
<td>.60</td>
</tr>
<tr>
<td>Other priced items</td>
<td>1.05</td>
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<tr>
<td>Meats, poultry, and fish</td>
<td>5.63</td>
</tr>
<tr>
<td>Meats</td>
<td>4.45</td>
</tr>
<tr>
<td>Beef and veal</td>
<td>2.21</td>
</tr>
<tr>
<td>Hamburger</td>
<td>.57</td>
</tr>
<tr>
<td>Steak</td>
<td>.80</td>
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<tr>
<td>Other priced items</td>
<td>.84</td>
</tr>
<tr>
<td>Pork</td>
<td>1.30</td>
</tr>
<tr>
<td>Pork chops</td>
<td>.36</td>
</tr>
<tr>
<td>Bacon</td>
<td>.30</td>
</tr>
<tr>
<td>Other priced items</td>
<td>.64</td>
</tr>
<tr>
<td>Other meats</td>
<td>.94</td>
</tr>
<tr>
<td>Poultry</td>
<td>.73</td>
</tr>
<tr>
<td>Frying chickens</td>
<td>.51</td>
</tr>
<tr>
<td>Other priced items</td>
<td>.22</td>
</tr>
<tr>
<td>Fish</td>
<td>.45</td>
</tr>
<tr>
<td>Dairy products</td>
<td>2.80</td>
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<tr>
<td>Milk, fresh (grocery)</td>
<td>.85</td>
</tr>
<tr>
<td>Milk, fresh (delivered)</td>
<td>.68</td>
</tr>
<tr>
<td>Butter</td>
<td>.25</td>
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<tr>
<td>Other priced items</td>
<td>1.02</td>
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<tr>
<td>Fruits and vegetables</td>
<td>3.02</td>
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<tr>
<td>Fresh fruits</td>
<td>.76</td>
</tr>
<tr>
<td>Apples</td>
<td>.17</td>
</tr>
<tr>
<td>Bananas</td>
<td>.15</td>
</tr>
<tr>
<td>Other priced items</td>
<td>.77</td>
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</table>

#### Food—Continued

<table>
<thead>
<tr>
<th>Components</th>
<th>Percent of all items December 1963</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food at home—Continued</td>
<td>4.54</td>
</tr>
<tr>
<td>Fruits and vegetables—Continued</td>
<td>3.75</td>
</tr>
<tr>
<td>Fresh fruits—Continued</td>
<td>.79</td>
</tr>
<tr>
<td>Fresh fruits</td>
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<tr>
<td>Other priced items</td>
<td>.40</td>
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<tr>
<td>Processed fruits and vegetables</td>
<td>1.32</td>
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<tr>
<td>Other food at home</td>
<td>3.99</td>
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<tr>
<td>Eggs</td>
<td>.64</td>
</tr>
<tr>
<td>Fats and oils</td>
<td>.64</td>
</tr>
<tr>
<td>Margarine</td>
<td>.55</td>
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<tr>
<td>Other priced items</td>
<td>.40</td>
</tr>
<tr>
<td>Sugar and sweets</td>
<td>.64</td>
</tr>
<tr>
<td>Nonalcoholic beverages</td>
<td>1.01</td>
</tr>
<tr>
<td>Coffee, can and bag</td>
<td>.40</td>
</tr>
<tr>
<td>Other priced items</td>
<td>.61</td>
</tr>
<tr>
<td>Prepared and partially prepared food</td>
<td>1.15</td>
</tr>
<tr>
<td>Food away from home</td>
<td>4.54</td>
</tr>
<tr>
<td>Restaurant meals</td>
<td>1.30</td>
</tr>
<tr>
<td>Between meal snacks</td>
<td>.40</td>
</tr>
<tr>
<td>Mortgage interest</td>
<td>2.83</td>
</tr>
<tr>
<td>Taxes and insurance</td>
<td>2.13</td>
</tr>
<tr>
<td>Real estate taxes</td>
<td>1.72</td>
</tr>
<tr>
<td>Property insurance</td>
<td>.41</td>
</tr>
<tr>
<td>Maintenance and repairs</td>
<td>3.03</td>
</tr>
<tr>
<td>Commodity</td>
<td>.98</td>
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<tr>
<td>Services</td>
<td>2.05</td>
</tr>
<tr>
<td>Fuel and utilities</td>
<td>5.26</td>
</tr>
<tr>
<td>Fuel oil and coal</td>
<td>7.3</td>
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<tr>
<td>Fuel oil</td>
<td>6.7</td>
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<tr>
<td>Coal</td>
<td>.06</td>
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<tr>
<td>Gas and electricity</td>
<td>2.71</td>
</tr>
<tr>
<td>Gas</td>
<td>1.30</td>
</tr>
<tr>
<td>Electricity</td>
<td>1.41</td>
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<tr>
<td>Other utilities</td>
<td>1.82</td>
</tr>
<tr>
<td>Telephone</td>
<td>1.38</td>
</tr>
<tr>
<td>Water and sewerage</td>
<td>.44</td>
</tr>
<tr>
<td>Household furnishings and operation</td>
<td>7.82</td>
</tr>
<tr>
<td>Textile housefurnishings</td>
<td>.61</td>
</tr>
<tr>
<td>Furniture</td>
<td>1.44</td>
</tr>
<tr>
<td>Bedding and coverings</td>
<td>1.28</td>
</tr>
<tr>
<td>Living room suit</td>
<td>1.28</td>
</tr>
<tr>
<td>Other priced items</td>
<td>.88</td>
</tr>
<tr>
<td>Floor coverings</td>
<td>.48</td>
</tr>
<tr>
<td>Rugs, soft surface</td>
<td>.34</td>
</tr>
<tr>
<td>Other priced items</td>
<td>.14</td>
</tr>
<tr>
<td>Appliances</td>
<td>1.36</td>
</tr>
<tr>
<td>Refrigerators</td>
<td>.28</td>
</tr>
<tr>
<td>Other priced items</td>
<td>1.08</td>
</tr>
<tr>
<td>Other housefurnishings</td>
<td>.83</td>
</tr>
<tr>
<td>Housekeeping supplies</td>
<td>1.55</td>
</tr>
<tr>
<td>Housekeeping services</td>
<td>1.55</td>
</tr>
<tr>
<td>Domestic service</td>
<td>.26</td>
</tr>
<tr>
<td>Baby sitter</td>
<td>.29</td>
</tr>
<tr>
<td>Postage</td>
<td>.23</td>
</tr>
<tr>
<td>Other priced items</td>
<td>.77</td>
</tr>
</tbody>
</table>

---

\(^1\) See footnotes at end of table.

\(^2\) See footnotes at end of table.
Table 2. Consumer price index (new series)\(^1\) relative importance of major groups, special groups and individual items selected with certainty\(^2\) December 1963—Continued

<table>
<thead>
<tr>
<th>Components</th>
<th>Percent of all items</th>
<th>Components</th>
<th>Percent of all items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>December 1963</td>
<td></td>
<td>December 1963</td>
</tr>
<tr>
<td>Apparel and upkeep</td>
<td>10.63</td>
<td>Health and recreation</td>
<td>19.45</td>
</tr>
<tr>
<td>Men's and boys' apparel</td>
<td>2.86</td>
<td>Medical care</td>
<td>5.70</td>
</tr>
<tr>
<td>Men's apparel</td>
<td>2.21</td>
<td>Drugs and pharmaceuticals</td>
<td>1.34</td>
</tr>
<tr>
<td>Suits, year round</td>
<td>.36</td>
<td>Over-the-counter items</td>
<td>.50</td>
</tr>
<tr>
<td>Other priced items</td>
<td>1.85</td>
<td>Prescriptions</td>
<td>.64</td>
</tr>
<tr>
<td>Boys' apparel</td>
<td>.65</td>
<td>Professional services</td>
<td>2.59</td>
</tr>
<tr>
<td>Women's and girls' apparel</td>
<td>4.08</td>
<td>Family doctor, house visit</td>
<td>.12</td>
</tr>
<tr>
<td>Women's apparel</td>
<td>3.23</td>
<td>Family doctor, office visit</td>
<td>.77</td>
</tr>
<tr>
<td>Winter coats</td>
<td>.28</td>
<td>Optometric examination and</td>
<td>.29</td>
</tr>
<tr>
<td>Street dresses</td>
<td>.50</td>
<td>eyeglasses</td>
<td>.86</td>
</tr>
<tr>
<td>Hose, nylon</td>
<td>.39</td>
<td>Dentists' fees</td>
<td>.55</td>
</tr>
<tr>
<td>Other priced items</td>
<td>2.06</td>
<td>Other priced items</td>
<td>.36</td>
</tr>
<tr>
<td>Girls' apparel</td>
<td>.85</td>
<td>Hospital services</td>
<td>1.61</td>
</tr>
<tr>
<td>Footwear</td>
<td>1.51</td>
<td>Hospital services</td>
<td>.66</td>
</tr>
<tr>
<td>Street shoes, men's</td>
<td>.26</td>
<td>Nonhospital services</td>
<td>.71</td>
</tr>
<tr>
<td>Street shoes, women's</td>
<td>.26</td>
<td>Overhead</td>
<td>.24</td>
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<tr>
<td>Other priced items</td>
<td>.99</td>
<td></td>
<td></td>
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<td>Other apparel</td>
<td>2.18</td>
<td>Personal care</td>
<td>2.76</td>
</tr>
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<td>Commodities</td>
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<td>Toilet goods</td>
<td>1.52</td>
</tr>
<tr>
<td>Services</td>
<td>1.49</td>
<td>Services</td>
<td>1.23</td>
</tr>
<tr>
<td>Dry cleaning</td>
<td>.79</td>
<td>Men's haircut</td>
<td>.51</td>
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<td>Men's suit</td>
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<td>.72</td>
</tr>
<tr>
<td>Women's dress</td>
<td>.35</td>
<td>Reading and recreation</td>
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<tr>
<td>Other priced items</td>
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<td>Recreation</td>
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<tr>
<td>Transportation</td>
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<td>TV sets</td>
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<td>Autos and related goods</td>
<td>9.02</td>
<td>Other priced items</td>
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<td>Auto purchase</td>
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<td>Recreational services</td>
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<tr>
<td>New cars</td>
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<td>Movies (indoor)</td>
<td>.38</td>
</tr>
<tr>
<td>Used cars</td>
<td>2.47</td>
<td>Bowling fees</td>
<td>.36</td>
</tr>
<tr>
<td>Gasoline and motor oil</td>
<td>3.28</td>
<td>Other priced items</td>
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<tr>
<td>Gasoline</td>
<td>3.05</td>
<td>Reading and education</td>
<td>1.58</td>
</tr>
<tr>
<td>Motor oil</td>
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<td>Newspapers</td>
<td>.50</td>
</tr>
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<td>Auto parts</td>
<td>.72</td>
<td>College tuition</td>
<td>.23</td>
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<tr>
<td>Automobile services</td>
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<td>Other priced items</td>
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<td>Auto repairs and maintenance</td>
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<td>Other automobile expenses</td>
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<td>Other goods and services</td>
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<td>Tobacco products</td>
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<td>Registration fees</td>
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<td>Cigarettes</td>
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<td>Drivers' license</td>
<td>.04</td>
<td>Other priced items</td>
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</tr>
<tr>
<td>Parking fees</td>
<td>.18</td>
<td>Alcoholic beverages</td>
<td>2.64</td>
</tr>
<tr>
<td>Auto financing charges(^3)</td>
<td>.63</td>
<td>Beer</td>
<td>1.06</td>
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<tr>
<td></td>
<td></td>
<td>Whiskey and wine</td>
<td>.78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Away from home</td>
<td>.80</td>
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<td>Public transportation</td>
<td>1.24</td>
<td>Personal expenses</td>
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</tr>
<tr>
<td>Local transit</td>
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<td>Funeral services</td>
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<td>Taxicabs</td>
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<td>Bank service charges</td>
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<td>Train fares</td>
<td>.07</td>
<td>Legal services</td>
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<td>Airplane fares</td>
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<td>Intercity bus fares</td>
<td>.05</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Miscellaneous(^3,(^5))</td>
<td>.38</td>
</tr>
</tbody>
</table>

\(^1\) For a description of the new series, see The Consumer Price Index, A Short Description, 1971.
\(^2\) The list of items priced includes all the more important goods and services and a sample of the less important ones. In combination, these represent all items included in the CPI. Weight for individual certainty items are shown separately. Some of them, however, are represented by more than one specification, but the weights for the individual specifications are not shown. The remaining weight of each expenditure class having both certainty and probability items was shared equally by the probability items as of December 1963, except in a few cases where weights for duplicated items have double weights.

\(^3\) Not actually priced; imputed from priced items.

\(^4\) Cost of health insurance is imputed by price changes for representative services plus the cost of overhead. For a more complete discussion, see article by James C. Daugherty, “Health Insurance in the Revised CPI,” Monthly Labor Review, November 1964, pp. 1299–1300.

\(^5\) Personal financing charges other than mortgage interest and auto financing.

months in all other places. Pricing of food is done each month on 3 consecutive days early in the month; rents and items for which prices are obtained by mail are reported as of the 15th of the month; pricing of other items extends over the entire calendar month. The Bureau uses mail questionnaires to obtain data on streetcar and bus fares, public utility rates, newspaper prices, and prices of certain other items which do not require personal visit by Bureau agents. For a number of items, e.g., home purchase, college tuition, used cars, magazines, etc., data collected by other Government agencies or private organizations are used.

To insure that the index reflects only changes in
prices and not changes due to quantity or quality differences, the Bureau has prepared detailed specifications which describe the physical characteristics of the items in the market basket. Specially trained Bureau representatives examine merchandise in the stores to determine whether the goods and services for which they record prices conform to the specifications. Where the precisely specified item is not sold at a particular retail establishment, the Bureau's representative quotes prices and obtains a detailed technical description of the item nearest to the physical characteristics of the specification, in order to insure that prices will be quoted on the same quality and quantity from time to time. At the first pricing in an outlet the agent selects the volume selling item meeting specification, making sure that it is regular merchandise in good condition and available in a customary assortment of colors, patterns, etc.

At the subsequent pricings the agent prices the identical item if it is still available in a reasonable assortment and selling in substantial volume. If it is not, she must substitute another volume selling item, meeting specification, if possible. If she cannot, she prices an item deviating from specification. Prices of substitute items meeting specification are compared directly. Prices of deviating items are introduced by linking or splicing in such a way that the difference in price between the specification and the deviating item is not reflected as a price change. If it is possible to obtain an estimate of the value of the quality difference, prices of the previous item are adjusted by the quality estimate and compared with prices for the current month.

When the sample of reporters is changed for any reason, prices from the new reporter also are introduced by linking.

### Sampling

A complicated index such as the CPI must be based on a whole complex of samples. A sample of cities or areas is required in which expenditure surveys and price collection will be conducted. Within each area there must be a sample of families or consumer units, from which consumer expenditures will be obtained. It is convenient, but not essential, that the city sampling points be the same for price collection as for the Consumer Expenditure Surveys.

Further, since it is impossible to price all the thousands of items which consumers buy, it is necessary to select a sample of items for pricing, to represent price movement of all items. Samples of outlets are needed at each sampling point in which price quotations are obtained for the selected items. Finally, pricing usually is done at a specific time of the month or quarter so there is, in effect, a sampling of time.

In the 1964 revision, the Bureau of Labor Statistics used probability sampling to a greater extent than had been done previously, despite the well-known difficulties involved. At the same time, the Bureau attempted to include in the CPI sampling design some method for obtaining an estimate, even if only a crude one, of sampling error. Probability sampling is a necessity, of course, if this is to be done in a conventional manner. However, even if probability sampling could be followed rigorously through all the complicated CPI structure, the mere computational load would be so extensive that it would be impractical to compute measures of error except by some "simple" approach. The objective, therefore, has been approached by the "replication" method.

The sample design includes an ex post facto pairing of probability cities (or Standard Metropolitan Statistical Areas), two replicated item samples, and replicated outlet samples. In addition to the minimum program, designed to produce an estimate of the total sampling error in the index from all sources, the structure includes more extended replication in selected cities aimed at permitting some evaluation of the components of the error, that is, variation in sampling results due to sampling of cities, items, and outlets.

### City Sample

A core sample of 50 SMSA's (see footnote 13) or smaller cities for the index, supplemented by 16 additional D size cities for the family expenditure surveys was the maximum size consistent with available budget. These additional D size cities were surveyed because expenditure patterns are more variable among small cities than among large cities. The primary sampling units (PSU's) are Standard Metropolitan Statistical Areas as they were defined by the Bureau of the Budget prior to the 1960 Census, except that the Standard Consolidated Areas for New York and Chicago were used, plus individual urban places outside the SMSA's. Because 1960 Census data were not then available, the measure of size used in sample selection was the estimated urban population as of January 1, 1959. The population weights actually assigned are based on 1960 data. The PSU's were stratified by broad region and by size into 12 regional-size strata. The 12 largest SMSA's were selected with certainty, that is, they represent themselves in the sample design. Since Alaska and Hawaii have been added in the revised CPI, one sample selection has been allocated to each of these two States. The remaining 36 selections are allocated to the 12 regional-size strata on the basis of relative population and relative costs of pricing.
cities of different size. Four size strata are defined as follows:

A. The 12 largest SMSA’s on the basis of urban population, in effect those with population over 1,400,000;

B. Other large SMSA’s with urban population greater than 250,000;

C. SMSA’s with urban population of 50,000–250,000; and

D. Nonmetropolitan urban places with population less than 50,000.

The method of selection used is known generally as “controlled selection” which was described by Roe Goodman and Leslie Kish in the September 1950 issue of the Journal of the American Statistical Association (pp. 350–372). This method accomplishes a good geographic dispersion of sampling points across the country.

After the initial 50-area sample was selected, the BLS received funds to prepare city indexes for six additional large SMSA’s—Cincinnati, Houston, Kansas City, Milwaukee, Minneapolis-St. Paul, and San Diego—as part of a plan to publish indexes for each SMSA with 1,000,000 total population in 1960. These areas were added to the national index in January 1966.

Samples of Consumer Units. The CES samples were chosen as subsamples of housing units enumerated in advance Comprehensive Housing Unit Surveys (CHUS) conducted in each area late in the year preceding the actual survey date.\(^{18}\) The CHUS also serve as the source of the samples of rental dwellings for measuring price change in rents, and of owner occupied units for measurement of changes in property taxes. They also provide data for weights for home purchase. The actual size of the CHUS sample in an area is determined primarily by the rental sample desired and by the proportion of renters in the given area, as estimated from Census data. The number of addresses enumerated in the CHUS is usually many times larger than it is in the samples for surveys of consumer expenditures.

Sampling of Items. A classification system has been developed to provide a logical publication framework containing the traditional major expenditure groups, subgroups, etc., but, in a broader sense, to divide the thousands of goods and services purchased by consumers into meaningful and manageable components of the universe. It provides the framework for the selection of the item sample and for the derivation of index weights.

Two levels of the classification system are of critical importance. These are: (1) the item level, and (2) the level which defines the finest stratification for the item sample; that is, the strata to which allocations of items are made and within which probability samples of items are selected. The term “expenditure class” (EC) is given to this level. The expenditure classes are primarily groupings of items which serve similar human needs. Items are grouped within an EC so that they are as homogeneous as possible with respect to their physical characteristics. It is not possible to confine groupings to items which are similar with respect to price movements.

Within an expenditure class base period expenditure weights will be held constant; that is, the EC expenditures serve as a way of defining the level of living which is to be held constant until the next major revision of the CPI. The Bureau plans to resample items within an EC between major revisions whenever there is evidence of a major redistribution of relative expenditures or indications that the previous sample of priced items does not adequately represent the class. The connotation of “item” in the sampling frame is necessarily fairly broad and the items are not of equal homogeneity in the different classes. Generally the listing is above that of the final “specified-in-detail” items for which prices are collected. For the most part no attempt has been made to carry probability sampling to this ultimate stage.

There were about 1,800 line items in the expenditure survey schedule. After extensive experimentation, using expenditure data from a 1959 pilot survey in Cincinnati, a final sampling frame containing 52 EC’s and 812 items was developed. The list of EC’s and the number of items in each are shown in table 3.

The first step in the selection of the item sample for the revised index was to make a roughly optimum allocation of the total number of items to be priced to each EC. Factors considered were the relative importances of the EC’s and a rough measure of variability of price movement.

As in past revisions of the CPI, the samples were selected on a national basis. Selection of independent samples, city-by-city, is not practical since it would result in a huge list of items to be priced in at least one city and an impossible burden of writing and keeping up with changes in specifications.

The two replicated samples of items of the revised CPI have been selected with “probability proportional to size,” size being defined as the relative importance of the expenditures for the item to total expenditures for all items. The general procedure was to array items within a stratum and by using a random start to make regular selections along the array. Each of the two replicated samples thus contains “certainty items;” that is, items which are certain of inclusion because their relative importance is greater than the selecting interval. The replicated samples also contain some du-
Table 3. Number of items in sampling frame and number of items priced by expenditure class

<table>
<thead>
<tr>
<th>Expenditure class number</th>
<th>Classes</th>
<th>Number of items</th>
<th>Number of items sampled</th>
<th>Number of specifications priced</th>
</tr>
</thead>
<tbody>
<tr>
<td>All items</td>
<td></td>
<td>812</td>
<td>309</td>
<td>396</td>
</tr>
<tr>
<td><strong>Food</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Food at home:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cereals and bakery products:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EC 1 Cereals and grain products</td>
<td>19</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>EC 2 Bakery products</td>
<td>16</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Meats, poultry, and fish:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EC 3 Beef and veal</td>
<td>12</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>EC 4 Poultry</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EC 5 Fish</td>
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<td>4</td>
<td>5</td>
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<tr>
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<td>Dairy products:</td>
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<td>EC 6 Dairy products</td>
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<td>Fruits and vegetables:</td>
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<tr>
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<td>EC 7 Fresh fruits</td>
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<td>8</td>
<td>8</td>
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<tr>
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<td>EC 8 Fresh vegetables</td>
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<td>11</td>
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<tr>
<td></td>
<td>Processed fruits and vegetables</td>
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<td>Other food at home:</td>
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<td>EC 10 Eggs</td>
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<td>1</td>
<td>1</td>
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<tr>
<td></td>
<td>EC 11 Fats and oils</td>
<td>8</td>
<td>3</td>
<td>3</td>
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<tr>
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<td>EC 12 Sugar and sweets</td>
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<td>4</td>
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</tr>
<tr>
<td></td>
<td>EC 13 Nonalcoholic beverages</td>
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<td>5</td>
<td>6</td>
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<tr>
<td></td>
<td>EC 14 Prepared and partially prepared foods</td>
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<td>8</td>
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<tr>
<td></td>
<td>EC 15 Food away from home</td>
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<tr>
<td><strong>Housing</strong></td>
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<td><strong>Homemakership</strong></td>
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<td>EC 16 Purchase and financing</td>
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<tr>
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<td>EC 17 Taxes and insurance</td>
<td>2</td>
<td>2</td>
<td>3</td>
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<tr>
<td></td>
<td>Maintenance and repairs:</td>
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<td></td>
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<tr>
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<td>EC 18 Commodity comforts</td>
<td>14</td>
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<td>6</td>
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<td>EC 20 Commodity services</td>
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<td>5</td>
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<td>EC 21 Fuel and utilities:</td>
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<td>10</td>
</tr>
<tr>
<td></td>
<td>Household furnishings and operation:</td>
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<td></td>
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<td>Housefurnishings:</td>
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<tr>
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<td>EC 22 Textile housefurnishings</td>
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<tr>
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<td>Furniture and floor coverings:</td>
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<tr>
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<td>EC 23 Furniture</td>
<td>31</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Floor coverings</td>
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<td>4</td>
</tr>
<tr>
<td></td>
<td>Appliances</td>
<td>21</td>
<td>8</td>
<td>8</td>
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<tr>
<td></td>
<td>Other housefurnishings</td>
<td>32</td>
<td>8</td>
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</tr>
<tr>
<td></td>
<td>Household operation:</td>
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</tr>
<tr>
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<td>EC 27 Housekeeping supplies</td>
<td>28</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>EC 28 Housekeeping services</td>
<td>14</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td><strong>Apparel and upkeep</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Men's and boys' apparel:</td>
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<tr>
<td></td>
<td>EC 29 Men's apparel</td>
<td>30</td>
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<td>EC 30 Boys' apparel</td>
<td>23</td>
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<tr>
<td></td>
<td>Women's and girls' apparel:</td>
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<tr>
<td></td>
<td>EC 31 Women's apparel</td>
<td>39</td>
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<td>26</td>
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<td>EC 32 Girls' apparel</td>
<td>31</td>
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<td>Footwear</td>
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<td>Other apparel:</td>
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<td>EC 34 Commodities</td>
<td>26</td>
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<td>EC 35 Services</td>
<td>14</td>
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<td><strong>Transportation</strong></td>
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<tr>
<td></td>
<td>Autos and related goods:</td>
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<td></td>
</tr>
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<td></td>
<td>EC 36 Auto purchase</td>
<td>2</td>
<td>2</td>
<td>12</td>
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<td></td>
<td>EC 37 Gasoline and motor oil</td>
<td>2</td>
<td>2</td>
<td>3</td>
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<tr>
<td></td>
<td>EC 38 Auto parts, etc.</td>
<td>6</td>
<td>2</td>
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<td></td>
<td>Automotive services:</td>
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</tr>
<tr>
<td></td>
<td>EC 39 Auto repairs and maintenance</td>
<td>13</td>
<td>6</td>
<td>6</td>
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<td></td>
<td>EC 40 Other automobile expenses</td>
<td>5</td>
<td>4</td>
<td>6</td>
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<td></td>
<td>EC 41 Public</td>
<td>6</td>
<td>5</td>
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Table 3. Number of items in sampling frame and number of items priced by expenditure class—Continued

<table>
<thead>
<tr>
<th>Expenditure class number</th>
<th>Classes</th>
<th>Number of items</th>
<th>Number of items sampled</th>
<th>Number of specifications priced</th>
</tr>
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<tbody>
<tr>
<td>EC 42</td>
<td>Health and recreation</td>
<td>2</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>EC 43</td>
<td>Medical care:</td>
<td>11</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>EC 44</td>
<td>Drugs and prescriptions</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>EC 45</td>
<td>Professional services</td>
<td>28</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>EC 46</td>
<td>Personal care:</td>
<td>9</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>EC 47</td>
<td>Services</td>
<td>29</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>EC 48</td>
<td>Recreational goods</td>
<td>13</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>EC 49</td>
<td>Recreational services</td>
<td>11</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>EC 50</td>
<td>Reading and education</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>EC 51</td>
<td>Other goods and services</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>EC 52</td>
<td>Financial and miscellaneous personal expenses</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

For the final selection, relative importances (in the family expenditure pattern) for the condensed sampling frame (52 EC’s and 812 items) were obtained from expenditure data for nine of the cities surveyed for 1960. Ideally, of course, the data should have covered all 66 cities, but such data were not available in time for use in selection of items. Expenditure data for these nine places were weighted together to give preliminary estimates of U.S. average expenditures. (Final index weights of course are based on complete data for all cities.)

The selection of one or more specifications or "specified-in-detail" items to represent the items selected from the sampling frame has been made in most cases by commodity specialists from expert knowledge of the item. Factors taken into consideration are the importance and representativeness of particular qualities and the feasibility of describing a selected item clearly enough to permit repetitive price collection. In a few cases where sufficient data existed, it is possible to make a second stage probability selection of specifications.

Outlet Sampling. The first big problem encountered in attempting probability sampling of outlets was to obtain information about the universe of retail and service establishments in a given area. Ideally, names and addresses of such places, information as to type of store or outlet, some indication of volume of sales, and preferably fairly specific information as to types of merchandise carried would have been desirable.

Comprehensive establishment data were obtained from a list of firms which report to the Bureau of Old Age and Survivors Insurance (Social Security Administration, U.S. Department of Health, Education, and Welfare). Using sampling ratios furnished by BLS, master samples of retail and service outlets were selected by BOASI. These were supplemented with listings from other sources.

In the larger SMSA’s, a two-stage sampling procedure has been followed. Samples of neighborhood and suburban localities and shopping centers have been selected in which pricing outside the downtown area is conducted. These were selected with probability proportional to sales volume, using the best available sales data. The listings of sample outlets were limited to those falling within the sampled areas.

The number of food stores priced varies from less than 10 in the smallest cities to about 80 in New York. The number of quotations for non-food items per city is quite small; the basic number in each outlet sample is four. This means that for the cities in which both item samples are priced eight is the maximum sample size even for items appearing in both item samples. In a few “A” cities, the sample sizes are set at 5 per sample or a maximum of 10. At the U.S. level, however, the number of quotations is sizeable.

In selecting the sample, allocations of quotations were made for each item by type of outlet, based on available sales data, “where bought” surveys, etc. As a specific example, if eight quotations are required for a particular woman’s shoe specification, the allocation might be three quotations to department stores, two to women’s specialty shops, two to women’s shoe stores, and one to family shoe stores. Specific allocations also are made by location within the SMSA (central business district, neighborhood centers, and suburbs) and, in some cases, to multiunit and independent establishments.

In addition to the pricing of regular retail and service outlets, there are a number of special items whose nature requires separate samples of specific types of “outlets;” for example, samples of physicians and other
## Table 4. List of commodities and services priced for the consumer price index as of January 1975

<table>
<thead>
<tr>
<th>Groups, subgroups, expenditure classes</th>
<th>Sample A</th>
<th>Sample B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Food at home:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC-1 Cereals and bakery products:</td>
<td>Corn flakes</td>
<td>Flour, white, all-purpose.</td>
</tr>
<tr>
<td></td>
<td>Rice, long and short grain</td>
<td>Cracker meal</td>
</tr>
<tr>
<td>EC-2 Bakery products</td>
<td>White bread</td>
<td>White bread.</td>
</tr>
<tr>
<td></td>
<td>Whole wheat bread</td>
<td>Cookies, cream filled.</td>
</tr>
<tr>
<td>EC-3 Meats, poultry, and fish:</td>
<td>Hamburger</td>
<td>Hamburger.</td>
</tr>
<tr>
<td></td>
<td>Veal cutlets</td>
<td>Veal cutlets</td>
</tr>
<tr>
<td>EC-4 Poultry</td>
<td>Frying chicken, whole or cut-up</td>
<td>Frying chicken, whole or cut-up.</td>
</tr>
<tr>
<td>EC-5 Fish</td>
<td>Turkey, medium size.</td>
<td>Turkey, medium size.</td>
</tr>
<tr>
<td>EC-6 Dairy products</td>
<td>Chicken breasts</td>
<td>Chicken breasts</td>
</tr>
<tr>
<td></td>
<td>Tuna fish</td>
<td>Tuna fish</td>
</tr>
<tr>
<td>EC-7 Fruits and vegetables:</td>
<td>Apples, all purpose</td>
<td>Apples, all purpose</td>
</tr>
<tr>
<td></td>
<td>Bananas, yellow variety</td>
<td>Bananas, yellow variety</td>
</tr>
<tr>
<td></td>
<td>Oranges, except Temple or King</td>
<td>Oranges, except Temple or King</td>
</tr>
<tr>
<td></td>
<td>Grapes, Thompson seedless</td>
<td>Grapes, Thompson seedless</td>
</tr>
<tr>
<td></td>
<td>Grapefruit, fresh, pink or white</td>
<td>Strawberry, fresh.</td>
</tr>
<tr>
<td></td>
<td>Orange juice, fresh</td>
<td>Watermelons, whole or sliced</td>
</tr>
<tr>
<td>EC-8 Fresh vegetables</td>
<td>Head lettuce</td>
<td>Head lettuce</td>
</tr>
<tr>
<td></td>
<td>Potatoes, white</td>
<td>Potatoes, white</td>
</tr>
<tr>
<td></td>
<td>Tomatoes</td>
<td>Tomatoes</td>
</tr>
<tr>
<td></td>
<td>Asparagus, green</td>
<td>Cabbage, all varieties except red</td>
</tr>
<tr>
<td></td>
<td>Tomatoes, topped, prepackaged</td>
<td>Celery, Pascal stalk</td>
</tr>
<tr>
<td></td>
<td>Cucumbers</td>
<td>Cucumbers</td>
</tr>
<tr>
<td></td>
<td>Spinach, prepackaged</td>
<td>Spinach, prepackaged</td>
</tr>
<tr>
<td>EC-9 Processed fruits and vegetables:</td>
<td>Pears, Bartlett, can or jar</td>
<td>Fruit cocktail, canned.</td>
</tr>
<tr>
<td></td>
<td>Lemonade, concentrate, frozen</td>
<td>Pineapple-Grapefruit juice drink, canned.</td>
</tr>
<tr>
<td></td>
<td>Beets, sliced, can or jar</td>
<td>Orange juice concentrate, frozen.</td>
</tr>
<tr>
<td></td>
<td>Tomatoes, can or jar</td>
<td>Peas, green, can or jar</td>
</tr>
<tr>
<td></td>
<td>Dried beans, Navy or Great Northern</td>
<td>Broccoli spears, frozen</td>
</tr>
<tr>
<td>Other foods at home:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EC-10 Eggs</td>
<td>Eggs, large, Grade A</td>
<td>Eggs, large, Grade A</td>
</tr>
<tr>
<td>EC-11 Fats and oils</td>
<td>Margarine, colored</td>
<td>Margarine, colored</td>
</tr>
<tr>
<td>EC-12 Sugar and sweets</td>
<td>Salad dressing, Italian</td>
<td>Salad or cooking oil, vegetable.</td>
</tr>
<tr>
<td>EC-13 Nonalcoholic beverages</td>
<td>Sugar, white, granulated</td>
<td>Grape jelly</td>
</tr>
<tr>
<td></td>
<td>Chocolate bars, plain milk</td>
<td>Chocolate flavored syrup.</td>
</tr>
<tr>
<td>EC-14 Prepared and partially prepared foods</td>
<td>Coffee, 1 lb. can</td>
<td>Coffee, 1 lb. can</td>
</tr>
<tr>
<td></td>
<td>Carbonated fruit drink</td>
<td>Coffee instant</td>
</tr>
<tr>
<td></td>
<td>Tea bags</td>
<td>Tea bags</td>
</tr>
<tr>
<td>EC-15 Food away from home:</td>
<td>Bean soup, canned, condensed</td>
<td>Chicken soup, canned, condensed.</td>
</tr>
<tr>
<td></td>
<td>Spaghetti, in tomato sauce, canned</td>
<td>Baby foods, strained</td>
</tr>
<tr>
<td></td>
<td>Mashed potatoes, instant</td>
<td>Sweet pickle relish</td>
</tr>
<tr>
<td></td>
<td>Potatoes, French fried, frozen</td>
<td>Pretzels, hard, salted</td>
</tr>
<tr>
<td></td>
<td>Restaurant meals:</td>
<td>Restaurant meals:</td>
</tr>
<tr>
<td></td>
<td>Lunch</td>
<td>Lunch</td>
</tr>
<tr>
<td></td>
<td>Breakfast</td>
<td>Breakfast</td>
</tr>
<tr>
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</table>

*See footnotes at end of table.*
Table 4. List of commodities and services priced for the consumer price index as of January 1975—Continued

<table>
<thead>
<tr>
<th>Groups, subgroups, expenditure classes</th>
<th>Sample A</th>
<th>Sample B</th>
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<td>Food—Continued</td>
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<td></td>
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<tr>
<td>Food away from home—Continued</td>
<td></td>
<td></td>
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<tr>
<td>Between meal snacks:</td>
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</tr>
<tr>
<td>Coffee, cup</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbonated beverages, cup</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frankfurter on roll</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ice cream, dish</td>
<td></td>
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</tr>
<tr>
<td>Rent</td>
<td></td>
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<tr>
<td>Home purchase</td>
<td></td>
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<tr>
<td>Mortgage interest rates</td>
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<tr>
<td>Property taxes, residential</td>
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<td></td>
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<tr>
<td>Property insurance premiums:</td>
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<tr>
<td>Fire and extended coverage</td>
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<td>Homeownership policy</td>
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<tr>
<td>Exterior house paint</td>
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<td>Air Filters</td>
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<tr>
<td>Packaged dry cement mix</td>
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<tr>
<td>Residing houses</td>
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<tr>
<td>Reshingling roofs</td>
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<tr>
<td>Replacing sinks</td>
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<td>Fuel oil and coal:</td>
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<td>Coal, anthracite or bituminous</td>
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<tr>
<td>Gas and electricity:</td>
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</tr>
<tr>
<td>Gas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electricity</td>
<td></td>
<td></td>
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<tr>
<td>Other utilities:</td>
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<td>Residential telephone services</td>
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<tr>
<td>Residential water and sewerage services</td>
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<tr>
<td>Pillow, bed</td>
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<tr>
<td>Curtains, tailored, polyester</td>
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<tr>
<td>Drapery fabric</td>
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<td>Recliners, upholstered</td>
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<tr>
<td>Sofas, convertible</td>
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<tr>
<td>Bedding sets, mattress and boxspring</td>
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<tr>
<td>Bedroom chests</td>
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<td>Aluminum folding chairs</td>
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<td>Rugs, soft surface:</td>
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<td>Broadloom, acrylic</td>
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<tr>
<td>Broadloom, nylon</td>
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<tr>
<td>Broadloom, polyester</td>
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<td></td>
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<tr>
<td>Refrigerator-freezers, electric</td>
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<td></td>
</tr>
<tr>
<td>Washing machines, electric, automatic</td>
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<td></td>
</tr>
<tr>
<td>Ranges, free standing, gas or electric</td>
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<td></td>
</tr>
<tr>
<td>Clothes dryers, electric, automatic</td>
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<td></td>
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<tr>
<td>Room heaters, electric, portable</td>
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<td></td>
</tr>
<tr>
<td>Detergent, liquid</td>
<td></td>
<td></td>
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<tr>
<td>Laundry soap for fine fabrics</td>
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<td></td>
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<tr>
<td>Scouring pads, steel wool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet tissue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic service, general housework</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baby sitter or child care service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postal services</td>
<td></td>
<td></td>
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<tr>
<td>Laundry flatwork, finished service</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Licensed day care service, preschool child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washing machine repairs</td>
<td></td>
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</tr>
</tbody>
</table>

See footnotes at end of table.
<table>
<thead>
<tr>
<th>Groups, subgroups, expenditure classes</th>
<th>Priced items</th>
<th>Sample A</th>
<th>Sample B</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Apparel and upkeep:</strong> Men's apparel</td>
<td>Suits, year-round weight</td>
<td>Suits, year-round weight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Topcoats or all-weather coats</td>
<td>Jackets, lightweight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sport jackets</td>
<td>Trousers, work</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slacks, wool, wool blend, or polyester</td>
<td>Slacks, cotton, manmade blends</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shirts, work</td>
<td>Shirts, business or dress</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shirts, sport, short sleeves</td>
<td>Socks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shirts, sport, long sleeves</td>
<td></td>
<td>Handkerchiefs, cotton or polyester/cotton.</td>
</tr>
<tr>
<td></td>
<td>T-shirts, cotton or polyester/cotton</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys' apparel</td>
<td>Coats, all purpose, cotton or cotton blend</td>
<td>Sport jackets, wool or wool blend</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dungarees, cotton or polyester/cotton</td>
<td>Undershorts, cotton</td>
<td></td>
</tr>
<tr>
<td><strong>Women's and girl's apparel:</strong> Women's apparel</td>
<td>Coats, heavyweight, wool or wool blend</td>
<td>Coats, heavyweight, wool or wool blend,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 qualities</td>
<td>2 qualities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carcoats, heavyweight</td>
<td>Coats, lightweight, wool or wool blend</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skirts, winter weight</td>
<td>Sweaters, wool or acrylic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skirts, summer weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dresses, daytime, chiefly manmade fiber</td>
<td>Dresses, daytime, chiefly manmade fiber, 2 qualities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dresses, street, manmade fiber, 2 qualities</td>
<td>Dresses, street, manmade fiber, 2 qualities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slacks, winter weight</td>
<td>Bathing suits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slacks, summer weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slips, nylon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls' apparel</td>
<td>Raincoats, vinyl or fabric</td>
<td>Coats, lightweight</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skirts, acrylic</td>
<td>Slacks, cotton or polyester</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skips, polyester blends or nylon</td>
<td>Shorts or scooter skirt</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Handbags, plastic</td>
<td>Dresses cotton, polyester/cotton or manmade fabric</td>
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<td></td>
<td></td>
<td>Robes, quilted</td>
<td></td>
</tr>
<tr>
<td><strong>Footwear</strong></td>
<td>Men's: Shoes, street, oxford or buckle strap</td>
<td>Shoes, street, oxford or buckle strap,</td>
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</tr>
<tr>
<td></td>
<td>2 qualities</td>
<td>2 qualities</td>
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<tr>
<td></td>
<td>Women's: Shoes, street, pump, 2 qualities</td>
<td>Shoes, street, pump, 2 qualities</td>
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<tr>
<td></td>
<td>Shoes, evening, pump</td>
<td>Shoes, evening, pump</td>
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<tr>
<td></td>
<td>Shoes, casual</td>
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<tr>
<td></td>
<td>Houseslippers, scuff</td>
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<td></td>
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<tr>
<td>Childrens': Sneakers, boys', oxford type</td>
<td></td>
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<tr>
<td><strong>Other apparel:</strong> Commodities</td>
<td>Diapers, cotton gauze or disposable</td>
<td>Wrist watches, men's imported movement</td>
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<tr>
<td></td>
<td>Yard goods</td>
<td>Wrist watches, women's imported movement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earrings, Pearl, simulated or imitation</td>
<td>Zipper, skirt or neck placket</td>
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<td></td>
<td>Dry cleaning, men's suits and women's dresses</td>
<td>Dry cleaning, men's suits and women's dresses</td>
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<tr>
<td></td>
<td>Shoe repairs, women's heel lift</td>
<td>Automatic laundry service</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Laundry, men's shirts</td>
<td>Tailoring charges, hem adjustment</td>
<td></td>
</tr>
<tr>
<td><strong>Transportation:</strong> Private: Auto purchase</td>
<td>New cars: Chevrolet, Impala, 4-door sedan</td>
<td>Chevrolet, Impala, 4-door sedan</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Chevrolet, Chevelle, sport coupe</td>
<td>Ford, Pinto, 3-door sedan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ford, LTD, 4-door hardtop</td>
<td>Ford, LTD, 4-door hardtop</td>
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<tr>
<td></td>
<td></td>
<td>Ford, Mustang II, 2-door hardtop</td>
<td>Chevrolet, Vega, 2-door hatchback</td>
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<tr>
<td></td>
<td></td>
<td>Plymouth, Gran Fury Custom, 4-door sedan</td>
<td>Plymouth, Valiant Duster, 2-door coupe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dodge, Royal Monaco, 4-door sedan</td>
<td>Plymouth, Fury Custom, 4-door sedan</td>
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<tr>
<td></td>
<td></td>
<td>American Motors, Hornet, sport wagon</td>
<td>Volkswagen, Deluxe, 2-door sedan</td>
</tr>
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</table>
Table 4. List of commodities and services priced for the consumer price index as of January 1975—Continued

<table>
<thead>
<tr>
<th>Groups, subgroups, expenditure classes</th>
<th>Priced items</th>
<th>Sample A</th>
<th>Sample B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation—Continued</td>
<td>Used cars:</td>
<td>2 years old, Chevrolet and Ford</td>
<td>2 years old, Chevrolet and Ford.</td>
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<td>3 years old...</td>
<td>do</td>
<td>3 years old, Do.</td>
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<td>4 years old...</td>
<td>do</td>
<td>4 years old, Do.</td>
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<td>5 years old...</td>
<td>do</td>
<td>5 years old, Do.</td>
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<td>Auto purchase—Continued</td>
<td>Gasoline, regular and premium</td>
<td>Gasoline, regular and premium.</td>
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<td>EC-37 Gasoline and motor oil</td>
<td>Motor oil, premium</td>
<td>Motor oil, premium.</td>
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<tr>
<td>EC-38 Auto parts</td>
<td>Storage batteries</td>
<td>Tires, tubeless, new.</td>
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<tr>
<td>EC-39 Auto repairs (mechanical) and maintenance</td>
<td>Chassis lubrication, complete</td>
<td>Water pump replacement.</td>
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<td></td>
<td>Motor tune-up</td>
<td>Exhaust system repair.</td>
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<td></td>
<td>Automatic transmission repair</td>
<td>Front end alignment.</td>
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<td>Other automobile expenses</td>
<td>Auto insurance premiums, liability and physical damage</td>
<td>Auto insurance premiums, liability and physical damage.</td>
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<td>EC-40</td>
<td>Auto financing charges</td>
<td>Auto financing charges.</td>
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<td>Auto registration fees</td>
<td>Auto registration fees.</td>
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<td>Auto operator’s permits</td>
<td>Auto operator’s permits.</td>
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<td>Parking fees, private and municipal</td>
<td>Parking fees, private and municipal.</td>
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<td>EC-41 Public transportation</td>
<td>Local transit fares</td>
<td>Local transit fares.</td>
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<td>Taxicab fares</td>
<td>Taxicab fares.</td>
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<td></td>
<td>Railroad fares, coach</td>
<td>Railroad fares, coach.</td>
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<td></td>
<td>Airplane fares, chiefly coach</td>
<td>Airplane fares, chiefly coach.</td>
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<tr>
<td></td>
<td>Bus fares, intercity</td>
<td>Bus fares, intercity.</td>
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<tr>
<td>Health and recreation:</td>
<td>Over-the-counter items:</td>
<td>Aspirin compounds.</td>
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<td></td>
<td>Multiple vitamin concentrates</td>
<td>Cough syrups.</td>
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<tr>
<td></td>
<td>Liquid tonics</td>
<td>Adhesive bandages, packages.</td>
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<tr>
<td></td>
<td>Cold tablets or capsules</td>
<td>Tetracycline HCL capsules.</td>
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<tr>
<td>Medical care:</td>
<td>Prescriptions:</td>
<td>Secobarbital sodium capsules.</td>
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<tr>
<td></td>
<td>Anti-infectives:</td>
<td>Hormones:</td>
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<tr>
<td></td>
<td>Ampicillin, trihydrate capsules</td>
<td>Prednisone tablets.</td>
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<td></td>
<td>Sedatives and hypnotics:</td>
<td>Progestogen-Estrogen contraceptives.</td>
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<tr>
<td></td>
<td>Phenobarbital tablets</td>
<td>Phenobarbital/hydroxyamine sulfate, atropine sulfate, and hyoscine hydro- bromide tablets.</td>
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<td>Analgesics:</td>
<td>Pentaerythritol tetrabromide tablets.</td>
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<td></td>
<td>Propoxyphene HCL (with APC) tablets</td>
<td>Chlorothiazide tablets.</td>
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<td></td>
<td>Ataractics:</td>
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<td></td>
<td>Chloridiazepoxide HCL capsules</td>
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<td></td>
<td>Antispasmodics:</td>
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<tr>
<td></td>
<td>Propantheline bromide tablets</td>
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<td></td>
<td>Cardiovasculars and antihypertensives:</td>
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<td></td>
<td>Reserpine tablets</td>
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<td></td>
<td>Cough preparations:</td>
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<tr>
<td></td>
<td>Promethazine expectorant with codeine</td>
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<tr>
<td>EC-43 Professional services</td>
<td>Fillings, adult, amalgam, one surface</td>
<td>Fillings, adult, amalgam, one surface.</td>
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<tr>
<td></td>
<td>Dentures, full upper</td>
<td>Extraction, adult.</td>
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<tr>
<td>Hospital services and health insurance:</td>
<td>General physician, office visits</td>
<td>General physician, office visits.</td>
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<tr>
<td></td>
<td>General physician, house visits</td>
<td>General physician, house visits.</td>
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<tr>
<td></td>
<td>Pediatric care, office visits</td>
<td>Obstetrical cases.</td>
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<tr>
<td></td>
<td>Psychiatrists, office visits</td>
<td>Chiropractors and podiatrists, office visits.</td>
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<tr>
<td></td>
<td>Routine laboratory tests</td>
<td>Hemorrathpy, adult.</td>
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<tr>
<td></td>
<td>Examination, prescription, and dispensing of eyeglasses</td>
<td>Examination, prescription, and dispensing of eyeglasses.</td>
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<tr>
<td></td>
<td>Filling, adult, amalgam, one surface</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Dentures, full upper</td>
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<tr>
<td>Hospital services</td>
<td>Semiprivate rooms</td>
<td>Semiprivate rooms.</td>
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<tr>
<td></td>
<td>Operating rooms</td>
<td>Operating rooms.</td>
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<td>Laboratory tests</td>
<td>X-ray diagnostic service series.</td>
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<td>Electrocardiograms</td>
<td>Oxygen.</td>
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<td>Anti-infectives</td>
<td>Tranquilizers.</td>
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<tr>
<td></td>
<td>Intravenous solutions</td>
<td>Physical therapy.</td>
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</table>
### Table 4. List of commodities and services priced for the consumer price index as of January 1975—Continued

<table>
<thead>
<tr>
<th>Groups, subgroups, expenditure classes</th>
<th>Priced items</th>
<th>Sample A</th>
<th>Sample B</th>
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</thead>
<tbody>
<tr>
<td>Health and recreation—Continued</td>
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<tr>
<td>Hospital services and health insurance—Continued</td>
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<td>Health insurance</td>
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<td>Claims Portion:</td>
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<tr>
<td>Hospital services:</td>
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<td></td>
<td></td>
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<tr>
<td>Semiprivate rooms</td>
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<td></td>
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<tr>
<td>Operating rooms</td>
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<tr>
<td>Laboratory tests</td>
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<tr>
<td>Electrocardiograms</td>
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<tr>
<td>Ambulance</td>
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<tr>
<td>Intravenous solutions</td>
<td></td>
<td></td>
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<tr>
<td>Nonhospital services</td>
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<tr>
<td>General physician, office visits</td>
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<tr>
<td>Surgeons' fees (Tonsillectomy/)</td>
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<td>Adenoidectomy</td>
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<td>Retained earnings (overhead)</td>
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<td>Personal care:</td>
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<tr>
<td>Toilet goods</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Toothpaste, standard dentifrice</td>
<td></td>
<td></td>
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<tr>
<td>Hand lotions, liquid</td>
<td></td>
<td></td>
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<tr>
<td>Face powder, pressed</td>
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<td>Cleansing tissues</td>
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<td>Personal care services</td>
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<tr>
<td>Men's haircuts</td>
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<td></td>
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<tr>
<td>Shampoo with wave sets, plain</td>
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<td></td>
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<tr>
<td>Women's haircuts</td>
<td></td>
<td></td>
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<td>Reading and recreation:</td>
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<td>Recreation:</td>
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<td>Recreational goods</td>
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<td>TV sets, color and black and white</td>
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<tr>
<td>Radios, portable</td>
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<td></td>
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<tr>
<td>TV replacement tubes</td>
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<td></td>
<td></td>
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<tr>
<td>Sports equipment:</td>
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<td></td>
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<tr>
<td>Golf balls</td>
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<tr>
<td>Basketballs</td>
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<td>Bowling balls</td>
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<td>Outboard motors</td>
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<td>Dog food, canned and boxed</td>
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<td>Indoor movie admissions:</td>
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<tr>
<td>Adult</td>
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<tr>
<td>Children's</td>
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<tr>
<td>TV repairs, picture tube replacement</td>
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<tr>
<td>Bowling fees, evening</td>
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<td>Golf green fees</td>
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<td>Newspapers, street sale and delivery</td>
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<tr>
<td>Undergraduate, resident</td>
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<tr>
<td>Undergraduate, nonresident</td>
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<td>Magazines, single copy and subscription</td>
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<td>College textbooks, undergraduate</td>
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<td>EC-51</td>
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<tr>
<td>Alcoholic beverages</td>
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<td>Cigars, domestic, regular size</td>
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<td>Beer, at home, local and national brands</td>
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<td>Whiskey, spirit blended and straight bourbon</td>
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<td>EC-52</td>
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<td>Financial and miscellaneous personal expenses</td>
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<td>Bank service charges, checking account</td>
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<td>Sample A</td>
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<td>Personal care:</td>
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<td>Women's haircuts</td>
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<tr>
<td>TV sets, color and black and white</td>
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<td>Radios, portable</td>
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<tr>
<td>TV replacement tubes</td>
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<tr>
<td>Sports equipment:</td>
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<td>Fishing rods, fresh water spincast</td>
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<td>Indoor movie admissions:</td>
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<td>Adult</td>
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<tr>
<td>Children's</td>
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<td></td>
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<tr>
<td>TV repairs, picture tube replacement</td>
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<tr>
<td>Bowling fees, evening</td>
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<tr>
<td>Golf green fees</td>
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<tr>
<td>EC-47</td>
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<td></td>
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<tr>
<td>Indoor movie admissions:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Adult</td>
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<td>Children's</td>
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<tr>
<td>TV repairs, picture tube replacement</td>
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<td>Bowling fees, evening</td>
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<td>Golf green fees</td>
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<tr>
<td>EC-49</td>
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<tr>
<td>Indoor movie admissions:</td>
<td></td>
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<td></td>
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<tr>
<td>Adult</td>
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<td>Children's</td>
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<td>TV repairs, picture tube replacement</td>
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<td>Bowling fees, evening</td>
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<tr>
<td>Golf green fees</td>
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<td></td>
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<tr>
<td>Other goods and services:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tobacco products</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cigarettes, nonfilter tip, regular size, carton</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>EC-50</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Alcoholic beverages</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cigars, domestic, regular size</td>
<td></td>
<td></td>
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<tr>
<td>Beer, at home, local and national brands</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Whiskey, spirit blended and straight bourbon</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>EC-52</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial and miscellaneous personal expenses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funeral services, adult</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank service charges, checking account</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 The list of commodities and services priced for the Honolulu, Hawaii SMSA differs from this list as follows: frozen fruit pies, mahi-mahi, papaya, pineapple, green beans, watercress, water heater, water heater replacement, men's sweaters and women's lightweight jackets, not priced elsewhere, are priced in Honolulu in lieu of cracker meal, haddock, orange juice, strawberries, asparagus, spinach, air filters, furnace repair, men's coats, and women's coats, respectively. In addition, men's tropical weight suits, boys' cotton or polyester/cotton sport coats and girls' cotton or polyester cotton skirts are priced in lieu of year-round weight suits, boys' wool or wool blend sport coats and girls' acrylic long sleeve sport shirts and women's socks are not priced in Honolulu.

2 Two of the largest volume sellers among the following types of fish are priced within each city, since within any given city all varieties of fish are not available: Frozen ocean perch and haddock; fresh cod, catfish, king salmon, halibut, sole, and haddock.

3 Not actually priced: imputed from priced items.
medical specialists, restaurants, dairies, hotels, property owners, etc. Each of these offers its own particular problems.

When the original samples, which were selected in Washington, were sent to the regional offices a great many practical problems were encountered, and many expedients and compromises with strict probability procedures were required to complete the initiation of pricing for the revised index. However, even though some deviations from probability sampling were inevitable and had been anticipated, the final samples adhere to the original basic structure to the maximum extent possible. As a result, the main benefits of probability sampling have been achieved: lack of bias, representation of different types of outlets, sections of each SMSA, etc.

Calculation Procedures

The index is a time series. As previously explained, it is a weighted average of price changes for a sample of priced items, expressed as a relative of average prices in a reference base as 100. Weights, which are based on annual consumer expenditures, are kept constant from month to month. The index measures changes as they occur. It is not adjusted for seasonal variation.19

The Bureau began publication of seasonally adjusted indexes in 1966, for selected components which show a significant seasonal pattern of price change.20

Formula. In the absence of major weight revisions, and ignoring the problems of sampling, the index formula is most simply expressed as:

\[ I_{i,o} = \frac{\sum(p_oq_o)q}{\sum(p_oq_o)} \times 100 \]

or by its algebraic equivalent, the dollar weighted average of price relatives:

\[ I_{i,o} = \frac{\sum \left( p_oq_o \right) p_i}{\sum p_oq_o} \times 100 \]

This is the customary, oversimplified way of writing a price index formula to show that the q’s are held constant between major revisions. In actual practice, the basic data for weights are values which include allowances for unpriced items, and the current index is computed by a chain computation procedure, as shown below:

\[ I_{i,o} = \frac{\sum(p_i - s q_o)(p_i - s q_o)q}{\sum(p_oq_o)} \times \frac{(p_i - s q_o)}{(p_i - s q_o)} \times 100 \]

where \( q \) is a derived composite of the annual quantities purchased in a weight base period for a bundle of goods and services to be represented by the specific item priced

\[ p \] and \( p' \) are the average prices of the specific commodities or services selected for pricing (the superscript indicates that the average prices are not necessarily derived from identical samples of outlets and specifications over long periods)

\( i-s \) is the month preceding a weight revision (most recently, December 1963)

\( i \) is the current month

\( a \) is the period of the most recent Consumer Expenditure Survey (1960-61) from which the revised weights are derived

\( o \) is the reference base period of the index (1967).

The \( (p_oq_o) \) or \( (p_i - s q_o) \) base “weights” for a given priced item are the average annual expenditures in a weight base period represented by that item and other similar non-priced items. Although constant physical weights are implicit in the index, in reality the constant q’s are not calculated separately.

In actual practice, the base expenditure for each item is projected forward for each pricing period by the price relative for the priced item:

\[ (p_iq_o) = (p_i - s q_o) \left( \frac{p_i}{p_i - s q_o} \right) \]

In practice, then, the index formula is as follows:

\[ I_{i,o} = \frac{\sum(p_i - s q_o)q}{\sum(p_oq_o)} \times \frac{\sum(p_i - s q_o)}{\sum(p_i - s q_o)} \]

Illustrative Calculation. Average price changes from the previous pricing period to the current month are expressed as relatives (or ratios) for each item, and the price changes for the various goods and services are combined, using weighting factors based on the importance of the item in consumer spending and that of other items which it represents. This composite importance is called the cost weight of the market basket item. There is a set of separate cost weights for each of the 56 urban locations included in the index. The following hypothetical example for pork illustrates the index procedure:

<table>
<thead>
<tr>
<th>Sample item</th>
<th>September price</th>
<th>October price</th>
<th>Ratio October to September</th>
<th>September cost weight</th>
<th>October cost weight (Sept. x ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork chops........</td>
<td>$0.75</td>
<td>$0.7725</td>
<td>1.03</td>
<td>$15.00</td>
<td>$15.45</td>
</tr>
<tr>
<td>Ham................</td>
<td>.80</td>
<td>.82</td>
<td>1.025</td>
<td>8.00</td>
<td>8.20</td>
</tr>
<tr>
<td>Bacon.............</td>
<td>1.00</td>
<td>1.02</td>
<td>1.02</td>
<td>10.00</td>
<td>10.20</td>
</tr>
<tr>
<td>Total............</td>
<td></td>
<td></td>
<td>33.00</td>
<td>33.85</td>
<td></td>
</tr>
</tbody>
</table>

\[ \text{19} \text{For a discussion of the problems involved in using varying seasonal weights, see "Use of Varying Seasonal Weights in Price Index Construction," by Doris P. Rothwell, in the Journal of the American Statistical Association, March 1958, pp. 66–77.} \]

\[ \text{20} \text{Factors used to compute seasonally adjusted indexes are available on request.} \]
Identical results could be obtained for pork by multiplying prices each period by the implied physical quantities included in the market basket, as the following illustrates.

<table>
<thead>
<tr>
<th>Sample item</th>
<th>Implied quantity (pounds)</th>
<th>September price</th>
<th>September cost weight</th>
<th>October price</th>
<th>October cost weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork chops</td>
<td>20</td>
<td>$0.75</td>
<td>$15.00</td>
<td>$0.7725</td>
<td>$15.45</td>
</tr>
<tr>
<td>Ham</td>
<td>10</td>
<td>$0.80</td>
<td>8.00</td>
<td>$0.82</td>
<td>8.20</td>
</tr>
<tr>
<td>Bacon</td>
<td>10</td>
<td>1.00</td>
<td>10.00</td>
<td>1.02</td>
<td>10.20</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>33.00</td>
<td></td>
<td>33.85</td>
<td></td>
</tr>
</tbody>
</table>

The average change in pork prices is computed by comparing the sum of the cost weights in October with the comparable sum for September, as follows:

October cost weight $33.85 \times 100 = 102.6$

September cost weight $33.00$

This means that pork prices in October were 102.6 percent of (or 2.6 percent higher than) pork prices in September.

Although the second method may appear simpler, in reality it is not. Deriving the implied quantity weights is an extra operation, and these implicit quantities change as revised samples are linked in. Furthermore, the second formulation greatly complicates the handling of the numerous substitutions of reporters and items which occur constantly in repetitive index work. Consequently, the first method is the one actually used for the CPI. The second illustration, however, may assist the user to understand the meaning of the index mechanism.

After the cost weights for each of the items have been calculated, they are added to area totals for commodity groups and all items. The U.S. totals are obtained by combining area totals, with each area total weighted according to the proportion of the total wage-earner and clerical-worker population which it represents in the index based on 1960 Census figures. Finally, published index values are computed by dividing the cost weight for a particular series by its average cost weight in the standard reference base period, and multiplying the result by 100.

**Reference Base Period.** Since 1971, the standard reference base of the index has been 1967 = 100. This means that current prices are expressed as a percentage of prices for the average of the year 1967. An index of 110 means that prices have increased 10 percent since the base period; similarly, an index of 90 means a 10-percent decrease. The index can be converted to any desired base period for which the index is available. This is done by dividing each index number to be converted by the index for the desired base period. Tables of conversion factors are provided on request for most series, enabling users to convert indexes for preceding periods on other bases to the current standard reference base 1967. Since the 1967 base was adopted in 1971, All Items indexes for the U.S. city average and the 23 areas for which separate indexes are available have been continued on their former bases (1957–59 in most cases). These indexes are computed directly from cost weights, in the same manner as the 1967 base indexes. Before the most recent rebasing, indexes on former bases were calculated by applying the appropriate conversion factor to the index on the standard reference base then in use. Use of published conversion factors to rebase All Items indexes from the 1967 base to their former bases will at times yield results which differ slightly from the official indexes published by BLS. These differences arise because of rounding.

**Imputation Procedures.** Although prices are not obtained in all 56 cities every month (table 1 for pricing cycle), all 56 cities are represented in each monthly index computation. Between quarterly survey dates, for every item except new automobiles, the weights are held at the level of their last pricing. For new automobiles, a price change is imputed to the unpriced cities on the basis of changes in cities surveyed every month.

For food and apparel items which are sold only at certain seasons of the year, the index calculation is made in the off-season as if prices of these items changed proportionally with prices of items of a similar nature which are available. For example, prices for strawberries, when these are not in season, are carried forward on the basis of changes in prices of all other fresh fruits. When the item returns to the market the current price is compared, in effect, with the estimated price implicit in the procedure described.

**Average Prices.** In the calculation of average food prices for publication, the prices used in the index are given special editing, since they are not necessarily restricted to a single specified quality and size. Procedures have been devised to calculate city and U.S. prices for publication which use index values and price relatives extensively. These procedures employ benchmark prices for defined specifications for each of the 56 cities, in which quotations not meeting the specified quality are excluded. Benchmark prices are computed in an independent operation, pooling prices for all outlets rather than as an average of average prices for the two subsamples. The benchmark prices then are ad-

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21Former Consumer Price Index Official Reference Bases and Periods in Use

<table>
<thead>
<tr>
<th>Reference Bases (= 100)</th>
<th>Periods in Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>From Through</td>
</tr>
<tr>
<td>1913</td>
<td>1913 September 1935</td>
</tr>
<tr>
<td>1923-25</td>
<td>October 1935 June 1940</td>
</tr>
<tr>
<td>1935-39</td>
<td>July 1940 1952</td>
</tr>
<tr>
<td>1947-49</td>
<td>1953 1961</td>
</tr>
<tr>
<td>1957-59</td>
<td>1962 1970</td>
</tr>
</tbody>
</table>
justed month by month by the price changes reflected in the index. The first benchmark calculation was for April 1964, from which date prices were estimated back to December 1963 and forward to December 1964. New benchmark calculations are made periodically, usually once a year. City prices are combined to U.S. averages by the use of the 1960 index population weights.\textsuperscript{22}

Average bills for specified quantities of gas and electricity and average prices of fuel oil, which are published for the largest cities, are the same as those used in the index calculation. Since these are for identical quantities and qualities from month to month, no special editing is required.

Average prices, as well as price indexes, are available on a monthly basis for regular and premium gasoline for 23 large metropolitan areas and the U.S. as a whole.

**Item Indexes.** Indexes for selected items and groups (commonly referred to as item indexes) were published semi-annually during 1964 and 1965. Quarterly publication was resumed in 1966 and monthly publication was initiated in January 1969.

### Analysis and Presentation

The CPI is made available first in a press release, usually near the end of the month following that to which the data relate. The press release is made available to the press and is mailed to a list of subscribers. This release contains a description of price changes during the month and several tables of major group and subgroup indexes and percent changes from selected dates, for the U.S. city average, and for selected large metropolitan areas. Percent changes, in some cases, are expressed as both simple rates and as compound rates. BLS monthly releases after 1965 have shown seasonally-adjusted national indexes and percent changes computed for selected groups and subgroups where there is a significant seasonal pattern of price change. In addition, each of the Bureau’s regional offices prepares a press release for each of the areas in its region for which CPI figures are published.

In 1972, publication of a set of consumer price indexes which groups urban areas by 1960 population size was begun.\textsuperscript{23} In 1973, publication of a set of consumer price indexes which groups urban areas by four major geographic regions was initiated.\textsuperscript{24} Both sets of indexes are calculated from data collected for use in the national CPI, and are available for the months of March, June, September, and December. A report containing a more comprehensive analytical text and additional tables is published several weeks after the date of the press release. Other monthly reports contain average prices of selected foods and fuels in the largest metropolitan areas.

The CPI for the United States and for selected areas is published also in the *Monthly Labor Review* in the issue dated 2 months later than the index. The annual *Handbook of Labor Statistics* contains annual average indexes for each CPI series and estimated U.S. average retail prices for selected foods beginning with the earliest reliable and consistent data available; monthly data are published for the two most recent years. In "The Anatomy of Price Change", an article published quarterly in the *Monthly Labor Review*, trends in the CPI and its components and their effect on the overall economy are analyzed.

Average prices for foods and fuels are published in *Estimated Retail Food Prices by Cities and Retail Prices and Indexes of Fuels and Utilities*.

### Uses of the Index

One of the most important uses of the index is as a guide to broad economic policy. It is one of the most widely used measures of inflationary pressures. During wartime periods, the index and its components have served an important administrative function in connection with determination of policies concerning price control and subsidies. In peacetime, the index and its underlying statistics have played an important part in the government’s effort to maintain stable wage-price relationships and to judge the advisability of making monetary or tax adjustments. It is one of the chief statistical tools for conversion of the national accounts to constant dollars.

The most widespread use of the CPI is in wage adjustments and collective bargaining negotiations. Although this was the primary reason for its beginning, use of the CPI for this purpose declined during the post-World I and depression periods. Its use in this way was revived during World War II, but escalation by the index did not receive widespread acceptance until the principle was written into a contract between the United Automobile, Aircraft, and Agricultural Implement Workers of America and the General Motors Corporation in 1948. The number of workers covered by such contracts in 1972 was more than 4 million.\textsuperscript{25} However, movements of the index have an indirect effect on wages and salaries of many more workers.\textsuperscript{24}

The CPI is used extensively to measure changes in purchasing power of the consumer dollar. It is the basis

\textsuperscript{22}For a more detailed discussion, see article by Doris P. Rothwell, "Calculation of Average Retail Food Prices," *Monthly Labor Review*, January 1965, pp. 61–66.


\textsuperscript{25}See *Wage Calendar*, 1972 (BLS Bulletin 1724).

for most estimates of changes in real earnings of labor, and for comparison with productivity measures. Changes in purchasing power are used for such diverse purposes as adjusting royalties, pensions of government and nongovernment workers, welfare payments, rental contracts, and occasionally alimony payments.

**Limitations of the Index**

The CPI is not an exact measure of price change. It is subject to sampling errors which may cause it to deviate somewhat from the results which would be obtained if actual records of all retail purchases by wage earners and clerical workers could be used to compile the index. These estimating or sampling errors are limitations on the precise accuracy of the index rather than mistakes in the index calculation. The accuracy could be increased by using much larger samples, but the cost is prohibitive. Furthermore, the index is believed to be sufficiently accurate for most of the practical uses made of it. With the changes in sampling techniques introduced in 1964, the Bureau is attempting to measure the sampling error in the index.²⁷

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**Table 5. Summary of characteristics of the CPI**

<table>
<thead>
<tr>
<th>DEFINITION OF THE INDEX</th>
<th>Consumer Price Index—U.S. City Average for Urban Wage Earners and Clerical Workers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formula (Simplified expression)</td>
<td>$I_{t/o} = I_{t-1/o}$, $\sum q_{a} = 1$, where the base period is 1967=100. All items series also published on 1957–59 base.</td>
</tr>
<tr>
<td>Base period</td>
<td>1967=100. All items series also published on 1957–59 base.</td>
</tr>
<tr>
<td>Definition of index expenditure weights</td>
<td>Average expenditures for urban wage-earner and clerical-worker consumers (including single workers) derived from the 1960–61 Consumer Expenditure Survey in 66 urban places, adjusted for price changes between the survey dates and 1963 except for 6 cities added in 1966.</td>
</tr>
</tbody>
</table>

**POPULATION COVERAGE OF EXPENDITURE SURVEY**

| Place of residence | Urban places 2500 or more in 1960; including Alaska and Hawaii. |
| Family size | No restriction; single consumer units included. |
| Occupation | Wage-earner and clerical-worker families and single individuals living alone. (More than half of total family income from wage-earner and clerical-worker occupations.) |
| Length of employment | At least 1 family member or single consumer unit must have been employed for 37 weeks or more during the survey year in wage-earner or clerical-worker occupations. |
| Income | No criterion as to income except the qualification above. |

**CITY COVERAGE**

| Population weights | Based on 1960 Population Census; Alaska and Hawaii included. Proportion of population in wage-earner and clerical-worker group covered by index was based upon BLS expenditure surveys. |
| Sample of priced cities | 50 metropolitan areas and cities selected originally to represent all urban places in the U.S. including Alaska and Hawaii with populations of 2500 or more in 1960. Six additional areas added in 1966. U.S. and 17 large metropolitan areas for families and single consumer units combined. Indexes for six more large metropolitan areas available in the latter part of 1965. |
| Published indexes | |

**ITEM SAMPLE**

| Basis of sample selection | Probability proportionate to importance in family spending. |
| Basis for allocation to priced items | Expenditures classified into 52 expenditure classes. Certainty items assigned their own importance; remainder of expenditures assigned equally to probability selections within expenditure classes. |
| Commodity coverage | Goods and services purchased for family living, including necessities and luxuries; excluding personal insurance, income and personal property taxes but including real estate taxes and sales and excise taxes. |
| Number of items priced | About 400 represented in U.S. index and published city indexes. Certainty items priced in all unpublished cities; other items in 1 of 2 subsamples of unpublished cities. |
| Pricing cycle | Prices of foods, fuels and a few other items priced monthly in all cities. |
| | Prices of most other commodities and services priced monthly in the 5 largest cities, and quarterly in remaining cities. |

**REPORTER COVERAGE**

| Location | In central cities and selected suburbs of 56 metropolitan areas (50 areas in 1964 and 1965). About 1,775 food stores (1,525 for 50 areas), 40,000 tenants (34,000 for 50 areas), 16,000 other reporters of all kinds (15,000 for 50 areas). |
| Number of reporters | Over 1 million food prices per year; about 80,000 rent charges per year (68,000 for 50 areas); over 475,000 quotations per year for items other than food and rent (over 450,000 for 50 areas). |
| Number of quotations | Personal visit of BLS agent except for a few items collected by mail or from secondary sources. Specification pricing but agent is permitted to price deviations from specification under prescribed conditions. |

²⁷
Another kind of error occurs because people who give information do not always report accurately. The Bureau makes every effort to keep these errors to a minimum, obtaining prices wherever possible by personal observation, and corrects errors whenever they are discovered subsequently. Precautions are taken to guard against errors in pricing, which would affect the index most seriously. The field representatives who collect the price data and the commodity specialists and clerks who process them are well trained to watch for unusual deviations in prices which might be due to errors in reporting.

The CPI represents the average movement of prices for urban wage earners and clerical workers as a broad group, but not the change in prices paid by any one family or small group of families. The index is not directly applicable to any other occupational group or to non-urban workers. Some families may find their outlays changing because of changes in factors other than prices, such as family composition. The index measures only the change in prices and none of the other factors which affect family living expenses.

In many instances, changes in quoted prices are accompanied by changes in the quality of consumer goods and services. Also new products are introduced frequently which bear little resemblance to products previously on the market; hence, direct price comparisons cannot be made. Quoted prices are adjusted for changes in quality, whenever necessary data are available. Technical specifications and highly trained personnel are relied on to insure comparability of quality of items compared from period to period. Nevertheless, some residual effects of quality changes on quoted prices undoubtedly do affect the movement of the CPI either downward or upward from time to time.

Another important limitation of the index is that it measures only time-to-time price change in a given area. City indexes do not show intercity differences in either prices or living costs. They show only differences in rates of price change from one time to another. Other types of measures are required to show place-to-place differences in living costs. The most recent such measure is "The Interim City Worker's Family Budget" which shows the estimated dollar costs of a "modest but adequate" level of living in 20 large cities and their suburbs in the fall of 1959, which is described in chapter 12.

27Preliminary estimates of sampling error were computed and published in Measurement of Sampling Error in the Consumer Price Index: First Results, by Marvin Wilkerson, paper presented at American Statistical Association meetings, December 29, 1964. Additional estimates will be made available as work continues on this project.


Technical References


the revised index. Examines some operational aspects, especially sample replication. Presents the index formula in general, simplified, and in operational form.


   Part I defines the housing component of the index and describes the derivation of expenditure weights used in the calculation of the shelter index. Part II describes the procedures used to measure changes in the prices of the various items of shelter cost.


   Summarizes and explains the methodology used to link compact cars into the Consumer Price Index in 1961. Discusses the historical treatment of quality changes in standard size cars.


   Describes Consumer Price Indexes which measure price change in urban areas grouped by regions. Provides historical data for these indexes together with a brief analysis of their behavior during the 1967–1973 period.


   Report of the detailed investigation by the Price Statistics Review Committee of the NBER in 1959 of the main price indexes compiled by the Federal Government: The Consumer Price Index; the Wholesale Price Index; and the Indexes of Prices Received and Paid by Farmers. Reviews and analyzes the various aspects of the indexes and presents general and specific recommendations for improvements. Twelve staff reports appended.


   Explains the BLS methods of collecting prices, and computing indexes and average prices for food items in the index. Emphasizes the unsuitable nature of index data for comparison of prices between cities. Presents estimated retail prices of food from December 1963 through November 1964, the cities covered, and the pricing diagram for food in the index.


   Describes a formula based on varying seasonal weights for month-to-month measurements of price change which does not exhibit the “biases” of chain indexes and which satisfies classical index theory with respect to year-to-year comparisons. Results of experimentation with alternative formulas are presented.


   Describes uses and measures of the CPI and its limitations as a proxy for a cost-of-living index. Reviews previous revisions and discusses problems and purposes of the current revision scheduled for completion in 1977. Includes a calendar showing scheduled steps on the revision, 1972–78.


   Nontechnical summary of results of hearings on the reliability of the Consumer Price Index. Presents details of history, uses, and method of construction of the index. Recommends continued support of the index by the Congress.


   Part 1 presents findings of an investigation by the Price Statistics Review Committee of the National Bureau of Economic Research in 1959–60 of all government price statistics. Also includes 12 staff papers on specific subjects. The detailed technical report includes recommendations for improvement of all indexes and, specifically for the Consumer Price Index, suggests extended coverage to include single consumers, probability sampling techniques, establishment of a research division, and regularly scheduled weight revisions. Part 2 presents testimony before the subcommittee of members of the Price Statistics Review Committee, government officials, and other interested parties concerning the committee report and recommendations.


   Brief statement of the results of examinations of methodology, compilation, composition, and presentation of the Consumer Price Index as of 1949. Extensive bibliography.


   Presents the most comprehensive treatment of the U.S. Consumer Price Index available in a single document. Provides an historical summary covering the scope and method of compiling the Consumer Price Index since its inception, a detailed explanation of present techniques, and a description of the 1964 comprehensive revision of the index. A bibliography of publications on methodology and analysis of price trends is included.


   A non-technical description of the index, its scope and computation. Explains the market basket, formula, uses and limitations of the index. Tables show cities included, population weights, pricing schedules, groups of goods and services priced, their relative importance and the number of items priced as of December 1963.
Technical References—Continued

   Provides basic data with which Consumer Price Index old series indexes can be adjusted for seasonal variation. Users are cautioned that the 1964 revision may have a very different effect on the series. Includes a description of the BLS method of computing seasonal factors, a discussion of its application to consumer price series, comments on specific series and tables providing indexes and seasonal factors for 66 selected series through May 1961.

   Discusses the present treatment of taxes in the index and the specific taxes included. Justifies the BLS policy of continuing to exclude income taxes from the index and including sales and excise taxes.

21. ________. Interim Adjustment of Consumers’ Price Index: Correction of New Unit Bias in Rent Component of Consumers’ Price Index and Relative Importance of Items, Bulletin 1039 (1952), 49 pp.
   Military developments in Korea in 1950 emphasized and made urgent the need for reweighting of certain segments of the index before the already initiated revision could be completed in 1952. The failure to reflect the difference between rents for new dwellings when they first enter the market and comparable dwellings already on the market during and after the Second World War is discussed and the method of adjustment presented. Tabulation of adjusted indexes from 1940–50, relative importances and weights generated by the interim adjustment also are presented.


   Summarizes the findings of the investigation in 1943–44 of the suitability of the Consumer Price Index for measurement of the change in the cost of living during wartime. Includes detailed discussions of the definition, scope, and statistical methodology of the index.

   Describes the system of replicated samples introduced into the consumer price index as of December 1963. Estimates of sampling error in the CPI are given and their adequacy and limitations evaluated.
Chapter 14. Wholesale Prices

Background

The Wholesale Price Index (WPI) is the oldest continuous statistical series published by the Bureau of Labor Statistics (BLS) and one of the oldest in the Federal Government. It was first published in 1902, and covered the years 1890–1901. The origins of the index are associated with a resolution of the U.S. Senate in 1891, which authorized the Senate Committee on Finance to investigate the effects of the tariff laws "upon the imports and exports, the growth, development, production, and prices of agricultural and manufactured articles at home and abroad."

The index published in 1902 on the base 1890-99 was an unweighted average of price relatives and included from 250 to 261 commodities. Since that time, many changes have been made in the sample of commodities, the base period, and in the method of calculating the index. The first major change was completed at the end of 1914, when a system of weighting was introduced and the index was recalculated back through 1890. By 1940, the number of commodities had increased to approximately 900, based on about 2,000 individual price quotations. Then, in 1952, the most extensive revision in the history of the index was completed. The number of commodities and quotations was doubled, weights were based on 1947 Censuses and changes were made in the calculation method. Some changes in classification were made also, including expansion to the present 15 major groups. A major reclassification was implemented in January 1967, when the 8-digit classification structure was initiated. Also at that time, new weights from the 1963 industrial censuses were introduced.

By January 1975, the number of commodities had increased to nearly 2,800, the number of price quotations had increased to over 10,000, and the index had become increasingly representative of general primary market price changes.

Description of Survey

Concepts

Throughout its history, the WPI has been a measure of price changes for goods sold in primary markets in the United States. "Wholesale" as used in the title of the index refers to sales in large quantities, not prices received by wholesalers, jobbers, or distributors.

From its inception, the index has been considered a general purpose index designed to measure changes in the general price level in other than retail markets. From the beginning of the index, however, attention was directed to some specific needs of users, and indexes for individual commodities and for major commodity groups were published. As early as 1903, two special group indexes by stage of processing — Raw Commodities and Manufactured Commodities — were published "to meet the wishes of students of price statistics." In recent years, emphasis has been placed on the development of more subdivisions within major groups and special combinations of indexes such as by stage of processing and by durability of product.

Most of the quotations reported to the Bureau are the selling prices of representative manufacturers or producers, but some prices are those quoted on organized exchanges (spot prices) or at central markets. Prices for imported commodities are those received by importers — the first commercial transaction involving the commodity in the United States. Since the index is intended to measure "pure" price change, that is, not influenced by changes in quality, quantity, shipping terms, product mix, etc., commodities included in the index are defined by precise specifications which incorporate their principal price-determining characteristics. So far as possible, prices are f.o.b. production point, and refer to sales for immediate delivery. Prices applicable to long-run contracts generally have been excluded except where contract prices dominate the market. "Futures" prices are not included.

An example of a commodity specification for steel strip is: "Strip, cold-rolled, carbon steel, coils, No. 4 temper, No. 2 finish, No. 3 edge, base chemistry, 6" x .050", in quantities of 10,000 to 19,999 lb., mill to user, f.o.b. mill, per 100 lb."
Universes

The WPI universe consists of all commodities sold in commercial transactions in primary markets of the United States, including Alaska and Hawaii. Commodities produced in the United States are included, as well as those imported for sale. The universe covers manufactured and processed goods and the output of industries classified as manufacturing, agriculture, forestry, fishing, mining, gas and electricity, public utilities, and goods competitive with those made in the producing sector, such as waste and scrap materials. All systematic production is represented, but individually priced items, such as works of art, are excluded. Also excluded are goods transferred between establishments owned by the same company (interplant or intracompany transfers). Goods sold at retail by producer-owned retail establishments also are excluded because they conceptually belong to a retail (customers') universe, rather than to primary market transactions.

Civilian goods normally purchased by the Government are in the universe, but military goods are not. Government sales of some commodities (e.g., electric power) are included if they can be considered competitive with free market sales.

Prices

To the extent possible, the prices used in constructing the index are those that apply to the first significant commercial transaction in the United States. Transactions for the same item at later stages of distribution are not included. However, as raw materials are transformed into semifinished and finished goods, the resulting products are represented.

With some exceptions, the prices refer to one particular day of each month. In most cases, the pricing date is Tuesday of the week containing the 13th day; but for some commodities (farm products, particularly) a day other than Tuesday is used because it is considered more representative. For some other products, an average of prices throughout the month is used and results in 1- or 2-month lags between the price reference month and the index month.

The Bureau attempts to base the WPI on actual transaction prices. Companies are requested to report prices less all discounts, allowances, rebates, free deals, etc., so that the resulting net price is the actual selling price of the commodity for the specified basis of quotation. The Bureau periodically emphasizes to reporters the need to take into account all discounts and allowances.

Prices are generally f.o.b. production or central marketing point to avoid reflection of changes in transportation costs. Delivered prices are included only when the customary practice of the industry is to quote on this basis and the Bureau cannot obtain a price at the production point. Subsidies to the producer and excise taxes are excluded since they are not considered part of the price, but import duties are included as part of the selling price of imported goods.

Although the same commodity is priced generally month after month, it is necessary to provide a means for bridging over changes in detailed specifications (or descriptions of items priced) so that only real price change will be measured. An adjustment is particularly important when new commodities are introduced, but even when specifications of existing commodities are changed, care is exercised to help insure that only price changes influence the index. A new price series resulting from a physical change in an article or a change in its selling terms is substituted for the earlier series by direct comparison or by linking. The objective of the linking procedure is to ensure that the index will reflect only those changes due to actual price differences.

Each time a change in the item priced occurs, the Bureau appraises the significance of the specification change to ascertain whether an actual price change occurred. If the specification change is minor and does not involve price-making factors, the substitution is effected by direct comparison, and any reported price change between the old and the new specification is reflected in the index. If changes in specification are major, and if either no real price change occurred or no information can be obtained concerning the value of the difference in specification (perhaps indicative of a change in quality), the substitution is made by linking and no change is reflected in the index. In this case, any reported difference in price level is not permitted to affect the index level.

When differences are major, an attempt is made to obtain data from the reporters on the value of the additional (or deleted) features and to adjust the price index accordingly. This is particularly important in the case of

5The following example illustrates the linking procedure: The September price for a certain machine used in the calculation of the index was $2,347.50. In October, a new model of the machine was introduced, priced at $2,562.60. The new model was considered essentially comparable with the old, except that it had a more powerful motor and larger tires. These were valued at $186.20 more than the value of those used on the former model. For linking, the September price of the new model was estimated at $2,533.70 ($2,347.50 September price of former model plus $186.20 increase in value of motor and tires). The price comparison between September and October was based on the estimated September price of $2,533.70 and the reported October price of $2,562.60. Thus a 1.1-percent increase was reflected in the October index, but the price change due to quality improvement (more powerful motor and larger tires) was not reflected.
### Wholesale Price Index

Relative importance, number of items and price quotations for major groups and subgroups

<table>
<thead>
<tr>
<th>Code</th>
<th>Grouping</th>
<th>Relative importance in total 1963 weights</th>
<th>Number of items and price quotations, July 1975</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>December 1974</td>
<td>December 1966</td>
</tr>
<tr>
<td>01</td>
<td>All Commodities</td>
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<td>100.000</td>
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<tr>
<td>01-1</td>
<td>Farm products, processed foods and feeds</td>
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<td>Farm products</td>
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<td>01-2</td>
<td>Fresh and dried fruits and vegetables</td>
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<tr>
<td>01-3</td>
<td>Grains</td>
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<td>Livestock</td>
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<td>Live poultry</td>
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<tr>
<td>01-6</td>
<td>Plant and animal fibers</td>
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<tr>
<td>01-7</td>
<td>Fluid milk</td>
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<td>Eggs</td>
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<td>Hay, hayseeds, and oilseeds</td>
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<td>Other farm products</td>
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<td>Processed foods and feeds</td>
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<td>Meats, poultry, and fish</td>
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<td>Dairy products</td>
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<td>02-4</td>
<td>Processed fruits and vegetables</td>
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<td>Sugar and confectionery</td>
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<tr>
<td>02-6</td>
<td>Beverages and beverage materials</td>
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<td>2.047</td>
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<td>02-7</td>
<td>Fats and oils</td>
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<td>Miscellaneous processed foods</td>
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<td>Manufactured animal feeds</td>
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<td>Industrial Commodities</td>
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<tr>
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<td>Cotton products</td>
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<td>Wool products</td>
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<td>Synthetic products</td>
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<td>Silk products</td>
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<td>Apparel</td>
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<td>Textile housefurnishings</td>
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<td>03-7</td>
<td>Miscellaneous textile products</td>
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<tr>
<td>04</td>
<td>Hides, skins, leather, and related products</td>
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<td>Hides and skins</td>
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<td>04-2</td>
<td>Leather</td>
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<tr>
<td>04-3</td>
<td>Footwear</td>
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<tr>
<td>04-4</td>
<td>Other leather and related products</td>
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<td>0.304</td>
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<tr>
<td>05</td>
<td>Fuels and related products and power</td>
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<td>05-1</td>
<td>Coal</td>
<td>1.104</td>
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<tr>
<td>05-2</td>
<td>Coke</td>
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<td>0.070</td>
</tr>
<tr>
<td>05-3</td>
<td>Gas fuels</td>
<td>0.722</td>
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<tr>
<td>05-4</td>
<td>Electric power</td>
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<tr>
<td>05-6</td>
<td>Crude petroleum</td>
<td>0.801</td>
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<td>Petroleum products, refined</td>
<td>4.968</td>
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<td>Chemicals and allied products</td>
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<td>Industrial chemicals</td>
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</tr>
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<td>06-2</td>
<td>Paint and paint materials</td>
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<td>06-3</td>
<td>Drugs and pharmaceuticals</td>
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<td>06-4</td>
<td>Fats and oils, inedible</td>
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<td>Agricultural chemicals and chemical products</td>
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<td>Plastic resins and materials</td>
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<td>06-7</td>
<td>Other chemicals and allied products</td>
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<tr>
<td>07</td>
<td>Rubber and plastic products</td>
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<td>Rubber and rubber products</td>
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<td>07-2</td>
<td>Plastic products</td>
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<td>—</td>
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<td>08</td>
<td>Lumber and wood products</td>
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<td>Lumber</td>
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<td>08-2</td>
<td>Millwork</td>
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<td>0.658</td>
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<tr>
<td>08-3</td>
<td>Plywood</td>
<td>0.368</td>
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<tr>
<td>08-4</td>
<td>Other wood products</td>
<td>0.129</td>
<td>0.129</td>
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</tbody>
</table>

See footnotes at end of table.
Wholesale Price Index—Continued

Relative importance, number of items and price quotations for major groups and subgroups

<table>
<thead>
<tr>
<th>Code</th>
<th>Grouping</th>
<th>Relative importance in total 1963 weights</th>
<th>Number of items and price quotations, July 1975</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>December 1974</td>
<td>December 1966</td>
</tr>
<tr>
<td>09</td>
<td>Pulp, paper, and allied products</td>
<td>4.782</td>
<td>4.877</td>
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<tr>
<td>09-1</td>
<td>Pulp, paper, and products, excluding building paper and board</td>
<td>4.672</td>
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<tr>
<td>09-2</td>
<td>Building paper and board</td>
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<td>Metals and metal products</td>
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<td>Iron and steel</td>
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<td>Nonferrous metals</td>
<td>3.403</td>
<td>3.205</td>
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<td>Metal containers</td>
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<td>Hardware</td>
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<td>10-5</td>
<td>Plumbing fixtures and brass fittings</td>
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<td>Heating equipment</td>
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<td>Fabricated structural metal products</td>
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<td>Machinery and equipment</td>
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<td>Metalworking machinery and equipment</td>
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<td>General purpose machinery and equipment</td>
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<td>Special industry machinery and equipment</td>
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<td>Electrical machinery and equipment</td>
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<td>Furniture and household durables</td>
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<td>Commercial furniture</td>
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<tr>
<td>13-9</td>
<td>Other nonmetallic minerals</td>
<td>0.454</td>
<td>0.369</td>
</tr>
<tr>
<td>14</td>
<td>Transportation equipment</td>
<td>6.054</td>
<td>7.244</td>
</tr>
<tr>
<td>14-1</td>
<td>Motor vehicles and equipment</td>
<td>5.221</td>
<td>6.932</td>
</tr>
<tr>
<td>14-2</td>
<td>Aircraft</td>
<td>0.390</td>
<td>—</td>
</tr>
<tr>
<td>14-4</td>
<td>Railroad equipment</td>
<td>0.323</td>
<td>0.312</td>
</tr>
<tr>
<td>14-8</td>
<td>Mobile homes</td>
<td>0.121</td>
<td>—</td>
</tr>
<tr>
<td>15</td>
<td>Miscellaneous products</td>
<td>2.105</td>
<td>2.498</td>
</tr>
<tr>
<td>15-1</td>
<td>Toys, sporting goods, small arms, ammunition</td>
<td>0.421</td>
<td>0.513</td>
</tr>
<tr>
<td>15-2</td>
<td>Tobacco products</td>
<td>0.701</td>
<td>0.802</td>
</tr>
<tr>
<td>15-3</td>
<td>Notions</td>
<td>0.089</td>
<td>0.102</td>
</tr>
<tr>
<td>15-4</td>
<td>Photographic equipment and supplies</td>
<td>0.287</td>
<td>0.386</td>
</tr>
<tr>
<td>15-9</td>
<td>Other miscellaneous products</td>
<td>0.608</td>
<td>0.695</td>
</tr>
</tbody>
</table>

1 Subgroup index not published.
2 Subgroup index discontinued January 1971.

NOTE: Relative importance represents the basic value weight of an item multiplied by the relative of price change between the weight date and a later date, and the result is expressed as a percentage of the total for all commodities. The differences between the relative importances as of December 1966, the date of last major weight change, and that of December 1974 are the result of price changes only.
some durable goods, such as automobiles, which have periodic model changes. Also, price increases which result from the addition of features that formerly sold at extra cost are not reflected in the index. Conversely, price changes attributable to deletion of equipment which was formerly standard are not treated as decreases.

In the event production of a specified commodity is discontinued by a reporter, or its importance is reduced, the Bureau collects price data for a similar or a replacement item. Prices are obtained for the new and the discontinued series for a 1-month overlap period. The index is extended by linking, and the difference, if any, between the new item price and the original price is taken as a measure of the quality difference between the two items.

Linking is also used for the addition to or deletion of commodities or groups of commodities from the index; the addition to or deletion of a company report from the sample of companies priced, or, on occasion, a change in the source of price. Whenever a new commodity is added to an existing commodity group, linking of the new item to any one of the existing items is pertinent. Instead, the weights of the entire group are redistributed to include the new item and the link is made at the group level instead of at the commodity level. A similar procedure is used to handle items that drop out of the index.

Prices for individual commodities reported by the individual companies are averaged (usually by means of an unweighted average). Month-to-month price change should be computed from matched-company data. In order that a change in the company-reporter sample itself not affect the measure of percent change, the change is calculated for any 2 months from identical-company data. Thus, a new report affects the index no earlier than the second month.

Classification

The classification system of the WPI follows commodity lines. Products are grouped by similarity of end-use or material composition, rather than by industry of origin. The WPI classification does not match the Standard Industrial Classification (SIC), the Standard Commodity Classification, the United Nations Standard International Trade Classification (SITC), or any other standard classification. Historical continuity and the needs of index users have been important in developing the classification. No single classification plan can meet all of the requirements for wholesale price statistics, but the plan adopted should be flexible enough to facilitate regrouping of price series to make special grouping indexes. In July 1975, the index was made up of 15 major groups, 88 subgroups, 294 product classes, 603 subproduct classes, and 2,793 items.8

To meet the needs of index users, a number of special group indexes are calculated and published each month. Among these are indexes by stage of processing,9 indexes by durability of product, and indexes of construction materials, in addition to about 22 other special group indexes.

Except for the stage of processing indexes, these special groupings consist of rearrangements of the WPI data into different combinations of price series, so that the appropriate prices and weights are those of the WPI. The stage of processing indexes, however, regroup each item priced in the WPI according to the amount of processing, manufacturing, or assembling it undergoes before entering the market. A commodity may appear in several different categories in this scheme. Thus, 29 percent of the fresh vegetables (by value-weight) was assigned to crude foodstuffs and feedstuffs for further processing and 71 percent to consumer foods (as “finished” goods). The value weights are the same as those of the WPI and the allocations among the stages of processing are from an inter-industry transaction study made for the year 1958 by the Bureau of Economic Analysis, U.S. Department of Commerce. Early in 1976, these allocations will be updated to 1967 relationships.

Data Sources and Collection Methods

Prices

Price data are collected by mail questionnaire, and reporting is voluntary and confidential. Most prices are collected each month. For a few commodities, for which price changes are infrequent, the shuttle schedule is mailed quarterly, but monthly prices are requested. Generally, the price data used in the index are obtained directly from the producing company, but some trade publications are used when the publication generally is accepted as reliable by the Bureau and the industry. For fish and most agricultural products, the prices used are those collected and published by other Government agencies.

Price reporting is initiated, wherever possible, by a personal visit by a Bureau representative to the prospective respondent. Pricing of additional products from established reporters often is started by mail. In any event, a detailed report describing all of the price-making characteristics of the commodity is prepared for each new price series. This commodity price information sheet (BLS 1810) is shown on pages 118, 119 and 120. The form becomes a part of the permanent record for the series. After the initial collection of prices, monthly information is collected by mail on a shuttle schedule. (BLS 473, shown on pages 121 and 122.)

8See table for the major groups and subgroups included in the WPI.

9The broad stages of processing are: Crude materials for further processing; Intermediate materials, supplies, and components; and Finished goods. Each of these is subdivided further.
Weights

The price data are combined using weights based on value of shipments. The major sources of the value data are:

- **Bureau of Census** ........ Census of Manufactures
- **Census of Mineral Industries**
- **Bureau of Mines** ........ Various publications, e.g., Minerals Yearbook
- **Department of Agriculture** .......... Various publications, e.g., Agricultural Statistics
- **Bureau of Fisheries** ........ Various publications, e.g., Fisheries of the United States

In addition, many other sources of data, such as trade associations, are used. Import data are obtained from a report of the U.S. Department of Commerce, United States Imports for Consumption.

Sampling

The monthly index is based on a judgment sample of commodities, a sample of specifications (descriptions), and a sample of reporters. The sample of commodities is chosen after a review of the data of the industrial censuses and other statistics of value of transactions. Generally, the commodities chosen are those of the largest shipment values. Starting with January 1967, expansion of Industry Sector Price Index sample coverage has been a major influence in selecting new products for the WPI. New items are not added until they have become established in the market. They are added, normally, in December or June of any year, and have their first effect on the index in January or July.

Samples of specifications and of reporters are selected after consultation with trade associations or other industry representatives and with staff of other government agencies. Individual commodity specifications are selected also on the basis of net dollar sales. That is, the "volume seller" of the industry (not of the company) is preferred. The specification describes not only the popular physical characteristics but also the most common quality, grade, level of distribution, and market. However, terms of sales (discounts, etc.) are based on the company's own most common practice. For some commodities, prices are quoted by producers and sellers in terms of a single specification taken as standard; all other prices are quoted as differentials from the standard. The latter is true for some farm products such as wheat and cotton. When no standard commodity basis exists, the specification to be priced is selected with the help of industry experts.

The number of reporters is determined, to some extent, by the variation of price movements among them and the degree of price leadership. Whenever possible, a minimum of three companies is obtained, so that data for specified commodities can be published without disclosure of information supplied by individual companies. For commodities with more than one major production area and a definite regional pattern, a larger sample is selected. Among these commodities are electric power, refined petroleum products, waste materials and building materials such as brick, cement, and stone.

A comparatively small list of properly selected commodities would produce a reliable index, if only an All Commodities index were desired. However, historically, interest has been great in indexes for groups of commodities and for individual commodities. To meet these needs, the Bureau has increased the sample in order to provide more detailed indexes as well as many special-purpose indexes. Probability sampling techniques generally have not been used for the WPI, but their feasibility currently is being tested.

Estimating Procedures

Formula and Calculation

In concept, the Wholesale Price Index is calculated according to a modified Laspeyres formula:

\[ I_t = \left( \frac{\sum Q_a P_i}{\sum Q_a P_o} \right) \times 100, \]

where \( P_o \) is the price of a commodity in the comparison period and \( P_i \) is its price currently. \( Q_a \) represents the quantity shipped during the weight-base period.

An alternative formulation more closely approximates the actual computation procedure:

\[ I_t = \left( \frac{\sum (Q_a P_o)}{\sum Q_a P_o} \right) \times 100. \]

In this form, the index is a weighted average of price relatives for each item (\( P/P_o \)). The expression (\( Q_a P_o \)) represents the weights in value form and the "\( P/o \)" and "\( Q/a \)" elements (both of which originally relate to period "\( o \)" but are adjusted for price change to period "\( a/o \)" are not derived separately. Each value weight includes not only the value of items priced but also the values of unpriced items whose price movements are assumed to behave similarly. When new weights are introduced, the index with new weights is linked to the index constructed with the earlier weights. The weight adjustment itself, therefore, affects only the later calculations of average price change. When specifications or samples change, the item relatives must be computed by linking (multiplying) the relatives for the separate periods for which the data are precisely comparable. (For a somewhat more detailed treatment, see chapter 13, Consumer Prices.)
WHOLESALE PRICES

Base Period

The Wholesale Price Index has been computed on the government-wide standard reference base 1967=100 since January 1971.\footnote{Conversion of indexes from the 1967=100 base to the 1957−59 base may be accomplished by multiplying the 1967=100 based index by that item's 1967 annual (12-month) average (1957-59=100) and dividing the result by 100. Averages for 1967, calculated from 12 months’ data, and appearing in the December 1968 issue of "Wholesale Prices and Price Indexes" may be used for base conversion.} It had been based 1957−59=100 from January 1962 through December 1970. Earlier bases were 1947−49, 1926, and 1913. New items (or new index groupings consisting primarily of new items) introduced into the index after 1967 cannot be calculated on the 1967 base. Such indexes are published with separate bases related to the date of introduction.

Weights

The WPI weights represent the total net selling value of commodities produced, processed, or imported in this country, including Alaska and Hawaii, and flowing into primary markets. The values are f.o.b. production point and are exclusive of excise taxes. The value of interplant transfers, military products, and goods sold at retail directly from producing establishments also are excluded. Thus the definition of the weights conforms to the universe definition.

Each commodity price series is considered representative of a class of prices and is assigned its own weight (the shipment value of the commodity) plus the weights of other related commodities not directly priced but whose prices are known or assumed to move similarly.\footnote{Before the 1952 revision (calculated back to 1947), priced items in the index were weighted only by their own market values.} The assignment of price movements for priced commodities to those for which quotations are not obtained is referred to as imputation. For some commodities — such as ships and some kinds of custom-made machinery — it is not possible to obtain direct measures of price movement. The weights for such items are assigned to other commodities or groups of commodities for which prices are available. Usually, this assignment is made to priced commodities that have a similar manufacturing process, on the assumption of similar price movements. Price movements for attachments and parts for certain machinery often are imputed to the machine itself.

The Bureau’s policy is to revise the WPI weights periodically when data from the industrial censuses become available.\footnote{In general, the censuses are collected at 5-year intervals.} The weights beginning in 1976 are based on the 1972 industrial censuses. Indexes for 1947 through 1954 are based primarily on the 1947 censuses. In the January 1955 index, adjustments were made to align the major group weight totals with 1952−53 average shipment values as reported in the Annual Surveys of Manufactures. Weights based on the 1954 census shipment values were introduced in January 1958. From 1961 through 1966, weights were based on 1958 census values, and from 1967 through 1975 they were based on 1963 census values. In January 1976 new weights from the 1972 industrial censuses were incorporated.

The Bureau publishes the relative importance of each item in the WPI rather than the actual values used as weights. The relative importance of an item represents its basic value weight used in the index, including imputations, multiplied by the relative of price change from the weight date to a later date; the result is expressed as a percent of the total for all commodities or for some index grouping.\footnote{The use of relative importance data to construct indexes for groups of products is discussed in the 1973 supplement of "Wholesale Prices and Price Indexes." Relative importances as of December for all WPI items are published in each annual supplement.}

Imputing Missing Prices

Whenever price data are not available for a particular month, it is necessary to estimate the missing price for use in the calculation of the index. For commodities in the farm products and processed foods groups, out of the market seasonally, the price in off-season is imputed from the combined movement of the related commodities for which prices are available for the two periods being compared. For other commodities, delinquent prices are held unchanged from the preceding month.

Prices for some custom-made items are reported to BLS as estimates. For example, prices for fabricated structural steel for buildings and bridges are obtained from producers who reprice, each month, steel of the same specifications as used in structures on which they had been engaged at the time pricing for the WPI was initiated. Elevators, normally sold including installation, are reported f.o.b. plant — i.e., excluding transportation and installation cost — for use in the WPI.

Analysis and Presentation

The monthly WPI is published first in a press release, usually issued in the first week of the month following the reference month. Indexes are shown for all groups and subgroups as well as for All Commodities, Farm Products and Processed Foods, and Industrial Commodities. Analytic tables also are included which show monthly percent changes for the preceding 12 months for major groupings, and selected seasonally adjusted and unadjusted changes for some stage of processing classifications. A brief description and analysis of the causes of price movements are included. The monthly detailed report, issued some time after the press release, carries all data for which
wholesale price indexes are published, including item indexes and all special group indexes. Prices for many individual commodities also are included. This report includes a more comprehensive analysis than that given in the press release. Annual summaries appear in the annual supplements. In addition, numerous historical tabulations at various levels of detail are available on request.

The monthly indexes are published as final. Beginning with data for January 1967, only major corrections are made and published immediately at the time the error is discovered. Subsequently, all corrections reported during the year are made, and the indexes for all 12 months and the annual average are republished as revised.

Selected seasonally adjusted indexes or percent changes are published in the press release and monthly detailed report. About 50 indexes which historically show significant and consistent seasonal movement are presented each month seasonally adjusted and unadjusted. The applicable seasonal adjustment factors are available on request from the Bureau. These factors are recalculated annually to include more recent data, and the most recent set of factors may differ somewhat from those previously in use.

**Uses and Limitations**

The WPI is used by government and private research agencies for many purposes, including market analysis, escalation of long-term purchase and sales contracts, and formulation of monetary policies. It is used, as well, as an indicator of economic trends.

A 1961 survey of users of the WPI revealed that more than one-half use the All Commodities index as a general economic indicator. About 40 percent use that index or its components to compare with their selling or buying prices. The survey revealed that over 10 billion dollars (in terms of unexpired value) in long-term contracts for purchase of material or lease of industrial property are escalated according to changes in the total index or its components. Government agencies and private research groups also use the component series in deflating value data in preparation of the gross national product estimates and in studies of economic growth.

The index also is used by buyers and sellers of commodities — purchasing agents and sales managers. In most of these cases, it is not the All Commodities index, but rather the group indexes and the individual price series that are employed. Buyers of commodities are able to check both the amounts which they pay for goods and the general movement of their purchase prices against the index. The use of the index for checking absolute price levels is limited substantially, however. The Bureau’s main goal has been to measure the direction and amount of change, and only incidentally

The index, as a measure of general and specific price trends, also is used widely in budget making and review, both in government and in industry; in planning the cost of plant expansion programs; in appraising inventories; in establishing replacement costs; etc. Components of the index also are used in LIFO (Last-In, First-Out) inventory accounting by some organizations.

Although the WPI often is used to measure change in purchasing power of the dollar, it should not be used to measure changes in general purchasing power, prices at retail, securities prices, etc. Comparisons between the level of the WPI, the Consumer Price Index, and the indexes of prices of farm products show relative change from a base period, but comparisons of the index levels should not be used as a measure of the actual margins between farm prices and manufacturing or between manufacturing and retail. Its commodity classification structure should be borne in mind when using it to measure price changes for industries, many of which make diverse products not classified as their “primary” products.15

Again, as in other measures, the WPI has some limitations even in the field for which it is conceptually designed. Segments of the index are used as deflators of gross national product data, but gaps in WPI coverage leave considerable areas for which deflators have not been provided.

The WPI is based on a purposive judgment sample. The All Commodities Index can be assumed to be more reliable than a component group index, in general. Also, it can be assumed that the reliability of the index has increased over time as the sample has expanded.16 As the economy has produced an increasing proportion of fabricated finished goods (whose price changes are relatively infrequent), over the years, movement of the WPI has become somewhat smoother. Currently, new products are added each year. In earlier decades, there were also major additions of large numbers of new items at one time, in commodity areas previously underrepresented. These sudden expansions could have made it appear that prices had stabilized suddenly.

To the extent that quality improves (or deteriorates) over the years, the index errs when no adjustment is made. However, the Bureau makes suitable adjustments whenever possible. Assuming quality improvement, the index would have an upward bias if direct comparison were made between unimproved and improved articles. If, on the other hand, such changes were consistently made by linking, a downward bias would result. Since the Bureau has not adopted either method exclusively, and in many instances tries to evaluate the changes brought to its attention, the bias that may exist is considered to be small. However, no measure of its magnitude is available.

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15 See ch. 15 on Industry Price Indexes.
16 The sample of priced items doubled in 1952 to about 1,850 items and has increased to about 2,500 since then.
Technical References

Number | Reference
--- | ---
A statement of the use of the Wholesale and Consumer Price Indexes in escalating purchase and sales contracts and wages, with some specific suggestions and pitfalls noted.


A description of scope, uses, and method of the U.S. Government’s interindustry statistical study of 1947. Includes discussions of computational problems, areas of use, data requirements, etc.

An appraisal of price statistics of the Federal Government by the Price Statistics Review Committee of NBER, covering uses, concepts, collection, and publication, sampling, and other aspects of the Consumer Price Index, Wholesale Price Index, Index of Prices Paid by Farmers, and other price measures.

History of weight changes and weighting concepts, from inception of the Wholesale Price Index.


Describes an inquiry into the course of wholesale prices for the purpose of continuing the study contained in the Report on Wholesale Prices, Wages, and Transportation made by the Senate Committee on Finance, March 3, 1893 (pp. 237–313).

Describes United States Senate Finance Committee index (pp. 205–211), and Department of Labor index (pp. 212–243).

Method of Calculating Special Group Indexes, (pp. 12–13).
Calculating Relative Importance Data (p. 14), Description of Indexes by Stage of Processing (Economic Sector Indexes) (pp. 15–22); A Possible Effect on Weight Revisions (p. 7).

Seasonal adjustment factors for 183 commodities and commodity groups, and description of BLS seasonal adjustment method.


Describes Supplementary Inquiry on Wholesale Price Reports (discount study), pp. 10–12, and January 1958 Revision of the Weighting Structure, pp. 14–16.


Describes derivation and use of relative importances (weights) and lists all WPI weights for December 1969.

Introduces the new standard reference base, 1967=100, and describes conversion from the former base.

Contains a summary of the complete Senate report on wholesale prices, wages, and transportation made in response to a Senate resolution of March 3, 1891.

Describes how a general price index could be constructed, what it should accomplish, and virtues and limitations of various approaches.

Relates Stigler-Kindahl study (NBER, 1970) to BLS program.

## PRICE INFORMATION SHEET

FOR

COMMODITIES SOLD IN PRIMARY MARKETS IN THE U.S.

The Bureau of Labor Statistics will hold all information furnished by the respondent in strict confidence.

<table>
<thead>
<tr>
<th>Name of Firm</th>
<th>Division or Affiliate</th>
<th>Address: Street</th>
<th>City &amp; State</th>
<th>Zip Code</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
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<table>
<thead>
<tr>
<th>Information Authorized by (Name)</th>
<th>Title</th>
</tr>
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<table>
<thead>
<tr>
<th>Information Furnished by (Name)</th>
<th>Title</th>
<th>Telephone No.</th>
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<td></td>
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<table>
<thead>
<tr>
<th>Mail Schedule to (Reporter)</th>
<th>Title</th>
<th>Telephone No.</th>
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<tr>
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<td></td>
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<table>
<thead>
<tr>
<th>Address: Street</th>
<th>City &amp; State</th>
<th>Zip Code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

### 1. COMMODITY DESCRIPTION

(include style number, model number, lot number, grade, brand, etc.)
## II. BASIS OF REPORTED PRICE

<table>
<thead>
<tr>
<th>Unit Quoted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of Order</td>
</tr>
<tr>
<td>Class of Seller (mfr., importer, etc.)</td>
</tr>
<tr>
<td>Shipping Terms (f.o.b., factory or shipping point, frt. allowed, delivered, etc.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Carrier Most Frequently Used (rail, truck, other)</th>
<th>Common Carrier</th>
<th>Company Owned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Prices preferred by BLS are the actual net transaction prices f.o.b. factory. If it is impossible to furnish such data, furnish discounts which could be used to arrive at the preferred data.

If you provide other than the actual transaction price, indicate the type of price furnished: __________________________.

## III. DISCOUNTS AND ALLOWANCES APPLICABLE TO REPORTED PRICES

(Check the box provided for any which have been deducted to obtain the reported prices.)

<table>
<thead>
<tr>
<th>Quantity Discount (based on size of order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade Discount</td>
</tr>
<tr>
<td>Cash Discount (indicate terms)</td>
</tr>
<tr>
<td>Seasonal Discount (indicate terms)</td>
</tr>
<tr>
<td>Other Discounts (Rebates, Cumulative Volume Discounts, Allowances, Free Deals, etc.) Explain fully:</td>
</tr>
</tbody>
</table>
### IV. PRICE HISTORY FOR COMMODITY DESCRIBED

(Provide the price history back through ______ for the commodity described previously in sections I and II.)

<table>
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<tr>
<th>Date</th>
<th>Price</th>
<th>Remarks</th>
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<tbody>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### V. GENERAL COMMODITY INFORMATION

- **Type of package, if applicable**
- **Is a refund allowed for returnable containers?**
- **Based on quantity, approximately what percent of your shipments of this commodity during the past year were inter-plant transfers (captive)?**
- **List any duties or excise taxes which are applicable to the reported prices. If tax is included in the reported price, explain how to calculate the price excluding the tax.**
- **Other remarks:**

### VI. APPROXIMATE PERCENTAGE OF SALES TO EACH CLASS OF CUSTOMER

<table>
<thead>
<tr>
<th>Other mfr. (O.E.M. or assembler)</th>
<th>Distributor</th>
<th>Jobber</th>
<th>Wholesaler</th>
<th>Retailer</th>
<th>User</th>
<th>Exporter</th>
<th>Other (specify)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales (approx. %)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

**IF ANY QUESTIONS ARISE CONCERNING THE FORM, PLEASE CONTACT:**

- **Interviewer**

- **Date of Interview**
INFORMATION FOR THE WHOLESALE PRICE INDEX

ALL REPORTS WILL BE HELD IN CONFIDENCE

Dear Sir:

The price data which you provide is used in computing the Wholesale Price Index which is the officially accepted indicator of primary market price movements. The index is widely used by industry and government.

These voluntary reports, submitted by you and other businessmen, are the major source of information used in preparing this index. The information you provide is strictly confidential and open to inspection only to sworn employees of the Bureau of Labor Statistics.

Please use the enclosed envelope, which requires no postage, for returning this schedule. Your continued cooperation is greatly appreciated.

COMMISSIONER OF LABOR STATISTICS

IMPORTANT INSTRUCTIONS

In the boxes provided on the other side, please be sure to indicate all changes in COMMODITY DESCRIPTION, BASIS OF QUOTATION, DISCOUNTS, ALLOWANCES, AND TAXES that may have occurred since your last report.

Your cooperation in keeping all information current is a great aid in computing a reliable, accurate Wholesale Price Index.

Remarks

________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________
________________________________________________________________________________________

http://fraser.stlouisfed.org/
INFORMATION FOR THE WHOLESALE PRICE INDEX

1. COMMODITY DESCRIPTION (Please indicate all changes.)

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<th>CHANGES</th>
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<td>Give date, nature, and estimated value of change</td>
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2. BASIS OF QUOTATION (Please indicate all changes.)

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<table>
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<th>Class of seller and customer</th>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Size of order</th>
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</thead>
<tbody>
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<table>
<thead>
<tr>
<th>Shipping terms</th>
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<tbody>
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<table>
<thead>
<tr>
<th>Other (Specify)</th>
</tr>
</thead>
<tbody>
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<td></td>
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<table>
<thead>
<tr>
<th>Date and nature of change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

3. DISCOUNTS, ALLOWANCES, AND TAXES Indicate all discounts, allowances, and taxes applicable to above basis of quotation. This information is needed to arrive at the ACTUAL SELLING PRICE. (Please indicate all changes.)

<table>
<thead>
<tr>
<th>Quantity discount</th>
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<tbody>
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<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Trade discount</th>
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<table>
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<tr>
<th>Cash discount</th>
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<tr>
<th>Seasonal discount</th>
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<table>
<thead>
<tr>
<th>Other discount</th>
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<table>
<thead>
<tr>
<th>Other charges</th>
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<table>
<thead>
<tr>
<th>Excise taxes</th>
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<table>
<thead>
<tr>
<th>Date and nature of change</th>
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<tr>
<td></td>
</tr>
</tbody>
</table>

4. PRICE INFORMATION For the commodity described in item 1, please enter below the current price for the date indicated, on the basis quoted in item 2.

<table>
<thead>
<tr>
<th>Pricing Date</th>
<th>Price</th>
<th>Date of Price Change (If any)</th>
<th>Pricing Date</th>
<th>Price</th>
<th>Date of Price Change (If any)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 11, 1975</td>
<td></td>
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<td>May 11, 1976</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 9, 1975</td>
<td></td>
<td></td>
<td>June 15, 1976</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mar. 9, 1976</td>
<td></td>
<td></td>
<td>Sept. 14, 1976</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PERMANENT OFFICE RECORD

KINDLY RETURN THIS FORM PROMPTLY
Chapter 15. Industry Price Indexes

Background

A part of the BLS project on interindustry economics in the early 1950's was the preparation of a series of industry price indexes, based upon data collected for the Wholesale Price Index (WPI), covering the period 1947 through 1953. The new indexes were necessary to revalue bills of goods and industry output, and were calculated by regrouping the WPI into an interindustry (input-output) classification structure. An additional set of product class indexes was computed in 1959 for the Bureau of the Census for use in their 1958 production index benchmark. This latter set was used to deflate the shipment values in Census product classes where actual production data was either lacking or unsatisfactory. Again, these were essentially indexes of commodity prices, classified as primary to a given industry.1

The need for a BLS program of published Industry Price Index time series became increasingly apparent in 1960 and 1961 when the Price Statistics Review Committee of the National Bureau of Economic Research recommended to the Bureau of the Budget that the basic objectives of an industrial price program should be comprehensiveness, maximum detail in reporting, and groupings most useful in economic analysis. The committee stated "... It seems desirable that the subclassification should aim at fitting into the Standard Industrial Classification."2

In 1962, the Bureau of Labor Statistics initiated the development of industry price indexes. Because of the project's scope, the program was seen as a long-run activity to be accomplished in several stages of development. The initial phase was devoted to a study of potential and conceptual data collection and conversion problems.

The first indexes used gross shipment weights and commodity prices from the WPI to construct output price indexes for the mining and manufacturing sectors. The development of output price indexes for the transportation, communications, and some other non-manufacturing industries is now in progress. The Bureau now publishes price indexes for total railroad freight and selected commodity groupings, based upon the Standard Transportation Commodity Codes (STCC), with data available from January 1969. Input price indexes, i.e., those representing the price of material purchases, are planned for future development.

Concepts

An industry price index is a composite index consisting of price series that follow the general economic pattern of a particular industry. It includes products, sometimes of dissimilar types, grouped by industry of origin. Thus, it differs from the Wholesale Price Index, which is based primarily upon groupings of similar commodities. These industry indexes may be output price indexes or input price indexes, based upon either the products and services sold or the products and services purchased by an industry. An output price index for a given industry represents price indexes for a sample of the products produced by that industry, averaged together according to the relative importance of production of each sample product to the industry. An input price index for an industry consists of an aggregation of price indexes for a sample of the commodities and services purchased by the industry, averaged together according to the relative magnitude of the purchases.

The direction of the Bureau's work has been toward two sets of output price indexes. The first set, the industry price indexes, uses weights of gross shipments of products "made-in-the-industry" for the deflation of industry shipments. The second set, the product class indexes, (to be used for deflating Census product classes) is output price indexes of industry shipments classified by industry, but weighted by shipments of the product produced anywhere in the economy.

1 The classification of establishments into industries, in this program, follows the guidelines established by the Office of Management and Budget in its Standard Industrial Classification (SIC) system, as defined in the 1972 edition. Under this classification system, related products or services are grouped together and given an industry code number (consisting of 4 digits). Every establishment is assigned to the industry in which its most important products or services, in terms of values, are classified. Many industries contain establishments which produce significant quantities of goods and services that are classified in other industries. These goods usually are referred to as "secondary products."

The second set's primary use is in input-output analysis. 3

**Universe**

The Standard Industrial Classification (SIC) system, as revised in 1972, is currently used to define the scope of the industry price index universe. This system encompasses all products covered in the SIC as revised in 1972. Related products or services are grouped together and assigned a division, two, three, or four digit industry code according to the level of industrial detail considered. At the present time, the scope of pricing is almost entirely restricted to the WPI commodity coverage due to the use of WPI price data.

In theory, if price indexes are to parallel industry output data, the indexes should cover the total output of each industry including the value of primary and secondary shipments, interplant transfers, the value of sales to all classes of customers, and the value of industrial services. They should also include the value of sales for export purposes, but exclude the value of excise taxes and costs of transporting finished goods to purchasers. This approach is consistent with the "total activity" coverage of statistical series on employment and production.

In practice, industry price indexes are currently limited in scope to the value of primary and secondary shipments. Total product shipments are used (including interplant transfers) which inherently include shipments to all customers and the value of exported products. The value of industrial services is not currently covered in the universe.

Theoretically, input price indexes of materials consumed in production should cover the total material inputs of the industry. This figure would include imports for consumption, transportation, delivery costs and excise taxes. In practice, the material input indexes will probably cover only the total material inputs of an industry. Since values for imports, transportation, delivery costs and excise taxes are difficult to obtain on an industry by industry basis, the Bureau is only at the preliminary stages in producing such material input indexes. 4

**Prices and Base Period**

Prices used in the present industry price indexes are generally those used in the WPI. 5 Industry price indexes ideally would extend pricing to all classes of customers, including retail, for inclusion in the output indexes. Buyer's prices, including the value of shipping costs, would be used for input indexes and would be representative of the particular mix of products purchased by the buying industry. Currently, price data is limited in scope to that obtained from the WPI which is conceptually limited to the actual transaction prices of individual sellers.

The current reference base period for the Industry Price Indexes is 1967 = 100.

**Classification**

The Standard Industrial Classification provides the basis for the classification scheme used in constructing industry price indexes. Within this framework, individual products are given a 7-digit code by the Bureau of Census. 6 The product indexes are then aggregated to 5-digit product classes. Using these product class indexes, 4-digit industry indexes are obtained using "made-in-the-industry" weights. In concept, industry indexes can be aggregated to fit the sectoring plan of the latest Input-Output model. 7 However, existing price coverage is restricted to the manufacturing and mining sectors, and it is inadequate, even in those two sectors, for reliable estimates at the 2- and 3-digit SIC levels.

**Sampling and Estimating Procedures**

**Sampling**

At the present time, the Industry Price Index program depends almost entirely upon price data primarily collected for the Wholesale Price Index. Thus, expansion of data for the industry price index has depended on the expansion of the WPI. This expansion is generally directed at those industries which are considered to be most significant, based on such standards as value of shipments, total employment, market importance, etc. Under these general criteria, particular commodities, specifications, and respondents are selected judgmentally for the WPI and industry price indexes on the basis of volume, market share, and price leadership.

Price data used in computing an industry output price index should be representative of the output of the industry, namely, of the value of products made in plants classified in the industry but excluding prices of products primary to the industry but made in plants classified in other industries. As a rough guide to the

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5See chapter 14, Wholesale Prices, for a detailed discussion of the prices used in the Wholesale Price Index.

6The SIC provides no product codes.

adequacy of sampling techniques, the immediate objective is to represent at least 50 percent of the total wherever-made value of the commodities included in each 5-digit Census product class. At the 4-digit industry level, the publication criteria are as follows. For those product classes which meet the 50 percent standard, the primary production for that industry is added to the production for all published secondary products. This aggregation is compared with the total value of primary and secondary shipments for the industry. Approximately 85 percent of the total should be represented in order to publish a particular industry index.

Weights

Since January 1976, weights for the output indexes are the 1972 value of shipments obtained from the Census of Manufactures, the Census of Mineral Industries and data of the U.S. Department of Agriculture. Values include those for interplant transfers, goods processed and consumed in the same establishment, and goods sold for export. Values of imported commodities are not included. The difference in the scope of the weights, as compared with the WPI, stems from the objective in this system to match price data with the scope of domestic industry production.

Each priced product actually represents a class of commodities and is assigned its own weight plus the weights of other products not directly priced in the index but whose prices are known or assumed to move similarly. Values for unpriced products which cannot be assigned to a specific priced commodity are imputed to the average movement of the product classes in which they fall.

For use in deflating industry shipments, the 4-digit (SIC) Industry Indexes are derived from 5-digit product class indexes weighted together by their shipments value for the particular industry, i.e., the “made-in-the-industry” value.

Formula and Calculation

A modification of the Laspeyres fixed-weight formula is used. The formula is:

$$I_i = \frac{\Sigma (QaPo)}{(Pi/Po)} \times 100$$

where $I_i$ is the current index value for a given grouping, Po is the price of an individual product in the base year 1967, Pi is its price currently, and Qa is the quantity shipped during the weight-base year 1972. Formerly, the weight-base period was 1963. In succeeding years, new weights will be introduced whenever weights are revised for the comprehensive WPI.

In actual practice, the calculation may be somewhat more involved than indicated by the simple formula above. For example, indexes used for deflating industry shipments values should employ product weights based upon values of commodities made within the same industry. Since the Census data for such values are available only at the 5-digit (product class) level and not in greater detail, it is necessary first to construct product class indexes based upon total output weights (wherever-made) which are available for detailed products. Then, using 5-digit made-in-the-industry weights, the product class indexes are combined to the 4-digit industry level.

- Analysis and Presentation

The published indexes for selected 5-digit product classes and 4-digit industries consist of annual averages for the period 1957 through 1964, and cover 44 manufacturing and eight mineral industries.

Monthly indexes are available beginning in January 1965 for the same limited number of industries and products. Indexes for additional industries are introduced as improved sampling qualifies them for publication. By January 1975, indexes were being published for 160 four-digit industries and 453 five-digit product classes.

- Uses and Limitations

Price statistics organized along industrial lines have particular relevance to studies of economic growth, productivity, and other types of industrial and economic analysis where the emphasis is on industrial structure rather than market or commodity-use classification.

Whether a price index meets a given specific need depends largely upon its commodity coverage and its weighting structure. An important use of an output index weighted by gross shipment values is to deflate values in order to arrive at measures of output in constant dollars. Most measures of output and productivity rely primarily upon physical quantity data for the various products of an industry, but in cases where quantity data are not available, deflated values can be used if suitable price indexes are available for use as deflators. Deflated value data may serve as a check on production indexes prepared from quantity data and unit-value weights. There are many sectors of the economy for which the analysis of industrial output is severely limited because appropriate price indexes are not available.

The process of deflation provides a means of obtaining an estimate of quantity change from data available on total dollar value and a price index. If the dollar values themselves are divided by the price index, the
resulting dollar values express the sales value in terms of constant dollar in the base period of the index. Or an index of dollar volume can be divided by the price index to obtain a production index.9

The output indexes also may be used for comparing price movements with other industry-based statistical measures such as employment, earnings, productivity, etc. In lieu of input indexes, price indexes consistent with total shipments weights can be useful for deflating industry inputs. For example, the appropriate index for deflating the value of aluminum purchased by an industry would be the index whose components represent shipments of aluminum to buyers in this industry rather than the aggregate output of the primary aluminum industry.

Input price indexes will be useful to research depart-

9It can be shown that division of the value index by the Laspeyres (base-year-weighted) price index yields a production index of the Paasche (current-year-weight) form. Division by the Paasche price index, conversely, yields a quantity index of the Laspeyres type. See chapter 31, Output per Employee Hour Measures: Industries and the Federal Government.

ments in private industry as well as to public agencies. They should be consistent in coverage with BLS series on average hourly earnings, another important element of cost. For contract escalation, they will give index users a wider choice of indexes. As previously indicated, input price indexes are not available yet.

The prices used in constructing the currently published output indexes are those which are regularly collected on a monthly basis and used in the calculation of the comprehensive Wholesale Price Index. These prices generally are at the primary market level, but a few are at other levels. It must be assumed that these price movements are similar to movements at the market level of sales represented by the Census data. To include interplant transfer values and values of goods produced and consumed in the same industry, it is necessary to assume that price movements of goods in commercial markets represent the price changes of goods not sold in commercial markets.

Until additional pricing can be done, industry indexes will be limited by the coverage—commodity and class of customer—of the Wholesale Price Index.

Technical References

Number

   A paper which considers input price indexes, their properties and briefly the properties of a system of input and output price indexes.

   Contains price indexes for about 50 four-digit (Standard Industrial Classification) industries, together with a technical note on concepts, methodology, and uses.


   An appraisal of price statistics of the Federal Government by the Price Statistics Review Committee of NBER, covering uses, concepts, collection, publication, sampling, and other aspects of the Consumer Price Index, Wholesale Price Index, Index of Prices Paid by Farmers, and other price measures.


   A presentation of summary data for 1967 in which the 467 detailed industries are aggregated to 85 industries, together with a technical note on concepts, methodology, and uses of input-output analysis.
Chapter 16. Spot Market Prices

Background

As early as January 1934, at the request of the U.S. Department of the Treasury, the Bureau of Labor Statistics began the computation of a daily commodity price index, using quotations for sensitive commodities. It was released first to the general public in January 1940. In 1952, in connection with the revision of all its major price index series, the Bureau issued a new Daily Index of Spot Market Prices. The new index was not a continuation of the old series, but was based on a new sample of 22 commodities and was calculated on a 1947-49 base; in contrast, the old index was based on 28 commodities and was calculated with August 1939 as base.

In January 1962, the 22-commodity index was recalculated on a 1957-59 = 100 base to correspond to the base period adopted for other Federal Government general purpose indexes. In January 1971, the index was rebased again in accordance with government-wide practice, this time to a 1967 = 100 base. In 1969, computation of the index on a daily basis was discontinued. Since then the index has been prepared for Tuesday of each week.

Description of Survey

The Spot Market Price Index is a measure of price movements of 22 sensitive basic commodities whose markets are presumed to be among the first to be influenced by changes in economic conditions. As such, it serves as one early indicator of impending changes in business activity.

The commodities used are in most cases either raw materials or products close to the initial production stage which, as a result of daily trading in fairly large volume of standardized qualities, are particularly sensitive to factors affecting current and future economic forces and conditions. Highly fabricated commodities are not included for two reasons: (1) they embody relatively large fixed costs which fact causes them to react less quickly to changes in market conditions; and (2) they are less important as price determinants than the more basic commodities which are used throughout the producing economy.

A spot price is a price at which a commodity is selling for immediate delivery. In the absence of a spot price, a bid or an asked price may be used. Some of the prices used are nominal prices in that they are not actual transaction prices. Often they are exchange prices—a price for a completely standard commodity which eliminates the effect of minor quality changes on actual transaction prices. Trade publications may use this type of price for commodities such as cocoa beans, coffee, and wool tops. The price for print cloth is an average of spot price and price for most distant forward contract because it was determined that a large part of the sales of print cloth are made on a contract basis.

The 22 commodities are combined into an “All Commodities” grouping, with two major subdivisions: Raw Industrials, and Foodstuffs. Raw Industrials include burlap, copper scrap, cotton, hides, lead scrap, print cloth, rosin, rubber, steel scrap, tallow, tin, wool tops, and zinc. Foodstuffs include butter, cocoa beans, corn, cottonseed oil, hogs, lard, steers, sugar, and wheat.

The items upon which the index is based are classified further into four smaller groups: Metals, Textiles and Fibers, Livestock and Products, and Fats and Oils. However, some of the 22 commodities do not fall into one of these four groupings. For example, sugar is not included in any special group. Furthermore, the groupings are not mutually exclusive. Lard, for instance, is in both the Livestock and Products Index and in the Fats and Oils Index.

Data Sources and Collection Methods

The prices used in the index are obtained from trade publications or from other Government agencies. Prices for cocoa beans, corn, steers, sugar, wheat, burlap, copper scrap, cotton, lead scrap, print cloth (spot), rubber, steel scrap, wool tops, and zinc, are of the same specification and market source as those used in the comprehensive monthly Wholesale Price Index. Prices for butter, hides, hogs, lard, rosin, tallow, and tin are either differently specified spot prices or from different markets.

* Exchanges which issue spot prices have committees to make a determination of the spot for the standard commodity.

*See chapter 14, Wholesale Prices.
Selection of Products

The criteria for the selection of commodities were (1) wide use for further processing (basic), (2) freely traded in an open market, (3) sensitive to changing conditions significant in those markets, and (4) sufficiently homogeneous or standardized so that uniform and representative price quotations can be obtained over a period of time.

Subject to these restrictions, efforts were made to include representative sensitive commodities from as large a segment of the economy as possible. Also, the influence of international markets upon the economy was taken into account by the inclusion of some key commodities (such as crude rubber and tin) which are important in international trade. Both in the sample and in the index structure, an attempt was made to prevent price movements of agricultural products from dominating the movement of the index.

Estimating Procedures

The Spot Market Index is an unweighted geometric mean of the individual commodity price relatives, i.e., of the ratios of the current prices to the base period prices. The use of the geometric mean has the advantage that the index is not dominated by extreme price movements of individual commodities. Since extremely large movements may be atypical, it was deemed better to minimize their effects, even at the expense of losing the effect of large representative changes. However, the fact that each of the commodities is unweighted in the index means that a price change for rosin, a comparatively unimportant commodity, has as much effect as an equal percentage movement in the price of a very important commodity such as wheat, cotton, or steel scrap.

The computation procedure involves obtaining for each commodity the ratio of its price in any given period to its price in the base period and taking the 22nd root of this product. This product is then multiplied by 100 to obtain the index number for each period. The calculation is made by means of logarithms. The formula reduces to

\[ \log I_k = \frac{\sum \log P_k - \sum \log P_o + 44}{22} \]

where

- \( I_k \) = Index for a given day
- \( P_k \) = Price for a given day
- \( P_o \) = Average (geometric) price in base period

44 = Logarithmic constant which when divided by 22 equals log of 100.

Monthly average indexes are obtained according to the previous procedure, except that \( P_k \) = the geometric average of the Tuesday prices (daily prices prior to 1969) over the month. In maintaining the index over time, it may be necessary to change commodity specifications or substitute entirely new products. These changes are handled by a statistical linking procedure so that only actual price movements are reflected in the index.

Analysis and Presentation

Tuesday spot market indexes and prices are published each week, on the Friday following the day of reference. A summary of weekly indexes and the average for each month are published with the first weekly release of the following month. Beginning with 1950, historical indexes are shown for Tuesday of each week together with monthly averages; from July 1946 through 1949 indexes are listed for Tuesday of each week only. In addition, indexes are published for selected earlier dates: August 15, 1939, December 6, 1941, August 17, 1945, and June 28, 1946.

Uses and Limitations

A survey of users in 1964 showed that the Index is frequently used as a general economic indicator, for gauging the direction of basic prices, for forecasting general price movements, and for current prices of specific commodities. Other uses, frequently mentioned, are for market research and for comparing price trends with the user's selling or buying prices.

The Tuesday Index of Spot Market Prices differs from the Wholesale Price Index in method of construction and weighting, as well as in the sample of items for which prices are included. While it is independent of the monthly comprehensive index, changes in the Tuesday Index or its components may foreshadow turns in Wholesale Price Indexes. However, the Tuesday Index is not a good indicator of current price trends for the whole economy. For this purpose, the comprehensive Wholesale Price Index should be used. The Tuesday Spot Market Index is, by design, very sensitive to price changes in basic commodities but, because of its unweighted structure, the magnitude of changes in any of the index groups cannot be used as a reliable measure of the general price change of all commodities within the groups.

For many of the 22 items, the commodity exchange prices are based upon transactions which cover as little as 25 percent of the total sold in all markets. In some
cases, the price is set by a committee of experts from the commodity exchange for a standardized commodity. Also, when there are not enough transactions from which to obtain an actual market price, a “normal” spot price is set. From this, it is apparent that the exchange prices may not always be representative of the large volume of private transactions occurring outside the organized market. However, it is believed that the reported exchange prices generally are used as the basis for private negotiations.

### Composition of Grouping Indexes

**Metals:** Copper scrap, lead scrap, steel scrap, tin, and zinc.

**Textiles and Fibers:** Burlap, cotton, print cloth, and wool tops.

**Livestock and Products:** Hides, hogs, lard, steers, and tallow.

**Fats and Oils:** Butter, cottonseed oil, lard, and tallow.

Specifications for Commodities Included in the Index as of October 1975

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Specifications</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burlap</td>
<td>10 oz., 40&quot;, ex-dock or ex-warehouse, duty paid, per yd.</td>
<td>New York.</td>
</tr>
<tr>
<td>Butter</td>
<td>Grade A, 92 score, per lb.</td>
<td>Chicago.</td>
</tr>
<tr>
<td>Cocoa beans</td>
<td>Accra, per lb.</td>
<td>New York.</td>
</tr>
<tr>
<td>Corn</td>
<td>No. 2 yellow, per bu.</td>
<td>Chicago.</td>
</tr>
<tr>
<td>Cotton</td>
<td>Middling, 11/16&quot;, per lb.</td>
<td>10 markets.</td>
</tr>
<tr>
<td>Cottonseed oil</td>
<td>Crude, valley, per lb.</td>
<td>Memphis.</td>
</tr>
<tr>
<td>Hides</td>
<td>Cow, light native, packer 30/53 lbs., fleshed, packer to tanner, dealer, or exporter per lb., f.o.b. shipping point.</td>
<td>Chicago.</td>
</tr>
<tr>
<td>Hogs</td>
<td>U.S. No. 2's and 3's, 200=220 lbs., per 100 lb.</td>
<td>Omaha.</td>
</tr>
<tr>
<td>Lard</td>
<td>Prime Steam, in tanks, per lb.</td>
<td>Chicago.</td>
</tr>
<tr>
<td>Lead scrap</td>
<td>Battery plates, smelters' buying price, East, carload lots; delivered buyers' works, per lb.</td>
<td>Chicago.</td>
</tr>
<tr>
<td>Print cloth</td>
<td>.48&quot;, 78x78 count, 4 yds./lb. spot and nearby, per yd.</td>
<td>New York.</td>
</tr>
<tr>
<td>Print cloth</td>
<td>.48&quot;, 78x78 count, 4 yds./lb., most distant contract, per yd.</td>
<td>New York.</td>
</tr>
<tr>
<td>Rosin</td>
<td>Gum, windowglass grade, carlots, per 100 lb.</td>
<td>New York.</td>
</tr>
<tr>
<td>Rubber</td>
<td>Crude, natural, No. 1 Ribbed Smoked Sheets, per lb.</td>
<td>New York.</td>
</tr>
<tr>
<td>Steel scrap</td>
<td>No. 1 heavy melting, (dealer), consumers' buying price, including brokerage, delivered, per gross ton.</td>
<td>Chicago.</td>
</tr>
<tr>
<td>Steers</td>
<td>Choice, 900-1100 lbs., per 100 lb.</td>
<td>Omaha.</td>
</tr>
<tr>
<td>Sugar</td>
<td>Raw, 96°, duty paid, per 100 lb.</td>
<td>New York.</td>
</tr>
<tr>
<td>Tallow</td>
<td>Packer's prime, inedible, per lb.</td>
<td>Chicago.</td>
</tr>
<tr>
<td>Tin</td>
<td>Grade A, spot delivery, per lb.</td>
<td>Chicago.</td>
</tr>
<tr>
<td>Wheat</td>
<td>No. 1 Dark Northern Spring, per bu.</td>
<td>Minneapolis.</td>
</tr>
<tr>
<td>Wheat</td>
<td>No. 1 Hard Winter Ord., per bu.</td>
<td>Kansas City</td>
</tr>
<tr>
<td>Wool tops</td>
<td>Certificated spot price, nominal, per lb.</td>
<td>Boston.</td>
</tr>
<tr>
<td>Zinc</td>
<td>Slab, Prime Western, for prompt delivery, delivered, (f.o.b. New York equivalent), per lb.</td>
<td>New York.</td>
</tr>
</tbody>
</table>
Chapter 17. International Price Indexes

Background

The International Prices Program grew out of a long-standing need for accurate measures of price changes for U.S. imports and exports. Some countries, such as West Germany and Japan, have been producing such indexes for more than 20 years. In the period immediately following World War II, the Bureau of Labor Statistics began a program to develop export and import price indexes. The program advanced to the point where hundreds of prices had been collected from exporters and importers and test indexes calculated. However, the program was terminated in 1948 (along with others) because of budget reductions. In 1961, a report on Federal Price Statistics given to the Subcommittee on Economic Statistics of the Joint Economic Committee, by the National Bureau of Economic Research (NBER) suggested responsibility for compilation of export and import price indexes be assigned to a Federal statistical agency, “to obtain the attention and resources for these indexes that we believe are essential.”

In 1967, the BLS also began research on the feasibility of developing export and import price indexes, and the first funding was provided for producing such measures in the budget for FY 1970.

Export price indexes were first published in 1971 and import price indexes in 1973. Data were collected annually for June of each year until 1974 when collection and publication was begun on a quarterly basis. The program is still in its expansion phase with published coverage as of September 1975 accounting for 27 percent of the 1974 value of exports and 6 percent of the 1974 value of imports. Coverage is expected to exceed 60 percent by value of both imports and exports by 1978. Published categories are based on the nomenclature of the Standard International Trade Classification of the United Nations (SITC), which is a product classification system.

Description of Survey

Concepts. The two indexes being developed in this program will cover virtually all transactions in non-military goods between the U.S. and the rest of the world. The export price index will provide a measure of price change for U.S. products sold to other countries. The import price index will provide a measure of price change for goods purchased from other countries by U.S. residents.

In addition to the goal of providing a general index of prices for U.S. exports and an index for U.S. imports, there is another important goal: to develop indexes for detailed product categories. This goal is being met through the present publication program wherein quarterly price indexes are published for numerous categories of finished manufactured goods both for exports and for imports. These categories are defined by the 4-and 5-digit level of detail of the SITC. The SITC is a product classification system used by numerous countries, including the U.S., to classify and publish the value of their exports and imports. The calculation of U.S. export and import price indexes by SITC category thus facilitates the comparison of U.S. price trends and sectoral production with the exports and imports and price trends of other countries. When sufficient coverage is achieved at this level of detail, higher level aggregate indexes will be prepared, though indexes will not be prepared for SITC categories with small values of trade.

Product Universe. The product universe of the export price indexes covers virtually all products sold by U.S. residents to foreign buyers. (Residents in this instance has its national income account definition, and it includes corporations, businesses, and individuals but does not require either U.S. ownership or U.S. citizenship.) The product universe of the import price index covers all products purchased from abroad by U.S. residents. The universe in the case of each of these indexes includes raw materials and agricultural products, semi-finished manufactures and finished manufactures including both capital goods, such as electrical machinery, agricultural equipment, textile equipment, etc., and consumer goods such as refrigerators, appliances, electronic equipment, clothing, etc. Transactions between related parties and between unrelated parties are priced in these indexes.
Military goods are not priced in the indexes except to the extent that some products may be purchased on the open market for military use, e.g., automobiles, clothing, non-specialized hardware, fuel, etc. A few items such as works of art, ships, and so forth are not included because of the difficulty of obtaining time series for comparable products in their categories.

**Prices.** The prices used in the construction of these indexes are collected according to the specification method. To the extent possible, they refer to prices at the U.S. border for exports and at both the foreign border and at the U.S. border for imports. For nearly all products, the prices refer to transactions completed during the first 2 weeks of the third month of each calendar quarter. If a firm had no transactions in a product during that 2-week period, prices for a transaction up to 2 weeks earlier or later may be used.

Every effort is made to obtain actual transaction prices. Respondents are requested on the price reporting forms to indicate all discounts, allowances, rebates, etc. applicable to the reported prices, so that the price used in the calculation of the indexes is the actual price for which the product was bought or sold. Respondents are reminded of this requirement through a combination of personal visits, telephone calls, correspondence and special enclosures with the reporting forms.

For the export price indexes, the preferred pricing basis is fas (free alongside ship) U.S. port of exportation for specified terms and size of shipment. In cases where firms report export prices fob (free on board) production point, information is collected which enables the Bureau to calculate a shipment cost to the specified port of U.S. exportation. This information includes location of product point and port of exportation, size and weight of shipment, name of carrier, and routing. For most finished manufactures, respondents frequently report export prices on an fob factory basis. Many of the export price indexes are being published on this basis pending conversion to fas basis. For imports two different prices are collected. The first is the import price fob at the foreign port of exportation. This is consistent with the basis for valuation of imports in the national accounts. The second is the import price cif (cost, insurance, and freight) at the U.S. port of importation. The price on a cif basis consists of the foreign selling price plus the other costs (insurance and freight) associated with bringing the product to the U.S. border. The import duty on the product, if any, is collected as a separate piece of information.

Since a price index requires that the same item be priced from period to period, it is necessary to recognize that products may be modified or changed from time to time. Since changes in specifications or terms of transaction constitute a change in the product being priced, an adjustment is made to compensate for these changes. The detailed specifications collected for each product include detailed descriptions of the physical and functional characteristics of the product, the terms of transaction including number of units bought or sold, discounts, credit terms, and packaging. Since the objective of the price index is to provide a measure of pure price change, changes in the product are linked into the index. The method used follows the linking procedure of the Wholesale Price Index. (See chapter 14.)

Average prices are not published or calculated because even within the narrowest category of products, i.e., 7-digit level of detail, scope is allowed for the products priced to vary among respondents in order to reflect the product most typical of each respondent in that category.

**Classification.** The classification systems used in the export and import price indexes are product classification systems. For exports, products are classified according to the 7-digit Schedule B classification system of the U.S. Department of Commerce as of 1973. The Schedule B system (Statistical Classification of Domestic Commodities Exported from the U.S.) provides approximately 4,000, 7-digit product codes. For imports, products are classified according to the Tariff Schedule of the U.S. Annotated (TSUSA) as of 1973. This is a 7-digit product classification system. At the 5-digit level the Tariff Schedule is determined by law and is the means whereby imported products are classified for duty purposes. Two-digit statistical suffixes or annotations may be added to each 5-digit Tariff Schedule number for statistical purposes. These annotations provide a more detailed classification system for recording the flow of products imported into the U.S. Approximately 8,000 of the more than 10,000 TSUSA categories are used each year.

Since the U.S. trade flows are recorded in value terms for each 7-digit Schedule B and each 7-digit TSUSA category, value weights are thus provided for calculation of the indexes.

The indexes which are published employ the nomenclature and classification of the SITC. The SITC is made up of 10 sections at the 1-digit level, 56 divisions at the 2-digit level, 177 groups at the 3-digit level, and 625 subgroups at the 4-digit level. Additional subsidiary classes are available raising to 1,312 the number of “basic items” in the system. Concordance schemes are used for classifying Schedule B categories or TSUSA categories into the SITC. The Schedule B, the TSUSA, and the SITC are exhaustive so that no product...
uct will appear in more than one place in export price indexes or import price indexes calculated for SITC categories.

Data Sources and Calculation Methods

Prices. Price data used in the indexes are collected by mail questionnaire and reporting is voluntary and confidential. Most prices are collected each quarter. In nearly all cases price data are collected directly from the exporter or the importer, though in a few cases prices are obtained from brokers.

Price reporting by firms is initiated in all cases by personal visit by a Bureau representative. At the time of the personal visit, if the prospective respondent’s cooperation is obtained, the reporting requirements are explained verbally and in writing, and the selection of products is made for which the firm will report price information. In most cases information initially provided by a firm contains data for earlier periods. In these cases, the Bureau representative often must leave the reporting forms with the respondent so that past prices, specifications, and discounts can be obtained by the firm from its records. Subsequently, current prices are collected by mail. However, telephone contact is maintained with the respondent, specifically with the person at the firm who is responsible for providing the price information each quarter. In addition, respondents are revisited periodically in order to review reporting practices and requirements and to review the sample of products for which prices are being reported. Frequently during these revisits some products which had been reported are dropped from further reporting and new items are added. Provision is also made on the forms used for the quarterly price reporting by mail for the respondent to discontinue reporting for products which have declined in importance or to add products which have become significant.

Weights. The price relatives are combined using value weights. In the case of the export price index, average price relatives in each 7-digit Schedule B category are weighted by the value of exports in that category during the base period used in the calculation formula. For the import price index, price relatives are weighted by the value of imports in each 7-digit TSUSA category during the base period. The value data are compiled by the Bureau of the Census for 7-digit categories from shippers’ export declarations and import entry documents and are available on magnetic tape and in regularly printed publications. The publications are:


Sampling. The export and import price indexes which have been calculated are based on judgment samples of products, specifications, and respondents. The sample of products is based on value criteria at the 7-digit level of detail for exports and for imports, as reported in statistics of U.S. trade. For the most part, the categories selected for pricing are chosen on the basis of high value. Thus some Schedule B numbers or TSUSA categories most likely will not be priced for a 4- or 5-digit index. The sample of respondents is chosen from industry directories and from information obtained in conversations with trade or industry associations and various government agencies. The individual products which are priced by a given respondent are selected during the personal visit by a Bureau representative. The selection of an item for pricing is based on the goal of selecting a product (or products) within a narrow product category, the price movement of which is typical for items exported by that respondent in that product category. The specifications provide a complete description of the item, its physical characteristics, its functions, and the terms of the typical transaction in that product category. For exports, the specifications also include the class of buyer and for imports they also include the country of origin. This method of obtaining specifications means that within an index (at the 4- or 5-digit level or within a 7-digit classification), the specifications priced for one firm most likely will be different from the specifications priced for another firm. The advantage of this approach lies in the fact that prices collected on a specification basis are used in the indexes and, at the same time, the products included in the index are most representative of each firm’s export or import transactions. This avoids the potential problem that a single national or regional specification may not accommodate product differences among firms and may be unrepresentative of the bulk of transactions in the product category for all firms.

No index is published in such a way as to reveal the name or price or price behavior of any respondent. This requires that there be a minimum of three respondents for each index. In most cases the number of respondents in each published index is larger than this minimum.

Probability sampling has been initiated for products and respondents. This procedure is used for nearly all of the indexes newly produced after June 1976. In addition, it will be used to replace the judgment samples in the previously published index groups. Eventually probability sampling will be used for all the indexes in each SITC section.

The samples are constructed from shippers’ export declarations and import entry documents filed with the Bureau of Census. These forms contain the 7-digit product code, value and quantity of the shipment, and the company name along with other information. The first section covered is exports of SITC-6, manufac-
tured articles classified chiefly by material. The products in this section account for slightly over 15 percent of the value of U.S. exports and include such products as iron and steel, non-ferrous metals, wood, glass, textiles, paper, etc. The procedures used for developing the sample of export products and respondents for SITC-6 will be applied to developing probability samples of products and respondents for all other SITC sections.

Products and respondents were selected using a sample design consisting of four stages. The first stage involved the selection by BLS of 253 of the 827, 7-digit numbers in sections 63–69 of Schedule B. The 827, 7-digit Schedule B numbers were first stratified in order to assure publishability at various 2-, 3-, 4-, and 7-digit levels. Within each stratum, a systematic sample was selected, with probability of selection proportionate to the 1973 dollar value of each Schedule B number.

The second stage of sampling was implemented by the Bureau of the Census using their file of shippers’ export declarations (SED’s). Line items pertaining to the 253 selected Schedule B numbers from all SED’s were sorted by Schedule B number, and stratified within by the dollar value of the shipment. Within each value stratum, a systematic, equal probability sample of line items was selected.

The BLS summarized this information from around 12,000 SED’s by exporter and Schedule B number. At this stage there were approximately 4,000 separate exporters, from which a sample of 1,000 was drawn using systematic, probability-proportionate-to-size, selection. The measure of size for each exporter was its maximum probability, a number arrived at by considering the importance of the portion of the universe the exporter represents in each Schedule B number. In some cases subsampling was undertaken to reduce reporter burden.

Estimating Procedures

Formula and Calculation. The export and import price indexes are weighted price relatives of the Laspeyres type. The weights are derived from U.S. export and import values respectively in the base year using the most detailed available product classification systems. Within each weight category, price relatives are weighted equally and then aggregated to the SITC index level.

\[
I_{x,t} = \frac{\sum_{j} \sum_{i} \left( \frac{P_{t}^{i}}{P_{t}^{o}} \right) w_{j}}{\sum_{j} w_{j}}
\]

where:

- \( x \) = SITC group for which index is calculated
- \( j \) = the weight categories within \( x \) (they are the Schedule B categories for exports, and the TSUSA categories for imports)
- \( i \) = product within \( j \)
- \( n \) = number of price relatives within \( j \)
- \( t \) = time
- \( w_{j} \) = share of value of \( j^{th} \) category in group \( x \) in the base year
- \( \frac{P_{t}^{i}}{P_{t}^{o}} \) = price relative of product \( i \) in year \( t \) to base year \( o \).

The value weights are the dollar value of exports or imports in each 7-digit category. Each value weight includes the items which are priced within the 7-digit category and also other items which are not priced but whose price movements are assumed to behave similarly. Not all weight categories are included in each SITC group for which an index is published. Instead, a sample of 7-digit categories represent all of the 7-digit categories within the index group. When new 7-digit categories, i.e. weights, are introduced into an index, the index including the new categories is linked to the earlier index.

Base Period. The export and import price indexes are published with the reference period 1967 = 100, where possible. In numerous cases, however, price data do not extend back to 1967 so that more recent reference bases must be used. As noted above, however, for calculation purposes the weight base is 1973. The indexes are set equal to 100 in 1967 after calculation.

Analyses and Presentation

The export and import price indexes are published in BLS press releases on a quarterly basis. The indexes are released 5 weeks after the end of the reference month. The indexes, which are not seasonally adjusted, are published for 4- and 5-digit SITC categories and are shown both on an index level and in terms of percent change. Revisions are published when they are made and are denoted in the press release with an "r."

Uses and Limitations

The indexes published in this program are the only indexes of prices related to the U.S. foreign trade sector. When the categories covered have been extended to encompass all categories of U.S. exports and imports, they will provide quarterly measures of the price trend of U.S. products sold abroad and of products imported to the U.S. from other countries. The series will enable analysts and policymakers to assess the effect of export and import price changes on the U.S. economy and its industrial sectors, as well as to analyze the effects of price changes on the balance of payments. The price measures will provide a basis for calculating changes in
the volume of real exports and imports in the aggregate and for product groups. They provide a basis for measuring changes in the prices of U.S. products in relation to price trends of comparable products of other major industrial countries with which the U.S. competes for markets.

Technical References


2. Interagency Committee on Measurement of Real Output, Subcommittee on Prices, Report on Criteria for Choice of Unit Values or Wholesale Prices in Deflators, see appendices (Washington, D.C., Bureau of the Budget, June 17, 1970, mimeographed)


Wages and Industrial Relations

Chapter 18. Occupational Pay and Supplementary Benefits

Background

The Bureau of Labor Statistics, for many decades, has conducted studies of wages by occupation and industry, based upon employer records. The Bureau's first such study, growing out of a study by the U.S. Senate in 1891, resulted in a wage rate record extending back continuously to 1860. Systematic collection of wage data by occupation and industry has continued since the turn of the century; changes in coverage have been dictated mainly by government requirements. A large survey program undertaken for the War Industries Board in 1919 produced occupational pay rates by industry and State, and (for some industries) by city. Between 1934 and 1940, the selection of industries studied was determined largely by administrative needs under the National Recovery Act, Public Contracts Act, and the Fair Labor Standards Act, with emphasis on nationwide data for relatively low-wage industries.

Survey activity shifted in the 1940–41 defense period to heavy industries essential to war production. Implementation of wage stabilization policy during the war required a large-scale program of occupational wage studies by industry and locality. The emphasis on data by locality has continued since 1945 within the framework of industry studies generally designed to yield national and regional estimates. In addition, the Bureau developed three new types of surveys.

Area wage surveys, initiated in the late 1940's, were designed to meet the growing demand for pay data related to office clerical and manual jobs that are common to a wide variety of manufacturing and non-manufacturing industries within metropolitan areas. This survey program was firmly established and temporarily expanded for use in the wage stabilization effort during the Korean emergency. The need for nationwide estimates of white-collar pay in private industry for use in appraising the Federal white-collar salary structure resulted in a survey design that would produce national averages, based on an area sample. Data for individual areas studied also serve the wage administration needs for other government agencies.

Prior to 1960, studies in a very few professions provided salary data. Beginning in that year, salary surveys have been made on a nationwide basis covering professional, administrative, technical, and clerical jobs in a broad spectrum of industries. Averages for these jobs are used by the administrative agencies directly concerned with Federal pay matters.

Recognizing the increased interest in governmental pay, and the fact that government employees represented a large and growing segment of the total work force, the Bureau began a series of wage and benefit studies in eight city governments during 1970. The series was later expanded to include all cities having 500,000 inhabitants or more; this group included 26 cities in 1975.

Description of Surveys

Although differing in industrial, geographic, and occupational coverage, the four types of surveys described form an integrated program of occupational wage surveys based upon a common set of administrative forms, manual of procedures, and common concepts and definitions. Employer cooperation in surveys is on a voluntary basis. Confidential individual establishment data compiled by the Bureau's field economists are grouped in published reports in a manner that will avoid possible disclosure of an establishment's rates. Establishments included in all surveys are classified by industry as defined in the 1967 edition of the Standard Industrial Classification Manual prepared by the U.S. Office of Management and Budget.\(^1\) Survey reports identify the minimum size of establishment (measured by total employment) studied. Definitions for Standard Metropolitan Statistical Areas are employed in all programs.\(^2\)

Industry wage surveys provide data for occupations selected to represent the full range of activities performed by workers. Consideration also is given, in their selection, to the prevalence in the industry, definiteness and clarity of duties, and importance as reference points in collective bargaining.

In addition to collecting straight-time first-shift rates (or hours and earnings for incentive workers) for individual workers in the selected occupations, surveys in most industries also establish the wage frequency distribution for broad employment groups, i.e., pro-

\(^1\) See app. B.

\(^2\) See app. C.
duction and related workers or nonsupervisory workers. Weekly work schedules; shift operations and differentials; paid holiday and vacation practices; and health, insurance, and retirement benefits are included in the information collected, along with the provisions made for other items, applicable to certain industries. The studies also provide estimates of bargaining agreement coverage, proportions employed under incentive pay plans, and the extent to which establishments provide a single rate or range of rates for individual job categories.

Fifty manufacturing and 20 nonmanufacturing industries, accounting for about 22.5 million employees, are surveyed on a regularly recurring basis. A majority are studied on a 5-year cycle, but a number of comparatively low-wage industries are on a 3-year cycle. In addition, special wage surveys are undertaken at the request of others.

Nearly all of the manufacturing, utilities, and mining industries are surveyed on a nationwide basis and estimates are provided also for regions and major areas of concentration. Surveys in trade, finance, and service industries usually are limited to a number of metropolitan areas. Nationwide surveys generally develop separate estimates by size of establishment, size of community, labor-management agreement coverage, and type of product or plant group.

Area wage surveys provide data for occupations common to a wide variety of industries in the areas surveyed. The 76 occupational categories studied include 29 office clerical; 17 electronic data processing, drafting, and industrial nurses; and 30 maintenance, toolroom, powerplant, and custodial and material movement jobs. Thus, they provide representation of the range of duties and responsibilities associated with white-collar, skilled maintenance trades, and other "indirect" manual jobs. Weekly salaries reported for individuals in white-collar jobs relate to regular straight-time salaries that are paid for standard workweeks. Average hourly earnings for maintenance and other manual jobs relate to first-shift hourly rates.

Industry divisions included are (1) manufacturing; (2) transportation, communication, and other public utilities; (3) wholesale trade; (4) retail trade; (5) finance, insurance, and real estate; and (6) selected service industries. Establishments employing fewer than 50 workers are excluded—with a minimum of 100 applying to manufacturing; transportation, communication, and other public utilities; and to retail trade in the 13 largest communities.

In addition to the all-industry averages and distributions of workers by earnings classes, separate data are provided for manufacturing and nonmanufacturing in each area and, wherever possible, for individual industry divisions in the nonmanufacturing sector. Among the 70 Standard Metropolitan Statistical Areas in this annual survey program as of 1976, separate data are provided for transportation, communication, and other public utilities in 68 areas; for retail trade in 32 areas; for wholesale trade and finance, insurance, and real estate in 18 areas; and for the selected service industries in 20 large areas. In 31 of the larger areas, wage data are presented separately for establishments that have 500 workers or more.

Data on weekly work schedules; paid holiday and vacation practices; and health, insurance, and retirement benefits are recorded separately for nonsupervisory office workers and plant workers (nonoffice). Shift operations and differentials are collected for plant workers in manufacturing. Data on minimum entrance rates for inexperienced office workers are collected in all industries. These items are studied every 3 years in all areas. This survey program also has developed information on profit-sharing plans, characteristics of sick leave plans, wage payment systems, and other items related to employee compensation.

Special area wage surveys have been conducted annually since 1967 at the request of the Employment Standards Administration for use in administering the Service Contract Act of 1965. Cross-industry surveys provide information on hourly earnings for 14 office occupations, 10 professional and technical jobs, and 20 maintenance, toolroom, powerplant, and custodial and material movement jobs. The industrial scope includes manufacturing; transportation, communication, and other public utilities; wholesale trade, retail trade; finance, insurance, and real estate, and selected service industries. Establishments with fewer than 50 employees are excluded from the scope of these special area wage surveys.

In addition to the cross-industry surveys, special industry studies are conducted for the Employment Standards Administration. These studies provide information on hourly earnings for 10 moving and storage jobs; 6 refuse hauling jobs; 24 contract construction jobs; 7 laundry jobs; and 6 food service jobs. For both the cross-industry surveys and special industry studies, data on incidence of paid holidays and vacation practices, and health, insurance, and retirement benefits are provided every 3 years.

The National Survey of Professional, Administrative, Technical, and Clerical Pay provides a fund of broadly based information on salary levels and distributions in private employment. The 72 occupation-work levels studied in 1975 were selected from the following fields: Accounting, legal services, personnel management, engineering and chemistry, buying, clerical supervisory, drafting, and clerical. Definitions for these occupations provide for classification of employees according to appropriate work levels (or classes). Although reflecting duties and responsibilities in industry, the definitions were designed to be translatable to specific pay grades in the General Schedule applying to Federal Classification Act employees. This survey, thus, provides information in a form suitable for use in comparing the compensation of salaried employees in
the Federal civil service with pay in private industry.

Monthly and annual average salaries are reported for all occupations. Data relate to the standard salaries that were paid for standard work schedules i.e., to the straight-time salary corresponding to the employee’s normal work schedule, excluding overtime hours. Nationwide salary distributions and averages are presented for men and women combined. Averages also are presented for establishments in metropolitan areas combined and for establishments employing 2,500 workers or more.

Industry divisions included are: (1) manufacturing, (2) transportation, communication, electric, gas and sanitary services, (3) wholesale trade, (4) retail trade, (5) finance, insurance, and real estate, and (6) engineering and architectural services, and commercially operated research, development, and testing laboratories.

Limited to the Nation’s metropolitan areas for the years 1960 through 1964, the annual survey was expanded in 1965 to include nonmetropolitan counties. The minimum establishment size included in the survey is 250 workers in manufacturing and retail trade and 100 in the other industries studied. The minimum establishment size has been adjusted at various times since 1961. Since the survey scope is subject to change, users are directed to the Scope and Method of Survey appendix in the bulletins for a description of current practice.3

_Municipal government wage surveys_ provide data for occupations common to many municipal governments. The 50 occupations studied include 10 office clerical; 5 occupations common to many municipal governments. To facilitate comparisons, the surveys are designed to be as comparable as possible to the Bureau’s area wage surveys of private industry and to other related studies. Average salaries relate to base salaries for a standard workweek, plus longevity pay, reported on a monthly basis. In addition to wage data, comprehensive information is provided on city pay plans and their administration, work practices, unionization, and health, insurance, and retirement benefits of municipal employees. To assist in making inter-city comparisons and comparisons with private industry and unions, the principal features of the benefit plans are described in standard formats. These formats are almost identical to those used in the Bureau’s _Digest of Health and Insurance Plans_, 1974 Edition, and the _Digest of Selected Pension Plans_, 1973 Edition.

**Concepts.** The Bureau’s occupational wage surveys summarize a highly specific wage measure—the rate of pay, excluding premium pay for overtime and for work on weekends, holidays, and late shifts, for individual workers. In the case of workers paid under piecework or other types of production incentive pay plans, an earned rate is computed by dividing straight-time earnings for a time period by corresponding hours worked. Production bonuses, commissions, and cost-of-living bonuses are counted as earnings. In general, bonuses that depend on factors other than the output of the individual worker or group of workers are excluded; examples of such nonproduction payments are safety, attendance, year-end or Christmas bonuses, and cash distributions under profit-sharing plans.

Unless stated otherwise, rates do not include tips or allowances for the value of meals, room, uniform, etc. The earnings figures, thus, represent cash wages (prior to deductions for social security, taxes, savings bonds, premium payments for group insurance, meals, room or uniforms) after the exclusion of premium pay for overtime, weekend, holiday, or late shift work.

Hours shown for salaried occupations relate to standard weekly hours for which the employee receives his regular straight-time salary.

Occupational classifications are defined in advance of the survey. Because of the emphasis on interestability and interarea comparability of occupational content, the Bureau’s job descriptions may differ significantly from those in use in individual establishments or those prepared for other purposes. The job descriptions used for wage survey purposes are typically brief and usually more generalized than those used for other purposes. The primary objective of the descriptions is to identify the essential elements of skill, difficulty, and responsibility that establish the basic concept of the job.4

Although work arrangements in any one establishment may not correspond precisely to those described, those workers meeting the basic requirements established for the job are included.5

In applying these job descriptions, the Bureau’s field representatives exclude working supervisors, apprentices, learners, beginners, trainees, handicapped workers, part-time or temporary workers, probationary workers unless provision for their inclusion is specifically stated in the job description.

4 An example of a job description:

**MACHINIST, MAINTENANCE**

Produces replacement parts and new parts in making repairs of metal parts of mechanical equipment operated in an establishment. Work involves most of the following: interpreting written instructions and specifications; planning and laying out of work; using a variety of machinist’s handtools and precision measuring instruments; setting up and operating standard machine tools; shaping of metal parts to close tolerances; making standard shop computations relating to dimensions of work, tooling, feeds, and speeds of machining; knowledge of the working properties of the common metals; selecting standard materials, parts, and equipment required for this work; and fitting and assembling parts into mechanical equipment. In general, the machinist’s work normally requires a rounded training in machine-shop practice usually acquired through a formal apprenticeship or equivalent training and experience.

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3 The terms “in scope” or “within scope” are used throughout this chapter to refer to the coverage of the particular survey being described.
Planning. Consultations are held with appropriate management, labor, and Government representatives to obtain views and recommendations related to scope, timing, selection, and definitions of survey items, and types of tabulations. Particularly in planning surveys in specific industries, these discussions importantly supplement comments and suggestions received from the regional offices at the conclusion of the previous study. Reflecting its use in evaluation of Federal white-collar pay, the design of the National Survey of Professional, Administrative, Technical, and Clerical Pay was developed in conjunction with the Office of Management and Budget and the Civil Service Commission. Changes in the survey scope, item coverage, and job definitions are initiated by these agencies.

The industrial scope of each survey is identified in terms of the classification system provided in the Standard Industrial Classification Manual. The scope may range from part of a 4-digit code for an industry study to a uniform combination of broad industry divisions and specific industries for the area wage surveys or the salary survey of professional, administrative, technical, and clerical jobs. The needs of major users are a prime consideration in designing the multipurpose occupational studies.

The minimum size of establishment included in a survey is set at a point where the possible contribution of the excluded establishments is regarded as negligible for most of the occupations surveyed. Another practical reason for the adoption of size limitations is the difficulty encountered in classifying workers in small establishments where they do not perform the specialized duties indicated in the job definitions.

In general, workers are included in a classification if the duties as described are performed a major part of the time and the remainder is spent on related duties requiring similar or lesser skill and responsibility. However, in some jobs, particularly office and skilled production-worker categories, workers may regularly perform a combination of duties involving more than one occupation. Unless indicated otherwise in the description, in these situations consideration for classification purposes is given to those elements of the job which are most important in determining its level for pay purposes. Thus, a worker meets the basic concept of the stenographer classification if taking of dictation is a regular requirement of the job even though a majority of time is spent on routine typing.

Considerations in timing of industry surveys include date of expiration of major labor-management agreements, deferred wage adjustments, seasonality of production (e.g., garments), and interests of users. Whenever possible, area wage surveys are timed to follow major wage settlements as well as to meet the needs of government agencies engaged in wage administration as required by law.

The types of occupations studied and criteria used in their selection were identified in the description of the various types of surveys. The job list for each survey is selected to represent a reasonably complete range of rates in the wage structure for the employment categories involved, i.e., production and related workers in a specific manufacturing industry or nonsupervisory office, maintenance, material handling, and custodial workers in a metropolitan area. The established hierarchy of job rates to be found within establishments and industries permits the use of pay data for such key or benchmark jobs for interpolating rates for other jobs. Technological developments or user interests may dictate changes in the job lists and definitions. New definitions for jobs usually are pretested in a variety of establishments prior to their use in a full-scale survey.

Questionnaires. Two basic schedules are used in obtaining data in all surveys. The first (BLS 2751A) includes items relating to products or services, employment, shift operations and differentials, work schedule, overtime premiums, paid holidays and vacations, insurance and retirement plans, union contract coverage, and other items applicable to the establishment. The second (BLS 2753G) is used in recording occupation, sex, method of wage payment, hours (where needed), and pay rate or earnings for each worker studied. Supplementary forms are used to meet particular needs.

Collection. Bureau field economists collect data by personal visit to each of the sample establishments. Job functions and factors in the establishment are carefully compared with those included in the Bureau job definitions. The job matching may involve review of records such as pay structure plans and organizational charts, company position descriptions, interviews with appropriate officials, and, on occasion, observation of jobs within plants. A satisfactory completion of job matching permits acceptance of company-prepared reports where this procedure is preferred by the respondent. Generally, however, the field economist secures wage or salary rates (or hours and earnings, when needed) from payroll or other records and data on the selected employer practices and supplementary benefits from company officials, company booklets, and labor-management agreements.

Area wage surveys in all areas involve personal visits every third year with partial collection by mail or telephone in the intervening years. Establishments par-
### WAGE SURVEY

#### GENERAL ESTABLISHMENT INFORMATION

**1. ESTABLISHMENT IDENTIFICATION**

<table>
<thead>
<tr>
<th>A. Survey</th>
<th>Payroll Period</th>
<th>B. Central Office</th>
<th>Payroll Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19__</td>
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<td>19__</td>
</tr>
</tbody>
</table>

- **Establishment Name**
- **Street Address**
- **City**
- **County, State and Zip Code**
- **Area Code - Telephone**
- **Name and Title of Authorizing Official**
- **Name and Title of Official Supplying Data**

**Address of Office from which Data was Obtained, if Different from Above**

**B. Central Office** (Complete if clearance and/or data obtained from this source)

- **Name of Company**
- **Street Address**
- **City, State and Zip Code**
- **Telephone**
- **Name of Authorizing Official**
- **Title**

#### 2. CURRENT PRODUCTS OR SERVICES AND PROCESSES

<table>
<thead>
<tr>
<th>A. Product or Service</th>
<th>Approximate % Annual Value</th>
<th>B. Scope of Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>19__</td>
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<td></td>
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<tr>
<td>19__</td>
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</tbody>
</table>

#### 3. OFFICE USE ONLY

<table>
<thead>
<tr>
<th>Year</th>
<th>Schedule No.</th>
<th>Ident.</th>
<th>Area</th>
<th>Region</th>
<th>State</th>
<th>City Size</th>
<th>SIC Code</th>
<th>Est. Size</th>
<th>Union</th>
<th>Weight</th>
<th>Special Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>19__</td>
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</table>
### 5. UNION CONTRACT COVERAGE

A. Are a majority of your production workers covered by union agreements? ________________

B. Are a majority of your office workers covered by union agreements? ________________

C. With what unions does this establishment have contracts? (Give name and affiliation below.)

- **Production Workers:**
  - ____________________________________________________________________________
  - ____________________________________________________________________________

- **Office Workers:**
  - ____________________________________________________________________________
  - ____________________________________________________________________________

D. What occupational groups are covered by the contract? (List groups below opposite the appropriate union.)

### 6. ESTABLISHMENT EMPLOYMENT (APPROXIMATE)

A. What is the approximate total employment* in this establishment? ________________

B. How many are nonsupervisory production (plant) workers? ________________

- **Men:**
  - ____________________________________________________________________________
  - ____________________________________________________________________________

- **Women:**
  - ____________________________________________________________________________
  - ____________________________________________________________________________

C. Nonsupervisory office workers? ________________

- **Men:**
  - ____________________________________________________________________________
  - ____________________________________________________________________________

- **Women:**
  - ____________________________________________________________________________
  - ____________________________________________________________________________

D. Other employees (executive, professional, supervisory, etc.)? ________________

E. ____________________________________________________________________________

F. ____________________________________________________________________________

*Includes salaried officers of corporations but does not include proprietors, members of unincorporated firms, pensioners, members of the armed forces carried on the payroll, or unpaid family workers.

G. Remarks

- ____________________________________________________________________________
  - ____________________________________________________________________________
  - ____________________________________________________________________________
  - ____________________________________________________________________________
<table>
<thead>
<tr>
<th>Schedule No.</th>
<th>Est. Name</th>
<th>OCCUPATION AND GRADE</th>
<th>Occupational code (1)</th>
<th>Sex (2)</th>
<th>Method of pay (3)</th>
<th>Number of workers (4)</th>
<th>Hours (5)</th>
<th>Salary, rate, or earnings (6)</th>
<th>Line No. (7)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
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participating in the mail collection receive a transcript of the job matching and wage data obtained previously, together with the job definitions. The up-dated returns are scrutinized and questionable entries are checked with the respondent. Personal visits are made to establishments not responding to the mail or telephone request and to those reporting unusual changes from year-earlier data.

The work of all field economists is checked for quality of reporting, with particular attention directed to accuracy in job matching. The revisits are made by supervisory and senior economists. Systematic technical audits of the validity of survey definitions, made by staff with specialized training, also are maintained for the technically complex nationwide white-collar salary survey.

**Sampling**

Before the sample is selected, a suitable sampling “frame” must be located or developed. A sampling frame is a list of establishments which fall within the designated scope of the survey. The frame is as close to a universe as possible but is often incomplete. BLS uses frames primarily compiled from lists provided by regulatory governmental agencies (primarily State unemployment insurance agencies). Because these lists are sometimes incomplete, they are supplemented by data from trade directories, trade associations, labor unions, and other sources.

The survey design employs a high degree of stratification. Each geographic-industry unit for which a separate analysis is to be presented is sampled independently. Within these broad groupings, a finer stratification by product (or other pertinent attributes) and size of establishment is made. Stratification may be carried still further in certain industries: Textile mills, for instance, are classified on the basis of integration, i.e., whether they spin only, weave only, or do both. Such stratification is highly important if the occupational structure of the various industry segments differs widely.

The sample for each industry-area group is a probability sample, each establishment having a predetermined chance of selection. However, in order to secure maximum accuracy at a fixed level of cost (or a fixed level of accuracy at minimum cost), the sampling fraction used in the various strata ranges downward from all large establishments through progressively declining proportions of the establishments in each smaller size group. This procedure follows the principles of optimum allocation where the standard deviation of the characteristic being estimated is proportional to the average employment in the stratum. Thus, each sampled stratum will be represented in the sample by a number of establishments roughly proportionate to its share of the total employment. Though this procedure may appear at first to yield a sample biased by the over-representation of large firms, the method of estimation employed yields unbiased estimates by the assignment of proper weights to the sampled establishments.

In the event a sample establishment within scope is uncooperative in supplying usable data, a substitute is assigned in the same industry-location-size class. (Since no close relation exists between failure to participate in these surveys and the items being studied, little bias is introduced by this procedure.)

The size of the sample in a particular survey depends on the size of the universe, the diversity of occupations, and their distribution, the relative dispersion of earnings among establishments, the distribution of the establishments by size, and the degree of accuracy required. Estimates of variance based on data from previous surveys are used in determining the size of the sample needed.

As indicated earlier, area wage surveys are limited to selected metropolitan areas. These areas, however, form a sample of all such areas, and, when properly combined (weighted), yield estimates of the national and regional levels. The sample of areas is based on the selection of one area from a stratum of similar areas. The criteria of stratification are region, type of industrial activity as measured by percent of manufacturing employment, and major industries. Each area is selected with its probability of selection proportionate to its nonagricultural employment. The largest metropolitan areas are self-representing, i.e., each one forms a stratum by itself and is certain of inclusion in the area sample. The present area sample contained about 70 percent of all nonagricultural employment of the metropolitan area complex of the entire country in 1973.

**Estimating Procedures**

Estimated average earnings (hourly, weekly, monthly, or annual) for an industry or an occupation are computed as the arithmetic mean of the individual employee’s earnings. They are not estimated by dividing total payrolls by the total time worked, since such information almost never is available on an occupational basis.

All estimates are derived from the sample data. The averages for occupations, as well as for industries, are weighted averages of individual earnings and not computed on an establishment basis. The proportion of employees affected by any fringe provision likewise is estimated from the sample; all plant and office workers in each establishment are considered to be covered by the predominant benefit policy in effect, and the entire plant and office employment of the establishment is separately classified accordingly.
As mentioned previously, the use of a variable sampling ratio in different strata of the population would result in biased estimates if straight addition of the data for the various establishments were made. Therefore, each establishment is assigned a weight that is the inverse of the sampling rate for the stratum from which it was selected—e.g., if a third of the establishments in one stratum are selected, each of the sampled establishments is given a weight of 3.

To illustrate the use of weights, suppose the universe were 7 establishments, from which a sample of 3 was selected. Assume that establishment A was drawn from a cell, or stratum, in which one of the two establishments was used in the sample. It therefore is given a weight of 2. Establishment B, on the other hand, was taken with certainty (or a probability of 1) and is thus given a weight of 1. Establishment C was taken from the remaining group where one of the four establishments was used in the sample, and hence is given a weight of 4. The following calculations are made in estimating average earnings for a given occupation.

<table>
<thead>
<tr>
<th>Establishment</th>
<th>Weight</th>
<th>Total Number of Workers</th>
<th>Average Hourly Earnings</th>
<th>Estimated Total Workers in Stratum</th>
<th>Estimated Total Earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>40</td>
<td>$2.60</td>
<td>2 x 40 x 2 x $2.60</td>
<td>$104.00</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>30</td>
<td>2.70</td>
<td>1 x 30 x 1 x 2.70</td>
<td>$81.00</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>10</td>
<td>2.65</td>
<td>4 x 10 x 4 x 2.65</td>
<td>$216.00</td>
</tr>
<tr>
<td>Estimated Universe</td>
<td>4</td>
<td>170</td>
<td></td>
<td>170 x 4 x 170 x 2.65</td>
<td>$744.00</td>
</tr>
</tbody>
</table>

The estimated average hourly earning is thus $\frac{454.00}{170}$ or $2.67.

A similar method applies to any characteristic estimated from the sample. To estimate the proportion of employees in establishments granting paid vacations of 2 weeks after 2 years of service, for instance, the establishments are classified according to the length of vacation granted after 2 years' service, establishment weights are applied to employment, as in the previous example, and the proportion of the estimated employment in the 2-week category of the estimated total employment then is computed. Using the same three establishments as in the previous example, this can be illustrated as follows:

<table>
<thead>
<tr>
<th>Establishment</th>
<th>Weight</th>
<th>Total Employment</th>
<th>Weighted Employment</th>
<th>Vacation Provisions After 2 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>100</td>
<td>200</td>
<td>1 week.</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>500</td>
<td>500</td>
<td>2 weeks.</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>75</td>
<td>300</td>
<td>1 week.</td>
</tr>
<tr>
<td>Estimated Universe</td>
<td>4</td>
<td>1,000</td>
<td></td>
<td></td>
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</table>

Thus, the estimated percentage of workers in establishments granting 2 weeks' vacation after 2 years of service is $\frac{500}{1,000}$ or 50 percent.

When a large establishment within survey scope, for which no substitute exists, is unable to supply data, the deficiency is alleviated by increasing the weight of the most nearly similar units. Should any segment be affected by a substantial amount of such noncooperation, the publication of materials will be diminished by omitting separate presentation of sectors seriously affected.

Where a sample of selected metropolitan areas is used to represent the totality of such areas, a second stage of weighting is used to expand the individual area totals to region and/or national estimates. Since, as indicated in the description of the sampling method, each area represents a stratum of similar areas, the total from each area is weighted to the estimated stratum totals by multiplying by the inverse of the chance of selection. This procedure provides the ratio of nonagricultural employment in the stratum to that in the sample area (one in the case of the large self-representing areas). Summing all such estimated stratum totals yields the earnings and employment totals for the region and the country as a whole.

**Analysis and Presentation**

Where an industry survey is designed to yield estimates for selected States or areas, these are published separately as information becomes available from all sample firms in the State or area unit. Industry surveys limited to selected areas do not provide a basis for the examinations of pay levels by size of community, size of establishment, product, or labor-management agreement coverage that generally are included in bulletin reports on nationwide surveys. Regardless of geographic scope, industry survey reports record the incidence of incentive pay plans and, to the extent possible, average pay levels separately for time and incentive workers.

Individual bulletin reports on individual area wage surveys are supplemented by two summary bulletins. The first compiles the results of individual area surveys made during a year. The second contains information on occupational earnings, employer practices, and supplementary wage benefits for all metropolitan areas combined and by industry division within the four broad census regions.

Percent increases, adjusted for changes in employment, are computed for broad occupational groups, e.g., office clerical, electronic data processing, skilled maintenance, and unskilled plant. These increases are computed annually, separately for all industries, manufacturing, and nonmanufacturing, for each metropolitan area studied, for all metropolitan areas combined, and for four broad census regions. Area pay relatives for the four occupational categories are published annually, permitting ready comparisons of average pay levels among areas. Estimates of labor-management
agreement coverage are also presented annually. Occupational pay relationships within individual establishments are summarized periodically.

Bulletins on the National Survey of Professional, Administrative, Technical, and Clerical Pay present occupational averages and distributions on an all-industry basis, nationwide and separately for all metropolitan areas combined, and for establishments employing 2,500 workers or more. Average pay levels for industry divisions are shown as percentages of the all-industry averages. Year-to-year percent changes for occupation-work levels and trend estimates for occupations are reported.

Industry wage, area wage, and municipal government wage survey reports are issued throughout the year as the surveys are completed. The bulletin on the National Survey of Professional, Administrative, Technical, and Clerical Pay is available in December.

Summaries of the data in the bulletins and special analyses appear also in the *Monthly Labor Review*.

**Uses and Limitations**

Occupational wage data developed in these surveys have a variety of uses. They are used by Federal, State, and local agencies in wage and salary administration and in the formulation of public policy on wages, as in minimum wage legislation. They are of value to Federal and State mediation and conciliation services and to State unemployment compensation agencies in judging the suitability of job offers. Knowledge of levels and trends of pay rates by occupation, industry, locality, and region is required in the analysis of current economic developments and in studies relating to wage dispersion and differentials.

Bureau data are used in connection with private wage or salary determinations by employers or through the collective bargaining process. To the extent that wages are a factor, survey data also are considered by employers in the selection of location for new facilities and in cost estimating related to contract work.

Occupational wage survey programs are not designed to supply mechanical answers to questions of pay policy. As suggested earlier, limitations are imposed in the selection and definition of industries, of geographic units for which estimates are developed, of occupations and associated items studied, and in determination of periodicity and timing of particular surveys. Depending upon his needs, the user may find it necessary to interpolate for occupations or areas missing from the survey on the basis of knowledge of pay relationships.

Because of interestablishment variation in the proportion of workers in the jobs studied and in the general level of pay, the survey averages do not necessarily reflect either the absolute or relative relationships found in the majority of establishments. To illustrate, employment in the specialized maintenance crafts tends to be concentrated in the larger establishments, whereas employment is custodial and material movement jobs is distributed more widely within an industry or area. Thus, to the extent that pay rates in the larger establishments vary from the average level, the skill differential measure based on the survey averages will differ to some degree from that obtainable within each of the larger establishments.

The incidence of incentive methods of payment may vary greatly among the occupations and establishments studied. Since hourly averages for incentive workers generally exceed those for hourly-rated workers in the same job, averages for some incentive-paid jobs may equal or exceed averages for jobs positioned higher on a job evaluation basis but normally paid on a time basis. Wherever possible, data are shown separately for time workers and incentive workers in the industry surveys. Incentive plans (generally plant-wide in application) apply to only a very small proportion of the workers in the indirect plant jobs studied in the area wage program.

Although year-to-year changes in averages for a job or job group primarily reflect general wage and salary changes or merit increases received by individuals, these averages also may be affected by changes in the labor force resulting from labor turnover, labor force expansions and reductions for other reasons, as well as changes in the proportion of workers employed in establishments with different pay levels. A labor force expansion might increase the proportion of lower paid workers and thereby lower the average, or the closing of a relatively high-paying establishment could cause average earnings in the area to drop.

This problem has been overcome for area wage surveys by holding establishment employments constant while computing percent increases in earnings. That is, the previous and current year earnings of each establishment are weighted by that establishment's previous year's employment. An establishment which does not have workers or has not been sampled in the previous year is not included in the calculation.

**Reliability of surveys.** Results of the surveys generally will be subject to sampling error. This error will not be uniform, since, for most occupations, the dispersion of earnings among establishments and frequency of occurrence of the occupation differ. In general, the sample is designed so that the chances are 9 out of 10 that the published average does not differ by more than 5 percent from the average that would be obtained by enumeration of all establishments in the universe.

The sampling error of the percentage of workers receiving any given supplementary benefit differs with the size of the percentage. However, the error is such that rankings of predominant practices almost always will appear in their true position. Small percentages may be subject to considerable error, but will always remain in the same scale of magnitude. For instance,
the proportion of employees in establishments providing more than 5 weeks' paid vacation to long-service employees may be given as 2 percent, when the true percentage for all establishments might be only 1 percent. Such a sampling error, while considerable, does not affect the essential inference that the practice is a rare one.

Estimates of the number of workers in a given occupation are subject to considerable sampling error, due to the wide variation among establishments in the proportion of workers found in individual occupations. (It is not unusual to find these estimates subject to sampling error of as much as 20 percent.) Hence, the estimated number of workers can be interpreted only as a rough measure of the relative importance of various occupations. The greatest degree of accuracy in these employment counts is for those occupations found principally in large establishments. This sampling error, however, does not materially affect the accuracy of the average earnings shown for the occupations. The estimate of average earnings is technically known as a "ratio estimate," i.e., it is the ratio of total earnings (not payrolls) to total employment in the occupation. Since these two variables are highly correlated (i.e., the errors tend to be in the same direction), the sampling error of the estimate (average hourly earnings) is considerably smaller than the sampling error of either total earnings or total employment.

Since completely current and accurate information regarding establishment products and the creation of new establishments is not available, the universe from which the sample is drawn may be incomplete. Sample firms incorrectly classified are accounted for in the actual field work, and the universe estimates are revised accordingly. Those firms which should have been included but were classified erroneously in other industries cannot be accounted for.

Since some measure of subjective judgment enters into the classification of occupations and other characteristics, there is some reporting variability in the results. A repetition of the survey in any establishment with different interviewers and respondents would undoubtedly produce slightly different results. However, when spread over a large number of establishments the differences, being random, would tend to balance out. Hence, analyses based on a small number of respondents must be used with care, even when all eligible establishments are included. No evidence of any consistent error has been uncovered.

Technical References

An outline of the occupational wage survey programs, as expanded in fiscal 1960. Lists the type of survey and cycle for each of 70 industries studied separately, and identifies the area sample as originally determined for the labor market survey program.


A discussion of differences in computing Area Wage Survey pay increases by the matched and unmatched sample techniques.


A description of the Area Wage Survey program and changes in the program's area sample.
Chapter 19. Union Wage Rates

Background and Description of Survey

Annual studies of union wage rates and hours are conducted in four industries: building construction, local transit, local trucking, and printing. A biennial study of union wage rates for grocery store employees is also included in the program. Union wage rates and hours are those agreed on through collective bargaining between employers and trade unions; they are defined as (1) the basic (minimum) wage rates (excluding holiday, vacation, or other benefit payments regularly made or credited to the worker each pay period) and (2) the maximum number of hours per week at straight-time rates. Rates in excess of the negotiated minimum, which may be paid for special qualifications or other reasons, are excluded.

The use of union agreements or other union records in studies of occupational wages is practicable in industries that are characterized by a high degree of organization and in which (1) defined craft groupings persist, as in building construction or printing, or (2) key occupations can be clearly delineated, as in local transit.

The Bureau's annual union wage studies began in 1907. Since that time, the number of cities studied has varied greatly. Beginning with the 1976 survey the sample was selected on a probability basis, consisting of 66 cities with 100,000 inhabitants or more, according to the 1970 Census. The scope of the information for individual industries has also been changed. For example, in 1971, a biennial study of wage rates and hours in the local-transit industry was conducted in 121 cities. Over-the-road drivers and local city drivers paid on a mileage or commission basis are excluded. All data, including indexes, are presented for the two major classifications of drivers and riding helpers.

The study of union wage rates and hours in the local-transit industry is limited to operating employees. Data are shown separately for operators of surface cars and buses, and elevated and subway lines, except that indexes are shown only for the industry as a whole.

Information is collected by mail from local unions and central labor unions, district councils, and other authoritative bodies to identify new local unions that should be included in the studies.

The study of union wage rates and hours in the building trades includes virtually all journeymen and helper classifications. Indexes and other data are shown for each important trade as well as for all trades combined. Beginning in July of 1972, the study was expanded to workers in five of the trades commonly found on highway, street, and other heavy construction projects—carpenters, cement finishers, operating engineers, structural-iron workers, and laborers. Wage data and other contract provisions are published by city for each of the five trades, although this information is not currently included in the calculation of any indexes or averages developed.

The union wage studies are designed to include all local unions in the covered industries in the selected cities. Periodic checks are made with central labor unions, district councils, and other authoritative bodies to identify new local unions that should be included in the studies.

Information is collected by mail from local unions and when necessary from international unions and regional union organizations. Personal visits are made to unions that do not respond to the mail questionnaire. Before 1947, all data relative to union wage studies were collected directly from local union officials (generally the secretaries or business agents) by Bureau representatives and entered on forms designed specifically for this purpose.

Data Sources and Collection Methods

The union wage studies are designed to include all local unions in the covered industries in the selected cities. Periodic checks are made with central labor unions, district councils, and other authoritative bodies to identify new local unions that should be included in the studies.

Information is collected by mail from local unions and when necessary from international unions and regional union organizations. Personal visits are made to unions that do not respond to the mail questionnaire. Before 1947, all data relative to union wage studies were collected directly from local union officials (generally the secretaries or business agents) by Bureau representatives and entered on forms designed specifically for this purpose.
Information requested relates to the first workday in July for all industries. This date was adopted, after numerous changes, because most new agreements in these industries have been negotiated by that time each year. In order to maintain year-to-year comparability, wage rate, hours, and membership data for the previous year are transcribed onto the forms before they are sent out. Union officials are requested to check the previous year’s data and revise any figures which may have been incorrectly reported, and to insert current data. Copies of union agreements also are requested from union officials for the purpose of (1) checking the data entered on the schedules with the terms of the agreements, and (2) building up the files of union agreements maintained by the Bureau of Labor Statistics. The reporting form used for the building trades survey is reproduced on pages 149–52.

Sampling and Estimating Procedures

The current series is designed to reflect union wage rates and hours in all cities of 100,000 inhabitants or more. All cities of 500,000 inhabitants or more are included, as are most cities in the 250,000 to 500,000 group. The cities in the 100,000 to 250,000 group selected for study are distributed widely throughout the United States. Data for some of the cities included in the study are weighted to compensate for cities not surveyed. To provide appropriate representation in the combination of data, each region is considered separately when city weights are assigned.

Rates

An overall average hourly rate is computed for each of the industries included in the union wage studies. In addition, averages are presented by occupation for grocery store employees; by industry branch, trade, city, and region in building construction and printing; and by occupation, city, and region, in local transit and local trucking.

Average union rates are calculated by weighting each quotation for the current year by the reported membership. These averages are levels designed to provide comparisons among trades and cities at a given time. They do not measure the trend of union rates, the function served by the index series.

Indexes

Chain indexes are calculated for all of the industries except grocery stores, to portray the trend of union wage rates and weekly hours. In calculating these indexes, the percent change in aggregates is computed from quotations for all identical classifications in the industry for 2 successive years. To obtain the aggregates, the rates and hours for both the previous and current years are weighted by the membership in the particular classification for the current year. The index for the current year is computed by multiplying the index for the preceding year by the ratio of the aggregate change. For example, in the 1974 study of building trades, the rate aggregate for all quotations increased 7.8 percent over the previous year. The July 1, 1974, index of union hourly wage rates for all building trades (173.4) is the result of multiplying the July 1, 1973, index (160.8) by the ratio of the aggregates (1.078). This method of index calculation minimizes the influence of year-to-year changes in membership.

Indexes of union hourly wage rates and weekly hours are computed for each classification as well as for all classifications combined in the building construction, local trucking, and printing industries. In the local transit industry an index is provided only for all classifications combined. Irregular hours of work for operating employees in many of the covered cities prevent the computation of an index for union weekly hours in the local transit industry. An index series for all grocery store workers will be developed upon the accumulation of sufficient trend data.

The base period for the indexes of union wage rates and weekly hours is the 1967 average. The series for the building trades and printing industry date back to 1907, for local transit to 1929, and for local trucking to 1936. Although data for the latter two industries were collected for years before the dates of the index series, indexes were not constructed because of inadequacies in the available data.

Analysis and Presentation

The averages and indexes mentioned together with other summary data are contained in the bulletins published annually for the building trades, printing, local transit, and local trucking studies. Included among the information shown for individual trade classifications is the proportion of union members having hourly rates at different levels, as well as the proportion of union members having, since the previous study, wage rate increases of specified amounts in terms of cents per hour and percent. The increase registered by the trade is shown also. The biennial grocery store bulletin presents average wage rates and increases since the previous survey for all cities of 100,000 inhabitants or more; a distribution of union members by hourly occupational wage rate; and intercity comparisons of wage rates by occupation.

In addition, the union rates of wages and hours in effect on the date of the survey, as reported by union...
Use and Limitations

The Bureau's union wage series provide a means of determining intercity wage differences for comparable work, and the relationships between rates applicable to workers in occupations requiring varying degrees of skill. The data are used in wage negotiations by both management and labor. The wage rates of building trades workers are especially important in estimating construction costs, because labor expenditures constitute an important element in the total cost of building construction. The index series derived from these studies provide barometers of year-to-year changes in rates of wages and hours in the industries covered.

Average union rates provide comparisons of wage rates among industries, trades, and cities at a given time. Unlike the indexes, they are not an accurate measurement of year-to-year changes because of fluctuations in membership and other factors. Membership figures for the various trades or classifications do not remain constant and changes may have a marked effect on average rates. For example, if organizational drives in cities having relatively lower rates of wages result in sharp increases in membership, the movement of the rate levels for the affected trades as a whole is naturally retarded. Conversely, increases in membership in cities having high wage rates accelerate the upward movement of averages.6

The union rates are not necessarily the actual rates paid to all workers, and the union hours are not necessarily the hours actually worked. Workers with above average experience and skill may be employed at rates above the union wage rates, especially during prosperous times when a tight job market creates competitive bidding for the better workers. During periods of depressed business activity, actual hours worked often are less than hours specified in the union agreement.

6Membership (used for weighting purposes) relates only to active members in the city and contiguous suburban areas. It does not reflect the total jurisdiction of local unions, which may extend beyond these limits, and it does not necessarily reflect metropolitan area rates.
Dear Union Official:

The Bureau of Labor Statistics is now conducting its annual survey of union wage rates and hours in the building trades. The continued success of these surveys, begun in 1907, depends largely upon your cooperation. Please complete the attached questionnaire and return it along with a copy of your current agreement in the enclosed, postage-paid envelope. Please return the questionnaire within two weeks, if possible.

Thank you very much for your cooperation.

Very truly yours,

Regional Commissioner for the Bureau of Labor Statistics

PART A. CONTRACT INFORMATION

I. Agreement Dates

(Enter date as follows: July 2, 1976, should read 07 02 76.)

A. On what date did your agreement go into effect? ..............................................

B. On what date was the agreement ratified or approved by the union membership? ..............................................

C. On what date does the current contract expire? ..............................................

D. Does the agreement have a reopening clause? .............................................. Yes ☐ No ☐
FOR THE FOLLOWING QUESTIONS, REPORT INFORMATION WHICH IS IN EFFECT ON THE FIRST WORKDAY IN JULY OF THIS YEAR. (Do not include retroactive increases, occurring when contracts approved after July 1 provide increases effective back through the first workday in July or before.)

II. Benefits

REPORTING INSTRUCTIONS

The Benefits information you reported last year is shown on the upper portion of the enclosed Part B form. Please correct last year’s information, where necessary, by lining out any incorrect data and writing the correction directly above it in the same box. (NOTE: If the rates shown do not agree with what you reported last year, we may have adjusted the data you reported to eliminate retroactive increases. In that case, do not correct the rates.)

For each benefit listed below, complete columns B through E as follows:

Column B — Check yes or no, to indicate whether your contract provides for an employer contribution for this benefit.

If no, skip to the next benefit.

If yes, complete the line as follows:

Column C — Enter the percent and/or dollar amount contributed. Include cost-of-living adjustments if they are made as payments to a specified fringe benefit. (For Insurance, report contributions for unmarried employees.)

(a) Percent — Enter contribution to the nearest hundredth of a percent (for 10%, enter 10.25; for 9%, enter 9.00).

(b) Dollars/Cents — Enter amount contributed to the nearest tenth of a cent (for one dollar, enter $1.00; for 72% cents, enter $.725).

(c) If the agreement does not specify the amount of contribution, leave columns (a) and (b) blank, and enter a check in column (c).

Column D — If you report an hourly contribution, leave this space blank. If you report other than hourly, enter one of the following codes to indicate the unit of time covered by this contribution:

D = Per shift (daily); W = Weekly; M = Monthly; A = Annually; B = Biweekly; S = Semi-monthly

Column E — Check one box.

### Table of Benefits

<table>
<thead>
<tr>
<th>Code</th>
<th>Name of benefit</th>
<th>Col. B Is this benefit provided?</th>
<th>Col. C How much does the employer contribute for each employee?</th>
<th>Col. D Method of pay</th>
<th>Col. E How is this contribution made?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Percent</td>
<td>Dollars/cents</td>
</tr>
<tr>
<td>01</td>
<td>Insurance*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>Pension</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>Vacation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>Holidays</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>05</td>
<td>Supplementary Unemployment Benefits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>06</td>
<td>Savings Funds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>Education and Promotion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08</td>
<td>Journeyman Training</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>98</td>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Includes such items as life insurance, hospitalization, medical, surgical, dental, and other similar types of health and welfare programs.
### III. Cost-of-living Adjustments

Does your agreement provide cost-of-living adjustments?

1 [ ] Yes  2 [ ] No (If no, skip to part IV. Membership)

If yes,

**A. How often are the adjustments made?**

1 [ ] Annually  2 [ ] Semi-annually  3 [ ] Quarterly  4 [ ] Monthly  9 [ ] Other (specify) ____________

For the following questions, enter the amounts as follows: Enter dollar amounts to the nearest tenth of a cent (for 12½ cents, enter $.125; for one dollar, enter $1.000). Enter percents to the nearest hundredth of a percent (for 5½ percent, enter 5.25%; for 6 percent, enter 6.00%).

**B. What is the amount of the cost-of-living adjustments made to wages—**

1. since July 1 of last year? ........................................

<table>
<thead>
<tr>
<th></th>
<th>16-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>or</td>
</tr>
<tr>
<td>%</td>
<td></td>
</tr>
</tbody>
</table>

2. since the effective date of your agreement (reported on page 1 of this form)? Do not include any cost-of-living adjustments made prior to this agreement. ..........................................................

<table>
<thead>
<tr>
<th></th>
<th>24-27</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>or</td>
</tr>
<tr>
<td>%</td>
<td></td>
</tr>
</tbody>
</table>

**C. What is the amount of the cost-of-living adjustments made to health and insurance, pensions, paid vacations, and other benefits—**

1. since July 1 of last year? ........................................

<table>
<thead>
<tr>
<th></th>
<th>32-35</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>or</td>
</tr>
<tr>
<td>%</td>
<td></td>
</tr>
</tbody>
</table>

2. since the effective date of your agreement (reported on page 1 of this form)? Do not include any cost-of-living adjustments made prior to this agreement. ..........................................................

<table>
<thead>
<tr>
<th></th>
<th>40-43</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>or</td>
</tr>
<tr>
<td>%</td>
<td></td>
</tr>
</tbody>
</table>

### IV. Membership

**A. What is the total membership of your local?** ..........................................................

|   | 48-52 |

**B. What is the total active membership covered by this agreement? (Exclude retirees and members of the Armed Forces.)** ..........................................................

|   | 53-57 |

How many of these members are:

- **Journeymen** ..................................................

|   | 56-62 |

- **Apprentices** ..................................................

|   | 63-69 |

- ** Helpers** ..................................................

|   | 68-72 |

- **Laborers** ..................................................

|   | 73-77 |
Instructions for Completion of Part B

Report wage rate information which is in effect on the first workday in July of this year. (Do not include retroactive increases, occurring when contracts approved after July 1 provide increases effective back through the first workday in July or before.)

Correctors to Last Year’s Data. The information you reported last year is shown on the enclosed part B form. If you find any errors in last year’s wage rate information, please use the following procedure to correct the data:

1. Line out the error and write the correction directly above it in the same box.
2. Enter the letter C in the last space on the line, in the column labelled “Action Code.”

NOTE: If the rates shown do not agree with what you reported last year, we may have adjusted the data you reported to eliminate retroactive increases. In that case, do not correct the rates.

Reporting Current Year’s Data. Please enter the current year’s data on the line marked “current year” on part B, in the spaces directly below last year’s. For each occupation listed, report the information described below, under the identifying columns. (Do not report for any occupation other than those listed.)

If the current year’s data is the same as last year’s for any item (wage rate, hours, membership), enter a check mark (✓) in that space instead of repeating the data.

Wage Rate in Effect July 1 — Report the minimum or basic straight-time wage rate in effect the first workday in July of this year. Include cost-of-living adjustments. Enter the amount to the nearest tenth of a cent. (For $10.50, enter $10.50; for $9.75, enter $9.75.)

Number of Weekly Hours — Report the maximum number of hours which can be worked each week at straight-time rates. Enter the number of hours to two decimal places. (For 37.5 hours, enter 37.50.)

Number of Union Members — Enter the number of workers available to work at each rate. If a worker is eligible to work at more than one occupation, report that worker only once, in the primary occupation. Exclude apprentices.

Method of Pay — If you report an hourly rate, leave this space blank. If you report other than hourly, enter one of the following codes:

D = Per shift (daily)  W = Weekly  M = Monthly
A = Annually  B = Biweekly  S = Semi-monthly

Have you included cost-of-living adjustments in the wage rates reported?

1  □  Yes  2  □  No  3  □  No contract provision for cost-of-living adjustments

Please return the completed form with a copy of the union contract, if available, in the accompanying postage paid envelope. If you have only one copy of the contract available, we will be glad to make a duplicate and return the original promptly.

Official Supplying Information
Name
Title
Address: Street
City  State  ZIP code
Telephone No.: Office
Home

Please return the completed form with a copy of the union contract, if available, in the accompanying postage paid envelope. If you have only one copy of the contract available, we will be glad to make a duplicate and return the original promptly.
### UNION WAGE RATES AND HOURS

**Employer Contributions for Selected Benefits:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Method of Pay</th>
<th>Method of Pay</th>
<th>Method of Pay</th>
<th>Method of Pay</th>
<th>Method of Pay</th>
<th>Method of Pay</th>
</tr>
</thead>
<tbody>
<tr>
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<td>(12-13)</td>
<td>(14-17)</td>
<td>(18-23)</td>
<td>(20)</td>
<td>(25-28)</td>
<td>(29-34)</td>
</tr>
<tr>
<td></td>
<td>(35)</td>
<td>(36-39)</td>
<td>(40-45)</td>
<td>(46)</td>
<td>(47-50)</td>
<td>(51-56)</td>
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<tr>
<td></td>
<td>(57)</td>
<td>(58-61)</td>
<td>(62-67)</td>
<td>(68)</td>
<td>(69-72)</td>
<td>(73-77)</td>
</tr>
</tbody>
</table>

**Trade or Occupation**

<table>
<thead>
<tr>
<th>J.T. Code (12-16)</th>
<th>Year (17-18)</th>
<th>Wage Rate in Effect July 1 (or first workday in July)</th>
<th>Number of Weekly Hours Before Overtime Pay</th>
<th>Number of Union Members at Each Reported Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(19-23)</td>
<td>(24-27)</td>
<td>(28-32)</td>
<td></td>
</tr>
</tbody>
</table>

**Office Use Only**

BLS 1150 (December 1975)
Chapter 20. Current Wage Developments

Background

Since January 1948, the Bureau of Labor Statistics has issued a monthly report, Current Wage Developments, which lists general wage changes and changes in supplementary benefits agreed to in selected collective bargaining situations, identifying the situations by company and union name. The scope of the listing has varied somewhat from time to time, but since 1953, it has been limited to agreements affecting approximately 1,000 production or nonsupervisory workers or more in manufacturing and selected nonmanufacturing industries. Beginning in 1968, limited government coverage has been included in the monthly listings. This coverage has generally been restricted to Federal and State Governments, and the public sector in the 10 largest metropolitan areas.

Current Wage Developments was initiated because of the rapid increase in wage rates and prices in the early post World War II period, the interest in determining the extent to which settlement patterns spread from industry to industry, and the discontinuance of an index of wage rates that had been initiated during World War II. Interest in the listing was stimulated by the Korean emergency when the Wage Stabilization Board needed data on the extent to which wages and benefits were being changed.

In 1949, and again in 1951 and 1952, statistical summaries of wage changes were prepared to supplement the listing, but regular preparation of a statistical summary began in 1954. These quarterly statistical summaries show the distribution of settlements and (since 1955) of workers by the size of the general wage changes agreed to.

Beginning in 1959, another statistical summary was instituted. It is limited to manufacturing, but includes information on general wage changes for nonunion and small union situations, as well as for large collective bargaining situations. From 1959 through 1970, this summary also included information on changes in supplementary benefits.

Description of Series

The summary of major collective bargaining situations hereafter is referred to as the “major” series, and the summary that is based on changes in wages in manufacturing firms of all kinds is described as the “manufacturing” series.

The major series describes general wage changes and changes in benefits in all collective bargaining settlements involving 1,000 production and related workers or more in manufacturing and 1,000 nonsupervisory workers or more in the nonmanufacturing sector, excluding Government and agriculture. Supervisory and professional employees are excluded.

Contracts covering multiplant firms are included if the agreement as a whole covers 1,000 workers or more even though each individual plant employs fewer workers. Also included are contracts with trade associations or with groups of firms that bargain jointly with a union or unions, even though the firms are not associated formally and each has fewer than the minimum number of workers covered by the series. Situations in which two or more unions, together representing more than 1,000 workers but individually representing fewer, negotiate essentially identical contracts with one firm or a group of firms, are tabulated as one bargaining unit.

The summary for manufacturing as a whole currently represents all establishments having four or more employees that adjust wages by means of general wage changes, regardless of whether the workers are represented by a union.

Wage change data are presented in cents per hour and, since 1959, as a percent of average straight-time hourly earnings, adjusted to exclude premium pay for overtime work.

Two general types of information are presented on wage changes: (1) Wage changes related to collective bargaining settlements occurring during a time period are tabulated. Both first-year changes (those scheduled during the first 12 months of the contract) and total wage changes over the life of the contract, expressed as an annual rate, are presented for these settlements; and (2) wage changes effective in a period, whether re-

1 The listing, as contrasted with these summaries, provides a much more detailed account of negotiated wage and benefit changes than can be presented in a tabular summary. When available, information on changes for large groups of nonunion workers, including professional, white-collar, and production employees, also is presented.

2 Only changes in benefits that represent changes in costs are included.

3 Prior to 1966, the construction, service trades, and finance industries also were excluded.

4 See Sampling and Estimating Procedures for revisions in coverage for samples drawn after 1975.

5 General wage changes are defined as changes affecting at least one-tenth of the workers at any one time or all workers in an occupation. Changes resulting from promotions, merit increases, etc., are excluded.
sulting from current settlements, prior year negotiations, or the operation of escalator clauses, also are measured.

In 1974, the Bureau introduced three new series related to these two types of wage measures. Wage changes in collective bargaining settlements now also are cross-classified by contract duration. This series measures first-year wage changes, increases deferred to subsequent years, and annual rates of changes by duration of contract.

Another recently introduced series compares first-year negotiated wage increases before and after cost-of-living escalator adjustments become effective. As they become known, by quarter, cost-of-living payments during the first year of the contract are added to first-year negotiated increases. Averages are presented for all settlements and for only those having escalator provisions.

A third series presents total effective wage changes, including the influence of current settlements, prior settlements, and escalator provisions, by quarter. Previously, these measures were available only on an annual basis. The quarterly effective wage-rate change series also is available for selected industry divisions.

In distributions of workers by size of wage change, all workers in an establishment or collective bargaining situation are distributed according to the average wage increase in the establishment or situation. The number of workers affected by changes in supplementary benefits includes all production and related workers in the situations where the benefit is changed, whether or not all are affected immediately. For example, if a fourth week of vacation is added for workers having 20 years’ service in an establishment employing 1,000 workers, a vacation change would be recorded for 1,000 workers, even though only a relatively small proportion would benefit from the change immediately.

Data Sources and Collection Methods

The statistical summary of the major series is compiled from the summaries of collective bargaining settlements listed in the monthly Current Wage Developments which, in turn, is derived primarily from secondary sources, including general circulation newspapers and periodicals, as well as union, management, and trade publications. Other important sources of information are the file of union contracts maintained by the BLS and the U. S. Department of Labor's files of pension and health and welfare agreements, maintained by the Division of Reports Processing. By the end of the year, the BLS contacts either management or labor representatives in any situation for which these other sources have not yielded information on wage and benefit changes during the year.

Information for nonunion and small unionized firms is gathered quarterly (semiannually in 1965 and 1966) by a questionnaire mailed to participating establishments. The information on general wage changes is supplemented by data on the major bargaining units obtained from the contract file (unionized establishments) and from newspaper clippings purchased from a commercial clipping service. At the end of the year, BLS employees contact, primarily by telephone, a sample of firms that have failed to respond to the mail questionnaire or that have provided incomplete or unclear information.

Sampling and Estimating Procedures

As indicated earlier, all bargaining situations having 1,000 workers or more in manufacturing and nonmanufacturing industries are included in the major series. It is believed that the current list of about 2,300 such situations, built up since Current Wage Developments was started in 1948, is very nearly complete. After a bargaining situation is added to the universe, it is withdrawn only if it ceases to be within the scope of the survey (e.g., a change to nonunion from union, or because of an apparently permanent drop in employment to substantially below 1,000).

The sample for manufacturing is derived from State unemployment insurance (UI) listings which show reporting units by location, number of employees, and industry classification. The sample is a highly stratified probability design with sampling ratios varying from 1 out of 200 establishments having up to 19 employees to all of those having 1,000 employees or more.

The ratios are uniform for all industries. Since data are available from secondary sources for all unionized situations having at least 1,000 production and related workers, data for all establishments meeting this criterion also are included in the summary for manufacturing. The sample selected from the UI listings is compared with this list of establishments for which information already is available; since data for these sample members are obtained from secondary sources, these establishments are not sent questionnaires. Approximately 6,000 establishments are left for the questionnaire survey.

Although the sampling design yields a sample in which large firms are relatively overrepresented, this
bias is overcome by the estimating procedure. Each establishment in the sample is assigned a weight which is the reciprocal of the sampling ratio in the stratum from which it was selected. An establishment selected from a stratum from which 1 out of 4 establishments is chosen is assigned a weight of 4, so that it represents itself and three other establishments. Information for each establishment is multiplied by the weight assigned to the establishment. Thus, all establishments, regardless of size, are represented appropriately in the final estimates.

An establishment in the subsample of nonrespondents is subsequently contacted and is weighted to represent all nonrespondents in the stratum. It is assigned a new weight—the product of the original weight and the inverse of the subsampling fraction. Thus, 1 out of 3 nonrespondent establishments subsampled from a group originally sampled at the rate of 1 out of 2 would be assigned a weight of 6. If an establishment included in the sample with certainty fails to respond, another similar establishment would be weighted to represent it.

To the estimates derived from the weighting of the sample questionnaire are added the data from secondary sources—the number of workers under major bargaining situations.

The totals thus obtained are further adjusted to reduce the hazards of sampling and to take account of opening or closing of establishments between compilation of the State unemployment insurance listing from which the sample is chosen and the date of the survey. Adjustments are made of employment levels for production workers in the 2-digit Standard Industrial Classification manufacturing industry groups, as reported in the monthly employment series of the Bureau of Labor Statistics for the period covered by the summary of wage changes. For example, if the estimate of production worker employment in an industry group derived from the sample is 100,000 but the Bureau’s estimate of employment in that industry group less the employment of the major situations was 110,000 workers, the weighted employment for each sample situation in that industry would be multiplied by 110,000 

The resulting industry group estimates would be combined to provide the estimates for all manufacturing.

The major series for manufacturing and nonmanufacturing combined is not adjusted in this fashion, since it is presumed to be all inclusive.

A new sample of nonunion and small unionized plants in manufacturing is generally selected every 3 years. After the initial contact, establishments that indicate that they have a policy of adjusting wages on an individual basis, rather than by means of general wage changes, are included in further surveys only to maintain the proper employment estimates.

**Presentation and Analysis**

Preliminary information on the “package cost” and general wage changes resulting from collective bargaining settlements involving the major situations is issued in press releases about 4 weeks after every quarter and the information is also summarized in *Current Wage Developments* (See “Measuring Collective Bargaining Settlements,” beginning on page 158 for a description of the package cost program). Measures reflecting the various influences on the overall size of wage settlements are presented. Wage changes are measured separately for settlements containing cost-of-living provisions and for those without such clauses. Wage-rate information is also presented separately for the manufacturing and nonmanufacturing sectors. Averages are also tabulated for all settlements excluding those in the construction industry, and for nonmanufacturing settlements excluding construction, as well as for construction settlements alone. The press releases also provide preliminary data on the total effective wage change, by component and for various industrial sectors, on a quarterly basis.

Final data on wage and benefit changes are not available until early in the following year, and are presented in *Current Wage Developments*, and to a limited extent, in the *Monthly Labor Review*. Yearend summaries also include information on the number of workers receiving changes in various supplemental practices, classified by benefit and by size of wage change.

Quarterly data and the full-year article for manufacturing are published in *Current Wage Developments*. The quarterly estimates which are based on preliminary data, stress wage changes resulting from settlements or management decisions made during the period, while the yearend article, which is based on final data, also analyzes trends in the size, frequency, and type of wage changes, and the prevalence and results of wage escalation policies. Because it is based on data for both large and small unionized and nonunionized establishments, the manufacturing analysis can make many other useful comparisons of its components.

**Uses and Limitations**

The data are used extensively by labor, management, and the Federal Mediation and Conciliation Service in collective bargaining; by private institutions and universities in studies of industries or groups of industries; and by local and Federal Government agencies interested in the current economic picture to determine trends in wage and benefit changes as well as for wage, income, and gross national product forecasts. The data relate to changes in wage rates and should not be interpreted as changes in employee earnings.

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10 See ch. 3.
WAGE DEVELOPMENTS IN MANUFACTURING, 1975

The Bureau of Labor Statistics will hold all information furnished by the respondent in strict confidence.

Keep this copy for your company file.

(Change if incorrect, include ZIP code.)

I. What was the major product (in terms of sales value) of this plant during 1974? ____________________________

II. Please provide employment and payroll information for the payroll period including January 12, 1975. See page 4 for explanation.

A. All employees

1. Number

B. All production and related workers

1. Number

2. Payroll $

3. Man-hours

III. Do collective bargaining agreements cover a majority of your production and related workers? .............. Yes □ No □

If "No," please skip to section VII. □

If "Yes," please answer all questions except VII.

IV. Union and Agreement Identification:

A. With what union or unions do you have a collective bargaining agreement? ____________________________

B. Are you a party to an agreement signed by an employer association with this union(s)? .............. Yes □ No □

If so, what is the association's name? ________________________________________________________________

V. Agreement Expiration Date:

When does your collective bargaining agreement(s) expire or become subject to reopening on wages?

(Space has been provided for two entries since the date may change during the year.)

VI. New or Revised Agreement:

Please mark appropriate boxes below to bring your report up to date for—

During the quarter—

Jan.—Mar. 1975 □ Yes □ No □

Apr.—June 1975 □ Yes □ No □

July—Sept. 1975 □ Yes □ No □

Oct.—Dec. 1975 □ Yes □ No □

A. Did you negotiate a new or revised collective bargaining contract(s) for your production and related workers? .............. □ Yes □ No □

B. If yes, did you agree on an immediate or deferred change in wages? .............. □ Yes □ No □

PLEASE TURN TO NEXT PAGE.
VII. Policy Regarding Wage Changes:

Whether or not you changed wages during the first quarter of 1975, what is your policy regarding general wage changes?

1. Wages are normally changed only on an individual basis.
2. General wage changes are sometimes made.

FOR UNION AND NONUNION FIRMS

VIII. Cost-of-Living Escalation:

Do you have a cost-of-living escalator policy whereby wages are changed _automatically_ with specified changes in a price index? Yes □ No □

If so, please list the months in which wage changes will go into effect if the price index warrants. (If you wish, you may include the formula used for determining the amount of the change, and we will compute the change to eliminate the necessity of mailing the questionnaire back to you.)

IX. Wage-Rate Changes for Production and Related Workers, 1975:

Please report any general wage-rate changes you have put into effect for your production and related workers in the previous quarter.

**Include:**

1. All changes affecting either (a) 10 percent or more of your production and related workers at any one time, or (b) all workers covered by a single collective bargaining agreement, even if the agreement applies to fewer than 10 percent of the workers.
2. Any change in your pay scales even though no workers received immediate pay increases as a result of this change.
3. Any cost-of-living escalator adjustments whether or not they are part of your permanent rate structure.
4. Increases decided on in earlier years but going into effect in 1975.
5. Increases decided on in 1975 but scheduled to go into effect in later years (list in Part C.)
6. Changes in hourly rates resulting from changes in hours without corresponding changes in weekly or daily pay.
7. Increases resulting from changes in the minimum wage law.

**Exclude:**

1. Increases to individuals resulting from promotions, automatic increases with length of service, or progression within an established rate range.
2. The cost of any changes in supplementary benefits.

A. Have you put into effect any such general wage changes during the quarter?

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>No</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

B. If your answer is "Yes", indicate below the form of the wage change(s) and list each change in subsection C:

1. Uniform cents per hour
2. Uniform percentage change
3. Higher cents per hour for skilled workers
4. Other (specify in section XI. "Remarks")
C. List any general wage-rate changes which have already been placed into effect during 1975 or which have already been decided upon and are scheduled to go into effect in the future. List effective date of increase, number of workers affected, class of workers affected, amount of change and type of change.

If all workers did not receive the same amount (either the same number of cents or the same percentage) list changes for each group on a separate line with the approximate number affected. For example, if there was a uniform across-the-board change plus added changes for some workers, list the uniform change first and show additional changes below. If a cost-of-living escalator adjustment went into effect at the same time as another increase, list it separately. Increases resulting from changes in minimum wage law should also be listed separately and identified.

In reporting information for incentive workers include, if possible, estimated effects of wage-rate changes on incentive workers' earnings.

For example, if base rates for incentive workers were raised 5 cents and this increased their hourly earnings about 7 cents, report 7 cents.)

If any changes in scales were made that did not affect any workers immediately, indicate the approximate number to be affected by the end of the year.

Indicate whether change was given in percentage or cents terms.

<table>
<thead>
<tr>
<th>Effective date</th>
<th>Approximate number receiving wage adjustments</th>
<th>Classes of production and related workers or jobs affected</th>
<th>Amount of hourly change</th>
<th>Check if this increase was</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Decided on in 1975</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Automatic cost-of-living escalator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Deferred (decided on in an earlier year)</td>
</tr>
</tbody>
</table>

D. Do you anticipate any wage changes during 1975 in addition to those listed above (cost-of-living changes or changes for which amount is unknown at the present time)?

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Explanations for Report on Wage Developments in Manufacturing, 1975

Section II-A All employees—total number on the payroll of the plant covered by this report who worked full-time or part-time or received pay for any part of the period reported. Include persons on paid vacations and sick leave. Exclude persons on leave without company pay the entire period as well as pensioners and members of the Armed Forces not working during the period reported.

Section II-B Production and related workers—Include working foremen and all nonsupervisory workers engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packaging, warehousing, shipping, trucking, hauling, maintenance, repair, janitorial, watchmen services, product development, auxiliary production for plant’s own use (e.g., power-plant), recordkeeping, driver-salesmen in food processing industries, and other services closely associated with these production operations.

Exclude employees engaged in executive, purchasing, finance, accounting, personnel, cafeteria, professional, and technical activities; sales; advertising; collection; installation, and servicing of products; route office functions; factory supervision above the working foremen level; and employees on your payroll engaged in construction of major additions or alterations to the plant.

1. Number. Include both full-time and part-time production and related workers on your payroll—whether wage or salaried—who worked during or received pay for any part of the payroll period reported. Include persons on paid sick leave, paid holidays, and paid vacations.

2. Payroll. Include pay earned during the payroll period by production and related workers reported in the preceding box. Payroll should be reported before deduction for old-age and unemployment insurance, group insurance, withholding tax, bonds, and union dues. Include cost-of-living allowances, pay for overtime, holidays, vacations, and sick leave.

3. Man-hours. Include all hours worked, not scheduled hours, during the payroll period by the production and related workers reported in the first box plus hours paid for stand-by or reporting time and holidays, and man-hours equivalent to pay received by employees directly from your firm for sick leave and for holidays and vacations for this payroll period.

NOTE: Data in Section II are to be reported for the payroll period including Jan. 12, 1975 and should not be revised during subsequent quarters.

Background

The Bureau's program of measuring the effects of collective bargaining settlements on hourly labor compensation is a reflection of two developments: One, the growing importance of fringe benefits as a proportion of employee compensation, and two, increased concern about the effects of collectively bargained wage and benefit changes on the price level.

Whereas in earlier years the economic terms of negotiated settlements could be equated largely with agreed-upon changes in wage rates, today, possible changes in a host of pay supplements must be considered—such as various forms of premium pay, paid leave, cash bonuses, and employer contributions to funds providing pension or health and welfare benefits. Although straight-time pay for working hours is still the major element of compensation, supplements are now a significant portion, accounting for about a fifth of total employer outlays for worker compensation.¹

Moreover, growing concern during the 1960's over the extent to which increased labor costs may contribute to inflation has heightened interest in the size of collective bargaining settlements.

Responding to these influences, the BLS began estimating the cost of wage and benefit (i.e., "package") changes in a limited number of key settlements in 1964. The work was expanded the following year and, since 1966, the Bureau has attempted to determine the price of all settlements affecting 5,000 workers or more in the private nonfarm sector. In addition, a separate series has been developed for the construction industry, covering settlements for 1,000 workers or more.

Description of Series

At present, the Bureau publishes two sets of data on wage-benefit decisions. One shows the annual rates of increases in settlements reached in a given time period and scheduled to go into effect at any time during the term of the agreements. The other is limited to the changes set for the first 12 months of the agreements.² Published data summarize settlements reached during individual quarters of a year, during full years, and during the first 6 and 9 months of each year.

Frequency distributions are shown for workers grouped by the size of their settlements. In these distributions, all workers affected by a given action are entered at the average for the bargaining unit. The sums of the individual settlements are averaged—both means and medians are presented—each settlement being weighted by the number of workers affected. However, the pricing of individual settlements is not disclosed.

Averages for full years are available separately for manufacturing and nonmanufacturing industries. Otherwise, no industry detail is published, except for the separate construction industry series.

As indicated in the preceding paragraphs, these series relate to the pricing of decisions, i.e., they measure the effect of changes agreed on in a given period although, considering the general practices of negotiating multiyear collective bargaining agreements containing provisions for annual (and sometimes more frequent) improvements, the changes may be introduced only at a subsequent date. Measures of wage and benefit changes actually placed in effect in specified periods, whether as a result of current bargains, changes agreed upon earlier but with deferred effective dates, or the operation of cost-of-living wage escalator clauses, also are available.

¹ See Paul L. Sheible, "Changes in Employee Compensation, 1966 to 1972," Monthly Labor Review, March 1975, pp. 10–16. It is difficult to measure the growth of supplements over the years and to quantify their current importance. The national income accounts provide one pertinent source of data. They show that supplements to wages and salaries rose as a percent of total employee compensation from 1 percent in 1929 to 12 percent in 1974. The National Income and Product Accounts of the United States, 1929–1965: Statistical Tables, U.S. Department of Commerce, Office of Business Economics (1966), p. 14; Survey of Current Business, January 1975, p. 32. These figures, however, do not reveal the relative importance of all supplements in either year, since many—such as premium payments, leave payments, and cash bonuses—appear as parts of wages and salaries. The figures therefore are not comparable to those found in surveys of employer expenditures for supplementary compensation.

² Before 1970, the Bureau published two measures of change over the life of the contract, the so-called equal timing and the time-weighted measures. The former assumed equal spacing of changes during the term of the contract; the latter took account of the actual effective dates of wage and benefit changes. The time-weighted measure has been discontinued, because it appeared to be of significance primarily for the analysis of individual settlements rather than for overall series of the type produced by the Bureau. Moreover, dropping of the time-weighted measure and introduction of a series on first-year changes provides parallel statistics both on wage-rate changes alone and on wages and benefits combined.
Data Sources and Collection Methods

The terms of the settlements to be priced are obtained primarily from secondary sources, such as general circulation newspapers and periodicals and union, management, and trade publications. Collective bargaining agreements and documents on pension and health and welfare plans also are consulted. When these sources are inadequate, direct requests for information are made to the companies and unions involved.

Large quantities of statistical data, as well as the settlement terms, are required. These are needed both to determine existing employer outlays and to assay the effect on these expenditures of agreed wage and benefit changes. Efforts are made to use existing data. However, when these prove inadequate, the parties are requested to furnish data. Such requests, it must be emphasized, are made to receive specific information from which the Bureau can price settlements; the requests are not made to receive the parties' own evaluations of the terms of their settlements.

One of the major sources of information on current hourly earnings is the establishment information which BLS obtains through its monthly employment, payroll, and hours survey. Information on current outlays for pay supplements may be available from BLS surveys of expenditures for such benefits. Pertinent information for estimating expenditures for some items may be found in industry wage surveys, e.g., extent of late-shift work and occupational employment distributions. Annual financial reports filed with the Department of Labor under the Welfare and Pension Plan Disclosure Act provide useful material. Not all the sources tapped are governmental; for instance, information on workmen's compensation insurance rates is reported by the National Council on Compensation Insurance.

Sampling and Estimating Procedures

As was noted earlier, the Bureau attempts to cover all settlements for 5,000 workers or more (1,000 or more in construction) in the private nonfarm sector. Substantially all such settlements come to the attention of the Bureau and are included in its series, it is believed.

Discussion of procedures for pricing individual settlements may be centered around three questions: (1) What items in a collective bargaining settlement are to be priced? (2) How are the costs of these items to be determined? (3) How are these costs to be expressed?

Coverage. Little evidence is needed to demonstrate that many terms of a union-management agreement, not merely the wage and benefit provisions, may affect directly or indirectly an employer's costs. For example, one of the so-called "noneconomic" terms of an agreement—seniority—may have a limited influence on costs through its effect on employee efficiency. However, such an item is essentially not measurable.

Consequently, the BLS program is confined to the wage-benefit component of collective bargaining agreements, i.e., to the effect of settlements on employer outlays for employee compensation. This component, clearly, is of major significance in its own right. Included are items such as changes in wage rates; modifications in premium pay, bonuses, paid leave, and severance pay; and adjustments in employer payments for pension, for health and welfare, and for supplemental unemployment benefits, excluding the costs of administering these benefits. Also included are changes in formal contract provisions specifying paid time for clothes change, washup, and lunch periods.

Excluded are informal modifications of unwritten rest-period practices; items related to, but not normally considered part of, compensation—such as per diem payments, moving expense reimbursements, and payments for safety clothing; and provision of facilities or services such as parking lots and health units, the costs of which often are charged to capital rather than labor accounts.

Determination of Costs. Since a value is placed on settlements at the time they are reached, the costs attributed to them obviously are estimates of outlays to be made in the future; they cannot be taken from employers' accounting records. The estimates are made on the assumption that conditions existing at the time the contract is negotiated will not change. For example, estimators assume that methods of financing pensions will not change, and that expenditures for insurance will not change except as a result of altered benefit provisions or modified participation because of changes in company contributions. They also assume that the composition of the labor force will not change.

In this regard, except for any guaranteed increases, which are treated as deferred adjustments, possible wage-rate changes as a result of cost-of-living escalator clauses are excluded because of difficulties in predicting movements of the Consumer Price Index. Thus, the Bureau prices the wage and benefit changes that would go into effect if the price level were to remain stable.

Nevertheless, package estimates do attempt to measure the costs associated with actual characteristics of

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3 Production of statistical series merely entails grouping and averaging the pricing of individual settlements. Published distributions show the number of workers under known settlements for which data were insufficient to permit pricing.

4 Almost inevitably a tendency has developed to regard all contract changes as serving to increase employer payments. Although this undoubtedly is the common result, some changes, even when proposed by unions, may lower costs. Union-management cooperation schemes have at times provided examples.

5 The series on wage and benefit changes actually placed into effect includes escalator adjustments, since the issue of prediction of CPI movements does not arise.
the work force affected by the settlements, not the costs for some hypothetical employee group. Attempts to base estimates on the actual age, length of service, sex, and skill characteristics of the workers involved recognize that the choice in incorporating alternative benefit changes into contracts is affected by their costs, which, in turn, are affected by the character of the work force. For example, an extra week of vacation after 15 years of service will cost very little when only 10 percent of the workers have that much service, but will cost about 1 percent of straight-time hourly earnings when half of the workers have been employed for 15 years or more.

As a rule, indirect effects of settlements are ignored: factors such as possible extension of settlement terms to nonunion workers in the same firm or to members of other bargaining units. Similarly, the cost of providing lengthened vacations is measured by the wages and salaries paid for the additional time off; costs of hiring vacation replacements, if necessary, are not considered. Moreover, effects on unit labor costs, which involve consideration of employee efficiency as well as employer payments, are disregarded.

However, "creep" is accounted for. Creep reflects the fact that an increase in wage rates will have a secondary effect on employer costs through its effect on outlays for benefits. A 20-cent-an-hour wage increase will affect not only straight-time wage rates but also supplementary payments governed by wage rates—such as overtime premiums, leave payments, pension benefits related to salary level, and social security payroll taxes (if earnings are not at or above the statutory maximum tax base). Creep is taken into account by raising each wage increase provided by the new contract by a creep, or loading, factor. This factor is essentially the ratio of current hourly expenditures on benefits that vary with wage levels to current straight-time hourly earnings.

Many items in a collective bargaining agreement are priced without difficulty. This is particularly true when settlement terms are expressed as cents-per-hour adjustments, e.g., a 20-cent-an-hour general wage increase or a 5-cent increase in employer contributions to a health and welfare fund. These stipulated cents-per-hour figures are utilized as the costs of the settlement provisions. Percentage wage adjustments are converted to cents-per-hour figures on the basis of current average straight-time hourly earnings. Although less direct, the cost of an additional holiday is estimated adequately by prorating 8 hours' average pay (if the normal workday is 8 hours) over the number of annual working hours per employee. The cost of an additional week of vacation for 25-year employees is estimated similarly, but one must know the number of employees with the required seniority.

Other settlement terms are more difficult to price. For example, the cost of an unfunded severance pay plan depends on the frequency of layoffs as well as on plan provisions. Estimates of such frequencies are at best hazardous. Pension improvement costs are particularly difficult to estimate because of the considerable discretion employers often have in funding their obligations. The general approach followed by the Bureau is to assume that a given pension benefit increase will raise existing expenditures for current service proportionately. Since employer contributions for pensions frequently vary widely from year to year, outlays in several past years are examined to develop a measure of current payments.

Under the BLS framework, estimates concerning most provisions are of actual cash outlays to be made by employers. However, in the case of improved paid leave provisions, a change may entail time off for workers, but not additional cash payments by the employer. However, payment per hour worked will rise and this change is taken as the cost effect of the settlement provision.

In case of a reduction in the basic workweek, the increase in hourly rates needed to maintain weekly pay is the major item BLS prices. To some extent, a reduced basic workweek may be accompanied by additional overtime work. However, unless this overtime is provided specifically in the agreement, it is ignored in the cost estimate.

Increases in hourly pay rates are not the only cost effects considered in this instance. Even if there is no change in total employer outlays for particular pay supplements but the contract provides for reduced hours, the outlays for them per hour worked will rise and affect the cost of settlement. Expressing the Costs. The total cost of a given settlement is obtained by adding up the cents-per-hour-worked costs of each of the individual wage or benefit changes. This sum is then expressed as a percent of pay, as this ratio facilitates inter-company comparisons by eliminating influences of payroll size and wage level. Furthermore, since economic studies generally emphasize relative rates of change in statistical series, percent-of-pay costs can be integrated into broad economic analyses.

Expression of package costs as a percent of pay requires estimation of an appropriate base (the denominator of the ratio) as well as the cost of the settlement terms (the numerator). The base used by the
Bureau consists of current outlays per hour worked for all items of employee compensation, as defined, plus employer expenditures for legally-required social insurance. The latter is part of employee compensation, although not subject to change through collective bargaining.

Since collective bargaining agreements generally are for 2-year periods or longer, BLS expresses the total percent increase over the contract term at an annual rate to permit comparison among agreements for differing time spans as well as to facilitate the use of the data in conjunction with other statistical series. These annual rates of increase take into account the compounding of successive changes. In addition, the Bureau computes first-year changes, i.e., the total change scheduled for the first 12 months of the agreement, expressed as a percent of current hourly compensation. As a general rule, the first-year increase is larger than the average annual increase over the full term of the agreement; contracts commonly are "front-loaded."

Contracts are considered to run from their effective dates to their termination dates. However, where wage reopening clauses are found, the reopening date is taken as the termination date and any agreement under the reopening clause is treated as a new settlement.

Pricing of a collective bargaining settlement is illustrated on the sample worksheet. This example assumes that at the time of the settlement straight-time hourly earnings averaged $3 and that total supplementary benefits were $1 an hour worked, providing total compensation of $4 an hour worked (the base). Also assumed is a creep factor of 20 percent, 2,000 annual working hours per employee, and a 3-year agreement effective January 1, 1975, providing the immediate and deferred wage and benefit improvements shown on the worksheet. The settlement provides a 7.1 percent first-year package and a 6.5 percent annual rate of increase over the 3-year term. The worksheet also shows the wage and benefit gains scheduled for each of the 3 calendar years (1975, 76, and 77), from which material the series on changes actually placed into effect is computed based on the pricing of items at the time settlements are reached. The latter data are computed without reference to creep and relate wage gains to average hourly earnings rather than average hourly compensation.

**Presentation and Analysis**

Press releases covering wage changes and wage and benefit changes in major collective bargaining settlements are issued toward the end of the month following the close of each quarter. These releases contain preliminary data for the first 3, 6, and 9 months of a year and for the full year. This material also appears in *Current Wage Developments (CWD).* Final quarterly material (both for individual quarters and the cumulative quarterly material appearing in the press releases) is included in the *CWD* article for the full year. Information on the total effective changes also appears in the final summary.

Summary data for recent individual quarters and 4-quarter periods are shown monthly in *CWD* together with other statistical series depicting aspects of change in employee compensation. The presentation facilitates analysis of the interrelations between the series and the divergences in their movements.

**Uses and Limitations**

Package cost data are used extensively by union and management officials, for whom data on developments in other firms and industries often provide an important criterion for their own deliberations. In a different vein, the data are examined by government officials and private analysts, concerned with the economic repercussions of collective bargaining on the costs of individual employers and on wage-price-employment relations within the economic system as a whole.

The user of the data should remember that the series does not purport to measure all changes in average hourly expenditures for employee compensation. Estimates are derived under the assumption that all factors affecting employer outlays other than contract modifications are constant. Nevertheless, changes in the volume of overtime and shift work, in the composition of the work force, in factors affecting incentive earnings, etc., are not unusual, and will influence outlays for employee compensation. In some instances, these changes are introduced by management specifically to offset costs of new labor agreements. In other cases, changes are the result of modified production schedules or of technological developments independent of collective bargaining, and may either add to or subtract from the cost of the union-management settlement. In any event, an important influence on the level of employee compensation, social insurance taxes, is essentially outside the scope of the package cost estimates.

Two other factors must be considered. First, package costs are only estimates of future changes in employer outlays. As already emphasized, completely accurate estimates should not be expected. Secondly, the data apply primarily to settlements for 5,000 workers or more.

Although package cost estimates are extremely valuable as comprehensive measures of change resulting from union-management negotiations, to use the estimates as precise, unambiguous, and unfailing measures of the economic effects of collective bargaining is adding an assignment which the data are incapable of fulfilling.

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11 Thus, the series on effective package changes essentially is based on the pricing of items at the time settlements are reached. The only exception is the subsequent addition of cost-of-living escalator wage changes.
### Package Cost Analysis Worksheet

#### Name - Location - Union

<table>
<thead>
<tr>
<th>SCHED.</th>
<th>A.H.E.</th>
<th>SIC</th>
<th>EMPLY.</th>
<th>F.Y.</th>
<th>Total Wages</th>
<th>DUR</th>
<th>No. Neg.</th>
<th>BASE</th>
<th>W&amp;G OT</th>
<th>BASE</th>
<th>W&amp;G Time</th>
<th>W&amp;B F.Y.</th>
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</thead>
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</tbody>
</table>

#### Date Priced Out
- 3/15/75

#### Previous Expiration Date
- 12/31/74

#### Date Negotiated
- 1/1/75

#### Effective Date of Agreement
- 1/1/75

#### New Expiration Date
- 12/31/77

#### Statistical Information

<table>
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<tr>
<th>MEASURE</th>
<th>Year</th>
<th>Total Cents</th>
<th>Divided by **</th>
<th>Total Percent Increase</th>
<th>Annual Rate of Increase</th>
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<tr>
<td>First-Year Wages &amp; Benefits</td>
<td></td>
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</tr>
<tr>
<td>Wages and Benefits (Over life of contract)</td>
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<tr>
<td>Wages and Benefits (time weighted)</td>
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<tr>
<td>First-Year Wages Alone</td>
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<td></td>
</tr>
<tr>
<td>Wages Over Life of Contract</td>
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<tr>
<td>Wages and Benefits Effective in</td>
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<tr>
<td>Wages Alone Effective in</td>
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<td></td>
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<tr>
<td>Other:</td>
<td></td>
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</tbody>
</table>

**Notes:**
- **For wages and benefits,** divide by the base; for wages alone, divide by the A.H.E.
- For the effective measures, divide by the adjusted base on A.H.E. as of the start of the appropriate year.

**Remarks:**
- No data should be supplied in these columns. When verification is made, the data will be supplied.

**Priced Out By:** John Doe

### Increases in Cents

- Wages: 5% @ 3.00
  - 1/1/75: 15.00
  - 1/1/75: 1.00
  - 1.20

### Other Information

- Holidays: 1 add.
  - 1/1/77: $3,499 @ 8 hrs. = 27.99

- Vacations: 20 add.
  - 1972 hrs. = 4.92

- Pensions add. 5% / hr. to fund 1/1/77
  - 1972 hrs. = $104.00

- Dental: Plan estab.
  - 1/1/77: $100 + 1972 = 5.07

### Totals

<table>
<thead>
<tr>
<th>Wages and fringes</th>
<th>83.61</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over life of contract</td>
<td></td>
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</tbody>
</table>
Technical References


Chapter 22. Wage Chronologies and Salary Trend Reports

Background

Most Bureau of Labor Statistics series showing the movement of money wages—such as data on average hourly earnings—apply to large aggregates of workers, e.g., all production workers in a given manufacturing industry either nationwide or in a particular State or local area. Wage chronologies and salary trend reports, on the other hand, apply to more narrowly defined employee groups.

Chronologies report on wage-rate changes made by specific employers. Except for the study on Federal General Schedule employees, they deal with developments under collective bargaining agreements. In all cases they report on supplementary benefits as well as wage changes.

Salary trend reports present and analyze changes in salaries of selected categories of government employees. In most instances, however, they do not contain separate data for individual employers.

Both programs date back to the early post-World War II period. The wage chronology program was instituted in 1948 and the first salary trend report was issued in 1950. To the extent possible, material for earlier years was included in the initial reports.

Description of Program

Chronologies. The following 32 chronologies currently are being maintained:

1. Aluminum Co. of America, and the United Steelworkers and the Aluminum Workers
2. American Telephone and Telegraph Co., Long Lines Dept., and the Communications Workers
3. The Anaconda Company and the United Steelworkers
4. Armour and Co. and the Meat Cutters and Butcher Workmen
5. Atlantic Richfield Co. and the Oil, Chemical and Atomic Workers
6. Berkshire Hathaway, Inc., and the Textile Workers Union of America
7. Bethlehem Steel Corp., Shipbuilding Dept. and the Marine and Shipbuilding Workers
8. Bituminous Coal Mine Operators and the United Mine Workers
9. The Boeing Co. (Washington plants) and the Machinists
10. Commonwealth Edison Co. of Chicago and the Electrical Workers (IBEW)
11. Dan River, Inc. and the United Textile Workers of America
12. Federal Employees Under the General Schedule Pay System
13. Firestone Tire and Rubber Co. and B. F. Goodrich Co. and the United Rubber Workers
14. FMC Corp., Chemical Group-Fiber Div. and the Textile Workers Union of America
15. Ford Motor Co. and the Automobile Workers
17. International Harvester Co. and the Automobile Workers
18. International Paper Co., Southern Kraft Division, and the United Papermakers and the Electrical Workers (IBEW)
19. International Shoe Co., and the United Shoe Workers and the Boot and Shoe Workers
20. Lockheed-California Co. and the Machinists
21. Martin Marietta Aerospace and the Automobile Workers
22. Massachusetts Shoe Manufacturers and the United Shoe Workers
23. New York City Laundries and the Amalgamated Laundry Workers Joint Board (affiliated with Amalgamated Clothing Workers)
24. North Atlantic Longshore Industry and the International Longshoremen’s Association
25. Pacific Coast Shipbuilding and various unions
26. Pacific Gas and Electric Co. and the Electrical Workers (IBEW)
27. Pacific Longshore Industry and the International Longshoremen’s and Warehousemen’s Union
28. Railroads and Various Unions
29. Rockwell International (Electronics, North American Aircraft/Space Operations) and the Automobile Workers
30. Swift & Co. and the Meat Cutters and Butcher Workmen
31. United States Steel Corp. and the United Steelworkers
32. Western Union Telegraph Co., and the United Telegraph Workers and the Communications Workers

Each chronology covers either a single wage-determination unit or a group of closely related units. It may cover an individual company and union (e.g., Ford Motor Co. and the United Automobile Workers), a single company and two unions or more (e.g., the Aluminum Co. of America and the United Steelworkers and the Aluminum Workers), a group of em-
employers and single union (e.g., New York City Laundries and the Amalgamated Clothing Workers), a group of companies and a group of unions (e.g., Pacific Coast shipbuilding companies and a number of craft unions), or a governmental body (e.g., the chronology covering Federal General Schedule employees).

The program is designed to summarize long-term wage-benefit developments in a variety of industrial environments. Accordingly, chronologies cover groups that (1) have existed over a period of years; (2) are important in their own industry; (3) employ a significant number of workers; (4) are of general public interest; and (5) are willing to cooperate with the Bureau and for which appropriate information is available.

Each chronology consists of an introductory description of the parties involved and their collective bargaining relationship, followed by (1) a narrative synopsis of the collective bargaining, legislative, or administrative developments resulting in specific wage and benefit changes, and (2) a tabular summary of the changes themselves. Each chronology contains separate tables showing general wage changes and changes in benefits.

As used in the wage chronology program, general wage changes are defined as upward or downward changes that affect an entire unit or a substantial group of workers at one time. Excluded are adjustments in individual rates (such as promotions, or merit or seniority increases) and minor adjustments in wage structure (such as changes in individual job rates or incentive rates) that do not have an immediate and noticeable effect on the general wage level. Because of the omission of non-general wage changes, fluctuation in incentive earnings, and other factors, the sum of the wage changes listed in each chronology will not coincide necessarily with the movement of average hourly earnings over the same period.

The tables generally include benefits such as guaranteed minimum earnings, shift premiums, daily and weekly overtime, weekend premiums, pay for holiday work, paid vacations and holidays, other paid leave provisions, reporting time, waiting time, paid lunch periods, pay for travel time, and health, welfare, and pension benefits.

When minimum plant rates, common labor rates, occupational wage rates, or rates for labor grades are important in the wage structure, they are shown in chronological sequence, parallel to the general wage changes.

**Salary Trend Reports.** These reports currently are issued for Federal General Schedule employees, police and firefighters, and urban public school teachers. They all contain indexes of long-term salary movements. Data on recent and current salary levels also are provided.

A report on municipal government refuse collectors was initiated in 1972, and although indexes of long-term salary movements are not yet available, salary level data and changes since 1972 are shown.

Reports for police, firefighters, refuse collectors, and teachers basically apply to cities having 100,000 inhabitants or more, and provide separate figures for regions and city-size groups, as well as overall national data. Material on individual cities, however, is not shown. Because it deals with a single employee group, the report on Federal General Schedule employees contains considerable detail on developments in wage structure.

### Data Sources

Both wage chronologies and salary trend reports are developed primarily from published data. Collective bargaining agreements, pension and welfare documents, and newspaper and periodical articles provide the main sources of chronology information. These are supplemented by direct requests to the parties for information when available written records are inadequate. Thus, most of the information used to compile chronologies is, in one form or another, already a matter of public knowledge. In all instances, to avoid dissemination of erroneous material, pre-publication drafts of chronologies are submitted to the parties for their review and comments.

Salary trend reports are prepared largely from salary data collected by other groups. That for Federal General Schedule employees is based on data published by the U.S. Civil Service Commission in its annual report on *Pay Structure of the Federal Civil Service*.

Reports on teachers, police and firefighters, and refuse collectors are based mainly upon compilations of data for individual cities made by the National Education Association for teachers and the International City Management Association for the other occupations. These are supplemented by annual surveys of salaries and working conditions conducted by the International Association of Fire Fighters and the Fraternal Order of Police, and by direct inquiries by the Bureau of Labor Statistics.

**Statistical Procedures**

Statistical analysis in the salary trend program is confined largely to the preparation of indexes (except for refuse collectors) of salary movements of groups of government employees. Sampling problems do not arise since in each case an effort is made to examine the total universe, i.e., all Federal General Schedule employees, and all teachers, firefighters, and police in cities having 100,000 inhabitants or more.

Indexes generally are computed by a method that minimizes the effect of year-to-year changes in relative employment in the cities or occupational categories.
covered. As a rule, chain indexes are employed, i.e., the index for the current year is obtained by adjusting the index for the prior year by the percent change in average salaries over the intervening period. Normally, to preserve a pure measure of salary change, average salaries for each of the 2 years are computed using current-year employments as weights.

Presentation and Analysis

**Wage Chronologies.** Wage chronologies are published individually as BLS Bulletins and revised periodically to incorporate material resulting from new collective bargaining settlements and legislative or administrative developments. Bulletins are updated after every other contract settlement or legislative enactment. Intervening developments are reported in supplements to existing bulletins. Thus, when 3-year collective bargaining agreements are negotiated, a revised bulletin should be issued once in 6 years.

**Salary Trend Reports.** Articles covering developments for Federal General Schedule employees, firefighters and police, and refuse collectors appear annually in *Current Wage Developments (CWD)*. Press releases containing summary data for firefighters and police precede publication of the articles. Salary changes for teachers are reported in biennial *CWD* articles, since the basic data are issued at 2-year intervals. Reprints are available of all *CWD* articles. In addition, all articles issued up to the mid-1960's have been collected and reprinted in the BLS bulletins listed in the technical references at the end of this chapter.

Chronologies are primarily listings of wage and benefit changes, with background material limited to descriptions of the collective bargaining, administrative or legislative processes leading up to the changes. Greater effort is made in salary trend reports to analyze the data. Background factors are presented and the wage movements are compared with wage changes for other employee groups.

**Uses and Limitations**

Both wage chronologies and salary trend reports are useful as sources of comparative wage data for union, management, and government officials engaged in wage setting, and as research tools for economic analysts. Chronologies are particularly useful for negotiators because the studies present detailed information on developments in units that frequently provide wage leadership for their industries. Moreover, comparisons of wage and benefit changes in such units provide valuable insights into wage setting in the American economy. In addition, the data help to explain the movements in aggregative statistics such as the Bureaus series on average hourly earnings. Salary trend reports are noteworthy as one of the relatively few sources of data on wage movements and levels in the government sector.

Although wage chronologies describe changes in supplementary benefits, they do not measure the effect of these changes on employers' hourly labor costs. In this connection, decisions on whether or not to adopt a given benefit change may hinge on its cost, which may vary among bargaining units having work forces of differing composition.

The temptation may be to use salary trend reports as indicators of salary movements for government employees in general. However, the particular groups covered by these reports are by no means a representative sample for this purpose.


Technical References


Compilations of previously published salary trend articles.
Chapter 23. Annual Earnings and Employment Patterns of Private Nonagricultural Workers

Background

A worker’s annual earnings from employment are an excellent gauge of economic well-being. Annual earnings depend on rates of pay and hours of employment which in turn are dependent on the worker’s occupation, industry of employment, and area of employment. Occupational wages, or hourly or weekly earnings data cannot be extrapolated to annual earnings because some workers are not employed for a full year and others may work in more than one occupation or in more than one industry. Since the late 1960’s, the Bureau of Labor Statistics has had a program of studies designed to provide information on annual earnings from wages and salaries in private nonagricultural employment. The first study, in 1964, was limited to wage and salary earnings covered by social security; subsequent studies have included data on wage and salary earnings covered under either the Social Security Act or the Railroad Retirement Act. Publications cover all years with the exception of 1968 and 1969, which were omitted when program modifications enabled more timely processing of data for 1970. Rather than delay the publication of 1970 data, the data for 1968 and 1969 were not processed. Bulletins are issued annually with special analytical studies being published intermittently in the *Monthly Labor Review*.

Description of the Series

The series covers earnings and employment patterns in the private, nonagricultural sector which, broadly defined, includes individuals who work for wages and salaries in employment covered by the Social Security Act and the Railroad Retirement Act. Excluded are earnings in agriculture, self-employment, and in government units other than those that participate in social security and function like private firms, such as hospitals and schools.

The studies provide distributions of median and mean earnings for the private nonagricultural sector as a whole, for each industry division, for each major industry group at the two-digit SIC level, and for selected industry groups at the three-digit SIC level of industry classification. The data, though available only for white-collar and blue-collar workers combined, are unique, because unlike annual earnings data from other sources, they permit an analysis of the distribution of wage and salary earnings and employment patterns by industry and quarters of employment.

The studies focus separately on earnings in the industry in which workers had greater earnings than in any other, and on earnings in all industries. Some of these data and some of the employment patterns data, separately and with earnings data, also are presented for workers classified by age, race, and sex. Information also is provided on the inequality of income distributions as measured by Gini indexes of concentration.

Earnings and employment patterns of workers who had covered wages and salaries in each quarter of the year are emphasized particularly. Information about earnings and employment patterns of four-quarter workers is the closest to data for workers fully attached to the private sector work force that can be obtained from the source materials. Data on workers employed in any quarter of the year more closely represent the experience of all workers in the private nonagricultural sector.

Source of Data

The data are developed by the Bureau of Labor Statistics from statistical information obtained from the Social Security Administration and the Railroad Retirement Board. To preserve the confidentiality of the records, the data are provided to the Bureau of Labor Statistics without identification of individuals or employers. However, to combine data from various employments and to facilitate statistical processing, each individual and employer is assigned a permanent control number, different from his social security or employer identification number.

Each individual in the sample provides demographic information (race, sex, and year of birth) when he applies for a social security number. Each employer under social security from whom the individual receives any
wages or salaries during the calendar quarter reports the amount of the wage payment in the quarter; employers covered under railroad retirement report monthly. However, employers cease to report wage and salary earnings after the worker has reached his taxable earnings limit in that employment situation. Employers report wages paid to the maximum annual limit under social security and to the maximum monthly limit under the railroad retirement system. Employer reports also indicate the industry and, except for employment covered by the Railroad Retirement Act (RRA), the area in which the wages or salaries were earned. Employers subject to the RRA also provide information about the occupational category the worker was employed in.

Sample Design, and Sampling and Nonsampling Variability

The sample, which includes 1 percent of all social security numbers, was selected on the basis of a multistage systematic cluster sampling procedure. Social security numbers are used as the individual’s identification number in both the social security and railroad retirement systems. An individual selected for the sample remains in it permanently.2

Since estimates in this study are based on a sample, they may differ from census figures. Moreover, the sample data are not adjusted to benchmark levels established by complete counts. In addition, the data are subject to nonsampling variability due to errors in reporting and classification and other possible error sources, that would be present in a complete enumeration as well as in a sample. As a result, ratios established from the sample data are considered to be reasonable estimates of those existing within the population as a whole. Nevertheless, particular care should be exercised in interpreting medians and percents based on relatively small numbers of cases as well as small differences between figures.3

Estimating Procedures

To estimate total earnings of individuals, the Social Security Administration determines the quarter in which the taxable limit is reached ("limit quarter"). Earnings in the prior quarter equal to or greater than the "limit quarter" earnings are substituted for those in the "limit quarter" and in all subsequent quarters. Limit quarter earnings, however, are used to estimate earnings in the limit and subsequent quarters if limit quarter earnings were higher than earnings in previous quarters. The summation of the quarterly earnings after these substitutions then becomes the estimated annual total. When the taxable limit is reached in the first quarter, the Social Security Administration imputes an estimated total.

Employers covered by the Railroad Retirement Act are required to provide information about the monthly earnings of each employee up to the maximum creditable limit subject to Railroad Retirement Act taxes. Hence, even earnings reported at the maximum level for each month aggregated to annual totals may be substantially below the worker's total earnings. The Railroad Retirement Board, however, collects information from employer records about the total annual earnings of a sample of workers covered by the act. Factors for raising creditable compensation under the Railroad Retirement Act to total railroad earnings are derived by comparing the total earnings data for individuals collected in the special study with the aggregated monthly earnings data for the same individuals. The incremental factors for workers in the same broad occupational categories are then averaged. The resulting factors, developed by the Railroad Retirement Board, are applied by the Bureau of Labor Statistics to the credited monthly earnings of each individual by taking into account his occupational category.4

Analysis and Presentation

The information presented can be classified into four major groups. The first deals with means, medians, and frequency distribution of earnings of workers grouped by race and sex and classified by the industry in which they received the largest part of their annual earnings (industry of major earnings). The second group presents mean and median earnings and numbers of workers grouped by age and classified by race, sex, and industry of major earnings. The third includes number of workers with various employment and demographic characteristics such as region of employment, quarters of work, and number of employers. The final group provides Gini indexes of concentration for workers grouped by race, sex, and industry of major earnings.


3 For an indication of the order of magnitude of the sampling errors and a fuller discussion of the sampling and non sampling variability to which the series is subject, see Workers Under Social Security, 1960, op. cit.

4 Although the Railroad Retirement Board collects annual earnings data for a 1-percent sample of workers, the sampling criteria differ from those used by the Social Security Administration. To permit the combination and integration of data from the two systems, the Railroad Retirement Board provides the Bureau of Labor Statistics with data for a sample of workers selected according to the sample design established by the Social Security Administration.
Workers Having Some Earnings in the Industry. Each individual who earned $1 or more in an industry during the year is counted in each industry in which he had any earnings. A worker who had some earnings in each of five three-digit industries, as defined in the Standard Industrial Classification Manual for example, is counted for each of these industries as well as in each two-digit industry and in each division of which the three-digit industries are a part. Because a worker is counted in each three-digit industry, each two-digit industry and in each division in which he had $1 in covered wage and salary earnings or more, the aggregate count at each level is greater than the total number of workers at each broader industry level (two-digit, division, private nonagricultural economy).

Major Earners and Industry of Major Earnings. To obtain the most realistic picture of the characteristics of workers employed in an industry during a year it is beneficial to exclude data for individuals who were only casually employed in the industry. Each employee-employer combination within the AEEP sample has a separate and distinct record. Thus, data for an individual worker, depending on his work experience, can be included for several different industries. To avoid this duplication of data (and as a result to provide more industry specific information) workers are assigned to an “industry of major earnings” at the 3-digit SIC level. This industry is the one from which the worker received the largest portion of his total wage and salary earnings. This assignment does not change at higher levels of aggregation, thus preventing a worker from being identified as a major earner in different industries at different SIC levels.

Employer. An employer in this study is an individual, partnership, or corporation recognized under the law as a separate entity meeting certain criteria. However, a firm which separately incorporates at each of its locations may be considered a separate employer at each location. Thus, a worker transferred from one to another location that is incorporated separately may have more than one employer in the same year even though he continued to work for the same firm.

Industrial Classification. Employment and earnings data based on the Social Security Administration’s (SSA) data file are classified according to the Administration’s industrial classification system. This system differs slightly from that published in the Standard Industrial Classification Manual (SIC), and used in most statistical series in the assignment of industry codes to governmental units. Most statistical series classify governmental units into SIC Division I-Government. The SSA, however, classifies only policymaking governmental units in Division I. All separable nonpolicymaking units are assigned to nongovernmental SSA industry classification code appropriate to their activity. Thus, for example, all employment with policymaking boards of education (classified by the SSA and SIC as government) has been excluded from this study. Schools, colleges, and other operating units covered under voluntary election provisions of the act, however, were treated as service industry employment, because the units were classified by SSA into SIC 82, educational services.

Employment and earnings data based on the Railroad Retirement Board’s file are classified into the following...
industries as defined in the SIC Manual: Railroads, SIC 401; sleeping car companies, SIC 402; express companies, SIC 404; rental of rail cars companies, SIC 474; and other companies performing services railroad transportation and certain railway labor organizations, SIC 861 and 863. In each case the assignment is based on the industrial classification of the worker’s last employer who was covered under the Railroad Retirement Act. Data for workers who had earnings in more than one industry, all of which were covered under the social security system or one of which was covered under the railroad retirement system, are classified and presented separately and in combination.

**Single and Multi-industry Workers.** At each level of industry classification the employment experience of each sample member was examined to see if all of his earnings were in one or more than one industry. Those with earnings in more than one industry were classified as multi-industry workers. This conceptual approach may be seen in the case of a worker who was employed, as illustrated below, by an employer in each of two three-digit industries within the same two-digit industry.

<table>
<thead>
<tr>
<th>Industry level</th>
<th>Number of employers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division A</td>
<td>2</td>
</tr>
<tr>
<td>2-digit group, A-1</td>
<td>2</td>
</tr>
<tr>
<td>3-digit group, A-11</td>
<td>1</td>
</tr>
<tr>
<td>3-digit group, A-12</td>
<td>1</td>
</tr>
</tbody>
</table>

**Region of Major Earnings.** The region in which workers had their major earnings is determined by a plurality earnings test similar to that described above in detail in “Major earners and industry of major earnings.” The region in which he had greater earnings than any other is his region of major earnings.

In a few cases, earnings in the industry and region of major earnings may not coincide. All data for major earnings are classified first by industry and then by region. A worker who earned 40 percent of his annual wages in industry A in the Northeast, 30 percent in industry B in the South, and the remaining 30 percent in industry C also in the South would be classified as a major earner in industry A and as having had his major earnings in the South.

In this series, workers employed under the Social Security Act or the Railroad Retirement Act are divided into five regions: Four cover the 50 States and the District of Columbia; the fifth includes all employment in U.S. territories, on foreign soil, or aboard ocean-going vessels.9

Data in this series do not indicate where wages and salaries covered by the Railroad Retirement Act were earned.10 Therefore, a convention was adopted ascribing all such employment to the North Central region where many railroads and railroad-related organizations have their headquarters.

**Race.** All workers in this series have been divided into two groups, “white” and “black.” The white category includes all workers except blacks. This convention, which is different from that used in most statistical series, was adopted to minimize the effect on those groups for whom the sample was not sufficiently large to present data separately and to maximize the analytical usefulness of the data.

### Gini Indexes of Concentration

Gini indexes are a widely used method of determining the equality of the distribution of income. This is done by comparing the cumulative percent of total wages earned by a given percent of the population with the percent of wages that would be earned by the population if the income distribution were exactly uniform (in a uniform distribution 10 percent of the population earns 10 percent of the income; 20 percent earns 20 percent, etc.). This concept can more easily be understood by considering the following illustrative income distribution:

<table>
<thead>
<tr>
<th>Population unit</th>
<th>Income units received</th>
<th>Cumulative percent of total income units</th>
<th>Income units received</th>
<th>Cumulative percent of total income units</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>20</td>
<td>1</td>
<td>6.6</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>40</td>
<td>2</td>
<td>19.9</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>60</td>
<td>3</td>
<td>39.9</td>
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<tr>
<td>4</td>
<td>3</td>
<td>80</td>
<td>4</td>
<td>66.6</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>100</td>
<td>5</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The plot of a perfectly equal distribution (in this example distribution A in the chart) yields a straight line usually referred to as the line of equality. A distribution other than one in which all units receive the same income (distribution B) would result in a curve beneath this line but having the same end points. The Gini index provides a measure of the amount of deviation of this curve from the line of equality. It is calculated by expressing the area bounded by the curve and the line of equality as a ratio of the total area of the triangle formed by the line of equality and the X- and Y-axis. This ratio

---

9 For all industries, except water transportation, employment outside the 50 states or the District of Columbia is only a small fraction, if any, of the total number of the industry’s major earners.

10 Employment under the Railroad Retirement Act makes up nearly all the major earners in the railroad industry (SIC 40) and a substantial proportion of those at the all transportation level, but only a very small fraction of the total employment in other industries or at the total private nonagricultural level. Thus, the convention adopted has a serious effect on the regional employment distributions and regional earnings picture at the all transportation level but little effect on other industries or at the total private nonagricultural level.
ranges from 0 to 1, with the degree of equality of the distribution decreasing as the index number increases.

Uses and Limitations

The data provide an insight into the answer to the question: “How well do private nonagricultural workers do in their industry of major earnings and to what extent do they supplement these earnings by employment in other private sector industries.” Data are used in collective bargaining; in formulating public policy and in making inter-industry and international comparisons; in analyzing the distribution and diversity of earnings, and variations in employment patterns among industries, regions, and between workers of different races and sexes.

The data, however, have several substantial limitations. Some workers whose annual earnings are included in the series also have earnings in self-employment, agriculture, or employment in governmental units excluded from the series. As a result, these workers appear to have low annual earnings. Probably most of these workers were attached to the employed work force to a very limited extent. The unavailability of data on hours or weeks worked or paid for, or occupational group (other than in railroading) seriously limits the analytic potential of the series. The 3-5 years lag between the reference period and the date of publication introduces another limiting factor. These delays result primarily from reporting requirements established by the law, the administrative requirements of the collecting agencies, and the processing required to reduce the mass of micro data into statistical summaries. Nevertheless, since employment patterns usually change very slowly and relative earnings distributions generally are quite comparable from year to year even though the level of earnings moves upward, the relationships shown are indicators of the current situation.

Notwithstanding the limitations, data from this series, unlike those from other sources,11 permit an analysis of the distribution of wage and salary earnings and employment patterns of workers by demographic characteristics, industry, and quarters of employment. Thus, they are uniquely useful to all concerned with the annual wage and salary income of individuals and the employment patterns of those in the private nonagricultural work force.

11 Dissimilarities in concept or method between the BLS annual earnings and employment pattern series and other series may result in important differences in sampling and nonsampling variability between series. Therefore, caution must be exercised in using data from the BLS annual earnings series in conjunction with data from other statistical series. The major sources of other annual earnings data together with a brief explanation of the most important difference between them and the data in this series are noted below.

The Social Security Administration (SSA) publishes some annual earnings data by industry. Their most recent report Workers Under Social Security, 1960 (1968), provides statistical information about employment, earnings, and insurance status of workers under old-age, survivors, disability, and health insurance. The SSA also publishes selected summary data in the Social Security Bulletin. The industry attachment concept used by the SSA, however, is different from that used in this study. Further, the Social Security data do not include earnings in employment covered by the Railroad Retirement Act.

The Railroad Retirement Board (RRB) annually publishes a “research and statistics note” which provides information about the total railroad earnings of railroad employees. The RRB data, however, exclude earnings in employment not covered by the Railroad Retirement Act.

Some annual earnings data at the all-industry level by occupational group are published by the Bureau of the Census, U.S. Department of Commerce, in “Consumer Income,” Series P-60 of the Current Population Reports. This publication also provides a distribution of wage and salary earnings, at the all-industry level, by sex and race. In addition average earnings by sex are presented for selected industry divisions and for a few major industry (two-digit SIC) groups. The study, based on a household survey, does not provide distributions of wage and salary earnings by industry group and has different concepts of industry attachment from those used in this study.

The Office of Business Economics of the U.S. Department of Commerce also publishes estimates of the average annual earnings of “full-time employees” in its Survey of Current Business; these estimates do not reflect the effect on average earnings of workers who work less than a full year.

Technical References

Chapter 24. Employer Expenditures for Employee Compensation

Background

The measurement of employer expenditures for employee compensation and the composition of payroll hours was undertaken by the Bureau of Labor Statistics (BLS) to fill a large gap in the statistics of employee compensation and hours paid for.

Prior to World War II, compensation for American labor consisted mainly of wages and salaries for time worked or units produced. Under the New Deal, however, additional payments were required under various social insurance programs, and later, during the years of World War II, employers were encouraged by the policies of the War Labor Board to grant wage supplements instead of wage increases, e.g., vacations and hospitalization. Shortly after the war, the NLRB ruled that pension plans were within the purview of collectively bargained agreements.1 Expenditures for these and other compensation elements, in addition to pay for working time, began to comprise a substantial portion of the total compensation of labor.

As early as 1875 the American Express Company instituted a private pension plan.2 In 1929, a private study3 indicated that there were almost 400 such plans, and by 1974 there were over 52,000 retirement plans and 139,000 welfare plans in the U.S.4

Paid vacations and holidays also have a relatively short history for most workers. Paid vacations were fairly well established for salaried workers by the middle of the nineteenth century. Industrial workers, however, first started to receive paid vacations around the turn of the century, and not until after World War I did the principle of paid vacations begin to assume importance in the development of labor policy; paid holidays generally were not found in industry until World War II, although it had been customary for salaried workers to receive pay for time not worked on designated holidays. By 1972, approximately 7 percent of the production worker hours paid for in manufacturing industries were leave hours, almost all of which were vacation and holiday hours.

The importance of recent changes in the structure of compensation may be illustrated by examining those that occurred for manufacturing production workers between 1959 and 1972. During that period, pay for working time increased from $2.23 to $3.84 an hour or about 72 percent. At the same time, employer expenditures for all other elements of compensation increased from 38 cents to $1.02 an hour or about 168 percent. Thus, the relative importance of pay for working time decreased from 85.4 percent of total compensation in 1959 to 78.9 percent in 1972.

The Bureau has for many years recognized the necessity of studying outlays for employee compensation. Early attempts were limited to exploratory work on methodology and the availability of data.5 By 1959, most of the technical and conceptual problems had been sufficiently resolved to permit the initiation of a regular program.

The first survey in the program, 1959 expenditures in manufacturing, was followed by a 1960 mining study; a 1961 finance, insurance, and real estate survey; and another manufacturing industry study in 1962. The 1963 study of expenditures for salaried (white-collar) workers, which covered most nonagriculture industries in the private sector, represented the first shift in program emphasis from an industry to an economy-wide orientation. Since then the program has been redesigned to cover all employees in the private nonfarm sector and to cover all significant items of employee compensation.

For 1972, a special study of compensation of State government employees was conducted and separate reports were issued for each State.6 Similar studies for local governments are being considered. Eventually it is planned to expand the program to cover the entire economy.

Description of Survey

The survey relates to employee compensation practices, employer expenditures arising from these prac-

2This was the first recorded private pension plan in America.
ties, and to all hours for which payment is made — hours worked, paid hours of vacation, holiday, sick leave, and civic and personal leave.

The program is designed to provide data biennially for the entire private nonfarm sector; separate information is given for manufacturing and nonmanufacturing industries, for all employees and for office and nonoffice employees separately. Data are also shown separately for nonoffice workers in union and nonunion establishments. Survey coverage extends to the 50 States and the District of Columbia.

The data relate to cash disbursements of employers for employee compensation, hours worked, and hours paid during a calendar year. Data for a lesser period of time do not completely reflect either the outlays made by employers or the number of hours paid for. Paid leave time, for example, usually is spread unequally throughout the calendar year; similarly, expenditures for most of the legally required insurance programs stop after a specified maximum amount is earned by each worker during the year. These practices result in wide variations between expenditures in the early part of the year and in the latter part of the year.

Expenditures

The expenditures studied are considered to constitute the major elements of employee compensation in American industry. The expenditures, and therefore their measurement, fall into three broad categories:

1. payments made directly to the workers and which constitute the total of their gross payroll;
2. legally required social insurances, mandated by the State and Federal Governments, which are most often financed through employment taxes; and
3. expenditures generally made to third party insurers or union-management administered benefit funds.

Items which are included in the workers' gross payroll include pay for time worked (at straight-time and premium rates of pay) and pay for time not worked such as vacations, holidays, sick leave time and time spent in court, on military leave, or for bereavement purposes. Also included in gross payroll are severance payments and nonproduction bonuses which do not provide retirement benefits.

Expenditures to finance legally required insurances include those for Social Security and Railroad Retirement taxes, Federal and State unemployment taxes, workers’ compensation, and in States which require them, payments to finance State Temporary Disability Insurance programs.

The remaining expenditures for compensation provide economic security for the worker and his dependents in the face of old age, death, disability, unemployment, or ill health; or provide paid leisure time. They include monies spent for employee life, accident and health insurance plans, retirement programs, vacation and holiday funds, severance pay funds and supplemental unemployment benefit funds, and savings and thrift plans.

Payroll Hours

The payroll hours studied are all hours for which the workers receive pay. These hours consist of plant or working hours, and vacation, holiday, sick and other hours of paid leave. Although an hour normally is defined as 60 minutes of elapsed time, a payroll hour does not necessarily consist of 60 minutes. For example, hours worked on a day that would otherwise have been a paid holiday are paid for twice—once as a paid holiday, and once as working hours. Therefore, an 8-hour holiday worked, for which 16 hours of payment was made, is counted as 16 hours—half of which are holiday hours and half are work hours. Conversely, some hours of leave are paid for at less than the regular rate and only the equivalent hours are counted. Each overtime hour worked at premium rate is counted as 1 plant-hour.

Establishment Policies

Data on establishment policies give an added dimension to the expenditures data and are important in their own right. Among the policies for which information is collected are the kinds of insurance provided (life, hospitalization, medical, etc.), whether employees must pay part of the cost of their private retirement or insurance coverage, and the number of holidays and weeks of vacation employees receive. The data on establishment policies are also used in the review of the expenditures and hours data collected in the survey.

Data Sources and Collection Methods

The data are obtained from annual records kept by the surveyed establishments. Generally, no single record is sufficient and several record sources must be summarized in each establishment to arrive at annual totals. The data are entered by the employer on preprinted forms in accordance with detailed instructions.

Not all companies keep records in the detail requested and approximations in these cases may be accepted. In general, two types of approximations are used. First, if the establishment records are kept for a broader grouping of employees than are being studied, the prorated share for the workers included in the survey is computed on the basis of employment, hours, or payroll, whichever is most appropriate. Second, by using collateral data, estimates are made where records are not kept but the practice is observed. For example, the expenditures for holiday pay may be approximated...
by multiplying the number of hours paid for holiday leave by average straight-time hourly earnings. Errors occurring from the use of these approximations would have to be in the same direction in substantially all the cases (overstatement or understatement of the actual values) to have a material effect on the accuracy of the results.

Data are collected primarily by mail, although personal visits are made to many of the large employers and to a sample of the establishments that have not responded to a second mailing of the questionnaire. A questionnaire used in the expenditure study is reproduced at the end of this chapter.

**Sampling Procedure**

The surveys are conducted on the basis of a highly stratified probability sample of establishments selected by industry, location, and employment size. The samples generally are designed to yield reliable data for an industry division at the national levels, in four broad economic regions, and for major industry groups.

The lists of establishments from which the samples are selected are those maintained by the State agencies administering the employment insurance laws. These lists show the employment, industry classification, and location of all establishments covered by those laws in each State. Some establishments in particular industries are exempted from the UI laws. The data used in sampling these establishments are obtained from lists compiled by regulatory Government agencies, trade associations, and other sources.

Within each industry, the sample is selected to yield the most accurate estimates possible with the resources available—the principle of optimum allocation. This is done by including in the sample a greater proportion of large establishments than of small. In general, an establishment's chance of selection is roughly proportionate to its employment size.

A subsample of establishments failing to reply to the mail inquiries is selected to represent all nonrespondents, following the same general plan as is used in the original sample. Establishments in this subsample are visited personally, instead of being solicited again by mail.

**Estimating Procedures**

Data for each sample establishment are weighted in accordance with the probability of selection of that establishment. In individual industry studies the selection is based on establishment size strata. For example, a reporting unit which is in a stratum at which the selection probability was set, at 1 out of 5 establishments, will be given a weight of 5, representing itself and four other establishments in this same stratum. In the biennial studies of the entire private nonfarm sector, the probability of selection is proportionate to establishment employment size. Thus, a reporting unit employing 1,000 workers, in a sample where the employment size probability base was set at 10,000, will be given a weight of 10, representing itself and other establishments having an aggregate employment of 10,000 workers. Under both procedures all establishments over a certain size are included.

The sample of nonrespondents for which data are collected by Bureau field representatives is weighted appropriately to represent all nonrespondents.

In the event that usable data cannot be obtained from any unit visited in person, whether among the followup of nonrespondents or among large units often selected in the sample with certainty, its weight is assigned to units in the sample with the most similar industry-size-location characteristics.

All estimated totals derived from such weighting procedures are adjusted further by the level of total employment or paid hours for the survey year, based on data from the Bureau's monthly establishment employment statistics program. For instance, if the level of the aggregates, as derived from the weighting procedures is 40 million in an industry class, and the corresponding level as shown by the employment statistics program is 44 million, the totals of the survey items would be multiplied by 1.1. The adjusted data represent all establishments.\(^7\)

Some improvisation is necessary in the construction of such annual benchmark totals. The monthly employment series provides data for only one pay period each month, and the estimate of annual totals is made by multiplying by the average number of weeks in a year (52.14).

Information from other sources, wherein a detailed breakdown by State or region is shown, is used as a basis for prorating the current employment (or hours) estimates into regional aggregates. Such sources include the Census of Manufacturers and County Business Patterns (based on Social Security establishment data).\(^8\)

**Presentation**

The expenditure data on the individual elements of compensation are combined to give a measure of total employee compensation. The expenditure data for each individual element and for groups of elements are presented as a percent of total compensation, in cents per paid hour, and in cents per working hour. These measures are shown for all establishments, as well as for only those establishments that had an actual expenditure for a particular practice during the reference year. Hours

\(^7\)See ch. 3, "Employment, Hours, and Earnings."

\(^8\)U.S. Department of Commerce, Bureau of the Census, County Business Patterns (various years).
Gentlemen:

The Bureau of Labor Statistics is conducting an important survey of how much companies spend for employee compensation—
for wages and salaries and for programs that provide for employees' health and welfare. Your Government needs this information
to aid in formulating economic policy. Please help us produce the best statistics possible by completing this form.

Information from the survey will be of value to your company also, since it will enable you to compare your expenditures for
employee compensation with those made by industry in general.

Keep a copy of your report on the extra form enclosed. When the Bureau's report on the survey is issued, we will send you a
copy and show you how to compare data for your company with the national averages.

Your report will be held in confidence by the Bureau of Labor Statistics. Nothing will be released relating to individual
companies.

Please complete the form within 3 weeks and return the one with the address label in the enclosed envelope. If you need
assistance in completing the form, phone the Bureau collect at Area code 202, 961-4019 or 961-3725. Thank you for your
cooperation.

Sincerely yours,

JULIUS SHISKIN
Commissioner

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<table>
<thead>
<tr>
<th>I. Company official to contact if there are questions about this report:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name and title (Please print or type)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. Units covered by this report:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is this questionnaire being completed for the unit(s) designated above?</td>
</tr>
<tr>
<td>□ Yes</td>
</tr>
<tr>
<td>□ No</td>
</tr>
</tbody>
</table>

If you checked no, please complete item VIII. at end of questionnaire to describe the units covered.

<table>
<thead>
<tr>
<th>III. Average 1974 employment in units covered by this report:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please enter the average number of employees in each category during 1974. Include full- and part-time employees. Types of employees in each category are described below.</td>
</tr>
<tr>
<td>A. Office employees (1974 average)</td>
</tr>
<tr>
<td>B. Nonoffice employees (1974 average)</td>
</tr>
<tr>
<td>C. Total 1974 average employment</td>
</tr>
</tbody>
</table>

**OFFICE EMPLOYEES**—Include all employees in executive, administrative, and management positions, above the working supervisor level. Also include supervisory and nonsupervisory professional employees and their technical assistants; employees engaged in office clerical operations; and all salespersons whose sales activities are primarily performed outside of the establishment (e.g., real estate salesmen and door-to-door salesmen).

**NONOFFICE EMPLOYEES**—Includes all employees, except office employees as defined above, in nonsupervisory, nonprofessional positions. Include employees engaged in fabricating, processing, or assembling; building or excavating; mining, drilling, or pumping; maintaining or repairing; shipping, receiving, handling, warehousing, packing, or trucking; retail sales; operating or working on moving vehicles (buses, boats, etc.); janitorial work; guard or watchman work; and similar activities.

**TOTAL EMPLOYMENT**—Is the sum of office plus nonoffice employees. Proprietors, members of unincorporated firms, and unpaid family workers are not considered to be employees and are excluded from the survey.
EMPLOYER EXPENDITURES FOR EMPLOYEE COMPENSATION

Part IV.

Line 1. Total gross payroll—Total of wages, salaries, and other payments made during 1974 before any deductions. The amount should equal wages reported on Internal Revenue Service Forms W-2 as subject to Federal withholding taxes, or total remuneration reported on line 11 of IRS Form 940, Employer’s Annual Federal Unemployment Tax Return 1974.

Lines 2 & 3. Pay for overtime, weekend and holiday work—For overtime and weekend work, report the straight-time pay for work beyond the normal workday or workweek on line 2 and the corresponding premium pay on line 3. For example: If overtime is paid at time and one-half, report two-thirds of total overtime cost on line 2 and one-third on line 3. For work on holidays, report straight-time pay for time actually worked on line 2 and any corresponding premium on line 3. Regular holiday pay or “pay in lieu of time off” should be reported only on line 6. For example: An employee worked on a holiday. He received his regular pay for working; plus one-half his regular pay as a premium for having to work on a holiday; plus his normal holiday pay. Report his regular pay for working on line 2, the premium on line 3, and the regular holiday pay on line 6. Report pay for work during vacation periods the same way, on lines 2, 3, and 5.

Line 4. Shift differentials—Total expenditures for pay above regular day-shift rates for work on late shifts. Include pay for hours not worked. For example: If late shift employees work 7½ hours per day but receive pay for 8 hours, report the total of the one-half hour payments as a shift differential.

Lines 5-8. Pay for leave—Report only regular leave expenses. Exclude payments to union administered vacation and holiday funds, trustees, etc., and pay for time actually worked on holidays or during vacation periods. (See overtime examples above under “Lines 2 and 3.”)

Line 9. Nonproduction bonuses—Total amount paid for nonproduction bonuses including lump-sum payments under profit-sharing plans, and other irregular or seasonal bonuses (such as attendance, Christmas, or yearend bonuses). Proceeds of profit-sharing plans which are paid into retirement plans should be reported on line 17; those paid into savings and thrift plans should be reported on line 20.

Line 10. Severance pay—Total of all payments made by the establishment to employees because of temporary or permanent severance of employment. Exclude payments to funds, (report these on line 19) and to pensioners under the provisions of pay-as-you-go pension plans (report these on line 17).

Line 11. Social Security (FICA)—In 1974 the employer’s payment was 5.85 percent of the first $13,200 paid each employee, or a maximum of $772.20 per employee. See IRS Form 941, Employer’s Quarterly Federal Tax Return which you filed in April, July, and October 1974, and January 1975. Report one-half the sum of your quarterly payments (line 14 of the tax forms).

Line 12. Federal unemployment insurance (FUTA)—In 1974 the employer’s payment was 0.5 percent of the first $4,200 paid each employee, or a maximum of $21 per employee. See IRS Form 940 for 1974, line 21. Railroads include total payments under Railroad Unemployment Insurance Act.

Line 13. State unemployment insurance—In most states the payment was at varying rates on the first $4,200 paid each employee. See IRS Form 940 for 1974, column 9.

Line 14. Workmen’s compensation and payments under the Federal Employer’s Liability Act—If your firm was self-insured enter the amount paid on workmen’s compensation claims. If an insurance policy was purchased enter the premium paid for 1974. If payment was made to a State fund enter the amount of the payment. Railroads should report payments made under the Federal Employer’s Liability Act for this item.

Line 15-21. Private welfare plans—Net payments (after deduction of refunds, rebates, and dividends) made during 1974 by the establishment to funds (including union-management funds), trustees, insurance companies, and payments made under the provisions of self-insured plans to employees or their beneficiaries. Include payments for current employees, employees on layoff, retired employees, and their dependents. Exclude employee contributions and all administrative costs incurred by the establishment. Also exclude payments made by funds, trustees, and insurance carriers to your employees or their beneficiaries.

Line 16. Life, accident, and health insurance plans, and union-management administered health funds—Life, accidental death and dismemberment, sickness and accident, wage and salary continuation insurance, and death benefits; and hospitalization, surgical, medical, dental, optical, and drug plans. Exclude expenditures for implant medical care and visiting nurses or physicians.

Line 17. Pension and retirement plans, and union-management administered pension funds—Direct payment to pensioners under a pay-as-you-go pension plan, payments under profit-sharing plans deferred until retirement, and payments for past and current liabilities under funded plans.

Part V.

Line 22. Total number of hours paid for in 1974—Total of all employee hours worked, plus all employee hours of paid leave.

Line 23. Number of overtime hours—All hours actually worked beyond the normal workday or workweek.

Line 24-27. Number of leave hours—All hours actually worked for which employees are paid, even if the time off is not taken. Example: An employee works 8 hours on a holiday. He receives regular pay for 8 hours work, and also receives 8 hours of pay for the holiday. The 8 holiday hours for which he was paid should be included on line 25. The 8 hours actually worked on the holiday should be included on line 23, since these hours were beyond the normal workweek. The total 16 hours for which he was paid should be included on line 22.
General Instructions for Parts IV and V Below

1. Please enter 1974 information for each numbered line.
2. If there were no expenditures or hours for an item, enter "0."
3. If it is not possible to make an estimate for an item, please enter "not available" on the appropriate line.
4. If your records combine data for several items, prorate the combined figure among the items to which it relates OR report the combined figure and clearly indicate to which items it relates.
5. If your records for an item combine data for office and nonoffice employees, please prorate the combined data between the two employee groups in the most appropriate manner. If it is not possible to prorate combined data, enter the total figure under office and enter "combined" under nonoffice.

IF YOU NEED HELP, CALL THE BUREAU COLLECT AT AREA CODE 202-961-4019 OR 961-3725

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Part IV. Total Compensation in 1974</th>
<th>Office</th>
<th>Nonoffice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total gross payroll</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Pay for overtime, weekend, and holiday work:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Straight-time pay for overtime, weekend, and holiday work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Premium pay for overtime, weekend, and holiday work</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Shift differentials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Pay for leave:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Vacation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Holidays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Sick leave</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Civic and personal leave</td>
<td></td>
<td></td>
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<tr>
<td>11.</td>
<td>Employer expenditures for legally required insurance:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Social Security (FICA) or railroad retirement</td>
<td></td>
<td></td>
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<tr>
<td>13.</td>
<td>Federal (FUTA) or railroad unemployment insurance</td>
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<tr>
<td>14.</td>
<td>State unemployment insurance</td>
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<tr>
<td>15.</td>
<td>Workmen's compensation and payments under Federal Employer's Liability Act</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Other, e.g., State temporary disability insurance (specify):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Employer expenditures for private welfare plans:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Life, accident, and health insurance plans, including union-management health funds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Pension and retirement plans, including union-management pension funds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Vacation and holiday funds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Severance pay and supplemental unemployment benefit funds</td>
<td></td>
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<tr>
<td>22.</td>
<td>Savings and thrift plans</td>
<td></td>
<td></td>
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<tr>
<td>23.</td>
<td>Other private welfare plans (specify):</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Part V. Hours Paid for in 1974

<table>
<thead>
<tr>
<th>Line No.</th>
<th>Part V. Hours Paid for in 1974</th>
<th>Office</th>
<th>Nonoffice</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.</td>
<td>Total number of hours paid for in 1974</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Number of overtime hours included in total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Number of leave hours included in total:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Vacation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Holiday</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Sick</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Civic and personal leave</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### EMPLOYER EXPENDITURES FOR EMPLOYEE COMPENSATION

#### VI. Establishment practices and policies:

**A. Paid vacations.** Report the number of employees who received vacation pay during 1974 directly from the establishment according to the amount of pay.

<table>
<thead>
<tr>
<th>Employees</th>
<th>No vacation pay</th>
<th>Under 1 week's pay</th>
<th>1 and under 2 weeks' pay</th>
<th>2 and under 3 weeks' pay</th>
<th>3 and under 4 weeks' pay</th>
<th>4 and under 5 weeks' pay</th>
<th>5 weeks' pay or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonoffice</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**B. Paid holidays.** Enter the number of days per employee. If more than one practice existed for an employee group, report that which applied to the greatest number in the group. If the greatest number of employees received no paid holidays, enter "0."

- Office employees: full days, half days
- Nonoffice employees: full days, half days

**C. Sick leave.** Did the establishment pay sick leave for any—

- Office employees: 
- Nonoffice employees: 

**D. Civic and personal leave.** Did the establishment pay civic leave (military, jury, witness, voting, etc.) or personal leave (such as for death in family) for any—

- Office employees: 
- Nonoffice employees: 

**E. Life, accident, and health insurance plans, and union-management administered health funds. Did the establishment finance any of the following insurance plans or funds for—**

- Office employees: 
- Nonoffice employees: 

**F. Pension and retirement plans or union-management administered pension funds.** Did the establishment finance such a plan or fund for—

- Office employees: 
- Nonoffice employees: 

**G. Collective bargaining.** Did union-management agreements cover a majority of the—

- Office employees: 
- Nonoffice employees: 

**H. Regular workweek, 1974.** How many hours (e.g., 44, 40, 37.5, etc.) and days (e.g., 4.5, 5.0, 5.5) were normally worked each week by the majority of the—

- Office employees: hours per week, days per week
- Nonoffice employees: hours per week, days per week

**I. If you were required to complete the U.S. Department of Labor's OSHA Form 103, "Occupational Injuries and Illness Survey," please enter the figure you reported in Section III of that form (Total Hours Worked in 1974):**

- Office employees: 
- Nonoffice employees: 

**VII. Is the unit(s) for which you are completing this report part of a larger company or corporate enterprise?**

- Under 50 employees
- 50-99 employees
- 100-249 employees
- 250-499 employees
- 500-999 employees
- 1000-2499 employees
- 2500 or more employees

**VIII. Units included in report (if different from that requested in address box):**

If this report relates to units in addition to the one designated at the top of page 1, please provide the following information for each unit included in the report.
1. The expenditure ratios are calculated as follows:
   1. Expenditures as a percent of total compensation for all establishments:
      \[
      \frac{\text{Aggregate expenditures for the practice}}{\text{Aggregate compensation in all establishments}} \times 100
      \]
   2. Expenditures as a percent of total compensation for establishments reporting expenditures:
      \[
      \frac{\text{Aggregate expenditures for the practice}}{\text{Aggregate compensation in establishments reporting expenditures}} \times 100
      \]

B. The expenditure rates are calculated as follows:
   1. Expenditures in cents per paid hour for all establishments:
      \[
      \frac{\text{Aggregate expenditures for the practice}}{\text{Aggregate paid hours}}
      \]
   2. Expenditures in cents per hour of work for all establishments:
      \[
      \frac{\text{Aggregate paid hours minus aggregate paid leave hours}}{\text{Aggregate paid hours}}
      \]
   3. Expenditures in cents per paid hour for establishments reporting expenditures:
      \[
      \frac{\text{Aggregate paid hours in establishments reporting expenditures}}{\text{Aggregate expenditures for the practice}}
      \]
   4. Expenditures in cents per paid working hour for establishments reporting expenditures:
      \[
      \frac{\text{Aggregate paid hours minus paid aggregate leave hours in establishments reporting expenditures}}{\text{Aggregate expenditures for the practice}}
      \]

The distribution of workers by establishment expenditure ratios and rates is published, as well as the averages of ratios and rates. Expenditures also are shown by selected establishment characteristics such as size, compensation level, unionization and, whenever possible, by region.

Analysis

The expenditure data describing the payroll or non-payroll elements of compensation are presented in summary by this characteristic. However, the analysis of the data is related to the benefit function of each element. Thus, for analytical purposes, elements of compensation that provide similar or interchangeable benefits are grouped together. The following groups of compensation elements are studied:

1. Pay for working time; straight time pay, and premiums for overtime, weekend holiday, and shift work.
2. Pay for leave time; vacations, holidays, miscellaneous leave of absence, and payments to vacation and holiday funds.
3. Payments for retirement programs; social security and private retirement plans.
4. Payments for health and related programs; life, accident, and health insurance, sick leave, and workers' compensation.
5. Payments for unemployment benefit programs; unemployment insurance, severance pay, and severance pay funds and supplemental unemployment benefit funds.
7. Savings and thrift plans.

Data are presented on the importance of various types of paid hours relative to all paid hours. Information is also published on the number of paid holidays and number of weeks of paid vacation received by workers.

Uses and Limitations

Data from the surveys are used by employers in comparing their expenditure and hours practices with the averages for their industry and with those of other establishments having similar or dissimilar characteristics (industry, size, location, union status, and average earnings levels of workers). Labor and management use the data in collective bargaining; and Government uses the statistics in the formulation of public policy, in producing estimates of industry output per man-hour, and in making international comparisons. They also are used in deriving estimates of the amount and type of labor compensation and the nature of the hours for which compensation is received by workers.

As indicated earlier, the expenditures studied comprise the significant elements of employee compensation in American industry. The aggregate of the expenditures studied represents total employee compensation. It does not, however, represent total labor cost which is a more encompassing concept and includes factors such as the cost of recruiting and training labor, the administrative expenses incurred in administering benefit programs, and many other expenditures resulting from the use of labor as a factor of production. Some of these expenditures may be important in particular establishments.

The expenditures and hours data are subject to both sampling and reporting errors, the precise magnitude and direction of which are not known. Nevertheless, the errors resulting from sampling generally are considered to fall within acceptable confidence ranges; and reporting errors, to have a material effect on the accuracy of the results, would have to be in the same direction in substantially all of the cases.
Technical References

   A study of the availability of records, willingness and ability of industry to provide data, the quality of expenditure data, and other matters of methodology and definition.
Chapter 25. The Employment Cost Index

Background

The Bureau of Labor Statistics is developing a new measure of the rate of change in employee compensation called the Employment Cost Index (ECI). This effort was initiated in response to a need for such a statistical series, expressed with increasing frequency over the past decade by government policymakers. Existing measures, while adequate for specific purposes, were found to be too fragmented, too limited in coverage, insufficiently timely or detailed, or subject to the influence of factors unrelated to the basic trend. The Bureau's basic objective is to produce a timely and comprehensive measure of changes in the price of labor services akin to the Consumer Price Index's measurement of the movement of prices of consumer goods and services. A corollary requirement is that the major components of the measure be capable of separate analysis.

Timeliness is important: The change in the measure must be available as soon as possible after it has occurred, not many months afterward. The measure should be comprehensive to cover costs incurred by employers for employee benefits in addition to wages and salaries and to encompass all industries, occupations, and areas. And the measure should be standardized so that it has a constant industrial, occupational, and geographic composition, much like the fixed-weight market basket of commodities in the Consumer Price Index.

The full development of the ECI will require a period of several years. Initially only quarterly percentage changes are being published for wages and salaries in the private nonfarm economy (excluding households) and for selected components of the economy. The ECI will be expanded gradually to broaden its coverage, detail, and frequency to a monthly index of all employee compensation in the economy as a whole. A more detailed set of statistics for industrial, occupational, and geographic components will also eventually be available.

In the course of developing the ECI, the Bureau obtained the advice of representatives of business and labor and consulted the academic and professional statistics communities. Extensive testing of procedures preceded data collection. The suggestions received and the experience gained in testing, together with the resources available and considerations of what was operationally feasible, helped shape the initial survey design.

Description of the Index

Major Features

The ECI is a measure of change in the price of labor defined as compensation per employee-hour worked. The self-employed, owner-managers, and unpaid family workers are excluded from coverage.

The ECI is designed as a Laspeyres, fixed-weight index at the occupational level, thus eliminating the effects of employment shifts among occupations. The index weights are derived from occupational employment for ECI industries reported in the 1970 Census of Population; the weights remain fixed from period to period pending a major index revision, which is next scheduled to occur when the results of the 1980 Census become available.

The index is computed from data on compensation by occupation collected from a sample of establishments weighted to represent the universe of occupations and establishments in the economy. The wage and salary component of the index is represented by straight-time hourly earnings in the occupation. Straight-time earnings are defined as total earnings before deductions, excluding premium payments for overtime, weekend, and late-shift work. Earnings include production bonuses, commissions, and cost-of-living allowances. They exclude payments in kind, room and board, tips, etc. The data collected are average wage and salary rates for the occupation, not aggregate payrolls divided by aggregate hours. Information on benefits, not yet covered at the current stage of development of the index, will be collected from the establishments reporting wage and salary data.

1 In its initial development, the measure was referred to as the General Wage Index. The term Employment Cost Index was substituted as a more appropriate description. For some of the seminal thinking on the ECI, see Norman J. Samuels, "Developing a General Wage Index," Monthly Labor Review, March 1971, pp. 3–8.

All earnings are computed on an hourly basis, whether or not this is the actual basis of payment. Earnings of salaried employees and those paid under incentive systems are converted to an hourly basis. Benefits will also be converted to an hourly basis when collected. Thus occupational hourly earnings plus the employer's cost per hour worked for employee benefits constitute the price of labor in the ECI.

Since pay rates generally pertain to the job rather than to the incumbent workers, the basic unit of data collection is an occupation in an establishment. The occupation is comprised of all those workers employed in jobs classified under an ECI occupation in the establishment. Thus the ECI measures changes in rates of pay for specific jobs, not changes in the earnings of individual workers.

While shifts in the types of workers within the occupation in a given establishment may affect wage movements, shifts in employment among occupations and establishments are controlled by measuring wage change for the same occupations in the same establishments and applying fixed employment weights to the results. The unit of observation is standardized to a certain extent below the occupational level by measuring only certain types of labor within the occupation, e.g., full or part time, incentive or time rated, depending on the predominant type.

**Scope**

The scope of the ECI will expand in four discrete stages:

- **Stage 1.** Straight-time hourly earnings; private nonfarm economy except households; quarterly percent changes; limited published detail (present stage of development).
- **Stage 2.** Straight-time hourly earnings and benefit costs; private nonfarm economy except households; quarterly indexes; limited published detail.
- **Stage 3.** Straight-time hourly earnings and benefit costs; total civilian economy; quarterly indexes; limited published detail.
- **Stage 4.** Straight-time hourly earnings and benefit costs, total civilian economy; monthly indexes; expanded published detail.

**Occupational Classification**

The ECI occupational classification system is based on the classification system used to collect data for the 1970 Census of Population. The Census system classifies all occupations reported into 441 3-digit occupational categories (such as Accountant, Stockhandler, etc.) which are then combined into 12 occupational groups:

- Professional, technical, and kindred workers
- Managers and administrators, except farm
- Sales workers
- Clerical and kindred workers
- Craft and kindred workers
- Operatives, except transport
- Transport equipment operatives
- Laborers, except farm
- Farmers and farm managers
- Farm laborers and farm supervisors
- Service workers, except private household
- Private household workers

For the ECI, the list of 441 occupations was modified to eliminate categories which are inappropriate for data collection purposes and in some instances to collapse occupations into a single category. The net effect was to reduce the 441 categories to 417.

Furthermore, only 9 of the 12 occupational groups listed above were used in the initial wage and salary survey. Farmers and farm managers, farm laborers and farm supervisors, and private household workers were excluded. For later stages of development of the index, all occupational categories listed will be included.

The Census occupational classification system merely lists occupations and occupational categories; no definitions are provided. For data collection purposes, definitions of the occupations have been developed.4

The occupations surveyed differ from industry to industry and from establishment to establishment, although in sum they represent the broad spectrum of occupations in the private nonfarm economy.

**Industrial Classification**

The ECI currently covers all private nonfarm establishments classified in major industry divisions B through H defined in the 1967 edition of the *Standard Industrial Classification Manual* (SIC), with the exception of private households. Published data are limited to the five major divisions of contract construction; manufacturing; wholesale and retail trade; transportation, communication, electric, gas, and sanitary services; and services, except private households, because the sample size is insufficient to support separate publication for mining, and finance, insurance, and real estate at this time. No minimum establishment size cutoff is used.

**Data Sources and Collection Methods**

The compensation data from which the ECI is computed are obtained quarterly from a sample of about


2,000 establishments and from a sample of occupations within these establishments. Occupational employment data for sample selection and weighting were also collected for the survey occupations in the sample establishments and in about 8,000 additional establishments from a larger sampling frame.

The index weights were derived from occupational employment figures reported in the 1970 Census of Population.

Data collection is initiated by a BLS field representative with an initial visit to the survey reporting unit. Quarterly reports thereafter are normally collected by mail or telephone to the BLS regional office. The purpose of the initial visit are: to introduce the program and obtain cooperation; to determine the organizational unit or units for establishment coverage; to perform job matches; to develop establishment reporting procedures; and to complete the first schedule.

A major task in the initial contact is job matching, that is, determining the jobs and workers in the establishment that match the occupation as defined for the survey. The job match and resulting employment figures are carefully documented on BLS form 3038 A, which also contains basic information about the establishment.

The establishment's reporting procedures are also recorded on BLS Form 3038 A. The preferred reporting arrangement is to have the establishment report the straight-time average hourly rate for each matched occupation. When this is not possible, the establishment may (1) report hourly rates, or hours and earnings, for each worker in a matched occupation (or provide comparable payroll records), placing the burden of computing the occupation average hourly rate on the BLS regional office; (2) report earnings detail for a sample of workers in all company jobs which match an ECI occupation; or (3) report earnings detail for all workers in a sample of company jobs which match a single ECI occupation. Options 2 and 3 reduce the burden of reporting where the number of incumbents or jobs is too large for efficient reporting. In practice, options 2 and 3 are seldom used.

Other determinations which are made at the time of initial collection are the characteristics of the occupations—whether the majority of incumbents are full or part time, time or incentive workers, or covered by collective bargaining agreements. This information is also recorded on BLS Form 3038 A.

The wage data are collected on BLS Form 3038 B. (See p. 184). This form is used as a shuttle and is sent back to the respondent for addition of new data every quarter. The survey months are March, June, September, and December; the data pertain to the pay period which includes the 12th of the month.

The information on forms 3038A and 3038B is coded, keypunched, and transmitted to the Bureau’s Washington office; questionable cases are verified, and the data are made ready for computation.

The Survey Design

Planning for the ECI survey involved the consideration of alternative designs within the overall budgetary constraint. Some of the major elements entering into these considerations were the basic ECI products desired, the availability of data, and requirements to assure statistically reliable estimates. Other elements considered were the efficiency of alternative collection procedures and the probable degree of cooperation from respondents.

Key factors in the ultimate choice of a survey design were the importance attached to obtaining initial data by personal visit, the availability of Census data on occupational employment among industries, and test results showing that respondents were more responsive to furnishing occupational wage data than wage data for individual employees.

The interaction of all the above planning considerations and test results led to the adoption of a survey design with the following features:

a. Selection of a set of sample occupations by industry based on the 1970 Census occupational employment distributions.

b. Sampling in two phases. The first phase consisted of about 10,000 employing units, the second phase of about 2,200. Collection of employment data for the selected occupations in (a) was undertaken in the first phase. However, maximum use was made of available data from BLS Occupational Employment Surveys wherever feasible.

c. A two-way controlled selection of sample establishments and occupations in the second phase of sampling as discussed in the following section. The resulting sample was used for wage collection purposes.

d. Data collection in the first phase by mail survey, in the second phase by initial personal visit and by mail or telephone thereafter.

Sampling

Selection of Sampling Units

Phase I occupations were selected from employment data provided by the 1970 Census of Population. An average of 23 occupations was selected for each of 62 SIC industry groups, generally at the 2-digit SIC level. Five of the occupations—those with the largest industry employment—were selected with certainty; two occupations were selected by sampling within each of nine major occupational groups within the industry.

The collection methods described here relate to the ongoing wage and salary survey in the private nonfarm economy. Procedures for collecting data on benefit costs and the agricultural, household, and government sectors are still being developed.

**ECI WAGE DATA FORM**

<table>
<thead>
<tr>
<th>Line no.</th>
<th>BLS occ. code</th>
<th>Identification of survey occupations, company jobs, or individuals for whom wage information is being reported on each line</th>
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<tbody>
<tr>
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<td>20</td>
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</tbody>
</table>

* Please use the back page of this form to explain significant earnings changes (i.e., decreases or large increases in the average rate of pay for an occupation) from one reporting period to the next.
The 18 occupations selected by sampling, together with the 5 certainty occupations, were then used as the 23 sample occupations in the first phase of data collection. The necessary factors for sample weighting were also obtained from this sampling activity.

Phase I establishments were a subsample of 10,000 from a probability sample of 200,000 previously selected for the 1972 Occupational Safety and Health (OSH) Survey. The latter sample was derived from a frame of about 4,000,000 reporting units covered by the unemployment insurance programs of each of the States. Generally, in manufacturing industries the reporting unit and the establishment are identical; in nonmanufacturing the reporting unit is a combined one for establishments with common activity in a county.

The selection of the 10,000 Phase I units was a probability-proportional-to-size (PPS) procedure applied to a 3-digit SIC industry classification of reporting units by employment size from the 1972 OSH file. The initial file used for ECI was not a complete universe, and a supplementary probability procedure was used to assure that the final ECI sample represented the entire frame of all units in the United States within the survey scope.

A match of the 10,000 Phase I units was made with the Occupational Employment Survey file. About 1,000 common units were found for which no new data on occupational employment were sought. Each of the remaining units was sent a schedule with the 23 occupations for the respective industry and was asked to provide employment counts by occupation. These data were edited and used in the Phase II sample selection. Where a unit was matched from the OES survey, OES data were compiled and structured to fit the ECI occupational categories. When a sample unit did not respond, data were imputed using average data from a comparable group of reporting units, usually at the 3-digit SIC level. The occupational data were then weighted, using weights derived from the overall Phase I PPS selection procedures.

Phase II of the double sampling procedure led to the final sample of about 2,200 establishments and the identification of the final set of specific occupations sampled within each establishment. The method of sampling employed in the second phase used a PPS procedure and adopted a principle first suggested by Lahiri.7 The principle was used with a single selection of establishments for each of 23 occupations jointly using a two-way controlled selection procedure. The general objective is to select establishments so that:

a. There is joint probability selection of establishments for all 23 detailed occupations in a given subindustry;
b. The number of selected sample occupations in an establishment is consistent with the expected number from an optimum allocation of the sample and condition-

c. The number of establishments to be asked to provide information on each sample occupation is consistent with the overall survey design plan; i.e., about 2,200.

The single selection of establishments for each of the 23 occupations in every one of the 62 industries was carried out in a series of steps.

In the first step, the weighted employment data from the Phase I survey were converted to relative measures of size within each occupation, with the sum of all such measures in an occupation across establishments equal to 1.00. For example, if weighted employment in an establishment represented 1.3 percent of total employment for the occupation, the relative measure of size would be 0.013.

The next step identified the maximum relative measure of size for each establishment, that is, the largest of all the occupational relative measures for that establishment. These maximum relative measures ranged from a very small fraction to 1, the latter representing an establishment which employed all of the workers in a given occupation in the industry.

The third step used the maximum relative measure of size to select Phase II establishments. To do this the data on the maximum relatives were cumulated successively across establishments to provide a basis for systematic PPS selection. In order to carry out the PPS selection it was necessary to determine the expected number of sample establishments in the particular industry by using the ratio of Phase I establishments in the cell to the total number in all cells multiplied by the overall Phase II sample size. The PPS systematic interval for a cell was calculated as the sum of the maximum relative measures of size divided by the expected number of Phase II sample establishments. The PPS selection was then carried out using a random start and successive multiples of the sampling interval. As a result of this step, the actual Phase II establishments were selected. Also identified were the sample occupations with the maximum relative measure of size for each of the selected establishments.

The fourth step used the data on relative measures of size for the occupations in the Phase II establishments (selected in the third step) in a two-way controlled selection method to determine which occupations would be in the sample for each establishment. This step involved converting the occupational relative measure of size into ratios relative to the sample establishment's maximum relative measure of size, and summing the ratios for each occupation across establishments in the cell and for all survey occupations in each establishment. The former sum indicates the expected number of establishments for a given occupation that would be provided by a single pattern of two-way controlled selection; the latter indicates the expected number of occupations for a given establishment provided by a single pattern. In two-way controlled selection, the occupational ratios are used with constraints on achieving both sets of expected numbers.
Simultaneously. Various single-way patterns are used to select sets of establishments and occupations.

The fourth step of the sample design was executed by use of a computer program developed for the two-way controlled selection. The process of selection required multiple patterns in order to achieve the goal of between 7 and 12 occupations for which periodic reports would be required from each sample establishment.

**Sample Rotation**

Current plans are to build sample rotation into the ECI program. Only very large establishments would be excluded from the rotation scheme. The cycle of sample rotation has not yet been established, but a 3- to 5-year rotation plan is under consideration.

**Index Computation**

The basic computational framework is the standard formula for a price-type index number with fixed weights as modified by the special statistical conditions which apply to the ECI. This formula (simplified for illustrative purposes) shows the fixed employment weights applied to compensation over the index computation periods as:

\[ I_t = I_{t-1} \cdot R_t \]

where \( R_t = \frac{\sum_s O_j \bar{X}_j}{\sum_s O_j \bar{X}_{j-1}} \)

and \( I \) is the symbol for the index, \( R \) represents a ratio of wage bills, \( \bar{X}_j \) is the symbol for average occupational compensation (initially straight-time pay) in time \( t \), and \( 0 \) is the symbol for occupational weight. Further amplifying this formula, the wage bill relative \( R_t \) is obtained by summing weighted occupational earnings across occupation within major occupational groups, major occupational groups within industries and, then the 62 SIC industry groups. This operation is expressed as:

\[ R_t = \frac{\sum_k \sum_h \sum_j O_j \bar{X}_j}{\sum_k \sum_h \sum_j O_j \bar{X}_{j-1}} \]

where \( k \) represents the SIC, \( h \) is the major occupational group, and \( j \) the Census occupation.

All indexes are computed from the following data:

a. Average straight-time hourly earnings for 3-digit census code occupations in the sample of matched establishments in the current and previous survey periods. The occupational wage data are identified by major occupational group, industry, geographic location, and metropolitan area and union status.

b. Employment, in 1970, for the 3-digit census code occupations in an industry cell, obtained from the decennial census.

c. Sample weights derived for each establishment-occupation from the prior Phase I occupational employment survey or the initial employment reported on the survey schedule.

The index computation involves essentially five steps:

1. Establishment-occupation sample weights are applied to the occupational earnings to obtain weighted average earnings for each occupation in each of the 62 SIC industry cells for the current and preceding survey periods.

2. These weighted average earnings are multiplied by base weight period employment from the decennial census to obtain wage bills for each occupation-industry cell for the survey periods.

3. The wage bills are summed across all cells to obtain total wage bills for the survey periods.

4. The aggregate wage bill for the current survey period is divided by the wage bill for the prior period to obtain ratios.

5. Initially, the ratios are converted to quarterly percentage changes. Eventually, the ratios will serve as link relatives to move the index from quarter to quarter.

The example shown to illustrate these steps uses hypothetical data attributed to an economy consisting of three establishments employing workers in two occupations, for the survey periods of September 1975, December 1975, and March 1976.

The computations for the occupational groups and industry divisions, follow the same procedures as those for the overall indexes except for the summation. The wage bills for the occupational group are summed across industries and regions for each group; the wage bills for the industry divisions are summed across occupational groups and regions for each industry division.

Computation procedures for the regions, union-nonunion and metropolitan-nonmetropolitan area indexes are identical to these for the overall index except that the establishment occupational rates are classified according to region, union-nonunion or metropolitan-nonmetropolitan area status for separate computations.

**Presentation**

The ECI is published quarterly in the second month after the survey period. For example, percentage changes computed from the survey data for June published in August. The release summarizes the

* In certain limited circumstances, when occupational wage data for establishments are not reported in the current survey period, the last reported data are projected forward by the average percent change in occupational wage data for the same occupation reported by other sample establishments in the cell. The projected wage data are imputed to the nonreporting establishment for the current survey period.
### Illustrative Index Computation

#### Step 1: Establishment-occupation sample weights are applied to the occupational earnings to obtain weighted average earnings for each occupation in each of the 62 SIC industry cells for the survey periods:

<table>
<thead>
<tr>
<th>Sample occupation</th>
<th>Straight-time hourly earnings</th>
<th>Sample weight (4)</th>
<th>Computation of weighted average earnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricians:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establishment 1</td>
<td>$5.30</td>
<td>$5.31</td>
<td>$5.40</td>
</tr>
<tr>
<td>Establishment 2</td>
<td>5.20</td>
<td>5.22</td>
<td>5.38</td>
</tr>
<tr>
<td>Establishment 3</td>
<td>5.16</td>
<td>5.18*</td>
<td>**</td>
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<tr>
<td>Total</td>
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<tr>
<td>Carpenters:</td>
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<tr>
<td>Establishment 1</td>
<td>4.90</td>
<td>4.90</td>
<td>4.94</td>
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<tr>
<td>Establishment 2</td>
<td>4.80</td>
<td>4.86</td>
<td>4.94</td>
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<tr>
<td>Establishment 3</td>
<td>4.86</td>
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<td>Weighted average</td>
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</table>

**NOTE:** Asterisk (*) indicates imputed data. Two asterisks indicate that Establishment 3, classified as a temporary nonrespondent in December, is a dropout in March. In (a) imputed data from Establishment 3 are used in calculation; in (b) only data from Establishments 1 and 2 are used.

#### Step 2: These weighted average earnings are multiplied by base weight period employment from the decennial census to obtain wage bills for each occupation-industry cell for the survey periods:

<table>
<thead>
<tr>
<th>Sample occupation</th>
<th>Weighted average earnings</th>
<th>Occupational weight—1970 census employment</th>
<th>Wage bills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sept. (1)</td>
<td>Dec. (2a)</td>
<td>Mar. (2b)</td>
</tr>
<tr>
<td>Electricians</td>
<td>$5.196</td>
<td>$5.215</td>
<td>$5.250</td>
</tr>
<tr>
<td>Carpenters</td>
<td>4.848</td>
<td>4.883</td>
<td>4.875</td>
</tr>
<tr>
<td>Total wage bill, craft and kindred workers, Industry 1</td>
<td>25,284</td>
<td>25,421</td>
<td>25,500</td>
</tr>
</tbody>
</table>

**NOTE:** Col. (2a) includes imputed figures from Establishment 3 (see step 1); Col. (2b) excludes Establishment 3.

#### Step 3: The wage bills are summed across all cells to obtain total wage bills for the survey periods:

<table>
<thead>
<tr>
<th>Industry</th>
<th>Wage bills</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$25,284</td>
</tr>
<tr>
<td>62</td>
<td>285,125</td>
</tr>
</tbody>
</table>

#### Step 4: The aggregate wage bill for the current survey period is divided by the wage bill for the prior period to obtain ratios:

- **December** = $287,345 ÷ $285,125 = 1.0078
- **March** = $291,600 ÷ $287,650 = 1.0137

#### Step 5: The ratios are converted to quarterly percentage changes:

- **December** = 0.78 percent
- **March** = 1.37 percent

Eventually, the ratios will serve as link relatives to move the index from quarter to quarter:

- **September index** = 100.00
- **December index** = 100.00 × 1.0078 = 100.78
- **March index** = 100.78 × 1.0137 = 102.16
Uses and Limitations

The Employment Cost Index will provide for the first time, a comprehensive and timely measure of changes in the rate of employment compensation, free of much of the influence of employment shifts. Such a measure may be especially useful for understanding and explaining trends in compensation, forecasting such trends, and relating them to other economic variables. In addition, it may be of use in the formation of wage decisions by parties to collective bargaining and in contract cost escalation, as well as for those presently unforeseen uses which inevitably arise from the ingenuity of the users. The ECI is not, however, intended as a substitute for existing measures of compensation, all of which are useful for their purposes. In many instances, it may complement or illuminate existing statistical series.

The limitations of the index must be kept in mind. Because the ECI is an index, it measures changes rather than levels of compensation. Further, the index is not a measure of the total cost of employing labor. Not all labor costs (e.g., training expenses, retroactive pay, etc.) fall under the Employment Cost Index definition of compensation; moreover, total employment costs vary with the amounts and types of labor used—factors which are held constant in the Employment Cost Index. In its initial stages the ECI will not cover all employers and employees and all compensation; ultimately this limitation will be eliminated. Finally, the index is not a pure rate measure. Although straight-time hourly earnings provide a close approximation of the rate and the Employment Cost Index is designed to eliminate employment shifts among establishments, industries, and occupations, employment shifts within the occupations and longevity pay increases will influence the level of earnings reported by the respondent.

Some of these limitations are temporary; some are built into the conceptual framework of the measure; and others stem from deficiencies in the state of the art of measurement which will be resolved in time with research and improvements in technique.

Technical References

Number

Chapter 26. Employee Benefit Plans

Background

The Bureau's studies of employee benefit plans date back to the early fifties when employment-related health benefit programs first appeared in collective bargaining agreements.¹ Before World War II job-related plans protecting employees and their dependents against the financial consequences of accident, sickness, death, and old age were practically nonexistent, especially for production workers. The development of these types of protection was stimulated by the Internal Revenue Act which as early as 1921 granted favorable tax treatment to employer contributions to both pension and welfare plans and to pension plan investment income. However, the phenomenal upsurge in plan growth resulted chiefly from three factors (1) wage controls during World War II and the early postwar period that permitted benefit plans while denying wage increases, (2) the National Labor Relations Board's interpretation of the Labor Management Relations Act of 1947 making pensions a legitimate collective bargaining issue (upheld by the U.S. Supreme Court in 1949) and (3) the 1949 report of the Steel Industry Fact Finding Board which maintained that industry had both a social and economic obligation to provide workers with social insurance and pensions. The wage freeze during the Korean War provided added stimuli to the growth of benefit plans.²

During the 1940's and 1950's, the establishment or improvement of such plans was almost always a collective bargaining issue. In the 1960's unions also succeeded in negotiating more comprehensive coverage, mostly by enlarging the scope of existing plans.

The Bureau's first studies were made in the 1940's and 1950's. These were based on small samples of negotiated plans and were designed to provide information about health benefit plans provisions rather than to collect statistics on the prevalence of such plans.³

In the late 1940's the Bureau issued several reports on health and insurance and retirement plans as part of its long-range program conducted jointly with the Social Security Administration and the U.S. Public Health Service of the Federal Security Agency (now the Department of Health, Education and Welfare). After the universe of employee benefit plans became known (as a result of the reporting requirements of the Welfare and Pension Plans Disclosure Act of 1959), the studies were based on scientifically selected samples representative of all plans filed under the Act.⁴

As a result, for the first time plans not under collective bargaining were included as were a representative sample of small plans, whether negotiated or not. These improvements in sampling, which are reflected in reports for 1960 and subsequent years, greatly enhanced the usefulness of the Bureau's studies.

Users

The Bureau is the major source of data on the extent to which workers are protected by job-related health and insurance, and pension plans, the protection afforded their dependents, and the extent to which they are protected after they are laid off or retire from active employment. Universe estimates based on the sample data collected generally are available in Bureau publications. They are frequently used by labor and management representatives involved in contract negotiations, State and Federal conciliators and mediators, public and private arbitrators, Congressmen and Congressional staff considering legislation affecting the welfare of workers, and government officials responsible for recommending legislation and reviewing proposed legislation. BLS studies and reports are used by teachers, students and others in the academic field, private consultants, researchers, writers, and others not directly involved in legislation or collective bargaining but who are concerned with the development,

¹For background information of the Bureau's role in the gathering of data on the results of collective bargaining see ch. 28, "Collective Bargaining Agreements."
⁴In accordance with the Act, administrators of welfare and pension plans, excluding those for government workers and employees of nonprofit organizations, having at least 26 participants filed with the Department of Labor detailed descriptions of their plans, including all amendments. Administrators of plans having at least 100 participants also had to file annual statistical reports on the financial status of their plans. In general, similar filings are required by the Department, in accordance with Employee Retirement Income Security Act, signed into law by the President on September 2, 1974, which replaces the Welfare and Pension Plans Disclosure Act.
status, and trends in employee benefit provisions and coverage.

**Description and Methodology**

Detailed analyses of the provisions of employment-related pension plans and health and insurance plans provide the core of the Bureau's major studies of employee benefit plans. The Bureau publishes several *Digests* that summarize the major provisions of selected pension plans, health and insurance plans, and other types of employee benefit plans. The pension studies are limited to retirement plans that provide monthly cash income for life to eligible workers. Deferred profit sharing plans, stock bonus plans, savings and thrift plans and other tax-qualified plans have not, as yet, been studied in detail. The employment-related health plans studied by the Bureau provide one or more of the following benefits: Hospital, surgical, medical, and major medical benefits. Many also include dental and vision care benefits as well as benefits for out-of-hospital diagnostic and laboratory services. Life insurance (including death benefits), accidental death and dismemberment insurance, and benefits for short and long-term disabilities are the more common benefits provided under insurance plans.

Statistical reports of the Bureau are based on probability samples representing the universe of plans filed with the Department of Labor. These samples include with certainty all the large plans—usually those having at least 5,000 participants— and, depending on the purpose of study, samples of smaller plans, stratified by such factors as worker coverage, and type of employer unit (single or multi-employer). Studies of this type are made in anticipation of requests for statistical data for legislation and for collective bargaining. In addition, several studies have been made at the request of or under contract with other government agencies such as the Labor-Management Services Administration, the Employment and Training Administration (formerly the Manpower Administration), and the Social Security Administration.

For the statistical studies that are now in progress the Bureau defines a single pension plan as one where the following provisions are identical for all plan participants: Age and service requirements for participation, vesting, normal retirement, early retirement, and special early retirement; definition of a full year of service in terms of hours worked; and definition of “break in service.” Previously, the Bureau accepted the administrator’s definition of a plan and if variations existed, analyzed the provisions applicable to the largest group of workers. Similarly, the Bureau defines a health and insurance plan as one that provides identical health benefits for a specified group of workers, i.e., all workers in the groups receive the same types and levels of benefits. Previously, as in the analysis of pension plans, if type or level of benefits varied, the benefits analyzed were those available to the largest group of workers.

The detailed analyses of health and insurance plans, and of pension plans involve the interpretation of complex legalistic language and insurance industry terminology, and conversion of the interpretations into codes which are aggregated to provide universe estimates of the number of plans and workers covered by specified plan provisions, requirements, etc. The interpretation of these aggregates are then summarized in nontechnical language as well as in statistical tables.

Digests of major provisions of selected health and insurance plans and selected pension plans are prepared periodically and published in the *Digest of Selected Health and Insurance Plans* and the *Digest of Selected Pension Plans*. While the plans (about 150) included in each Digest are not representative of the universe of plans, they are “leading” plans that set the trend of plan development. Each plan was initially selected because it represented a large number of workers in a particular industry or because of its unique features. The benefits described in each summary are those available to the largest group of workers covered by the plan. The Digests are kept up-to-date by the issuance of supplements. New Digests are reissued every 3 or 4 years.

The digests of selected health and insurance plans and selected pension plans are prepared by analyzing major provisions of selected plans and then summarizing the analysis into nontechnical text. To assure completeness and accuracy of interpretation, the summaries are reviewed by the parties to the plans. Also, whenever a plan is changed the parties are requested to update the published plan summary. The revised summary, which is reviewed by the Bureau for completeness and consistency in interpretations, is issued as a supplement to the *Digest*. (Digests of other types of employee benefit plans such as profit-sharing, stock bonus and savings plans, and supplementary unemployment plans have also been prepared using the method described above, but they are not kept up-to-date.)

Since almost all of the plans summarized in each edition of the *Digests* were included in the previous edition comparisons are readily made. Articles on recent changes in these significant plans are regularly published in the *Monthly Labor Review*.

Other employee-benefit publications of the Bureau include articles on the incidence of pension plans, based on results of the Bureau’s biennial surveys of expenditures for employee compensation (see chapter 24) and on the prevalence of collectively bargained health and insurance and pension plans based on data collected for the Bureau’s *Directory of National and International Labor Organizations* (see Chapter 29).
Technical References

Number

**Pensions**


**Health and Insurance**


**Health and Insurance and Retirement**


**Directory**

Chapter 27. Work Stoppages

Background

Work stoppage statistics are compiled by the Bureau of Labor Statistics to provide a quantitative measure of the extent to which disputes between labor and management result in strikes or lockouts and of the immediate economic disruption resulting from such stoppages. When considered along with general economic measures, these statistics also serve at times as a broad indicator of the state of industrial unrest.

The first attempt by any Federal agency to compile statistics on strikes was made in 1880, when the Bureau of the Census sent questionnaires to employers and workers involved in all disputes which were noted in the public press during the year. Information was received on 762 situations. Some data were obtained on the causes of strikes and their results, but not on the number of workers involved or resultant days of idleness.

The next collection of strike statistics was undertaken in 1887, when the Bureau of Labor, then in the Department of the Interior, examined files of newspapers, trade journals, and commercial periodicals for references to strikes for all years from 1881 to 1886. Staff members visited the areas where strikes were reported and obtained detailed information about each strike from every available person or source. As a consequence of these efforts, data were published for the 1881-1905 period on the number of strikes and workers involved, with breakdowns by industry and State; the number of establishments involved; and the percentage of strikes involving labor organizations.

No Federal agency collected national information on stoppages occurring during the 1906-13 period. In 1914, relying exclusively on printed sources, the Bureau of Labor Statistics attempted to compile a record of all strikes and lockouts during the year. In the following year, the Bureau inaugurated a method for the collection of strike and lockout material which has been followed, with modifications, since that time. Briefly stated, the procedure was to send questionnaires to the parties involved in work stoppages, following receipt from the press and other sources of notices relating to these situations.

Improvements in the program in 1927, in particular the procurement of data on the number of workers involved in all stoppages and the computation of days of idleness, inaugurated the modern series of monthly and annual strike data.

Description of the Series

The present series on work stoppages covers all strikes and lockouts known to the Bureau of Labor Statistics and its cooperating agencies. It covers all that continue for 1 full day or shift or longer and involve six workers or more. These limitations on size and duration, somewhat arbitrary but of long standing, are necessary for reasons of efficiency, and, in part, because of the difficulty involved in defining, identifying, and securing information on strikes that last a few hours or less.

The Bureau defines a strike as a temporary stoppage of work by a group of employees to express a grievance or enforce a demand. A lockout is defined as a temporary withholding of work by an employer (or a group of employers) to enforce terms of employment on a group of employees. Since 1922, the Bureau has made no attempt to distinguish between strikes and lockouts in its statistics; both types are included in the term "work stoppages" and, for the sake of convenience in writing, in the term "strikes."

Although an employer-employee dispute is implicit in these definitions, some inclusions in the Bureau's series relate only indirectly to this concept. For example, jurisdictional strikes and rival union disputes between two unions or more often have the employer on the sidelines. In a sympathy strike, the issue of the stoppage does not usually involve the immediate employer. Moreover, protest strikes against the actions of governmental agencies are not the result of a dispute between an employer and his employees.

All stoppages, whether or not authorized by the union, legal or illegal, are counted. On the other hand, the Bureau's series excludes strikes of American sea-

1Throughout this chapter, the terms "work stoppage" and "strike" are used interchangeably; both terms, unless otherwise noted, also include lockouts. The definitions, terms, and classifications used by the Bureau in compiling work stoppage data were adopted for statistical and research purposes and have no legal significance.

2On the State level, the Bureau of Labor Statistics of Massachusetts, issued a report in 1880 on strikes in that State from 1825. In 1881, the Bureau of Industrial Statistics of Pennsylvania issued a report on strikes in that State from 1835.

3For additional information on the early history of the work stoppage statistics program, see BLS Bulletin 651, Strikes in the United States, 1880 to 1936 (1938).
men or other workers in foreign ports and strikes of foreign crews in American ports. Also excluded are so-called slowdowns, where employees continue at work but at deliberately reduced production speed, and those instances in which workers report an hour or two late each day as a protest gesture or quit work several hours before closing time to attend rallies or mass meetings.

The number of work stoppages occurring during a given period provides a measure of the frequency of disputes; the severity and effect of such actions are measured by the number of workers involved, duration, and the resultant days of idleness. The basic statistical unit in the Bureau's series is the individual strike or lockout. If groups of employees (regardless of their number and type and location of employment) join in a work stoppage for a common objective, their action is classed as a single strike.

The figure used for the number of workers involved in a strike or lockout is the maximum number actually made idle in the establishment or establishments directly involved. No distinction is made in arriving at this figure between the active participants in the strike, the number of union members or workers covered by an agreement, and those sent home by the employer when a stoppage by one group or department prevents plant operation.

Days of idleness, like the number of workers involved, are based on the idleness at the establishment or establishments directly involved. Workers involved multiplied by workdays lost equal total days idle. In instances where the number of workers idle varies during the period of the stoppage, appropriate adjustments are made in this calculation. Allowance is made in these computations for holidays and days not normally worked.

Data Sources and Collection Methods

The task of collecting strike data has two basic elements: (1) to learn of work stoppages when and wherever they occur, and (2) to obtain the necessary facts regarding each situation as quickly as possible.

Information about the existence of stoppages currently is obtained from various sources, including: (1) clippings from daily and weekly newspapers throughout the country provided by commercial clipping services; (2) notices received directly from the Federal Mediation and Conciliation Service; (3) a periodic compilation by the local offices of the State employment security agencies, provided through the Employment and Training Administration of the U.S. Department of Labor; (4) a number of other State agencies, such as State mediation boards and labor departments; (5) various employers and employer associations; (6) international unions and their publications; (7) and other Federal agencies and commissions.

Aside from the clippings from newspapers and other publications, most of these sources have been developed over a period of years. As a general rule, expansion in the Bureau's "lead" sources brings an increase in the number of stoppages reported, but has little effect on the total number of workers and days of idleness, because the added stoppages tend to be small.

After the receipt of notices regarding the existence of work stoppages, the Bureau mails questionnaires to the parties involved to secure direct information on each stoppage. Should a reply not be received within 3 weeks, a second questionnaire is mailed, and, in the case of continued nonresponse, a mailogram or telegram may be sent, or an effort made to secure the necessary data by telephone. In some instances of nonresponse, field representatives of the Bureau secure the necessary data; in others, cooperating State agencies may be asked to contact the parties.

The types of information sought by the Bureau through its questionnaire have changed over the years, partly in response to changing needs. The primary function of these reports is to compile statistics, not to keep records on the strike activity of individual firms and unions. The separate questionnaires currently used for private and public sector disputes are shown on pages 194-196.

Although strikes, by their very nature, are usually matters of public knowledge and of reporting by newspapers and other publications, the Bureau holds confidential the individual reports submitted by private sector employers and unions, as well as supplementary data collected through State or Federal agencies. The rules of confidentiality observed here are similar to those followed in other Bureau surveys. This restriction does not apply to strikes in the public sector.

Estimating Procedures

Since the Bureau is able to obtain information on virtually all work stoppages within the scope of its definition, estimating is necessary only in the preparation of its monthly reports on the level of strike activity in the United States as a whole. The availability of reasonably accurate data on the larger stoppages at the time these estimates are prepared—approximately 4 weeks after the end of the month of reference—assures approximate conformity to the final statistics which are based almost exclusively on the parties' replies.

Monthly estimates are prepared on the number of stoppages, the number of workers involved, and days of idleness. As there is a lag between the occurrence and reporting of a number of relatively small strikes, the number of stoppages beginning during a given month is estimated by increasing the number of strikes on which(693,834),(921,919)

4 A modified form of this questionnaire is used in the case of most jurisdictional disputes and those in coal mining.

In the case of prolonged strikes, a less detailed questionnaire is sent to the parties periodically to determine the status of the stoppage.
WORK STOPPAGES

U.S. DEPARTMENT OF LABOR
Bureau of Labor Statistics
Washington, D.C. 20212

This request for information relates to:

1. Government Department, Agency, or Installation
   - Name:
   - Address:
   - Facility where stoppage occurred (name if different from above):
   - Address:
   - Level (check one):  □ Federal  □ Municipality  □ School district
     □ State  □ County  □ Other (specify)
   - Function (check one):  □ Administrative services
     □ Welfare services  □ Law enforcement and correction
     □ Fire protection  □ Sanitation services
     □ Hospitals and health services  □ Education
     □ Transportation and allied facilities  □ Streets and highways
     □ Parks, recreation, libraries, etc.  □ Other utilities
     □ Other (specify)

2. Union or Association
   - Name:
   - Local no.
   - Affiliation:  □ AFL-CIO  □ Other union
   - Address:  □ Other union  □ Employee association
   - Did the organization call or support the work stoppage?  □ Yes  □ No
   - Does this organization have official recognition?  □ Yes  □ No

3. Dates of Stoppage and Workweek
   - Stoppage began on:
   - Settlement reached on:
   - Settlement ratified on:
   - Employees returned to work on:
   - Scheduled workweek prior to stoppage—
     Days  _____  Hours  _____

4. Employees Affected
   - Total employees idled at least one full shift or day:
     (IMPORTANT – Include all employees directly involved in the stoppage and employees made idle by lack of work in the same facilities or by observance of picket lines. If exact figures are not available, please provide estimate.)
   - Did the number idled change significantly during the stoppage?  □ Yes  □ No
     (If “yes” please enter changes in number idled and dates of changes on reverse side of this form.)
   - Occupational classification (check one or more):
     □ Teachers  □ Nurses  □ Other professional and technical employees
     □ Clerical  □ Policemen  □ Sanitation men
     □ Craftsmen (specify)  □ Other blue collar and manual
     □ Other (specify)

5. Agreement Information
   - Stoppage occurred (check one):
     □ In attempting to obtain recognition
     □ During agreement term (change in terms not involved)
     □ In negotiating first agreement (expiration or reopening)
     □ No formal agreement involved
     □ Other (specify)
   - Major issues in dispute in order of importance:
   - Please specify the method used to resolve this dispute (check one):
     □ Agreement of the parties  □ Mediation (conciliation)
     □ Return to work without agreement  □ Fact-finding
     □ Compulsory arbitration  □ Other (specify)
     □ Voluntary arbitration  □ Injunction (court order)
   - Did agreement to return to work include a procedure for handling any unsettled major issues involved in the stoppage (e.g., by submission to arbitration or fact-finding)?  □ Yes  □ No
     (If yes, note issues and procedures agreed upon on reverse side of this form.)
   - Did a government agency, or private individual, or organization assist in arranging the return to work?  □ Yes  □ No
     (Check one or more):  □ Federal  □ State  □ Local  □ Private  □ None
   - Please identify government agency:
     □ Federal  □ State  □ Local  □ Private  □ None
   - Signature of person making report:
     □ Title:
     □ Department or organization:
     □ Date:

* If more than one facility was involved, please enter information on reverse side of this form. Also use reverse side for clarifying remarks, particularly on nature of stoppage (mass sick leave, or resignations, etc.).
1. **Employer**

   Name: ____________________________
   Address: ____________________________

   Number of establishments directly involved in which workers observed picket lines: ____________________________

   If more than one establishment, use reverse side; if one enter below:

   a. Location: ____________________________
   b. Industry: ____________________________

   (Indicate major activity and principal products or services, e.g., Mining-bituminous coal; Construction-highways and streets; Manufacturing-wood upholstered furniture; Wholesale trade-plumbing supplies; Transportation-motor freight.)

2. **Union**

   Name: ____________________________
   Address: ____________________________

   □ AFL-CIO
   □ Other

   Did the union call or support the work stoppage?
   □ Yes □ No □ No information

3. **Dates of Stoppages and Workweek**

<table>
<thead>
<tr>
<th>Stoppage began on:</th>
<th>Settlement reached on:</th>
<th>Settlement ratified on:</th>
<th>Employees returned to work on:</th>
<th>Scheduled workweek prior to stoppage:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Days _______  Hours _______</td>
</tr>
</tbody>
</table>

4. **Employees Affected**

   Total employees idled at least one full day or shift: ____________________________
   (IMPORTANT - Include all employees directly involved in the stoppage and employees made idle by lack of work in the same establishments or by observance of picket lines. If exact figures are not available, please provide estimates.)

   Did the number idle change significantly during the stoppage?
   □ Yes □ No

   (If yes, please enter changes in the number idle and dates of changes on reverse side.)

   Occupational classification (check one or more):
   □ Professional and technical
   □ Sales
   □ Protective
   □ Clerical
   □ Production and maintenance
   □ Service
   □ Other (specify) ____________________________

5. **Contract Status**

   Stoppage occurred (check one):
   □ In negotiating 1st agreement or obtaining union recognition
   □ During agreement term (change in terms not involved)
   □ In renegotiating agreement (expiration or reopening)
   □ Other (specify) ____________________________

6. **Major issues in dispute, in order of importance:**

   (Please list) ____________________________

7. **Did employees return to work—**

   □ voluntarily, or □ under the terms of a court order or injunction?

8. **Did agreement to return to work include a procedure for handling any unsettled major issues involved in the stoppage (e.g., by submission to arbitration)?**

   □ Yes □ No

   If yes, note issues and procedures agreed upon on reverse side of this form.

9. **Did a government agency, or private individual, or organization assist in arranging the return to work?**

   (Check one or more):
   □ Federal
   □ State
   □ Local
   □ Private
   □ None

   Please identify government agency ____________________________

   Signature of person making report: ____________________________
   Title: ____________________________
   Company and organization: ____________________________
   Date: ____________________________

**USE REVERSE SIDE FOR ANY CLARIFYING REMARKS**
Supplementary Information for Items 1 and 4

If the stoppage involved more than one establishment or if idleness varied from period to period during the stoppage, please use the following space to indicate the number idle in each establishment and the variation in idleness at different dates. Include both workers directly concerned and those made idle because of dispute in the same establishment.

IF EXACT FIGURES ARE NOT AVAILABLE, PLEASE FURNISH ESTIMATES.

<table>
<thead>
<tr>
<th>Establishment involved and location (City, County, State)</th>
<th>Industry or principal product</th>
<th>Approximate number of workers idle a full shift or more</th>
<th>Dates this number was idle a full shift or more</th>
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</tbody>
</table>

REMARKS:__________________________________________________________________________
leads have been received by a percentage which is fixed for each calendar month. An estimate of the total number of stoppages in effect during the month is obtained by supplementing the latter estimate by a percentage of the stoppages in effect during the prior month.

In estimating the number of workers involved and total idleness, efforts are made to obtain as much preliminary information as possible on the size and duration of individual large stoppages—those of at least 500 workers or 5,000 days of idleness. To the known figures for these large stoppages is added the product of the estimated number of smaller strikes and the average number of workers (or days) that previous experience indicates for such stoppages.

In its preliminary reports, as well as in its final reports, the Bureau relates the days of idleness to the total estimated working time of all workers. The “total economy” measure of strike idleness, which was instituted in 1967, includes government and agricultural employees and private nonfarm workers, but excludes forestry, fisheries, and private household employment in its employment count and in the computation of idleness ratios. Before 1967, the BLS series excluded government and agricultural workers from employment totals, but accounted for time lost by these workers while on strike. This reevaluation of methods has improved the calculations of idleness and made the Bureau’s measurement of work stoppage intensity national in scope.

**Analysis and Interpretation**

The data presented in the parties’ reports are analyzed and classified according to a number of significant factors, briefly described here:

1. Each strike is assigned an *industrial classification* in accordance with the *Standard Industrial Classification Manual* prepared by the Office of Management and Budget. In those cases in which a stoppage affects workers in more than one industry, one of two procedures may be followed. If the stoppage is small, the strike is classified in the industry in which it was initiated; in large interindustry stoppages, a stoppage is recorded for each industry affected, and the approximate numbers of workers and idleness are allocated to each.

2. The *duration* of each stoppage is taken as the number of calendar days from its beginning to end. For stoppages which begin at a definite time and are terminated by a formal agreement, no problem arises in the determination of duration. However, some stoppages, for a variety of reasons, are never settled formally. These range from situations in which the workers gradually return to their jobs without a settlement to those in which the employer decides to go out of business. In cases of the former variety, the details of each individual situation are studied before a stoppage is terminated for statistical purposes; in the latter instances, the stoppage is terminated with the employer’s announcement of his decision to discontinue operations. On occasion, if actual settlement is reached later, the statistical record of the stoppage is adjusted accordingly.

3. *Geographical classification* of stoppages followed State and city boundary lines, through 1951. Beginning in 1952, the compilation of data by Standard Metropolitan Statistical Areas superseded city boundary lines. In interarea stoppages, a stoppage is recorded in each area affected, and workers and days of idleness are allocated proportionately.

4. The *issues* in dispute in most strikes are many and varied, and do not always lend themselves readily to immediate and exact classification. Stoppages are classified by major issue into the following broad groupings: (a) wages, hours, and supplementary benefits; (b) union organization and security; (c) job security; (d) plant administration; and (e) inter- or intra-union matters. Each of these groups is sub-divided into more specific categories.

5. Stoppages are classified by the *contractual relationship* existing between the parties involved. The following four situations apply: (a) negotiation of the initial agreement; (b) renegotiation of an agreement; (c) agreement in effect (new contract terms not involved); and (d) no contractual relationship.

6. The *union involved* is another major classification. For this purpose, the union is the organization whose contract was involved or which has taken active leadership in the stoppage. Disputes involving more than one union are classified as jurisdictional or rival union disputes or as involving cooperating unions. If unorganized workers strike, a separate classification is used. For publication purposes, union information is presented by major affiliation of the union, i.e., AFL—CIO, or nonaffiliation such as “Independent,” “single firm,” or “no union.”

7. The assistance of *mediators*, either governmental or private, in the resolution of industrial disputes is recorded.

8. The manner in which stoppages are *settled* involves classification into the following categories: (a) those ending with a formal settlement; (b) those terminating without a formal settlement, and those in which work is resumed with either the old or new workers; and (c) those concluded by the employer’s decision to go out of business.

9. A classification also is made of the manner in which *unsettled issues* are to be resolved in those situations where strikes are terminated with the understanding that such matters will be handled after the resumption of normal operations.

10. More recently, information has been collected and data has been tabulated by broad occupational

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*See app. C.*

*When a major change in the classification of issues was introduced in 1961, the Bureau included in its annual report for that year a method of linking the new classifications with the old.*
groups. This information is available from 1971 for government work stoppages and since 1972 for those that occurred in the private sector.

Presentation

Publications in the area of work stoppages include monthly preliminary estimates, annual reports, and special reports which are issued irregularly.

Monthly preliminary estimates are issued approximately 20 work days after the end of the month of reference in the form of press releases. Such reports presently are prepared for the first 11 months of each year, with a preliminary estimate of total strike activity during the year being issued about 2 weeks after the close of the calendar year.

Selected final tabulations of strike activity are presented in a release which usually is issued in June. An annual bulletin, containing detailed information on the characteristics of work stoppages during the prior year, is published each year.

Special reports containing historical work stoppage data by industry and area, or an analysis of a particular aspect of strikes, are issued irregularly. This latter category also may include Bureau reports of a non-statistical nature, including chronologies of "national emergency" disputes arising under the terms of the Taft-Hartley Act.

Uses and Limitations

The use of strike statistics as an indicator of industrial unrest has been the traditional reason for their compilation in the United States and in other industrialized countries. Whether they serve this elementary purpose today is open to question. In any event, some qualifications must be taken into consideration in this use. The willingness of workers to strike as a protest against existing conditions may be encouraged or deterred by outside influences, such as the employment situation, the state of the business cycle, and possible political or public reaction. Within the plant, the strength of the union or of employer opposition may influence both the willingness of the workers to start a strike or to extend its duration.

Whether as a measure of industrial unrest or the state of labor-management relations, strike statistics are necessary for Federal, State, and municipal government agencies, particularly those concerned with labor affairs. Unions, employers, and employer associations use strike data to assess their own experiences, and business and civic organizations are concerned with their community promotional possibilities. Schools, particularly those teaching courses in industrial relations, and industrial relations counselors also find strike statistics useful. Finally, the press is interested, since strikes and information about them are newsworthy.

Although it is virtually certain that the Bureau is able to locate, and obtain information on, the larger work stoppages, some small strikes undoubtedly escape notice each year. While these omissions do affect data on number of strikes, the statistics on workers and days of idleness are virtually complete. As has been noted, the addition of new sources of information has not materially changed these latter figures, but these new sources have acted to lessen slightly the degree of comparability in the number of strikes reported from period to period. It follows that the narrower the classification of strike data, the greater is the chance of a significant omission. For example, while the figures for individual States may be taken as reasonably complete, the figures for a specific industry group within a State may be appreciably affected by the omission of one strike.

Secondary idleness is not measured; that is, the figures do not cover those employees made idle in other establishments or industries as a result of material or service shortages resulting from a work stoppage. At times, the idleness of employees directly involved in a strike may be considerably less than the idleness of other workers brought about indirectly. No satisfactory method, however, has been found to measure or estimate such indirect effects adequately.

The Bureau does not attempt to measure the cost of strikes in terms of the amount of production and wages lost. The calculation of cost involves many complex and interrelated factors for which information is not readily available, including such matters as production schedules before and after the stoppage, diversion of output or services to other plants or employers, the flow of raw materials, and the amount of overtime worked before and after the strike. The problem is magnified beyond statistical control if secondary costs are to be accounted for.

Technical References

   Compares the methods used to compile statistics on industrial disputes, and outlines standards by which some degree of international comparability may be secured.

   Summarizes the definitions and methodology utilized by the Bureau of Labor Statistics in its work stoppage statistics program.


   Contains a history of statistics on strikes and lockouts in the United States and major statistical data available from the earliest recorded date through 1936.

   Provides background on the collective bargaining patterns in the industry, the governing statute, and a history and analysis of strikes from 1936 through 1969.

   Data and analysis are similar to *Airline* report. Work stoppage information pertains to 1950–69.

   Provides a review of the background and collective bargaining environment of the industry, dispute settlement machinery, and work stoppage history.
Chapter 28. Collective Bargaining Agreements

Background

Collective bargaining agreements and related documents setting forth the provisions of employee-benefit plans provide a valuable source of information on industry wage practices, supplementary benefits, job and union security, the timing of wage negotiations, the nature of plant operations and working conditions, and many of the day-to-day aspects of employer-employee and union-management relationships.

The Bureau of Labor Statistics has utilized these basic industrial relations materials for public and Government informational purposes in three major ways, by: (1) maintaining a file of current agreements open to public inspection and inquiry; (2) preparing reports which reproduce representative agreement provisions or the variety of provisions relating to similar problems, or digests of selected identified agreements or benefit plans; and (3) by preparing studies measuring the prevalence and characteristics of specific types of agreement and benefit plan provisions or of other aspects of collective bargaining such as multiemployer bargaining.

The development of industrial relations practices that are now widely prevalent is reflected in the Bureau’s studies over the years. The Bureau’s interest in the collection and analysis of union agreements dates back more than 70 years. Systematic efforts to collect agreements began in 1912. The first of a number of BLS bulletins devoted entirely to the subject of collective bargaining agreements appeared in 1925. A large number of reports and bulletins on a wide variety of industrial relations subjects have since been published.

The Bureau’s responsibility in the field of agreement collection and analysis received additional sanction and guidance in the Labor Management Relations (Taft-Hartley) Act, 1947, section 211, which reads as follows:

Sec. 211. (a) For the guidance and information of interested representatives of employers, employees, and the general public, the Bureau of Labor Statistics of the Department of Labor shall maintain a file of copies of all available collective bargaining agreements and other available agreements and actions thereunder settling or adjusting labor disputes. Such file shall be open to inspection under appropriate conditions prescribed by the Secretary of Labor, except that no specific information submitted in confidence shall be disclosed.

(b) The Bureau of Labor Statistics in the Department of Labor is authorized to furnish upon request of the [Federal Mediation and Conciliation] Service, or employers, employees, or their representatives, all available data and factual information which may aid in the settlement of any labor dispute, except that no specific information submitted in confidence shall be disclosed.

Concepts and Scope

Although the substance of collective bargaining rests partly upon a foundation of unwritten industry, company, and union practices, and upon various legal requirements, the basic unit in agreement collection and analysis is the written agreement itself. The agreement may cover a single plant, a number of plants of a multiplant company, or a number of companies, in some cases over a thousand, bound together formally or informally in an association for collective bargaining purposes. It may express conditions of employment in simple terms, and leave much of the administrative detail and other matters to the day-to-day relationships between the parties, or it may attempt to cover all details and, thus, leave as little as possible to later bargaining or haggling. Agreements vary in size from a few sheets to over 300 pages of a pocket-sized booklet. They reflect the diversity of employment conditions among industries and companies and of the scope of the issues over which bargaining takes place, as well as differences in the degree of precision sought and the language used.

 Estimates of the number of agreements currently in effect range up to 170,000. The number of workers covered by agreements is estimated at about 24 million. The Bureau presently maintains a file of approximately 6,200 current agreements in the private sector, covering about 10.4 million workers. All industries are represented in the file except railroads and airlines. Since railroads and airlines are required to submit copies of agreements to the National Mediation Board, the Bureau does not attempt to collect these agreements.

1 A bulletin of the Department of Labor, Number 42, September 1902, included this note: “It is the purpose of this Department to publish from time to time important agreements between large bodies of employers and employees with regard to wages, hours of labor, etc. The Department would be pleased to receive copies of such agreements whenever made.” (p. 1057)

Between 1888 and 1903, the Bureau of Labor (now the Bureau of Labor Statistics) had independent status as a Department of Labor, under the direction of a commissioner.

2 During the early postwar period, the number of agreements on file exceeded 12,000.
As a result of the recent growth of collective bargaining in the public sector, the file has been expanded to include a variety of documents covering employees of the Federal Government, States, counties, cities, and special jurisdictions. These documents range from traditional collective bargaining agreements through memoranda of agreement to executive orders, administrative promulgations, and legislative actions, which are clearly the result of bilateral negotiations. The public file is growing steadily. It presently exceeds 2,300 documents at all government levels and covers more than 1.5 million public employees.

The Bureau’s quantitative analysis of agreement provisions covers virtually the entire range of issues dealt with in collective bargaining. The basic assumption underlying such analysis is that the variety of subjects can be defined, classified, and counted.

In its general analysis of agreements, as distinct from special industry studies, the Bureau is concerned with these major objectives: (1) The presentation of data by industry group and for manufacturing and nonmanufacturing as a whole, (2) the presentation of data by region or union affiliation if the subject requires it, (3) a realistic measure of representativeness in the agreements studied, and (4) the study of practices which are (as yet) relatively uncommon in collective bargaining agreements. For agreements covering public employees, data are presented by the type of government activity (police department, veterans administration, etc.) and for cities, by population size.

Methods of Collection and Analysis

Collection of Agreements

The selection of agreements for the file is currently based on two guides: To enlarge to the fullest the opportunities for public and governmental use of the file, and to provide a diversified collection of agreements for special reports, which the Bureau occasionally is called upon to prepare. The extent to which these objectives are fulfilled is obviously affected by the size of the file.

A third guide—that of constructing a file which truly represents all public and private agreements and thus provides a firmer basis for sound generalizations on all agreements—has long been a goal of the Bureau.

The maintenance of a current file of agreements is a continuous undertaking because of two factors: (1) The typical agreement has a fixed duration, after which it is no longer considered current (unless notice of renewal without change has been received), and (2) submission of agreements to the Bureau is voluntary on the part of employers or unions. To allow for the ratification and the printing of new agreements, requests for copies are mailed about 2 or 3 months after the expiration date indicated in the previous agreement or upon other notice of contract change. As in other phases of the Bureau’s work, the voluntary cooperation of employers and unions is of utmost importance. Any restrictions imposed by respondents on the public use of agreements are observed scrupulously by the Bureau.

To facilitate the use of the file in accordance with the types of requests customarily made, each agreement received is coded for a series of identifying features, which include union, location, number of workers covered, industry, and effective and expiration dates. For public employee documents, the level of government and the government activity also are coded.

Agreement Analysis

The Bureau’s utilization of the private sector agreements it collects has moved through different stages over the years, in pace with, or controlled by, the increasing prevalence and maturity of collective bargaining. During the early years, significant agreements were reproduced in their entirety. As collective bargaining spread, and the size and representative character of the Bureau’s file increased, attention was directed towards reproducing and analyzing the variety of agreement clauses relating to similar subjects, culled from a large number of agreements. Although illustrative clauses continue to be utilized in most of the Bureau’s agreement studies, major emphasis during recent years has been devoted to measuring the prevalence and characteristics of particular provisions and of types and levels of benefits. The Bureau’s Bulletin 1425 series represents its most comprehensive efforts to date. The Bureau also has undertaken a broader, more extensive rather than intensive analysis, in which it searches the agreement to measure the prevalence, but not the detailed characteristics of more than 100 different collective bargaining provisions.

The results are published in “Characteristics” studies for the private and public sectors. Based upon these “Characteristics” studies, users may obtain, on request, listings of agreements containing specified provisions at a cost for computer time.

In these studies, problems relating to techniques of coding and analysis come to the fore. In 1948 and 1949, when the Bureau’s file consisted of more than 12,000 agreements, it was decided that a sample of 3,000 agreements would be feasible. The selection of specific agreements was based on a number of factors, including industry, agreement coverage, location, union representation, and bargaining practices. Limited data upon which to base a representative selection of agreements


4The agreements file is located in the Washington Office of the Bureau’s Division of Industrial Relations. Agreements submitted to the Bureau with a stipulated limitation on public use are not available for inspection. Requests for information concerning specific agreements or agreement clauses are accommodated, depending upon the nature of the request, within the limits of staff resources.
were compensated for, at least in part, by extensive experience with collective bargaining practices on the part of the sample selectors.

During subsequent years, however, available staff resources were not sufficient to deal with a sample of this size. The feasibility of reconstituting a sample of 1,500 to 2,000 agreements, which had become the maximum work load, and of assuring appropriate safeguards against deterioration, was rejected as being beyond the resources of the staff and the available data. The most advantageous alternative was to base the private industry agreement studies on all agreements covering 1,000 workers or more and, thus, to avoid sampling. The Bureau's file already contained almost all of these; the Bureau's monthly report, Current Wage Developments, was a ready source of information on those that were not included. The total number of workers covered by agreements of this size (now between 1,700 and 1,900) is about 8.2 million and represents a very substantial worker coverage in agreement studies. The number of establishments covered is not known.5

A key analysis list containing all private industry agreements covering 1,000 or more workers, although perhaps not the ideal coverage, has definite advantages: (1) It achieves maximum worker coverage in the studies for a given investment of staff resources, (2) it provides a simple, objective measure of the coverage of the studies, (3) it permits the presentation of various combinations and breakdowns of the data without the necessity of complicated weighting schemes and without the bias resulting from the lack of proper weighting, (4) it is safeguarded against obsolescence, since the Bureau is best able to keep abreast of changes in agreements of this size, and (5) it has a significant meaning to users of these studies.

The distinguishing feature of agreement analysis is that it deals mainly with legal language, which requires interpretation, rather than with numbers or other universal, sharply defined attributes. The process of analysis consists of interpreting provisions, reducing them to numbers (codes), aggregating the numbers, and converting the aggregates back to types of provisions and prevalence. Data are presented in terms of number of agreements and number of workers covered. Since agreement provisions on the whole are notable more for their variety of expression and details than for their uniformity, the process of analysis becomes a simplification process by which some of the original content and variety is lost. Under such circumstances, the planning of studies acquires a special importance if significant differences are not be buried.

The distinction between size of agreement (employees covered) and size of establishment is important. A substantial proportion of these agreements are association negotiated and cover a large number of small establishments. Two agreements, for example, involving the United Mine Workers (Ind.), cover most of the anthracite and bituminous coal mines in the country. Some association agreements in New York State cover more than a thousand firms.

The keystone of agreement analysis study is obviously the interpretation of the agreement and the assignment of the predetermined code number. For some subjects, an agreement must be read in its entirety; for others, only a portion. Long and legal provisions must be reduced to their essentials. Since the interpretation of agreement provisions is often a troublesome matter for the parties themselves (as reflected in the widespread adoption of provisions for arbitration), misinterpretations undoubtedly occur. These are kept to a minimum by a staff experienced in agreement analysis and by continuous efforts to assure consistency of interpretations.

**Uses and Limitations**

The studies of agreement provisions are of practical use to public and private employers and unions engaged in collective bargaining, to arbitrators and factfinding boards, to administrators of company wage and industrial relations programs, and to legislators and Government officials. Persons not directly involved in collective bargaining or in related administrative activities (e.g., teachers and students of labor problems, writers for newspapers and trade and technical journals, and foreign observers) find value in the broader aspects of employer-employee relationships revealed in these studies.

The limitations of these studies of agreement provisions and employee-benefit plans are determined, in large part, by their application. For studies of paid holiday provisions or other supplementary benefits, the fact that these studies cover only the area of collective bargaining may constitute a limitation on generalizations applying to all workers but not necessarily on their uses in collective bargaining or in wage and employee administration. On the other hand, these studies do not show locality practice, which may reduce their usefulness for some collective bargaining purposes but not for broad generalizations relating to workers under collective bargaining.

Additional limitations of agreement provision studies are inherent in the selection of agreements for study—the exclusion of railroad and airline agreements and of agreements covering fewer than 1,000 workers—and in the technique of analysis, as indicated previously. Limitations are also connected with the particular subjects studied, which are pointed out in each study. A fundamental limitation which must be borne in mind in connection with certain studies (e.g., grievance procedure) is that they relate to written policy rather than actual practice. Practices which are not provided for in the agreements but are, instead, matters of company policy going beyond the agreement, traditional industry policy, informal acceptance by management and unions, or arbitrators' decisions, can be neither detected nor measured in agreement analysis.
Technical References


   - 1425–1, 1964: Grievance Procedures
   - 1425–2, 1965: Severance Pay and Layoff Benefit Plans
   - 1425–4, 1966: Deferred Wage Increase and Escalator Clauses
   - 1425–5, 1966: Management Rights and Union-Management Cooperation
   - 1425–6, 1966: Arbitration Procedures
   - 1425–8, 1969: Subcontracting
   - 1425–10, 1969: Plant Movement, Transfer, and Relocation Allowances
   - 1425–12, 1970: Administration of Negotiated Pension, Health, and Insurance Plans
   - 1425–13, 1971: Layoff, Recall and Worksharing Procedures
   - 1425–14, 1972: Administration of Seniority
   - 1425–15, 1974: Hours, Overtime, and Weekend Work

3. __________, Characteristics series (private industries)
   - Bulletin 1686, Agreements covering 5,000 workers or more (1970)

4. __________, Construction studies
   - Bulletin 1819, Characteristics (1972–73)
   - Bulletin 1864, Contract clauses (1975)

5. __________, Public employee studies (Federal)
   - Bulletin 1661, Negotiation Impasse, Grievance, and Arbitration in Federal Agreements (1970)

6. __________, Public employee studies (State and local)
   - Bulletin 1833, Grievance and Arbitration Procedures in State and Local Agreements (1975)
   - Bulletin 1861, Characteristics of State and Local Agreements (1974)
Chapter 29. Union and Association Membership

Background

The Bureau of Labor Statistics’ interest in union membership as a significant social and economic indicator is of long standing. The first BLS publication listing membership figures for national and international labor unions in the United States was probably the Handbook of American Trade-Unions, issued in 1926 (BLS Bulletin 420), followed by a similar publication in 1929 (BLS Bulletin 506) and an extensive revision in 1936 (BLS Bulletin 618). The Handbooks, however, devoted little space to overall membership figures or trends; their main emphasis was on the origins and early history of particular unions, their government and structure, trade jurisdiction, and types of beneficial activities.

In 1939, on a modest scale, the Bureau began to publish an annual trade union directory, but it was not until 1948 (Bulletin 937) that the listing of union officers, headquarters’ addresses, etc., was supplemented with an entry for each union on membership and number of local unions, and a compilation of total membership. In subsequent years the information sought from national and international unions has expanded considerably. Data on women members first appeared in the 1953 Directory, and separate tabulations for areas outside the United States (Canada, Puerto Rico, etc.), in the 1955 edition. Since 1957, each Directory has carried information on the number and proportion of members who are white-collar workers and on those in major industry groups. State figures were introduced on a limited basis in 1959, when AFL–CIO central bodies were asked to furnish estimates on the number enrolled by Federation affiliates. In its 1965 Directory, the Bureau showed State figures as reported by national unions. In 1971, the name of the publication was changed from “Directory of National and International Labor Unions in the United States” to “Directory of National Unions and Employee Associations,” thereby expanding its scope to provide information on organizations of growing importance in collective bargaining and other employee representation activities, mostly at the State and local level. Many of the items referred to have been refined since they were first introduced, and the accumulated information now permits analysis of trends in total membership and several of its components.

Data Sources and Collection

For part of the Bureau’s biennial Directory of National Unions and Employee Associations, unions and associations meeting the criteria noted are asked to report the average number of dues-paying members or the number of members in good standing for the 2 most recent years, including members outside the United States; the proportion of white-collar and women members; breakdowns by major industry and by State, and other membership information. (See copy of questionnaires on pp. 208–216.) To be included in the Directory, a union must be an affiliate of the AFL-CIO or, in the case of unaffiliated unions, a party to collective bargaining agreements with different employers in more than one State. Among the unions in the latter category are such unaffiliated unions as the Teamsters, the Mine Workers, and the Auto Workers. In addition, the Directory accounts for all unions of Federal Government employees that have received “exclusive recognition” as specified in Executive Order 11491. Associations are included if they are engaged in collective bargaining or employee representation activities and claim membership in more than one State or, if they had members in only one State, represented employees in two or more cities within the State. Thus, by definition, the Bureau excludes from its Directory those unions whose activities are confined to a single locality or to a single employer. Although the Bureau sends questionnaires to all multilocal unions who have submitted reports to the U.S. Department of Labor as required by the Labor-Management Reporting and Disclosure Act, and to all associations of whose activities it has knowledge, possibly some small unaffiliated unions or associations meeting listing criteria, as defined, may escape attention. These inadvertent omissions do not affect membership totals in any significant way.

When some unions or associations are unable to furnish information for one or more of the questionnaire items, estimates are derived from other sources on file, notably union and association periodicals, convention proceedings, financial statements, and collective bar-

2The names of all reporting unions appear in the Department’s Register of Reporting Labor Organizations, last issued in 1971.
<table>
<thead>
<tr>
<th>1. Affiliation:</th>
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<th></th>
<th></th>
<th></th>
<th>Area code and telephone number</th>
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<tr>
<td>(Check appropriate box)</td>
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<td>None □</td>
<td>Other (specify) □</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. President:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
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<tr>
<td>3. Secretary-Treasurer:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4. Person in charge of organizing activities:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
<td>Title:</td>
<td>Mailing address if different from headquarters (street, city, state, zip code):</td>
</tr>
<tr>
<td>5. Research Director:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
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<tr>
<td>6. Education Director:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
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<tr>
<td>7. Person in charge of social insurance (health insurance, pension, etc.) activities:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
<td>Title:</td>
<td>Mailing address if different from headquarters (street, city, state, zip code):</td>
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<tr>
<td>8. Person in charge of legal activities:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
<td>Title:</td>
<td>Mailing address if different from headquarters (street, city, state, zip code):</td>
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<tr>
<td>9. Person in charge of legislative activities:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
<td>Title:</td>
<td>Mailing address if different from headquarters (street, city, state, zip code):</td>
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<tr>
<td>10. Person in charge of public relations activities:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
<td>Title:</td>
<td>Mailing address if different from headquarters (street, city, state, zip code):</td>
</tr>
<tr>
<td>11. Person in charge of health and safety activities:</td>
<td>Mr. □</td>
<td>Ms. □</td>
<td></td>
<td>Title:</td>
<td>Mailing address if different from headquarters (street, city, state, zip code):</td>
</tr>
</tbody>
</table>
**UNION AND ASSOCIATION MEMBERSHIP**

### II. CONVENTIONS AND PUBLICATIONS

1. Frequency of conventions: Annual [ ] Semi-annual [ ] Biennial [ ] Other (specify) [ ]

2. Next convention: (Month/Day/Year) __________________________ (City, State) __________________________

3. Name of official publication(s):
   - How often published
   - Editor

### III. AFFILIATED BODIES

Enter the number of locals operating at the end of 1974:

### IV. MEMBERSHIP

Enter the annual average dues-paying membership count for 1973 and 1974. If complete returns for 1974 are not available, use 9 or 10 month average:

- 1973 ________________________________________ members
- 1974 ________________________________________ members

### V. CLASSIFICATION OF 1974 MEMBERSHIP

1. Enter the approximate percentage of membership who are women (if none, enter zero):

2. Enter the approximate percentage of membership in the following "white-collar" categories:

   - Professional and/or technical
   - Clerical
   - Sales

3. Industry composition of union membership. Enter the approximate percentage of all union members working in establishments in each of the following industry groups:

   **Manufacturing:**
   - Ordinance and accessories
   - Food and kindred products (including beverages)
   - Tobacco manufacturers
   - Textile mill products
   - Apparel and other finished products made from fabrics and similar materials
   - Lumber and wood products, except furniture
   - Furniture and fixtures
   - Paper and allied products
   - Printing, publishing and allied industries
   - Chemicals and allied products
   - Petroleum refining and related industries
   - Rubber and misc. plastics products
   - Leather and leather products
   - Stone, clay, glass, and concrete products
   - Primary metals industries
   - Fabricated metal products, except ordnance, machinery and transportation equipment
   - Machinery, except electrical
   - Electrical machinery, equipment and supplies
   - Transportation equipment
   - Professional, scientific and controlling instruments; photographic and optical goods, watches and clocks
   - Miscellaneous manufacturing industries

   **Nonmanufacturing:**
   - Mining and quarrying (including crude petroleum and natural gas production)
   - Contract construction (building and special trades)
   - Transportation services (including railroads, air, bus, truck and water transportation, and allied services)
   - Telephone and telegraph
   - Electric, gas, and sanitary services (including water)
   - Wholesale and retail trade
   - Finance, insurance and real estate
   - Service industries (including hotels, laundries and other personal services, repair services, motion pictures, amusement and related services, hospitals, educational institutions, non-profit membership organizations)
   - Agriculture and fishing
   - Nonmanufacturing (classification not available)

   **Government:**
   - Federal
   - State
   - Local (including counties, municipalities, townships, school districts and others)

   Total 100 %
V. CLASSIFICATION OF 1974 MEMBERSHIP—Continued

4. State distribution of union membership. Enter the approximate number or percentage of members in each of the 50 States.

<table>
<thead>
<tr>
<th>State</th>
<th>Approximate number of members or percentage</th>
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<tbody>
<tr>
<td>Alabama</td>
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<td>Alaska</td>
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<td>Hawaii</td>
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<td>Idaho</td>
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<td>Iowa</td>
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<tr>
<td>Kansas</td>
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<tr>
<td>Kentucky</td>
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<tr>
<td>Louisiana</td>
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</tbody>
</table>

5. For any area outside the United States, please enter the number of dues-paying members and the number of local unions in existence as of the end of 1974 or any other appropriate current period:

<table>
<thead>
<tr>
<th>Location</th>
<th>Approximate number of union members</th>
<th>Number of local unions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td></td>
<td></td>
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<tr>
<td>Puerto Rico</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canal Zone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

VI. COLLECTIVE BARGAINING AGREEMENTS

1. Enter the number of basic collective bargaining agreements with employers. Exclude supplemental and pension, health and insurance agreements:

<table>
<thead>
<tr>
<th>Total agreements</th>
<th>United States agreements</th>
</tr>
</thead>
</table>

2. a. Enter the number of different employers covered by collective bargaining agreements:

<table>
<thead>
<tr>
<th>Total employers</th>
<th>United States employers</th>
</tr>
</thead>
</table>

b. If more than one employer, are the employers located in at least two States? Yes ☐ No ☐

3. Enter the number of workers covered by these agreements. Include nonmembers in the bargaining units:

<table>
<thead>
<tr>
<th>Total workers</th>
<th>United States workers</th>
</tr>
</thead>
</table>

4. Enter the percentage of workers in the United States (as reported in 3 above) who are covered by collective bargaining agreements providing:

a. Health and insurance benefits %

b. Retirement or pension benefits %

VII. INITIATION FEES, DUES, AND PER CAPITA

1. Initiation fees
   A. What is the initiation fee required of new members?

   1. If one rate applies to all new members, enter here: $ ________________

   2. If your constitution does not provide a fixed rate, please enter below where appropriate:

      a. Minimum fee only, of $ _______________________________________

      b. Maximum fee only, of $ _______________________________________

      c. Both a minimum and maximum of $ ________ to $ ________________

   3. If your constitution does not provide a minimum and/or maximum, but allows the local union to determine the initiation fee, please check this box. ☐

   B. Does the initiation fee vary depending on either the level of skill or type of work of the new member? Yes ☐ No ☐

   If yes, please explain ________________________________________________

   C. What portion of the initiation fee is remitted to the national union? $ ________________ or ________________ %
VII. INITIATION FEES, DUES, AND PER CAPITA—Continued

2. Dues
   A. What monthly dues are now in effect?
      1. If one rate applies to all active members, enter here: $ ________________
      2. If a single rate does not apply, please enter as appropriate:
         a. Minimum dues only, of $ __________________________
         b. Maximum dues only, of $ __________________________
         c. Both a maximum and a minimum, of $ ________________ to $ ________________
         d. No minimum or maximum amount; determined by local union: □
   3. If the above do not apply, are dues based on:
      a. Percentage of earnings (enter %): ________________ %
      b. Number of hours of work: ____________________________ hours
      c. Sliding scale according to earnings (specify) ____________________________
      d. Other arrangement (please specify) ____________________________

   B. What union dues, if any, are the following categories of members required to pay?
      Not required Required
      1. Apprentices ........................................................... □ $ ________________
      2. Retirees ............................................................ □ $ ________________
      3. Unemployed ....................................................... □ $ ________________
      4. Temporarily laid off (less than one month) ................... □ $ ________________
      5. Other special groups (please specify) __________________________ □ $ ________________

3. Per capita
   A. What per capita taxes are remitted to the national union from each member’s monthly dues? $ ________________ or ________________ %
   B. What amount or portion of the per capita is earmarked for the following? $ or %
      1. General fund ....................................................... ____________________________
      2. Strike fund ......................................................... ____________________________
      3. Convention fund .................................................. ____________________________
      4. Union publications ............................................... ____________________________
      5. Education fund (including family centers) ....................... ____________________________
      6. Retired members fund .......................................... ____________________________
      7. Other (please specify) ........................................... ____________________________

VIII.

Enter the total number of members on the union’s national governing body (executive board, executive council, national council, grand lodge or similar body) __________________________ , and the number of women on the national governing body ____________________________.

MAY WE HAVE YOUR COMMENTS REGARDING THE PRESENT DIRECTORY AND PROPOSALS FOR CHANGES IN FUTURE EDITIONS?

Name of person reporting: __________________________ Title: __________________________ Date: __________________________
Dear

We are revising our Directory of National Unions and Employee Associations, 1973. Will you please fill out this form and return it to us in the enclosed envelope which requires no postage. A duplicate copy is enclosed for your files.

Your cooperation is greatly appreciated.

Sincerely yours,

[Signature]

COMMISSIONER OF LABOR STATISTICS

Enclosures

1. Headquarters address if different from above (Street, City, State, Zip Code):

   ________________________________________________
   ______________________  _______________________  

2. President: Mr. □  Ms. □ 

3. Secretary-Treasurer: Mr. □  Ms. □ 

4. Other Chief Executive Officers: Title
   Mr. □  Ms. □
   Mr. □  Ms. □
   Mr. □  Ms. □
   Mr. □  Ms. □

5. Name of official publication(s): How often published  Editor

   ________________________________________________
   ______________________  _______________________  

6. Research Director: Mr. □  Ms. □ 

7. Education Director: Mr. □  Ms. □ 

8. Legislative Representative: Mr. □  Ms. □ 

9. Legal Counsel: Mr. □  Ms. □ 

10. Public Relations Director: Mr. □  Ms. □ 

11. Estimated number of members of AFL-CIO unions in the State (include those not affiliated with State AFL-CIO):

12. Enter the total number of members on the State governing body (executive board, executive council, or similar body)
   ________________________________
   ________________________________
   ________________________________
   ________________________________

13. Convention frequency: Annual □  Biennial □  Other (specify) □ 

Name of person reporting:  Title:  Date: 

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Federal Reserve Bank of St. Louis
## Directory of National Unions and Employee Associations, 1975

### PROFESSIONAL AND PUBLIC EMPLOYEE ASSOCIATION QUESTIONNAIRE

### I. ASSOCIATION:

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>[Enter Address]</td>
</tr>
<tr>
<td>Telephone no./Area code</td>
<td>[Enter Telephone number]</td>
</tr>
</tbody>
</table>

### II. SCOPE OF ACTIVITY

1. Does your association, or its chapters, represent all or some members in collective negotiations with employers?  
   - Yes [ ]  
   - No [ ]

2. Does your organization have chapters in two or more cities within a State or in two or more States?  
   - Yes [ ]  
   - No [ ]

*IF THE ANSWER TO BOTH QUESTIONS IS YES, PLEASE COMPLETE THIS FORM. IF NO, TO EITHER QUESTION, PLEASE SIGN AND RETURN THE FORM WITHOUT FURTHER ENTRIES.*

### III. AFFILIATION

1. Is your organization affiliated with a central association?  
   - Yes [ ]  
   - No [ ]

2. If yes, please name [Enter Name]

### IV. OFFICIALS

1. President: Mr. [ ] Ms. [ ]  
   - Title: [Enter Title]
   - (Please check): Elective [ ] Appointed [ ] Salaried [ ] Non-salaried [ ]

2. Secretary-Treasurer or Secretary: Mr. [ ] Ms. [ ]  
   - Title: [Enter Title]
   - (Please check): Elective [ ] Appointed [ ] Salaried [ ] Non-salaried [ ]

3. Executive-Secretary or Director: Mr. [ ] Ms. [ ]  
   - Title: [Enter Title]
   - (Please check): Elective [ ] Appointed [ ] Salaried [ ] Non-salaried [ ]

4. Person in charge of organizing activities: Mr. [ ] Ms. [ ]  
   - Title: [Enter Title]

5. Research Director: Mr. [ ] Ms. [ ]  
   - Title: [Enter Title]

6. Person in charge of social insurance (health insurance, pension) activities: Mr. [ ] Ms. [ ]  
   - Title: [Enter Title]

7. Person in charge of legal activities: Mr. [ ] Ms. [ ]  
   - Mailing address if different from headquarters (street, city, state, and zip code): [Enter Address]

8. Person in charge of government relations or legislative activities: Mr. [ ] Ms. [ ]  
   - Title: [Enter Title]

9. Person in charge of public relations activities: Mr. [ ] Ms. [ ]  
   - Title: [Enter Title]

10. Person in charge of collective bargaining or negotiating activities: Mr. [ ] Ms. [ ]  
    - Title: [Enter Title]
V. CONVENTIONS AND PUBLICATIONS

1. Frequency of conventions: Annual □ Semi-annual □ Biennial □ Other (specify) □

2. Next convention: (Month) (Day) (Year) (City, State)

3. Name of official publication(s) How often published Editor
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

VI. AFFILIATED BODIES

Enter the number of chapters or locals operating at the end of 1974

VII. MEMBERSHIP

1. Enter the annual average dues-paying membership count for 1973 and 1974. If complete returns for 1974 are not available, use 9 or 10 month average:
   1973 members 1974 members

VIII. CLASSIFICATION OF 1974 MEMBERSHIP

1. Enter the approximate percentage of membership who are women

2. Enter the approximate percentage of membership in the following occupational categories:
   - Professional or technical
   - Clerical
   - Blue collar or manual crafts
   - Policemen or firemen
   - Other (specify)

   Total 100%

3. Enter the approximate percentage of all members employed in:
   - Private industries
   - Government agencies
   - Federal
   - State
   - Local (include counties, municipalities, townships, school districts, and others)

   Total 100%

4. State distribution of membership: Enter the approximate number or percentage of members in each of the 50 States.
### IX. Employee Representation and Collective Bargaining Agreements or Memorandum of Understanding

1. Enter the number of employees represented by your organization on matters of wages, working conditions, grievances, etc., in dealings or meetings with supervisors or officials: ________________________________ Employees

2. Enter the number of bilateral basic agreements and memoranda with employers. Exclude supplemental, pension, health and insurance agreements, and ordinances and statutes: ________________________________ Agreements

3. Enter the number of employers covered by agreements and memoranda: ________________________________ Employers

4. Enter the number of employees covered by the agreement shown in IX-2 above. Include nonmembers in each bargaining unit: ________________________________ Employees

5. Enter the number of dues-paying members covered by the agreements shown in IX-2 above: ________________________________ Members

### X. Initiation Fees, Dues, and Per Capita

1. Initiation fees
   - A. What is the initiation fee required of new members?
     1. If one rate applies to all new members, specify $ ________________
     2. If your constitution does not provide a fixed rate, please enter below where appropriate:
        a. Minimum fee only, of $ ________________
        b. Maximum fee only, of $ ________________
        c. Both a minimum and maximum of $ ________________ to $ ________________
     3. If your constitution does not provide a minimum and/or maximum, but allows the locals or chapters to determine the initiation fee, please check this box. □
   - B. Does the initiation fee vary depending on either the level of skill or type of work of the new member? Yes □ No □
     Please explain ____________________________________________________________________________________________________________
   - C. What portion of the initiation fee is remitted to your organization's headquarters? $ ________________ or ____________%

2. Dues
   - A. What monthly dues are now in effect?
     1. If one rate applies to all active members, enter here $ ________________
     2. If a single rate does not apply, please enter below as appropriate:
        a. Minimum dues only, of $ ________________
        b. Maximum dues only, of $ ________________
        c. Both a minimum and maximum, of $ ________________ to $ ________________
        d. No minimum or maximum amount; determined by locals □
     3. If the above do not apply, are dues based on:
        a. Percentage of earnings __________% ________________
        b. Number of hours of work ________________ hours
        c. Sliding scale according to earnings
          ___________________________________________________________________________________________________________________
          ___________________________________________________________________________________________________________________
        d. Other arrangement (specify) __________________________________________

   - B. What dues, if any, are the following categories of members required to pay? □ not required □ required
     1. apprentices ____________________________
     2. retirees ____________________________
     3. unemployed ____________________________
     4. temporarily laid off (less than one month) ____________________________
     5. other special groups (specify) ____________________________
**X. INITIATION FEES, DUES, AND PER CAPITA—Continued**

### 3. Per Capita

- **A.** What per capita taxes are remitted to the headquarters from each member's monthly dues? $_________ or ________%  

- **B.** What amount or portion of the per capita is earmarked for the following? $ or %
  1. General fund
  2. Strike fund
  3. Convention fund
  4. Publications
  5. Education fund (including family centers)
  6. Retired members fund
  7. Other (specify)

### XI.

Enter the total number of members on the association's governing body (executive board, executive council, national council, or similar body) ________________, and the number of women on the national governing body ____________________

**MAY WE HAVE YOUR COMMENTS REGARDING THE PRESENT DIRECTORY AND PROPOSALS FOR CHANGES IN FUTURE EDITIONS?**

---

**Name of person reporting:**  
**Title:**  
**Date:**
gaining agreements. No sampling procedures are used; the data are based on the entire universe of national unions and employee associations, as defined.

Presentation

The data for each union and association and summaries are presented in the Directory and in articles in the Monthly Labor Review. Wherever appropriate, separate data are presented for AFL–CIO affiliates, unaffiliated unions and associations, and cover questionnaire items such as total membership for the last 2 years, members in and outside the United States, size of unions, women and white-collar members, and industry distribution. Gains and losses over the past decade are analyzed, and major unions are ranked according to size at particular points in time. Of considerable interest to users of the Directory are the changes of union and association membership related to changes in the total labor force and to employees in nonagricultural establishments. Data by industry and on women and white-collar members permit rough approximations on the extent of union penetration compared with earlier periods. As from time to time various items on union administration have been added to the questionnaire, information has been obtained on the methods of electing officers, number of staff personnel on national union payrolls, characteristics of strike benefit plans, women officers, dues structure and internal financial arrangements.

In addition to statistical summaries, the Directory also contains appendixes which list, for each union and association, membership in areas outside the United States, number of women, proportion of white-collar members, and proportion of members in major industry groups. To permit the showing of trend data, the appendix has recently been expanded to include a tabulation showing membership figures for a decade or so for each organization having 100,000 members or more.

Uses and Limitations

The Bureau's membership figures are published on a regular basis, and serve as the principal indicator of gains and losses for particular unions and associations, and for the labor movement as a whole, particularly as a measure of inroads or declines in industry and occupational groups. Comparisons of labor relations policies and their economic effects can be made between organized and unorganized sectors. They are used by agencies of the Federal Government, State and local governments, by management personnel, union officials, students of the labor movement and economic affairs, and the general public. The Directory also is distributed widely abroad, notably to international organizations and labor unions.

Difficulties in measuring membership arise from (1) the variety of concepts and practices among organizations as to the definition and reporting of membership, (2) the availability at headquarters of the various data requested, and (3) the willingness of unions and associations to make those data available to outsiders.

In an attempt to achieve uniform reporting practices, the Bureau asks all organizations to report on the annual average number of dues-paying members. Although a worker when joining a union or association assumes an obligation to pay dues, uniform reporting practices do not result from applying this criterion alone.

Eligibility for membership is defined in a variety of ways and payment of dues is only one of several criteria. Some organizations set less than full dues requirements or waive the payment for workers who are unemployed or on strike. Such exonerated workers, however, usually remain members in good standing, with the same rights as full dues-paying members. Similar qualifications may apply to members who are apprentices, retired, or in the Armed Forces.3

In an attempt to determine union practices in reporting membership, the Bureau repeatedly has requested unions to indicate whether they include or exclude from membership reports five specified groups: the unemployed; those involved on work stoppages; those in the Armed Forces; apprentices; and the retired. Moreover, unions were asked to furnish an estimated or actual figure on the number of members in "excluded" categories. Ideally, if all organizations could furnish such data, it would be possible to compute the total number of workers who, at least in some way, can be considered as "organized." The responses, however, have fallen far short of this goal. Only a small number of unions reported, in whole or in part, the practices they followed. An even smaller number of unions were able

3In its 1963 Directory, the Bureau took a closer look at the relationship between dues submitted to the international union, the so-called per capita tax, and reported membership totals for particular unions. Per capita tax receipts were divided by the per capita tax rate. Briefly, the findings indicated that while a number of unions use a "per capita" receipt figure in their reports to the Bureau, such an approach was inappropriate in the case of other unions for reasons which the unions explained in detail. Some unions include a large number of seasonal employees whose dues payments are limited to several months during the year. Other unions questioned the use of a computed membership figure where for large groups of workers (sick, unemployed, those promoted out of the bargaining unit, etc.) only a partial per capita tax is paid, at times less than one-tenth of the amount required of other members. A few unions indicated categories of members completely dues exempt (e.g., life members, 50-year members, etc.). Financial obligations also frequently are waived for workers recently organized and for local unions in economic difficulties. In addition, several unions set dues on a sliding scale proportionate to the income of members, a method which rules out computations of this sort. Thus, on examination it became clear that computing membership by dividing the tax rate into tax receipts could not be used as a uniform yardstick applicable for all unions.
to furnish figures on the number of workers involved.4

Thus, no uniform answer exists to the deceptively simple question: Who is a union member? The answer varies from organization to organization as determined by its own policies and practices.

Although financial statements may be of some help in arriving at membership approximations, they cannot be

4At various times, suggestions have been made on the use of alternative sources for membership information, notably the use of “voting strength” of international unions at AFL–CIO conventions, based upon average paid membership to the Federation. This, however, is not a reliable measure. Some unions, for reasons of prestige, tend to overpay, while others, as a matter of convenience, pay an arbitrary amount. Moreover, this method could not be used for unions outside the AFL–CIO. Adding a question on union membership to the regular Current Population Survey, conducted by the Census Bureau for the Bureau of Labor Statistics, does not yield a tally for particular unions. Despite its inherent reporting problems, it is the best source of data on earnings and demographic characteristics and permits a ready comparison between union and nonunion workers.

Data presently compiled are submitted by officials of national unions and associations. Perhaps more accurate data, and certainly more detailed data, could be obtained by contacting local affiliates, as is done in Canada, but the task of soliciting responses from more than 70,000 organizations is beyond the present resources of the Bureau.

Technical References

Number

   A study measuring union growth by State and region, analyzing geographic and industrial shifts in membership. Includes a discussion of sources and methods of measurement.
3. ______. Directories of Labor Unions in the United States: (Bulletins 937, 1948; 980, 1950; and 1127, 1953).
   In addition to membership data, the Directories also include a brief description of the methods used, and a copy of the questionnaire.
   The Bureau’s first comprehensive study giving economic and demographic data for union and non-union wage and salary workers.
   Of invaluable aid to students in the field because of its extensive discussion of measurement problems. Appendix tables present figures for the period 1900 to 1934 including data on the extent of organization by industry.
Productivity and Technology

Chapter 30. Productivity Measures: Private Economy and Major Sectors

Background and Description of Measures

Indexes of labor productivity and compensation per hour, unit labor cost, and related measures for broad economic sectors providing information about the relationship between productivity, prices, wages, employment, and economic growth are published by the Bureau of Labor Statistics. The labor input is measured as the paid hours of all persons engaged in production, including production and nonproduction workers, proprietors, private household workers, and unpaid family workers. Measures of output per hour are developed for the total private economy and its farm and nonfarm sectors, from 1909 to the present. Since 1947, these data have been supplemented with comparable measures of compensation and costs for the farm and nonfarm sectors as well as for the manufacturing and nonfinancial corporate sectors. For the latter period indexes are available quarterly as well as annually. These productivity measures, first published in 1959, represent the culmination of a long series of developments in productivity measurement in the Bureau.2

Productivity and related measures are prepared for the following sectors of the U.S. economy:

Quarterly and Annual Measures
- Private Sector1
- Private Business2
- Nonfinancial Corporations
- Manufacturing
- Nonfarm Business

Annual Measures Only3
- Agriculture
- Construction
- Mining
- Transportation

1Output for the private economy—gross private domestic product—is defined as gross national product less output of the general government and rest-of-world sectors.
2Private Business output excludes from the output of the total private sector: a) Gross housing product of owner-occupied dwellings and, b) gross product of institutions (non-profit) and private household workers.
3The listed sectors, plus manufacturing, aggregate to the total private sector.
4Government enterprises include those activities of Federal, State and local governments which are paid for on a fee-for-service basis.

The Bureau of Labor Statistics output per hour measures are constructed as the ratio between gross domestic product—GDP—originating in the private economy and its subsectors3, and the corresponding hours of all persons engaged in production. The changes through time in these major indexes reflect efficiency in the use of labor, and indirectly, the effect of other input factors in the domestic production of goods and services. The changes in productivity and related measures throughout the business cycle typically show patterns which differ substantially from those found in long-term movements, and therefore are the objects of special analytic studies.

Labor input measures are based primarily on BLS establishment payroll data on employment and hours and reflect hours at work and paid time for vacation, holidays and sick leave as well.

Indexes of compensation per hour measure the hourly cost to employers of wages and salaries, as well as supplemental payments, which include employers' contributions to social security, unemployment insurance taxes, and payments for private health insurance and pension plans. Measures of real compensation per hour reflect the adjustment of hourly compensation for changes in the Consumer Price Index.

Unit labor cost measures the cost of labor input required to produce one unit of output, and is derived by dividing compensation in current dollars by output in constant dollars. Unit nonlabor payments measure the

2For a detailed description of the historical development of productivity measurement program of the Bureau of Labor Statistics, see chapter 31.
3Gross domestic product is gross national product less the net return on foreign investments. Net return on foreign investments is considered as originating in the "rest-of-world" sector.
cost of nonlabor items such as depreciation, rent, interest, and indirect business taxes in addition to corporate profit and profit-type income of proprietorships and partnerships.

Data Sources and Estimating Procedures

Output. Real gross domestic product originating in the total private economy and its sectors is the basis for preparation of the output component of the productivity estimates. Thus the output components of the entire set of measures is based upon and consistent with the National Income and Product Accounts prepared by the U.S. Department of Commerce. Gross product is the market value of final goods and services produced within a given time period, and includes purchases of goods and services by consumers; gross private domestic investment, net foreign investment, and purchases by government. Gross national product (GNP) is equal to income received by labor and property for services rendered in the current production of goods and services, in addition to capital consumption allowances, indirect business taxes, and several other minor items. Gross domestic product (GDP) is simply gross national product less “rest-of-world” output, and embodies net factor payments to domestic owners of factors of production located outside the United States.

Gross domestic product in current dollars cannot be used directly as the output measure because it reflects price changes as well as changes in physical volume. The Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce prepares estimates of constant-dollar GDP for the private business sector and major sectors; these estimates exclude changes in the value of production resulting from price change. Therefore, they reflect only changes in real product, which is basis for output per hour measures.²

Output data for the manufacturing sector based on gross product are derived by the BEA on an annual basis only. In order to achieve quarterly estimates of manufacturing output consistent with the BEA’s gross product concept, BLS uses the quarterly changes in the Federal Reserve Board index of manufacturing production to move the gross product data. The results are benchmarked annually to the published BEA output levels. Thus the output data used for all major sectors are consistent with the output concepts embodied in the national income and product accounts.


Labor Input. The primary source of hours and employment data is the BLS Current Employment Statistics (CES) program, which provides monthly survey data on employment (for all employees and production or nonsupervisory workers) and average weekly hours of production workers in nonagricultural establishments. Jobs rather than persons are counted, so that multiple jobholders are counted more than once. Weekly hours are measured as hours paid for rather than as hours at work. These statistics are based on payroll records from a sample establishments such that the probability of sample selection is related to the establishment size: large establishments (relative to the sector) fall into the sample with certainty, whereas smaller establishments are sampled on a probability basis. Data on employment, hours, and earnings are collected monthly; the reference period for these data is the payroll period including the 12th of the month. (The CES methods are described fully in chapter 3.) Establishment data are published monthly in Employment and Earnings and in an annual summary.

Compensation and Labor Cost. The BEA develops employee compensation data as part of the national income accounts. These quarterly data include direct payments to labor—wages and salaries (including executive compensation), commissions, tips, bonuses, and payments in kind representing income to the recipients—and supplements to these direct payments. Supplements consist of employer contributions to funds for social insurance, private pension and health and welfare plans, compensation for injuries, etc.

The compensation measures taken from establishment payrolls refer exclusively to wage and salary workers. Labor cost would be seriously underestimated by this measure of employee compensation alone in sectors such as farm and retail trade, where hours worked by proprietors represent a substantial portion of total labor input. The BLS, therefore, imputes compensation for labor services of proprietors and private household workers, and includes the hours of unpaid family workers in the hours of all employees engaged in production. Labor compensation per hour for proprietors is assumed to be the same as that of the average employee in that sector.

Unit labor and nonlabor costs. The Bureau also presents data on labor and nonlabor costs per unit of output for the private sector and its major components. Unit labor cost relates hourly compensation of all persons to output per hour and is defined as compensation per unit of constant-dollar output.³ Nonlabor payments are the excess of gross product originating in an economic sector over corresponding labor compensation, and in-

clude corporate profits and the profit-type income of proprietors and nonlabor cost: interest, depreciation, rent, indirect business taxes, etc.

Since CES data include only for nonfarm wage and salary workers, data from other sources—(National Income and Product Accounts or the Current Population Survey)—are used for farm employment and, in the nonfarm sector, proprietors, unpaid family workers, and private household workers.

Separate estimates for employment and hours paid are developed for each major sector and are aggregated to private business and nonfarm business levels. Hours of labor input are treated as homogeneous units; no distinction is made among workers with different skill levels or wages.

In the manufacturing sector, separate estimates for production and nonproduction worker hours are derived and aggregated to the manufacturing total. Employment and average weekly hours for production workers are taken directly from CES data. Average weekly hours for nonproduction workers are developed from BLS studies of wages and supplements in the manufacturing sector which provide data on the regularly scheduled workweek of white-collar employees.

For nonmanufacturing sectors, employment and average weekly hours are taken from the CES survey. Although CES weekly hours data refer only to non-supervisory workers, it is assumed for hours computation that the length of the workweek in each nonmanufacturing industry is the same for all wage and salary workers.

Analysis and Presentation

Indexes of output per hour show changes in the ratio of output to hours of labor input; however, these indexes should not be interpreted as representing solely labor’s contribution to production. Rather, they reflect the interaction of many factors working in cooperation with the hours of labor input, including technology, capital investment, human capital (education and skill) energy, and raw materials.

In aggregate sectors, productivity changes through time reflect movements within the various component industries as well as shifts in the relative importance of each of the industries. For example, changes in labor productivity, or output per hour, are influenced by the relative shift of labor input from low to high productivity industries and by productivity changes in the component sectors. Within industries, other shifts occur which are not accounted for adequately—changes in income and tastes, for example, may contribute to shifts in consumption patterns to higher quality goods, or to services rather than goods.

Short-term movements in productivity and unit labor cost often result from cyclical variation in output; this tends to distort the long-term relationship between output and labor input, as noted below. A number of studies are now going on to separate cyclical from long-term productivity movements.

Indexes of output per hour, compensation per hour, and related cost data are published quarterly in two series of BLS press releases: Productivity and Costs in the Business Sector, and Productivity and Costs in Nonfinancial Corporations. In addition, quarterly and annual analyses are published regularly in the Monthly Labor Review. Historical indexes of these and related data are available on request, as are detailed descriptions of data sources and computational procedures.

Indexes of output per hour and related cost data are published monthly in Employment and Earnings, the Monthly Labor Review, and the Chartbook on Prices, Wages, and Productivity, and annually in the Handbook of Labor Statistics.

Calculation Procedures

Labor productivity or output per hour, is computed as:

\[
\text{Labor productivity} = \frac{\text{Constant-dollar output}}{\text{Hours of labor Input}}
\]

or

\[
P = \frac{O}{H}
\]

In instances where several sectors are involved, labor productivity can be computed equivalently as

\[
P = \frac{\sum_i O_i}{\sum_i H_i}
\]

or as

\[
P = \sum_i W_i \left(\frac{O_i}{H_i}\right)
\]

where

- \(O_i\) is constant-dollar output in sector \(i\)
- \(H_i\) is hours of labor input in sector \(i\)
- \(W_i = H_i / \sum H_i\) is the hours-based weighting factor for sector \(i\)
- \(P\) is average labor productivity for the aggregate sector

The computation of labor compensation per hour is equivalent to computation of output per hour. Unit labor cost, ULC, is computed as labor compensation, \(C\), per unit of (constant-dollar) output, but is often represented as

\[
ULC = \frac{(C/H)}{(O/H)}
\]

a form which highlights the relationships among unit
labor cost, hourly compensation, and labor productivity.

Real compensation per hour (RC) is computed as hourly compensation deflated by the Consumer Price Index (CPI):  

$$RC = \frac{C}{H} \div CPI$$

Unit nonlabor payments, UNLP, includes all nonlabor components of gross product originating in a given sector—depreciation, rent, interest, and indirect business taxes as well as profits and profit-type income—whereas unit nonlabor cost excludes profit. These measures are computed:

$$UNLP = \frac{(OC-C)}{O}$$

and

$$UNLC = \frac{(OC-C-PR)}{O}$$

where

OC is current-dollar gross product originating
C is current-dollar compensation
O is constant-dollar output
PR is profits

Labor's share in gross product originating in a given sector is simply the ratio of labor compensation paid in that sector to the gross product, both measured in current dollars:

$$LS = \frac{C}{OC}$$

and, analogously, the nonlabor or "capital" share is defined as

$$CS = \frac{(OC-C)}{OC} = 1-LS$$

The measures noted above are prepared quarterly in index form for the major sectors of the private economy. In addition, quarterly percent changes at compound annual rates and percent changes from the same quarter in the previous year are computed:

$$Qt = 100 \left( \frac{V_t}{V_{t-1}} \right) - 100$$

$$Y_t = 100 \left( \frac{V_t}{V_{t-4}} \right) - 100$$

where

t is a time subscript denoting the quarter
V is a series described above
Qt is the quarterly percent change in series V from quarter t−1 to quarter t, measured at a compound annual rate
Yt is the percent change in series V from quarter t−4—the same quarter 1 year before—to quarter t

In order to achieve greater precision in reported measures, all computations are made with the measures themselves rather than with their corresponding indexes.


**There are two conventions in the handling of quarterly (or subannual) changes at compound annual rates that involve approximations. The inexactness of these approximations is amplified by relatively large changes in the economic measures caused by the recent inflation, sharp recession, and rapid recovery.

Since most of the productivity and cost measures are reported as percentages to one decimal place, e.g., 2.6 percent, questions sometimes arise because the greater precision carried in the automated computations results in differences in the final decimal place. For example, denoting "percent change in" by the prefix d, if H = A · E, then

$$dH = dA + dE$$

and if P = O/H,

$$dP = dO - dH$$

For changes in the neighborhood of 1 or 2 percent, this approximation is very good. However, the term omitted in the approximation, dA · dE in the first case, and −dO · dH in the second, becomes significant in the first decimal place as the sum of changes in question approaches 5 percent, as the following examples demonstrate.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Approximation</th>
<th>True Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>dA</td>
<td>dE</td>
<td>dA + dE</td>
<td>dA + dE + (dA · dE)</td>
</tr>
<tr>
<td>1.0</td>
<td>1.0</td>
<td>2.0</td>
<td>2.01</td>
</tr>
<tr>
<td>2.5</td>
<td>2.5</td>
<td>5.0</td>
<td>5.06</td>
</tr>
<tr>
<td>5.0</td>
<td>5.0</td>
<td>10.0</td>
<td>10.25</td>
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<tr>
<td>10.0</td>
<td>10.0</td>
<td>20.0</td>
<td>21.00</td>
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Furthermore, when the changes involved are compounded to annual rates with greater precision in the calculation than is typically reported in the final figures, the approximation shown above is even less exact.

The second convention is to represent the annual rate of change more simply as four times the quarterly percentage change, that is, in terms analogous to those shown for Qt in the text,

$$Q_t = 400 \left( \frac{I_t/I_{t-1}}{1} \right) = 4I$$

Again in this instance, the true compound annual rate of change, Qt, noticeably exceeds the approximation even for changes near 1 percent, as is shown below:

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</thead>
<tbody>
<tr>
<td>dI</td>
<td>A</td>
<td>dI = 4dI</td>
<td>Q_t = 100 (I_t/I_{t-1})^4 -100</td>
</tr>
<tr>
<td>1.0</td>
<td>4.0</td>
<td>4.06</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>10.0</td>
<td>10.38</td>
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<tr>
<td>5.0</td>
<td>20.0</td>
<td>21.55</td>
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<tr>
<td>10.0</td>
<td>40.0</td>
<td>46.41</td>
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tion, interest, rent, indirect business taxes, etc. Unit labor cost, or compensation per unit of output, represents a major portion of total unit cost and so reflects the combined effect of changes in output per hour and compensation per hour: thus an increase in compensation per hour tends to increase unit labor cost while an increase in output per hour tends to reduce it. Therefore, through its impact on unit labor cost, output per hour is a crucial element in the wage-price relationship, for it indicates the extent to which compensation gains can occur without putting pressure on prices or reducing payments to other input factors.

Certain characteristics of the labor productivity and related cost data should be recognized in order to apply them appropriately to specific situations. First, the data for aggregate sectors reflect changes in various constituent industries as well as shifts in the relative importance of these industries: a significant portion of labor productivity growth from 1947 to the present is attributable to the relative shift of workers from the farm to the nonfarm sector. Second, the measures are often linked by lead or lag relationships particularly during the business cycle when inventories, overtime hours, and the rate of capital utilization are used to buffer the effects of short-term swings in product demand. Third, data and other resources available for estimation somewhat limit the productivity, output, compensation, and employment measures which can be constructed. In several sectors where output is difficult to define in a satisfactory way, productivity measures are correspondingly weak—construction, financial services, and the imputed value of owner-occupied dwellings are examples. In consequence, the productivity and cost measures for these sectors should be interpreted with caution.


### Technical References

#### Number

**A. Bureau of Labor Statistics Publications**

   - Annual review article for 1975. Examines relations among growth rates in labor productivity, capital productivity, and the capital/labor ratio. Shift of hours from the farm to the nonfarm sector since 1909 is presented.
   - Annual review article for 1974. Recent rates of capital formation are examined.
   - A presentation and analysis of output per man-hour indexes and trends for the total private U.S. economy and major sectors. Includes a description of methods and sources for developing output per man-hour measures.
   - A collection of nearly 800 references concerning productivity and productivity measurement. Each reference includes a brief annotation.

**B. Other Publications**

   - Outlines the theoretical framework and empirical application of an integrated approach to measuring labor and capital input.
   - A study of output and productivity growth in 9 Western countries. Includes a discussion of factors affecting productivity growth and the effects of these factors in contributing to differential growth rates between countries.
Technical References—Continued


A presentation of historical measures of output, factor input, and productivity for the U.S. economy and industry groups, including descriptions of concepts and methods of measurement. Also includes discussion of implications of productivity change for economic growth, prices, incomes, and resource allocation.


A paper describing some of the problems of developing the measures which were used in the specification of the guideposts.


A selection of papers concerning the development of output, input, productivity and cost measures for individual industrial sectors.


A collection of papers concerning the concepts, definitions, procedures, and data limitations of measuring output, input and productivity in service producing industries.
Chapter 31. Output Per Employee-Hour
Measures: Industries and the Federal Government

Background

Studies of output per employee-hour for individual industries have long been a part of the BLS program. The first Commissioner of Labor, Caroll D. Wright, conducted a study of 60 manufacturing industries in 1898. The study, prompted by concern on the part of Congress that human labor was being displaced by machinery, was presented in the report “Hand and Machine Labor”; this provided striking evidence of the savings in labor resulting from mechanization in the last half of the 19th century. The impact of productivity advance upon employment remained an important focus of the BLS program throughout the 1920's and 1930's. Also during this period, the Bureau began the preparation and publication of industry indexes of output per employee-hour, which were based on available production data from the periodic Census of Manufactures and employment statistics collected by the BLS.

In 1940, Congress authorized the Bureau of Labor Statistics to undertake continuing studies of productivity and technological changes. The Bureau extended earlier indexes of output per employee-hour developed by the National Research Project of the Works Projects Administration, and published measures for selected industries. This work, however, was reduced in volume during World War II, owing to the lack of meaningful production and employee-hour data for many manufacturing industries.

The advent of World War II also caused a change in the emphasis of the program from problems of unemployment to concern with the most efficient utilization of scarce labor resources. The BLS undertook a number of studies of labor requirements for defense industries, such as synthetic rubber and shipbuilding. After the War, the industry studies program resumed on a regular basis, and was supplemented by a number of industry studies based on the direct collection of data from employers. Budget restrictions after 1952 have prevented the continuation of direct collection of data. Consequently, the preparation of industry measures is largely limited to those industries where readily available data can be used to construct measures.

In recent years, public interest in productivity has grown, and increases in output per employee-hour have been recognized as important indicators of economic progress and a means to higher income levels, rather than merely a threat to job opportunities.

The Industry Studies program covers a variety of manufacturing and nonmanufacturing industries at the 3 and 4 digit Standard Industrial Classification level. Measures for these industries are published on an annual basis and are provided for most years between 1947 and the most recent year for which data are available. For many industries, measures are also provided for 1939.

Recently coverage has been expanded to include industries in trade and services and with the increasing importance of the public sector, has been extended to various functional areas in the Federal Government. Productivity measurement in the Federal Government was initiated by a request from the Joint Economic Committee in the fall of 1970 to the General Accounting Office in conjunction with the Office of Management and Budget, and the Civil Service Commission. A joint Federal productivity measurement task force consisting of these agencies, with technical assistance and support from the Bureau of Labor Statistics was established. This task force collected data and constructed indexes for fiscal years 1967–71. In July 1973, the Office of Management and Budget endorsed the continuation of the project to measure Federal productivity, and the Bureau of Labor Statistics assumed full responsibility for collecting input, output, and related information, in addition to the development of productivity measures.

Since July 1973, the Bureau’s continuing effort has been directed towards expanding coverage to include organizational units not previously covered, improving the quality of some of the input and output data, and refining the methodological procedures used to construct productivity indexes.

Concepts

Indexes of output per employee-hour measure changes in the relationship between the physical volume of an organization's output and the employee-hours expended in that output. Although traditionally output per employee-hour has been the most frequently used measure, expression of physical output per employee-hour often is simplified if stated in terms of its reciprocal: Employee-hour requirements per unit of output (unit employee-hours). Therefore, this form of index is used in the following description.
For an industry producing a single uniform output, the unit employee-hours index is simply the ratio of the employee-hours expended to produce a unit of output over two periods of time. This ratio may be expressed as follows:

\[ I_u = \frac{1}{I_t} = \frac{L_1}{L_0} \]

Where: \( I_u \) represents the unit employee-hour index, \( I_t \) represents the output per employee-hour index, and \( L_1 \) and \( L_0 \) denote unit employee-hours expended in the current and base periods, respectively.

For an industry producing a number of products or services (the more typical case), the unit employee-hours index is the ratio for two periods of the total hours required for the output of a given composite of products or services. Indexes of such industries vary with the composite specified and can take many forms. Letting \( Q_0 \) and \( Q_t \) represent base period and current period quantities of a given product respectively, two of these forms are:

a. Using a current period composite, and

\[ I_u = \frac{\sum q_i l_i}{\sum q_1 l_0} \]

b. Using a base period composite.

\[ I_u = \frac{\sum q_0 l_i}{\sum q_0 l_0} \]

An index constructed according to (a) compares the employee-hours expended in the production of the current composite with the employee-hours which would have been required to produce the current composite in the base period. An index constructed according to (b) compares the employee-hours required in both periods to produce the base period composite. Thus, these indexes eliminate the effects of variations over time in the relative importance of products or services on unit employee-hours.

In either form, an index of unit employee-hours also can be viewed as the quotient of an index of employees and an index of output, i.e.,

Employee-hours index ÷ Output index = Unit employee-hours index

\[ I_u = \frac{\sum l_i q_i}{\sum l_0 q_0} \]

\[ \frac{\sum l_i q_i}{\sum l_0 q_0} \div \frac{\sum l_i q_i}{\sum l_i q_i} = \frac{\sum l_i q_i}{\sum l_0 q_0} \]

The employee-hours index measures the change in aggregate employee-hours between the base and current periods. The employee-hours data are the total hours expended by employees in establishments classified in the industry, in producing the base period and current period composites.

As can be seen in the formulas, the appropriate output index is one which compares the quantities of the various products or services in the current and the base periods, each weighted by the employee-hours expended per unit produced in a given period. A current period weighted unit employee-hours index uses a base period weighted output index divided into the employee-hours index. Conversely, a base period weighted unit employee-hours index is consistent with an output index which utilizes current period weights.

**Methods and Sources**

**Industries**

**Output Per Employee-Hour**

The Bureau of Labor Statistics computes an index of output per employee-hour by dividing an output index by an index of aggregate employee-hours. For most industries, measures are prepared separately relating output to (a) all employee-hours, (b) production worker hours, and (c) nonproduction worker hours. (The standard definitions of production workers and nonproduction workers are used.) Three corresponding measures also are computed relating output to the number of employees. For industries in trade and services, measures are prepared relating output to the hours of all persons involved in producing that output, including self-employed and unpaid family workers.

**Output**

BLS industry output indexes are based on quantifiable units of products or services of the industry combined with fixed period weights. Whenever possible, physical quantities are used as the unit of measurement. For those industries lacking quantity data, constant dollar value of shipments, sales, or revenue data are used to develop the output series. This procedure is used almost exclusively for the non-goods producing industries. For manufacturing and mining industries, quantity data on physical output are usually most comprehensive for years covered by a census. To make maximum use of the comprehensive census data, output indexes are derived from data for two consecutive censuses; these indexes are referred to as benchmark indexes. For intercensal years, annual indexes are based on either physical output data (generally in less
detail than for Census years) or, if such data are not available, value of output adjusted for price change (i.e., the value of output in constant dollars). The annual series subsequently are adjusted to the benchmark levels for the census years.

Weights. The mathematical form of the output index calls for the use of unit employee-hour weights. Such weights, used whenever possible, are derived from special surveys or from data for specialized establishments published in the Census of Manufactures. In some industries, however, unit employee-hour information is not available for individual products. Consequently, the BLS uses substitute weights when it is believed that they are proportional to unit employee-hour weights; these are usually unit value weights. Unit value weights are computed from Census or survey data on the quantity and value of shipments of the primary products of the industry. The introduction of these substitute weights results in an industry output per employee-hour index which reflects shifts in value per employee-hour of the various products in the industry. Thus, a change can occur in the index without any change in the output per employee-hour for any product of the industry.

The extent to which error or bias may be introduced by the use of unit value weights is not known. The index is equivalent to one weighted with unit employee-hours if the unit employee-hours and unit values among the products are proportional, or if there is no correlation between the relative change in quantity and value per employee-hour. There is evidence that unit values are fairly reliable approximations for individual products in instances where wages constitute a large proportion of total value of output. An error generated in the output index by an error in the weights usually is considerably smaller than the error in the weights themselves.

In some industries, unit value weights for specific products and unit employee-hour weights for product groups are used at different stages in constructing the industry output indexes. When this procedure is used, the individual products are first aggregated into primary product group indexes with unit value weights. These indexes are then combined into an industry output index with primary product group employee-hours. The primary product group employee-hours relate to a base period, as do the value weights.

To obtain primary product group employee-hour weights, total employee-hours for plants specializing in each primary product class, derived from published census data on production worker hours and nonproduction worker employment, are supplemented by unpublished BLS estimates of nonproduction worker hours. (See page 225 for the procedures used to estimate nonproduction worker employee-hours.) Ratios of employee-hours to value of shipments are multiplied by the corresponding value of primary products shipped by the entire industry to provide the estimated primary product group employee-hour weights. This procedure assumes that employee-hours per dollar for each product class shipped by the entire industry are the same as those for plants specializing in the product group. This procedure is used only when the “specialization” and “coverage” ratios of the industry are high, and specialization data for all or most of the product groups are available.


Benchmark indexes. For most manufacturing, trade and service, and all mining industries, indexes reflecting changes in output between census years are constructed. These are called benchmark indexes.

For manufacturing industries, benchmark indexes are developed through the use of the following procedure: Price indexes for each primary product class are generated from data on the value of each individual product within the class, whether made in the industry or elsewhere. Wholesale price indexes are used wherever possible to convert the product values to constant dollar estimates. If a wholesale price index is not available, a price index is developed using both the quantity and value data reported for the product in the Census of Manufactures. The primary product class price indexes are derived from the sum of the current dollar values and the sum of the constant dollar values.

These “wherever made” primary product class price indexes are used to deflate the value of primary products produced only by the industry. This procedure assumes that the price movements of the primary products within the industry are the same as the price movements for all primary products wherever made. These constant dollar values are related to corresponding base year values in order to derive separate primary product indexes within the industry.

These separate primary product indexes are then combined with employee-hour weights to derive the total industry primary product output index. The index of primary products of the industry is multiplied by a “coverage” adjustment to represent the total output of the industry. This adjustment is the ratio of the index of value of industry shipments (after inclusion of net addi-
tions to inventories) to the index of value of shipments of primary products. The final industry output index thus reflects inventory buildups and changing proportions of secondary products.

Benchmark indexes for the mining industries are computed from unweighted tonnage data as reported in the Census of Mineral Industries. For trade and service industries, benchmark indexes are computed from total sales data reported in the Census of Business.

**Annual Indexes.** Annual output indexes are constructed by the following described procedures. The annual indexes are adjusted, if necessary, to the levels of the benchmark indexes previously described. The adjustment factors for 2 census years are used to determine the adjustment factors for the intervening years by linear interpolation.

1. **Physical Output.** Most annual output indexes are based on physical quantities of products combined with fixed-period unit employee-hour or unit value weights. The basic quantity data are generally primary products of an industry classified into product groups; the finest level of detail available is used. The quantity data relate to primary products "wherever made" and in some cases to shipments of the products.

The Bureau's annual measures of production are constructed from data on physical quantities of products which comprise a high percent of the total value of an industry's output. Coverage varies between 80 and 100 percent.

2. **Deflated value.** When adequate annual physical quantity data are not available, indexes are derived from data on the value of industry output adjusted for price change. Since the adjustment for price change is most often downward, the indexes usually are called "deflated value" indexes. Such indexes are conceptually equivalent to indexes which use data on physical quantities of products combined with unit value weights. This index is derived by dividing the value of the industry's output by an industry price index. An index of these deflated values shows the change in the real value of output between the past and current periods.3

For manufacturing industries, data on value of production are often not directly available, and data on value of shipments must be used. In this case, data on value of shipments for each year are divided by an industry price index representing the average annual price for the year. Beginning and end-of-year finished goods and work in process inventories are also deflated. The estimated value of shipments in constant dollars is then adjusted by the net change in inventories — also in constant dollars — to yield an estimate of the constant dollar value of production. For industries in trade and services, data on the value of sales for each year are divided by a specially constructed industry price index to derive a measure of the change in the industries' real output.

**Sources.** Industry output indexes are prepared from basic data published by various public and private agencies, using the greatest level of detail available.


For deflated value series, industry price indexes are derived from wholesale and consumer price indexes developed by the Bureau of Labor Statistics.

**Employee-Hours**

An index of employee-hours is computed by dividing the aggregate employee-hours for each year by the base-period aggregate. Employee-hours are treated as homogeneous and additive with no distinction made between hours of different groups of employees. Data on changes in qualitative aspects of employee-hours, such as skill, efficiency, health, experience, age, and sex of persons comprising the aggregate are not used and generally are not available. For mining industries, employee-hour indexes are constructed for production workers; for manufacturing industries, indexes are developed for all employees; production workers and nonproduction workers. For service and trade industries, indexes are constructed for the hours of all persons, which includes paid employees, partners, proprietors, and unpaid family workers.
Sources. Industry employment and employee-hours indexes are developed from basic data compiled by the Bureau of Labor Statistics or the Bureau of the Census. For trade and service industries these data are supplemented by data from the Internal Revenue Service. For most private nonagricultural industries (including manufacturing), the Bureau of Labor Statistics publishes employment and average weekly hours data for production or nonsupervisory workers and employment data for all employees. For manufacturing industries, the Bureau of the Census publishes employment and aggregate hours data for production workers and employment data for all employees.

The BLS and Census differ in their definition of employee-hours. Census data include all hours at the plant, whether worked or paid for, and exclude paid time for vacations, holidays, or sick leave when the employee is not at the plant. Overtime and other premium pay hours are included on the basis of actual time at the plant. In contrast, the Bureau of Labor Statistics data include time for paid vacations, holidays, and sick leave, as well as plant employee-hours. Differences in the data from the two sources for the same industry, however, also stem from the difference in sampling and reporting methods.

Generally, whenever employment and hours data are available from both the Bureau of the Census and the Bureau of Labor Statistics, the labor input data which are used are those consistent with the data on output. Thus, when output data from the Bureau of the Census are used, employment and hours data from the same source usually are preferred.

Nonproduction Worker Hours. While both the Bureau of the Census and the BLS provide data on production worker employee-hours, neither source provides annual data by industry on nonproduction worker or all-employee hours. Therefore, these measures are estimated.

The estimates of aggregate nonproduction worker employee-hours for the manufacturing industries are derived from published employment data, and estimates of average annual hours worked or paid per nonproduction worker.

For years prior to 1968, the estimates of average annual hours worked are calculated by multiplying the number of work-weeks in the year times the scheduled weekly hours. This produces an estimate of average annual hours paid. Estimated hours for vacations, holidays, disability, and personal time off are subtracted from average annual hours paid to obtain an estimate for average annual hours worked.

Estimated hours for vacation, holidays and disabilities are based on data from various BLS surveys and studies of the Department of Health, Education, and Welfare. Personal time off has been estimated as a constant from references in relevant publications.

Since 1968, the estimates of average annual hours paid and hours worked have been based on data collected in the BLS biennial surveys of employee compensation in the private nonfarm economy. For the trade and service industries, estimates are made for the hours of partners, proprietors, and unpaid family workers using unpublished data collected in the BLS Current Population Survey, and for supervisory workers using data from the Census of Population.

All employee-hours estimates for manufacturing industries are derived by summing the aggregate hours for production workers, and the estimated aggregate hours for nonproduction workers. For trade and service industries, all person hour estimates are derived by summing the aggregate hours for paid employees and the estimated aggregate hours for partners, proprietors, and unpaid family workers.

Comparability of Output and Employee-Hours Data

For industries other than in trade and services, employee-hours data are based on total employee-hours of establishments classified in an industry, whether the employee-hours are applied to production of primary or secondary products. Annual physical output data, on the other hand, usually include only primary products of an industry. In addition, they are usually reported on a “wherever made” basis. Thus, there can be some discrepancy in the coverage of output and employee-hours measures. This is not a serious problem unless there is considerable variation from year-to-year in the proportion of primary products to total products of an industry, or if there is change in the proportion of primary products which are made in other industries. The comparability of the employee-hours and output data is indicated by the specialization and coverage ratios which the Bureau of the Census publishes. All industries in the BLS industry measurement program have high specialization and coverage ratios.

In selecting industries for the measurement program, attention is also given to changes in the degree of vertical integration. Employee-hours relate to all operations performed by establishments of an industry, while output usually is measured in terms of the final product. If establishments undertake additional operations (such as the manufacture of components which had previously been purchased from suppliers) employee-hours will increase but there will be no corresponding increase in final output. Thus, output per employee-hour indexes would be biased. In developing industry indexes, the BLS examines data such as the ratio of cost of materials to value of shipments for any indication of a change in the degree of vertical integration.

Federal Government

Output per employee-year, output, employee-year, and indexes for selected functional areas of government
activity and for the total of all 245 participating organizations are constructed in a manner similar to that described for industries. At the present time, these measures cover about 65 percent (1.8 million employee-years) of the Federal civilian work force.

Ideally, a productivity index should relate final outputs to their associated direct and indirect input(s), and, in fact the output data are final from the perspective of the functional areas within which these data are classified. However, since the outputs of one organization may be consumed wholly or partially by another Federal organization in the production of its final outputs, all output indicators in the Federal sample may not be final from the perspective of a higher level organization; for example, the entire Federal Government. Therefore, the overall statistics do not represent "Federal productivity" but rather, the weighted average of the productivity changes of the measured Federal organizations included in the sample.

In the Federal sample, nearly 1200 products and services are aggregated into output indexes by combining the quantities of each type of output by their respective base-year labor requirements. These unit employee-year weights are constructed from the detailed output and input data provided by each organization. For fiscal years 1967–1972, fiscal year 1967 weights are used: for years after 1972, fiscal year 1972 weights are used. The two output segments are combined and referenced to a fiscal year 1967 base.

The organizational indexes are grouped into 16 functional categories, based on type of government activity. Some of these categories, such as standard printing and power, are more homogeneous than others, such as citizens' records and specialized manufacturing. Nonetheless, these categories provide insight into the trends for the major functional areas underlying the overall sample. Although productivity, output and input indexes are also constructed for each participating organization, these are not published but are returned to each organization for its own use (for example, to stimulate further examination of the causes of productivity change within each organization). This is one method used by BLS to validate the basic data (that is, by examining the reasonableness of the derived trends).

Employee-year indexes are developed from agency data submissions. As in all labor input measures used by the Bureau to develop productivity indexes, employee-years are considered homogeneous and additive. Each employee-year reflects the regularly scheduled time, overtime, and leave time of all full-time, part-time or intermittent employees. An employee-year is equivalent to one individual paid for 40 hours a week, 52 weeks a year.

Presentation

BLS industry indexes are published annually in the form of a bulletin, Productivity Indexes for Selected Industries. A limited amount of the most current data are provided in an annual press release. As new industry indexes are developed, they are presented as articles in the Monthly Labor Review. The articles contain an analysis of productivity, output and employment trends in the industry. Technical notes describing the methodology used to develop the indexes are available on request. Unpublished indexes for all 4, 3, and 2 digit SIC manufacturing industries are available for analytical purposes upon request. Federal Government indexes are published annually in the Monthly Labor Review.

Indexes of output per employee-hour also are published in the Statistical Abstract of the United States and in the Handbook of Labor Statistics. Some indexes for earlier years are published in Historical Statistics of the United States.

4The following definitions briefly describe the nature of the organizations classified within each function:

1. Citizens' records—Organizations maintaining records of government obligation to citizens and vice versa, also criminal and demographic records.
2. Reference services—Organizations maintaining library or publications services, or developing statistical information for the public.
3. Loans and grants—Organizations making research grants and various business loans.
4. Training and education—Organizations overseeing training, education, and social welfare programs.
5. Agriculture and Natural resources—Organizations responsible for overseeing and protecting natural resources.
6. Regulation—Organizations responsible for enforcing Federal statutes in such areas as interstate commerce, immigration, taxation, and labor.
7. Medical services—Organizations operating hospitals, clinics, or public health programs.
8. Power—Organizations responsible for generation, sale, or transmission of electric power.
9. Transportation—Organizations responsible for operating U.S. canals, and maintaining safe conditions in U.S. airways and waterways.
10. Postal service—Organization responsible for delivering the mail and providing other services, such as mail insurance and money orders.
11. Specialized manufacturing—Organizations involved in manufacturing-type activities, such as printing currency or maps and fish production.
12. Standard printing—Organizations printing standard text or statistical documents.
13. Procurement and supply—Organizations responsible for purchasing and distributing supplies.
14. Overhaul and repair of equipment—Organizations responsible for upkeep of major military equipment.
15. Maintenance of facilities—Organizations responsible for the operation and upkeep of Federal buildings or installations.
16. General support services—Organizations performing overall administrative and supportive activities such as personnel, automatic data processing, and budget.
Uses and Limitations

Measures of output per employee-hour are particularly useful for studying changes in labor utilization, projecting future employment requirements, analyzing trends in labor costs, comparing productivity progress among countries, examining the effects of technological improvements on employment and unemployment, and analyzing related economic and industrial activities. Such analysis usually requires that indexes of output per employee-hour be used in conjunction with other data. Specifically, related data on production and employment are useful in studying technological effects; to study trends in labor costs, data on earnings and other labor expenditures are necessary.

Although the measures relate output to one input—labor time—they do not measure the specific contribution of labor, capital, or any other factor of production. Rather, they reflect the joint effect of a number of interrelated influences such as changes in technology, capital investment per worker, utilization of capacity, layout and flow of material, skill and effort of the work force, managerial skill, and labor-management relations. Also, indexes which relate output to one group of employees represent the total output of the industry resulting from all employees; they are not representative of the specific contribution of that group of employees.

These productivity measures of output per employee-hour are subject to certain qualifications. First, existing techniques cannot fully take into account changes in the quality of goods and services produced. Second, although efforts have been made to maintain consistency of coverage between the output and labor input estimates, some statistical differences may remain. Third, changes in the degree of plant integration and specialization often are not reflected adequately in the production statistics. This may result in overstatement of productivity gains in some years and understatement in others. Fourth, indexes involving nonproduction worker hours are subject to a wider margin of error than are the indexes using production worker hours because of the technique for estimating average employee-hours of nonproduction workers. Errors in estimating hours for nonproduction workers, however, have a relatively insignificant effect on the estimates of hours for all employees. Finally, year-to-year changes in output per employee-hour are irregular, and therefore are not necessarily indicative of basic changes in long-term trends. Conversely, long-term trends are not necessarily applicable to any one year or to any period in the future. Because of these and other statistical limitations, these indexes cannot be considered precise measures; instead they should be interpreted as general indicators of movements of output per employee-hour.

Technical References

Bureau of Labor Statistics


Explains why productivity increase is important to the economy, how it is measured, and why it is difficult to measure.


Other


Introduces basic ideas about productivity. Discusses the sources of productivity, and relates productivity to business cycles, inflation, and economic policy. Also discusses productivity abroad.

   A collection of essays dealing with conceptual and measurement problems of output and productivity in service industries. Among industries discussed are medical care, commercial banks, and retail trade. Chapters also deal with service industries in Canada and with the development of service industries in the 19th century.


   Discusses concepts of productivity measurement with emphasis on measurement at the company level.


   A collection of papers and comments devoted to an appraisal of the measurement of output, input, and productivity.
Chapter 32. Technological Change

Background

Studies of technological changes and their labor implications have been undertaken by the BLS over the years for a variety of purposes. During the 1930's, public interest focused on the unemployed and reports were prepared on technological changes and displacement of workers in various industries. During World War II, emerging technologies were studied for purposes of improving manpower utilization.

Beginning in the mid-1950's, nationwide attention was focused on the implications of new developments classified under the general term "automation." The BLS made a series of studies on a plant basis, in the insurance, petroleum refining, bakery, air lines, and electronics industries, to explore the manpower implications of various changes. Later, broader studies were undertaken, including a survey of manpower impacts of changeover to electronic computers in 20 large companies and intensive studies of technological change in the coal and paper industries.

These studies formed the basis, beginning in the early 1960's, for a more systematic investigation of future changes. Research now underway pinpoints technologies which will become increasingly important over the next decade in key industries and attempts to provide advance information about their manpower implications.

Description of Studies

The Bureau's research program on technological change involves a variety of reports and studies of different degrees of detail and approach. The current program thus provides; summary reports surveying trends in major industries; detailed industry studies; and studies of major technological innovations, such as computers, that affect workers in different industries.

Reviews of Technological Trends in Major Industries

To provide a broad overview of significant trends in the economy, the Bureau prepares a summary report, applying to key industries on new types of machinery, processes and products which are believed likely to have an important effect over the next 5 to 10 years. The industries covered comprise a cross section of the economy and include those where the pace may be slow as well as those where change is rapid. The first version of this report, entitled Technological Trends in 36 Major American Industries, was issued by the President's Advisory Committee on Labor-Management Policy in 1964. A revised edition covering 40 industries was published in 1966.1 Bulletins containing later revisions of 11 industries were published in 1974-75.2

The emphasis of the report is on technological developments within each industry in an early stage of the innovation's commercial use—i.e., the period after introduction on the market but before widespread adoption. Inventions and discoveries still in the "drawing board" stage are considered unlikely to have as much impact over the next decade as those already tested and are generally not discussed.

The report briefly describes recent technological developments, indicating insofar as practicable some economic advantages of various types of new equipment, processes or products; their importance in terms of the employee-hours engaged in the operations affected; estimated extent of use currently and in 5 to 10 years, and some factors affecting adoption such as the volume of investment and expenditures for research and development. The advantages described include not only labor savings per unit, but also quality improvements, fuel and material economies, greater accuracy, new markets, etc.

In assessing the employment implications of technological changes, account is taken of the possible rate of growth in output per employee-hour and in the industry's total output. Appraisal also is made of the changes in occupational structure and of some issues and examples of adjustment that are taking place.

Outlook Reports on Industry Technological Trends

Intensive studies are made of selected major industries where far reaching changes, on a large scale, are taking place, such as coal, railroads, and textiles. These

1 See technical reference 13.
2 See technical references 1 and 3.
studies involve detailed analysis of the economic implications of major technological developments within individual industries. Factors analyzed include investment trends and factors affecting the prospects for the diffusion of recent technological advances, such as the structure of the industry. Estimates are developed of the displacement of present by new methods over the next 10 years. Unit labor requirements under new and old technologies are compared, wherever possible. Since the focus of the study is on the industry as a whole, data on recent industry trends in output per employee-hour, production, and employment are examined in relation to long-term trends and projections of future trends are developed.

### Technological Innovation Studies

Some technical innovations have applicability in many industries. Among these are such developments as computers, numerical control of machine tools, materials handling equipment, and control instruments. Because of their far reaching impact, special studies have been made of the nature, status, prospects for adoption, and implications for unit labor requirements, occupational change, training needs, and problems of industrial relations. In analyzing their impact in different industries, differences as well as similarities are revealed.

### Data Sources and Collection Methods

A variety of data sources and collection methods are utilized in making studies of technological change and its impact.

#### Personal Interviews

In making studies, analysts personally conduct intensive interviews with plant managers, personnel directors, and other officials who have direct knowledge of changes at their plant. Union officials at the plant, and in some cases, individual workers are interviewed. The analyst uses a checklist of questions in conducting informal interviews in order to elicit the maximum amount of data. Plants and offices included in these studies are selected on the basis of having recently made a major change in their equipment, products, or methods of production.

Personal interviews also are utilized to help determine industry trends. Informal interviews are conducted with engineers, scientists, economists, and other experts in companies which produce and use new technology, unions, trade associations, government agencies, universities, etc., who have specialized knowledge of a particular technological development or industry trend. One objective in these cases is to obtain their expert judgment about the nature, pace of introduction, and possible impact of developments with which few plants have had any experience. The emphasis in these interviews is on the technological change rather than on experiences in adjusting.

#### Trade and Technical Publications

Important sources of information concerning technical trends are trade journals, technical magazines and books, conference proceedings, government hearings, and company reports. Annual reports of leading corporations and company house organs often contain useful information on current technical development in some industries. In making studies of industries, these publications are reviewed to obtain information about the status and prospects of important developments and to ascertain which companies and plants merit more intensive field visiting. Reports and publications of firms that produce particular types of equipment often are found useful in studies of industries that use such equipment.

#### Statistical Data Sources

Quantitative information about the status of specific technological developments is fragmentary and scarce. The Bureau makes use of available data from many public and private sources. These sources include, for example: Office of Management and Budget; annual inventory of computers in the Federal Government; Business and Defense Services Administration: annual survey of numerically controlled machine tools; McGraw-Hill Company: survey of computers in industry; American Bankers’ Association: survey of banking automation; American Machinists Magazine: inventory of metalworking machinery; and Bureau of Mines: annual reports on mining equipment.

Statistical information on industrywide trends are useful in analyzing the economic implications of technological change. Among the important sources used in preparing studies are the Bureau’s indexes of output per employee-hour and related series on production, employment and hours; the Bureau of Census data on expenditures on plant and equipment; and the National Science Foundation’s estimates of research and development.

#### Plant Records

In making detailed studies of the impact of technological change on individual workers within a plant, analysts sometimes can obtain from employers’ files, data on such aspects as the age, sex, and related personal characteristics of employees whose jobs are eliminated and the jobs in the plant held by each indi-
vidual affected before and after the change; similar data are collected on individuals who are selected for the positions created in connection with automated equipment.4

Expert Review

In preparing forecasts of future technological trends, a critical step is the review of preliminary reports with outstanding experts in each industry.5 Drafts of industry reports are mailed to company executives, union research directors, trade association officials, technical journal editors, and university and government specialists for their assessment of the validity and adequacy of projected trends. Over 450 persons were contacted in this way in the preparation of a report on technological trends in major industries. Some experts are visited personally to review draft statements in detail. Through this means, reports on technological prospects are designed to reflect, as much as possible, the authoritative views of a number of persons who have expert, first hand knowledge of each industry.

Analysis and Interpretation

For a better understanding of research results in this field, it is important to keep in mind the meaning of certain key ideas and concepts. Some of the key problems of interpretation and analysis in this type of research are therefore set forth, briefly.

Definition of Technological Change

Technological change is defined broadly in the BLS studies, as encompassing significant changes in processes and equipment, products and services produced, and materials, fuels, and energy used. The term “automation,” which is sometimes popularly used as a synonym for “technological change,” designates, strictly speaking, a particular type of current development. It has been variously defined, for example, as “automatic operation,” “the mechanization of sensory, control and thought processes,” and “a concern with production processes as a system.”

While BLS studies have been concerned with developments in “automation,” particularly in anticipating long-term trends in the future, they are not the only technological changes taking place that affect labor requirements and industrial relations. For example, new ways of generating power, piggybacking in transportation, use of synthetic materials in manufacturing, mechanized methods of materials handling, and faster steelmaking processes are important technological developments, not usually covered by technical definitions of “automation,” but having significant manpower implications.

Impact on Productivity

Since one of the principal consequences of technological change, so far as manpower utilization is concerned, is an increase in productivity—i.e., output per employee-hour, special attention is given in BLS studies to analyzing changes in industrial productivity. Such trend analysis is a useful method of measuring the pace of technological change. Changes in productivity, however, also reflect changes in capacity utilization and many other nontechnical factors; it is important to recognize that the productivity trend is only a partial measure of the rate of technological change.

In determining the impact of a specific technology, BLS studies try to indicate the reduction in unit labor requirements that the new processes are designed to achieve. In some cases, estimates of labor savings are derived on the basis of comparisons with the estimated average technology of the industry under study; in others, with the best equipment that is available; or in actual plant studies, with the technology that is actually displaced.

It is also important to distinguish between the impact on productivity of the operation directly affected and on productivity of the plant as a whole. An advanced machine tool, for example, may result in a relatively large reduction in unit labor requirements in the machining operation, but would have little impact on finishing, and assembling, and may even require additional labor in engineering and maintenance work.6 The impact on plant productivity, therefore, would be considerably less than the effect on productivity of any department or operation directly affected.

Impact on Employment

In assessing the impact of technological change on employment, it is necessary to consider the implications of plant manpower policies and the effects of economic changes, with which technical changes interact. Analysis of the impact of technological change purely in terms of machinery is incomplete.

At the plant level, for example, the substitution of machinery for labor may substantially reduce job opportunities in operations directly affected. If efforts are made, however, to eliminate these jobs by not filling vacancies created by quits, deaths, and retirement of employees, or by transfer of affected workers to other positions in the plant or office, labor savings could be achieved without displacing the workers affected from the plant.

Moreover, the employment impact of technical change is also interrelated with the effects of the busi-
ness cycle. Thus, workers whose jobs are eliminated by technical changes may not be displaced from a plant until a decline in demand results in layoffs—a long time after the change has been made in some cases. In the subsequent recovery, however, they may not be hired back because their jobs no longer exist.

Since many changes exert their effects on employment through the competitive market, the employment trend for the industry as a whole must also be examined. The plant which reduces its unit costs through technological improvement may be able to gain a larger share of the market and increase its employment, but at the expense of the less technically advanced competing plants, which may be forced to shut down, displacing workers far from the location of the change.

Because of the whole complex of economic factors that operate through the market, including changes in demand, location, foreign competition, merger, and consumer taste, it is very difficult to isolate the expanding and displacing effects of technological change.

Impact on Occupations

Two aspects of occupational change resulting from technological changes are examined. Changes in job structure—the distribution of the plant or office work force by function or broad skill grouping—are studied to determine the extent of upgrading or downgrading. Since the content of jobs may be altered as a result of changes in equipment or processes, attention also is directed to intensive before-and-after analysis of job duties and the knowledge and abilities required to perform these duties as indicated by job descriptions and observation. The content of newly created jobs, such as programmer, also is studied and the qualifications required and personal characteristics of individuals selected for these new positions are described, so far as possible.7

Adjustments to Technological Change

Technological change has important implications for personnel management and collective bargaining within plants. The introduction of new machinery, products, or processes often requires movement of workers among jobs within the plant or office by transfer or promotion, the setting of wage rates, and selection of persons for new jobs. Often the adjustment proceeds according to rules established in advance through collective bargaining. Provisions to assist workers whose jobs are eliminated include severance pay, retraining, and early retirement. Besides analyzing the operation of formal provisions under collective bargaining, Bureau studies describe informal efforts to provide training, to utilize attrition, and to obtain jobs for displaced workers elsewhere.8 The limitations of these measures as well as their advantages are important matters studies.

Uses and Limitations

BLS studies of technological change are prepared as part of the U.S. Department of Labor’s program for carrying out the objectives and responsibilities of the Manpower Development and Training Act of 1962 and the subsequent Comprehensive Employment and Training Act (CETA) of 1973. Under these acts, the Secretary of Labor is required “to establish techniques and methods for detecting in advance the potential manpower impact of automation, technological progress, and other changes in the structure of production.” As part of such an early warning system, BLS studies and reports of technological change are useful to managers, union leaders, educators, economists, government officials, and others in planning policies to cushion the impact of change. The study of emerging technological trends and possible implications, moreover, provides a basis for more valid projections of productivity and economic growth. They also are useful in pinpointing manpower problems and determining the most productive direction of future research to obtain possible solutions.

Some limitations of the Bureau’s studies of technological change must be kept in mind in assessing their appropriateness for particular uses. In general, it is important to recognize that judgments about the future direction and pace of technological change and its implications are necessarily complex and difficult. The rate of introduction of new technology depends not only on technical advantages but also on many economic factors, such as the volume of investment, market prospects, and the availability of trained workers, all of which are subject to significant variations. Moreover, since the period of introduction generally spans a number of years, new developments are constantly appearing so that assessments of the outlook must be reappraised from time to time in the light of new information.

Finally, studies of the impact of technological change deal primarily with changes within individual industries. But these changes often involve changes in the type and amount of goods and services purchased from other industries and could therefore have important implications for production and employment in industries supplying inputs. The accumulation of information on interindustry relationships, through the Bureau’s economic growth studies, will provide a quantitative basis for analyzing this aspect of technological change.

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7 See technical references 6 and 9.

8 See technical references 8 and 15 for further discussion.
Number

   Appraises major technological changes emerging in five key industries and discusses their impact on productivity and occupations over the next five to 10 years.

   This pilot study explores the impact of changes in the workweek schedule in 16 firms to determine objectives and methods for introducing workweek changes and to assess the availability of data for further research implications for productivity and manpower.

   Appraises major technological changes emerging in six key industries and discusses their impact on productivity occupations over the next five to 10 years.

   Presents information on the current employment and education and training characteristics of computer occupations; explores the impact of advancing computer technology on computer manpower and education; and projects computer occupational requirements and their implications for training.

   Analyzes the impact of technology on manpower in textile mills. Includes data on capital expenditures and research and development.

   Describes changes in technology in the printing and publishing industry and its impact on productivity, employment, occupational requirements, and methods of adjustment.

   Discusses the impact of technology on manpower and productivity in laundry and dry cleaning establishments. Discusses outlook to 1980.

   Describes changes in technology and their impact on productivity, employment, occupational requirements, and methods of adjustment.

   Describes the impact of computer process control on employment, occupations, skills, training, and labor-management relations in six process industries. Discusses outlook for future and implications for production and productivity.

    Case studies of the manpower policies and experiences of several telephone companies in cushioning the impact of technological change on their employees.

    A study of the changes in technology in this major industry, and the impact on productivity, employment, and occupational requirements.

    Mail survey of over 400 insurance companies. Covers extent, pace, and employment implications of electronic data processing.

    Description of outlook for major technological developments based on a variety of data sources and expert review.

    A study of manpower implications of a key technical innovation affecting metalworking industries. Discusses problem of generalizing about change in productivity as result of specific change.

    Detailed case study of large-scale changeover to electronic data processing. Illustrates use of internal personnel records in analyzing effects of office automation.
Chapter 33. Construction Labor Requirements

Background

New construction is a major component of the Nation's output of goods and services and a major source of employment. The jobs it creates occur not only at the site of employment, but also in the many manufacturing, trade, transportation, and service industries which furnish the materials and services required in the construction process. Because of this far-reaching employment impact, the creation of new construction projects often is regarded as a means of countering cyclical unemployment.

To assist in assessing the extent of the impact of construction expenditures on employment, a series of labor and material requirements studies for different types of construction was started in 1959. The program was established as a result of Congressional legislation, requiring the Bureau of Labor Statistics to provide estimates of the amount of total employment generated directly and indirectly by various kinds of construction per dollar of expenditure.

Earlier Bureau efforts to relate employment and volume of construction included the "Labor Required for New Construction" series, with reference mainly to onsite employee-hours. This series, started in the early thirties, appeared intermittently through the years, but was not based on actual surveys and was finally halted in the mid-fifties because the factors employed were found to be obsolete. There was also a series of Public Works Administration studies published in 1940, covering Federal public works projects constructed in the mid-thirties; and a few individual studies of specific types of construction.

The present studies include the major types of building construction (schools, hospitals, public and private housing, etc.) and also heavy construction (highways, civil works, etc.). However, only one or two selected types of construction are surveyed in any given year. The various types of construction are resurveyed periodically. These resurveys may, in addition to providing current information on labor requirements, contribute information useful in preparing construction cost indexes and estimates of changes in productivity of onsite construction labor.

Description of Survey

The surveys are designed primarily to determine the number of employee-hours represented by a fixed volume ($1,000) of construction contract for a specific type of construction activity. Employee-hours, as defined by the surveys, include both onsite and offsite construction employment and the indirect employment required to produce and deliver materials used in the construction.

Data for onsite construction employment cover total employee-hours of workers engaged at the construction site and consist mainly of construction craft workers but also include employee-hours for the supervisory, engineering, clerical, and custodial employees who work at the site. Offsite construction labor represents employment in contractors' offices and warehouses which directly supports the onsite work. Data for indirect labor include employment in all the industries which are engaged in the production and distribution of building materials, equipment and supplies.

In order to determine the direct employment more frequently for specific construction activities, surveys, in some instances, are limited to developing only onsite and offsite construction employment.

Certain types of employment are not covered by the survey. For example, no estimate is made of the employment used in the planning and designing of the projects studied. Also excluded are estimates of employment required in government and public utility agencies which might be affected by the construction being studied. Employment created by the respending of wages and profits of the workers and their employers—the multiplier effect—are not considered within the scope of the studies.

Data Sources and Collection Methods

The surveys cover both construction which is nonfederally assisted and that which may be totally or partially financed through Federal funds. Although the type of construction labor and material requirements data sought are similar for both federally and nonfederally aided projects, the sources for the data are different, particularly for the onsite employee-hour information.

For the construction of nonfederally aided projects—those financed entirely by various levels of local government, private individuals or voluntary groups—onsite employee-hour data, by occupation, are obtained by field representatives from local authorities, architects, contractors, and other direct participants in the projects. These individuals provide the desired employee-hour information from payroll records, daily work force reports, or summary time re-
For those projects financed wholly or in part by Federal funds, onsite employment information generally is obtained from contractors' payrolls submitted to the government under regulations of the Davis-Bacon Act, Hill-Burton Act, or other Federal legislation covering federally aided construction.

These payrolls furnish the data for onsite employee-hour requirements, as well as data on wages for all hourly rated workers on the projects. Data for onsite salaried employees, not accounted for on the payrolls, are obtained by the field representatives from the contractors.

Access to these payrolls also makes possible the collection and presentation of additional detail for the projects studied. This includes information on wage relationships, timing of construction operations, and requirements by type of contractor.

Information on material and equipment costs for the projects studied—i.e., the items which are used for estimating indirect employment—is collected by the field representatives from the individual contractors and subcontractors engaged in the construction of the sample projects.

Sampling and Estimating Procedures

Sampling procedures vary with the type of construction being studied. The "universe" of projects for a specified study generally represents all of the projects known to have been completed during a selected 1-year period.

The projects are then stratified into cells having similar characteristics which may affect employee-hour requirements. Factors considered important in cell stratification include (a) regional location, (b) metropolitan or nonmetropolitan locality, (c) types of structure (when known), (d) purpose of structure (if variable) and (e) amount of total construction contract (i.e., size of project).

One project or more are selected at random from each cell and assigned weights to give total representation of the cell. Substitutions, when necessary, are made from the same cells.

Data from the sample projects are combined in aggregate form to represent the total dollar volume of each cell.

As indicated previously, the indirect employment estimates are derived from the materials and equipment cost information obtained from the contractors and subcontractors cooperating in the studies. The contractors provide a list of the value of each type of material used in the construction of sample projects. These material listings are classified into categories consistent with a 4-digit Standard Industrial Classification code as used in Census of Manufactures product groups. For each of these product groups, average amounts of material (in dollars) required for each $1,000 of contract construction cost are determined. The value of materials is reduced by a ratio representing the difference between valuation by the purchaser and valuation by the producer. (This ratio is based on valuation data provided by the U.S. Department of Commerce, Bureau of Economic Analysis.) This latter step is required because all data reported by contractors are in purchasers' value, and reduction to producers' value is necessary to obtain figures consistent with Census data which are used to calculate manufacturing employment.

Primary employment in manufacturing is considered to be that required to produce the construction bill of materials in their final stage of fabrication. In this stage, employee-hours are developed by multiplying average producers' value of each construction material by the ratio of manufacturing employee-hours per $1,000 of production. (This ratio is established by using the Census of Manufactures.)

Primary employee-hours in the trade, transportation, and service industries are estimated from the difference between producers' and purchasers' value for each construction material. The value differences are allotted to trade and transportation, and primary employee-hours for each component of transportation and trade are then estimated from labor factors provided by BLS.

Secondary employment is defined as the employment in all industries involved in production and transportation of building materials and equipment from basic extraction to, but not including, the final manufacturing stage. The Interagency Input-output Study is used to obtain these estimates. For each group of materials, the interindustry study provides information on the amount of secondary products required from each of its industry sectors. The product data are converted to employee-hours by use of output per employee-hour ratios for each of the sectors. Adjustments for price and productivity are made to provide estimates consistent with the year of construction and bill of materials.

For each offsite stage (primary and secondary), an employee-hour figure per $1,000 for the construction being studied is obtained. When these employee-hours, plus the builders' offsite employment, are combined with the direct or onsite employee-hours, the total employment effect, within the definition used by the studies, is determined.

An exact study of the offsite employment of each construction contractor is not attempted, since it is almost impossible to relate accurately such employment to the projects studied. Builders' offsite employment is occupied not only with the sample projects studied, but also with other current or future projects. The estimate of contractors' offsite employee-hours for each $1,000 of construction contract is based on the difference between construction worker employment and total employment in the construction industry, with adjustments for onsite supervisory and administrative employment.

Analysis and Presentation

The construction labor and materials requirements studies are published in Bureau bulletins. Summary articles, based on the survey findings, appear in the Monthly Labor Review. The bulletins and articles highlight the total employee-hours generated per dollar volume of construction expenditures, with subtotals for onsite, employee offsite, and indirect employee-hours. In presenting the labor and materials data, the statistical tabulations are supplemented with an analysis of the various factors which apparently affected the employee-hour requirements for the specific types of construction studied. The bulletins contain information on the characteristics of the sample projects and the employee-hours per square foot and per $1,000 of contract cost, with an analysis of the variations in requirements and costs arising from differences in design, type of structure, and regional or metropolitan versus nonmetropolitan influences.

The reports include information and analysis of: Onsite employee-hour requirements by occupation; the employment share of the general and special trades contractors engaged in the construction work; direct onsite wage cost; the distribution of employment by periods of construction time; and the cost of major materials, equipment, and supplies.

When feasible, comparisons of unit employee-hour and material requirements for earlier periods are made and analyzed.

Uses and Limitations

The results of the labor requirements surveys are used by other offices of the Bureau, other Bureaus of the Department of Labor, other governmental agencies, congressional committees, and industry research and trade organizations, to assist in gauging the impact of planned expenditures for construction on employment, and the economy, generally. Of special interest to market research analysts and companies manufacturing materials for use in construction, are the materials listings per $1,000 of construction contract.

While the overall estimates of employment are believed to be reasonably accurate, the detailed data would have a wider margin of sampling error and may be subject to other limitations. Employee-hour and material requirements are affected by a number of factors such as location, size of project, type of structure, architectural design, availability of certain materials or equipment, labor skills, and local building codes and customs. The effects of these separate factors cannot be isolated.

Technical References

Number


2. "Labor and Material Requirements for Apartment Construction," by Robert Ball, Monthly Labor Review, January 1975, pages 70–73. A summary report of a study of private multi-family housing projects completed in 1971. Employee-hour requirements are shown by occupation and contractor operation. Materials and equipment are detailed by type. Data are provided on four broad regional groupings.

3. Labor and Material Requirements for Public Housing Construction, (BLS Bulletin 1821, 1975). A report based on the findings of a survey of public housing projects which were administered by the Housing Assistance Administration of the Department of Housing and Urban Development. Data are shown by four broad geographic regions. Updates the 1960 study.


5. Labor and Material Requirements for Hospital and Nursing Home Construction, (BLS Bulletin 1691, 1971). A study similar to the 1962 study but with data shown per square foot as well as per $1,000 of construction contract. Updates the 1960 study.

6. Labor and Material Requirements for School Construction, (BLS Bulletin 1586, 1968). A survey of selected elementary and secondary public schools constructed primarily during the period of 1964–65. In addition to providing information on employee-hours, the study also includes data on the types and value of materials used, wages paid, occupations distributed and use of apprentices. Updates the 1959 study.

7. Labor and Material Requirements for Sewer Works Construction, (BLS Bulletin 1490, 1966). This study was designed to measure the total employee-hours of labor required for each $1,000 of new sewer facilities construction contract. The basis for this study was 138 contracts for new sewer works in the years 1962–1963.

8. Labor and Material Requirements for College Housing Construction, (BLS Bulletin 1441, May 1965). A report based on findings in a survey of 43 college housing projects which were administered by the Community Facilities Administration. The survey is designed primarily to determine the employee-hours required for $1,000 of college housing construction.


Chapter 34. Foreign Labor Statistics and Trade Research

Background

From its inception, the Bureau of Labor Statistics has collected and published statistical information on labor conditions and developments abroad. Foreign labor research and statistical analyses have been undertaken because (1) information on labor conditions published by a majority of foreign countries is not readily available to U.S. labor representatives, employers, Government officials, and others, and is often not available in English; (2) comparisons between U.S. and foreign labor conditions shed light on U.S. economic performance relative to other industrial nations; (3) the growth of foreign trade has an important influence on the U.S. economy and U.S. employment; and (4) often, only an expert can judge the quality of foreign statistical source materials.

Description of Measures

The foreign labor statistical reports released by the Bureau cover a variety of international comparative measures, mainly for the western industrial countries. A trade monitoring program, currently under development, is intended to measure changes in U.S. imports, output, and employment in sufficient detail to permit analysis of the relationships between trade and employment.\(^1\)

**International Comparisons.** The principal comparative measures developed and issued by the Bureau cover labor force, employment, and unemployment; productivity, hourly compensation, and unit labor costs in the manufacturing sector; earnings and supplementary benefits received by manufacturing production workers; and trends in consumer prices and family expenditures. Other comparative data, on topics such as industrial disputes, producer prices, real earnings, national product, and capital investment, are compiled and issued occasionally.

Comparative measures of the civilian labor force, employment, and unemployment are prepared regularly for the United States, Canada, Japan, Australia, France, Germany, Italy, Sweden, and the United Kingdom. For most of the countries, the series begin with 1959. Labor force participation rates and unemployment rates, adjusted to U.S. concepts, are calculated annually, and estimated unemployment rates (seasonally adjusted) are prepared monthly for most of the countries.

Comparative trends in manufacturing productivity, hourly compensation, and unit labor costs are compiled and published annually for the United States and 11 other industrial countries. Trends are expressed in index form (1967=100) and as percentage changes at annual rates. For most countries, the series begin with 1950. The output component of the measures refers in most cases to gross product originating in the sector. The hours and compensation components refer to all employed persons in the United States and Canada; to wage earners only in Switzerland; and to all wage and salary earners in the other countries. Indexes of unit labor costs (labor compensation per unit of output) for foreign countries are calculated in national currency units and in U.S. dollar values at applicable commercial exchange rates.

Comparative levels and trends in productivity and labor costs in the iron and steel industry in five countries are estimated annually, beginning with 1964. The measures express levels of output per hour, hourly compensation, and unit labor costs abroad relative to the U.S. level (United States=100). They also show trends in index form (1967=100) and at annual rates of change.

Estimates of total compensation per hour worked for production workers in all manufacturing and selected major manufacturing industries are prepared annually for ten industrial countries. The estimates are developed from data on direct payments to the workers published by each country, plus employer expenditures for legally required insurance programs and contractual and private benefit plans. They are expressed in national currency units and in U.S. dollar values at applicable commercial exchange rates.

Indexes for consumer prices and for the "food-at-home" component are compiled regularly for the United States and 14 foreign countries for a common base year (1967=100). Annual indexes since 1950 and monthly or quarterly indexes since 1970 are available for most of the countries.

**Trade Monitoring.** Section 282 of the Trade Act of 1974 provides that the Secretary of Commerce and the

\(^1\)Other BLS activities in the international field include the measurement and analysis of price trends for U.S. exports and imports, and the provision of technical training or orientation to foreign statisticians and other foreign visitors on U.S. labor statistics methods and on the economic conditions of U.S. workers.
Secretary of Labor shall establish and maintain a trade monitoring system, which will reflect (a) changes in the volume of imports into the United States; (b) the relation of such imports to changes in domestic production; (c) changes in employment within domestic industries producing articles like or directly competitive with such imports; and (d) the extent to which such changes in production and employment are concentrated in specific geographic regions of the United States. The primary responsibility for conducting the trade monitoring program has been delegated to the BLS.

The trade monitoring system is currently under development. Pilot tabulations show U.S. imports for consumption and manufacturing employment for most industries for the past seven years. Ratios of imports to new supply (domestic shipments plus imports) have been calculated for most manufacturing industries through 1973. Section 282 cannot be complied with fully until the concordance between trade and domestic industry classifications has been improved and more detailed data for domestic industry and geographic regions are available.

Data Sources

Research in foreign labor and trade is based upon statistical data and other source materials from (a) statistical agencies of foreign countries studied; (b) international and supranational bodies such as the United Nations, International Labour Office, Organization for Economic Cooperation and Development, and the European Community; (c) U.S. agencies, including the Bureau of the Census and the Bureau of Economic Analysis in the Department of Commerce, the Federal Reserve Board, and several offices in the BLS; and (d) private agencies such as banks, industry associations, and research institutions. All data are drawn from secondary sources; the Bureau does not initiate surveys or data collection programs abroad. The U.S. Foreign Service provides many periodicals and publications and answers many technical questions about foreign data series.

Labor force and unemployment statistics are obtained from monthly or quarterly household surveys for six of the nine countries regularly studied; namely, the United States, Canada, Australia, Japan, Italy, and Sweden. For the other three countries—France, Germany, and the United Kingdom—current unemployment estimates are derived from administrative data on the number of registrants at public employment offices. These three countries conduct occasional household surveys of the labor force which contain suitable benchmark data for use in adjusting current registration figures.

For the manufacturing productivity and labor cost indexes, a variety of sources are drawn upon for the 12 countries covered. The preferred measure of output is real gross product originating in manufacturing at market prices, which is available from the national accounts of most countries. For current output data, it is usually necessary to use an index of production based largely on gross output series. Total hours worked or paid for are derived mainly from regular surveys of employment and hours. Aggregate labor compensation is available from the national accounts of most of the countries; current figures are derived from current surveys of earnings and employment plus periodic labor cost surveys.

For data on direct pay, estimates of hourly compensation levels for manufacturing production workers are derived mainly from current earnings surveys; and for benchmark data on direct pay and supplementary labor payments, from periodic labor cost surveys. Foreign exchange rates used are the certified noon buying rates for cable transfers, published by the Federal Reserve Board.

Statistics on consumer prices, and consumer expenditure surveys, are obtained from published reports of the statistical agencies of the countries studied.

For trade research, the principal data source is the Census Bureau's monthly data tape on U.S. imports (IM-145), supplemented by annual concordance tapes which relate import data to the SIC classification system. Data on domestic output are obtained mainly from the quinquennial industrial censuses and from the annual surveys of manufacturing conducted by the Bureau of the Census. Employment data are taken from the BLS monthly establishment survey of employment and earnings.

Estimating Procedures

Several procedures are used to make international comparisons, because statistical concepts and methods vary from country to country.

For civilian labor force and unemployment comparisons, each country's published data are adjusted, if necessary, to establish estimates consistent with U.S. definitions and standards. No adjustments are made to the published data for Canada and Australia, since the concepts and methods in these two countries are virtually identical to those in the United States. Slight adjustments are made to the data for Japan, Italy, and Sweden, which also conduct regular labor force surveys. For Japan and Italy, unpaid family workers who work less than 15 hours during the survey week are subtracted from figures for labor force and employment. For Sweden, the military are removed from the labor force data, and a slight adjustment is made to include an estimate for persons over 75 years of age who are economically active. For France, Germany, and the United Kingdom, monthly reports on registrations at
employment offices provide current data on unem-
ployment trends, and annual labor force surveys pro-
vide benchmark data on the level of the labor force and
total unemployed. Estimates of current labor force
levels are obtained by extrapolation of results from the
most recent years’ labor force surveys.

The Bureau uses the Census X-11 program to make
monthly and quarterly seasonal estimates of unem-
ployment rates for Sweden, Italy, and the United King-
dom. For the other countries, the Bureau uses the
seasonal adjustments made by their respective statisti-
cal agencies. The Bureau occasionally estimates unem-
ployment rates by sex and age group, adjusted to U.S.
concepts, for each country.

Indexes of manufacturing productivity, hourly com-
penation, and unit labor costs are constructed from
three aggregative measures, i.e., output, total hours,
and total compensation. Real output represents, in
most cases, gross product originating in manufacturing
at constant prices, as reported in national accounts of
each country. For current measures, indexes of indus-
trial production are used in the absence of national
accounts data on gross product originating. Total hours
data represent “hours worked” in most of the countries
but “hours paid” in the United States and Switzerland.
Total hours figures from statistical agencies are used
without adjustment for Canada, Denmark, and Swe-
den. For four of the countries, BLS estimates total
hours from published data on employment and average
hours of wage earners and salaried employees. For
Germany, Italy, and the United Kingdom, data are
available for total employment and wage earners’ hours
but not for average hours of salaried employees. For
Switzerland, employment and hours data are available
for wage workers only. Total compensation data are
available from national accounts for 9 of the 12 coun-
tries covered. Estimates for France and Belgium are
made by BLS from data on average earnings, average
compensation, employment, and average hours. Esti-
mates for Switzerland cover wage workers only. For all
countries, current estimates of total compensation are
constructed from existing series on employment,
hours, earnings, and supplements until national ac-
counts aggregates become available. BLS also makes
adjustments to cover the costs of employment or
payroll taxes that have been levied at times in France,
Sweden, and the United Kingdom.

Estimates of hourly compensation of wage or produc-
tion workers are prepared annually for all manufactur-
ing and selected individual manufacturing industries in
ten industrial countries. The estimates are based on
current published earnings data, benchmarked to labor
cost survey data on average compensation per hour
worked. Adjustments are made, where possible, to ac-
count for worker earnings in small establishments,
which are sometimes omitted from current earnings
surveys. Results are expressed in national currency
units and in U.S. dollar equivalent values at applicable
commercial exchange rates.

Trends and levels of productivity, hourly compensa-
tion, and unit labor costs in the iron and steel industries
of five countries are based upon a detailed comparison
of physical output and labor input for the year 1964.
Output of each country was weighted according to 1961
U.S. labor requirements for about 70 principal products
of industry. Adjustments were made so that each
country’s data represented the product scope of U.S.
industry group SIC 331, Blast Furnaces, Steel Works,
and Rolling Mills. Measures since 1964 are based upon
country indexes of iron and steel output and various
measures of labor hours and compensation.

The Bureau receives consumer price trend data as
distributed by most countries of the world and maintains
index series for 14 industrial countries beginning with
1950. No adjustments are made in the overall indexes
except to convert them to a uniform base year
(1967 = 100). Series are also maintained for the “food at
home” component of the CPI for 11 countries, which
requires adjustment in several cases to remove restau-
rant meals and nonfood items from published indexes.

### Analysis and Presentation

Analyses of international labor statistics are focused
upon comparisons with U.S. experience. Wherever
possible, foreign data are adjusted to U.S. definitions
and concepts to facilitate comparisons. For example,
figures on hourly compensation abroad are converted
into their equivalent values in U.S. dollars to provide a
uniform basis for comparison.

Labor force, employment, and unemployment trend
data are analyzed from time to time to determine the
sources or components of change in labor force mea-
sures. Shifts in labor force composition are analyzed by
age, sex, and industrial sector. Productivity and labor
cost trend data are analyzed to explain the relative
contributions of shifts in employment, hours, output,
wages, and exchange rates upon changes in the mea-
sures.

The form of presentation of reports and tabulations
on foreign labor statistics and trade varies with the
degree of analysis and major use of the reports. Several
comprehensive bulletins have been published, cover-
ing measures of productivity, compensation, unit labor
costs, and other data in full detail, including analyses
and technical descriptions of the data. For more current
developments, articles are published regularly in the
Monthly Labor Review and press releases are issued
occasionally. The BLS Handbook of Labor Statistics
and the Census Bureau’s Statistical Abstract of the
United States publish many of the principal foreign data
series annually in tabular form. On occasion, compara-
tive studies and tabulations are released through the
President's International Economic Report and as separate reports for congressional committees and special government commissions.

Uses and Limitations

The principal uses of information on foreign labor statistics and trade are (a) to assess current economic trends abroad that may bear upon U.S. performance; (b) to inform Government and private officials of foreign developments that might affect U.S. policy; (c) to review foreign experience for possible application domestically; (d) to aid in the appraisal of U.S. competitiveness in foreign and domestic markets; and (e) to provide labor information to individuals, corporations, labor unions, and others concerned with foreign investment and development.

International comparisons based on foreign labor data are limited because statistical concepts and methods in each country are fashioned to meet domestic rather than international needs. In some cases, foreign data are adjusted for consistency with U.S. series and in other cases, data are sufficiently similar in definition and concept for valid comparisons without adjustment. However, when conceptual differences are substantial, the Bureau attempts to describe the differences explicitly so users will not draw misleading conclusions. The differences between U.S. and foreign data may apply to every aspect of statistical reporting, including definition of the factor to be measured, definition of the sector or industry to be covered, sample design, survey method, design of questionnaire, and processing of results. Progress toward more uniform statistical practices is being made through various U.N. agencies and technical assistance programs.

Technical References

Number


Number

A comparison of absolute levels of productivity and labor costs in a major industry.


A theoretical and empirical analysis of the growth rates for different industries and countries.


Develops methods for a system of international comparisons and makes such comparisons for a selected group of countries.


Results of a bilateral effort to compare compensation levels and structures and study factors affecting wages.


Includes 4 papers submitted by the Bureau of Labor Statistics, covering international price competitiveness, foreign trade and employment, productivity and unit labor costs in export and import-competing industries, and comparative international labor costs and productivity.


A chartbook designed to facilitate international comparisons of productivity trends and levels and related factors, prepared for the National Commission on Productivity.
Occupational Safety and Health

Chapter 35. Occupational Safety and Health Statistics

Background

The Bureau of Labor Statistics has long been interested in safety and health conditions for workers on the job. As early as 1893, the Bureau issued its first report on work injuries. Subsequent reports spurred an increasing concern for the worker disabled on the job and greatly influenced the development of the present workers' compensation system.

In 1910, at the request of the steel companies, the Bureau inaugurated an annual injury-rate series for the iron and steel industries. By the late 1920's, work-injury data were being published for 30 manufacturing industries. These studies, frequently based on State workers' compensation records, provided limited measures of the frequency and severity of on-the-job injuries. Finally, in 1939, a voluntary system of data collection using a mail survey of manufacturing and nonmanufacturing industries was begun. The survey was based on concepts originally developed by BLS and expanded upon by the American National Standards Institute. Results were published annually through 1970 in a series of bulletins and reports.

Passage of the Occupational Safety and Health Act in 1970 had a great impact on the work-injury statistics program. Under the new legislation, recordkeeping and reporting of occupational safety and health data are mandatory. Employers are required to keep records of occupational illnesses, finally recognized as a serious health hazard, as well as occupational injuries. In addition, an annual survey of occupational injuries and illnesses based on employer records is required.

Recordkeeping Requirements

The recordkeeping system, which is the foundation of the entire statistical program, was developed to meet the needs of several agencies. It was necessary that the system guide the Occupational Safety and Health Administration (OSHA) in allocating resources for setting standards and compliance activities, provide BLS and cooperating State agencies with a basis for meaningful statistics, and aid the National Institute of Occupational Safety and Health (NIOSH) in its research. The records also had to contain information in a form suitable for ready use by Federal and State compliance officers, and had to include sufficient data to help management and employees pinpoint problem areas. Numerous meetings with representatives of NIOSH, the Occupational Safety and Health Administration, the business and labor communities, and other interested parties culminated in a series of recordkeeping regulations published in the Code of Federal Regulations, Title 29, Part 1904. July 1, 1971, marked the beginning of recordkeeping and reporting under the new act.

The regulations stipulate what cases must be recorded. Recordable cases include all work-related deaths and nonfatal illnesses, and those nonfatal injuries which result in one or more of the following: Loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment (other than first aid). The chart on the following page is a guide to the recordability of cases under the act. Employers must record each occurrence as a fatality, a lost workday case, or a nonfatal case without lost workdays in a one-line entry on the Log of Occupational Injuries and Illnesses (OSHA No. 100). Each case classified as a lost workday case involves 1 or more days following the day of injury or onset of illness on which the employee was unable to perform the duties of the job to which regularly assigned. The number of such days are entered on the log in one of two categories: Days away from work or days of restricted work activity. Days away from work is self-explanatory; days of restricted work activity are days on which the employee was assigned to another job on a temporary basis, or worked at a permanent job less than full time, or worked at a permanently assigned job but could not perform all duties normally connected with it.

Each case must also be described in detail on a supplementary record (Form OSHA No. 101), or equivalent, such as the workers' compensation form if it includes all necessary information. In addition, the information from the log must be summarized annually on the Summary of Occupational Injuries and Illnesses (OSHA No. 102). The summary must be posted, in a place where all employees are likely to see it, no later than February 1, and remain in place until March 1. Examples of completed recordkeeping forms appear on page 251.

Virtually all employers are covered by the act. How-
ever, to ease the recordkeeping burden on small businesses, employers who had no more than seven employees at any one time in the previous year were exempted from keeping records. For the 1975 and 1976 recordkeeping period only, a provision in the Department of Labor Appropriations Act extended the exemption from recordkeeping requirements to employers who had 8, 9, or 10 employees. In the absence of further action by Congress or the Department of Labor, employers with 8, 9, or 10 employees will be required to keep OSHA injury and illness records for 1977 and subsequent years. The recordkeeping exemption, however, does not affect the obligation of employers to observe all safety and health regulations of the act. Also, all employers are still required to report any accident which results in one or more deaths or in hospitalization of five employees or more. The report must be made orally or in writing within 48 hours after the accident to the Area Director of the Occupational Safety and Health Administration or to the State agency which has enforcement responsibilities, if appropriate.

The only other exceptions to the recordkeeping requirements are for employees covered under other Federal safety and health legislation that provides for the mandatory recording and reporting of data comparable to that required by OSHA.

An animated film is being prepared and a tape cassette package, An Audio Aid to OSHA Recordkeeping, is available to aid employer understanding of recordkeeping forms and definitions. The most frequently asked questions concerning recordkeeping have been compiled in a booklet, What Every Employer Needs to Know About OSHA Recordkeeping (BLS Report 412–2).

**Description of the Survey**

The Bureau of Labor Statistics was assigned the responsibility by the Secretary of Labor, in Order No. 12–71 (36 F.R. 8754), for developing and implementing a new statistical program which would be responsive to the needs of the act; in particular, the Bureau was to collect, compile, and analyze occupational safety and health statistics. An annual survey is conducted to help fulfill these obligations.

**State Participation**

In keeping with the intent of the Act to encourage States to develop plans for establishing and administering systems for the collection and compilation of occupational safety and health statistics, the BLS OSHA statistical program was extended to the States. Federal grants were awarded to cover a full 90 percent of the planning and developmental costs. Between June of 1971 and 1973, 50 States and 5 jurisdictions attempted to identify their statistical needs and develop necessary resources to participate with BLS in conducting the annual survey. Other planning activities included studying the feasibility of establishing a supplemental data system to compile casual data related to injuries, and extending the recordkeeping and reporting systems to State and local governments which are not covered by the Act. The Act, however, contains special provisions requiring the States to legislate coverage for State and local government employees upon assuming responsibilities under the Act.

As of January 1, 1976, 45 States and 5 Federal jurisdictions are participating in the survey on an operational basis. Federal grants covering 50 percent of the operating costs permit the States to develop estimates at the State level and concomitantly, to provide the data from which BLS produces national results. National data for 3 of the 5 States which do not have operational grants are being collected by BLS, and for the other 2, by State agencies under contract. Participating statistical grant agencies collect and process data, and prepare estimates using standardized procedures established by BLS to insure uniformity and consistency among the States. To further insure comparability and reliability, BLS designs and identifies the survey sample for each State, validates survey results, and also provides technical assistance to the participating agencies on a continuing basis through its eight regional offices.

**Scope of the Survey**

The OSHA survey is presently the largest annual sample survey conducted by the Bureau. The sample includes 540,000 reporting units representing 5 million workplaces. Of these, 220,000 are processed by BLS to develop national estimates; an additional 320,000 are selected so that States participating in the program will have sufficient information to generate State estimates.

Survey data are solicited from employers in agriculture, forestry, and fisheries; oil and gas extraction; contract construction; manufacturing; transportation and public utilities; wholesale and retail trade; finance, insurance, and real estate; and services industries. Data for employees covered by other Federal safety and health legislation are provided by the Mining Enforcement and Safety Administration of the Department of the Interior and the Federal Railroad Administration of the Department of Transportation. The Occupational Safety and Health Administration is responsible for the collection and compilation of comparable data for Federal agencies. State and local governments are not represented in the national sample at this time. Self-employed persons are not considered to be "employees" under the act.

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1 This exemption does not apply if an employer is notified in writing that his establishment has been selected for inclusion in the survey sample for the upcoming year or if recordkeeping is required by State legislation.
Concepts

Definitions used in the annual survey are the same as those used in OSHA recordkeeping. Employers report the numbers of fatalities, lost workday cases, including the number of lost workdays, and nonfatal cases without lost workdays for all injuries and seven categories of illnesses occurring during the year.

To determine priorities in the development of safety standards and in OSHA compliance activities, data must be collected and presented in a manner that allows for comparison among industries and establishments of varying sizes. Therefore, incidence rates are produced for each type of case reported under OSHA definitions. Incidence rates express various measures of injuries and illnesses in terms of a constant, i.e., exposure hours in the work environment (200,000 employee-hours or the equivalent of 100 full-time employees working for 1 year), thus allowing for a common statistical base across industries regardless of employment size of establishments. In this way, the injury and illness experience of a firm with 5 cases recorded for 70 employees may be shown on the same base as that of an entire industry with 12,000 cases for 150,000 employees. (Methods of calculating incidence rates are discussed in a later section.)

Comparisons may also be made to evaluate the performance of a particular industry over a period of time, or similar establishments in the same industry, or the same industry in different geographic areas. Further comparisons are possible using the different types of rates computed for each industry—nonfatal cases without lost workdays, lost workday cases, injuries, illnesses, lost workdays, or total cases.

Data Collection

State agencies mail report forms to selected employers in February of each year to cover the previous calendar year's experience. For those States not participating in the program, report forms are mailed by BLS. The employer completes a single report form which is then used for national and State estimates. This eliminates duplicate reporting by respondents and, together with the use of identical survey techniques at the national and State levels, insures maximum comparability of estimates.

Information for the injury and illness portion of the report form is copied directly from the Summary of Occupational Injuries and Illnesses which the employer should already have completed and posted in the establishment.

The form also contains questions about the number of employee hours worked (needed in the calculation of incidence rates), the reporting unit's principal product or activity, and average employment, to ensure that the establishment is classified in the correct industry and employment size class. In addition, one section, which may vary from year to year, deals with related areas of job safety and health. (See page 254 for example of survey form.)

State agency personnel edit the completed report forms and verify apparent inconsistencies through phone calls, correspondence, or personal visits. The data are keypunched and mechanically edited. Reports which do not meet the computer screening criteria are verified with the employer.

By mid-summer, the active collection phase of the survey is completed and the preparation of final data for both national and State estimates begins.

Sample

The sample was selected to represent private industries in the States and territories, and to produce estimates of the number of occurrences and incidence rates of occupational injuries and illnesses for the Nation as a whole.

Because separate estimates by industry are required by the Occupational Safety and Health Administration, the universe was stratified into industries according to the 1967 edition of the Standard Industrial Classification Manual (SIC) published by the Office of Management and Budget. A sample size necessary to produce a certain level of precision in the estimate of incidence rates is then determined for each industry. Beginning with the 1975 sample, measures of the variability of incidence rates calculated in previous occupational safety and health surveys along with the number of establishments in the industry, and the employment in large establishments, were used to calculate a sample size for each industry. The number of employees in large establishments is used as a control on the sample size. When industries are dominated by a few large establishments, smaller samples are necessary if the large establishments are included in the sample with certainty. Industries with higher expected incidence rates tend to be subject to more variability and, therefore, are allotted a proportionately larger sample than industries with lower rates.

Within an industry, the number of injuries and illnesses an establishment experiences varies with the employment of the establishment. Because of this, the universe of establishments within an industry is stratified by employment and then an optimum allocation is achieved by distributing the sample to each size group proportionate to the total employment and the variation in the size group. The sampling ratios for the various employment-size groups range from all units above a certain size class selected with certainty through declining proportions in each

2 The 1972 edition of the Manual will be used starting with the 1976 survey.
smaller employment-size group. Sample sizes are then adjusted to produce integral sampling ratios.

Because the survey is a Federal-State cooperative program and the data must also meet the needs of participating State agencies, the universe was then stratified into States prior to sample selection. The ratios determined for each industry-employment-size group are used to select a sample within a State-industry-employment-size group sampling cell.

The sample design produces injury and illness incidence rates at the 4-digit SIC level in manufacturing and the 3-digit level in nonmanufacturing. States may choose to expand the sample to cover the universe or to concentrate on a particular industry. A segment of each State sample is selected for the purpose of generating national estimates.

**Estimating Procedures**

Using a weighting procedure, sample units are made to represent all units in their size class for a particular industry. Each sample member is assigned a State weight, and, if it is to be used to produce national results, a national weight as well.

**Weighting.** Weights are determined by the inverse of the sampling ratios for the size class from which the unit was selected. The national and State weights are often different since the unit may represent a different proportion of the universe in each case. Weights of responding units are adjusted in each sampling cell to account for the non-response in that cell. Units are then shifted into the estimating cell determined by response characteristics. Each unit carries the weight of its sampling cell which has been adjusted for non-response into its estimating cell. Data for each unit are multiplied by the appropriate weight and non-response adjustment factor. The products are then aggregated to obtain a total for the estimating cell (each SIC size stratum is an estimating cell).

Data for an individual estimating cell are weighted according to the following formula:

\[
X_i = \sum_{j=1}^{n} W_{ij} X_{ij}
\]

Where 
- \(X_i\) = weighted estimate of characteristics, e.g., number of cases reported, in size class “i”
- \(W_{ij}\) = weight of sample unit (establishment) “j” in size class “i”, adjusted for non-response
- \(X_{ij}\) = characteristics reported by sample unit “j” in size class “i”

**Benchmarking.** Data are further adjusted to reflect the actual employment in an industry during the survey year. Since the universe file which provides the sample frame is not current to the reference year of the survey, it becomes necessary to “benchmark” the data to reflect current employment levels.

The benchmarking procedure relates the employment estimate used in sampling to the actual employment for the reference year of the survey. The ratio of the actual employment to the weighted employment estimate is called the benchmark factor.

The benchmark factor is determined as follows:

**Benchmark Formula**

\[
B = \frac{M}{\sum_{l=1}^{L} \sum_{j=1}^{n} W_{ij} E_{ij}}
\]

Where:
- \(B\) = benchmark factor for some industry
- \(M\) = benchmark employment for the same industry
- \(L\) = number of size classes
- \(W_{ij}\) = weight of sample unit “j” in size class “i”, adjusted for non-response
- \(E_{ij}\) = survey employment for sample unit “j” in size class “i”

Often there are estimating cells where the response-adjusted weight of each unit is one. These cells are assigned benchmark factors of one. Their employment is not used to calculate the benchmark factor and is subtracted from the benchmark employment \(M\). However, this is not done when there is a larger cell (in terms of average employment) where at least one unit carries a response-adjusted weight greater than one.

The weighted characteristic of the estimating cell is multiplied by the benchmark factor so that the cell becomes more representative of the universe during the survey reference year.

Totals for each parameter measured in the survey are simply the sums of the adjusted data for each estimating cell. These totals are computed by employment size and industry for all recordable cases—fatalities, nonfatal cases without lost workdays, lost workday cases, number of lost workdays, etc.

**Incidence Rate Calculation**

Incidence rates are calculated using the totals obtained through the weighting and benchmarking procedures just described. The adjusted estimates for a particular characteristic are aggregated to the appropriate level of industry detail. The total is multiplied by 200,000 (the base number of hours worked by 100 full-time employees for 1 year). This product is then divided by the weighted and benchmarked estimate of hours worked as reported in the survey for that industry segment.
The following formula is used to calculate the incidence rate at the lowest level of industry detail:

**Incidence Rate Formula:**

\[
\text{Incidence rate} = \left( \frac{1}{M} \sum_{j=1}^{L} \sum_{i=1}^{n_i} w_{ij} x_{ij} \right) \cdot \frac{200,000}{\sum_{j=1}^{L} \sum_{i=1}^{n_i} w_{ij} e_{ij}} \]

Where:
- \( L \) = number of size classes
- \( W_{ij} \) = weight of sample unit “j” in size class “i”, adjusted for non-response
- \( X_{ij} \) = characteristic reported by sample unit “j” in size class “i”
- \( E_{ij} \) = survey employment for sample unit “j” in size class “i”
- \( M \) = benchmark employment for some industry
- \( H_{ij} \) = number of hours worked for establishment “j” in size class “i”

Incidence rates for higher levels of industry detail are produced using aggregated weighted and benchmarked totals. Rates may be computed by industry groupings, employment size, geographic area, extent or outcome of case, number of lost workdays, etc.

**Nonsampling Variability**

The quality of the reported data is a major concern in the execution of the survey. Although data are carefully edited and screened, many errors caused by misinterpretation of recordkeeping definitions by employers will not be uncovered. For this reason, a quality control program is conducted annually to evaluate the extent of error in the records. A sample of establishments which participated in the annual survey, is visited. OSH survey personnel compare entries on the log (Form OSHA No. 100) with the supplementary records (Form OSHA No. 101) and other available information to evaluate the reliability of the log entries which provide the basic data for the reporting system.

**Presentation**

A bulletin covering national and selected State results, *Occupational Injuries and Illnesses in the United States by industry* is published annually. It contains an analysis of the survey results, as well as tabulations of the injury and illness measures produced by the survey. This includes numbers and/or rates for fatalities, nonfatal cases without lost workdays, lost workday cases and lost workdays, by industry and employment size. Other information such as tabulations of data from the varying section of the form also is published.

Prior to the publication of the bulletin, selected national data are published in the form of a press release and a chart book. In addition, selected yearly data are released in a series of OSHA industry guides as aids to evaluating a firm’s injury and illness experience within that industry. Data also are re-published extensively in safety and trade journals and in the *President’s Report on Occupational Safety and Health*, an annual report to the U.S. Congress.

**Uses and Limitations**

National and State policymakers look to the survey as an indicator of the magnitude of occupational safety and health problems. The Occupational Safety and Health Administration uses the statistics to help determine which industries have the greatest need to improve their safety programs, and to measure the effectiveness of the act in reducing work-related injuries and illnesses.

Both labor and management use the estimates in evaluating their own safety programs. Incidence rates may be computed for an individual establishment and its performance compared to the national rate for that industry and establishment size. Insurance carriers involved in workers’ compensation, industrial hygienists, manufacturers of safety equipment, researchers, and others are concerned with industries’ job safety and health performance.

Despite some progress in identification, the reporting of illnesses continues to present difficulties. Occupational illnesses may develop years after an employee has left the firm where he or she contracted the illness. Moreover, many illnesses which may be of occupational origin are not as yet commonly recognized as such.

The survey results are further limited by the lack of comparable historical data. Industry coverage, rate computation, and especially definitions for recordable cases have changed drastically from the previous BLS work-injury program. The 1972 survey, covering the first full year of employer recordkeeping, will provide base-year data. Analyses utilizing time series will not be possible until data for several years are available.

**Technical Reference**

Guide to Recordability of Cases Under the Occupational Safety and Health Act

If a case

- Results from a work accident or from an exposure in the work environment and is
  - A death
  - An illness

- An injury which involves
  - Medical treatment (other than first aid)
  - Loss of consciousness
  - Restriction of work or motion
  - Transfer to another job

If none of these then the case is not to be recorded.

Note: a case must involve a death, or an illness, or an injury to an employee.
# EXAMPLES OF COMPLETED RECORDKEEPING FORMS

## SUMMARY OF OCCUPATIONAL INJURIES AND ILLNESSES FOR CALENDAR YEAR 1975

<table>
<thead>
<tr>
<th>INJURY AND ILLNESS CATEGORY</th>
<th>TOTAL CASES</th>
<th>DEATHS</th>
<th>LOST WORKDAY CASES</th>
<th>DAYS AWAY FROM WORK</th>
<th>DAYS OF RESTRICTED WORK ACTIVITY</th>
<th>NONLATEAL CASES WITHOUT LOST WORKDAYS</th>
<th>TERMINATION OR PERMANENT TRANSFERS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OCCUPATIONAL INJURIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Skin Disease</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>23</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Dust Disease of the Lungs</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>23</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other Respiratory Conditions Due to Toxic Agents</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>23</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Poisoning (Systemic Effects of Toxic Materials)</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>23</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Disorders Due to Physical Agents</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>23</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Disorders Associated With Pneumoconiosis</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>23</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Other Occupational Illnesses</td>
<td>10</td>
<td>0</td>
<td>4</td>
<td>23</td>
<td>13</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL OCCUPATIONAL ILLNESSES</strong> (Sum of codes 21 through code 29)</td>
<td>50</td>
<td>0</td>
<td>20</td>
<td>100</td>
<td>70</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

The sample summary at left was prepared using the cases from the log above as follows:

- The first line (code 10) of the summary is used to record injuries. These are identified on the log by a code 10 in column 7.
- Col. 1. Total Cases: Four cases involved injuries (identified by a code 10 in column 7 of the log).
- Col. 2. Deaths: There were no deaths (no entries in column 8 of the log).
- Col. 3. Total Lost Workday Cases: Three of the four injury cases had a check in column 9 of the log.
- Col. 4. Cases Involving Days Away From Work: Two of the four injury cases had an entry in column 9A of the log.
- Col. 5. Days Away From Work: The two injury cases which had entries in column 9A of the log had a total of 23 days away from work.
- Col. 6. Days of Restricted Work Activity: The two injury cases which had entries in column 9A of the log involved a total of 13 days of restricted work activity.
- Col. 7. Nonfatal Cases Without Lost Workdays: One injury case had a check in column 10 of the log.
- Col. 8. Terminations or Permanent Transfers: One injury case had a check in column 11 of the log.

**CHECK:** The sum of columns 2, 3, and 7 should equal the number entered in column 4. It does.

The same procedure is used to summarize each occupational illness category. There are entries on the lines for codes 10 and 25 because those codes were used in column 7 of the log to record the two illness cases.

On the line for code 10, Total - Occupational Illnesses, the sum of the entries for codes 21 through 29 were entered.

The totals for all occupational injuries and illnesses were entered on the line for code 31. The entries for codes 10 and 30 were added to arrive at these totals.
INSTRUCTIONS FOR COMPLETING FORM OSHA NO. 103
1975 OCCUPATIONAL INJURIES AND ILLNESSES SURVEY
(coversing calendar year 1975)

SURVEY REPORTING REGULATIONS
Title 29, Part 1904.20-22 of the Code of Federal Regulations requires that: each employer shall return the completed survey Form, OSHA No. 103, within 3 weeks of receipt in accordance with the instructions shown below.

FAILURE TO COMPLY WITH THE REPORTING REQUIREMENTS MAY RESULT IN THE ISSUANCE OF CITATIONS AND ASSESSMENTS OF PENALTIES.

Change of Ownership - When there has been a change of ownership during the report period, the records of the current owner and the preserved records of the previous owner are to be incorporated in the report. Explain fully under "Comments."

Partial-Year Reporting - For establishments which were not in existence for the entire report year, the report should cover the portion of the period during which the establishment(s) was in existence. Explain fully under "Comments."

SECTION I - ESTABLISHMENTS INCLUDED IN THE REPORT
This report should include only those establishments located in, or identified by, the Report Location or Identification designation which appears below your mailing address. This designation may be a geographical area, usually a county or city, or it could be a brief description of your operation within a geographical area. If you have any question concerning the coverage of this report, please contact the agency identified on the OSHA No. 103 report form.

Enter in Section I the number of establishment(s) (as defined below) included in this report.

DEFINITION OF ESTABLISHMENT
An ESTABLISHMENT is defined as a single physical location where business is conducted or where services or industrial operations are performed. (For example: a factory, mill, store, hotel, restaurant, movie theatre, farm, ranch, bank, sales office, warehouse, or central administrative office.)

For firms engaged in activities such as construction, transportation, communication, or electric, gas and sanitary services, which may be physically dispersed, reports should cover the place to which employees normally report each day.

Reports for personnel who do not primarily report or work at a single establishment, such as traveling salesmen, technicians, engineers, etc., should cover the location from which they are paid or the base from which personnel operate to carry out their activities.

SECTION II - ANNUAL AVERAGE EMPLOYMENT IN 1975
Enter in Section II the average of full and part-time employees who worked during calendar year 1975 in the establishment(s) included in this report. Include all classes of employees, including seasonal, temporary, administrative, supervisory, clerical, professional, technical, sales, delivery, installation, construction, and service personnel, as well as operating and related workers.

Annual Average employment should be computed by: (a) adding the employment for all pay periods during 1975, and then dividing that sum by the total number of such pay periods throughout the entire year, including periods with no employment. For example, if you had the following monthly employment - Jan. 10; Feb. 15; Mar. 15; Apr. 5; May 5; June 5; July 5; Aug. 0; Sept. 5; Oct. 5; Nov. 5; Dec. 5 - you would sum the number of employees for each monthly pay period (in this case, 60) and then divide that total by 12 (the number of pay periods during the year) to derive an average annual employment of 5.

SECTION III - TOTAL HOURS WORKED IN 1975
Enter in Section III the total number of hours actually worked by all classes of employees during 1975. Be sure to include ONLY time on duty. DO NOT include any non-work time even though paid, such as vacations, sick leave, holidays, etc. The hours worked figure should be obtained from payroll or other time records wherever possible; if hours worked are not maintained separately from hours paid, please enter your best estimate. If actual hours worked are not available for employees paid on commission, salary, by the mile, etc., hours worked may be estimated on the basis of scheduled hours or 8 hours per workday. (Example - if a group of 10 salaried employees worked an average of 8 hours per day, 5 days a week, for 50 weeks of the report period the total hours worked for this group would be 10 x 8 x 5 x 50 = 20,000 hours for the report period.)

SECTION IV - SUPPORT ACTIVITIES PERFORMED FOR OTHER ESTABLISHMENTS OF YOUR COMPANY
It is necessary to know whether this report includes any establishment whose primary function is to provide supporting services to other establishments of your company. The more important examples include central administrative (headquarters or district) offices; research, development, or testing facilities; and storage (warehouses).

Answer "No" if (a) services are not the primary function of any establishment(s) included in this report or (b) if services are provided but only on a contract or fee basis for the general public or for other business firms.

Answer "Yes" only if supporting services are provided to other establishments of your company. Also, indicate the primary type of service or support provided by checking as many boxes as apply. For example, if one separate establishment is a central administrative office and another is a warehouse, check both (1) and (3). If several supporting services are performed in one establishment at a single location, check the one box which best describes the primary activity.
SECTION V - NATURE OF BUSINESS IN 1975

In order to assign the appropriate nature of business code, we must have information about the specific economic activity carried on by the establishment(s) included in your report during calendar year 1975.

NOTE: If more than one establishment is included (as indicated in Section I), information in Section V should reflect the combined activities of all such establishments. One code will be assigned which best indicates the nature of business of the group of establishments as a whole.

Item 1: General Activity - Enter the principal activity during 1975 in general terms such as manufacturing, construction, trade, finance, services, etc.

Item 2: Specific Activity - List in order of importance the specific products, lines of trade, types of services, or other economic activities. Provide as much detail as possible. Opposite each entry, please enter the approximate percentage of 1975 annual dollar value of production, sales receipts, etc., as appropriate. Reliable estimates are acceptable.

SECTION VI - RECORDABLE INJURIES AND ILLNESSES

Check the appropriate box. If you checked "Yes" complete the remainder of the questionnaire. If you checked "No" complete Section VII and Section IX.

SECTION VII - SUPPLEMENTARY DATA ON JOB SAFETY AND HEALTH

PART A: Enter the number corresponding to the first month in 1975 in which your establishment(s) had an OSHA compliance inspection. For example, if the inspection occurred in March, enter "03". If the inspection occurred in November, enter "11", etc. Include inspections under the Federal or State equivalents of the Occupational Safety and Health Act by Federal or State inspectors and other inspections which may result in penalties for violations of safety standards. Do not include inspections limited to elevators or boilers or those which are consultative in nature.

Part B: Periodic general medical examinations—an examination administered by a doctor, or registered professional personnel under the standing orders of a doctor, in which medical opinions or conclusions are drawn.

Periodic medical surveillance examinations—periodic screening of employees who are exposed to toxic substances, hazardous materials, or injurious forces (e.g., noise, radiation, etc.).

SECTION VIII - INJURY AND ILLNESS SUMMARY

This section can be completed quickly and easily by copying the data already entered on your OSHA No. 102 "Summary of Occupational Injuries and Illnesses" for 1975 or by summarizing the data from your OSHA No. 100 "Log of Occupational Injuries and Illnesses".

NOTE: If this report includes more than one establishment, the separate OSHA No. 102 summaries for each must be added and the sums entered in Section VIII. However, you should first make sure that each OSHA No. 102 form has been correctly prepared. The OSHA No. 102 form is the summary of cases which have been entered on the Log of Occupational Injuries and Illnesses (OSHA No. 100) during calendar year 1975. Please review the Log to make sure that all entries are correct and complete. Each case should be included in only one of the three types: Fatalities (Log column 8); Lost Workday Cases (Log column 9); or Nonfatal Cases Without Lost Workdays (Log column 10). The Summary (OSHA No. 102) should have been completed by summarizing, separately, occupational injuries (code 10) and the seven categories of occupational illnesses (code 21 through 29) according to instructions on the back of the Summary form. Please remember that, if an employee's loss of workdays is still continuing at the time the summary is completed, you should estimate the number of future workdays he will lose and add this estimate to the actual workdays already lost.

NOTE: All cases which, in your judgment, required only First Aid Treatment, even when administered by a doctor or nurse, should not be included on this report. First Aid Treatment is defined as one-time treatment and subsequent observation of minor scratches, cuts, burns, splinters, particles in the eye, etc.

SECTION IX

Please complete all parts, including telephone number. Then return the OSHA No. 103 form (but NOT your file copy) in the self-addressed envelope.
1. Establishments Included in this Report
   This report should include only those establishments located in, or identified by, the Report Location or Identification which appears below your mailing address on this form. Enter the number of establishments (see definition on page 1) included in this report.

2. Annual Average Employment in 1975
   Enter the average number of employees who worked during calendar year 1975. Include all classes of employees, including seasonal, temporary, part-time, etc. See instructions for examples of computing your average employment.

3. Total Hours Worked in 1975
   Enter the total number of hours actually worked by all employees during 1975. Do not include any non-work time even though paid, such as vacations, sick leave, etc. Note: If employees worked low hours during 1975 due to layoffs, strikes, fires, etc., explain under comments (section IX).

4. Support Activities Performed for Other Establishments of Your Company
   Does this report include any establishment(s) whose primary function is to provide support activities or services exclusively for other establishments of your company?

5. Nature of Business for 1975
   Indicate the general type of activity performed during 1975 by the establishment(s) included in this report (i.e., manufacturing, wholesale trade, retail trade, construction, services, finance, etc.).

6. Recordable Injuries and Illnesses
   Did you have any recordable injuries or illnesses during calendar year 1975? (Check one)
   - No (complete Section VII and Section IX)
   - Yes - complete Sections VII, VIII and IX

7. Supplementary Data on Job Safety and Health
   A. If your establishment(s) had either a Federal or State OSHA compliance inspection during calendar year 1975, please enter the month of the first inspection.

   B. (a) Do you provide medical examinations for your employees? (Check as many as apply)
      - No
      - Yes

   (b) If yes, indicate the type of medical examinations provided to your employees. (Check as many as apply)
      - Pre-placement examinations of new employees
      - Periodic general medical examinations
      - Periodic medical surveillance examinations
      - Examination of employees returning to work after a lost time job-related injury or illness
      - Examination of employees upon termination of employment
      - Other

   C. Do you have an established safety and health training program? (Check as many as apply)
      - No
      - Yes - training for new employees
      - Yes - training sessions for employees exposed to toxic substances which exceed prescribed action levels
      - Yes - scheduled employee meetings, quarterly or more often
      - Yes - informal, nonscheduled training by supervisors
      - Yes - Other (specify)

   D. Enter the number of lost workday cases (not the number of lost workdays) in your establishment(s) in 1975 which had 15 or more workdays away from work. (Refer to column 9a of the log, OSHA No. 100)
### VIII. INJURY AND ILLNESS SUMMARY (Covering Calendar Year 1975)

#### INSTRUCTIONS:
- This section may be completed by copying data from OSHA No. 102, "Summary, Occupational Injuries and Illnesses," or by summarizing the data from OSHA No. 100, "Log of Occupational Injuries and Illnesses."
- Leave Section VIII blank if there were no recordable injuries or illnesses during 1975.
- Code 30 - Add all Occupational Illnesses (Code 21 + 22 + 23 + 24 + 25 + 26 + 29) and enter on this line for each column (1) through (8).
- Code 31 - Add Occupational Injuries (Code 10) and the sum of all Occupational Illnesses (Code 30) and enter on this line for each column (1) through (8).
- Please note that first aid, even when administered by a doctor or nurse, is not recordable.

#### INJURY AND ILLNESS CATEGORY

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>TOTAL CASES</th>
<th>DEATHS</th>
<th>LOST WORKDAY CASES ONLY</th>
<th>NONFATAL CASES WITHOUT LOST WORKDAYS</th>
<th>TERMINATIONS OR PERMANENT TRANSFERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupational Injuries</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupational Skin Diseases or Disorders</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust Diseases of the Lungs</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory Conditions Due to Toxic Agents</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poisoning (Systemic Effects of Toxic Materials)</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Disorders Due to Physical Agents</td>
<td>25</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Disorders Associated with Repeated Trauma</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>All Other Occupational Illnesses</td>
<td>29</td>
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<tr>
<td>TOTAL OCCUPATIONAL ILLNESSES</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL OCCUPATIONAL INJURIES AND ILLNESSES</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### IX. COMMENTS:

Report prepared by: [Name]

Title: [Title]

Area Code and Phone: [Area Code and Phone]

Date: [Date]
Economic Trends

Chapter 36. Economic Growth Studies

Background

The Bureau of Labor Statistics has developed a program of economic growth studies aimed at providing a framework for analyzing the problems of long-run economic growth. The primary objective of this program is to develop projections of employment opportunities under alternative assumptions. These projections provide a framework for assessing a number of important economic problems including labor utilization over the next decade and employment requirements of specific government programs.

Methods

A system of economic growth models has been developed to serve as a tool in making economic projections. This system begins by projecting the economic growth rate of the United States under conditions of potential or near potential utilization of its labor and capital resources. This is referred to as potential gross national product (GNP). To do this, the system must project the labor force to the target year, assuming a specified unemployment rate, and project the rates of change in productivity and average hours paid.

This potential gross national product (GNP) is then distributed among the major demand components of GNP by use of a macro-econometric model. This model converts potential GNP into income by sector, such as government revenues, personal income and business income, and in turn translates income into aggregate purchases or demand. The foreign trade sector and some government accounts are left for exogenous adjustment to permit flexibility in certain assumptions of the projections. The macro-model is designed so that projections of supply GNP and demand GNP are not necessarily equal. The equating or balancing of these is done by making selected changes in government fiscal policy.

The next stage in the projections is to develop a projection of the industry composition of demand for each of the major demand categories. For example, the consumer expenditures category includes the amounts spent on rents, automobiles, medical expenses, and other goods and services purchased by consumers. For each of the major demand categories, different analytical procedures are followed in allocating demand to the producing industry. In some cases submodels are used to assist in this analysis. The industry detail to which the categories of demand are allocated matches the input-output classification used in the subsequent step.

Demand as used in the national income accounts refers only to final demand, i.e., that of the ultimate consumer. To place a value on the output of an industry whose products are not sold to ultimate consumers, but are used instead by other industries in the course of their own production, an additional set of calculations is necessary using an input-output model. The input-output model translates final demand for a given product into the output that is required from all other industries to produce the materials needed to manufacture that product or service.

Prior to use of this model, the input-output coefficients are projected. The input-output tables used as a base in the economic growth model are developed by the Bureau of Economic Analysis, U.S. Department of Commerce. However, these input-output tables incorporate the technology and product mix for a base year, and may not reflect the technology and product mix which may prevail during the period for which the projection is being made. Thus, it is necessary to project changes in the input-output coefficients. Two methods are used to do this: Detailed analyses are made of the changes taking place in the technology of various industries as well as the changes expected in product mix due to differing growth rates of product groups within industries. For industries for which detailed studies are not made, analyses are developed to determine the direction and magnitude of change in the use of its products by other industries.

Next, employment estimates by industry are developed. This is accomplished by use of a set of industry productivity projections. The final stage is to balance the model. Projections contain many complex relationships among economic variables that were developed through a lengthy sequence of operations. It is necessary to have a set of checks and balances to insure that the various stages of the projections make up an internally consistent model. The economic growth model is designed to provide a feed-back and balancing procedure with respect to three of its elements: Imports, investment, and employment. In practice, all three of
these elements must be brought into balance simultaneously.

**Uses**

*Long-term Employment Projections.* The projections developed in the economic growth program serve a number of uses. The employment projections by industry are used in developing occupational outlook projections. The projections developed by the Bureau form an important part of the U.S. Government’s report to international organizations on long-term economic outlook for the United States. In addition, other Government agencies use various parts of the economic growth projection to develop their own projections. The projections of GNP and industry growth patterns are also used in private industry by analysts to make diversification studies, market analysis, and long-term capital plans.

*Current Labor Requirements Studies.* The economic growth model permits analytical uses in addition to long-term employment projections. Specifically, the model can be used to generate the industry by industry labor requirements of various economic sectors or types of demand for recent years. Estimates of this type have been made for some time for national defense, consumption, exports and other demand categories as a basis for the long-term projections and for special projects. Recently, this use of the model has been extended to cover labor requirements for a variety of specific Federal Government programs, such as the Space Shuttle program and National Institute of Health research grants.

**Limitations**

Since the model relates program outlays or purchases by industry to employment requirements, model results have sometimes been used for comparison of the employment content of different programs or for short run projections of the job requirements implicit in a proposed program change. In doing this, the employment generated by a program in a recent year is divided by the total value of purchases to derive program employment requirements per billion or million dollars of expenditures. As a result, the number of jobs generated per unit of outlay in one program may be compared with the number generated by the same outlay in another program. Or, proposed growth in a particular program’s outlays may be translated into an estimate of employment change. These types of utilization, however, are subject to a number of limitations. Since the model system at this time counts just the number of jobs required without differentiating between full-time and part-time employment or between low-paying and high-paying jobs, comparison of jobs per unit of expenditure provides only a partial indication of the relative job requirements of two programs. Also, short-term projections of employment requirements based on proposed changes in program outlays provides only a first step in the estimation of actual employment change. Projection, using model relationships, assumes that base year program expenditures patterns remain relatively constant and, less realistically, that employment will always change in direct proportion to changes in outlays. Realistically, an employment projection, such as this, should use marginal or incremental requirements relationships rather than the average ones in the model, and it must take account of all labor demand and supply factors.

**Technical References**

ditures and Manpower Requirements for Selected Federal Programs,* (Bulletin 1851, 1975).
"I can remember the methods and procedures which existed in the bureau in the middle 1920's when I first came to Washington to work in the Bureau of Labor Statistics. By that time, the bureau was no longer on a hand basis entirely. Office machines had come into general use, but these were of the manually operated type. Each clerk had on his desk a hand calculating machine to grind out multiplications and divisions. The calculators then in use required the clerk to work as long as possible turning a small crank on the machine. The fatigue element made it necessary to change assignments of clerks frequently as it was not possible for any clerk to work day-in and day-out on a machine." 1

These remarks by former Commissioner Clague show that hand-powered machines were helping the Bureau of Labor Statistics (BLS) process data at least a half-century ago. Self-powered machines were not used until 1931. At that time, data on employment, hours, and earnings were tabulated by electric accounting machines (EAM), using punched cards. A few years later the Bureau extended the punched card tabulating system to work on the retail food price survey, and in 1934, the tabulators were augmented by the installation of an electromechanical multiplier. From these small beginnings, the Bureau of Labor Statistics gained prominence among national statistical agencies in the use of electronic computers. This is the story of how it happened.

People and Machines Until 1952

"In the last two decades of the 19th century when the Bureau first began its work, practically everything was done by hand. For example, the schedules obtained in the course of some study were tabulated by hand. Additions, subtractions, divisions, and multiplications were laboriously worked out by individual clerks. The process of checking was extremely time-consuming since all computations had to be done a second time by an independent clerk. There can still be found in the archives of the Bureau of Labor Statistics the rough-work of various statistical studies which were conducted in the days when there was not a single item of mechanical tabulating or computing equipment in the whole organization."

"It is difficult to judge how long these old operations took, and how many man-hours were expended in making up the simplest of statistical tables. We do know that the studies of those days were nearly all one-time affairs. It would have been impossible to have put out a regular monthly series by adhering to a rigid time schedule. Each study took from one to three years or more. An output of one major study per year was considered a satisfactory performance." 2

Manually driven machines, the first aids to data processing, were used by BLS early in this century. Early in the 1930's, powered machines were installed in two small sections of the Bureau. One of these was the Consumer Price Division where the machines were used to compile data on retail food prices. The other location was the Employment Statistics Division where the machines helped compile data on how people were at work. On January 1, 1935, work was centralized in a newly formed Machine Tabulation Division to serve all parts of the Bureau. The Division proved so successful in speed and economy that it was drafted to compile special tabulations of employment application and placement data for an expanding United States Employment Service.

By March of 1935, the Division had expanded to over 250 employees and it began to process 6 million punched cards representing applications of unemployed persons. This work led to an inventory system which was kept up to date by deleting the cards for all persons placed in jobs and adding cards for any new unemployed persons. The increased work load brought by the inventory system resulted in expanding the staff of the Machine Tabulation Division to about 400 persons.

When the presidential reorganization plan of 1938 was put into effect, the U.S. Employment Service was transferred to the Social Security Administration where another machine unit took up the task of serving the Employment Service. In the meantime, Secretary of


2 Ibid., p. 45.
Labor Frances M. Perkins had decreed that all future machine tabulation work of the Department be performed by the centralized unit in the Bureau of Labor Statistics. In accordance with those directions, the smaller units of the Women’s Bureau and the Children’s Bureau were integrated with the larger BLS Machine Tabulation Division during 1939.

Because of the success in meeting deadline dates and requirements of the U.S. Employment Service, divisions of BLS, and other Department of Labor agencies, many outside departments and independent agencies requested and received tabulations on a reimbursable contract basis. From 1938 through 1941, tabulations were prepared at one time or another for many of the principal government agencies and departments. After Pearl Harbor, the BLS Machine Tabulation Division also serviced the War Labor Board, War Manpower Commission, War Production Board, Office of Price Administration, and many other Federal agencies.

The Bureau continued its practice of serving other agencies after the war, a tradition that was sustained for as long as the Bureau had its own machines. But the staff of the Division of Machine Tabulation began to decline in the early postwar years, partly because of the end of the pressing wartime demand but also because of the advent of better machines.

In the early postwar years, new data processing machines with advanced capabilities were acquired as quickly as they became available. For example, in the late 1940’s old tabulators were replaced by faster and more complex machines of more than twice the capacity. Slow, obsolete sorters with mechanical fingers were replaced in the early 1950’s by high-speed sorters with electronic sensors.

The increased capabilities of machines did not spell the end of reliance on people. A great deal of work remained for clerical staff. The machines were mainly tools to summarize information provided in responses to Bureau questionnaires. Checking the returns for accuracy, correcting those found erroneous, and expanding the summed sample figures to measures of economic events still required laborious, time-consuming work by individual clerks who, aided by electrically powered mechanical desk calculators, turned the summary data into statistics about prices, wages, employment, hours of work, earnings, and other economic measures.

First Electronic Computer (1952–58)

The Bureau acquired its first small electronic computing machine, an IBM 604, in 1952. It was slow and had very limited capacity even by the standards of the time. But it had an impact on the Bureau’s work that was all out of proportion to its size. The effect is illustrated by the Current Employment Statistics program which provides monthly summary data on employment, hours worked by production employees, and their hourly and weekly earnings. The information is compiled on a national scale in considerable industrial detail. The figures are calculated by tabulating a sample of establishments in nonagricultural activities such as commerce, manufacturing, services, and government.

The IBM 604 could do work previously performed by the clerks. It could convert the sample totals, compiled by the tabulators, into economic measures. These tasks included: special adjustments to compensate a tendency for the employment estimates to drift downward each month by negligible amounts that were significant in the longer run; steps to smooth minor discontinuities in hours and earnings series due to small month-to-month changes in sample composition; spotting questionable reports on the basis of comparison with past or typical responses; and raising or lowering the monthly employment figures derived from sample data to the actual level of a total count made annually. All these steps formerly done by clerks were transferred to the electronic calculator.

Prior to implementation of the little computer (it was actually called an Electronic Calculator), the published summary data, comprising 1,200 national industry employment, hours, and earnings series, were compiled from data supplied each month by a sample of approximately 97,000 enterprises. By the time the employment statistics program was fully reorganized around the electronic calculator in 1958, the Bureau was publishing more than 2,000 monthly series on employment, hours, and earnings, almost double the earlier figure.

The increase was reflected primarily in more and more data about narrower and narrower segments of the economy. For example, in the early 1950’s, information about the number of workers, their weekly earnings, and their hours of work was compiled for four principal lines of retail trade: General merchandise stores, food and liquor stores, automotive and accessory stores, and apparel shops. By the late 1950’s, the food and liquor line alone was subdivided into grocery stores, meat and vegetable markets, dairy product stores, and a catch-all called other food and liquor stores. The breakout of new industry detail occurred across the full spectrum of American industry and commerce and responded to a demand by the public, Congress, trade associations, and others for more and more knowledge about what was happening.

During the same time—1952 to 1958—the number of reports processed each month increased by 15,000, from 97,000 to 112,000, thus assuring an adequate sample base to help bring more details of the Nation’s economic picture into focus. Despite this increase in both input and output, staffing in the program was reduced by half, from 125 to about 60 people, a very sharp increase in productivity that was entirely an outcome of careful exploitation of the small electronic computer.
First-Generation Computer System (1958–63)

The replacement of the IBM 604 electronic calculating machine by the IBM 650 computer in 1958 marked a considerable advance in electronic data processing capability for the Bureau. This true, first-generation electronic computer had a further impact on staffing patterns and permitted the Bureau to produce and release increasing amounts of data to the public in a more timely way.

The 650 acquired by BLS was a vacuum-tube machine that worked with punched cards, much like the 604, but its internal electronics offered far greater computational capacity. Because larger amounts of input could be handled efficiently, the coverage of many sample surveys was expanded, and the Bureau was able to provide information about smaller units of the economy. By 1963, the employment statistics program was collecting and processing 130,000 reports from employers each month and producing and publishing summary data for 2,300 series at the national level.

The increased numbers reflected a further breakout of industry detail. For example, a single-line entry in Bureau publications for apparel shops was broken out into four kinds: Men’s and boys’ apparel, women’s ready to wear, family clothing stores, and shoe stores. Correspondingly detailed industry data emerged throughout the national economic spectrum as pictured in Bureau journals.

With the IBM 650, machine time to process the data and calculate the employment statistics was cut in half, from 2 weeks to 1. Greater memory capacity permitted the development of far more complex calculating algorithms. A major step forward in this regard was the completion of a large and technically difficult computer program to isolate the influence of seasonal factors in economic time series. (See appendix A.) As a result, for the first time, summary data were routinely adjusted to remove the influence of seasonal forces, giving impetus to a major improvement in the timeliness of economic analysis. Despite these additional statistical products, clerical staff in the program was cut from 60 to 45.

Second-Generation Computer (1963–70)

In 1963, the Bureau replaced the 650 system with an IBM 7074, a much more powerful and faster machine of the so-called second-generation computers where transistors and diodes largely replaced the vacuum tubes of the first-generation machines. A major advantage of the 7074 computer over the older machine was that its principal input/output medium was magnetic tape rather than punched cards. The speed and versatility of tape processing allowed further improvement of many of the Bureau’s substantive programs.

One area of major progress was screening and editing of data from survey respondents. The number and types of practical checks increased so that computer programs could include an intricate combination of internal and external checks and matched sample techniques. The speed and power of this machine enabled Bureau staff to develop self-correcting systems and automatic followup routines that permitted the resolution of errors in reported data in a minimum amount of time. Evidence of success was in the speedy calculation of current employment figures, down from 1 week to less than a day (actually, overnight).

The IBM 7074 also enhance printing practices by performing page composition. Before 1964, page composition for the two large employment statistics annual summary publications was done manually. That is, the punched card file that carried the data for printing was hand modified to provide for proper spacing, alphabetic headings, and similar information to make the printed pages understandable and easy to read. To avoid this work, a computer program to compose pages was developed for the 7074. It cut blocks of data to size, set the spacing between blocks, and finished the bottom of pages cleanly. It positioned alphabetic labels and headings and carried continuation indicators from page to page as needed. While page composition of text was not
uncommon at that time, page composition of statistical tables by computer is still unusual even in the mid-1970's.

By 1967, compilation of increasing amounts of statistics had caused each book to expand to nearly 1,000 pages. Sheer size had become a problem. Fortunately, events outside of BLS provided a solution. The Merganthaler Co., a manufacturer of printing machines, had developed a computer driven photo-composition machine for text preparation, and the Government Printing Office (GPO) installed one of the first models. Called Linotron, the machine offered a wide range of type styles, fonts, and sizes; the right combination of these features would squeeze much more information on a page than computer printouts allowed. By combining the page composition techniques developed at BLS with the photo-composition facilities of Linotron, the Bureau's computer systems staff was able to reduce the size of the two books by more than a third, beginning with the 1968 issue of Employment and Earnings for States and Areas and the book of national statistics in 1971.

The productivity trends noted in the earlier periods continued. In the employment program, for example, clerical staff decreased to about 30, and 160,000 monthly reports from respondents throughout the country now produced nearly 3,000 published series at the national industry level (figure 1). This was almost three times the number shown at the beginning of the decade, reflecting the combined effect of expanded samples and the opportunity given by the more powerful computer to be responsive to public demand for more detailed descriptions of how changes in our national economic machine affected the rank-and-file American worker.

### Figure 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of published series</th>
<th>Number of monthly reports processed</th>
<th>Size of staff</th>
<th>Machine time to process</th>
<th>Computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>1,200</td>
<td>97,000</td>
<td>125</td>
<td>2 weeks</td>
<td>None</td>
</tr>
<tr>
<td>1958</td>
<td>2,000</td>
<td>112,000</td>
<td>60</td>
<td>2 weeks</td>
<td>IBM 604</td>
</tr>
<tr>
<td>1963</td>
<td>2,300</td>
<td>130,000</td>
<td>45</td>
<td>1 week</td>
<td>IBM 650</td>
</tr>
<tr>
<td>1968</td>
<td>3,000</td>
<td>160,000</td>
<td>30</td>
<td>Overnight</td>
<td>IBM 7074</td>
</tr>
</tbody>
</table>

Similar reductions were taking place in other Bureau programs. Gross bureauwide reductions in clerical staff were somewhat offset by the expansion of systems and programming staff, but the productivity of the expanding staff was, of course, far greater than that of declining staff because of the much greater power of the machines they used.

By the end of the 1960's, the first great wave of accommodation to the computer had taken place and had pushed the Bureau into a unique dependence on the computer. This can be seen by comparison with the role of computers elsewhere. In a manufacturing plant, for example, physical components such as trucks, conveyor belts, and machines are used to collect and process raw material into the final product. The computer may provide administrative support (payrolls, inventories, etc.) and may be used for process control, but it is not directly involved in the physical process of manufacture. In BLS, the computer is the machine that actually takes raw data, processes it, and turns it into statistical information about the national economy and the working conditions of the wage earner—the Bureau's end-product.

### Use of the Computer for Research

In the decade of the 1950's, BLS used its computer mainly to summarize, estimate, and present data in simple tabular worksheet results. In the 1960's, the computer's work expanded—it was programmed to select samples, control response, and to assist generally in production tasks. But by the mid-1960's it was also accepted as a tool to be used directly by professionals to make economic projections and do complex statistical analysis. Some interesting and successful developments outside of automating large-scale survey work took place.

Prior to 1967, a number of obstacles combined to keep researchers from using the computer. The lack of a computer language tailored to statistical applications made program development by the researcher difficult. At the same time, the Bureau's limited programming resources were mainly committed to survey processing. But perhaps the major hindrance from the researcher's viewpoint during this period was poor response—2 to 5 days between the time the job was sent to the machine room and the time it was returned.

In 1967, there was a dramatic increase in the use of the computer as a research tool and the type and complexity of analysis being done. The Bureau initiated an intensive training program to familiarize its professional research staff with basic computer concepts and in the use of the FORTRAN (Formula Translation) programming language. The training allowed researchers to write their own FORTRAN programs or to use prewritten or "canned" generalized statistical routines such as multiple regression and seasonal adjustment. The Bureau also installed a (then) powerful computer operating system called FOS (FORTRAN Operating System). By managing the flow of work through the machine, FOS reduced response time to 3 or 4 hours (compared with several days).

During the period 1965—67, fewer than 100 analytical tasks per month were being processed. By the end of 1967, an average of more than 350 jobs were being run each month. Most of these represented work that would not have been undertaken had the FOS system not been available. The jobs ranged in complexity from the simple weighting of a few dozen time series to processing over 100 multiple regression problems.
The Data Bank

Throughout the post-World War II years, and with the aid of the computer, great quantities of information about the Nation’s economic life were being compiled across the range of Bureau surveys. About 1962, the BLS addressed the problem of storing large amounts of data in a machine-readable form in a data bank.

At first, only certain employment and other labor force summary statistics were in the data bank, but during the late 1960's it was expanded to include retail and wholesale price summary data and eventually to cover the full range of aggregated data from major BLS programs. By 1970, the bank held about 30,000 time series and some cross-sectional data such as the results of annual surveys of occupational wage rates, matrices of input/output studies, and occupational employment surveys. In increasing instances, the machine-readable data were made available to analysts outside the Bureau. Among the most popular data were the file of the 1960–61 Survey of Consumer Expenditures. Part of a decennial study of family expenditures used to update the Consumer Price Index, this file was the only micro data retained for research.

However, it was not enough simply to store data. To be useful they had to be readily retrievable, and means by which analysts could communicate their processing needs to the computer had to be found.

Computer Languages

The information-processing community has been simplifying talk with the electronic computer almost since the advent of the machine. Help first went to the computer science professionals themselves, who, for their own use, sought more powerful instructions that went well beyond the binary code of the machine. The forward thrust led through mnemonic instructions, representative of groups of binary codes, to high-level languages, such as FORTRAN and COBOL, in which a few words generate masses of machine codes.

Although these gains improved the lot of the programmer, direct use of the computer as a common tool for scientists in their day-to-day work came more slowly. For years, the specialized nature of computer languages required that computer-oriented technicians be posted between the user and the machine to convert analytical goals into machine instructions. This provoked a problem. Communication between the two disparate disciplines was rarely complete, and the practice had all the disadvantages of dealing with complex technical matters through an interpreter. Gains occurred when some users learned FORTRAN, even though it meant dealing with concepts outside their profession.

By the mid-1960's, engineers and professionals in other sciences had been given meaningful direct access to the machine by words common in their profession. A brief history of computer languages reveals how this happened and marks the lines along which further evolution occurred.

Procedure-oriented Languages. The first computer languages required that the steps to be followed by the machine be spelled out. These languages are called “procedure oriented” and figure 2 shows some of their evolutionary stages. Unlikely as it may seem now, 3 decades ago instructions for the earliest computers were written in binary numbers similar to those shown at the top of figure 2. Worse still, they were given to the machine by means of on-off hand switches that set the desired values. Simplifications soon followed.

The “machine” language in figure 2, where a few decimal numbers replaced numerous binary digits, represents a later stage. For example, the many binary digits shown first under “operation code” are replaced by the decimal number 13 and a sign. Still later, mnemonic codes (ZA1 means “zero and add to accumulator 1”) replaced numeric codes and the instructions began to look more meaningful. Combinations of mnemonic codes into “Macro” instructions represented a higher language level, and, finally, the culmination of procedure-oriented languages is illustrated by FORTRAN.

Figure 2

Development of Computer Languages

Example

PROBLEM Add “A” to “B,” call result “C.” (Machine is an IBM 7074.) “A” is stored at location 2000, “B” is stored at location 2001, “C” is to be stored at location 2002. The instructions to do this are shown below in five different levels of computer language.

<table>
<thead>
<tr>
<th>Language</th>
<th>Operation Code</th>
<th>Storage Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>BINARY</td>
<td>101 00011 01010 00101 00110 00110 00011</td>
<td>2001 00101 00110 00110 00110</td>
</tr>
<tr>
<td>MACHINE</td>
<td>+13</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>+14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-11</td>
<td></td>
</tr>
<tr>
<td>MNEMONIC</td>
<td>ZA1</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>AI</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>ZST1</td>
<td>C</td>
</tr>
<tr>
<td>MACRO</td>
<td>ARITH</td>
<td>C = A + B</td>
</tr>
<tr>
<td>FORTRAN</td>
<td></td>
<td>C = A + B</td>
</tr>
</tbody>
</table>

At each stage of this grossly simplified picture, the way in which to get the value C was set forth, rather than the problem itself. Even in the last stage, where the steps are largely hidden from view, the instruction is procedural, for it says: “To obtain C, add A to B.” On the other hand, the problem is really one of simply saying: “Find C.”
Problem-oriented Languages. In recent years, talking to machines has become more natural. Computer instructions closely related to the professional language of the user were developed. The structure of these new languages departed radically from the procedural languages, tending to require only a statement of the end-product wanted. The way in which the product is to be obtained is known to the computer through programs already available to it. These new languages were called "problem oriented" and, more recently, "very high-level languages."

It is interesting to note that these problem-oriented languages often were created by people experienced in both the science of the user and in the principles of information processing. Several problem-oriented languages, for example, were constructed by engineers who knew computers. The most widely known of these, COGO (COordinate GeOmetry) uses terms engineers are familiar with—coordinate, point azimuth, line, intersect, and area—to solve geometric problems in road and structure building.

A similar approach to computer languages was taken by the BLS system design staff. They developed a computer language consisting of words that were already part of the analyst's working vocabulary such as "table," "line," "column," "region," or "size." The user would state a tabulation requirement in these words, declaring objectives but not procedures. The system could develop the methodology.

The language and set of computer programs supporting the system were called the BLS Information System. Working in conjunction with the BLS Data Bank, the Information System gave BLS social scientists direct access to the Bureau's common pool of data. The user was not constrained by predetermined or fixed output formats. With the system's language, the user could request data, make computations and, at the same time, control the layout of the results in a table including spacing and the placement of alphabetic headings and stubs. In addition, connected with the Information System there was a library of statistical routines including spacing and the placement of alphabetic headings and stubs. In addition, connected with the Information System there was a library of statistical routines with advanced analytical capabilities to provide for complex research tasks.

Although hardly the last word and despite many problems, the BLS Information System was undoubtedly a forerunner; the Time Series Information System of the Australian Bureau of Statistics, which was based on the BLS system and the CANSIM System (Canadian Socio-economic Information System) of Statistics Canada, with similar objectives but based on a more advanced hardware, came along a bit later.

Time Sharing

Implementation of the BLS Information System did not end efforts to give analysts direct access to data. The Bureau also improved its analytical capability during the late 1960's by leasing the remote services of a commercial time-sharing computer. This system assisted analysts in developing complex statistical programs and provided results, after only a momentary pause, through typewriter terminals connected to the time-sharing computer by telephone lines.

The Bureau's systems development team continued to evaluate research requirements and capabilities. In 1970, use of time-sharing facilities for research was transferred to the computer center of the National Institutes of Health (NIH), a step that later proved to be the forerunner of a major shift in the Bureau's data processing stance.

Mainly, however, the late 1960's were marked by a pause in the development of new approaches to computer use because of two events. The first was the imminence of a large-scale, third-generation computer about which much had to be learned; it was no longer prudent to spend resources in improving old methods. The second event was that this machine, an IBM 360/65, would be assigned to a new Department of Labor computer center to which all BLS data-processing equipment would be transferred. This consolidated center was intended to serve all agencies of the Department of Labor. BLS would no longer be responsible for managing computers. It would become a customer.

It had been intended that the Bureau would transfer its work from the old IBM 7074 to the new 360/65, both belonging to the Department of Labor. However, the services offered by the NIH facility proved more suitable to BLS needs than the essentially business data processing environment that evolved in the Department of Labor center to serve the needs of the other agencies in the Department. To meet its own scientific research requirements, the National Institutes of Health had created a unique and powerful computer center. By 1975, it comprised a number of the most advanced large-scale newly available computers. Seen as a single machine by its remote customers, the center combined two multiprocessor IBM 370/168's (almost like four 168's), and one 370/145, with a total of 18 million bytes of storage, into an installation that provided prompt service at costs that met expectations about economies of large scale. It was also specially tuned to the requirements for processing data for scientific research and, in this regard, admirably suited BLS.

By mid-1975, most of the Bureau's computer work was done at the NIH facility. This included compilation of major Bureau statistical products. On the other hand,
a few surveys were still running on the old 7074 so that some of the work at NIH was testing and debugging new computer programs for production use of third-generation machines. But, perhaps even more, it was analytical work performed by the Bureau’s research staff. While computer requirements for its better known, major products had remained fairly stable, the Bureau’s computer usage increased substantially, largely because the powerful NIH machines had offered researchers an unprecedented and irresistible opportunity to pursue their goals.

The Bureau’s needs had clearly outgrown the Department of Labor facilities, which were limited to a single IBM 360/65 with comparatively little capacity for attaching communicating terminals and lacking the advanced software associated with research work. In mid-1975, the Bureau of Labor Statistics and the National Institutes of Health formalized their relationship in a binding agreement to share facilities and techniques and to protect against unilateral actions that might adversely affect one or the other party.

BLS staff communicates with the remote NIH computer, located in Bethesda, Maryland, miles from the downtown Washington, D. C., location of BLS, through an array of terminal equipment. There are two main types. There are nearly 100 typewriter terminals (most type on paper, but a few display messages and results on cathode ray (TV) tubes). These slow-speed terminals are strategically placed about the headquarters building for more than 600 registered users. Many terminals are assigned to research analysts for ease of accessibility. Other typewriter terminals are assigned to the production staff.

To augment the slow typewriter terminals, five small, high-speed, computers handle large-scale input and output tasks; magnetic tape and punched cards provide mass input and fast 1,100 line/minute printers generate listings and display computed results. In addition, as backup and to tie in with the Department of Labor’s regional telecommunications network, the Department’s 360/65 has electronic access to the NIH machine to facilitate transmission of BLS data between Washington and the field offices.

Approach to Third-Generation Computers

BLS suffered the trauma of going from one machine generation to another on two prior occasions: in 1958 to the IBM 650 and in 1963 to the IBM 7074. In both cases, some twenty to forty major systems (depending on the method of counting) were moved, one by one, each without regard to its relationship to others or to Bureau needs taken as a whole. The result was a patchwork, serving no bureauwide end, and often failing to meet even the substantive needs of each separate system.

Mindful of these experiences and to avoid making the same mistakes, an effort was made to set down what had gone wrong before. Among other complaints, managers often were bitter about the machine’s elephant-like response to pressing needs, compared to the glowing promises of great speed. Computers were frequently viewed by the ultimate users—management and program officers—as having been counterproductive in some ill-defined way.

Before computers, BLS data processing requirements were largely characterized as a stream of reports, flowing through a variety of processing steps. As the reports arrived they would be logged in and moved from work station to work station for review, acceptance, or correction, often by referring back to the respondent in time to modify the report before the summary tabulations were prepared.

With second-generation tape sequential processing, the work previously done by clerks, desk calculators, and tabulating machines was given to the computer on the grounds that it could do the job more swiftly, efficiently, and with greater accuracy. In a sense, this turned out to be true. But it was far from satisfactory.

Tape sequential processing was found to be a barrier in the midst of the processing stream. Here’s why: The computer work usually required matching incoming reports against a complete machine master file of all the reports expected. Running the master file for every small batch of responses was costly, so all returns were held until the last possible moment for bulk processing of as many reports as possible. Then in one frantic burst the computer reviewed, edited, rejected, or accepted reports far more swiftly and accurately than people had done. Owing to the delay, little time was left to review and correct the rejected cases except by adding staff to meet the peak requirements. Even by peak staffing it was often not possible to get corrections from respondents in time to be included in the summary tabulations.

In addition to blocking a flow that should have been continuous and uninterrupted, the old equipment did not really advance the cause of analytical research in a satisfactory way. The Bureau’s massive data base was a tempting target for BLS economists, statisticians, demographers, and other social scientists. Although the machines marked an important advance in processing large data files, and even after trying and succeeding, the researcher remained perturbed by the awkward, time-consuming problems faced in using this powerful device to deal with data scattered throughout files. As in the case of production, the analyst found the computer to be an instrument of great promise that was never really fulfilled.

What follows is an outline of BLS reaction to these findings. The work described is partly complete. Some of the remainder will take time and considerable effort. And some may never be finished. Nevertheless, there is a blueprint, a master plan, to give unity to the BLS approach to third-generation computers.
Data Processing at BLS

New Directions

Data Base Management and Telecommunications

An important item in understanding the BLS picture is the magnitude of its data base, both its aggregated or summary data and its micro data base of reports supplied by respondents. For example, each month some 160,000 establishments across the country supply data about employment, hours of work, and earnings for the BLS Industry Employment program. Many more reports on prices, wages, labor turnover, safety, and so forth, are received. The resulting micro data base was so huge that it could not be organized for accessibility. In some instances, it was not even preserved for storage in machine-readable form. It is a major task to capture, preserve, and make these data available for research after they have served their initial purpose in the compilation of current statistics.

A data base management software system to process the Bureau’s macro and micro data elements was seen as a way to get at these difficulties. There were several goals: The data base management system must permit the use of network concepts to set down the logical relationships among data items (the way the card catalog points to the shelf location of books in a library). A search for data would then follow a direct path to the item sought on immediate access hardware (disk) rather than a sequential search from the beginning of the magnetic tape file. Second, the system must permit reports to be processed promptly. This would level resource requirements and speed results by maintaining a continuous flow. Although mainly keyed to production requirements, the management system must also enhance the Bureau’s capacity to do research and so serve the full spectrum of BLS computer processing needs.

A computer program called TOTAL, developed by a private vendor of software, was selected for use as the BLS data base management tool. It eliminated the need to develop these facilities with scarce BLS resources and, combined with the new, direct access hardware, broke the barrier that had been imposed on work flow by the tape sequential, batch processing approach.

The data base management approach also serves to enhance research. Analysts need not pass an entire reel of tape, or sequences of reels, to select data for study. In effect, they name the data they wish to study and the data base manager will locate and retrieve the information from the direct access storage devices for them.

To assist work flow, the Department of Labor installed a Regional Terminal Network (RTN) in 1973. The terminals, small card-reading and printing computers located in regional offices, can communicate via telephone lines with the central computer facilities in Washington and speed the flow of data from the field.

The Bureau’s Occupational Wage Survey (OWS) started the use of telecommunications in BLS. Information about wages paid to clerks, mechanics, engineers, and secretaries, for example, is collected from representative sample establishments across the country. Prior to 1974, the questionnaires were mailed to Washington for review by computers. If the data seemed questionable, the report was mailed back to the appropriate BLS regional office for clarification or correction. The process was lengthy and impeded the timely compilation of wage statistics.

The BLS systems staff designed telecommunications into the third-generation wage system. By mid-1975, the occupational wage questionnaires, comprising a sample of about 25,000 establishments, were being keypunched at the eight BLS regional offices, creating some 2 million cards each year. The data on them are sent via the terminal network to Washington where the computer review takes place as before. The network is a two-way instrument, however. The questionable cases (comprising some 10,000 cards) are wired back to the regional offices for review and correction. The questionable cases are simultaneously transmitted by the Washington computer and printed by the receiving computer in the regional office, often in time to catch the BLS field representative still collecting data in the same area and available to discuss problems with the respondent.

The availability of the data base management system and the telecommunications network means that the responses to BLS questionnaires may be fully processed in a reasonably brief time. Reports with questionable or erroneous data may be spotted in time to take corrective action and will often be ready for tabulation when the summary statistics are prepared at the timed intervals.

Additionally, the OWS/RTN system allows the regional office to order previously gathered survey data directly from the computer to help in the collection of current statistics from establishments within the region. Regional staff may also call completely formatted and edited statistical tables out of the Washington computer, camera ready for photo-offset printing in BLS bulletins.

Data Documentation

Computers and people have common problems when they seek to process data: They both need to know what is available, which data they will process, where these are located, and how to get them. Both computer programmers and researchers must identify the variables they intend to manipulate. For the computer programmer, no matter which programming language is used, there is a requirement to map a path by citing data location, record length, and other essential information that will guide the program through the computer to the proper places in various storage media for location and extraction of data the program will subsequently process.
The BLS goal is to provide a "Codebook" and a "Dictionary," readable by both man and machine, as sources of most of the information needed to process BLS data. For researchers there will be a Dictionary which names what is in the data base and defines the variables cited. For the programmer, there is a Codebook with technical data needed for describing the data formats and locations to PL/1, the Bureau's standard programming language. Additionally, for all users, the Codebook is the source of machine-readable information needed by programs that serve the range of general statistical data processing functions such as screening, tabulation, and file manipulation. Together, the Codebook and Dictionary form a data documentation system.

Data Security and Integrity

Responses to questionnaires are made under a pledge by the Bureau to keep the data in confidence, to be used only for statistical purposes. Pains are taken to insure that the pledge is kept. Therefore, the BLS data base is surrounded by a circle of protective software. Speaking illustratively, there is a central core holding the BLS time-series data in a standard, time-oriented format, the summary cross-sectional results and individual responses to the Bureau's questionnaires. Together, these form the data base. To describe and manage the macro and micro data pictured in the center of figure 3, there are the data documentation system and the data base management system (DBMS). To preserve security and integrity, there is a ring of software.

The protective software must recognize four types of accessibility to the core: the first is to data that are published. These are, available to anyone, inside or outside of the Bureau, in or out of the government, and the only precaution is to see that they are indeed accessible. The second need is for access by BLS employees to data that are not published. They include summary figures that contribute to published information but are not statistically reliable on their own account. Usually, access to these figures is limited to the professional staff responsible for the subject-matter area to which the figures apply. On the third level of accessibility, well inside the data base, the respondent reports are deposited, withheld, and protected to keep the pledge of confidentiality. A fourth level holds statistics produced by the social scientist who developed them in analyzing the micro or macro data base. It might include data that are transitory and have no official standing at the time, but which may lead to information of more substance.

Besides guarding against unauthorized use, software surrounding the data base also protects the integrity of the figures; provisions are made to recover from equipment failures such as a head crash on a magnetic disc or inadvertent erasure of a magnetic tape.

Modular, General-Purpose Programs

In the plan to move to third-generation equipment, some fifty or sixty identifiable "systems" were subsumed under twenty-two redesign projects with the idea that similarities could be incorporated into a single approach. For example, the Bureau has separate statistical surveys for collecting prices of commodities in the wholesale market and in international markets. These data contribute to the Wholesale Price Index, Industry Sector Price Indexes, and International Price Comparison programs. These separate surveys had previously prompted separate, independent computer systems even though the calculations and other computer operations performed often were essentially parallel. In the redesign effort, the three systems were reduced to one, at considerable savings in time, money, and subsequent maintenance.

The same approach was taken in combining four recurring occupational wage studies into one computer system. Although apparently similar, these four surveys—industry studies; area studies; professional, administrative, technical, and clerical occupations; and service occupations—are in fact different in detail. They bring dissimilar information, demanding differing review criteria and standards. Output is similarly variable in substance and geographic detail. For example, some surveys gather only wage data. Others also collect information on paid vacations and holidays, shift differentials, overtime provisions, and health insurance and pension plans. One survey produces area results; others, industry findings on a national scale. This fully integrated occupational wages system, nevertheless, will accept the disparate and mixed data stream and keep it together where similar functional requirements can be met by the same computer routine. When different components require dissimilar processing, the system automatically divides the stream according to the action to be taken.

The notion of combining systems with like functions wherever possible led to the idea of generalized software to reduce the amount of ad hoc programming. The idea is akin to the general-purpose programs that manage, describe, and protect files; these tend to be the concerns of most ADP users. The third ring (figure 3) holds general-purpose programs that deal with the unique needs of large-scale, statistical data processing.

The idea is to have general modules that perform certain well-defined functions common to processing statistical surveys. It means, for example, that a program for sample selection is kept apart from addressing, and addressing is kept separate from tabulation. Modules capable of performing these general functions could then be pulled off the shelf and put in place as building blocks to construct all or part of a system. Common functions are shared among many Bureau survey systems and it is possible to identify these rather easily. Thus, modular design of systems in BLS is par-
Figure 3.

BLS Data Processing Approach
particularly productive.

Although readily identified, the construction of a full line of functional modules is a tall order. More than a dozen general-purpose programs are required. Building these modules is a costly, complex task, taking time to complete. The Bureau’s approach is step by step. As resources permit, efforts are directed toward the modules that are most needed and that will bring prompt payback.

**Table Producing Language.** The first outcome of the step-by-step approach was a powerful new computer language to enable Bureau staff to turn out statistical tables at less cost and more promptly than the traditional computer languages allowed. It is called Table Producing Language (TPL). The TPL system already knows what a table is and how to generate one. It only needs to be told the particulars about the one wanted. Thus, when the user describes the table wanted with the table producing language, the tedious and time-consuming effort otherwise involved in telling the computer, step by step, how to make the calculations and lay out the table framework is avoided. Secondly, this approach has severed the connection between the user and the computer. The user need not be familiar with how the computer works. Moreover, it allows Bureau social scientists to use the everyday common BLS nomenclature to describe the tables. In short, TPL has reduced a burden, speeded work, and increased the BLS capacity to respond.

The table producing language belongs to the emerging class of languages which the computer people call very high level, problem oriented—very high level because they are disengaged from the computer, and problem oriented because they deal with narrow problems. It embodies an extension of the principles developed in the old BLS Information System and owes a great deal to the pioneer work of the earlier effort.

Here is where the system stands today: TPL is a computer system that selects and restructures data, cross-tabulates and summarizes, uses the results for arithmetic calculations, and organizes their display in statistical tables. Except for hardware restrictions, the system is free of ordinary constraints. There is no limitation on the number of accessible variables and it can process about 32,000 for a single table. They may be cross-tabulated and the results displayed as tables without restriction. Processing hierarchical data files is a featured advantage. The system can do inter-record analysis and more than one record format may occur on any level. All data on all levels of the hierarchy are available for classifying, selecting, and computing; aggregation or counting can take place at any level of the hierarchy.

**Print Control Language.** Photocomposition is a standard process in the publication business, and a great deal of money has been invested in tying the computer into printing technology. This partnership has supported the design and development of sophisticated software that takes alphabetic characters and photocomposes text for newspaper and other large-volume publications. Statistical agencies produce relatively little text. However, an important goal of the Bureau of Labor Statistics is publication of its statistical tables in periodicals and bulletins. The Bureau, in fact, is an important publishing house in the U.S. Government, and statistical tables are the bulk of its printed output. As an instance, the BLS is once more in the midst of its decennial study of family expenditures for goods and services and will, as in the past, have demands for extensive printing of the statistical results.

An extension of TPL serves table production in ways other than as a tool for tabulation; namely, it can provide clean copy of statistical results for photo-offset printing in many of the Bureau’s publications. It can set up a clean and concise framework of explanatory alphabetic information, such as table and column headings and stubs, as well as footnotes and similar data, that makes sense and is readable. The TPL extension that meets these needs is called the Print Control Language (PCL).

Through PCL, the user can specify column and stub widths and insert alphabetic labels for each variable, as well as footnotes and other text. Decimal points and special symbols such as dollar signs are available. There are options for hyphenating and centering titles. Taken together, these features can create tables that are acceptable for direct photo-offset printing of many of the Bureau’s tables.

Even though deriving tables for direct photo-offset printing has been made easier, the print facility has been extended one final step. Photo-offset reproduction of computer printout is less satisfactory than tables composed by special devices such as the Government Printing Office’s Linotron photocomposition machine. An extended version of the Print Control Language permits tables to be formed by photocomposer. The user has a wide range of print size, and other choices for typographic enhancement with the result that the printed tables appear to have been typeset.

**Statistical and Econometric Routines.** The basic TPL arithmetic calculations do not permit many of the complex, scientific analyses required by the Bureau’s statisticians, economists, demographers, and other analysts. There is an option that allows the research user to shunt tabulated results into the statistical analysis package called SOUPAC, a collection of statistical routines compiled by the University of Illinois in a way that works well with TPL. For the TPL user, as well as for those who have data to process without going through TPL, it offers a broad range of statistical procedures, including most of the common statistical methods, and
allows BLS researchers to undertake complex statistical tasks, while at the same time allowing simple statistical tasks to be accomplished in straightforward fashion.

In a similar way, it is intended that other packages will be provided to accept and process data from the data base. For example, the Bureau has acquired a copy of the Harvard-MIT version of the econometric package called Time Series Processor (TSP). It is designed to carry out all the computational steps which occur routinely in statistical analysis of time series and also to provide some of the more sophisticated econometric techniques for manipulation and analysis of time series.

**Charting System.** The Bureau is considering a generalized time-series charting system for much of the Bureau's production work in charting. Because the Bureau's main product is time series about the Nation's economy, the system will center on the production of time-series charts suitable for publication. To that end they must be of high quality, editorially and visually. The system will permit wide choice of features to be included in any chart it produces. They include: A variable number of vertical and horizontal lines to form a grid as well as the axis; more than one data line on each chart; scaling the Y-axis according to user specifications; a time axis of specified length and periodicity; titles both centered above the chart and drawn within the chart, and the character size of all lettering as specified by the user.

The series may be plotted without alteration, or they may be transformed before charting into plots showing percent change, annualized percent change, and moving average. All these choices are designed to permit the user to have control over the appearance of the chart so that it can be photographed for photo-offset printing without further editing.

**Screening, Editing, and Correction System.** Many computer programs for testing the accuracy of statistical data are prepared by Bureau staff in support of survey objectives. These programs examine the micro data contained in the responses to BLS questionnaires and mark those which appear to be of doubtful validity or clearly erroneous. Errors can creep into the micro data stream at many points—the respondent can make an error through misunderstanding or miscalculation, the data can be incorrectly transcribed to the report form, or keyed incorrectly to the punched card or magnetic tape, and so forth. Because of the variety of reports, the total number of different test calculations that can be made number in the hundreds, although any one report is subject to far fewer.

Two general types of tests are made. One sees if the report simply makes sense—reported totals should not differ from the sum of the parts. For example, questionnaires returned by respondents in the Occupational Wage Surveys show a figure for all persons at work in the establishment and a total for men and women, separately. These figures should not differ from the amounts the computer gets by summing the number of employees for each level of wage rate in occupations covered by the survey, plus total figures for all other occupations not covered in the survey.

The other general type brings information from outside the current report for comparison. In one survey, for example, data are flagged for review when the current number of employees is shown to have changed by an unreasonable amount from the preceding month, or when the average hourly earnings figure—calculated by dividing total pay by total employee-hours reported—is outside reasonable bounds.

Although the subject matter may differ sharply from survey to survey, the computer steps and factors taken into account are essentially the same for all surveys. By combining the requirements for reviewing statistical data into one general-purpose computer program, the need to continually write special-purpose, tailor-made programs will be reduced. Tailor-made programs demand substantial resources and impede timeliness. A general system can make the Bureau more responsive to public demand for speedy compilation of statistical information.

The success in designing and implementing a generalized cross-tabulation system and some analysis of a generalized approach to screening, as well as some experimental work along those lines, suggests that the project is feasible.

**File Manipulation System.** The situation where the reported data, even when correct, are not ready for tabulation is a common one. Typically, at the beginning of a survey, information is organized for easy and efficient collection, entry, and screening. The resulting file organization is not usually suitable for tabulation and subsequent analysis. TPL contains capabilities for manipulating data during the tabulation process, but TPL is not designed to create new files or do major manipulations. These functions will be performed by the proposed General-Purpose File Manipulation System.

Presently, many tailor-made programs are written to select, merge, reorganize, and similarly process data. The General-Purpose File Manipulation System will largely eliminate this need and allow users to perform a wide variety of operations to prepare data files for other uses such as tabulation or statistical analysis. Its capabilities will include selecting subsets of the original data, merging data from different files, reorganizing the data structures, and calculating new variables.

The file manipulation system will fill the gap between the general screening system, which is concerned with the correctness of reported data, and TPL, which tabulates and displays data. It will also support later research and analysis efforts that involve processing requirements not present when the survey data were first collected.
Survey Collection System. To provide a general solution to processing problems associated with mailing and control of responses to BLS questionnaires, a module, designated as a General Survey Collection System, is planned. It will provide for sample selection, mailing label generation, response control, followup list generation, and status reports, as required by BLS surveys. To serve these ends, the system must support and maintain registers of names and addresses and other information about respondent attributes such as industry code and employment size. A major factor in this system is the maintenance of about 4 million names, addresses, and attributes that comprise the Bureau’s universe file of establishments from which sample cases are selected.

Query. From time to time, there is interest in retrieving the records supplied by a specific respondent or sets of respondents, to a Bureau questionnaire. Such interest may derive from discussions with the respondent about the nature of the response or similar concerns about the individual case, for example, in comparing responses with an independent quality measurement survey. A retrieval facility to query the micro data base would serve this need.

To some extent, TPL can be used to retrieve and display records for specified respondents. Its limitations in this regard, however, suggest that it may not be entirely suitable. On the other hand, it is not clear that there is a Bureau need for more facility than TPL can provide. When a significant requirement beyond TPL capacity is identified, the Bureau will proceed accordingly. Purchase or rental of a vendor-supplied system also will be studied in the event that expanded facilities are needed.

Microfilm. Computer output on microfilm (COM) is practiced in BLS. However, like the query facility, it is not clear at this point that a general solution for placing computer output on microfilm is an important Bureau requirement. At present, printed tables are the principal BLS output. In the event that a generalized COM tool is justified, it is likely to be an extension of the Print Control Language.

Application Systems. It can be fairly argued that data processing requirements of national statistical agencies may never be totally generalized. Some requirements appear in only one or two surveys. Or, at any rate, they do not occur frequently enough to warrant the expense of a general solution. For example, the compilation of some statistics is based on the special formulation of mathematical and statistical arguments, having applica-

tion only in a specific case. The modified Laspeyres index formula used in the compilation of the Consumer Price Index is an instance. Another example lies in measuring sampling variability. Although the SOUPAC routines mentioned earlier are readily available, many of the sample designs and estimating procedures used in BLS surveys are quite complex and specially tailored, and, therefore, estimates of sampling variability must be gained through special-purpose programs. Programming these specialized instances will of course rely on the common computer languages—PL/1, FORTRAN, COBOL (figure 3).

The Plan in Practice

Given the picture (figure 3) of a central data base, a Data Base Management System and Data Documentation System, and blocks of general-purpose functional modules, how will future systems designers do their work? It seems clear that their work will be reduced. The data base management software will help see that data are kept in order, that corrections, deletions, and additions are processed into and out of the data base expeditiously and reliably. They will not have to provide software for data security and integrity; the general-purpose routines are available. If their data are new, they need describe them only once and store this information in the Codebook. All subsequent inquiries for data descriptions may be by reference to the Data Documentation System where the programmer will find readymade file descriptions accurately portrayed and easily transcribed (automatically) into the relevant section of the program. Thus, the programmer will mainly need to be concerned with the accuracy of the special computational algorithms.

When an assignment calls for a statistical system from sample selection through publication of results, system designers can consider the general-purpose modules to address, edit, tabulate, and format the results for printing. They can provide for special analyses through the package of statistical routines and display results on computer-drawn charts.

The research economist, statistician, demographer, and other social scientist will have these same tools available, and they need not be knowledgeable in the computer science discipline. Naming the variables the user wants tabulated and citing the kinds of tabulations to be performed will cause the data management system to reach into the Codebook for the location of the values of the variable cited, retrieve and deliver these figures to the tabulating system for processing, and display the results in the form expressed by the user.
Technical References

Appendix A. The BLS Seasonal Factor Method

Background

An economic time series may be affected by regular intra-yearly ("seasonal") movements which result from climatic conditions, model changeovers, vacation practices, holidays, and similar factors. Often such effects are large enough to mask the short-term underlying movements of the series. By isolating and removing the effect of such intra-yearly repetitive movements, the current evaluation of a series may be made more perceptive.

Seasonal movements are found in almost all economic time series. They may be regular, yet they do show variation from year to year and are also subject to changes in pattern over time. Because these intra-yearly patterns are combined with the underlying growth or decline and cyclical movements of the series ("trend-cycle") and also random irregularities, it is difficult to determine the pattern with exactness.

More than a half-century ago, attempts were made to isolate seasonal factors from time series. Some early methods depended upon smoothing curves by using personal judgment. Other formal approaches were periodogram analysis, regression analysis, and correlation analysis. Because these methods involved a large amount of work, relatively little application of seasonal factor adjustment procedures was carried out.

In the mid-1950's, new electronic equipment made more elaborate approaches feasible in seasonal factor methods as well as in other areas. Using a computer, the Bureau of the Census developed seasonal factors based on a ratio-to-moving-average approach. This was a major forward step, as it made possible the uniform application of a method to a large number of series at a relatively low cost. Subsequent improvements in methods and in computer technology have led to more refined procedures which are both faster and cheaper than the original technique.

The Bureau of Labor Statistics began its work in seasonal factor methods in 1959, primarily to correct a deficiency in the method then used. Prior to this time, when additional data became available and seasonal factors were generated from the lengthened series, the new factors sometimes differed markedly from the corresponding factors based on the shorter series. This difference could affect any portion of the series. It was difficult to accept a process by which the addition of recent information could affect significantly the seasonal factors for periods as much as 15 years earlier, especially since this meant that factors could never become final. The first method developed by BLS and introduced in 1960 had two goals: First, to stabilize the seasonal factors for the earlier part of the series; second, to minimize the revisions in the factors for the recent period.

Since 1960, the Bureau, through continued research, has made numerous changes and improvements in its techniques and in methods of applying them. These changes were described as they were introduced. The method introduced in May 1966 is described in the sections which follow.

At about the same time, the Bureau of the Census introduced the X-11 variant of Method II of its seasonal adjustment program as the last product in the series developed from its research efforts under the direction of Julius Shiskin. The BLS is making increasing use of the X-11 method for adjusting its series and the reader should consult the literature on that method as well. (See technical references at end of chapter.) Like the BLS method, the X-11 method uses the same ratio-to-moving-average theory of adjustment and usually produces almost identical results. The X-11 method offers flexibility in the selection of moving average weights and credence factor intervals. It also provides an additive version within the same program, an optional trading day adjustment routine, and a number of useful analytical measures.

The BLS method still provides an excellent adjustment of most series and requires considerably fewer computer resources for operation.

Characteristics of BLS Seasonal Factor Method

The BLS method is a ratio-to-moving-average method. It assumes that the three component parts —trend-cycle, seasonal, and irregular—are multiplied together (multiplicative assumption) to give the original


2 See U.S. Department of Labor items in the list of Technical References at the end of this appendix.
Basic Approach

The BLS method attempts to separate an economic time series into three constituent parts: the underlying movement or trend-cycle which is a combination of the long-term, cyclical, and subcyclical movements (T); the annual repetitive movement within the year, or "seasonal" (S); the irregular or residual unexplained movement (I). These three components, when multiplied together, completely and exactly exhaust the original observations (O). (See charts 1 and 2.) The exact allocation among the components is somewhat arbitrary, because there are no simple criteria or generally accepted techniques for separating them. The BLS method attempts to strike a good balance between the conflicting objectives of smoothness in the trend-cycle, stability in the seasonal, and randomness in the irregular. The process is an iterative one; each successive iteration provides an improved estimate for each of the components of the original series.

Three iterations are used, each having two phases. The first phase of each iteration starts with a centered 12-month moving average as the estimate of trend-cycle. Seasonal-irregulars are then secured and partitioned into seasonal and irregular components. The second phase in each iteration starts with an improved trend-cycle in which the centered 12-month moving average has been improved by recovering the residual trend-cycle from the irregulars of the first phase. The seasonal and irregular components then are developed as in the first phase.

The Bureau's method uses "credence factors" based on the irregulars from the second phase of each iteration to reduce the effect of large irregularities in the original observations. These are supplementary weights in which observations with small irregulars are given more weight than observations with large irregulars in calculating the trend-cycle and the seasonal factors.

Detailed Procedure of BLS Seasonal Factor Method

First Iteration

First Phase. The initial estimate of trend-cycle (T) is the centered 12-month moving average of the original observations. The trend-cycle value for each month is divided into its corresponding original value (O) to produce a series of seasonal-irregular (SI) ratios (O/T = SI).

Treating each month separately (i.e., all January's, all February's), the SI ratios are arrayed by years and

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Federal Reserve Bank of St. Louis
Chart 1.

United States Unemployment, Males, Age 20 and Over, 1948-70
Chart 2.

United States Unemployment, Males, Age 20 and Over, 1948-70

Seasonal

Irregular

1948 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 1970
moving 7-term weighted averages\(^6\) \((S')\) are secured \(\text{(in percentage form)}\) as estimates of the unforced seasonal factors. The unforced seasonals \((S')\) for each year are then adjusted to yield a monthly average of 100.0 for the calendar year.\(^7\) These forced seasonal factors \((S)\) are the seasonal factors for the first phase of the first iteration. Each seasonal-irregular ratio \((SI)\) is then divided by its forced seasonal factor \((S)\) to yield the random or irregular ratio \((SI/S = I)\). The irregular ratios at this stage may contain some residual trend-cycle.\(^8\) To separate the residual trend-cycle from the truly random variation contained in the irregulars, a 9-term weighted moving average\(^9\) \((\text{trend-cycle correction})\) of the first phase irregulars is secured. This completes the first phase of the first iteration.

**Second Phase.** The second phase of the first iteration starts with an improved estimate of the trend-cycle. This is secured by multiplying the trend-cycle used in the first phase \(\text{(the centered 12-month moving average)}\) of original observations \(\text{by the trend-cycle correction\,(weighted moving average of first phase irregulars)}\). Using this improved trend-cycle, the second phase repeats the computational steps of the first phase to develop new SI ratios, new unforced seasonals \((S')\), new forced seasonals \((S)\), and new irregulars \((I)\). At this point, the generated trend-cycle and seasonal components represent the components of the original series fairly well except for the effect of highly deviant original values. In the BLS method, the influence of such values is diminished by using supplementary weights in addition to the regular weights given in footnotes 7 and 10. The use of these supplementary weights \(\text{(called \"credence factors\") gives less impact to the extreme observations (those with large irregular components) and relatively more to the neighboring values with smaller irregular components.}^{10}\)

With the preliminary credence factors, the SI ratios of the second phase are repartitioned into seasonals and irregulars. The adjusted unforced seasonal is a 7-term moving average of the SI ratios, using as relative weights the product of the standard 7-term weights \((\text{given in footnote 7})\) and the preliminary credence factor associated with each value. These unforced seasonals \((S')\) are forced in the usual manner to total 1200 for the calendar year, after which adjusted irregulars are

---

\(^6\) The weight patterns used are:

<table>
<thead>
<tr>
<th>Seasonal</th>
<th>Weight pattern assigned to seven consecutive seasonal-irregular ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st year</td>
<td>.281 .270 .242 .207</td>
</tr>
<tr>
<td>2nd year</td>
<td>.213 .221 .213 .191 .162</td>
</tr>
<tr>
<td>3rd year</td>
<td>.160 .179 .185 .179 .160 .137</td>
</tr>
<tr>
<td>Middle years</td>
<td>.120 .141 .157 .164 .157 .141 .120</td>
</tr>
<tr>
<td>3rd from end</td>
<td>— .137 .160 .179 .185 .179 .160</td>
</tr>
<tr>
<td>2nd from end</td>
<td>— — .162 .191 .213 .221 .213</td>
</tr>
<tr>
<td>End year</td>
<td>— — — .207 .242 .270 .281</td>
</tr>
</tbody>
</table>

The underlined value indicates the year to which the weighted average applies.

\(^7\) The forcing is performed in two stages: If the unforced seasonals do not start in January, the first 12 unforced seasonals are summed and the total divided into 1200 to provide a forcing factor. This factor is then multiplied by the unforced seasonals for the partial year only \(\text{(through the first December value)}\) to provide forced seasonals for the incomplete at the beginning of the series. A similar procedure is followed at the end of the series if the unforced seasonals do not end in December. For each of the full calendar years between, a forcing factor is computed by dividing the sum of the unforced seasonals for the year into 1200. This factor is then multiplied by the unforced seasonals in that year to produce the forced seasonals.

\(^8\) This is because the 12-month moving average is not very good at following abrupt or curvilinear changes in the level of the original series, particularly in the vicinity of peaks and troughs. Since the trend-cycle, seasonal, and irregular components completely and exactly exhaust the original series, any deficiency of the first estimate of trend-cycle is transferred to the seasonal and/or the irregular. However, the seasonal factors are secured by averaging seven SI ratios, each one year apart. This averages the deficiency for seven different years, with the result that the deficiency of the 12-month moving average, as an estimator of trend-cycle, appears mainly in the irregular component. The periods where the 12-month moving average is a poor estimator of trend-cycle, usually have a run of consecutive irregular ratio all on the same side of the base reference ratio of 1.000 instead of being scattered above and below this base.

\(^9\) The weight patterns used are:

<table>
<thead>
<tr>
<th>Month</th>
<th>Weight pattern assigned to nine consecutive irregulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st month</td>
<td>.370 .341 .256 .115-082 — — —</td>
</tr>
<tr>
<td>2nd month</td>
<td>.254 .276 .254 .191 .086-061 — — —</td>
</tr>
<tr>
<td>3rd month</td>
<td>.160 .214 .214 .160 .072-051 — — —</td>
</tr>
<tr>
<td>4th month</td>
<td>.067 .150 .199 .199 .150 .067-048 — — —</td>
</tr>
<tr>
<td>Middle months</td>
<td>.050 .071 .157 .209 .226 .209 .157 .071-050</td>
</tr>
<tr>
<td>4th month from end</td>
<td>— .048 .067 .150 .199 .216 .199 .150 .067</td>
</tr>
<tr>
<td>3rd month from end</td>
<td>— .051 .072 .160 .214 .231 .214 .160</td>
</tr>
<tr>
<td>2nd month from end</td>
<td>— — .061 .086 .191 .254 .276 .254</td>
</tr>
<tr>
<td>End month</td>
<td>— — — .082 .115 .256 .341 .370</td>
</tr>
</tbody>
</table>

The underlined weight indicates the month to which the weighted average applies.

\(^{10}\) The credence factors are computed as follows. First, a test is made to locate extreme irregulars falling outside of the 3 sigma limit. These irregulars are replaced by a value of 1.000 for a new sigma calculation. A moving 61-term standard deviation of the irregulars is computed for calibrating the irregular associated with the middle (31st) term. For the 30 terms at the beginning \(\text{(end)}\) of the series, the first \(\text{(last)}\) centered value is used for the calibration. Each irregular is then standardized by getting its absolute difference from the mean of the 61 terms used to secure its standard deviation, and dividing this difference by the standard deviation.

A preliminary \"credence factor\" is assigned to each value, based on its standardized irregular, as follows: For a standardized irregular of 1.000 or less, the credence factor is 1.000. For a standardized irregular of 2.800 or more, the credence factor is 0.000. For a standardized irregular between 1.000. For a standardized irregular of 2.800 or more, the standardized irregular \(\text{2.8 sigma limit makes it extremely unlikely for a \"good\" value, not affected by a strike or other such aberration, to be assigned zero credence. Only one-half of one percent of the values in the normal distribution lie beyond this limit. On the other hand, \"bad\" values which deserve to be disregarded have a much higher probability of falling outside the limit.}
calculated by dividing the adjusted forced seasonals (S) into the SI values.

This repartitioning of the SI ratios removes the large irregular variation from the seasonal component and puts it in the irregular component instead. However, the trend-cycle is still contaminated by deviant original values, because it was calculated before the credence factors were developed.

The second iteration is designed to provide an improved 12-month average for use in developing revised components. In preparation for this, the adjusted irregulars of the first iteration are used to develop revised (intermediate) credence factors. These intermediate credence factors are computed from the adjusted irregulars in exactly the same way (described in footnote 10) as the preliminary credence factors are obtained from the earlier second phase irregulars.

The first use of the intermediate credence factors is to create a modified original series having no large irregularities. Each original value having a credence factor less than 1.000 is replaced by a modified value in which the irregularity has been reduced. The creation of the modified original series marks the end of the first iteration.

Second Iteration

First Phase. The second iteration is similar to the first iteration, except that the intermediate credence factors are used along with the weight patterns of footnotes 7 and 10. The second iteration, like the first, has two phases. The first phase begins with the centered 12-month moving average of the modified original series previously described. SI ratios are secured by dividing the actual original series (not modified) by this 12-month average. The SI ratios are arrayed by month and moving 7-term averages, using the weights of footnote 7 and the intermediate credence factors, are taken to yield unforced seasonals (S'). (The credence factors prevent extreme observations from affecting the seasonal.) The forcing process is then applied to yield seasons (S) which average 100.0 for the calendar year. Irregulars (I) are secured by dividing the latest SI ratios by their corresponding forced seasonals (S). These irregulars may include some residual trend-cycle because of the failure of the 12-month moving average to fully penetrate the peaks and troughs of the modified original series. A trend-cycle correction is computed by arraying the irregulars in normal time sequence and taking moving 9-term averages, using the weights of footnote 10 and the intermediate credence factors. This completes the first phase of the second iteration.

Second Phase. The second phase of the second iteration starts with an improved trend-cycle, which is the product of the centered 12-month moving average of the modified originals and the trend-cycle correction previously described. The second phase repeats the steps and procedures of the first phase to develop new SI ratios, new unforced seasonals (S') making use of the intermediate credence factors, new forced seasonals (S), and new irregulars (I).

These second phase irregulars are used to calculate final credence factors in the same way as before (see footnote 10). Then a new modified original series is secured in the same manner as before (see footnote 11), using the final credence factors. This completes the second iteration.

Third Iteration

The third iteration carries the refinement process still further. It follows the same steps as in the second iteration, from the centered 12-month moving average of the newly modified original series up to the development of the irregular component near the end of the second phase. This completes the partitioning of the series into the final trend-cycle, seasonal, and irregular components. As supplementary information to aid in analysis and evaluation, the final irregular is standardized using 61-term moving sigmas, which are printed also. The seasonally adjusted series is calculated by dividing the original series (O) by the final seasonal factors (S).

Cautionary Notes

In applying the method, the user should be aware that the result of combining series which have been adjusted separately will usually be a little different from the direct adjustment of the combined series. For example, the quotient of seasonally adjusted unemployment divided by seasonally adjusted labor force will not be quite the same as when the unemployment rate is adjusted directly. Similarly, the sum of seasonally adjusted unemployment and seasonally adjusted employment will not quite match the directly adjusted labor force. Separate adjustment of components and

11 The amount of reduction for each observation is such that the deviation of its new irregular from 1.000 is the product of the credence factor and the deviation of its old irregular component. Thus, each modified original value is the product of the trend-cycle and seasonal components developed in the first iteration, times an irregular which has been scaled down if it exceeded one standard deviation. The modified original values are used only to secure an improved 12-month moving average with which to start the second iteration: seasonal-irregulars are always calculated from the actual original values.

12 Additional iterations yield little further modification. The decision to stop with 3 iterations was based on the very small changes occurring after the third iteration, the reasonable fit of the trend-cycle to the original data, and the cost of additional processing.
summing of them to the total usually provides series that are easier to analyze; it is also to be clearly preferred in some cases where the relative weights among components with greatly different seasonals may shift radically. In the case of other series, however, it may be better to adjust the total directly if high irregularity among some of the components makes a good adjustment of all components difficult.

Finally, it is worth noting that the availability of a fast, efficient procedure for making seasonal computations can easily lead to the processing of large numbers of series without allotting enough time to review the results. No standard procedure can take the place of careful review and evaluation by a skilled analyst. A review of all results is strongly recommended. The computer program for applying the BLS method facilitates such review by providing the needed materials in a logical and easily used format.

### Technical References

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Appendix B. Industrial Classification

Much of the usefulness of BLS statistics presented by industries is due to the fact that they can be compared with other types of data for the same industries. This is possible because BLS and other Federal and State agencies follow as closely as possible a single system to define and classify industries in the U.S. economy. The Government publishes a Standard Industrial Classification Manual (SIC)\(^1\) of industries based on principles set forth by a technical group made up of government and industry experts. The Bureau of Labor Statistics participated in the initial development of standard industrial classification and continues to work with the Office of Management and Budget and other agencies in seeking to improve the SIC system.

Three basic principles were followed in developing the SIC.\(^2\)

1. The classification should conform to the existing structure of American industry.
2. Each establishment is to be classified according to its primary activity.
3. To be recognized as an industry, the group of establishments constituting the proposed classification must be statistically significant in the number of persons employed, the volume of business done, and other measures of economic activity.

As there are thousands of products and activities, the SIC provides for grouping these into categories, both narrow and broad, to enhance the value of industrial statistics for users interested in different levels of detail. The broadest level grouping divides the economy into 12 Divisions: A. Agriculture, forestry, and fishing; B. Mining; C. Construction; D. Manufacturing; E. Transportation, communications, electric, gas, and sanitary services; F. Wholesale trade; G. Retail trade; H. Finance, insurance, and real estate; I. Services; J. Public administration; and K. Nonclassifiable establishments.

At the 2-digit level all products and services are combined into 84 “major groups.” Thus, in the Manufacturing Division, establishments engaged in manufacturing machinery, apparatus, and supplies for the generation, storage, transmission, transformation, and use of electrical energy are combined into Major Group 36.—Electrical and electronic machinery, equipment, and supplies.


Thousands of products and activities are distinguished at the 4-digit level. For example, in Group 367, nine industries are defined: 3671. Radio and television receiving type electron tubes, except cathode ray; 3672. Cathode ray television picture tubes; 3673. Transmitting, industrial, and special purpose electron tubes; 3674. Semiconductors and related devices; 3675. Electronic capacitors; 3676. Resistors, for electric applications; 3677. Electronic coils, transformers and other inductors; 3678. Connectors, for electronic applications; and, 3679. Electronic components, not elsewhere classified.

Using the SIC as a guide, the Bureau classifies the reports received according to primary product or activity. The SIC is used in the same way by the agencies supplying the Bureau with universe lists and benchmark data. Hence, a high degree of orderliness and consistency is attained, which benefits not only the users of all BLS establishment statistics, but also the users of all Government figures.

Certain operational problems make it impracticable, however, to secure complete uniformity by this process. Also, specific modes of applying the SIC differ from one statistical program to another. For example, there may be differences in the way in which “primary activity” is determined; or changes in the major activity of individual establishments which occur over time may be handled in statistical time series in different ways. Consequently, the use of the same manual and the use of a common set of principles of application do not always result in identical industry classification of a given establishment by all agencies, or even all programs within BLS. Therefore, any major deviations from the normal method of handling industrial classification are described in the chapters which pertain to the individual statistical series in which such deviations occur.

\(^2\) Ibid., p. 9.
An establishment is defined as an economic unit, generally at a single physical location where business is conducted or where services or industrial operations are performed. (For example: a factory, mill, store, hotel, movie theater, mine, farm, ranch, bank, railroad depot, airline terminal, sales office, warehouse, or central administrative office).

Where distinct and separate economic activities are performed at a single physical location (such as construction activities operated out of the same physical location as a lumber yard), each activity should be treated as a separate establishment wherever (1) no one industry description in the classification includes such combined activities; (2) the employment in each such economic activity is significant; and (3) reports can be prepared on the number of employees, their wages and salaries, sales or receipts, and other establishment type data.

For activities such as construction, transportation, communications, electric, gas, and sanitary services, and similar physically dispersed operations, establishments are represented by those relatively permanent main or branch offices, terminals, stations, etc., which are either (1) directly responsible for supervising such activities, or (2) the base from which personnel operate to carry out these activities. Hence, the individual sites, projects, fields, networks, lines or systems of such dispersed activities are not ordinarily considered to be establishments.

An establishment is not necessarily identical with the enterprise or company, which may consist of one or more establishments. Also, it is to be distinguished from subunits, departments, or divisions. Supplemental interpretations of the definition of an establishment are included in the industry descriptions of the Standard Industrial Classification where appropriate.3

In 1972, classification was changed so that all establishments primarily engaged in the same kind of economic activity are now classified in the same four-digit industry, regardless of their types of ownership. Hence, their owners may include such diverse legal organizations as corporations, partnerships, individual proprietors, government agencies, joint ventures, etc.

This change from the 1967 edition removes "Government" as an industry division, per se, and treats it as an ownership characteristic. Government establishments, therefore, are now classified by their primary economic activity, rather than by type of owner.4 Because of this change it will be necessary determine if a particular statistic covers all of the industry or only the private sector, and also if it includes all government or only public administration.

3 Ibid., p. 10.
4 Ibid., p. 11.
Appendix C. Geographic Classification

Geographic Classifications in BLS Publications

The geographic detail for which BLS publishes data varies with the scope and size of the surveys it undertakes. In addition to national summaries, depending on the particular survey, the Bureau publishes data for four different regional classifications: for individual States and outlying areas (Puerto Rico, Guam, and the Virgin Islands); for individual cities, Standard Metropolitan Statistical Areas (SMSA’s) and Standard Consolidated Statistical Areas (SCSA’s); for Labor Areas, and other ad hoc areas formed to meet specific survey objectives.

BLS Regions Standard Metropolitan Statistical Areas (SMSA’s), and Standard Consolidated Statistical Areas (SCSA’s).

For survey estimates and indexes, (including estimates of the civilian labor force and unemployment, area wage surveys\(^1\), productivity surveys, and the Consumer Price Index), the BLS generally uses a four-regional classification system\(^2\) as follows:


North Central: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin;

South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia;


Data for the Wholesale Price Index, Employment and Wages,\(^3\) and Union Wage Rates and Hours\(^4\) are published by nine regions. The regional classification for the last is different from the first two; the difference is not only in the titles of the regions but also in the states that comprise the regions.

Data published by State, e.g., annual employment estimates, are aggregated by the BLS in accordance with the 10 Federal Administrative Regions established by the Office of Management and Budget. A map of these regions appears on the inside back cover of this Handbook.

SMSA’s and SCSA’s are designated by the Office of Management and Budget through the Federal Committee on Standard Metropolitan Statistical Areas. BLS is represented on this Committee along with other organizations.\(^5\)

A standard metropolitan statistical area always includes "a city (cities) of specified population which constitutes the central city and the county (counties) in which it is located. A standard metropolitan statistical area also includes contiguous counties when the economic and social relationships between the central and contiguous counties meet specified criteria of metropolitan character and integration. A standard metropolitan statistical area may cross State lines. In

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\(^1\) The Wholesale Price Index and Employment and Wages are published by the nine regions: New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont; Middle Atlantic: New Jersey, New York, Pennsylvania; South Atlantic: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia; East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin; West South Central: Arkansas, Louisiana, Oklahoma, Texas; East South Central: Alabama, Kentucky, Mississippi, Tennessee; West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota; Mountain: Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Utah, Wyoming; Pacific: Alaska, California, Hawaii, Oregon, Washington. These nine regions are the same as the nine divisions used in Bureau of the Census publications.

\(^2\) Union Wage Rates and Hours are published by the nine regions: New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont; Middle Atlantic: New Jersey, New York, Pennsylvania; Border States: Delaware, District of Columbia, Kentucky, Maryland, Virginia, West Virginia; Southeast: Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee; Southwest: Arkansas, Louisiana, Oklahoma, Texas; Great Lakes: Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin; Middle West: Iowa, Kansas, Missouri, Nebraska, North Dakota, South Dakota; Mountain: Arizona, Colorado, Idaho, Montana, New Mexico, Utah, Wyoming; Pacific: Alaska, California, Hawaii, Nevada, Oregon, Washington.

\(^3\) The other organizations include the Employment and Training Administration of the Department of Labor, the Department of Housing and Urban Development, the Bureau of the Census, the Federal Reserve Board, the Department of Agriculture, and the Bureau of Domestic Commerce of the Department of Commerce. The Committee is chaired by representatives of the Office of Management and Budget.
New England, standard metropolitan statistical areas are composed of cities and towns instead of counties. The basic criteria are that "each standard metropolitan statistical area must include at least:

(a) One city with 50,000 or more inhabitants, or
(b) A city with at least 25,000 inhabitants, which together with those contiguous places (incorporated or unincorporated) having population densities of at least 1000 persons per square mile, has a combined population of 50,000 and constitutes for general economic and social purposes a single community, provided that the county or counties in which the city and contiguous places are located has a total population of at least 75,000."^6

A standard consolidated statistical area is defined to always includes "two or more contiguous standard metropolitan statistical areas which meet the following criteria of size, urban character, integration, and contiguity of urbanized areas.

1. One of the standard metropolitan statistical areas has a population of at least 1,000,000.
2. At least 75.00 percent of the population of each standard metropolitan statistical area is urban.
3. The sum of the number of workers commuting between the two standard metropolitan statistical areas is equal to:
   a. at least 15.00 percent of the employed workers residing in the smaller standard metropolitan statistical area, or
   b. at least 10.00 percent of the employed workers residing in the smaller standard metropolitan statistical area, and

^6 For a complete definition, including all the criteria and special provisions, see Office of Management and Budget, Standard Metropolitan Statistical Areas (1975), p. 1.

Labor Areas

A "labor area" consists of a central city or cities and the surrounding territory within commuting distance. It is an economically integrated geographical unit within which workers may readily change jobs without changing their place of residence. Labor areas usually include one or more entire counties, except in New England where towns are considered the major geographical units.

Major labor areas usually have at least one central city with a population of 50,000 or more. In most instances boundaries of major labor areas coincide with those of Standard Metropolitan Statistical areas. Smaller labor areas are defined only when they have had substantial unemployment.

Geographical boundaries of all classified areas are listed in a Employment and Training Administration publication entitled "Directory of Important Labor Areas." Revisions in labor area boundaries are listed monthly in the "Area Trends in Employment and Unemployment" bulletin.

^7 For a complete definition, including designation of titles, see Office of Management and Budget, Standard Metropolitan Statistical Areas (1975), page 59.
### Geographic areas currently used in selected BLS programs

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**Notes:**

1. Defined according to survey objectives.
2. Four-region classification designated in section, "BLS Regions."
4. Ten-region classification, i.e., Federal Administrative Regions.
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