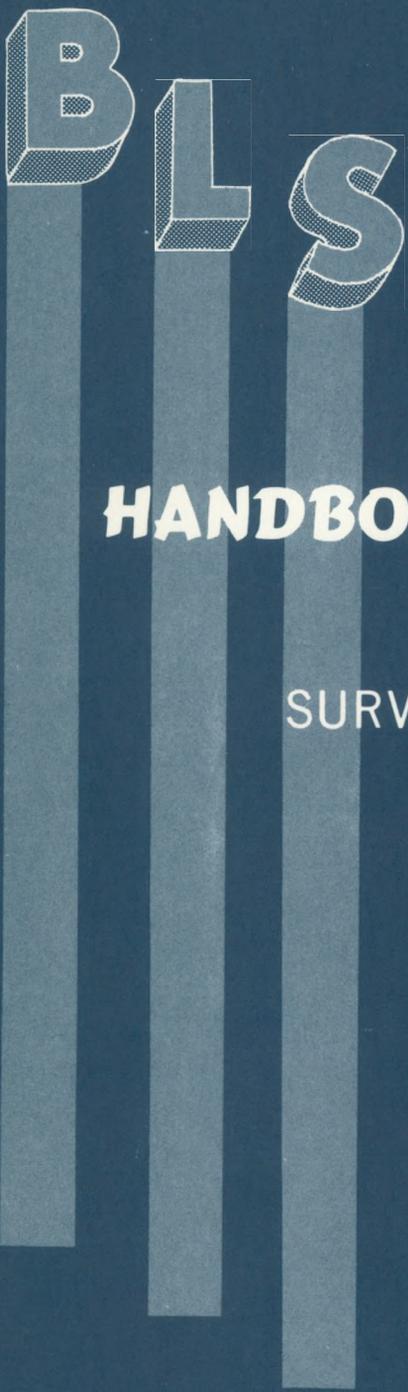


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HANDBOOK OF METHODS
for
SURVEYS AND STUDIES

Bulletin No. 1458

UNITED STATES DEPARTMENT OF LABOR
W. Willard Wirtz, Secretary

BUREAU OF LABOR STATISTICS
Arthur M. Ross, Commissioner

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Preface

Sixteen years have passed since the first effort was made to put together into one handbook statements of the methods used by the Bureau of Labor Statistics (BLS) in preparing its major statistical series. The policy of telling users how BLS figures are obtained was in existence long before the first handbook was published (Bulletin 933, 1950). The Bureau underlined this policy again a few years later in an expanded and revised edition of the 1950 bulletin (Bulletin 1168, 1955). During the decade since the second edition, new series have been added and surveys undertaken to widen and sharpen our understanding of the economic and social forces molding our national destiny. Over the same period, new and better ways of doing the job of measurement and factfinding have been found. It is time to bring the handbook up to date and to describe these new techniques and new surveys. The present volume attempts to do this in a simple and direct manner, so as to make more useful and understandable the factual picture presented by the Bureau's figures.

For each major program there is a brief account of how it came into being and what it attempts to do. Where the original data come from is noted, terms are defined, and the concepts adopted are outlined. The statements which follow describe how the data are put into final form, tell how the results may be used, and state the limitations to be kept in mind in using the information. Occasionally, in the interest of being precise, there is added a form, a table, or a mathematical formulation. The purpose is always to tell the user of our statistics how and why the Bureau does the job. Since this volume permits only brief treatment of each subject, lists of other publications which have more complete information, or which can furnish additional insights into the subject matter are provided at the end of most chapters.

BLS statistics are used for many purposes, and sometimes the data ideally suited to one purpose may have limitations for another. The user, confronted with a specific problem, must judge whether the accuracy and reliability of the selected statistics are adequate to meet the needs of his problem. The chapters on techniques used in preparing BLS series and conducting BLS surveys contain the information necessary for evaluating the fitness of the statistics for the various uses to which they may be put.

This handbook was prepared by the staff of the Bureau of Labor Statistics under the general direction of Robert J. Myers, Deputy Commissioner, Robert B. Steffes coordinated the preparation of manuscripts and provided technical guidance.

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BLS Handbook of Methods for Surveys and Studies

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 demand¹

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 8 decades 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 25 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 noncomparability, 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."²

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 extends back 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 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

¹ See *Industrial Depressions, The First Annual Report of the Commissioner of Labor, March 1886*, pp. 15-16.

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).

Bureau history and of developments of later years are to be found elsewhere.³ However, in describing the various statistical programs⁴ 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 workers. Voluntary reporting and the preserving of the confidential nature of reported data are important characteristics of BLS programs.

Voluntary Reporting and Confidentiality

In the 80-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 their 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 his contribution is important to the ultimate success of the survey and that he may find the survey results useful in his own pursuits. The policy of not identifying the respondent is implemented by combining the data reported by the different sources and issuing the findings in summary form.

Another assurance given the respondent is that his report 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.⁵ 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.⁶

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 suasion similar to our own. The Bureau of Labor Statistics, while its functions as a statistical agency are prescribed by law,⁷ 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 agency."⁸ The Bureau's figures are prepared to serve the needs of business, labor, Congress, the general

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).

⁵ For example, see *Norwegian Nitrogen Company v. United States*, 288 U.S. 294; *United States v. Kohler*, 13 Fed. Rules Serv. 33.333 (E.D., Pa., 1949); *Hawes v. Walsh*, 277 Fed. 569, the Court of Appeals for the District of Columbia. In all of these cases, the courts sustained the policy of protecting the confidentiality of information given voluntarily and in confidence to an agency of the Federal Government.

⁶ See Supreme Court of the United States, *St. Regis Paper Company, Petitioner, v. United States*, No. 47, October term, 1961.

⁷ Excerpts from 29 U.S.C. 1, acts of June 27, 1884, ch. 127, 23 Stat. 60; June 13, 1888, ch. 389, § 1, 25 Stat. 182; Feb. 14, 1903, ch. 552, § 4, 32 Stat. 826; Mar. 18, 1904, ch. 716, 33 Stat. 136; Mar. 4, 1913, ch. 141, § 3, 37 Stat. 737.

⁸ Bureau of the Budget, *Statistical Services of the United States Government* (revised edition), 1963, p. 7.

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.

The Bureau plays a larger and more significant role than merely publishing general purpose statistics. Its activities frequently influence, and sometimes are crucial, to the determining and shaping of public policy. The Bureau's experts have the keen understanding of economic and social forces which results from intensive and continuous involvement in factfinding and in the painstaking analysis of data.

Staff

The Bureau's work extends beyond the initial collection and processing of data. 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, Masters, Ph.D.'s, and those with research experience, in the 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 data results 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 were added to provide better utilization 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 we utilize in compiling our 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 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 have special competence although not council members. 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 Bureau of the Budget's 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 in-

dustrial 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 utilized.⁹

The Bureau also follows the Bureau of the Budget's definition of "production and related workers,"¹⁰ and uses the "standard payroll period."¹¹ 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 appendix 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."

Manpower and Employment Statistics

Chapter 1. Labor Force, Employment, and Unemployment

Background

Each month, the Bureau analyzes and publishes statistics on the labor force, featuring information on employment and unemployment classified by a variety of demographic, social, and economic characteristics. These statistics are derived from the Current Population Survey, which is conducted by the Bureau of the Census. The survey is based on a probability sample of households, representing the civilian noninstitutional population of the United States.

Concepts of the labor force, employment, and unemployment now in use were introduced in the latter stages of the depression of the 1930's, chiefly in the interest of deriving more objective measurements of unemployment and employment than were previously available. Prior to the thirties, aside from attempts in some of the decennial censuses, there were no direct measurements of the number of jobless persons. The development of mass unemployment in the early thirties made the need for statistics urgent, 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 in order 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 concepts was developed in the late 1930's which sought to meet these various criticisms. According to the new concepts, the classification of an individual depends principally upon 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 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 late in 1943. Its name was changed at that time to the Monthly Report on the Labor Force (MRLF), which was also the title of the Census reports and subsequently the BLS reports describing the sample results every month. The survey title was changed once more—in 1948—to the present "Current Population Survey" (CPS) in order to reflect more accurately its expanding role as a source for a wide variety of demographic and economic characteristics of the population. In 1959, responsibility for analyzing and publishing the CPS labor force data was transferred to the BLS, while the Census Bureau has continued to collect and tabulate the statistics.

Description of Survey

The Current Population Survey provides statistics on the civilian noninstitutional population 14 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 below 14 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 work-

ing. The institutional population, which is excluded from coverage, consists of inmates of penal and mental institutions, tuberculosis sanitariums, and homes for the aged, infirm, and needy.¹

The CPS is collected each month from a probability sample of approximately 35,000 households. Participation in the survey is on a purely voluntary basis. Respondents are assured that all information obtained is completely confidential and is used only for the purpose of estimating national totals. The BLS policy of confidentiality is explained more fully in the Introduction.

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 is "current" and the time reference not so short that the occurrence of holidays or other accidental events causes extremely 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 week containing the 12th day of the month has been used.

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 farm, or who worked at least 15 hours as unpaid workers in a family-operated enterprise and (2) all those who were not working or looking for work but who had jobs or businesses from which they were temporarily absent because of illness, bad weather, vacation, labor-management dispute, or various personal reasons. Excluded from the employed group 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 and were looking for work. Those who had made efforts to find work within the preceding 60-day period—such as by registering at a public

or private employment agency, writing letters of application, canvassing for work, etc.—and who, during the survey week, were awaiting the results of these efforts, are considered to be looking for work. Also included as unemployed are those who did not work at all during the survey week and (a) were waiting to be called back to a job from which they had been laid off, (b) were waiting to report to a new wage or salary job scheduled to start within the following 30 days (and were not in school during the survey week), or (c) would have been looking for work except that they were temporarily ill or believed no work was available in their line of work or in the community.

Labor Force. The civilian labor force comprises the total of all civilians classified as employed or unemployed in accordance with the criteria described above. The total labor force includes members of the Armed Forces stationed either in the United States or abroad.

Not in Labor Force. All civilians who are not classified as employed, unemployed, or in the Armed Forces 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, and "other." The "other" group includes, for the most part, retired persons, individuals reported as too old to work, the voluntarily idle, and seasonal workers for whom the survey week fell in an "off" season and who were not reported as looking for work. Persons doing only incidental unpaid family work (less than 15 hours in the specified week) are also classified as not in labor force.

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. All persons—whether or not attending school—who had new jobs not scheduled to begin until after 30 days (and not working or looking for work) are classified as not in labor force.

¹ For a fuller explanation of the Current Population Survey, see *Concepts and Methods Used in Household Statistics on Employment and Unemployment from the Current Population Survey*, United States Department of Commerce and United States Department of Labor, 1964.

Problems of Concept. The basis of the labor force classification used in the Current Population Survey is the activity of an individual during a particular calendar week each month. Obviously, a person could have engaged in more than one activity during the period. Thus, in classifying persons, it is necessary to assign a priority to the various activities for which information was obtained. In this way, an individual is classified in only one group and unduplicated totals of the employed, the unemployed, and persons outside the labor force can be obtained.

In this classification system, the highest priority is assigned to "working." Thus, if a person did any work—as defined in the concepts—during the survey week, he is classified as "at work" and is included with the employed, even though he may also have looked for work, gone to school, or done something else.

The activity "looking for work" is given second priority in the classification scheme. In defining the unemployed, a slight departure is made from a strict "activity" concept to include certain groups who, although not actively looking for work in the specified week, report that they would have been doing so except for certain special circumstances, such as illness or waiting to be called back to a job from which they had been laid off.

Some modification of the "activity" concept has been made also in the case of the employed. If the only criterion considered were activity during a calendar week, large numbers of persons who have definite job attachments but were temporarily absent from work in the survey week for reasons such as illness, vacation, or bad weather, would be excluded from the labor force count. Because their absence probably would not exceed a week or two, their exclusion from the labor force might result in an unrealistic count of the economically active population. Therefore, a third category is set up within the priority system. This category consists of persons who were neither working nor looking for work but who had jobs or businesses from which they were temporarily absent because of a labor dispute, illness, vacation, bad weather, or a related reason during the survey week. This group, "persons with jobs but not at work," is measured separately but is added to the "at work" group to derive estimates of the total number of employed persons.

Sampling

The Survey Design

The Current Population Survey sample is located in 357 sample areas comprising 701 counties and independent cities with coverage in every State and the District of Columbia. In all, some 40,000 housing units and other living quarters are designated for the sample at any time, of which about 35,000, containing about 80,000 persons 14 years and over, are occupied by households eligible for interview. The remainder are units found to be vacant, converted to nonresidential use, containing persons with residence elsewhere, or ineligible for other reasons. Of the occupied units eligible for enumeration, about 4 to 6 percent are not interviewed in a given month because the residents are not found at home after repeated calls, are temporarily absent, or are unavailable for other reasons.²

Selection of Sample Areas. The entire area of the United States consisting of 3,128 counties and independent cities is divided into 1,913 primary sampling units. With some minor exceptions, a primary sampling unit (PSU) consists of a county or a number of contiguous counties. Each of the 212 standard metropolitan statistical areas (SMSA's)³ in existence at the time of the 1960 Census constitutes a separate PSU. 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 357 strata. Among these PSU's, 107 of the largest standard metropolitan statistical areas (including all with over 250,000 inhabitants) and five other areas (not SMSA's) are separate strata representing them-

² For a more detailed description of the sample design and other technical phases of the CPS program, see U.S. Bureau of the Census, *Technical Paper No. 7*, "The Current Population Survey—A Report on Methodology," (1963).

³ See appendix C.

selves. In general, however, a stratum consists of a set of PSU's as much alike as possible in various characteristics such as geographic region, population density, rate of growth in the 1950-60 decade, percentage nonwhite, principal industry, and type of agriculture.

Except for the 112 areas mentioned above, each of which is a complete stratum, the strata are established so that their sizes in terms of 1960 population are approximately equal. From each stratum a single PSU is selected to represent the entire stratum. In the 112 strata in which there is only a single PSU (the 107 SMSA's and 5 special cases), the single PSU automatically falls in the sample. Where 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 1960 population. For example, within a stratum the chance that a PSU with a population of 50,000 would be selected is twice that for a unit with 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 1965, it was 1 household for every 1,662 households in each stratum. 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 1960 Census. In a sample area which was one-tenth of the stratum, the within-PSU sampling ratio which results is 1 in 166.2, thereby achieving the desired ratio of 1 in 1,662 for the stratum. For each PSU which is a stratum representing only itself, the sampling ratio is 1 in 1,662 regardless of the size of the PSU.

Within each of the 357 sample PSU's, the number of households to be enumerated each month is determined by the application of the within-PSU sampling ratio rather than through the assignment of a fixed quota. This procedure makes it possible to reflect, on a current basis, population changes within the sample area. Consequently, the sample as a whole properly reflects the changing distribution of the population and avoids the distortion which would result from the application of 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 1960 Census and contain, on the average, about 250 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 1960 population.

The next step is to select a cluster of approximately 6 households to be enumerated within each designated ED. This is done, wherever possible, from the list of addresses for the ED compiled during the 1960 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, a systematic sample of clusters of 18 consecutive addresses is selected from the ED and every third address within the cluster is designated for the current sample. This provides a slightly more reliable sample than would be the case for a cluster of 6 consecutive units. The remaining 12 units in the larger cluster are available for future samples.

The 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 for updating parts of the census lists is also followed to reflect units missed in the Census or new construction in areas where there is no adequate system of building permits. 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 6 housing units or other living quarters. For each subdivided enumeration district, one segment is designated for the sample, with the probability of selection proportionate to the estimated "size" of the segment. Prior to 1962 when the 357-area sample was designed, area sampling methods were used throughout. The change to list sampling, where feasible, resulted in reduced sampling error; it is also a more economical procedure.

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 which 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, with the last eighth 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 Current Population Survey. At the time of the first enumeration of a household, the interviewer prepares a roster of the household members, including their personal characteristics (date of birth, sex, race, marital status, educational attainment, veteran status, 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.

At each monthly visit, a questionnaire is completed or revised for each household member 14 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.

Additional questions are asked each month to help clarify the information on employment 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 and whether or not they were paid for their time off. For the unemployed, he records (1) the length of time they have been looking for work, (2) whether they are seeking full- or part-time work, and (3) 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.

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 Washington office of the Census Bureau. All of the questionnaires are received in Washington by the end of the week after enumeration. The raw data are transferred to computer tape and checked for completeness and consistency.

The interviewers on the Current Population Survey 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 prior to the survey. Moreover, through editing of their completed questionnaires, repeated observation during enumeration, and a systematic reinterview 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". It is possible to achieve this rather complicated procedure rapidly and automatically because of the availability of high-speed electronic digital computers. The principal steps involved are as given below.

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 color (white, nonwhite) and residence group of households (urban, rural nonfarm, rural farm). The adjustment is made separately within each pair of rotation groups (the incoming pair, the two continuing pairs, and the outgoing pair).

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, color, 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 the entire population with respect to these characteristics. Such weighting is accomplished through two stages of ratio estimates as follows:

1. *First stage.* The first stage of ratio estimates takes into account differences in the distribution by color 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 color, are not available on a current basis. Therefore, using 1960 Census data, estimated population totals by color 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 1960 Census. In deriving these ratios, PSU's that comprised 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 Current Population Survey, 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 color-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, color, and sex. Independent estimates of the entire population, by these characteristics, are prepared each month. They are calculated by carrying forward the most recent census data (1960) to take account of subsequent aging of the population, mortality, and migration between the United States and other countries. 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 distribution within a given age-color-sex group by employment status and various other characteristics. In developing statistics, these sample distributions are multiplied by the ratio of the independent population estimate to the sample estimate for the appropriate age-color-sex group.

Composite Estimate. The last step in the preparation of estimates makes use of a composite estimate. In this procedure, a weighted average of two estimates is obtained for the current month

for any particular item. The first estimate is the result of the two stages of ratio estimates described above. The second estimate consists of the composite estimate for the preceding month to which has been added an estimate of the change in each item between the preceding month and the present month, based upon that part of the sample which is common to both months (75 percent). While the weights for the two components of such a composite estimate do not necessarily have to be equal, in this instance the weights used for combining these two estimates are each one-half. Equal weights in this case satisfy the condition that for virtually all items there will be some gain in reliability over the estimation procedure after the first two stages of ratio estimates.

The composite estimate results in a reduction in the sampling error beyond that which is achieved after the two stages of ratio estimates described above; for some items the reduction is substantial. The resultant gains in reliability are greatest in estimates of month-to-month change, although gains are also obtained for estimates of level in a given month, change from year-to-year, or change over other intervals of time.

Presentation and Uses

The Current Population Survey (CPS) provides a large amount of detail on the economic status and activities of the population of the United States. It is the source of estimates of total employment, both farm and nonfarm; of nonfarm self-employed persons, domestics, and unpaid helpers in nonfarm family enterprises; and of total unemployment, whether or not covered by unemployment insurance. It is a comprehensive source of information on the personal characteristics of the total labor force and of the employed and unemployed, such as age, sex, race, and marital status.

It provides distributions of workers by the numbers 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 teachers, stenographers, carpenters, laborers, etc.). It also pro-

vides limited statistics on the industries in which they work.

Information is available from the survey not only for persons in the current labor force but also for those who are outside 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, older 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 and Monthly Report on the Labor Force*. The tables in this report provide information on the labor force, employment, and unemployment by a number of characteristics, such as age, sex, color, marital status, industry, and occupation. Approximately 40 of the most important estimates from the CPS are presented each month on a seasonally adjusted basis. These estimates are adjusted by the BLS Seasonal Factor Method, which is described in the appendix on seasonal adjustment.

The CPS is also used for a program of special inquiries to obtain detailed information from particular segments of the labor force or for particular characteristics of the labor force. Approximately 6 to 8 such special surveys are made each year. The inquiries are repeated annually in the same month for some topics, including the extent of work experience of the population during the calendar year, marital and family characteristics of workers, the employment of school-age youth, the employment of recent high school graduates and dropouts, the extent of overtime work at premium pay, and the prevalence of multiple job-holding. Surveys have been made periodically on such subjects as job mobility, length of time on current job, and educational attainment of workers. In addition there have been one-time surveys.

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 Current Population Survey is designed to produce reliable National estimates. It is not designed to produce 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 approximately fifty times as large as the present sample.

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 4 to 6 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 noninter-

views, 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 are usually supplied for omitted items on the basis of the distribution in these items for persons of similar characteristics.

2. *Independent Population Estimates.* The independent population estimates used in the estimation procedure (see discussion under "Ratio Estimates," p. 11) may also provide a source of error, although on balance their use substantially improves the statistical reliability of many of the important figures. 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 components 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 substantial statistical operation of this type. It is likely, however, that the net error arising from processing is 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 Current Population Survey 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 Current Population Survey. A measure of sampling variability indicates the range of difference 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 com-

putations do not, however, 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 Monthly Report on the Labor Force* and in other reports based on the Current Population Survey, 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 the high-speed electronic computer makes possible considerably more detailed estimates that 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 Current Population Survey,⁴ 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.

⁴For a summary of these studies, see Bureau of the Census, *Technical Paper No. 6*, "The Current Population Survey Reinterview Program—Some Notes and Discussion" (March 1963).

Technical References

Number

1. President's Committee to Appraise Employment and Unemployment Statistics, *Measuring Employment and Unemployment* (1962).
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.
2. U.S. Department of Commerce, Bureau of the Census, *Technical Paper No. 6*, "The Current Population Survey Reinterview Program—Some Notes and Discussion" (1963).
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3. U.S. Department of Commerce, Bureau of the Census, *Technical Paper No. 7*, "The Current Population Survey—A Report on Methodology" (1963).
A brief history of the Current Population Survey (CPS) from its inception (1943) 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.
4. U.S. Department of Labor, Bureau of Labor Statistics and U.S. Department of Commerce, Bureau of the Census, *Concepts and Methods Used in Household Statistics on Employment and Unemployment from the Current Population Survey*. BLS Report 279 and Current Population Reports, Series P-23, No. 13 (1964).
A concise description of the methodology used in obtaining labor force information from sample households. Labor force concepts and definitions are defined. The adequacy of labor force data and quality controls are discussed, and major improvements in the Current Population Survey are listed chronologically.
5. U.S. Department of Labor, Bureau of Labor Statistics, *How the Government Measures Unemployment* (1964).
A short nontechnical discussion of the concepts and methods used in obtaining labor force statistics from the Current Population Survey.

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Chapter 2. 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. Prior to 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. There had existed no regular compilation of employment data 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 for 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 period of 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 made frequent references 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 Manufactures, through that of 1939. For nonmanufacturing industries, benchmarks were developed from various sources, including the Censuses of Business taken at intervals from 1929 on.

Throughout the period from 1915 to the beginning of World War II, there was a constantly growing interest in employment statistics for States and areas. 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 emerging social security programs. While most improvements had to await the end of the war, several important advances took place during those years.

The most far reaching decision was to use as employment benchmarks the data on employment collected primarily for administrative purposes by the newly organized social insurance programs. Tabulations of such materials became available about 1940 from the unemployment insurance program and they soon became the preferred sources of benchmark data. They covered several industrial categories not covered by the Census of Manufacturers and Business, respectively, and they were available annually. After 1939, these were taken only at 5-year intervals.

As the unemployment insurance program developed, the feeling grew that the proper place to estimate State and area employment was in the State agencies rather than in Washington. By 1949, all States had joined the system, and since that year the industry employment statistics program has been a fully integrated Federal-State project which provides employment, hours, and earnings information on a national, State, and area basis in considerable industrial detail. This cooperative program has as its formal base of authority a Congressional act of July 7, 1930 (ch. 873, 46 Stat. 1019; 29 U.S.C. 2). In 1965, cooperative arrangements were in effect with 45 State employment security agencies affiliated with the Bureau of Employment Security and with 6 State labor departments.

Description 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 1965, this sample included over 135,000 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 a majority of the metropolitan areas. The data include series on total employment, production or nonsupervisory worker employment, women employed, average hourly earnings, average weekly 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 man-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

¹ *Standard Industrial Classification Manual* (Bureau of the Budget, Executive Office of the President, 1957), p. 2.

day of the month, plus intermittent employees who worked any time during the month (e.g., Christmas temporary employees of the Post Office Department).

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, man-hours, and payrolls are collected on production workers. This group, in general, covers those employees, up through the level of working foremen, 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 such activities as accounting, sales, advertising, routine office work, professional and technical functions, and force account construction.² Production workers in mining are defined in a similar manner. A more detailed description of the classes of employees included in the production and nonproduction workers categories in manufacturing is shown on the facsimile

of the BLS 790 C schedule on pages 18 and 19 of this bulletin.

In contract construction, the term construction workers covers workers, up through the level of working foremen, 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, man-hours, and payrolls of nonsupervisory 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 in most of 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, pp. 20 and 21.)

For government and for nonprofit institutions and organizations, including hospitals and educational institutions, data are collected only for "all employees."

The series on hours and earnings is based on reports of gross payroll and corresponding paid man-hours for production workers.³ In order to derive these series, BLS collects the following data: (See facsimile of BLS 790 C on pp. 18 and 19.)

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).

² Force-account construction is construction work performed by an establishment, primarily engaged in some business other than construction, for its own account and use and by its own employees.

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

BLS Codes

State	Report No.	Ind.		
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Form BLS 790 E
 Before entering data see
 explanations on other side

LOCATION OF ESTABLISHMENT(S) COVERED IN THIS REPORT			
(Number of establishments)	(City)	(County)	(State)

Information reported on this form is strictly confidential, and will be seen only by sworn employees of the Bureau of Labor Statistics and the State agencies cooperating in its statistical programs. It will not be revealed to any other person or agency nor published in such a manner that data relating to an individual company can be identified.

YEAR AND MONTH	PAY PERIOD				DO NOT USE	ALL EMPLOYEES		NONSUPERVISORY EMPLOYEES					DO NOT USE				
	DATES		NUMBER OF DAYS			L/P	NUMBER		Enter in these columns the number of nonsupervisory employees who worked during or received pay for any part of the period reported, the pay earned (excluding commissions), and all hours worked or paid for. Include pay and man-hours for overtime, sick leave, holidays, and vacations			COMMISSIONS OF NONSUPERVISORY EMPLOYEES		P. R.	H.	Expl. code	
	From-- (Both dates inclusive)	Through	During the entire period	During 7-day period which includes the 12th of the month			Both sexes	Women only	NUMBER OF NONSUPERVISORY EMPLOYEES	NONSUPERVISORY-EMPLOYEE PAYROLL (omit cents)	NONSUPERVISORY-EMPLOYEE MAN-HOURS (omit fractions)	Amount of commissions (omit cents)	Period in which earned				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(10A)	From-- (10B)	Through (10C)	(10x)	(11x)	(12)	
1965																	
Dec. 1966									\$.....								
Jan.																	
Feb.																	
Mar.																	
Apr.																	
May																	
June																	
July																	
Aug.																	
Sept.																	
Oct.																	
Nov.																	
Dec.																	

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.

(13)	(13)	(13)
1966	1966	1966
Jan.....	May.....	Sept.....
Feb.....	June.....	Oct.....
Mar.....	July.....	Nov.....
Apr.....	Aug.....	Dec.....

(Person to be addressed if questions arise regarding this report)

U.S. GOVERNMENT PRINTING OFFICE: 1965-O-780-780

(Position)

EMPLOYMENT, HOURS, AND EARNINGS

BLS 790 C
MANUFACTURING

Budget Bureau No. 44-R745.13.
Approval expires January 31, 1967.

MONTHLY REPORT

ON

EMPLOYMENT, PAYROLL, AND HOURS

U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON, D.C. 20212

(CHANGE NAME AND MAILING ADDRESS IF INCORRECT—INCLUDE ZIP CODE)

Return promptly each month in the enclosed envelope which requires
no postage

EXPLANATIONS FOR ENTERING DATA ON REVERSE SIDE

Columns 2 and 3. **PAY PERIOD DATES.**—The standard survey reference week for each month is the calendar week (Sunday through Saturday) which includes the 12th of the month. Enter the first and last dates of your pay period which most nearly coincide with this reference period.

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 production and related workers performed 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 PRODUCTION AND RELATED WORKERS.**—Enter the number of production and related workers, 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 "production and related workers" includes working foremen and all nonsupervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, packing, warehousing, shipping, trucking, hauling, maintenance, repair, janitorial, watchman services, product development, auxiliary production for plant's own use (e.g., power plant), and recordkeeping, and other services closely associated with the above production operations.

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., routemen), advertising, credit, collection, and in installation and servicing of own products, routine office function, factory supervision (above the working foreman 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 MAN-HOURS.**—Enter the sum of (1) man-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 man-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 10Y. **OVERTIME PAYROLL.**—Enter that part of the payroll included in column 10 which represents the straight-time pay *plus* the premiums paid for hours worked in excess of either the straight-workday or workweek. Payments for Saturday and Sunday hours (or 6th and 7th day hours) should be included only if overtime premiums were paid. Payments for holiday hours *worked* should not be included unless the payments are at more than the straight-time rate.

Do not include pay related to hours for which *only* shift differential, hazard, incentive, or other similar types of premiums were paid.

If there were no overtime payments, enter "0" in column 10Y.

Column 11Y. **OVERTIME MAN-HOURS.**—Enter the number of man-hours included in column 11 for which overtime was paid (as described above). If none, enter "0" in column 11Y.

BLS Codes

State	Report No.	Ind.		
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Form BLS 790 C

Before entering data see explanations on other side

LOCATION OF ESTABLISHMENT(S) COVERED IN THIS REPORT			
(Number of establishments)	(City)	(County)	(State)
.....
.....

Information reported on this form is strictly confidential, and will be seen only by sworn employees of the Bureau of Labor Statistics and the State agencies cooperating in its statistical programs. It will not be revealed to any other person or agency nor published in such a manner that data relating to an individual company can be identified.

YEAR AND MONTH	PAY PERIOD					ALL EMPLOYEES		PRODUCTION AND RELATED WORKERS					YOUR COMMENTS	
	DATES		NUMBER OF DAYS			NUMBER		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, and all hours worked or paid for. Include pay and man-hours for overtime, sick leave, holidays, and vacations.					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:	
	From— (Both dates inclusive)	Through	During entire period	During 7-day period which includes the 12th of the month	DO NOT USE L/P	Both sexes	Women only	NUMBER OF PRODUCTION WORKERS	TOTAL PRODUCTION WORKER PAYROLL INCLUDING OVERTIME PAY (omit cents)	TOTAL PRODUCTION-WORKER MAN-HOURS INCLUDING OVERTIME MAN-HOURS (omit fractions)	PRODUCTION-WORKER OVERTIME		DO NOT USE Expl. Code	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	PAYROLL Included in column 10 (omit cents) (10Y)	MAN-HOURS Included in column 11 (omit fractions) (11Y)	(12)	(13)
1965														
Dec									\$.....		\$.....			
1966														
Jan														
Feb														
Mar														
Apr														
May														
June														
July														
Aug														
Sept														
Oct														
Nov														
Dec														

More business
Temporary summer help
Wage rate increase
Layoff for retooling

Overtime
Strike
Fire
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 production workers affected.

EMPLOYMENT, HOURS, AND EARNINGS

(Person to be addressed if questions arise regarding this report)

(Position)

BLS 790 Industry Class Supplement

Budget Bureau No. 44-R745.13.
Approval expires January 31, 1967.

MANUFACTURING

STATEMENT OF PRODUCTS

U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON, D.C. 20212

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

Information reported on this form is strictly confidential, and will be seen only by sworn employees of the Bureau of Labor Statistics and the State agencies cooperating in its statistical programs. It will not be revealed to any other person or agency nor published in such a manner that data relating to an individual company can be identified.

LOCATION _____
(City) (County) (State)

BLS CODES	State	Report No.	Ind.	Empl.	Mo.	Yr.	Proposed Ind.	UI CODE	Ind.	Mo.	Yr.

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 1965. 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 1965 (List items separately) (a)	PERCENT OF TOTAL SALES VALUE OR RECEIPTS DURING 1965 (b)	PRINCIPAL MATERIALS USED (For each product listed in column (a)) (c)	WAS MATERIAL USED PRODUCED IN THIS ESTABLISHMENT? (d)	
			Yes	No
1A. Manufacturing (Specify below) _____	%			
_____	%			
_____	%			
_____	%			
_____	%			
_____	%			
_____	%			
1B. Nonmanufacturing (Specify below) _____	%	2. Is this establishment part of a multiunit company? <input type="checkbox"/> Yes <input type="checkbox"/> No If "Yes," enter name and location of controlling company.		
_____	%			
_____	%			
_____	%			
Combined Total	100%			
3. Space for Your Comments. (Use this space for further explanation of information about the products or activities of your establishment, additional information concerning materials used, etc.)				

(Person to be addressed if questions arise regarding this report)

(Position)

Tips and the value of free rent, fuel, meals, or other payment in kind are not included.

3. Total man-hours worked (including overtime hours) during the pay period, hours paid for standby or reporting time, and equivalent man-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 man-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 differential, hazard, incentive, or similar types of premiums were paid are excluded from overtime hours.

5. Overtime payrolls, which are the total amounts of pay for the overtime man-hours as described in (4).

Overtime hours and payroll data are collected only from establishments engaged in manufacturing industries.

Industrial Classification

All national, State, and area employment, hours, and earnings series data are classified in accordance with the *Standard Industrial Classification Manual*, U.S. Bureau of the Budget, 1957, as amended by the 1963 supplement. (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. 22 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 man-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 Bureau of Employment Security of the U.S. De-

⁴ Young, Dudley E. and Goldstein, Sidney, "The BLS Employment Series and Manufacturing Reporting Practices," *Monthly Labor Review*, November 1957, pp. 1367-1371.

partment of Labor, 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.⁵ 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.

In 1964, unemployment insurance data accounted for three-fourths of the total benchmark. For the group of establishments exempt from State unemployment insurance laws because of their small size⁶ and for certain classes of non-profit institutions, the data used are those provided by the national old-age insurance program administered by the Social Security Administration of the U.S. Department of Health, Education, and Welfare.

For industries not covered by either of the two programs, benchmarks are compiled from a number of special sources. The most important of these are the Interstate Commerce Commission (interstate railroads), the American Hospital Association (private nonprofit hospitals), the Office of Education in the U.S. Department of Health, Education, and Welfare, and the National Catholic

Welfare Conference (private schools, colleges, and universities), the U.S. Civil Service Commission (Federal Government), and the Governments Division of the Bureau of the Census (State and local government).⁷

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 Bureau of Employment Security, 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 which 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 on punch-cards or machine listings, 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

⁵ The State employment security agencies are required to submit tabulations of these reports to the Bureau of Employment Security each quarter. These tabulations are due in the Washington office of BES by the middle of the fifth month after the end of the quarter of reference. For example, the first quarter tabulation, which provides the basis of the BLS benchmarks, is due on August 15. Review and editing of these tabulations and preparation of national summaries from them requires several months additional work on the part of both BLS and BES before the benchmark is completed.

⁶ In 1965, the unemployment insurance laws of 19 States and the District of Columbia covered all employers of 1 or more workers, 4 States covered employers of 3 workers or more, and the remaining 27 States covered employers of 4 workers or more.

⁷ For a more detailed description of the benchmark, see Schechter, Samuel, "The 1959 Benchmarks for the BLS Payroll Employment Statistics," *Monthly Labor Review*, December 1962, pp. 1385-1392.

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 man-hours, and for manufacturing, overtime man-hours and payroll. 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. 18-21.)

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 an electronic 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.⁸

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

⁸ Mendelssohn, Rudolph C. "Machine Methods in Employment Statistics," *Monthly Labor Review*, May 1955, pp. 567-569.

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.⁹

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.

⁹ For the national sample, additional reports needed for State and area samples are added to those required by the national design.

¹⁰ If permanent changes in the composition of the sample take place, the "production-worker, 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." (See p. 27.)

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:

$$50,000 \times \frac{26,000}{25,000} \text{ (or } 1.04) = 52,000$$

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 $\frac{19,500}{26,000}$ or .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.¹⁰

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 amounts of the revisions made since 1957 is presented in table 1.

The BLS employment statistics sample is not, strictly speaking, a true probability sample and hence no formal statement on sampling error can be made. Nevertheless the BLS estimates of employment, hours, and earnings are judged to have a high degree of reliability for most industries. This reliability is due to the relatively large percentage of the employment universe covered by the sample, the frequent adjustments of employment estimates to benchmark levels, the use of special techniques (such as stratification by size and/or region), and the use of "bias adjustment factors" which are anticipatory corrections applied to the employment estimates for each month, to reduce the amount of adjustment required at the next benchmark. These "bias adjustment factors" are based on the percent of adjustment made at the most recent benchmark revision, modified where necessary by the experience of earlier benchmark adjustments.

Differences between the benchmarks and the estimates result less from sampling and response errors than from changes in the industrial classification of individual establishments (owing to changes in product or activity) which are not reflected in the levels of estimates until the data are adjusted to new benchmarks. At more detailed industry levels, particularly within manufacturing, changes in classification account for a major part of the adjustment. However, this factor becomes of less importance at broader aggregations of industries where differences due to classification are generally small. Another cause of differences, generally minor, between the estimates and the benchmark arises from improvements in the quality of benchmark data.

TABLE 1. NONAGRICULTURAL EMPLOYMENT ESTIMATES, BY INDUSTRY DIVISION, AS A PERCENTAGE OF THE BENCHMARK FOR RECENT YEARS

Industry division	1965	1964	1963	1962	1961
Total.....	99.5	100.0	101.0	99.3	100.0
Mining.....	99.5	100.0	100.3	99.2	99.4
Contract construction.....	100.9	101.5	101.5	93.9	99.9
Manufacturing.....	99.8	100.2	100.1	99.4	99.7
Transportation and public utilities.....	100.1	100.4	100.0	100.4	100.7
Wholesale and retail trade.....	99.4	100.4	100.6	100.1	100.5
Finance, insurance, and real estate.....	100.7	99.4	99.8	99.9	101.0
Service and miscellaneous.....	97.9	99.7	100.8	98.0	99.4
Government.....	99.8	99.0	103.8	100.0	100.0
Federal.....	100.0	100.0	100.0	100.0	100.0
State and local.....	99.7	98.7	105.1	100.0	100.0

¹ State and local benchmark derived from October 1962 *Census of Governments*. Last previous revision of estimate was made to benchmarks based on April 1957 *Census of Governments*.

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.

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.¹¹ 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.

¹¹ 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.

a. *Average weekly hours and gross earnings.* To obtain average weekly hours for an individual estimating cell, the sum of the man-hour totals 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 total is divided by the reported man-hour total.

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 .¹² 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

¹² If the difference between the estimate and the average computed from the sample ($V_0 - U_0$), 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 2. NUMBER OF INDUSTRIES FOR WHICH "PRIMARY" SERIES ARE PUBLISHED UNDER THE BLS INDUSTRY EMPLOYMENT STATISTICS PROGRAM—EMPLOYMENT, HOURS, AND EARNINGS, JANUARY 1966

Industry division	All employees	Production workers ¹	Women	Hours and earnings ²	Average overtime hours
Total.....	401	349	363	352	146
Mining.....	12	11	9	11	-----
Contract construction.....	11	11	-----	11	-----
Manufacturing.....	271	270	271	270	146
Transportation and public utilities.....	22	14	17	17	-----
Trade.....	35	31	34	31	-----
Finance, insurance, and real estate.....	14	9	14	9	-----
Service and miscellaneous.....	20	3	18	3	-----
Government.....	15	-----	-----	-----	-----
Nonagricultural employment.....	1	-----	-----	-----	-----

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.

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 man-hours. Payroll aggregates are the product of aggregate man-hours and average hourly earnings. Payroll and man-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 man-hour aggregates by the corresponding production-worker employment estimates. Average hourly earnings for groups are computed by dividing the payroll aggregates by the man-hour aggregates. This method is equivalent to weighting weekly hours by estimated universe production-worker employment and hourly earnings by estimated universe man-hours.

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. Man-hour data were not collected for many industries in the finance and service divisions prior to 1964. In these industries when reporting of man-hour data is incomplete, average weekly earnings are obtained by dividing the sum of the reported payroll totals by the total number of nonsupervisory workers for the same establishments.

b. *Overtime man-hours.* To obtain average weekly overtime hours in manufacturing industries, the sum of the overtime man-hours reported

is divided by the number of production workers in the same establishments.

c. *Spendable 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.¹³

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 in the manufacturing, mining, contract construction, and wholesale and retail trade divisions are computed and published for a worker with no dependents and a worker with three dependents.

Gross and spendable weekly earnings also are computed and published in terms of 1957-59 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 man-hours and one-half of total overtime man-hours, which is equivalent to payrolls divided by straight-time man-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 weekly man-hours and payrolls are prepared by dividing the current month's aggregates by the averages for the 1957-59 period.

Seasonally Adjusted Series

Many economic statistics, including employment and average weekly hours, 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 series are published regularly for selected employment and hours 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 and average overtime hours 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. Seasonally adjusted series also are prepared for aggregate weekly man-hours for mining, contract construction, manufacturing, and the major industries in manufacturing.

Presentation and Uses

At the national level, the program produces each month a total of over 2,000 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 late 1964, following revision to the 1963 benchmark, data for 210 such industries were published.

In December 1964, employment and hours and earnings statistics were available for 50 States, the District of Columbia, and 154 areas. Approxi-

¹³ "The Calculation and Uses of the Spendable Earnings Series," *Monthly Labor Review*, April 1966, pp. 405-409.

mately 6,600 employment series and hours and earnings series for about 3,100 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 4 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 year.

National estimates in the detail described in tables 2, 3, and 4 are published in the monthly report *Employment and Earnings and Monthly Report of the Labor Force*. This publication is

TABLE 3. NUMBER OF INDUSTRIES FOR WHICH SPECIAL SERIES ARE PUBLISHED UNDER THE BLS INDUSTRY EMPLOYMENT STATISTICS PROGRAM—EMPLOYMENT, HOURS, AND EARNINGS, JANUARY 1966

Industry division	Index of aggregate weekly man-hours	Index of aggregate weekly payrolls	Spendable average weekly earnings ¹	Gross weekly earnings (1957-59 dollars)	Average hourly earnings (excluding overtime)
Mining.....	1	1	1	1	-----
Contract construction.....	1	1	1	1	-----
Manufacturing.....	24	1	1	1	23
Trade.....	-----	-----	1	1	-----
Mining, construction and manufacturing.....	1	1	-----	-----	-----

¹In current and 1957-59 dollars;

TABLE 4. NUMBER OF SEASONALLY ADJUSTED SERIES PUBLISHED UNDER THE BLS INDUSTRY EMPLOYMENT STATISTICS PROGRAM—EMPLOYMENT, HOURS, AND EARNINGS, JANUARY 1966

Industry division	Seasonally adjusted series					
	All employees	Production workers	Indexes of employment	Average weekly hours	Man-hour index	Average overtime hours
Nonagricultural employment.....	1	-----	1	-----	-----	-----
Mining, construction, and manufacturing.....	-----	-----	-----	-----	1	-----
Mining.....	1	-----	1	1	1	-----
Contract construction.....	1	-----	1	1	1	-----
Manufacturing.....	24	24	1	24	24	3
Transportation and public utilities.....	1	-----	1	-----	-----	-----
Trade.....	3	-----	3	3	-----	-----
Finance, insurance, and real estate.....	1	-----	1	-----	-----	-----
Service and miscellaneous.....	1	-----	1	-----	-----	-----
Government.....	3	-----	3	-----	-----	-----

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 and Monthly Report of the Labor Force*, 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 Statistics for the 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 Statistics for States and Areas*, provides historical data (annual averages) on all employees and on production-worker hours and earnings series published by State agencies for States and areas back to the beginning of these series, in some instances to 1939. This volume is published annually. Detailed industry rates are available monthly in releases published by the cooperating State agencies.

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 well-being 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.¹⁴ 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.¹⁵ 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 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

¹⁴ Weinberg, Edgar, "BLS Earnings Series as Applied to Price Escalation," *Monthly Labor Review*, July 1952, pp. 57-59.

¹⁵ See chapter 1 for a description of this survey.

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 man-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 disposable 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 de-

ductions 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 1957-59 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 U.S. Bureau of the 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.

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3. President's Committee to Appraise Employment and Unemployment Statistics, *Measuring Employment and Unemployment*. 1962.
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—JOHN P. WYMER

Office of Manpower and Employment Statistics

Chapter 3. Labor Turnover

Background

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

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 Bureau of Employment Security 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. In December 1964, these agencies published nearly 10,000 labor turnover series in manufacturing and mining industries for States and areas. These rates were based on a sample of approximately 44,000 reports which also were used to prepare the national series.

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 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 prej-

udice to the worker, for reasons such as lack of orders, model changeover, 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.

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

Industry Classification

The classification system used for compiling and publishing rates is that described in the 1957 *Standard Industrial Classification Manual* as amended by the 1963 supplement, issued by the Bureau of the 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 2 of this bulletin.

Data Sources

The labor turnover program covers all industries in the manufacturing and mining divisions, and for the Nation as a whole, the telephone communications and the telegraph communications industries. Each month the Bureau collects data on labor turnover actions from a sample of establishments drawn from a list of those subject to State unemployment insurance programs. (See chapter 2, p. 15 of this bulletin.) The respondent extracts the figures largely from his personnel records, though some smaller establishments which do not maintain special personnel records utilize their payroll records in making out the reports. A response analysis survey, which analyzed the reporting practices of a scientifically selected sample of the establishments in the labor turnover panel, showed that a number of employers did not report the figures for all items precisely as requested on the schedule. Nevertheless, the effect of these deviations on the published data appeared to be quite insignificant, particularly for the broader classes of turnover actions, namely 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. 36 and 37 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 total number of actions for each turnover item during the calendar month, total employment, and the number of women employed. 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. Turnover data reported for women are limited to total accessions, total separations, and quits.

DL 1219

Budget Bureau No. 44-R1064.6.
Approval expires January 31, 1967.

State	Report No.	Ind.	

U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
BUREAU OF EMPLOYMENT SECURITY
WASHINGTON, D. C. 20212

**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)

Information reported on this form is strictly confidential, and will be seen only by sworn employees of the Bureau of Labor Statistics, the Bureau of Employment Security, and the State agencies cooperating in their statistical programs. It will not be revealed to any other person or agency nor published in such a manner that data relating to an individual company can be identified.

LOCATION _____
(City) (County) (State)

Before entering data see explanations on other side

I. LABOR TURNOVER DURING CALENDAR MONTH

YEAR AND MONTH (1)	PERIOD COVERED BY LABOR TURNOVER (Cols. 4 through 14) Preferably one calendar month		ALL EMPLOYEES (BOTH SEXES)								ALL WOMEN EMPLOYEES			
	From-- (Both dates inclusive) (2)	Through (3)	SEPARATIONS (during calendar month)					ACCESSIONS (during calendar month)			SEPARATIONS		ACCESSIONS	
			Total Separations (Sum of cols. 5 through 8) (4)	Quits (5)	Discharges (6)	Layoffs (7)	Other separations (8)	Total Accessions (Sum of cols. 10 and 11) (9)	New hires (10)	Other Accessions (11)	Women separations included in col. 4 (12)	Women quits included in col. 5 (13)	Women Accessions included in col. 9 (14)	
1965 Dec.														
1966 Jan.														
Feb.														
Mar.														
Apr.														
May														
June														
July														
Aug.														
Sept.														
Oct.														
Nov.														
Dec.														

II. EMPLOYMENT—ONE PAY PERIOD ONLY

III. YOUR COMMENTS

YEAR AND MONTH (15)	NUMBER OF EMPLOYEES who worked during or received pay for any part of the pay period which includes the 12th of the month		DO NOT USE Expl. Code (18)	Enter Main Factors Responsible for any significant month-to-month changes in Sections I and II. Examples are: More business Seasonal increase Temporary summer help Fire Strike Weather
	Total Both sexes (16)	Women only (17)		
1965 Dec.				(19)
1966 Jan.				
Feb.				
Mar.				
Apr.				
May				
June				
July				
Aug.				
Sept.				
Oct.				
Nov.				
Dec.				

(Person to be addressed if questions arise regarding this report)

(Position)

READ THESE EXPLANATIONS BEFORE ENTERING DATA ON OTHER SIDE

PERIODS COVERED BY THIS REPORT

Information on labor turnover, cols. 4 through 14, is requested for the *entire calendar month* or, if this is not possible, for a period which most closely covers the calendar month. In either case enter in cols. 2 and 3 the beginning and ending dates for the monthly period for which turnover data are reported.

Information on employment, cols. 16 and 17, is requested for *one pay period only* (preferably one week) which includes the 12th of the month.

SEPARATIONS (All Employees)

ACCESSIONS (All Employees)

TOTAL SEPARATIONS DURING CALENDAR MONTH

(Column 4)

Enter in column 4 the sum of columns 5 through 8.

QUITS (Column 5)

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.

DISCHARGES (Column 6)

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, col. 8.

LAYOFFS (Column 7)

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.

OTHER SEPARATIONS (Column 8)

This group should 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 the physical standards required, 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.

TOTAL ACCESSIONS DURING CALENDAR MONTH (Column 9)

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 col. 9 the sum of cols. 10 and 11.

NEW HIRES (Column 10)

New hires are temporary or 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. Former employees you *did* call back should be included in "total accessions" and "other accessions," but not in "new hires." Persons transferred from other establishments of this company should be reported in "other accessions."

OTHER ACCESSIONS (Column 11)

Include all additions to the employment roll other than new hires. This includes all employees called back to work by the employer from a layoff as defined for col. 7, 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.

WOMEN SEPARATIONS AND ACCESSIONS (Columns 12 through 14)

Enter the number of women included in the figures reported for cols. 4, 5, and 9. If no separations of women occurred during the month, enter "0" in cols. 12 and 13; if no accessions, enter "0" in col. 14.

YOUR COMMENTS (Column 19)

Enter the main factors responsible for significant month-to-month changes in Labor Turnover items (cols. 4 through 14) and Employment (cols. 16 and 17). Some examples are listed in the heading of col. 19.

EMPLOYMENT

ALL EMPLOYEES (Column 16)

Enter the total number of persons (both sexes) 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) which includes the 12th of the month. 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 for which they received pay directly from your firm for the pay period covered 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 pay period covered.

NOTE: If the number differs from the "All Employees" total reported on the Employment, Payroll, and Hours form, explain under Comments.

WOMEN EMPLOYEES (Column 17)

Enter the number of women included in the figure reported for col. 16. If you have no women employees, enter "0".

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 allocation design was obtained by sampling with probability proportionate to average size of employment within each of the strata. The total size of sample regarded as necessary to produce satisfactory estimates of employment was distributed among the size 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 all manufacturing industries, establishments with 250 or more employees are included in the sample with certainty, and in some industries the cutoff is lower. The sizes of the samples for various industries were determined empirically on the basis of experience.

¹ For the national sample, additional reports needed for State and area samples are added to those required by the national design.

The 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, however, the rates for States and areas are not generally prepared at the same degree of industry detail as the national rates, the national design usually provides sufficient reports for the preparation of State and area rates.¹

Estimating Procedures

Turnover rates are estimates of ratios. For individual industries, the 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 2 of this bulletin. Rates for "all manufacturing" and for the durable and non-durable goods subdivisions of manufacturing are weighted by employment in the major industry groups.

Women turnover items are subtracted from total turnover items to obtain turnover items for men for each sample report. Turnover rates for men and women for individual industries are computed by dividing the total number of turnover actions by the corresponding employment totals for men and women. Separate men and women turnover rates for industry groups are obtained by weighting the rates in individual industries by the employment estimates for men and women.

As of 1965, size stratification was not used in the preparation of labor turnover rates. Until 1963 and 1964, a number of State agencies, including

those for several large States, were not fully integrated into the program. Until this integration was completed, the use of size stratification did not appear to be desirable because of imbalances in the sample both by State and industry. In 1965, it was planned to introduce size stratification into the preparation of labor turnover rates as soon as practicable.

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.

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 basic method is given in appendix A of this bulletin.

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, 194 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 manu-

facturing. The rates for all manufacturing for years prior to 1958 were revised, however, to reflect the influence of these industries.

Industry turnover rates on a national basis are prepared by the BLS for all employees and for men and women separately. For all employees, 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. For men and women, rates for total accessions, total separations, and quits are published for manufacturing industry groups and subdivisions.

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 rates for both detailed industries and broad categories are published in *Employment and Earnings and Monthly Report of the Labor Force* about 2 months after the month of reference. Separate rates for men and women are published in *Employment and Earnings and Monthly Report of the Labor Force* on a quarterly basis, for the first month of each calendar quarter.

The labor turnover rates for all manufacturing for selected States and metropolitan areas are published each month in *Employment and Earnings and Monthly Report of the Labor Force*. Detailed industry rates are 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 volume called *Employment and Earnings Statistics for the 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 accession rates 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.

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Chapter 4. Employment of Scientific and Technical Personnel

Background

The growth in industrial employment of scientists and engineers has been at once a symptom and a driving force in the rapid technological progress of American industry. For a number of years, a major element in this growth has been the needs of the Federal Government for increasingly complex and technologically advanced National Defense materiel. With expanding activities in space research and technology, the Federal Government's needs, fulfilled largely through private industry, are increasing rapidly. The surveys of scientific and technical personnel, though still in their development stage to an important degree, provide a basis for evaluating future requirements for such personnel.

The surveys of scientific and technical personnel were initiated by the Bureau of Labor Statistics in 1959, under the sponsorship of the National Science Foundation. They are part of a comprehensive statistical program, coordinated by the Foundation, which is designed to yield estimates of the employment of scientists and engineers in all sectors of the U.S. economy. The Bureau of Labor Statistics conducts a survey of scientific and technical personnel in industry on an annual basis, and related surveys of State government agencies and of local governments at less frequent intervals. Since 1962, the Bureau of Labor Statistics has had full responsibility for the conduct and publication of these surveys, which continue to be planned in consultation with the National Science Foundation.

Description of Surveys

The surveys of scientific and technical personnel in industry gather data on the employment of engineers as a group, and on scientists and technicians by major occupational specialty. Engineers and scientists are further distributed according to whether they are primarily engaged in research and development activities, in management and administration, in technical sales and service, in production and operations, or in "all other" func-

tions. In addition to the numbers of scientific and technical personnel, data are also collected on the total numbers of economists, statisticians, and psychologists. Data are published separately for all major industry groups, and in finer industry detail for a selected number of major industry groups. Beginning in 1966, data will be presented also by geographic areas.

State government agencies and local government units are surveyed to obtain information on employment of engineers, scientists, technicians, economists, statisticians, and psychologists. These surveys also obtain employment data for several health-service occupations. Employment is tabulated by the various governmental functions in which the workers are engaged. Data are also published by State where appropriate.

For each professional occupation, respondents are asked to report the number of persons whose current positions require knowledge equivalent at least to that acquired through completion of a 4-year college course with an appropriate academic major, regardless of whether they hold a college degree. These surveys, thus, cover all persons actually working in one of the designated occupations, specifically including those who do not hold an appropriate degree or any degree at all, but specifically excluding persons trained in the occupation but currently employed in positions not requiring the use of such training.

Technicians are defined as persons actually engaged in technical work at a level which requires knowledge of engineering, mathematical, physical and life sciences, comparable to that acquired through technical institutes, junior colleges, or other formal post-high school training less extensive than 4-year college training, or through equivalent on-the-job training or experience.

Data Sources

The sources of the occupational data reported by respondents are personnel records, and, especially for the smaller reporting units, personal knowledge on the part of the persons completing the reports. Discussions with a number of large

respondents have taught that their records typically contain much of the data in the desired form, but that some adjustments by the respondent are often necessary because the occupational classifications used in his records differ somewhat from those specified for the surveys.

The employment benchmarks for the survey of scientific and technical personnel in industry are derived from employment data tabulated from the first quarter reports of the unemployment insurance program. The benchmarks used for the local government surveys are derived from the periodic censuses of local government units, by the Bureau of the Census. The survey of State government agencies does not use benchmarks, since the survey is based on a compilation of data from all State government agencies employing personnel in occupations covered by the survey.

Collection Methods

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. These visits, which limited resources have prevented from being either numerous or frequent, are carried out by senior staff members assigned to the surveys. There are normally two follow-up mailings, and a sub-sample of residual nonrespondents are contacted further by telephone.

The response experience in these surveys has been very encouraging. Respondents supplying usable information have constituted approximately 90 percent of the reports solicited in virtually every year, and have never been below 85 percent.

Sampling

The basic sample for the industry survey was drawn from lists of establishments reporting to each of the 51 (State and D.C.) employment security agencies for unemployment insurance (UI) purposes, supplemented by a list of interstate railroads and related companies supplied by the Interstate Commerce Commission. Industry classification of establishments is based on information available to the State agencies.

Certain categories of establishments are eliminated from the master list before the sample is selected, either because a separate survey of the given category is being made or because the number of scientific and technical personnel employed are believed to be negligible. The categories of organizations omitted are those classified according to the Standard Industrial Classification system in the following major industry groups: 01 and 02—farms; 80—medical and other health services (except 807, medical and dental laboratories, which is included); 82—educational services; 84—museums, art galleries, and botanical and zoological gardens; 86—nonprofit membership organizations; 88—private households; 89—miscellaneous services (except 8911, engineering and architectural service, which is included); 91 through 94—government; and 99—nonclassifiable establishments.

Establishments below a specified minimum size, determined separately for each industry group, are also excluded from the listing prior to sampling. Because of the large number of establishments in the small size groups, minimum size cutoffs are essential to the efficiency of the survey. Since the excluded establishments employ very few persons working as scientists, engineers, or technicians, survey results are affected little by these omissions.

Sample numbers are allocated among the various industry-size strata in accordance with the principle of optimum allocation, taking into account the expected response rates by industry and by size, so as to obtain maximum reliability within available resources. The overall sample size is determined so that the variance (two relative standard errors) for the estimate of the total number of scientists and engineers for all industries combined is about 3 percent. In every covered industry, all establishments with 1,000 employees or more are included in the sample. In other industry-size cells, the sampling ratios range from 1 in 1 to 1 in 100. In general, the larger the establishment and the greater the number of technical personnel used by the industry, the higher is the sampling ratio. All selections are made randomly within the designated strata.

Since scientific and engineering employment is concentrated to a significant degree in research and development laboratories, not separately

identifiable in the UI universe, the probability sample was supplemented. The essential rule for unbiased supplementation is that the supplementary units must be drawn independently of the probability sample; that is, the chance that a unit is drawn in the probability sample must be independent of the chance that the unit is selected as a supplement. The initial supplementation was drawn from a list of industrial research laboratories compiled by the National Academy of Science—National Research Council and from a list of small business concerns interested in performing research and development compiled by the Small Business Administration. Beginning in 1966, when a new sample was drawn, supplementation was achieved by retaining in the mailing list all establishments which reported employment of 20 or more scientists and engineers in surveys based on the previous sample; this procedure is to be repeated whenever a new sample is drawn (every 2 to 3 years). Establishments selected as supplements are tabulated as a separate cell within their industry and size class with a weight of 1, regardless of whether they are also members of the probability sample. (See Estimating Procedures.)

The mailing list for the State government surveys is not a sample, but includes all agencies of State governments which could conceivably employ personnel in any of the designated occupations. The agencies are identified from information in directories and other documents furnished by the States.

The survey of employment of scientific and technical personnel in local government units is based on a stratified random sample of the universe of government units, other than school districts, obtained from the Bureau of the Census. Stratification is by State; by type of governmental unit—county, municipality, township, and special district; and by the 1960 population size of county, municipality, and township, or, in the case of special districts, by the governmental function of the district as determined by the Bureau of the Census.

Sample numbers are allocated among the various strata in accordance with the principle of optimum allocation, taking into account the expected response rates by type of government unit, and by size or function. The sample size for each State is determined so as to produce estimates of the number of scientists, engineers, technicians, and professional health workers with reasonable sampling tolerances. The sampling ratios used vary from 1 in 1 for all counties, municipalities and townships with 1960 populations of 50,000 persons or more, and for special districts reported, in the 1957 Census of Governments, to have 20 full-time employees or more, to 1 in 35 for small units expected to employ relatively few scientific, engineering, technical, or health personnel. All selections are made randomly within the designated strata.

Estimating Procedures

For the survey of scientific and technical personnel in industry and for the survey of scientific and technical personnel employed by local government units, two different types of statistical findings are derived from sample data. One type, designated as primary estimates, includes the total items for each question, such as total scientists and engineers, total technicians, or total professional health service personnel. The second type, called secondary estimates, includes the components of the primary estimates.

Primary estimates are obtained for probability cells as the ratio of primary item employment to total employment (of the reporting units in the cell), multiplied by a total employment figure in that industry and size class that is adjusted for any supplemental units in that industry and size class to prevent duplicate estimation for supplemental units.¹ Primary estimates for supplemental cells are obtained by summing the primary item employment for the supplemental reports plus an estimate for nonrespondent supplemental units.

Secondary estimates are obtained by computing, for each cell, a ratio of the given component item to the corresponding primary item, using information only for those establishments supplying data on both items. The secondary estimates are then

¹ Symbolically, $P' = \frac{\sum p_i}{\sum e_i} M$, where M is the cell universe total employment, $\sum p_i$ is the sum of the primary item employment of the cell respondents, $\sum e_i$ is the sum of total employment of the cell respondents, and P' is the primary estimate. M is adjusted to prevent duplicate estimation for supplemental sample reporters.

derived by multiplying that ratio by the cell estimate of the corresponding primary item.²

Estimates for the survey of scientific and technical personnel employed by State government agencies are obtained by summing the reported data. The response rate in this survey is extraordinarily high—of the order of 96 to 98 percent—and examination of the nonrespondents shows that the number of scientists, engineers, and other personnel employed by them is negligible.

Analysis, Interpretation, and Presentation

A report on the findings of each survey is published, usually within two years of the reference date of the survey. Each report consists of an analytical interpretation of the findings, supported by a statistical appendix containing in tabular form all of the data that can be meaningfully derived from the survey.

Uses and Limitations

The data derived from these surveys form the essential statistical base (1) for evaluating the adequacy of the scientific and technical manpower resources of the United States in the light of the demand placed or to be placed upon them, and (2) for determining the rate of growth of these re-

sources. They have been used in evaluating the impact of new or materially enlarged Federal programs, calling for substantial scientific and technical manpower input, upon the continuing needs of the economy in general and of national defense in particular. For example, there have been special studies of the impact of the Apollo Program and of the Supersonic Aircraft Program. One of the earliest uses of these studies was in connection with the impact upon the economy of the increased military demands of the Korean War. Another use of these data is as the basis for long-range projections of future manpower requirements in science and engineering. (See *The Long-Range Demand for Scientific and Technical Personnel*, NSF 61-65.) Still another use is to provide data for occupational guidance counselors and others who are concerned with providing young people with information on which to base a career choice.

The estimates derived from these surveys must be interpreted as approximations. All of the surveys are subject to possible response and processing errors, although these are reduced insofar as possible, through checking procedures and through correspondence with reporters whose data are internally inconsistent or appear to involve misinterpretations of definitions or other instructions. In addition, estimates derived from sample surveys are limited by sampling error.

² $C' = \frac{\sum c_i}{\sum p_i} P'$, where P' is as defined in footnote 1, $\sum c_i$ is the sum of a given component item employment of the cell respondents, $\sum p_i$ is the sum of the primary item employment of the same respondents, and C' is the secondary estimate.

Technical References

Number

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Chapter 5. Occupational Outlook

Background

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

In response to a resolution by the National Vocational Guidance Association, calling upon the Congress to authorize this type of information for sale, and to requests by other private individuals and groups, the first edition of the *Occupational Outlook Handbook* was published in 1949. The favorable public response to the *Handbook* was a major factor in the Bureau's decision to issue, with the backing of the VA, a revised and enlarged edition, which was released in 1951.

Following the conclusion of the Korean hostilities, there was a sharp increase in public recognition of the key role of vocational guidance in staffing essential occupations and effectively utilizing the Nation's manpower resources. This resulted in the Congress in 1955 providing for the maintenance of the *Occupational Outlook Handbook* and its related publications 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 originated as a companion piece to the

Handbook. The 1957 *Handbook* was followed in due course by the 1959, 1961, 1963-64, and 1966-67 editions of the *Handbook*.

Description of Program

Under the occupational outlook program, the Bureau of Labor Statistics conducts research in, and provides information on, future occupational and industry manpower requirements and resources. It provides vocational guidance information on expected employment opportunities for the use of counselors, educators, and others helping young people in choosing a field of work. It also provides manpower information for local and national training authorities and policy makers 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.

In its 2½ decades of industry and occupational research, the occupational outlook program has systematically accumulated and analyzed considerable manpower information on such topics as employment trends for major industries of the economy and for most major occupations; employment effects of a great many long-term programs of government agencies, including those for defense, highways, scientific research, space technology, medical care, and education; and changes in industry and occupational requirements.

Toward providing an overall framework of future manpower requirements for the economy as a whole, projections are developed for the broad industry and occupational groups, and have been published regularly.¹ Every other year, hundreds of different, detailed occupational and industry statements are published in the *Occupational Outlook Handbook*. In most of these occupational outlook statements, information is provided on: nature of work; places of employment, education and training requirements; employment outlook for about 10 years ahead, including, in most cases, estimates of annual requirements for growth and replacement needs; and earnings and working conditions. In presenting outlook statements for in-

¹"America's Industrial and Occupational Manpower Requirements, 1964-75," prepared for the National Commission on Technology, Automation, and Economic Progress, published in *Technology and the American Economy*, Appendix Vol. I, February 1966.

dustries, information is included on nature and location of each industry and other industry characteristics, as well as information on the industry's major occupations.

In presenting the employment outlook for an occupation, information is provided not only on the demand for workers but also on the potential supply of workers from many sources—schools and other training institutions, transfers from other occupations, and reentries to the labor force. The balance between supply and demand, in those occupations for which an assessment is possible, gives some indication of the nature of job competition in a specific field facing young people in the years ahead.

In addition to the overall and detailed industry and occupational projections developed for the *Handbook* and described earlier, special manpower studies are prepared, as part of the occupational outlook program, that provide information, narrower in scope and greater in depth, on the changing industrial structure and occupational composition of American industries, such as railroads, civil aviation, and electronics.² Other special studies provide more technical information and quantitative projections of manpower requirements and resources in specific occupations, industries, or for specific groups of workers—such as teachers, technicians and nonwhite workers—which include consideration of the current and future demand-supply relationships and their implications.³ Still others discuss only manpower requirements trends and projections, especially in

those occupational groups where the supply of workers is difficult to estimate, such as skilled workers and workers in defense-related employment.⁴

Sources of Data

The projections and other manpower information developed in the occupational outlook program utilize a wide variety of data sources, which vary mainly with the particular occupation or industry under examination. The following sections indicate some of the major sources of statistical and other information utilized in the program.

The basic statistics on current and past employment in occupations and industries have been based mainly on Bureau of Labor Statistics household data from the *Monthly Report on the Labor Force* (MRLF) and establishment data from *Employment and Earnings*. (A single publication starting with the February 1966 issue). Use is made also of the scientific and technical personnel surveys conducted by the Bureau, which contain data on scientists, engineers, and technicians. The decennial Census of Population is utilized for data on most occupations not covered by the limited detail published in the MRLF and Censuses of Business and Manufacturing are used to fill in industry detail. Information from the Civil Service Commission is used for data on Federal Government workers. These basic sources of occupational and industry employment statistics are augmented by data from Federal regulatory agencies, such as the Federal Aviation Agency and Interstate Commerce Commission, which collect industry and occupational statistics. In some cases, employment data are obtained from unions, industries, trade associations, and professional societies. In most cases, however, these general statistics serve only as a starting point for the development of the specific, current estimates needed for a particular report.

In developing analyses of past and projected changes in employment requirements—which will be described later—the outlook program utilizes statistics of output, hours of work, and output per man-hour. The major sources of the statistics used are Bureau of Labor Statistics studies of productivity and technological development, the Federal

² *Employment and Changing Occupational Patterns in the Railroad Industry, 1947-60* (BLS Bulletin 1344, 1963); *Employment Requirements and Changing Occupational Structure in Civil Aviation* (BLS Bulletin 1367, 1964); and *Employment Outlook and Changing Occupational Structure in Electronics Manufacturing* (BLS Bulletin 1363, 1963).

³ Maxine G. Stewart, "A New Look at Manpower Needs in Teaching," *Monthly Labor Review*, June 1964, pp. 639-644; *Technician Manpower: Requirements, Resources, and Training Needs* (BLS Bulletin 1512, 1966); Joe L. Russell, "Changing Patterns in Employment of Nonwhite Workers," *Monthly Labor Review*, May 1966, pp. 508-509; and "Job Hopes High for Record College Class," U.S. Department of Labor, Press Release, June 5, 1966 (USDL 7246).

⁴ Allan F. Salt, "Estimated Need for Skilled Workers, 1965-75," *Monthly Labor Review*, April 1966, pp. 365-371; and Joseph F. Fulton, "Employment Impact of Changing Defense Programs," *Monthly Labor Review*, May 1964, pp. 508-516; and Bernard Yabroff, "Trends and Outlook for Government Employment," *Monthly Labor Review*, March 1965, pp. 285-291.

Reserve Board production indexes, and the U.S. Department of Commerce output data from the *Annual Survey of Manufactures* and the *Census of Manufactures*. Industry associations and unions also often provide similar types of data.

Estimates of the past and probable future supply of workers utilize entirely different sources of information. U.S. Office of Education data on enrollments and degrees in high school, post-secondary schools, and colleges and universities form a major component of the supply estimates. Bureau of Apprenticeship and Training statistics on apprenticeship, as well as information on company training programs, provided through company reports and personal interviews, provide other inputs into the supply estimates.

Special studies of various aspects of the supply of workers provide essential information for the development of the estimates and projections of supply. A few examples of these types of statistical source materials are occupational mobility studies (Bureau of Labor Statistics); Tables of Working Life (Bureau of Labor Statistics); followup studies of college graduates (National Science Foundation); and many other specific types of studies, often of a one-time nature. Earnings information, which appears in many of the outlook publications, is drawn primarily from wage and earnings surveys conducted by the Bureau of Labor Statistics, supplemented with additional information on many occupations from Federal regulatory agencies. Studies of union wage scales are also used. Information is also drawn from reports by the National Science Foundation, professional societies and other groups.

Filling in gaps in the various types of statistics used is information obtained from (1) personal interviews with employers or others closely associated with an industry or occupation; (2) reports and interviews with professional or trade associations and licensing agencies; (3) union publications and officials; and (4) periodicals, trade journals, annual reports, and so on.

Methods of Analysis

The projections of requirements and resources developed for the occupational outlook program require varying methods of analysis, usually because of differences in the factors affecting a par-

ticular occupation or industry, but also because of differences in the amount of data available for analysis. The broad pattern of research, however, is generally the same in all of the detailed, comprehensive occupational and industry studies.

The starting point in most studies is an analysis of the factors affecting the demand for workers in the occupation, and an assessment of how these factors may operate in the future. Occupational employment is affected by a host of factors. Technological change is the most often discussed factor affecting occupational employment, but occupational changes are also influenced by other factors, such as growth in population and its changing age distribution, as in the case of teachers. Government policy—relating, for example, to the magnitude of the defense and space programs and to expenditures for research and development—also plays a major role. Occupational employment is also influenced by institutional factors, such as union-management relationships and practices, as in the case of railroad workers, or by the relative supply of workers in other occupations, as for example, the substitution effect resulting from shortages of engineers and their replacement by technicians. Also influencing occupational employment are changes in the total demand for the employing firm's product; changes in the level of income and distribution of income among consumers, industry and government; and changing patterns of consumption.

It is apparent, in view of this multitude of factors, that no one technique can be used successfully to project manpower requirements in all occupation and industries. The growth and decline of each occupation is affected by its own complex of factors. The number of teachers required, for example, is affected by the number of pupils (related to birth rates and trends in the proportion of children at each age who attend school) and by trends in the ratio of teachers to pupils, which depend upon education practices and available financing.

Projections of requirements for scientists, engineers, and technicians require consideration of different factors. These must take into account such factors as the growing utilization of technical personnel, the increasing technological complexity of industrial products and processes, changes in levels of expenditures for defense, and growing research and development activities. Requirements for

automobile mechanics are related to the number of new automobiles and accessories and the age of automobiles; for radio and TV repairmen, to the number of radios and TV's sold, and their age and complexity; for policemen, to population and urbanization; for truckdrivers, to improved equipment and highways, and for competing methods of transportation.

For many occupations, the significant factors influencing employment are the prospective levels of demand for the products of the various industries in which the occupation is found, and the effect of these changes in demand on employment in the industries. Among the general factors which must be considered in an analysis for an industry study are expected changes in the total domestic production of the industry's product or service, competition with other products or services, expected technological changes, output per man-hour, and changes in hours of work. More specifically, in projecting the activity or production level of an individual industry, it is necessary first to establish the nature of the demand for an industry's products or services and the relationship of this industry to the growth of the whole economy. Obviously, an industry producing products directly for consumers will have a different type of demand function than an industry which is making raw materials to be used as a component for further manufacturing.

In projecting the production of steel, for example, consideration must be given to the expected increase in population and the trend in steel output per capita. The total requirements for steel depend on the requirements projected for each of the principal steel-using industries, such as the automobile, construction, electrical appliances, machinery, and containers industries; competition to steel from other materials, such as aluminum and plastics; and the import-export balance for steel. In effect, it is necessary to project the output of both domestic and foreign users of steel in order to estimate total steel requirements. Future industry production or activity levels can then be translated into overall manpower requirements by estimating changes in man hours per unit of output for each industry, and by making assumptions as to changes in hours of work.

Because of the tremendous amount of resources necessary to make an extensive study of each industry in the economy, a more global type of anal-

ysis has been used to fill the gaps and to provide an overall framework for the occupational and industry projections. In making the analysis for the products of each industry, the usual starting point is the total demand of the economy for goods and services; this can be apportioned among the requirements for each major product or service (classified by industry). The estimates of production can then be translated into requirements for workers in total and by occupation.

The general approach in the development of this industry framework is to begin with the population and labor force projections developed by the Bureau of the Census and the Bureau of Labor Statistics. Assumptions are made as to the size of the Armed Forces, the level of unemployment, annual hours of work, and output per man-hour. Multiple correlations are made which take into account past employment trends and relationships, and variables such as unemployment, size of the Armed Forces, gross national product, and population. By this technique, preliminary projections of manpower requirements are developed for each industry for which adequate data are available.

The results of the multiple regression analysis are then used as the basis for further judgment decisions as to the level of manpower requirements in the projected period, particularly for those industries for which detailed industry studies have been made. The considerable amount of information on individual industries developed in the occupational outlook program over many years and through discussion with representatives of industry and unions provides essential background in making these judgments. Analysis of trends and projections for the economy as a whole, or for individual industries made by other groups, such as the National Planning Association, Stanford Research Institute, State and local governments, and universities, also contribute to these judgments. The adjusted overall industry projection framework is then utilized as a basis for occupational requirements. These rough occupational projections are then analyzed and adjusted on the basis of the individual occupational studies previously described, both the detail and the control totals. (See description of Industry-Occupational Matrix, ch. 7.) In general, it may be said that the projections are based heavily on judgment as to the effect of the demand factors on specific occupations.

Projections of changes in manpower requirements by occupation and industry provide only one part of the information on the total number of job openings which will need to be filled in the years ahead. In most occupations, more workers are needed yearly to fill positions left vacant by those who leave the occupation to enter other occupations or because of retirement or death, than are needed to staff new positions created by growth of the field. In estimating the total number of openings likely to arise in an occupation, the occupational outlook program analyzes studies of occupational mobility among selected groups of workers, and tables of working life.

These tables of working life, which are similar to the actuarial tables of life expectancy used by insurance companies, provide a basis for assessing future rates of replacement resulting from deaths and retirements, which are in turn affected by differences in sex and average age of the workers in particular occupations. Where men comprise the great majority of workers, estimated replacement rates for deaths and retirement usually average between 1 and 4 percent a year. In occupations in which women predominate, the rate is usually much higher, and allowance must be made for the large numbers of women who leave paid employment to get married and assume family responsibilities but who return to paid employment after marriage or raising a family. The replacement rate among elementary school teachers, for example, is estimated at 8 percent a year; many of these teachers return to employment at a later date.

In appraising the overall employment opportunities in an occupation, estimates are also made of the future supply of personnel, at least in those fields in which the supply is identifiable. Statistics on high school and college enrollments and graduations are the chief sources of information on the potential supply of personnel in the professions and in occupations requiring extensive formal education. Data on numbers of apprentices and graduates of vocational and technical training programs provide some limited information on new entrants into skilled trades. However, in many occupations most new entrants are trained informally, through on-the-job training or company training programs.

It is not enough to know, of course, how many persons are being formally trained for an occupa-

tion, since not all those completing formal training or education in a particular field enter that field upon completion of their courses. As a result, special surveys are utilized 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 MDTA and other types of training. Limited data on transfers out of an occupation or re-entries into an occupation are also utilized, although, in general, data on occupational mobility are available for only a few occupations.

The estimates of the future demand in an occupation is then related to estimates of the future supply to develop the employment outlook in that field and to provide information to policy makers, educators, and others on the implications of these relationships.

Presentation

The *Occupational Outlook Handbook* is the major publication of the occupational outlook program. Oriented toward vocational guidance, the *Handbook* is a basic reference source, published every other year, which includes comprehensive and non-technical job information on approximately 700 occupations and 30 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. In addition to these two publications, developed mainly for use in vocational guidance, the occupational outlook program conducts technical and detailed studies on specific occupations and industries in order to furnish information to manpower experts, personnel departments, and others interested in the more technical aspects of the Nation's future manpower needs.

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Chapter 6. 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.

Methodology

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 1970, 1975, and 1980 were published in February 1965, approximately 6 months after the latest population projections became available.

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 the situation in 1955-57, when the unemployment rate averaged 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 be 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 almost everyone of working age (14 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 "B" of the population projections published in the Census Bureau's *Current Population Reports*, P-25, No. 286 was chosen.

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 and 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 a number of these specific demographic and social factors. For example, projections of the proportion of persons enrolled in schools in the various young ages are used to subdivide the future population of young persons into those who are expected to be in school and those not in school. The population of married women in ages 20 to 44, by age, 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. Similarly, projected marital status distributions of older adult women are used to provide the future numbers in each marital category within each age.

For each of these 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 monthly statistics on the labor force prepared by the Bureau of Labor Statistics and based on the Current Population Survey of the Bureau of the Census is the source of the basic historical data on labor force participation rates by age and sex used in projecting the labor force. Historical data on labor force activity by various categories within several of the age-sex groups were 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. Projections of school enrollment and marital status, by age, are based on published and unpublished data of the Bureau of the Census. Data used in projecting the proportion of women in each age group by presence of 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

Number

1. Cooper, Sophia, "Interim Revised Projections of the U.S. Labor Force, 1965-67," *Monthly Labor Review*, October 1962, pp. 1089-1099, reprinted as Special Labor Force Report No. 24.
2. —, and Denis F. Johnston, "Labor Force Projections for 1970-80," *Monthly Labor Review*, February 1965, pp. 129-140, reprinted as Special Labor Force Report No. 49.
3. *Population and Labor Force Projections for the U.S., 1960 to 1975* (BLS Bulletin 1242, 1959).

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Chapter 7. Industry-Occupational Matrix

Background

The Bureau of Labor Statistics has developed a comprehensive set of data on the occupational employment composition of industry sectors representing the entire economy as of 1960. These data are set up to form a table, or matrix, with 156 specific occupations or groupings of occupations cross-classified with 137 industries. Thus, it is possible to see the occupational pattern of each industry—i.e., what proportion each occupation is of total employment in an industry. Looked at another way, the tabulation makes it possible to determine how total employment in an occupation is distributed by industry.

Initial 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 of the early 1950's, sponsored by the U.S. Department of the Air Force. That program was terminated in 1953, but the 1950 matrix and its 1960 successor continue to provide the basic information for emergency manpower planning, now carried on by the Office of Emergency Planning. In recent years, the strong interest in training new workers, retraining workers displaced by automation, and providing information to high school counselors and to students making career decisions, has focused increased attention on the need for estimates of the numbers presently employed in detailed occupations and the likely future employment requirements by occupation. The Industry-Occupational Matrix provides a systematic approach to developing the desired information.

Sources of Data

Data for the 1960 Industry-Occupational Matrix were brought together from a wide variety of sources. A major source was the *Occupation by Industry* report from the 1960 Census of Population. The *Monthly Report on the Labor Force*

(MRLF) was the source for total employment, employment for broad occupational groups and for a few large, specific occupations.¹ Other sources of occupational employment data included the Bureau of Labor Statistics annual surveys of occupational wage rates in metropolitan areas and selected industries;² 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 licensure 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,³ teachers, and policemen.

In total, specific estimates from sources other than the Census were entered in the detailed cells of the matrix for about 16 million workers or one-fourth of all those who were employed in 1960. The remaining detail in the matrix was derived by forcing 1960 population census estimates for detailed cells (published in *Occupation by Industry*) to 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 from the MRLF. Most of the industry employment totals are 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 MRLF estimates. The adjustments of the matrix to consistency with MRLF estimates of total employment and industry employment estimates, derived as described above, brings the matrix for 1960 into agreement with data which are the basis for projections of total employment and employment by industry, being made by the Bureau. Employment estimates in the matrix

¹ See ch. 1.

² See ch. 14.

³ See ch. 4.

may be modified as additional information is developed.

Analysis and Uses

A basic objective of the project is to have available a comprehensive set of data on industry-occupational relationships which can be used in projecting manpower 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 utilizes 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, office clerical workers, actuaries, and others. In contrast, the workforce in restaurants is largely made up of waiters, waitresses, cooks, and owner-managers. Over periods as short as a decade, the occupational structure of many industries is 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 chang-

ing 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 10 to 15 years, it is clear that these 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 which affect skill requirements are being studied in an effort to estimate the future occupational structure of each matrix industry. The adjusted occupational patterns are being used, together with projections of employment by industry from the Government's Economic Growth Project,⁴ to estimate future employment requirements for about 100 occupations.

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⁴ See Chapter 30.

Prices and Living Conditions

Chapter 8. Consumer Expenditures and Income

Background

Consumer expenditure surveys¹ 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 include 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 1888-91,² in line with the legislation creating the Bureau, was to study the worker's consumption habits and living costs 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 rising prices led to the second survey, during the year 1901. The index of prices of food purchased by workingmen, with weights based on the 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 10.) The next major study, for 1934-36, was made primarily to revise these index weights and covered only urban wage and clerical workers.

However, in the severe economic depression of the 1930's, interest in consumer surveys expanded from study of the welfare of selected groups to general economic analysis. Thus, 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 undertook to show consumption of all segments of the population, both urban and rural.³ The Bureau's sixth major sur-

vey, for 1950, covered all urban consumers. It provided the basis for revising the Consumer Price Index (CPI) and also supplied abundant material for broader types of economic and market analysis. The remainder of this chapter deals with the 1960-61 survey—the latest in the series⁴ describing changes in the consumption habits of the American people.

Description of Survey

The basic orientation of the Bureau's most recent survey was to obtain detailed information for revising the CPI. The increasing need for consumer expenditure and income data for other purposes was taken into account in planning the survey of urban families in 1960 and 1961. Then, in cooperation with the U.S. Department of Agriculture (USDA), the 1961 coverage was extended to rural areas. Thus, for the first time since 1941, information on spending habits became available for a cross-section of the entire noninstitutional population in urban, rural nonfarm, and rural farm areas of the United States. Concepts, techniques, and publications for the 1960-61 survey were planned to provide as much continuity and comparability as possible with the Bureau's 1950 and earlier expenditure surveys.

¹ In this chapter, the initials CES are used to refer to the program of consumer expenditure surveys.

² The State of Massachusetts conducted the first expenditure survey in the United States. This investigation of living conditions in 1874-75 undertook to measure the welfare of the workingman's family before and after migration to the United States. For a more detailed account of expenditure surveys in this country, see U.S. Bureau of the Census, *Historical Statistics of the United States—Colonial Times to 1957*, Chapter G (1960).

³ The Bureau also cooperated with the U.S. Department of Agriculture in a smaller scale nationwide survey of urban and rural families in 1941-42 to obtain facts on which to base decisions for the civilian economy during wartime. In addition, the Bureau conducted a Survey of Prices Paid by Consumers in 1944 among a nationwide sample of urban families; as a byproduct of the reports required for the analysis of prices, certain data on family income, savings, and expenditures were obtained.

⁴ In addition to these 7 major surveys, the Bureau has conducted a number of expenditure surveys in cities selected for specialized studies.

All data were collected through the voluntary cooperation of families.⁵ The family, or consumer unit (CU), referred to (1) a group of people usually living together who pooled their income and drew from a common fund for their major items of expense,⁶ or (2) a person whose income and expenditures were not pooled with others, whether living alone or in a household. However, never-married children living with parents always were considered as members of the parents' consumer unit.

Information was recorded for the family as composed in the survey year, including part-year members. Family members were not eligible for periods in the survey year that they lived in military camps, posts, or reservations; in institutions; abroad (except on vacation, etc.); or were members of another CU.⁷

A complete account of family income and outlays was compiled for a calendar year. This account included information to determine net changes in the family's assets and liabilities during the year. The estimated value of goods and services received as gifts or otherwise, without direct expenditures by the family, was requested also. To supplement the annual data, families who prepared meals at home provided a detailed 7-day record of expenditures for food and related items purchased frequently.

For selected items of clothing, housefurnishings, and food, the record of expenditures was supplemented by information on quantities purchased and prices paid. Characteristics of the housing occupied by homeowners and renters and an inventory of the major items of housefurnishings they owned were recorded.

To permit more meaningful analysis of the spending habits of American families, limited demographic information was obtained. This information included the sex, age, years of school completed, occupation, race, and marital status of each family member.

Data Sources and Collection Methods

All data were collected by personal interview. The BLS was responsible for collecting data from all residents of urban places. The BLS and USDA shared this responsibility in the rural areas

of Standard Metropolitan Statistical Areas (SMSA's)⁸ and the USDA had sole responsibility for interviewing rural households in nonmetropolitan areas.⁹

Field Organization

To reduce the size of the staff to be recruited and trained and to utilize this staff over a longer period, it was decided that the urban survey would cover 2 years, 1960 and 1961. For similar reasons, the surveys for each year were conducted in two "waves." As field work was completed in the largest SMSA's, supervisors were reassigned to smaller places. Interviews for the 1960 and 1961 CES were conducted in the spring and summer of 1961 and 1962, respectively.

The supervisory field personnel were recruited by the BLS Regional Offices¹⁰ and brought to Washington for 6 weeks of intensive training on the purposes of the survey, survey techniques, and schedule content. These supervisors went to an assigned city where they, in turn, recruited interviewers, whom they trained for about 8 days.

Questionnaires

The detailed questionnaires used by the BLS agents in interviewing families in the 1960-61 survey had been tested in surveys for 1959 in three cities. They incorporated modifications based on this experience. Three forms were used in the nonfarm surveys. Schedule A was a two-page form to determine the family's eligibility for the survey and, for families who refused or were unable to participate in the survey, it provided a record of minimum data for the analysis of non-response. Schedule B, on which the interviewer entered the complete annual record of the family's living arrangements, income, spending, and

⁵ See discussion of bureauwide policy on voluntary reporting and confidentiality, under Introduction.

⁶ This category includes children temporarily away from home at school or college.

⁷ The tabulations published in the CES reports listed in the table at the end of this chapter include only full-year consumer units, i.e., units with at least one member who was eligible over the entire survey year. In addition, the Bureau obtained schedules from approximately 400 part-year CU's, for special analytical research.

⁸ See appendix B for description of SMSA classification system.

⁹ See discussion of sample design, p. 56.

¹⁰ The following description refers to procedures of the BLS, but USDA procedures were similar.

changes in savings, consisted of 59 pages and formed the basic framework of the survey. Schedule C provided 15 pages for a detailed report of the family's purchases of food, beverages, tobacco, personal care, and household supplies in the week preceding the interview.¹¹ The coding system for summarizing and classifying the data was devised while the 1960-61 schedules were being designed, and tabulating codes were printed on the schedules. The precoded data were then readily transferred to punch cards and magnetic tapes for tabulating.

Information in schedule B was grouped in 23 sections, placed in a sequence so as to establish and maintain rapport between the interviewer and the respondent. The detailed checklists of items¹² in each section were included not only to facilitate recall, but to provide the specific information needed to determine CPI weights. However, all sections were rarely applicable to a single family. For example, if the family were renters, the sections relating to homeownership could be omitted. Families were encouraged to refer to records whenever possible.

Reported receipts and disbursements were summarized and reviewed in the field to determine the completeness, consistency, and balance of the family account. Families were reinterviewed when the field supervisor deemed it necessary to clarify

¹¹ A modification of schedule B, providing for detailed reporting of farm receipts, disbursements, changes in farm assets, and value of home-produced food, but otherwise paralleling the non-farm schedule, was used by the U.S. Department of Agriculture in rural farm areas. Schedule C was not used in interviewing farm families.

¹² For a discussion of global versus detailed questions and "free-listing" versus "check-listing," see report by Helen Humes Lamale, *Methodology of the Survey of Consumer Expenditures in 1950*, Philadelphia, Pa., University of Pennsylvania, Wharton School of Finance, 1959, pp. 18-19.

¹³ Prior to editing the schedules for machine tabulation, the schedules were reviewed in the Washington offices of the BLS and USDA primarily to determine that entries conformed to the survey concepts and methodology. This review was concentrated on sections of the schedule which had proved most difficult in previous surveys, and on unusual situations which required specialized instructions. Occasionally, schedules were returned to the field for clarification or additional information, and some schedules considered complete in the field were rejected in Washington. If a schedule met the test of the review and editing instructions with respect to internal completeness and consistency of expenditures with each other and the family's reported manner of living, the record was used even though there was a substantial lack of balance between the family's reported total receipts and disbursements.

¹⁴ This procedure involves the probability selection of a sample "pattern" from a set of patterns purposively established so that, taken as a group, they give each primary sampling unit its proper chance of appearing in the final sample. The selection of the city sample is described in "Technical Note—The Revised City Sample for the Consumer Price Index," *Monthly Labor Review*, October 1960, pp. 1078-1083. (BLS Reprint 2352.)

ambiguous entries or to complete a record.¹³ On the average, the interviewer spent 7 to 8 hours with a family in a series of visits arranged at the family's convenience.

Sampling

Separate stratified samples were selected for urban areas, rural areas in metropolitan counties, and rural areas in nonmetropolitan counties. A three-stage sample design was used within each area to obtain a sample of consumer units representative of all U.S. consumer units as defined for this survey.

In developing urban sampling plans, continued representativeness of the sample for measuring national changes in consumer prices was of paramount importance. Consideration of probable resources led to setting 66 as the maximum number of cities for the CES sample. Tests of the effectiveness of some of the more obvious modes of stratification indicated that no elaborate stratification was justifiable for so small a sample of cities. In general, classifications by geographic region and size of city seemed to be most effective, especially since an important objective in selecting specific cities was to achieve good geographic dispersion. For this purpose, the BLS utilized the "controlled selection" procedure.¹⁴ The primary sampling unit was the Standard Metropolitan Statistical Area (SMSA) in the metropolitan segment of the United States and the individual urban place in nonmetropolitan areas.

Sample Design for Three Urbanizations

In the first stage of the design for the *urban* sample, all SMSA's and nonmetropolitan urban places were classified by population size and region. A sample of 66 places listed in the table was selected to represent all urban places in the 50 States. All of the 12 largest areas in the United States automatically were included. For New York and Chicago, the Standard Consolidated Areas, rather than the constituent SMSA's, were used as primary sampling units. However, in the collection and analysis of the data, the New York-Northeastern New Jersey Standard Consolidated Area was divided into two subareas—New York, N.Y. and Northeastern New Jersey. All of these largest areas were surveyed in both years with data

SURVEY OF CONSUMER EXPENDITURES, 1960-61

(SUMMARY OF SAMPLE SIZE AND AVAILABILITY OF DATA FOR URBAN AND RURAL AREAS, BY GEOGRAPHIC REGION, POPULATION STRATUM, AND SMSA OR OTHER URBAN PLACE)

Region, population stratum, SMSA, or other urban place	Number of—		Survey year		Publications	
	Assignment addresses	Usable schedules	1960	1961	BLS report number	Supplements
Total urban and rural—United States	1 17,283	1 13,728	(*)	(*)	237-93	1, 2, 3
Northeast.....	4,127	3,228	(*)	(*)	237-89	1, 2, 3
North Central.....	5,187	4,092	(*)	(*)	237-90	1, 2, 3
South.....	5,100	4,180	(*)	(*)	237-91	1, 2, 3
West.....	1 2,869	1 2,228	(*)	(*)	237-92	1, 2, 3
Rural farm—United States	2,581	1,967		(*)	(?)	(?)
Northeast.....	214	145		(*)	(?)	(?)
North Central.....	980	742		(*)	(?)	(?)
South.....	1,181	925		(*)	(?)	(?)
West.....	206	155		(*)	(?)	(?)
Rural nonfarm—United States	2,497	2,285		(*)	237-88	1, 2, 3
Northeast.....	453	406		(*)	237-84	1, 2, 3
North Central.....	702	628		(*)	237-85	1, 2, 3
South.....	999	948		(*)	237-86	1, 2, 3
West.....	343	303		(*)	237-87	1, 2, 3
Urban—United States	1 12,205	1 9,476	(*)	(*)	237-38	1, 2, 3
North	3,460	2,677	(*)	(*)	237-34	1, 2, 3
SMSA, population 1,400,000 and over						
Boston, Mass.....	375	268	(*)	(*)	237-7 and 57	# 1
New York, N.Y.....	625	448	(*)	(*)	237-4 and 54	# 1
Northeastern New Jersey.....	500	356	(*)	(*)	237-13 and 63	# 1
Philadelphia, Pa.....	375	313	(*)	(*)	237-8 and 58	# 1
Pittsburgh, Pa.....	375	323	(*)	(*)	237-11 and 61	# 1
SMSA, population 250,000 to 1,400,000						
Buffalo, N.Y.....	250	199	(*)		237-18	# 1
Hartford, Conn.....	250	175		(*)	237-68	# 1
SMSA, population 50,000 to 250,000						
Portland, Maine.....	160	135	(*)		237-14	# 1
Lancaster, Pa.....	160	161		(*)	237-64	# 1
Nonmetropolitan urban place, population 2,500 to 50,000						
Burlington, Vt.....	65	52	(*)		237-24	(?)
Kingston, N.Y.....	65	47	(*)		237-24	(?)
Lewistown, Pa.....	65	41	(*)		237-24	(?)
Athol, Mass.....	65	60		(*)	237-74	(?)
Millville, N.J.....	65	56		(*)	237-74	(?)
Southbridge, Mass.....	65	53		(*)	237-74	(?)
North Central	3,505	2,722	(*)	(*)	237-35	1, 2, 3
SMSA, population 1,400,000 and over						
Chicago, Ill.....	500	371	(*)	(*)	237-5 and 55	# 1
Cleveland, Ohio.....	375	294	(*)	(*)	237-21 and 71	# 1
Detroit, Mich.....	375	290	(*)	(*)	237-1 and 51	# 1
St. Louis, Mo.....	375	319	(*)	(*)	237-15 and 65	# 1
SMSA, population 250,000 to 1,400,000						
Indianapolis, Ind.....	250	173	(*)		237-10	# 1
Dayton, Ohio.....	250	180		(*)	237-60	# 1
Wichita, Kans.....	250	189		(*)	237-67	# 1
SMSA, population 50,000 to 250,000						
Cedar Rapids, Iowa.....	160	125	(*)		237-17	# 1
Champaign-Urbana, Ill.....	160	126	(*)		237-23	# 1
Green Bay, Wis.....	160	130		(*)	237-73	# 1
Nonmetropolitan urban place, population 2,500 to 50,000						
Devils Lake, N.Dak.....	65	49	(*)		237-27	(?)
Findlay, Ohio.....	65	55	(*)		237-27	(?)
LaSalle, Ill.....	65	55	(*)		237-27	(?)
Niles, Mich.....	65	61	(*)		237-27	(?)
Owatonna, Minn.....	65	48	(*)		237-27	(?)
Cambridge, Ohio.....	65	43		(*)	237-77	(?)
Crookston, Minn.....	65	61		(*)	237-77	(?)
Logansport, Ind.....	65	50		(*)	237-77	(?)
Manhattan, Kans.....	65	45		(*)	237-77	(?)
Menasha, Wis.....	65	58		(*)	237-77	(?)
South	2,920	2,307	(*)	(*)	237-36	1, 2, 3
SMSA, population 1,400,000 and over						
Baltimore, Md.....	375	313	(*)	(*)	237-16 and 66	# 1
Washington, D.C.....	375	323	(*)	(*)	237-3 and 53	# 1
SMSA, population 250,000 to 1,400,000						
Atlanta, Ga.....	250	198	(*)		237-6	# 1
Dallas, Tex.....	250	178	(*)		237-20	# 1
Nashville, Tenn.....	250	201		(*)	237-56	# 1
SMSA, population 50,000 to 250,000						
Austin, Tex.....	160	110	(*)		237-12	# 1
Orlando, Fla.....	160	106	(*)		237-19	# 1
Baton Rouge, La.....	160	112		(*)	237-62	# 1
Durham, N.C.....	160	135		(*)	237-69	# 1

See footnotes at end of table.

SURVEY OF CONSUMER EXPENDITURES, 1960-61—Continued

(SUMMARY OF SAMPLE SIZE AND AVAILABILITY OF DATA FOR URBAN AND RURAL AREAS, BY GEOGRAPHIC REGION, POPULATION STRATUM, AND SMSA OR OTHER URBAN PLACE)—Continued

Region, population stratum, SMSA, or other urban place	Number of—		Survey year		Publications	
	Assignment addresses	Usable schedules	1960	1961	BLS report number	Supplements
Urban—United States—Continued						
South—Continued						
Nonmetropolitan urban place, population 2,500 to 50,000						
Cleveland, Tenn.	65	43	(*)	-----	237-25	(4)
Griffin, Ga.	65	61	(*)	-----	237-25	(4)
McAllen, Tex.	65	38	(*)	-----	237-25	(4)
Reserve, La.	65	64	(*)	-----	237-25	(4)
Union, S.C.	65	50	(*)	-----	237-25	(4)
Vicksburg, Miss.	65	55	(*)	-----	237-25	(4)
Florence, Ala.	65	54		(*)	237-75	(4)
Gainesville, Tex.	65	56		(*)	237-75	(4)
Mangum, Okla.	65	50		(*)	237-75	(4)
Martinsville, Va.	65	55		(*)	237-75	(4)
Okmulgee, Okla.	65	48		(*)	237-75	(4)
Sebring, Fla.	65	57		(*)	237-75	(4)
West	12,320	11,770	(*)	(*)	237-37	1,2,3
SMSA, population 1,400,000 and over						
Los Angeles-Long Beach, Calif.	500	388	(*)	(*)	237-22 and 72	1
San Francisco-Oakland, Calif.	375	302	(*)	(*)	237-2 and 52	1
SMSA, population 250,000 to 1,400,000						
Seattle, Wash.	250	209	(*)	-----	237-9	1
Denver, Colo.	250	204		(*)	237-59	1
Honolulu, Hawaii	250	215		(*)	237-78	1
SMSA, population 50,000 to 250,000						
Bakersfield, Calif.	160	120		(*)	237-70	1
Nonmetropolitan urban place, population 2,500 to 50,000						
Anchorage, Alaska	275	134	(4)	(4)	237-29	(4)
Gallup, N. Mex.	65	58	(*)	-----	237-26	(4)
Klamath Falls, Oreg.	65	44	(*)	-----	237-26	(4)
Eureka, Calif.	65	42		(*)	237-76	(4)
Orem, Utah	65	54		(*)	237-76	(4)

* Asterisk indicates year of survey.

1 Includes Anchorage, Alaska, which was surveyed for 1959.

2 Published by the U.S. Department of Agriculture.

3 Supplements 2 and 3 not to be published; for a limited time photocopies of tables may be obtained from the Bureau of Labor Statistics at a nominal cost.

4 No supplements available.

5 Survey for 1959.

NOTE: The Bureau also has published reports for the following special-city surveys: Cincinnati, Ohio, 1959 (Report 237-28); Fairbanks, Alaska, 1959 (Report 237-30); Ketchikan, Alaska, 1960 (Report 237-31); Juneau, Alaska, 1960 (Report 237-32); Las Vegas, Nev., 1962 (Report 237-33); Houston, Tex., 1963 (Report 237-33); Kansas City, Kans.-Mo., 1963 (Report 237-79); Milwaukee, Wis., 1963 (Report 237-80); Minneapolis-St. Paul, Minn., 1963 (Report 237-81); and San Diego, Calif., 1963 (Report 237-82).

collected from half the sample of consumer units each year. Half of the remaining sample of smaller SMSA's and urban places was surveyed each year, i.e., for 1960 and 1961.

At the second stage, a sample of housing unit (living quarter) addresses was obtained in each city and in the entire urban part of each SMSA from the Comprehensive Housing Unit Survey (CHUS) conducted by BLS in the fall of 1960¹⁵ or 1961. The BLS housing unit surveys were based on area block samples designed to represent all noninstitutional living quarters (including non-transient accommodations in hotels and rooming houses) in the urban area.

¹⁵ Because of the shortage of time, the BLS did not conduct a CHUS in 1960 in places with population of 2,500 to 50,000. The 1960 sample for these cities was selected from 1960 Census of Housing and Population listings of living quarter addresses arranged by Enumeration Districts (ED's).

¹⁶ These classifications, which were on the basis of Census definitions, made it possible for the BLS to refer addresses of all households meeting the Census definition of farm operator or farm resident to the USDA for inclusion in the rural sample.

In the third stage, a subsample of addresses was selected from the housing unit addresses obtained in the CHUS or Census, arranged by a number of characteristics, e.g., household size.

The first stage in selecting the *rural sample in metropolitan areas* utilized all 34 SMSA's selected for the urban sample. In the second stage, BLS conducted a Rural Housing Unit Survey (RHUS) which consisted of a listing of housing unit addresses in a stratified sample of Census Enumeration Districts (ED's) and a subsample of smaller segments or blocks in the designated ED's. Each housing unit was visited and classified as farm or nonfarm, and as to whether the family included a farm operator.¹⁶ In the third stage, subsamples of rural nonfarm and rural farm housing unit addresses were selected from the RHUS listing by applying a ratio based on census data on rural farm and rural nonfarm households in each stratum.

In the first stage of the USDA's design for the *rural sample in nonmetropolitan areas*, counties were grouped by State Economic Areas¹⁷ into 126 strata equal in weighted counts of rural farm and rural nonfarm dwellings, as the same sample of counties was to be used for both farm and nonfarm households. For each stratum, one county was chosen at random with a probability proportional to its weighted count. Counties were selected from 41 States. At the second stage, within each sample county, a selection of rural segments was made separately from rural places (100 to 2,500 inhabitants) and the open country. Addresses of all housing units in these segments were listed and classified as farm and nonfarm. Farm operators also were identified. In the third stage, subsamples of nonfarm and farm housing unit addresses were selected from the survey listings.

Sample Size

The master sample for the total urban and rural population included 17,283 living quarter addresses which were assigned to the interviewers.¹⁸ Usable schedules were tabulated for 13,728 consumer units. The distribution of assignment addresses and usable schedules by urbanization, geographic region, and for individual metropolitan areas or cities in the urban sample is shown in the table.

Estimating Procedures

To describe the spending and saving of all families in the United States, data from the CES samples have been combined to obtain regional and U.S. levels.¹⁹ This information was summarized for each level of urbanization and for the entire population by using a system of weights based on the 1960 Census of Population.

To obtain the weights, adjustments were made in the Census total of persons in the population on April 1, 1960, to correct for definitional differences between the Census and the CES universe. The institutional population and on-post military personnel, which were not included in the CES, were deducted from the Census population. Since the CES data apply to the full survey year and family size is measured in year-equivalent persons, while the Census data are a count of persons on April 1,

1960, the Census data were adjusted to take account of births, deaths, and net civilian migration during 1960. For the 50 States, the net effect of the adjustments was to lower the population total from 179,325,671 to 177,391,360.

The total adjusted population was distributed among the sampling strata in accordance with the distribution of the unadjusted population. The population represented by each surveyed area was divided by the average family size in the area, as determined from the survey, to obtain the total number of families represented by each area. The estimated number of consumer units in the universe for the United States was 55,306,253.

The adjusted 1960 population was used as urban weights for both 1960 and 1961. Weights were computed for 67 urban strata,²⁰ including Anchorage, Alaska, which was surveyed for 1959. (See table.) Rural nonfarm weights were computed for 42 strata—34 SMSA's and a farm operator and nonoperator stratum for each of the four regions. The rural farm sample was designed to be self-weighting within regions. Sample averages for the four regions were combined to U.S. levels by the application of weights consistent with those weights used in the urban and rural nonfarm parts of the CES.

In applying the weights to the stratum averages, to obtain U.S. and/or regional averages, the blow-up factor for each class (e.g., income group, family-size class, etc.) was the number of consumer units in the universe represented by each sample family in a stratum multiplied by the number of families in the sample for that class. The resulting numbers of consumer units became the multipliers in calculating stratum aggregates which

¹⁷ See appendix B.

¹⁸ The address following each address in the master sample was picked as an alternate. The alternate address was substituted if the master address could not be located or the unit was vacant, if no one was at home after at least 2 visits, or if the occupant refused or was unable to give the minimum information required for classifying the family.

If the interviewer found more than one consumer unit living at an address, each unit was included in the sample. In hotels and apartments, the address given to the interviewer indicated a specific housing unit or units within the structure.

¹⁹ The samples were not designed to provide tabulations by State.

²⁰ For a single year such as 1961, the city weights differed from the 1960-61 weights, in that cities surveyed in that year carried the entire weight for their respective region city-size stratum in the 1961 tabulations. In combining 1960 and 1961, each year's sample represented approximately half of the adjusted population. The 1959 data for Anchorage were weighted into the combined 1960-61 tabulation for the West and the United States, but not into the tabulations for 1960 or 1961.

were combined to regional and U.S. levels. The regional and U.S. averages were obtained by dividing the sum of the stratum aggregates by the number of consumer units in the universe for the class.

Analysis and Presentation

Data were tabulated separately for each city and region listed in the table. All dollar values (income, expenditures, and changes in savings) were shown as averages per family (i.e., consumer unit). As city tabulations were completed, they were examined for reasonableness and internal consistency, and were compared with tabulations for other cities in the 1960-61 CES sample and with information from independent sources—principally the 1960 censuses of population and housing. Similar analytical comparisons were made for the regional and U.S. tabulations at each level of urbanization. For the urban sample, trends since 1950 were analyzed for cities which were in the CES sample for both periods. Each report contained brief analytical and interpretative text, plus definitions and statements on methodology.

The basic reports (see column 5, table) presented averages for major components of family accounts for consumer units classified by five characteristics: Family income after taxes, family size, age of family head, occupation of the head, and housing tenure. Supplement 1 presented the same information, classified by four additional characteristics: Education of the head, race, family type, and number of full-time earners. At the regional and U.S. levels, families also were classified by whether they lived inside or outside metropolitan areas; and inside SMSA's, by central city and other location.

Data for eight family characteristics in the above summaries were cross-classified (two variables) with each of other selected characteristics, as follows:

1. Family size with income, age of head, family type and location and size of place.
2. Age of head with income, occupation of head, and tenure.
3. Occupation of head with income, race, and tenure.
4. Education of head with income, and occupation of head.
5. Race with income, and tenure.
6. Number of full-time earners with income.
7. Tenure with income.
8. Family type with income, and occupation of head.

The two-variable tables are published as Supplement 2 to the basic reports.

Supplement 3 presents in detail the components of consumer expenditures, income, and changes in savings, which were summarized in the basic reports and Supplements 1 and 2. To illustrate, the category "automobile transportation" is broken down into 10 subgroups of expenditures. These detailed tabulations provide data for consumer units cross-classified by family size and income after taxes, and by family size and location of the family's residence inside or outside SMSA's.

Uses and Limitations

From its inception, the 1960-61 CES was planned to serve a variety of purposes. To this end, questionnaires and tabulation plans were circulated among a number of Federal agencies for comment. The BLS also formed the Consumer Expenditure Advisory Committee, representing academic, private research, and marketing users, and consulted with this Committee on a wide range of decisions affecting the CES. To date, the results have been used for only some of the contemplated purposes.

As stated earlier, the primary objective of the 1960-61 CES was to revise the CPI (chapter 10). The Bureau also uses the data to revise and expand its work in deriving standard quantity budgets for selected types of families (chapter 9). As time and resources permit, the Bureau proposes to draw upon this fund of consumer information to develop a broad program of family living conditions studies.²¹

The U.S. Department of Commerce relies on these family expenditure studies as the sole source of information for revising its benchmark estimates for a number of components in the household sector of the national accounts. The Internal Revenue Service used the published 1960-61 data to revise its tables of State sales tax payments, for guidelines to taxpayers in filing their Federal in-

²¹ The Bureau has initiated a series of special analytical reports (BLS Report 238-1, et. seq.) based on the 1960-61 CES. A list of reports in this series is available upon request.

The Bureau also prepares methodological monographs for the expenditure surveys which compare national aggregates of income, expenditures, and savings derived from the CES with aggregates developed for the national income and product accounts by the U.S. Department of Commerce and with data from other sources.

come tax returns. Currently the Department of Health, Education, and Welfare is studying the data in connection with numerous welfare analyses.

A number of universities utilize the Bureau's basic data in a variety of research projects. The potentialities of the survey results in consumer market analysis are evident from reports issued by the National Industrial Conference Board, the Chamber of Commerce of the United States, and a variety of trade publications and business organizations.

Data obtained from a sample survey as complex as the survey of Consumer Expenditures are subject to many types of errors. These include sampling, recording, and processing errors, and errors due to the refusal or inability of some families to give the information requested.

All data were reviewed, edited, and screened to minimize processing errors. Chance variations due to sampling can be measured statistically, and the BLS has published preliminary rough estimates of sampling error in the urban sample, in its report for the urban United States. Preparation of more detailed estimates for both the urban and rural segments will depend upon the availability of resources. Each report contains a section alert-

ing users to the cautions that must be exercised in using averages based on small samples and provides either the actual number or the basis for determining the number of families on which the averages in each table are based. Approximately 78 percent of the national sample of urban and rural families furnished usable schedules and some of the nonrespondents supplied limited information on family characteristics.²² Among the participating families, inaccurate reporting is a source of error, despite continued research in schedule design and intensive training of the interviewers. Such inaccuracies result from memory errors, misunderstanding of a question or reluctance to answer it, and incorrect entries by the interviewer. Although the BLS and USDA have accumulated substantial knowledge about such reporting errors and will continue research in this field, these errors cannot be quantified satisfactorily.

²² This information is used in the monographs on methodology (see footnote 21) to evaluate the nature of the sample losses due to nonresponse. It has been the Bureau's practice not to attempt to introduce in the basic CES tables adjustments for nonresponse or for the underreporting which is common in virtually all compilations of income statistics. Such adjustments present many difficulties when data are cross-classified as extensively as are the CES tabulations.

Technical References

Number

1. Brady, Dorothy S. and Williams, Faith M., "Advances in the Techniques of Measuring and Estimating Consumer Expenditures," *Journal of Farm Economics*, May 1945, pp. 315-344.

A review of changes in the direction of family expenditure surveys as the role of the consumer gained importance in economic theory in the mid-1930's. Discusses problems of concepts, definitions, sampling, and data collection that emerged as emphasis shifted from the analysis of expenditures of selected occupational groups to the interrelationships of expenditures, income, and savings of all types of families throughout the United States.

2. Ferber, Robert, "Research on Household Behavior," *The American Economic Review*, March 1962, pp. 19-63.

A survey of the main empirical research since World War II on the determinants of household spending and saving behavior. Includes an extensive bibliography.

3. International Labour Office, *Family Living Studies—A Symposium*, Studies and Reports, New Series No. 63, Geneva, 1961.

A collection of recent case studies selected to draw attention to different types of family living studies and to their methods and problems. The 15 chapters include surveys from countries throughout the world.

4. Lamale, Helen H., "Changes in Concepts of Income Adequacy over the Last Century," *The American Economic Review*, May 1958, pp. 291-299.

Relates changes in criteria for income adequacy to economic and social developments in three broad periods: 1860 to 1900—the "Subsistence" or "Break-Even" concept; 1900 to 1935—the "Living-Wage" concept; since 1935—the "Social" concept.

Technical References—Continued

Number

5. Lamale, Helen H. *Study of Consumer Expenditures, Incomes and Savings—Methodology of the Survey of Consumer Expenditures in 1950*. Philadelphia, Pa., University of Pennsylvania, Wharton School of Finance and Commerce, 1959.
A comprehensive statement of the purposes, procedures, and reliability of results of the 1950 survey, with summaries of earlier surveys and research which influenced the 1950 methodology. Includes facsimiles of questionnaires used in BLS expenditure surveys for 1901, 1917-19, and 1950.
6. Stigler, George J., "The Early History of Empirical Studies of Consumer Behavior," *The Journal of Political Economy*, April 1954, pp. 95-113.
Examines the relationship of the empirical work on consumer behavior to the theoretical work on income and demand prior to the twentieth century.
7. United Nations Statistical Office, *Handbook of Household Surveys: A Practical Guide for Inquiries on Levels of Living*, Provisional Edition. (Studies in Methods, Series F. No. 10.) New York, United Nations, 1964.
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8. U.S. Bureau of the Census, *Historical Statistics of the United States—Colonial Times to 1957*, (1960) Chapter G. The same, *Continuation to 1962 and Revisions*, 1965.
A compilation of tabular data from major Government and private statistical reports on consumer income and expenditures in the United States. Text describing each report is keyed to the tabulations.
9. U.S. Department of Labor, *How American Buying Habits Change* (1959).
A popular-style book dovetailing various studies to yield a picture of changes in the consumption habits of the American people between 1875 and 1950. Includes a chapter of technical comments on consumption statistics and an extensive bibliography.
10. Williams, Faith M. and Zimmerman, Carle C., *Studies of Family Living in the United States and Other Countries: An Analysis of Material and Method*, U.S. Department of Agriculture, Miscellaneous Publication No. 223, December 1935.
Analytical annotated bibliography of approximately 1,500 studies of family living made in 52 countries. Includes statements on the history and methodology of consumption studies since their inception.
A continuation of this bibliography, covering 1946 and later years, is published in Miss Williams chapter, "International Comparisons of Patterns of Family Consumption," in *Consumer Behavior—Research on Consumer Reactions* (Lincoln H. Clark, ed.) New York, Harper and Brothers, 1958.
11. Zimmerman, Carle C., *Consumption and Standards of Living*, New York, D. Van Nostrand Co., Inc., 1936.
A definitive analysis of family budget studies, with pertinent tabular materials, and discussion of psychological, social, and economic concepts and theories of consumption.

—KATHRYN R. MURPHY

Office of Prices and Living Conditions

Chapter 9. Standard Budgets

Background

“Standards of living” refer to the goals of consumers and workers with respect to their consumption of goods and services, use of leisure time, and conditions of work. Standard budgets measure the total costs or amounts of income required to achieve the levels and manner of living implicit in these goals.¹ The cost estimates are developed by translating the generalized concept of a living standard into a list of commodities and services which can be priced. In theory, the list is based wholly on objective judgments that the items and quantities specified are essential in maintaining the living standard. Thus, standard budgets are normative, or benchmark, estimates of living costs. They do not represent the ways in which family incomes should be spent, nor do they show how 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 the living conditions of cotton-mill workers in Fall River, Mass. and 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 was developed in 1919, defining a standard of health and decency. 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 not 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, however, the “requirements” were formulated primarily on the basis of the personal judgment of the budget makers.² It was not until 1946, when the Bureau compiled the City Worker’s Family Budget, that an objective method was

developed for the derivation of all segments of a standard budget.³ 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,⁴ and it is this methodology which is described in the remainder of this chapter.

Description of the Budget

All normative estimates of living costs must be based on specific family situations. The construction of a standard budget, therefore, requires a set of assumptions, i.e., specifications, which must be stated explicitly 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; and the relative position of the living standard on the consumption scale established by society, which ranks various consumption patterns in an ascending order from mere subsistence to plenitude in every respect.

Family composition has a significant effect on spending patterns, manner of living, and family needs. For the City Worker’s Family Budget, it was specified that the family consists of an employed husband, age 38, with a wife not employed outside the home, and two children, a girl age 8 and a boy 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 Budget for

¹ 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. The Bureau’s use of these terms conforms with this recommendation. 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.

² Published sources for these budgets are described in Technical Reference No. 2 (listed on p. 67).

³ See Technical Reference No. 10. For description of a companion budget for an elderly couple, see Technical Reference No. 11.

⁴ See Technical Reference Nos. 5 and 7.

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 family unit, which has a markedly different pattern of living and needs from the younger family, has been the subject of special concern in national policy formation over the last two 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.⁵

Both types of families were assumed to live in a large city or its suburbs. Assumptions were made concerning, also, the living arrangements and tenure⁶ of the families; inventories of house-furnishings, household equipment, and clothing; means of transportation; ownership of life insurance, provisions for medical care, savings positions, etc. Generally these assumptions are based 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.

The standard of living represented in both budgets lies somewhere between a minimum and a liberal standard. It is described as "modest but adequate" according to prevailing standards of what is needed for health, efficiency, the nurture of children, and for participation in social and community activities. The social concept of what constitutes an adequate living standard, or goal, changes over time as modes and manner of living change. Furthermore, in a complex and dynamic society, at any given point in time, there is no single living standard which can be considered as an appropriate norm for all purposes.⁷ For at least the last two decades, the "modest but adequate" standard reflected in the budgets for a four-person family and a retired couple has been interpreted to be more appropriate than a minimum standard as a measure of income adequacy for self-supporting families. This standard has been considered too high, however, as a norm for dependent families receiving public assistance, and too low for some of the other purposes for which measures of income adequacy are needed today.

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 data reported in the Bureau's surveys of consumer expenditures,⁸ to determine by objective procedures the choices of goods and services made by consumers in successive income groups.

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, plumbing facilities, adequate supplies of utilities and heat, and the 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

⁵ Extensive 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, published by BLS in November 1960, is described in a *Technical Note: Estimating Equivalent Incomes or Budget Costs by Family Type* (see Technical Reference No. 8). The scale is based on the assumption that families spending the same proportion of income on food have attained equal levels of living. While 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.

⁶ Although there has been a substantial increase in home-ownership among city families at all income levels since prewar years, resources available for the interim revision of the budgets did not permit the development of satisfactory concepts, procedures, and data for defining comparable dollar estimates of budget costs for homeowners. Therefore, the interim budgets include estimates for rental housing costs only.

⁷ For additional discussion of the relativity of living standards, see Technical Reference Nos. 3 and 4.

⁸ For a description of the Bureau's surveys of consumer expenditures, see chapter 8.

of electricity and other utility services required 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 quasi-standard for medical care, and a family membership in a group hospitalization plan was specified for this component of the budgets. Quantities of medical care services not covered by insurance were derived from data on utilization rates provided by the U.S. National Health Survey conducted in 1957-58.

For the other components of the budgets (clothing, housefurnishings, transportation, personal care, household operation, reading, recreation, tobacco, education, gifts and contributions, and miscellaneous expenses), there are no generally accepted scientific standards. Therefore, a technique was developed which relied on the collective judgments of consumers as to what is adequate. Purchases were examined at successive income levels to determine the income level at which the rate of increase in quantities purchased began to decline in relation to the rate of change in income, i.e., the point of maximum elasticity. The average numbers and kinds of items purchased at this income level became the quantities and qualities specified for the budgets.

Prices for items included in the budgets were collected in the types of stores and professional and service establishments customarily patronized by city workers' families. The prices, pricing procedures, reporting stores, and service establishments, and price calculation methods were those used by the Bureau for the Consumer Price Index,⁹ except that more price quotations were obtained in some cases to permit calculation of average prices and different qualities were priced in other cases to represent the budget level.¹⁰

Analysis and Presentation

In the methodology described previously, a standard budget is the end result of complex statistical analyses and calculations; it is not simply the product of a survey of how 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 standards 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 living standards. The appropriateness of the operating assumptions can be evaluated only with reference to the purposes to be served by and the uses made of the standard budgets.¹¹

Standard budget cost estimates may be analyzed in four general ways: (1) Budget costs are analyzed in relation to income. However, a standard budget is a completely appropriate measure of income adequacy only for the specific family type for which it was constructed. This type of analysis has been restricted, therefore, by the development of budget cost estimates for only two family types, coupled with the paucity of data on income by family composition. (2) Budget costs in one place are compared with costs in another, i.e., the budget costs provide a basis for calculating an index of intercity differences in living costs. The Bureau has provided this type of analysis in conjunction with its published reports on the budgets, and has recommended the method as the only valid approach to the development of a general purpose intercity index for cities with reasonably comparable patterns of consumption. (3) Budget costs are compared over time to provide a measure of change in living standards. The sporadic character of the Bureau's standard budget research program imposes serious limitations on this type of analysis, but potentially the program provides a basis for evaluating changes in the levels and standards of living of families from decade to decade. (4) Finally, budget costs estimates for different standards of living are compared with each other to provide a measure of the aggregate addition to income required to raise consumption to particular levels. This type of analysis remains theoretical, since cost estimates for more than one living standard have not been developed in this country since the early 1940's.

⁹ For a description of the Consumer Price Index, see chapter 10.

¹⁰ Technical Reference Nos. 5, 7, 10, and 11 provide additional details on the methodology, as well as lists of goods and services priced and dollar cost estimates, of the BLS budgets.

¹¹ For a discussion of the uses of standard budgets, see Technical Reference No. 9. See also Technical Reference No. 6 for comments on the needs for and limitations of existing budgets for the elderly.

Uses and Limitations

Standard budgets are used as tools 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. Normative estimates of living costs are needed, for example, to measure the extent to which social security benefits or payments under unemployment insurance programs meet family needs; to estimate aggregate requirements for consumer goods as a basis for developing public policies; or to prepare sound and valid estimates of the number of families living in poverty. Standard budgets also provide benchmarks for administrative determinations of need or of the cost of an adequate living standard, as required by a number of existing laws or policies of voluntary social, welfare, and educational agencies, e.g., in the determination of eligibility for public assistance; public housing; subsidized medical, mental health, or guidance services; or college scholarship aid.

In addition to their primary use as tools in evaluating income adequacy, standard budgets are needed 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.

No single estimate of living costs such as that provided by the City Worker's Family Budget or the Budget for a Retired Couple, which have been priced in only 20 large cities, can be used validly for all of the purposes for which living costs estimates are needed. For example, budget costs for only two family types are not an appropriate basis for making global estimates of need (for the urban population in the United States, Northeast Region, New York City, etc.), which should be based on

cost estimates or on some measure of equivalent income requirements, for families of all sizes and types. Furthermore, prices collected in 20 large cities for a specific date are not representative of prices in other large or medium-size cities; and neither budget quantities or prices for large cities are necessarily appropriate to the manner of living in small cities. Similarly, the Bureau's two standard budgets represent a specified standard of living, which may be higher or lower than the standard appropriate for evaluating income adequacy under the requirements of existing or proposed policies, laws, or programs, or within the framework of a specific research project. This determination can be made only by the policy maker, administrator, or research worker—not by the budget maker.

Intercity living cost indexes based on the BLS budgets are designed to reflect differences in costs of established residents in a community. Differences in housing costs, for example, are based on the average costs of occupied rental dwellings and are not a valid measure of the costs of vacant rental units available to new residents or the costs of maintaining an owned home. Differences in the cost of food reflect not only differences in price levels, but more importantly differences in regional preference patterns in the choice of food to meet the nutritional standard.¹² The indexes, therefore, are more appropriate for use as a research tool in analyses of the relationship between income and costs of established residents in different locations than as a measure of differences in costs for families moving from one location to another.

¹² 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

Number

1. Brackett, Jean C., "Intercity Differences in Family Food Budget Costs," *Monthly Labor Review*, October 1963, pp. 1189-1194.
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. Also presents a discussion of the conceptual implications of varying the weights in a place-to-place comparison of family living costs.
2. Clorety, Joseph A., "Consumption Statistics: A Technical Comment," *How American Buying Habits Change*, chapter X, 1959, pp. 217-242.
Includes a section on "Standard Budgets as Indicators of Progress" (pp. 232-242). Also presents in summary form a representative cross-section of budgets compiled in this country during the 20th century, showing average dollar cost figures for the total and for the major components of each budget.
3. Lamale, Helen H., "Changes in Concepts of Income Adequacy Over the Last Century," *Journal of the American Economic Association*, May 1958, pp. 291-299.
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; and a discussion of the implications in this relationship for present-day concepts of income adequacy.
4. Lamale, Helen H., "Poverty: The Word and the Reality," *Monthly Labor Review*, July 1965, pp. 822-827.
Discusses the role of standard budgets in providing an intelligible definition of poverty, for use in evaluating income adequacy for different family types and in different geographical locations and for estimating the extent of poverty in the United States.
5. Lamale, Helen H. and Stotz, Margaret S., "The Interim City Worker's Family Budget," *Monthly Labor Review*, August 1960, pp. 785-808.
Estimates of 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 (Atlanta, Baltimore, Boston, Chicago, Cincinnati, Cleveland, Detroit, Houston, Kansas City, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh, Portland, Oreg., St. Louis, San Francisco, Scranton, Seattle, and Washington, D.C.) Includes a detailed list of the goods and services considered necessary by four-person families to maintain the specified living standard as determined by levels of living actually achieved in the 1950's, and describes how this representative list was developed and priced. (See Reference No. 10 for description of original BLS City Worker's Family Budget.)
6. Orshansky, Mollie, "Budget for an Elderly Couple: Interim Revision by the Bureau of Labor Statistics," *Social Security Bulletin*, December 1960, pp. 26-36.
A summary report on "The BLS Interim Budget for a Retired Couple". (See Reference No. 7.) Includes a discussion of various conceptual problems encountered in developing normative living costs estimates for a retired couple, and some of the limitations of this particular budget for the multitude of purposes for which budgets for older persons and families are needed.
7. Stotz, Margaret S., "The BLS Interim Budget for a Retired Couple," *Monthly Labor Review*, November 1960, pp. 1141-1157.
Estimates of the cost of a "modest but adequate" standard of living for a man age 65 or over and his wife (living in rented housing), at autumn 1959 prices, in 20 large cities and their suburbs (cities are the same as those listed in Reference No. 5). Includes a detailed list of the goods and services considered necessary for retired couples to maintain the specified living standard as determined by levels of living actually achieved in the 1950's; and describes how this representative list was developed and priced. (See Reference No. 11 for description of original Budget for an Elderly Couple.)
8. U.S. Department of Labor, Bureau of Labor Statistics, "Estimating Equivalent Incomes or Budget Costs by Family Type," *Monthly Labor Review*, November 1960, pp. 1197-1200.
Describes a scale for measuring the relative after-tax income required by families of differing composition to maintain the same level of material well-being, or for estimating comparable costs of goods and services for families of different age, size, and type. (Scale values cannot be used to estimate relative costs of components of family budgets—food, housing, taxes, insurance, etc.)

Technical References—Continued*Number*

9. U.S. Department of Labor, Bureau of Labor Statistics, "Estimating Equivalent Incomes or Budget Costs by Family Type." *Report of the Advisory Committee on Standard Budget Research*, June 1963, 26 pp.
 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.
10. ——. "*Workers' Budgets in the United States: City Families and Single Persons, 1946 and 1947*," (BLS Bulletin 927, 1948) 55 pp.
 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.
11. Federal Security Agency, Social Security Administration, "A Budget for an Elderly Couple," *Social Security Bulletin*, February 1948, pp. 4-12.
 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's Budget. See Reference No. 10.)

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Chapter 10. Consumer Prices

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 1913.¹ 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.

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.² This adjustment was followed by the first comprehensive postwar revision of the index, which was completed in January 1953.³ 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.⁴ The House Committee on Education and Labor conducted a detailed examination of the index in 1951.⁵ 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.⁶

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.

¹ Collection 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.

² See *Interim Adjustment of Consumers' Price Index* (BLS Bulletin 1039, 1951).

³ See *Consumer Prices in the United States 1953–58* (BLS Bulletin 1256).

⁴ *Report of the President's Committee on the Cost of Living*, Office of Economic Stabilization, Washington, 1945.

⁵ *Consumers' Price Index—Report of a Special Subcommittee of the Committee on Education and Labor*. House of Representatives, 82/1, Subcommittee Report No. 2, Washington, 1951.

⁶ *Government Price Statistics—Hearings before the Subcommittee on Economic Statistics, Joint Economic Committee, Congress of the United States, 87/1, Part 1, Washington, January 24, 1961.*

Description of the Index

*Concept and Scope.*⁷ The Consumer Price Index (CPI) is a statistical measure of changes in prices of goods and services bought by urban wage earners and clerical workers,⁸ including families and single persons. The index often is called the "cost-of-living index," but its official name is Consumer Price Index for Urban Wage Earners and Clerical Workers. It measures changes in prices, which are the most important cause of changes in the cost of living, but it does not indicate how much families actually spend to defray their living expenses. Prior to January 1964, the complete name for the index was: Index of Change in Prices of Goods and Services Purchased by City Wage-Earner and Clerical-Worker Families to Maintain Their Level of Living.

The Consumer Price Index is a weighted aggregative index number with "fixed" or "constant" annual weights, or it often is referred to as a "market basket" index. Thus, in the Consumer Price Index the procedure is to measure price change by repricing at regular time intervals and comparing aggregate costs of the goods and services bought by consumers in a selected base period. The quantities of these goods and services are kept constant except at times of weight revisions. Since new weights are introduced without affecting the index level, any change in aggregate costs is due to price change. The quantities represent not only annual consumption of the goods and services actually priced for the index but also consumption of related items for which prices are not obtained, so that the total cost of the market basket represents total consumer spending for goods and services.

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 homeowner-

ship. 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.⁹ 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 units¹⁰ in addition to families of two or more.¹¹ 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)¹² in 66 Standard Metropolitan Statistical Areas (SMSA's) and smaller cities

⁷ See article by Sidney A. Jaffe, "The Statistical Structure of the Revised CPI," *Monthly Labor Review*, August 1964, pp. 916-924.

⁸ 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, except farm; private household workers; and farm laborers and foremen. 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).

⁹ For a more detailed discussion, see "Taxes and the Consumers' Price Index," *Monthly Labor Review*, January 1953, pp. 53-57. (Reprint 2090.)

¹⁰ 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.

¹¹ From January through November 1964, the Bureau computed a separate index applying only to families of two or more, for comparability with the previous series. Since the same items were priced for families and singles, the overall movement of the separate index was identical with the index including single workers and it was discontinued.

¹² The Survey of Consumer Expenditures is discussed in Chapter 8 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. (Reprint 2352)

TABLE 1. CITIES, POPULATION WEIGHTS, AND PRICING SCHEDULE FOR THE REVISED CONSUMER PRICE INDEX

City and size stratum	Population weight ¹	Pricing schedule ²						
		Food ³	Other items					
			Samples	Schedule ³				
M	1	2		3				
A. Standard metropolitan statistical areas of 1,400,000 or more in 1960:								
Baltimore, Md.....	1.402	1A, 1B, 2A, 2B	1A, 2B				X	
Boston, Mass.....	1.930		1A, 2B		X			
Chicago-Northwestern Indiana ⁴	5.552		1A, 1B, 2A, 2B	X			X	
Cleveland, Ohio.....	1.325		1A, 2B			X		
Detroit, Mich.....	2.895		1A, 2B	X				
Los Angeles-Long Beach, Calif.....	5.017		1A, 2B	X				
New York-Northeastern New Jersey ⁴	12.577		1A, 2B	X				
Philadelphia, Pa.....	2.703		1A, 2B	X				
Pittsburgh, Pa.....	1.565		1A, 2B		X			
St. Louis, Mo.....	1.428		1A, 2B					X
San Francisco-Oakland, Calif.....	2.372		1A, 1B, 2A, 2B				X	X
Washington, D.C.....	1.255		1A, 1B, 2A, 2B			X		
B. Standard metropolitan statistical areas of 250,000 to 1,399,999 in 1960:⁴								
Atlanta, Ga.....	2.934		1A, 2B	1A, 2B				X
Buffalo, N.Y.....	2.347			1A, 2B			X	
Cincinnati, Ohio-Ky.....	740	1A, 2B					X	
Dallas, Tex.....	2.934	1A, 2B					X	
Dayton, Ohio.....	1.096	1A, 2B				X		
Denver, Colo.....	1.838	1A, 2B			X			
Hartford, Conn.....	2.348	1						X
Honolulu, Hawaii.....	354	1A, 2B			X			X
Houston, Tex.....	999	1A, 2B						X
Indianapolis, Ind.....	1.095	2						X
Kansas City, Mo.-Kans.....	710	1A, 2B					X	
Milwaukee, Wis.....	850	1A, 2B				X		
Minneapolis-St. Paul, Minn.....	1.042	1A, 2B			X			
Nashville, Tenn.....	2.933	2			X			
San Diego, Calif.....	672	1A, 2B					X	
Seattle, Wash.....	1.837	1A, 2B				X		
Wichita, Kans.....	1.096	1A, 2B		X				
C. Standard metropolitan statistical areas of 50,000 to 249,999 in 1960:								
Austin, Tex.....	1.250	1	1		X			
Bakersfield, Calif.....	1.323	2	2				X	
Baton Rouge, La.....	1.250	2	2			X		
Cedar Rapids, Iowa.....	1.284	1A, 2B	1A, 2B		X			
Champaign-Urbana, Ill.....	1.284	1A, 2B	1A, 2B		X			
Durham, N.C.....	1.250	1A, 2B	1A, 2B				X	
Green Bay, Wis.....	1.284	1	1			X		
Lancaster, Pa.....	1.803	1	1	X				
Orlando, Fla.....	1.250	1A, 2B	1A, 2B				X	
Portland, Maine.....	1.803	2	2			X		
D. Urban places of 2,500 to 49,999 in 1960:								
Anchorage, Alaska.....	.065	1, 2	1, 2		X			
Crookston, Minn.....	1.352	1	1				X	
Devils Lake, N.Dak.....	1.352	2	2				X	
Findlay, Ohio.....	1.352	1	1			X		
Florence, Ala.....	1.227	1	1		X			
Kingston, N.Y.....	1.171	2	2				X	
Klamath Falls, Oreg.....	1.338	1	1			X		
Logansport, Ind.....	1.352	2	2		X			
Mangum, Okla.....	1.226	1	1				X	
Martinsville, Va.....	1.227	2	2			X		
McAllen, Tex.....	1.227	2	2				X	
Millville, N.J.....	1.171	2	2			X		
Niles, Mich.....	1.351	1	1		X			
Orem, Utah.....	1.339	2	2		X			
Southbridge, Mass.....	1.170	1	1			X		
Union, S.C.....	1.227	1	1				X	
Vicksburg, Miss.....	1.226	2	2		X			

¹ The 18 largest Standard Metropolitan Statistical Areas as defined for the 1960 Census of Population were selected on a certainty basis and represent themselves only in the population weight patterns. The other sample selections carry not only their own population weights but also prorata shares of the population weights of all cities in their region in the same population class.

² Item samples are identified as samples "1" and "2." Outlet samples are identified as samples "A" and "B." The determination as to the extent of sampling within an area depended on plans for publishing separate area indexes and on plans for developing estimates of sampling error and its components.

³ Foods, fuels, and several other items are priced every month in all cities. Prices of a few items are collected semiannually or annually in all cities. Prices of other goods and services are obtained on the schedule indicated:

M=Every month.

1=January, April, July, and October.

2=February, May, August, and November.

3=March, June, September, and December.

⁴ Standard Consolidated Areas.

⁵ Population weights revised for this group beginning January 1966.

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 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.¹³

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 unchanged¹⁴ 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.¹⁵ 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 indicated in table 1, with a few items surveyed semiannually or annually. Because food prices change frequently, and because

¹³ 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.

¹⁴ Minor weight revisions are introduced by linking.

¹⁵ For a more complete discussion, see *The Consumer Price Index: Pricing and Calculation Procedures*, unnumbered paper by Doris P. Rothwell, Bureau of Labor Statistics, U.S. Department of Labor, 1964.

TABLE 2. CONSUMER PRICE INDEX (NEW SERIES)¹ RELATIVE IMPORTANCE OF MAJOR GROUPS, SPECIAL GROUPS AND INDIVIDUAL ITEMS SELECTED WITH CERTAINTY² DECEMBER 1963

Components	Percent of all items December 1963	Components	Percent of all items December 1963
All items.....	100.00	Housing.....	33.23
MAJOR GROUPS		Shelter.....	20.15
Food.....	22.43	Rent.....	5.50
Housing.....	33.23	Hotels and motels.....	.38
Apparel and upkeep.....	10.63	Homeownership.....	14.27
Transportation.....	13.88	Purchase and financing.....	9.11
Health and recreation.....	19.45	Home purchase.....	6.28
Medical care.....	5.70	Mortgage interest.....	2.83
Personal care.....	2.75	Taxes and insurance.....	2.13
Reading and recreation.....	5.94	Real estate taxes.....	1.72
Other goods and services.....	5.06	Property insurance.....	.41
SPECIAL GROUPS		Maintenance and repairs.....	3.03
All items less shelter.....	79.85	Commodities.....	.98
All items less food.....	77.57	Services.....	2.05
Commodities.....	65.97	Fuel and utilities.....	5.26
Nondurables.....	47.19	Fuel oil and coal.....	.73
Durables.....	18.78	Fuel oil.....	.67
Services.....	34.03	Coal.....	.06
Commodities less food.....	43.54	Gas and electricity.....	2.71
Nondurables less food.....	24.76	Gas.....	1.30
Apparel commodities.....	9.16	Electricity.....	1.41
Apparel commodities less food and apparel.....	7.65	Other utilities.....	1.82
Nondurables less food and apparel.....	15.60	Telephone.....	1.38
Household durables.....	5.69	Water and sewerage.....	.44
Housefurnishings.....	4.72	Household furnishings and operation.....	7.82
Services less rent.....	28.53	Textile housefurnishings.....	.61
Household services less rent.....	13.47	Furniture.....	1.44
Transportation services.....	4.86	Bedroom suite.....	.28
Medical care services.....	4.56	Living room suite.....	.28
Other services.....	5.64	Other priced items.....	.88
INDIVIDUAL ITEMS		Floor coverings.....	.48
Food.....	22.43	Rugs, soft surface.....	.34
Food at home.....	17.89	Other priced items.....	.14
Cereals and bakery products.....	2.45	Appliances.....	1.36
Cereals.....	.80	Refrigerators.....	.28
Bakery products.....	1.65	Other priced items.....	1.08
White bread.....	.60	Other housefurnishings.....	.83
Other priced items.....	1.05	Housekeeping supplies.....	1.55
Meats, poultry, and fish.....	5.63	Housekeeping services.....	1.55
Meats.....	4.45	Domestic service.....	.26
Beef and veal.....	2.21	Baby sitter.....	.29
Hamburger.....	.57	Postage.....	.23
Steak.....	.80	Other priced items.....	.77
Other priced items.....	.84	Apparel and upkeep.....	10.63
Pork.....	1.30	Men's and boys' apparel.....	2.86
Pork chops.....	.36	Men's apparel.....	2.21
Bacon.....	.30	Suits, year round.....	.36
Other priced items.....	.64	Other priced items.....	1.85
Other meats.....	.94	Boys' apparel.....	.65
Poultry.....	.78	Women's and girls' apparel.....	4.08
Frying chickens.....	.51	Women's apparel.....	3.23
Other priced items.....	.22	Winter coats.....	.28
Fish.....	.45	Street dresses.....	.50
Dairy products.....	2.80	Hose, nylon.....	.39
Milk, fresh (grocery).....	.85	Other priced items.....	2.06
Milk, fresh (delivered).....	.68	Girls' apparel.....	.85
Butter.....	.25	Footwear.....	1.51
Other priced items.....	1.02	Street shoes, men's.....	.26
Fruits and vegetables.....	3.02	Street shoes, women's.....	.26
Fresh fruits.....	.76	Other priced items.....	.99
Apples.....	.17	Other apparel.....	2.18
Bananas.....	.15	Commodities.....	.71
Oranges.....	.20	Services.....	1.49
Other priced items.....	.24	Dry cleaning.....	.79
Fresh vegetables.....	.94	Men's suit.....	.44
Lettuce.....	.16	Women's dress.....	.35
Potatoes.....	.24	Other priced items.....	.68
Tomatoes.....	.14	Transportation.....	13.88
Other priced items.....	.40	Private transportation.....	12.64
Processed fruits and vegetables.....	1.32	Autos and related goods.....	9.02
Other food at home.....	3.99	Auto purchase.....	5.02
Eggs.....	.64	New cars.....	2.55
Fats and oils.....	.55	Used cars.....	2.47
Margarine.....	.15	Gasoline and motor oil.....	3.28
Other priced items.....	.40	Gasoline.....	3.05
Sugar and sweets.....	.64	Motor oil.....	.23
Nonalcoholic beverages.....	1.01	Auto parts.....	.72
Coffee, can and bag.....	.40	Automobile services.....	3.62
Other priced items.....	.61	Auto repairs and maintenance.....	.98
Prepared and partially prepared food.....	1.15	Other automobile expenses.....	2.64
Food away from home.....	4.54	Auto insurance.....	1.42
Restaurant meals.....	3.75	Registration fees.....	.37
Between meal snacks.....	.79	Drivers' license.....	.04
		Parking fees.....	.18
		Auto financing charges ³.....	.63
		Public transportation.....	1.24
		Local transit.....	.78
		Taxicabs.....	.14
		Train fares.....	.07
		Airplane fares.....	.20
		Intercity bus fares.....	.05

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 CERTAINTY² DECEMBER 1963—Continued

Components	Percent of all items December 1963	Components	Percent of all items December 1963
Health and recreation.....	19.45	Health and recreation—Continued	
Medical care.....	5.70	Reading and recreation—Continued	
Drugs and pharmaceuticals.....	1.14	Recreation—Continued	
Over-the-counter items.....	.50	Recreational services.....	1.58
Prescriptions.....	.64	Movies (indoor).....	.38
Professional services.....	2.59	Bowling fees.....	.36
Family doctor, house visit.....	.12	Other priced items.....	.84
Family doctor, office visit.....	.77	Reading and education.....	1.58
Optometric examination and eyeglasses.....	.29	Newspapers.....	.50
Dentists' fees.....	.86	College tuition.....	.23
Other priced items.....	.55	Other priced items.....	.85
Hospital services.....	.36	Other goods and services.....	5.06
Health insurance ⁴	1.61	Tobacco products.....	1.89
Hospital services.....	.66	Cigarettes.....	1.74
Nonhospital services.....	.71	Other priced items.....	.15
Overhead.....	.24	Alcoholic beverages.....	2.64
Personal care.....	2.75	Beer.....	1.06
Toilet goods.....	1.52	Whiskey and wine.....	.78
Services.....	1.23	A way from home.....	.80
Men's haircut.....	.51	Personal expenses.....	.53
Other priced items.....	.72	Funeral services.....	.28
Reading and recreation.....	5.94	Bank service charges.....	.12
Recreation.....	4.36	Legal services.....	.13
Recreational goods.....	2.78		
TV sets.....	.63	Miscellaneous ⁵.....	.38
Other priced items.....	2.15		

¹ For a description of the new series, see *The Consumer Price Index, Revised January 1964. A Short Description.*

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. Weights 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 to 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.

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 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.¹⁶ 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

¹⁶ For a more detailed discussion, see *Sampling Aspects of the Revised CPI*, unnumbered paper by Marvin Wilkerson, Bureau of Labor Statistics, U.S. Department of Labor, 1964.

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.¹⁷ 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 sampling; 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 gen-

¹⁷ The selection of the CES sample is discussed in chapter 8 of this bulletin.

TABLE 3. NUMBER OF ITEMS IN SAMPLING FRAME AND NUMBER OF ITEMS PRICED BY EXPENDITURE CLASS

Expenditure class number	Classes	Number of items	Number of items sampled	Number of specifications priced
	All items.....	812	309	396
	Food.....	267	93	105
	Food at home:			
	Cereals and bakery products:			
EC 1.....	Cereals and grain products.....	19	4	4
EC 2.....	Bakery products.....	16	5	5
	Meats, poultry, and fish:			
EC 3.....	Meats:			
	Beef and veal.....	12	7	9
	Pork.....	12	6	6
	Other meats.....	14	6	6
EC 4.....	Poultry.....	4	3	3
EC 5.....	Fish.....	6	4	5
EC 6.....	Dairy products.....	19	6	7
	Fruits and vegetables:			
EC 7.....	Fresh fruits.....	15	8	8
EC 8.....	Fresh vegetables.....	20	11	11
EC 9.....	Processed fruits and vegetables.....	48	10	10
	Other food at home:			
EC 10.....	Eggs.....	1	1	1
EC 11.....	Fats and oils.....	8	3	3
EC 12.....	Sugar and sweets.....	12	4	4
EC 13.....	Nonalcoholic beverages.....	8	5	6
EC 14.....	Prepared and partially prepared foods.....	50	8	8
EC 15.....	Food away from home.....	3	2	9
	Housing.....	212	73	81
	Shelter:			
EC 16.....	Rent.....	4	2	2
	Homeownership:			
EC 17.....	Purchase and financing.....	3	2	2
EC 18.....	Taxes and insurance.....	2	2	3
	Maintenance and repairs:			
EC 19.....	Commodities.....	14	6	6
EC 20.....	Services.....	30	5	5
EC 21.....	Fuel and utilities.....	6	6	10
	Household furnishings and operation:			
EC 22.....	Housefurnishings:			
	Textile housefurnishings.....	20	6	6
	Furniture and floor coverings:			
EC 23.....	Furniture.....	31	10	11
EC 24.....	Floor coverings.....	7	3	4
EC 25.....	Appliances.....	21	8	8
EC 26.....	Other housefurnishings.....	32	8	8
	Household operation:			
EC 27.....	Housekeeping supplies.....	28	8	8
EC 28.....	Housekeeping services.....	14	7	8
	Apparel and upkeep.....	184	64	77
	Men's and boys' apparel:			
EC 29.....	Men's apparel.....	30	12	15
EC 30.....	Boys' apparel.....	23	4	4
	Women's and girls' apparel:			
EC 31.....	Women's apparel.....	39	19	26
EC 32.....	Girls' apparel.....	31	8	9
EC 33.....	Footwear.....	21	9	11
	Other apparel:			
EC 34.....	Commodities.....	26	6	6
EC 35.....	Services.....	14	6	6
	Transportation.....	34	21	34
	Private:			
	Autos and related goods:			
EC 36.....	Auto purchase.....	2	2	12
EC 37.....	Gasoline and motor oil.....	2	2	3
EC 38.....	Auto parts, etc.....	6	2	2
	Automobile services:			
EC 39.....	Auto repairs and maintenance.....	13	6	6
EC 40.....	Other automobile expenses.....	5	4	6
EC 41.....	Public.....	6	5	5
	Health and recreation.....	115	58	99
	Medical care:			
EC 42.....	Drugs and prescriptions.....	2	2	20
EC 43.....	Professional services.....	11	9	12
EC 44.....	Hospital services and health insurance.....	2	2	6
	Personal care:			
EC 45.....	Toilet goods.....	28	8	8
EC 46.....	Services.....	9	4	4
	Reading and recreation:			
	Recreation:			
EC 47.....	Recreational goods.....	29	13	20
EC 48.....	Recreational services.....	13	6	7
EC 49.....	Reading and education.....	11	6	
	Other goods and services:			
EC 50.....	Tobacco products.....	3	2	
EC 51.....	Alcoholic beverages.....	3	3	
EC 52.....	Financial and miscellaneous personal expenses.....	4	3	3

eral 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 duplicates of items selected but not with certainty. Table 4 contains a listing of the items priced in each sample.

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 in 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 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 an-

TABLE 4. LIST OF ITEMS PRICED FOR THE REVISED CONSUMER PRICE INDEX AS OF DECEMBER 1963

Groups, subgroups, expenditure classes	Priced items	
	Sample A	Sample B
Food:		
Food at home:		
Cereals and bakery products:		
EC-1 Cereals and grain products.....	Corn flakes.....	Flour, white, all-purpose.
	Rice, long and short grain.....	Cracker meal.
EC-2 Bakery products.....	White bread.....	White bread.
	Whole wheat bread.....	Cookies, cream filled.
	Layer cake, plain.....	Cinnamon rolls, frosted.
Meats, poultry, and fish:		
Meats:		
EC-3 3A Beef and veal.....	Hamburger, preground.....	Hamburger, preground.
	Steaks, round, bone-in.....	Steaks, round, bone-in.
	Steaks, porterhouse, bone-in.....	Steaks, sirloin, bone-in.
	Rump roasts, standing.....	Rump roasts, standing.
	Chuck roasts, bone-in.....	Rib roasts, bone-in.
	Veal outlets, bone-in.....	Beef liver, sliced.
3B Pork.....	Pork chops, center cut.....	Pork chops, center cut.
	Bacon, sliced.....	Bacon, sliced.
	Pork roasts, loin halves.....	Pork roasts, loin halves.
	Picnics, smoked.....	Ham, whole.
3C Other meats.....	Lamb chops, loin.....	Bologna sausage, sliced.
	Salami sausage, sliced.....	Liverwurst sausage, sliced or whole.
	Frankfurters, skinless.....	Ham, canned, domestic or imported.
EC-4 Poultry.....	Frying chickens, ready-to-cook.....	Frying chickens, ready-to-cook.
	Chicken breasts, fresh.....	Turkey, fresh or frozen.
EC-5 Fish.....	Fillets or steaks, fresh or frozen ¹	Shrimp, raw, frozen.
	Tuna fish, chunk style.....	Sardines, Maine.
EC-6 Dairy products.....	Milk, fresh, grocery.....	Milk, fresh, grocery.
	Milk, fresh, delivered.....	Milk, fresh, delivered.
	Milk, fresh, skim.....	Milk, evaporated, canned.
	Ice cream, prepackaged.....	Cheese, American process.
	Butter, salted.....	Butter, salted.
Fruits and vegetables:		
EC-7 Fresh fruits.....	Apples, all purpose.....	Apples, all purpose.
	Bananas, yellow variety.....	Bananas, yellow variety.
	Oranges, except Temple or King.....	Oranges, except Temple or King.
	Grapes, Thompson seedless.....	Grapes, Thompson seedless.
	Grapefruit, fresh, pink or white.....	Strawberries, fresh.
	Orange juice, fresh.....	Watermelons, whole or sliced.
EC-8 Fresh vegetables.....	Head lettuce.....	Head lettuce.
	Potatoes, white.....	Potatoes, white.
	Tomatoes.....	Tomatoes.
	Asparagus, green.....	Cabbage, all varieties except red.
	Carrots, topped, prepackaged.....	Celery, Pascal, stalk.
	Cucumbers.....	Onions, yellow.
EC-9 Processed fruits and vegetables..	Spinach, prepackaged.....	Peppers, sweet, green.
	Pears, Bartlett, can or jar.....	Fruit cocktail, canned.
	Lemonade, concentrate, frozen.....	Pineapple-Grapefruit juice drink, canned.
	Beets, sliced, can or jar.....	Orange juice concentrate, frozen.
	Tomatoes, can or jar.....	Peas, green, can or jar.
	Dried beans, Navy or Great Northern.....	Broccoli spears, frozen.
Other foods at home:		
EC-10 Eggs.....	Eggs, fresh, large, Grade A.....	Eggs, fresh, large, Grade A.
EC-11 Fats and oils.....	Margarine, colored.....	Margarine, colored.
	Salad dressing, Italian.....	Salad or cooking oil, vegetable.
EC-12 Sugar and sweets.....	Sugar, white, granulated.....	Grape jelly, pure.
	Chocolate bar, plain milk.....	Chocolate flavored syrup.
EC-13 Nonalcoholic beverages.....	Coffee, can or bag.....	Coffee, can or bag.
	Carbonated drinks, fruit-flavored.....	Coffee, instant.
	Tea bags, orange pekoe and pekoe tea.....	Cola drink, carbonated.
EC-14 Prepared and partially prepared foods.	Bean soup, canned, condensed.....	Chicken soup, canned, condensed.
	Spaghetti, in tomato sauce, canned.....	Baby foods, strained.
	Mashed potatoes, instant.....	Sweet pickle relish.
	Potatoes, French fried, frozen.....	Pretzels, hard, salted.
EC-15 Food away from home.....	Restaurant meals:	Restaurant meals:
	Lunch.....	Lunch.
	Breakfast.....	Dinner.
	Between meal snacks:	Between meal snacks:
	Coffee, cup.....	Coffee, cup.
	Carbonated beverages, cup.....	Carbonated beverages, cup.
	Frankfurter on roll.....	Pie, slice.
	Ice cream, dish.....	Candy bar.
Housing:		
Shelter:		
EC-16 Rent.....	Rent of house or apartment.....	Rent of house or apartment.
	Hotel, motel room rates.....	Hotel, motel room rates.
EC-17 Homeownership:		
Home purchase and financing.....	Home purchase.....	Home purchase.
	Mortgage interest rates.....	Mortgage interest rates.
EC-18 Taxes and insurance.....	Property taxes, residential.....	Property taxes, residential.
	Property insurance rates:	Property insurance rates:
	Fire and extended coverage.....	Fire and extended coverage.
	Comprehensive homeownership policy.....	Comprehensive homeownership policy.
EC-19 Maintenance and repairs:		
Commodities.....	Exterior house paint.....	Interior house paint.
	Furnace air filters.....	Shelving, Ponderosa pine.
	Packaged dry cement mix.....	Shrubby, evergreen.
EC-20 Services.....	Residing houses.....	Residing houses.
	Reshingling roofs.....	Repainting living and dining rooms.
	Replacing sinks.....	Repairing furnaces.

See footnotes at end of table.

TABLE 4. LIST OF ITEMS PRICED FOR THE REVISED CONSUMER PRICE INDEX AS OF DECEMBER 1963—Continued

Groups, subgroups, expenditure classes	Priced items	
	Sample A	Sample B
EC-21 Housing—Continued Fuel and utilities.....	Fuel oil and coal: Fuel oil, #2..... Coal, anthracite or bituminous..... Gas and electricity: Gas, 3 bills per city..... Electricity, 3 bills per city..... Other utilities: Residential telephone services..... Residential water and sewerage services.....	Fuel oil, #2. Coal, anthracite or bituminous. Gas, 3 bills per city. Electricity, 3 bills per city. Residential telephone services. Residential water and sewerage services.
EC-22 Household furnishings and operation: Textile housefurnishings.....	Pillows, bed, polyester or acrylic filling..... Curtains, tailored, polyester marquisette..... Drapery fabric, cotton or rayon/acetate.....	Sheets, percale or muslin. Bedspreads, chiefly cotton, tufted. Slipcovers, ready-made, chiefly cotton.
EC-23 Furniture.....	Bedroom suites, good or inexpensive quality..... Living room suites, good and inexpensive quality..... Lounge chairs, upholstered..... Sofas, dual purpose..... Sleep sets, Hollywood bed type..... Aluminum folding chairs.....	Bedroom suites, good or inexpensive quality. Living room suites, good and inexpensive quality. Dining room suites. Sofas, standard, upholstered. Box springs. Crib.
EC-24 Floor coverings.....	Rugs, soft surface: Broadloom, wool..... Broadloom, nylon..... Rugs, hard surface.....	Rugs, soft surface: Broadloom, wool. Broadloom, nylon. Tile, vinyl.
EC-25 Appliances.....	Refrigerators or refrigerator-freezers, electric..... Washing machines, electric, automatic..... Ranges, free standing, gas or electric..... Clothes dryers, electric, automatic..... Room heaters, electric, portable.....	Refrigerators or refrigerator-freezers, electric. Washing machines, electric, automatic. Vacuum cleaners, canister type. Air conditioners, demountable. Garbage disposal units.
EC-26 Other housefurnishings.....	Dinnerware, earthenware..... Carpet sweepers, manually operated..... Venetian blinds, white, steel or aluminum slats..... Electric drills, hand held.....	Flatware, stainless steel. Table lamps, with shade. Lawn mowers, power, rotary type. Nails, 8d (penny) common.
EC-27 Housekeeping supplies.....	Detergent, liquid, laundry..... Laundry soap for fine fabrics..... Scouring pads, steel wool..... Toilet tissue.....	Detergent, granules or powder. Air deodorizers, spray type. Paper napkins, embossed. Stationery, envelopes.
EC-28 Housekeeping services.....	Domestic service, general housework..... Baby sitter service..... Postal services..... Laundry flatwork, finished service..... Licensed day care service, preschool child..... Washing machine repairs.....	Domestic service, general housework. Baby sitter service. Postal services. Laundry flatwork, finished service. Reupholstering furniture. Moving expenses.
EC-29 Apparel and upkeep: Men's and boys' apparel: Men's apparel.....	Suits, year round weight, 2 qualities..... Topcoats, wool..... Suits, tropical weight..... Slacks, wool or wool blend..... Shirts, work, cotton..... Shirts, sport, cotton, short sleeves..... Shirts, sport, cotton, long sleeves..... T-shirt.....	Suits, year round weight, 2 qualities. Jackets, lightweight. Trousers, work, cotton. Slacks, cotton or manmade blend. Shirts, business, cotton. Socks, cotton. Handkerchiefs, cotton.
EC-30 Boys' apparel.....	Coats, all purpose, cotton or cotton blend..... Dungarees, cotton or cotton blend.....	Sport coats, wool or wool blend. Undershorts, cotton.
EC-31 Women's and girls' apparel: Women's apparel.....	Coats, heavyweight, wool or wool blend, 2 qualities..... Carcoats, heavyweight, cotton..... Skirts, wool or wool blend..... Skirts, cotton or cotton blend..... Dresses, street, chiefly manmade fiber, 2 qualities..... Dresses, street, wool or wool blend..... Dresses, street, cotton..... Housedresses, cotton..... Slacks, lightweight, cotton and carded cotton..... Slips, nylon..... Brassieres, cotton..... Hose, nylon, full fashioned and seamless, 2 styles..... Anklets, cotton..... Handbags, rayon faille or plastic.....	Coats, heavyweight, wool or wool blend, 2 qualities. Coats, lightweight, topper. Sweaters, wool or acrylic. Dresses, cocktail, street length. Dresses, street, chiefly manmade fiber, 2 qualities. Dresses, street, wool or wool blend. Dresses, street, cotton. Blouses, cotton. Bathing suits, one piece. Girdles, manmade blend. Panties, acetate. Hose, nylon, full fashioned and seamless, 2 styles. Gloves, fabric, nylon or cotton.
EC-32 Girls' apparel.....	Raincoats, vinyl plastic or chiefly cotton..... Skirts, wool or wool blend..... Slips, cotton blend..... Handbags, plastic.....	Coats, lightweight, topper. Slacks, cotton. Shorts, cotton. Dresses, cotton. Robes, duster style, quilted tricot, or percale.
EC-33 Footwear.....	Men's: Shoes, street, oxford, 2 qualities..... Women's: Shoes, street, pump, 2 styles..... Shoes, evening, pump..... Shoes, casual, pump..... Houseslippers, scuff..... Children's: Sneakers, boys', oxford type.....	Shoes, street oxford, 2 qualities. Shoes, work, high. Shoes, street, pump, 2 styles. Shoes, evening, pump.
EC-34 Other apparel: Commodities.....	Diapers, cotton gauze..... Yard goods, cotton..... Earrings, Pearl, simulated or imitation.....	Wrist watches, men's, imported movement. Wrist watches, women's, imported movement. Zipper, skirt or neck placket.
EC-35 Services.....	Dry cleaning, men's suits and women's dresses..... Shoe repairs, women's heel lift..... Laundry, men's shirts.....	Dry cleaning, men's suits and women's dresses. Automatic laundry service. Tailoring charges, hem adjustment.

See footnotes at end of table.

TABLE 4. LIST OF ITEMS PRICED FOR THE REVISED CONSUMER PRICE INDEX AS OF DECEMBER 1963—Continued

Groups, subgroups, expenditure classes	Priced items	
	Sample A	Sample B
Transportation:		
Private:		
EC-36 Auto purchase.....	New cars: Chevrolet, Impala, 2-door, hardtop..... Chevrolet, Chevelle, 2-door hardtop..... Ford, Galaxie 500, 2-door hardtop..... Plymouth, Fury III, 4-door sedan..... Rambler, Classic 860, 4-door sedan..... Used cars: 2 years old, Chevrolet and Ford..... 3 years old.....do..... 4 years old.....do..... 5 years old.....do.....	Chevrolet, Impala, 2-door hardtop. Ford, Falcon, Futura, 4-door sedan. Ford, Galaxie 500, 2-door hardtop. Pontiac, Catalina, 4-door sedan. Volkswagen, Deluxe, 2-door hardtop. 2 years old, Chevrolet and Ford. 3 years old, Do. 4 years old, Do. 5 years old, Do.
EC-37 Gasoline and motor oil.....	Gasoline, regular and premium..... Motor oil, premium.....	Gasoline, regular and premium. Motor oil, premium.
EC-38 Auto parts.....	Tires, tubeless, retread.....	Tires, tubeless, new.
EC-39 Automobile services: Auto repairs and maintenance.....	Chassis lubrication, complete..... Motor tune-up..... Automatic transmission repair.....	Water pump replacement. Replacing muffler. Front end alignment.
EC-40 Other automobile expenses.....	Auto insurance rates, liability and physical damage. Auto financing charges. ² Auto registration and inspection fees. Driver's license fees. Parking fees, private and municipal.	Auto insurance rates, liability and physical damage. Auto financing charges. ² Auto registration and inspection fees. Driver's license fees. Parking fees, private and municipal.
EC-41 Public transportation.....	Local transit fares..... Taxicab fares..... Railroad fares, coach..... Airplane fares, chiefly coach..... Bus fares, intercity.....	Local transit fares. Taxicab fares. Railroad fares, coach. Airplane fares, chiefly coach. Bus fares, intercity.
Health and recreation:		
Medical care:		
EC-42 Drugs and prescriptions.....	Over-the-counter items: Multiple vitamin concentrates..... Liquid tonics..... Cold tablets or capsules..... Prescriptions: Anti-infectives: Penicillin G buffered tablets..... Sulfisoxazole tablets..... Sedatives and hypnotics: Phenobarbital tablets..... Ataractics: Chlordiazepoxide-hydrochloride capsules..... Antispasmodics: Propranolol Hydrochloride tablets..... Cardiovasculars and antihypertensives: Reserpine tablets..... Antiarthritics..... Cough preparations: Terpin hydrate with codeine, elixir.	Aspirin compounds. Cough syrups. Adhesive bandages, package. Tetracycline capsules. Secobarbital sodium capsules. Meprobamate tablets. Phenobarbital and belladonna extract. Crystalline digitoxin tablets. Chlorothiazide tablets. Prednisone, tablets.
EC-43 Professional services.....	Family doctor, office visits..... Family doctor, house visits..... Pediatric care, office visits..... Psychiatrists, office visits..... Routine laboratory tests..... Examination, prescriptions and dispensing of eyeglasses..... Fillings, adult, amalgam, one surface..... Dentures, full upper.....	Family doctor, office visits. Family doctor, house visits. Obstetrical cases. Chiropractors and podiatrists, office visits. Herniorrhaphy, adult. Examination, prescriptions and dispensing of eyeglasses. Fillings, adult, amalgam, one surface. Extractions, adult.
EC-44 Hospital services and health insurance:		
Hospital services.....	Daily service charges: Semiprivate room..... Private room..... Hospital services: Daily service charges, semiprivate room..... Daily service charges, private room..... Operating room..... Nonhospital services: Family doctor, office visit..... Surgeon's fees, tonsillectomy/adenoidectomy.....	Daily service charges: Semiprivate room. Private room. Hospital services: Daily service charges, semiprivate room. Daily service charges, private room. X-ray diagnostic series, upper G.I. Nonhospital services: Family doctor, office visit. Surgeon's fees, herniorrhaphy, adult. Obstetrical cases. Prescriptions and drugs.
Health insurance.....	Prescriptions and drugs..... Retained earnings (overhead).....	Prescriptions and drugs. Retained earnings (overhead).
EC-45 Personal care: Toilet goods.....	Toothpaste, standard dentifrice..... Hand lotions, liquid..... Face powder, pressed..... Cleansing tissues..... Men's haircuts..... Shampoo and wave sets, plain..... Women's haircuts.....	Toilet soap, hand milled. Shaving cream, aerosol. Deodorants, cream or roll-on. Home permanent refills. Men's haircuts. Shampoo and wave sets, plain. Permanent waves, cold.
EC-46 Personal care services.....		

See footnotes at end of table.

TABLE 4. LIST OF ITEMS PRICED FOR THE REVISED CONSUMER PRICE INDEX AS OF DECEMBER 1963—Continued

Groups, subgroups, expenditure classes	Priced items	
	Sample A	Sample B
Health and recreation—Continued Reading and recreation: Recreation: EC-47 Recreational goods.....	TV sets, portable and console..... Radios, portable and table models, AM band only..... TV replacement tubes..... Sports equipment: Golf balls, liquid center..... Basketballs, rubber or vinyl cover..... Outboard motors..... Tricycles..... Dolls..... Stuffed animal..... Dog food, canned and boxed..... Indoor movie admissions: Adult..... Children's..... TV repairs, picture tube replacement..... Bowling fees, evening..... Golf green fees.....	TV sets, portable and console..... Radios, portable and table models, AM band only..... Tape recorders, portable..... Sports equipment: Fishing rods, fresh water spincast..... Bowling balls..... Phonograph records, stereophonic..... Bicycles, boys', 26"..... Movie cameras, 8 mm, fully automatic lens..... Film, 35 mm, color.....
EC-48 Recreational services.....	Indoor movie admissions: Adult..... Children's..... TV repairs, picture tube replacement..... Bowling fees, evening..... Golf green fees.....	Indoor movie admissions: Adult..... Children's..... Drive-in movie admissions, adult..... Bowling fees, evening..... Film developing, black and white..... Newspapers, street sale and delivery..... College tuition and fees, undergraduate..... Magazines, single copy and subscription..... College textbooks, undergraduate.....
EC-49 Reading and education.....	Newspapers, street sale and delivery..... College tuition and fees, undergraduate..... Magazines, single copy and subscription..... College textbooks, undergraduate.....	Newspapers, street sale and delivery..... College tuition and fees, undergraduate..... Paperback books, not school or technical..... Piano lessons, beginner.....
EC-50 Other goods and services: Tobacco products.....	Cigarettes, nonfilter tip, regular size, pack..... Cigarettes, filter tip, king size, carton..... Cigars, domestic, regular size.....	Cigarettes, nonfilter tip, regular size, carton..... Cigarettes, filter tip, king size, pack..... Cigars, domestic, regular size.....
EC-51 Alcoholic beverages.....	Beer, at home, local and national brands..... Whiskey, spirit blended and straight bourbon..... Wine, dessert and table..... Beer, away from home.....	Beer, at home, local and national brands..... Whiskey, spirit blended and straight bourbon..... Wine, dessert and table..... Beer, away from home.....
EC-52 Financial and miscellaneous personal expenses.....	Funeral services, adult..... Bank service charges, checking account.....	Funeral services, adult..... Legal services, short form will.....

¹ 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.

² Not actually priced; imputed from priced items.

³ Four items are priced only for health insurance: Operating room, X-ray, tonsillectomy, and retained earnings; prices for the remaining items are also included as directly priced professional and hospital services.

ticipated, 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.¹⁸

The Bureau began publication of seasonally adjusted indexes in 1966, for selected components which show a significant seasonal pattern of price change.¹⁹

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

$$(1) \quad I_{t:o} = \frac{\sum (p_t q_o)}{\sum (p_o q_o)} \times 100$$

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

$$(1a) \quad I_{t:o} = \frac{\sum \left[\frac{(p_o q_o) p_t}{p_o} \right]}{\sum (p_o q_o)} \times 100$$

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

¹⁸ 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.

¹⁹ Factors used to compute seasonally adjusted indexes are available on request.

items, and the current index is computed by a chain computation procedure, as shown below:

$$(2) \quad I_{i:o} = \frac{\sum(p_{i-s}q_o)}{\sum(p_oq_o)} \times \frac{(p'_i q_a)}{(p'_{i-s} q_a)} \times 100$$

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 (1957-59).

The (p_oq_o) or $(p'_{i-s}q_a)$ 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:

$$(p_i q_a) = (p_{i-1} q_a) \left(\frac{p_i}{p_{i-1}} \right)$$

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

$$(3) \quad I_{i:o} = \frac{\text{(Dec. 1963 Index)} \sum(p_{i-s}q_o)}{\sum(p_oq_o)} \times \frac{\text{(Change from Dec. 1963 to month } i-1)}{\sum(p'_{i-1}q_a)} \times \frac{\text{(Change from month } i-1 \text{ to month } i)}{\sum(p'_{i-s}q_a)} \times \frac{\sum(p'_{i-1}q_a) \left(\frac{p_i}{p_{i-1}} \right)}{\sum(p'_{i-1}q_a)} \times 100$$

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:

Sample item	September price	October price	Ratio October÷September	September cost weight	October cost weight (Sept. X ratio)
Pork chops----	\$0.75	\$0.7725	1.03	\$15.00	\$15.45
Ham-----	.80	.82	1.025	8.00	8.20
Bacon-----	1.00	1.02	1.02	10.00	10.20
Total-----				33.00	33.85

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.

Sample item	Implied quantity (pounds)	September price	September cost weight	October price	October cost weight
Pork chops-----	20	\$0.75	\$15.00	\$0.7725	\$15.45
Ham-----	10	.80	8.00	.82	8.20
Bacon-----	10	1.00	10.00	1.02	10.20
Total-----			33.00		33.85

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:

$$\begin{aligned} \text{October cost weight} & \text{-----} & \$33.85 \times 100 = 102.6 \\ \text{September cost weight} & \text{-----} & \$33.00 \end{aligned}$$

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, the U.S. totals for the current and previous months are compared to compute the average price change.

Reference Base Period. Since 1962 the index has been calculated on the reference base of 1957-59=100.²⁰ This means that current prices are expressed as a percentage of prices for the average of the 3 years—1957, 1958, and 1959. 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 prior periods on other bases to the current 1957-59 base. Since the 1957-59 base was adopted in 1962, some indexes have been continued on the bases of 1947-49=100 and 1939=100. These are calculated by the application of appropriate conversion factors to indexes computed on the 1957-59 base.

Imputation Procedures. Although prices are not obtained in all 56 cities every month (see table 1 for pricing cycle), it is necessary to represent all 56 cities 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, which in effect means prices are estimated unchanged. 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 all year. For example, prices for strawberries when 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, in effect, compared 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 are then adjusted 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 planned as of each January. City prices are combined to U.S. averages by the use of the 1960 index population weights.²¹

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.

Item Indexes. Indexes for selected items and groups (commonly referred to as item indexes), were published semiannually during 1964 and 1965. Quarterly publication was resumed in 1966. Although the published indexes refer to March, June, September, and December, some prices for earlier months must be used in their calculation for cities not priced in these months. In June, for example, the indexes are based on (a) June prices in the 5 cities surveyed every month and the 17 cities surveyed in June on a quarterly cycle; and (b) April and May prices in the 17 cities surveyed in each of those months on a quarterly cycle, carried forward to June as in the composite index calculation.

²⁰ The index base was 1947-49=100 from 1953 through 1961, 1935-39=100 from 1935 through 1952, and 1913=100 from 1913 through 1934.

²¹ 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.

Analysis and Presentation

The CPI is made available first at a press conference, usually held near the end of the month following that to which the data relate. On the same day, the press release is mailed to a list of subscribers who have immediate need for the data. This release contains a brief description of price changes during the month and several tables of major group and subgroup indexes and percentage changes from selected dates, for the U.S. city average and selected large metropolitan areas. It includes seasonally adjusted indexes for selected components. A report containing the same text with some additional tables is published about two weeks after the date of the press release. In addition each of the Bureau's six regional offices prepares and mails a press release for each of the cities in its region for which CPI figures are published. These releases are timed to coincide with the national release. Other monthly reports contain average prices of selected foods and fuels in the largest metropolitan areas. A quarterly publication presents the U.S. city average indexes for individual goods and services.

The CPI for the United States and for selected areas is published also in the *Monthly Labor Review* in the issue dated two months later than the index. The annual Statistical Supplement to the *Monthly Labor Review* contains indexes for individual goods and services (item indexes) as well as the relative importance of the items in the total index as of December.

Average prices for foods and fuels are published in *Estimated Retail Food Prices by Cities* and *Retail Prices and Indexes of Fuels and Electricity*.

Uses of the Index

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 War 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 1965 was about 2 million. However, movements of the index have an indirect effect on wages and salaries of many more workers.²²

The CPI is used extensively to measure changes in purchasing power of the consumer dollar. It is the basis 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 non-government workers, welfare payments, rental contracts, and occasionally alimony payments.

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.

Limitations of the Index

The CPI is not an exact measure of price changes. 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 upon 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 Bu-

²² See article by Francis S. Cunningham, "The Use of Price Indexes in Escalator Contracts," *Monthly Labor Review*, August 1963, pp. 948-952. Reprint 2424.

TABLE 5. SUMMARY OF CHARACTERISTICS OF THE CPI BEGINNING 1964

DEFINITION OF THE INDEX	
Title.....	Consumer Price Index—U.S. City Average for Urban Wage Earners and Clerical Workers.
Formula (Simplified expression).....	$I_{t:t_0} = I_{t-1:t_0} \frac{\sum (p_{t-1} q_t) \left(\frac{p_t}{p_{t-1}} \right)}{\sum p_{t-1} q_t}$
Base period.....	1957-59=100. Series also published on 1947-49 and 1939 bases.
Duration.....	January 1964 forward.
Definition of index expenditure weights.....	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.
POPULATION COVERAGE OF EXPENDITURE SURVEY	
Place of residence.....	Urban places of 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.
Published indexes.....	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.
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, except for San Diego and Milwaukee where all items are priced quarterly. 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).
Number of reporters.....	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 quotations.....	Over 1 million food prices per year; about 80,000 rent charges per year (68,000 for 50 areas); about 375,000 quotations per year for items other than food and rent (350,000 for 50 areas).
Pricing technique.....	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.

reau is attempting to measure the sampling error in the index.²³

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

²³ Preliminary 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.

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.²⁴ 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.²⁵

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 9.

²⁴ Hoover, Ethel D., "The CPI and Problems of Quality Change," *Monthly Labor Review*, November 1961, pp. 1175-1185. Reprint 2378, and Larsgaard, Olga A., and Louise J. Mack, "Compact Cars in the Consumer Price Index," *Monthly Labor Review*, May 1961, pp. 519-523. Reprint 2368.

²⁵ See testimony of Ewan Clague in *Hearings before the Subcommittee on Economic Statistics*, Joint Economic Committee, Congress of the United States, 87/1, Part II, p. 588, Washington, May 1, 2, 3, 4, and 5, 1961.

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1. Cunningham, Francis S. "The Use of Price Indexes in Escalator Contracts," *Monthly Labor Review*, August 1963, pp. 948-952. Reprint No. 2424.
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2. Daugherty, James C. "Health Insurance in the Revised CPI," *Monthly Labor Review*, November 1964, pp. 1299-1300.
Explains and justifies the major change in the treatment of the health insurance component of medical care as initiated in the recent revision of the Consumer Price Index. Compares the former method of pricing actual premium rates with the new method of pricing the benefits received for hospital and professional services combined with a measurement for retained earnings.
3. Hoover, Ethel D. "The CPI and Problems of Quality Change," *Monthly Labor Review*, November 1961, pp. 1175-1185.
Explains and illustrates problems of quality measurement met in the index calculation procedures. Defines quality as used by the BLS, specification pricing, direct price comparisons, and linking procedures. Concludes that there is no evidence to support the argument that the index is not a true measure of price change because of not fully eliminating the effect of quality changes.
4. Humes, Helen and Schiro, Bruno. "The Rent Component of the Consumers' Price Index. Part I—Concept and Measurement," *Monthly Labor Review*, December 1948, pp. 631-637. "The Rent Component of the Consumers' Price Index. Part II—Methodology of Measurement," *Monthly Labor Review*, January 1949, pp. 60-68. Combined in Reprint No. 1947.
Part I discusses the basic concepts underlying the rent index. Part II explains the methods of obtaining and calculating rental data, the "new unit bias" which existed during World War II and the problem of compensating for depreciation of quality caused by aging.
5. Jaffe, Sidney A. "The Statistical Structure of the Revised CPI," *Monthly Labor Review*, August 1964, pp. 916-924.
Describes the concept and formulation, population and expenditure coverage, statistical techniques and problems of the revised index. Examines some operational aspects, especially sample replication. Presents the index formula in general, simplified, and in operational form.
6. ——. *The Consumer Price Index—Technical Questions and Practical Answers*. Paper presented before the American Statistical Association Meeting, Washington, D.C., December 30, 1959 (Mimeographed by the U.S. Department of Labor, Bureau of Labor Statistics). 27 pp.
General explanation and definition of the index concepts, coverage and calculation. Discussion of problem areas including sampling, seasonality, and alleged quality bias.

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7. Lamale, Helen Humes. "Housing Costs in the Consumer Price Index, Part I," *Monthly Labor Review*, February 1956, pp. 189-196. "Housing Costs in the Consumer Price Index. Part II," *Monthly Labor Review*, April 1956, pp. 442-446. Combined in Reprint No. 2188.
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.
8. Larsgaard, Olga A. and Mack, Louise J. "Compact Cars in the Consumer Price Index," *Monthly Labor Review*, May 1961, pp. 519-523. Reprint No. 2368.
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.
9. National Bureau of Economic Research. *The Price Statistics of the Federal Government: Review, Appraisal, and Recommendations*, (Washington, National Bureau of Economic Research, General Series, Number 73, 1961), 496 pp. Also appears in *Government Price Statistics: Hearings*, Subcommittee on Economic Statistics of the Joint Economic Committee, 87th Cong., 1st sess., Part 1, January 24, 1961, ([Washington,] U.S. Government Printing Office, 1961), 526 pp.
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.
10. Rothwell, Doris P. "Calculation of Average Retail Food Prices," *Monthly Labor Review*, January 1965, pp. 61-66.
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.
11. ——. *The Consumer Price Index: Pricing and Calculation Procedures*, (Unnumbered paper, U.S. Department of Labor, Bureau of Labor Statistics, March 1964), 22 pp.
Discusses sampling, pricing by specification; price collection, processing, and editing. Describes index formula, calculation of price relatives, expenditure weights, indexes, aggregation, and correction policy.
12. ——. "Use of Varying Seasonal Weights in Price Index Construction," *Journal of the American Statistical Association*, March 1958, pp. 66-77.
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.
13. U.S. Congress, House of Representatives, Committee on Education and Labor. *Consumers' Price Index*, Special subcommittee of the Committee on Education and Labor, 82nd Cong., 1st sess., Report No. 2 (1951), 39 pp.
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.
14. U.S. Congress, Joint Economic Committee. *Government Price Statistics: Hearings*, Subcommittee on Economic Statistics, 87th Cong., 1st sess., Part I, January 24, 1961 (Washington, U.S. Government Printing Office, 1961), 526 pp. Part 2, May 1, 2, 3, 4, and 5, 1961. (1961), 265 pp.
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.

Technical References—Continued*Number*

15. U.S. Congress, Joint Committee on the Economic Report. *The Consumers' Price Index—Report of the Joint Committee on the Economic Report on the Consumers' Price Index of the United States Bureau of Labor Statistics*, 80th Cong., 2nd sess. (1949), 20 pp.
Brief statement of the results of examinations of methodology, compilation, composition, and presentation of the Consumer Price Index as of 1949. Extensive bibliography.
16. U.S. Department of Labor, Bureau of Labor Statistics. *The Consumer Price Index (Revised January 1964): A Short Description*, (U.S. Department of Labor, Bureau of Labor Statistics, September 1964).
A nontechnical 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.
17. ——. *Seasonal Factors, Consumer Price Index: Selected Series, June 1953–May 1961*, Bulletin 1366 (1963), 47 pp.
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.
18. ——. "Taxes and the Consumers' Price Index," *Monthly Labor Review*, January 1953, pp. 53–57. Reprint No. 2090.
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.
19. ——. *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.
20. ——. *Consumer Prices in the United States, 1953–58: Price Trends and Indexes*, Bulletin 1256, (1959), 126 pp.
Analyzes and explains retail price trends and their effect on the economy from 1953 to 1958. Brief history of the index and comparison of features of the old index based on the 1934–36 expenditures survey, with the adjusted index based on the 1947–49 expenditures survey in 7 cities and the revised index based on the 1950 expenditures survey. Explains the 1952 revision in detail. Presents historical indexes for various segments of the index.
21. U.S. Office of Economic Stabilization. *Report of the President's Committee on the Cost of Living*, (1945), 423 pp.
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.
22. Wilkerson, Marvin. *Measurement of Sampling Error in the Consumer Price Index: First Results*. Paper presented at the American Statistical Association meeting, Washington, D.C., December 1964 (mimeographed by the U.S. Department of Labor, Bureau of Labor Statistics), 16 pp.
With the computation of the Revised Consumer Price Index, completed in 1964, a first attempt was made to produce estimates of error for a comprehensive national price index. Presents a brief description of the replication design, estimates of error through October 1964. Discusses limitations of the error estimates and provides an interpretation of the results.

Technical References—Continued*Number*

23. Wilkerson, Marvin. *Sampling Aspects of the Revised CPI* (Unnumbered paper, U.S. Department of Labor, Bureau of Labor Statistics, October 1964), 33 pp.

Explains two significant improvements in methodology made in the Consumer Price Index at the time of the most recent revision: (1) application of probability sampling, and (2) estimation of sampling error through a system of replicated samples. Tables present the sampling frame for selection of the index item sample and pairing of index cities for replication computations.

24. ——. "The Revised City Sample for the Consumer Price Index," *Monthly Labor Review*, October 1960, pp. 1078-1083. Reprint No. 2352.

Describes the selection procedures used to derive the core sample of 50 cities used in the revised Consumer Price Index computation. Tables show probability patterns for the selected areas and basic and alternate city samples for the Consumer Price Index and the Consumer Expenditures Survey.

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Chapter 11. 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 United States 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.”¹

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 1890.² 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.³ 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.

By January 1965, the number of commodities had increased to more than 2,200, the number of price quotations had increased to almost 6,800, and the index had become increasingly representative of general primary market price changes.

Description of Survey

Concepts

Throughout its history, the Wholesale Price Index 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 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 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 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 the principal price-determining characteristics of the com-

¹ *Wholesale Prices, Wages, and Transportation*, Senate Report No. 1394, “The Aldrich Report,” Senate Committee on Finance, Congress of the United States, March 3, 1893, Part I, (52nd Cong., 2nd sess.), Government Printing Office 1893; and *Course of Wholesale Prices, 1890–1901*, Bulletin of the Department of Labor, No. 39, March 1902, pp. 205–209.

The Aldrich Report included 230 series of price quotations combined to an All Commodities Index on the base 1860 covering the period 1840–1891, but not all series of quotations covered the entire period. This study was brought up to date in 1900 by the Department of Labor, under the supervision of Roland P. Falkner, Professor of Statistics of the Wharton School of Finance and Economy, University of Pennsylvania. The index was an unweighted average of 99 price relatives, computed quarterly, covering the period from 1890 through 1899 and on the base January 1890–January 1892=100.

² See also, Allan D. Searle, “Weight Revisions in the Wholesale Price Index, 1890–1960,” *Monthly Labor Review*, February 1962, pp. 175–182.

³ A large number of the newly introduced commodity prices were carried back to 1947. The presently published index contains the new commodities for the period 1947–51 and displaces the older less comprehensive index on the 1926 base published for the same period.

modities.⁴ So far as possible, prices are f.o.b. production point, and refer to sales for immediate delivery. Prices applicable to long-run contracts are not included, nor are "futures."

Universe

The Wholesale Price Index 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 of the economy, 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 intra-company transfers). Goods sold at retail by producer-owned retail establishments also are excluded because they conceptually belong to a retail (consumers') 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 which 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 15th; but for some commodities (farm products, particularly) a day other than Tuesday is used because it is considered more representative.⁵

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. However, list or book prices are used if transaction prices are unobtainable.

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 selling terms is substituted for the earlier series by direct comparison or by linking. The objective of the linking procedure is to insure that the index will reflect only those changes which are due to actual price differences.⁶ Each time a change in

⁴ 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."

⁵ The prices used in the index through 1951 were the simple arithmetic averages of prices for all Tuesdays in the month.

⁶ The 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 price increase was reflected in the October index while the price change due to quality improvement (more powerful motor and larger tires) was not reflected.

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 some durable goods, such as automobiles, which have periodic model changes. Also, price increases which result from the addition of features which 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 and, 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 not 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 which 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 percentage 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 Wholesale Price Index 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 January 1965, the index was made up of 15 major groups, 90 subgroups, 314 product classes, 37 subproduct classes, and 2,213 items.⁷

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,⁸ Indexes by Durability of Product, and Indexes of Construction Materials. In addition, there are about 25 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

⁷ See table for the major groups and subgroups included in the WPI.

⁸ The broad stages of processing are: Crude materials for further processing; Intermediate materials, supplies, and components; and Finished goods. Each of these is subdivided further.

WHOLESALE PRICE INDEX

RELATIVE IMPORTANCE AND NUMBER OF ITEMS BY REPORTING SOURCE FOR MAJOR GROUPS AND SUBGROUPS

Item	Relative importance in total 1958 weights		Number of items and price quotations									
			All sources January 1965		Company reports January 1965		Trade publications January 1965		Trade associations January 1965		Government agencies January 1965	
			December 1964	December 1960	Items	Price quotations	Items	Price quotations	Items	Price quotations	Items	Price quotations
All commodities.....	100.000	100.000	2,213	6,779	1,650	6,061	407	455	11	11	145	252
01 Farm products.....	10.124	10.589	104	135	8	38	18	18			78	79
011 Fresh and dried fruits and vegetables.....	1.188	1.129	30	42	3	15	10	10			17	17
012 Grains.....	1.469	1.479	8	8							8	8
013 Livestock and live poultry.....	3.226	3.741	22	22							22	22
014 Plant and animal fibers.....	.709	.686	17	21	2	6	2	2			13	13
015 Fluid milk.....	1.474	1.514	8	8							8	8
016 Eggs.....	.451	.619	4	4							4	4
017 Hay, hayseeds, and oilseeds.....	.779	.631	9	13	2	5	2	2			5	6
018 Other farm products.....	.828	.790	6	17	1	12	4	4			1	1
02 Processed foods.....	13.956	14.038	141	411	69	283	14	14			58	114
021 Cereal and bakery products.....	2.326	2.251	19	46	17	44					2	2
022 Meats, poultry, and fish.....	4.088	4.545	43	119	5	25	1	1			37	93
023 Dairy products and ice cream.....	2.605	2.588	14	41	2	29					12	12
024 Canned and frozen fruits and vegetables.....	1.086	1.063	25	128	25	128						
025 Sugar and confectionery.....	1.409	1.386	8	17	5	14					3	3
026 Packaged beverage materials.....	.603	.525	5	18	5	18						
027 Edible fats and oils ¹.....	.762	.696	17	24	3	10	12	12			2	2
028 Miscellaneous processed foods.....	1.067	1.004	10	18	7	15	1	1			2	2
03 Textile products and apparel.....	7.809	7.754	186	582	162	558	24	24				
031 Cotton products.....	1.959	1.904	53	140	35	125	15	15				
032 Wool products.....	.458	.432	18	53	17	52	1	1				
033 Manmade fiber textile products.....	1.385	1.374	33	82	27	76	6	6				
034 Silk products.....	.021	.019	2	4	2	4						
035 Apparel.....	3.819	3.758	74	289	74	289						
036 Miscellaneous textile products.....	.151	.156	5	13	4	12	1	1				
037 Plastic housefurnishings ¹.....	.016	.021	1	1			1	1				
04 Hides, skins, leather, and leather products.....	1.452	1.432	46	100	27	81	18	18	1	1		
041 Hides and skins.....	.103	.110	12	12	2	2	10	10				
042 Leather.....	.239	.234	11	14	3	6	8	8				
043 Footwear.....	.786	.769	16	53	16	53						
044 Other leather products.....	.324	.319	7	21	6	20			1	1		
05 Fuels and related products, and power.....	7.576	7.870	51	174	11	60	37	61	1	1	2	52
051 Coal.....	.539	.549	9	66	5	38	4	28				
052 Coke.....	.071	.069	6	6			6	6				
053 Gas fuels.....	.730	.707	2	2			1	1	1	1		
054 Electric power.....	1.621	1.639	2	52							2	52
056 Crude petroleum ¹.....	.773	.778	6	22	6	22						
057 Petroleum products, refined.....	3.842	4.128	26	26			26	26				
06 Chemicals and allied products.....	6.437	6.643	358	609	167	418	190	190			1	1
061 Industrial chemicals.....	2.240	2.379	113	117	4	8	108	108			1	1
062 Paint and paint materials ¹.....	.816	.870	30	72	7	49	23	23				
063 Drugs and pharmaceuticals.....	.856	.898	110	230	77	197	33	33				
064 Fats and oils, inedible.....	.177	.122	8	8			8	8				
065 Mixed fertilizer.....	.236	.229	28	28	28	28						
066 Fertilizer materials.....	.247	.256	12	12			12	12				
067 Other chemicals and allied products.....	1.865	1.889	57	142	51	136	6	6				
07 Rubber and rubber products.....	1.352	1.430	42	146	39	143			3	3		
071 Crude rubber.....	.222	.236	9	35	6	32			3	3		
072 Tires and tubes.....	.530	.550	6	28	6	28						
073 Miscellaneous rubber products.....	.600	.644	27	83	27	83						
08 Lumber and wood products.....	2.680	2.597	72	347	51	326	15	15	6	6		
081 Lumber.....	1.568	1.493	49	235	28	214	15	15	6	6		
082 Millwork.....	.733	.697	18	73	18	73						
083 Plywood.....	.379	.407	5	39	5	39						
09 Pulp, paper, and allied products.....	4.752	4.860	66	234	52	198	14	36				
091 Woodpulp.....	.233	.229	7	7			7	7				
092 Wastepaper.....	.118	.090	6	27			6	27				
093 Paper.....	1.293	1.276	10	36	10	36						
094 Paperboard.....	.440	.445	10	32	9	30	1	2				
095 Converted paper and paperboard products.....	2.508	2.646	27	99	27	99						
096 Building paper and board.....	.160	.174	6	33	6	33						
10 Metals and metal products.....	13.381	12.826	341	1,161	270	1,088	71	73				
101 Iron and steel.....	4.785	4.728	103	406	66	367	37	39				
102 Nonferrous metals.....	3.161	2.793	70	148	36	114	34	34				
103 Metal containers.....	.652	.618	6	22	6	22						
104 Hardware.....	.531	.522	40	103	40	103						
105 Plumbing fixtures and brass fittings.....	.196	.193	13	71	13	71						
106 Heating equipment.....	.295	.308	23	111	23	111						
107 Fabricated structural metal products.....	1.928	1.933	41	156	41	156						
108 Fabricated nonstructural metal products.....	1.833	1.731	45	144	45	144						

See footnote at end of table.

WHOLESALE PRICE INDEX—Continued
RELATIVE IMPORTANCE AND NUMBER OF ITEMS BY REPORTING SOURCE FOR MAJOR GROUPS AND SUBGROUPS

Item	Relative importance in total 1958 weights		Number of items and price quotations									
			All sources January 1965		Company reports January 1965		Trade publications January 1965		Trade associations January 1965		Government agencies January 1965	
			December 1964	December 1960	Items	Price quotations	Items	Price quotations	Items	Price quotations	Items	Price quotations
11 Machinery and motive products.....	17.694	17.573	559	1,512	559	1,512						
111 Agricultural machinery and equipment.....	.886	.829	44	148	44	148						
112 Construction machinery and equipment.....	.866	.814	46	140	46	140						
113 Metal working machinery and equipment.....	1.256	1.177	79	231	79	231						
114 General purpose machinery and equipment.....	2.007	1.975	91	271	91	271						
115 Miscellaneous machinery.....	1.358	1.335	77	235	77	235						
116 Special industry machinery and equipment.....	1.479	1.390	76	130	76	130						
117 Electrical machinery and equipment.....	4.485	4.682	89	294	89	294						
118 Motor vehicles.....	5.023	5.039	52	55	52	55						
119 Transportation equipment, other than motor vehicles ¹.....	.334	.332	5	8	5	8						
12 Furniture and other household durables.....	3.944	4.001	89	527	89	527						
121 Household furniture.....	.967	.935	20	189	20	189						
122 Commercial furniture.....	.399	.395	7	24	7	24						
123 Floor coverings.....	.377	.383	10	45	10	45						
124 Household appliances.....	.928	.978	21	121	21	121						
125 Television, radio receivers, and phonographs.....	.434	.487	7	45	7	45						
126 Other household durable goods.....	.839	.823	24	103	24	103						
13 Nonmetallic mineral products.....	2.871	2.865	39	409	34	404	5	5				
131 Flat glass.....	.254	.244	4	10	4	10						
132 Concrete ingredients.....	.721	.719	4	190	4	190						
133 Concrete products.....	.896	.908	4	70	4	70						
134 Structural clay products.....	.349	.343	11	55	6	50	5	5				
135 Gypsum products.....	.131	.126	3	11	3	11						
136 Asphalt roofing.....	.136	.136	5	19	5	19						
137 Other nonmetallic minerals.....	.384	.389	8	54	8	54						
14 Tobacco products and bottled beverages.....	2.586	2.473	18	126	18	126						
141 Tobacco products.....	.993	.955	9	48	9	48						
144 Alcoholic beverages.....	1.036	1.038	6	62	6	62						
145 Nonalcoholic beverages.....	.557	.480	3	16	3	16						
15 Miscellaneous products.....	3.386	3.049	101	306	94	299	1	1			6	6
151 Toys, sporting goods, small arms, etc.....	.472	.470	29	88	29	88						
152 Manufactured animal feeds.....	1.928	1.603	13	53	6	46	1	1			6	6
153 Notions and accessories.....	.106	.105	6	12	6	12						
154 Jewelry, watches, and photographic equipment.....	.578	.574	31	75	31	75						
155 Other miscellaneous products.....	.302	.297	22	78	22	78						

¹ Subgroup index not published.

NOTE: Relative importance represents the basic value weight of an item or items multiplied by the relative of price change between the weight date to a later date and the result expressed as a percentage of the total for all

commodities. The differences between the relative importance as of December 1960, the date of last major weight change, and that of December 1964 are due principally to price change only.

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, 25 percent of the fresh vegetables (by value-weight) was assigned to crude food-stuffs and feed-stuffs for further processing and 75 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 1947.⁹

⁹ See W. Duane Evans and Marvin Hoffenberg, "The Inter-Industry Relations Study for 1947," *The Review of Economics and Statistics*, May 1952, pp. 97-142; also, National Bureau of Economic Research, *Input-Output Relations; and Appraisal, Studies in Income and Wealth*, vol. 18, New York, N.Y., 1955.

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, where 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 personal visit by a Bureau representative to the prospective respondent. Pricing of additional products from established reporters often is done 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 99 and 100. The form becomes a part of the permanent record for the series. After the initial collection of prices, monthly information is collected by mail by means of a shuttle schedule (BLS 473, shown on pages 101 and 102).

Weights

The price data are combined using weights based on value of shipments. The major sources of the value data are:

Bureau of Census-----	<i>Census of Manufactures</i> <i>Census of Mineral Industries</i>
Bureau of Mines-----	Various publications, e.g., <i>Minerals Yearbook</i> .
Department of Agriculture.	Various publications, e.g., <i>Agricultural Statistics</i> .
Bureau of Fisheries----	Various publications, e.g., <i>Fisheries of the United States</i> .

In addition, many other sources of data, such as trade associations, are used. Import data are obtained from reports of the U.S. Department of Commerce, *United States Trade with Puerto Rico and with United States Possessions* (No. 800) and *United States Imports for Consumption* (No. FT 110).

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. New items are not added until they have become established in the market.¹⁰ They

are added, normally, in December of any year, with the first effect in the index in January.

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 the most common quality, grade, level of distribution, and market. However, terms of sale (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. This is true for some farm products such as wheat and cotton. When there is no standard commodity basis, 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 waste materials and such building materials 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 there has been great interest 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.

¹⁰ If new items are added before they become fully established, the sharp price decline experienced by most products, as they move from development to mass production, imparts a downward bias to the index. Also, many new products turn out to be of only transitory significance.

Estimating Procedures

Formula and Calculation

In concept, the Wholesale Price Index is calculated according to a modified Laspeyres formula:

(1) $I_t = [\sum Q_a P_i / \sum Q_a P_o] \times 100$, 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:

$$(2) I_t = [\sum (Q_a P_o) (P_i / P_o) / \sum Q_a P_o] \times 100$$

In this form, the index is a weighted average of price relatives for each item (P_i / P_o). The expression ($Q_a P_o$) represents the weights in value form and the "P" and "Q" elements (both of which originally relate to period "a" but are adjusted for price change to period "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 10, Consumer Prices.)

Base Period

The Wholesale Price Index has been computed on the base 1957-59=100 (average of 1957, 1958, and 1959) since January 1962.¹¹ Earlier bases were 1947-49, 1926, and 1913. New items (or new index groupings consisting primarily of new items) introduced into the index after 1957 cannot be cal-

¹¹ Rebasement factors for shifting the indexes from the 1957-59 base to the 1947-49 base are published in the January 1962 final report, *Wholesale Prices and Price Indexes*.

¹² Before the 1952 revision (calculated back to 1947), priced items in the index were weighted only by their own market values.

¹³ The censuses are, in general, collected at 5-year intervals.

culated on the 1957-59 base. Such indexes are published with separate bases related to the date of introduction.

Weights

The Wholesale Price Index 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.¹² 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 which 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 Wholesale Price Index weights periodically when data from the industrial censuses become available.¹³ The weights beginning in 1961 are based on the 1958 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. The 1963 Censuses of Manufactures and Mineral Industries provide data for revising these weights. Minor redistributions of the

weights are made from time to time to take care of additions or deletions of commodities from the sample.

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 and the result expressed as a percentage of the total for all commodities or for some index grouping.¹⁴

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 in the first month of delinquency, prices are estimated by a standard procedure. This procedure either holds prices unchanged from the preceding month or provides imputations based on the price movement of other series in the cell (also taking account of previous movements of the delinquent series), depending on whether these other series have been unchanged or have changed by more or less than 1 percent over the latest 3-month period.

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. Before the institution of pricing for collapsible tubes, this commodity price was calculated on the basis of the price for the component metal.

¹⁴ The use of relative importance data to construct indexes for groups of products is discussed in BLS Bulletin 1214, 1957, *Wholesale Prices and Price Indexes, 1954-56*. Relative importances as of December for each item are published in annual bulletins.

¹⁵ *Wholesale Prices and Price Indexes, 1961* (BLS Bulletin 1382, 1964), p. 2.

Weekly Index

The weekly index represents a modified extension of the latest complete monthly index calculation. It is based on price data for a group of over 250 commodities, mostly metals, petroleum, and food product items which are generally characterized by more frequent price changes than the other commodities. Other commodities are estimated unchanged. The average percent change from the latest monthly index is converted to index form for publication. No attempt is made to maintain a continuous series by correcting these indexes to new monthly levels.

Analysis and Presentation

The monthly Wholesale Price Index is published first in a press release issued 4 to 5 weeks after the pricing date (Tuesday of the week containing the 15th of the month). Indexes are shown for all groups and subgroups as well as for All Commodities, Farm Products and Processed Foods combined, and All Commodities Other than Farm Products and Foods. 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 bulletins carry the data for the year. In addition, numerous historical tabulations at various levels of detail are available on request.

In the first month of publication, the monthly indexes are preliminary and subject to revision. In the following month, revisions and substitutions of actual prices for estimated prices are incorporated. The indexes are published at this time as final. Any revisions which come to light after the final index has been published are made subject to a standard correction policy which takes account of the magnitude of the error.¹⁵

In addition to the weekly estimated All Commodities index described earlier, weekly indexes for finished steel products and for petroleum products are issued in separate releases.

BLS 1810

THIS FORM WILL BE HELD IN CONFIDENCE

Budget Bureau No. 44 R 602.5

U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS

Approval expires: 12-31-67

Washington, D.C. 20212

Commodity _____

Code No. _____

COMMODITY PRICE INFORMATION SHEET

Firm name _____		
Plant or division _____	Mfr. <input type="checkbox"/>	Other _____
(Specify)		
Address _____	_____	_____
(Street)	(City and State)	(Zip code)
Information authorized by _____	Title _____	
Information furnished by _____	Title _____	
Mail schedule to _____	Title _____	
Address _____	(Reporter)	_____
(Street)	(City and State)	(Zip code)

1. COMMODITY DESCRIPTION (include style no., model no., lot no., grade, brand, etc.)

2. PRICE HISTORY FOR COMMODITY DESCRIBED ABOVE

Date	Price	Remarks	Date	Price	Remarks

3. CHECK OR FILL-IN PERTINENT INFORMATION ABOUT PRICES REPORTED ABOVE

- A. Class of seller _____ to Class of customer _____
(mfr., importer, etc.) (wholesaler, user, etc.)
- B. Prices are: Actual transaction prices* ; List prices subject to discounts ;
 List prices less discounts ; Other (specify) _____
- C. Unit quoted _____ D. Size of order _____
- E. Shipping terms (f. o. b.; frt. allowed; etc.) _____
- F. Type of package used; Crate ; Carton ; Bag ; Other _____
- G. Is refund allowed for returnable container? Yes No If "Yes", explain _____

* Actual selling prices to class of customer, for size of order, shipping terms, and discounts reported.

4. ENTER DISCOUNTS AND ALLOWANCES APPLICABLE TO REPORTED PRICES WHEN COMMODITY DESCRIBED IS SOLD TO THE CLASS OF CUSTOMER SPECIFIED IN 3A.

- A. Trade discount _____ %
- B. Quantity discount (based on size of order specified in 3D) _____ %

FOR THE FOLLOWING, INDICATE DISCOUNT TERMS AND ESTIMATE THE PERCENT OF SALES AFFECTED

	<u>Terms</u>	<u>Estimated % of sales</u>
C. Cash discount _____	_____	_____ %
D. Seasonal discounts _____	_____	_____ %
E. Cumulative volume discount _____	_____	_____ %
F. Rebates (monthly) _____	_____	_____ %
G. Other discounts, allowances, free deals, etc. (explain fully) _____	_____	

CIRCLE ALL DISCOUNTS OR ALLOWANCES ABOVE WHICH
HAVE BEEN DEDUCTED IN ARRIVING AT PRICES REPORTED

5. LIST DUTIES OR EXCISE TAXES APPLICABLE TO REPORTED PRICES.

A. These are included in prices quoted Not included

B. If tax is included, give example of how to calculate price excluding tax.

6. ENTER APPROXIMATE PERCENTAGE OF SALES TO EACH CLASS OF CUSTOMER.

	Other mfr. (O.E.M. or assembler)	Distributor	Jobber	Wholesaler	Retailer	User	Other (specify)	Total
Sales (approx.%)								100%

Remarks: _____

BLS Representative _____ Date _____

INFORMATION FOR THE WHOLESALE PRICE INDEX

Code No. _____

1. COMMODITY DESCRIPTION (Please indicate all changes.) _____

CHANGES

Give date, nature, and estimated value of change

2. BASIS OF QUOTATION (Please indicate all changes.) _____

Date and nature of change

Unit _____
 Class of seller and customer _____
 Size of order _____
 Shipping terms _____
 Other (Specify.) _____

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.) _____

Date and nature of change

	YES	NO
Quantity discount		
Trade discount		
Cash discount		
Seasonal discount		
Other discount		
Other charges		
Excise taxes		

Have any indicated discounts been deducted from the reported price?

Have any of these been included?

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.

_____ Price as of Sept. 14, 1965

PRICING DATE	PRICE	DATE OF PRICE CHANGE (if any)	PRICING DATE	PRICE	DATE OF PRICE CHANGE (if any)
Oct. 12, 1965			Apr. 12, 1966		
Nov. 16, 1965			May 17, 1966		
Dec. 14, 1965			June 14, 1966		
Jan. 11, 1966			July 12, 1966		
Feb. 15, 1966			Aug. 16, 1966		
Mar. 15, 1966			Sept. 13, 1966		

PERMANENT OFFICE RECORD
 KINDLY RETURN
 THIS FORM PROMPTLY

Seasonally adjusted indexes are not published. However, because of the interest in the subject, the Bureau has published seasonal factors for about 180 commodities and commodity groups of the WPI and for the All Commodities index.¹⁶

Uses and Limitations

The Wholesale Price Index is used by government and private research agencies for many purposes, including market analysis, escalation of long-term purchase and sales contracts, formulation of monetary policies, and 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 in accord with 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 which 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 to measure actual selling prices.

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.

While the WPI often is used to measure change in purchasing power of the dollar, it should not be used to measure change 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.¹⁷

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 Wholesale Price Index 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.¹⁸ As the economy has produced an increasing proportion of fabricated finished goods (whose price changes are relatively infrequent), over the years, the WPI has become somewhat more stable. 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 under-represented. These sudden expansions could have made it appear that prices had suddenly stabilized.

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. Assum-

¹⁶ *Seasonal Adjustment Factors, Wholesale Price Index: Selected Series 1948-61* (BLS Bulletin 1379, 1963).

¹⁷ See chapter 12 on Industry-Sector Indexes.

¹⁸ The sample of priced items doubled in 1952 to about 1,850 items and has increased by about 400 since then.

ing 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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Office of Prices and Living Conditions

Chapter 12. Industry-Sector Indexes

Background

During recent years a growing need for comprehensive measures of industrial prices, in addition to the market oriented prices of the Wholesale Price Index, has become increasingly apparent. As a result, the Bureau initiated a program of industry-sector price indexes based upon data collected for the WPI.

An industry or sector price index is essentially a composite index made up of price series that match the economic activity of a defined industry or economic sector. The Wholesale Price Index, on the other hand, is compiled according to commodity rather than industry groupings. The number of sectors or industries for which these series are compiled depends somewhat upon resources available for additional pricing.

A set of industry-sector price indexes covering the years 1947 through 1953 was prepared in the early 1950's as part of the Bureau's project on interindustry economics. These indexes, generally a regrouping of the Wholesale Price Indexes into the interindustry (input-output) classification structure, were designed for revaluing bills of goods and industry outputs. In 1959, another set of such indexes was compiled for the Bureau of the Census in connection with that agency's construction of the 1958 production index benchmark.¹ This second group of price indexes was used in deflating values of shipments in those census product classes where physical production data were lacking or unsatisfactory. Again, these were essentially indexes of commodity prices, classified as primary to a given industry.²

The need for the Bureau to develop Industry-Sector Price Indexes 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.³ The committee stated ". . . It seems desirable that the subclassification should aim at fitting into the Standard Industrial Classification."

In 1962, the Bureau of Labor Statistics initiated the development of industry and sector price indexes. Because of its scope, the program is viewed as a long-run program to be accomplished in several stages. The first stage is being devoted to the study of conceptual and data problems with only a gradual expansion of commodity pricing.

The first indexes to be developed will be output price indexes utilizing gross shipments weights. Priority will be given to indexes for the manufacturing, mining, and agricultural divisions of the Standard Industrial Classification. Input price indexes, i.e., indexes representing the price of industrial purchases, will come later. Eventually the work will expand to include sector indexes with both value-added and net weights from which intra-sector shipments are excluded.

Description of the Survey

Concepts

An industry or sector price index is a composite index derived from several series of prices that closely match the economic activity of a specified industry or industry sector. These indexes may be either output 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

¹ Neither of these earlier indexes were published, but were made available to other government research agencies. See Chapter 30, section on Economic Growth Studies, for background on interindustry studies.

² The classification of establishments into industries, in this program, follows the guidelines established by the Bureau of the Budget in its Standard Industrial Classification (SIC) system, as revised in 1957. 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." See appendix B.

³ *Government Price Statistics, Hearings before the Subcommittee on Economic Statistics, of the Joint Economic Committee, Congress of the United States, Part I, January 24, 1961, page 64.* Also see report of United Nations Economic and Social Council; *Problems and Methods in the Gathering of Representative and Comparable Wholesale Price Series*, E/CN. 3/264, 15 March 1960, Chapter II.

price indexes for the products of the industry, averaged together according to the relative importance of production of each product to the industry. An input price index for an industry consists of an aggregation of price indexes for all of the commodities and services purchased by the industry, averaged together according to the relative magnitude of the purchases.

The Bureau's work is being directed first toward two sets of output indexes. One set is being weighted by gross shipments of products "made in the industry" to be used for deflating industry shipments. The second set will be output price indexes of product shipments classified on the industrial basis but weighted by shipments of the product produced anywhere in the economy. The principal use of the second set is for input-output analysis.⁴

Universe

Ultimately, the scope of the universe will be defined in terms of the Bureau of the Budget's Standard Industrial Classification (SIC) system as revised in 1957, which covers all domestic economic activity. This system groups together related products or services and assigns them industry and sector codes. Currently, however, the scope of pricing is effectively restricted to the commodities' coverage of the WPI because of the use of WPI price data.

If price indexes are to parallel industry output data, the indexes should cover the total output of each industry including the value of interplant transfers, the value of sales to all classes of customers, and the value of industrial services. They should include the value of sales for export but exclude excise taxes and costs of transporting finished goods to purchasers. This is consistent with the "total activity" coverage of statistical series on employment and production.

Input price indexes of materials consumed in production should cover total materials inputs of the industry. This would include imports for consumption, and also transportation and delivery costs.

Prices and Base Period

The prices used in the current Industry-Sector Indexes are in general those used in the Wholesale

Price Index. In the Wholesale Price Index, primary market prices, f.o.b. production point, are used. For the Industry-Sector Indexes, pricing eventually should be extended to all classes of customers, including retail, for use in the output indexes. Buyers' prices, including shipping costs, should be used for input indexes and should represent the particular mix of products purchased by the buying industry.

The current reference base period is the same as that for other Federal Government indexes—1957-59=100.

Classification

The Standard Industrial Classification (SIC) of the Bureau of the Budget provides the framework for the Industry-Sector Index classification scheme. Within this framework, individual products are given a 7-digit code by the Bureau of the Census.⁵ The product indexes are aggregated to 5-digit product classes and 4-digit industries. Industry indexes can be aggregated to 3- and 2-digit levels as well. Four-digit industry indexes also can be aggregated to fit the sectoring plan of the latest Input-Output model.⁶

Sampling and Estimating Procedures

Sampling

Currently the Industry-Sector program largely depends on price data already available in the Wholesale Price Index. However, extension of industrial pricing is being geared to the new program. A sampling plan has been prepared which outlines industrial sectors that should have priority as new pricing is undertaken. As the result of this analysis, pricing may be cut back in some sectors to permit extension of pricing into inadequately covered sectors.

⁴ See Chapter 30, section on Economic Growth Studies, for a discussion of the nature and uses of input-output data. See also W. Duane Evans and Marvin Hoffenberg, "The Inter-Industry Relations Study for 1947," *The Review of Economics and Statistics*, May 1952, pp. 97-142; and "Input-Output Relations and Appraisal," *Studies in Income and Wealth*, vol. 18, National Bureau of Economic Research, New York, 1955.

⁵ The SIC provides no product codes.

⁶ The Input-Output model referred to is that compiled by the Office of Business Economics, U.S. Department of Commerce. See Goldman, Morris R., et al., "The Inter-Industry Structure of the U.S." *Survey of Current Business*, November 1964, pp. 10-29.

Price data used in computing an industry-output price index should be representative of the output of the industry, that is, of the values of products made in plants classified in the industry, but should exclude prices of products primary to the industry but made in plants classified in other industries. Even though the products are the same, the prices received by the primary and secondary industries may be different, sometimes because these industries sell to different types of users. As a rough guide to the adequacy of sampling, the immediate objective is to represent at least 50 percent by value of the commodities included in each 5-digit Census product class.⁷ This percentage will be slightly less at higher levels of aggregation. This criterion will be adjusted to levels indicated by differences in variability of price change among product classes as experience makes possible the use of more sophisticated sampling approaches.

Weights

Weights for the output indexes are 1958 value of shipments obtained from the Census of Manufacturers, the Census of Mineral Industries, and data of the U.S. Department of Agriculture. Values include interplant transfer values, values for goods produced and consumed in the same establishment, and the value of 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.⁸

For use in deflating industry shipments, the 4-digit (SIC) Industry Indexes will be 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.

For indexes to be used for deflating interindustry product flows, weights will be used at both

5- and 4-digit levels of aggregation that will correspond to the production of goods made both within and outside of the primary industries.

Formula and Calculation

A modification of the Laspeyres fixed-weight formula is used. The underlying formula is: $I_t = \frac{\sum (P_t/P_o \cdot P_o Q_a)}{\sum P_o Q_a}$ where P_t/P_o is an individual product price index. $P_o Q_a$, the value weight (base year price times weight year quantity), currently is the 1958 value of shipments adjusted for price change from the year 1958 to the average of 1957, 1958, and 1959. In succeeding years, new weights will be introduced whenever weights are revised for the comprehensive Wholesale Price Index.⁹

In actual practice the calculation may be somewhat more involved than indicated by the simple formula presented previously. 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, it is necessary first to construct product-class indexes based upon total output (wherever made) weights. 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 are annual averages for the period 1957 through 1964, and cover only a limited number of manufacturing and mineral industries. Future plans call for the publica-

⁷ As the component 7-digit products are usually quite homogeneous in physical structure, it can be assumed that one commodity specification priced directly will adequately represent an entire 7-digit product. However, as a consequence of this assumption, changes in classification detail at the product level from one Census period to another may result in changes in reported coverage without any corresponding change in sample.

⁸ This procedure is the same as that employed in the WPI. However, as the product classes are defined differently, an unpriced commodity may have a different price movement imputed to it in the Industry Index program than it has in the WPI.

⁹ Much of the value used in weighting the WPI is derived from the periodic Census of Manufactures and Mineral Industries which are currently collected on 5-year cycles. See Chapter 11, Wholesale Prices.

tion of monthly indexes as they become available, and a bulletin containing historical indexes and conceptual treatment.

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 as distinct from market or commodity-use classifications.

Whether an 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 value series 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 also 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.

Essentially the process of deflation provides a means of obtaining an estimate of quantity change from available data 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 purchasing power of the dollar as of the base period of the index. Or an index of dollar volume can be divided by the price index to obtain a production index.¹⁰

The output indexes also may be used for comparing movements of prices with other industry-based statistical measures such as employment, earnings, productivity, etc. Price indexes consist-

ent with total shipments weights will 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 the entire economy's shipments of aluminum to buyers in this industry rather than the aggregate output of the primary aluminum industry.

Input price indexes will be especially useful to research departments in private industry as well as to public agencies in making cost studies. 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. Input price indexes, however, are not available yet.

There are a number of uses which combine output and input indexes. For example, gross output price indexes and materials input price indexes can be used to yield a measure of value added in constant dollars.

The prices used in constructing the currently published indexes are those 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 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, these new indexes will be limited by the coverage—commodity and class of customer—of the comprehensive Wholesale Price Index.

¹⁰ It 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 23, Output per Manhour: Industries.

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Number

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Office of Prices and Living Conditions

Chapter 13. Daily 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 base to correspond to the base period adopted for other Federal Government general purpose indexes.

Description of Survey

The Daily 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.¹ 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. A listing of prices is compiled each morning for the preceding day. Prices for cocoa beans, steers, sugar, wheat, burlap, copper scrap, cotton, lead scrap, print cloth (spot), rosin, rubber, steel scrap, wool tops, and zinc, are of the same specification and source as those used in the comprehensive monthly Wholesale Price Index.²

¹ Exchanges which issue spot prices have committees to make a determination of the spot price for the standard commodity.

² See Chapter 11, Wholesale Prices.

Prices for butter, corn, hides, hogs, lard, tallow, and tin are either differently specified spot prices or from different markets.

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 daily index is an unweighted geometric mean³ 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 the product of these ratios.

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

$$\frac{\text{Log } I_k = \sum \text{Log } P_k - \sum \text{log } P_o + 44}{22}$$

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 2 equals log of 100.

Monthly average indexes are obtained according to the previous procedure, except that P_k = the geometric average of the daily prices 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

Indexes and prices are published each day, Monday through Friday, based on data for the preceding day. They also are available in a weekly summary issued each Wednesday. In addition, the weekly summary gives daily spot prices for eight commodities which are not included in the index. The daily spot market indexes and prices also are presented in bulletins issued at approximately 3-year intervals. Historical series on the 1957-59 base are available in mimeographed form on a daily basis beginning with 1950; for Tuesday of each week from July 1946 through 1949; and for four selected 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 Daily Index is frequently used as a general economic in-

³ The geometric mean of n figures is the n th root of their product. Thus, the geometric mean of the numbers 1.5, 2.0, and 9.0 is 3.0 ($1.5 \times 2 \times 9 = 27$. $3\sqrt[3]{27} = 3$). The arithmetic mean, is 4.2.

indicator, for gaging 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 Daily 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 Daily Index or its components may foreshadow turns in Wholesale Price Indexes. However, the Daily 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 Daily 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 "nominal" 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 January 1965

Commodity	Specifications	Market
Burlap.....	10 oz., 40", in carloads, ex-dock or warehouse, duty paid, per yd.	New York.
Butter.....	Grade A, 92 score, per lb.....	Chicago.
Cocoa beans.....	Accra, per lb.....	New York.
Copper scrap....	No. 1 copper, refiners', buying price, delivered buyers' works, per lb.	New York.
Corn.....	No. 3 yellow, per bu.....	Chicago.
Cotton.....	Middling, 1", per lb.....	15 markets.
Cottonseed oil...	Crude, Valley, per lb.....	Memphis.
Hides.....	Packer, light native, cow, per lb.....	Chicago.
Hogs.....	U.S. No. 1, 2's, and 3's, 200-220 lbs., per 100 lb.	Chicago.
Lard.....	Prime Steam, in tanks, per lb.....	Chicago.
Lead scrap.....	Battery plates, smelters' buying price, delivered buyers' works, per lb.	New York.
Print cloth.....	39", 80 x 80 count, 4 yds./lb., spot and nearby, per yd.	New York.
Print cloth.....	39", 80 x 80 count, 4 yds./lb., most distant contract, per yd.	New York.
Rosin.....	Gum, WG grade, carlots, per 100 lb....	New York.
Rubber.....	Crude, natural, No. 1 Ribbed Smoked Sheets, per lb.	New York.
Steel scrap.....	No. 1 heavy melting, (dealer), consumers' buying price, including brokerage, delivered, per gross ton.	Chicago.
Steers.....	Choice, 900-1100 lbs., per 100 lb.....	Chicago.
Sugar.....	Raw, 96", duty paid, per 100 lb.....	New York.
Tallow.....	Packers' Prime, inedible, per lb.....	Chicago.
Tin.....	Grade A, spot delivery, ex-dock, per lb.	New York.
Wheat.....	No. 1 Dark Northern Spring, per bu....	Minneapolis.
Wheat.....	No. 1 Hard Winter, per bu.....	Kansas City.
Wool tops.....	Certificated spot price, nominal, per lb.	New York.
Zinc.....	Slab, Prime Western, for prompt delivery, delivered, per lb.	New York.

—HELEN F. HALD

Office of Prices and Living Conditions

Wages and Industrial Relations

Chapter 14. 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 has 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 also yield national and regional estimates. In addition, the Bureau developed two new types of surveys.

Community 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 nonmanufacturing 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 needs of the U.S. Department of Defense and other agencies in setting rates for "wage-board" employees.

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, and technical jobs in a broad spectrum of industries. Averages for these jobs, together with national averages for clerical and drafting jobs included in the community wage surveys, are utilized by the administrative agencies directly concerned with Federal pay matters.

Description of Surveys

Although differing in industrial, geographic, and occupational coverage, the 3 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 1957 edition of the *Standard Industrial Classification Manual* prepared by the U.S. Bureau of the 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 provide representativeness of the range of rates, methods of wage payment, and of men's and women's work activities. Consideration also is given, in their selection, to the prevalence in the industry, definiteness and clarity of duties, and

¹ See appendix B.

² See appendix C.

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., production and related workers or nonsupervisory workers. Weekly work schedules, shift operations and differentials, paid holiday and vacation practices, and health, insurance, and pension 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 labor-management 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 20 million employees, are surveyed on a regularly recurring basis. A majority are studied on a 5-year cycle, but many comparatively low-wage industries are on a 3-year cycle.

Nearly all of the manufacturing, utilities, and mining industries are studied on a nationwide basis and estimates are also provided for regions and major areas of concentration. Surveys in trade, finance, and service industries usually are limited to a score or more 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.

Community wage surveys provide data for occupations common to a wide variety of industries in the communities surveyed. The more than three-score occupational categories studied are about equally divided between (1) office clerical, draftsmen, and industrial nurses, and (2) maintenance, toolroom, power plant, and custodian 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 collected 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 dozen 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 80 Standard Metropolitan Statistical Areas in this annual survey program as of 1965, separate data are provided for transportation, communication, and other public utilities in 72 areas, for retail trade in 23 areas, for wholesale trade and finance, insurance, and real estate in 16 areas, and for the selected service industries in 8 large areas.

Data on weekly work schedules, paid holiday and vacation practices, and health, insurance, and pension benefits are recorded separately for non-supervisory office workers and plant (nonoffice) workers. 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. All of these items are studied annually in six large areas and biennially in other 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.

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 75 occupation-work levels studied were selected from the following fields: Accounting, legal services, office services, personnel management, engineering and chemistry, 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 Classi-

fication 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.

Average salaries, monthly and annual for all occupations and also on a weekly basis for clerical, 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. Salary distributions and averages are presented for men and women combined. Since the clerical salary data largely are derived from the community wage survey program, separate estimates for men and women are made available for metropolitan areas studied in the program.

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 in-

³ The terms "in scope" or "within scope" are used throughout this chapter to refer to the coverage of the particular survey being described.

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 his 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.

⁵ 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.

cluded in the survey was raised from 100 to 250 in 1961. Since the survey scope is subject to change, users are directed to the Scope and Method of Survey appendix in the reports for a description of current practice.³

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.

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 interestablishment 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

It should be recognized that 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, and probationary workers.

Paid holidays, paid vacations, and health, insurance, and pension plans are treated statistically on the basis that these are applicable to all non-supervisory plant or office workers if a majority of such workers are eligible or can expect eventually to qualify for the practices listed. Data for health, insurance, and pension plans are limited to those plans for which at least a part of the cost is borne by the employer. Informal provisions are excluded.

Survey Methods

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 Bureau of the 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 community wage surveys or the salary survey of professional, administrative, technical, and clerical jobs. The needs of major users are a major consideration in designing the multi-purpose 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.

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. Wherever possible, community 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 pension plans, union contract coverage, and other items applicable to the establishment. The second (BLS 2752A) 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 struc-

Your report will be held in confidence

GENERAL ESTABLISHMENT INFORMATION

1. ESTABLISHMENT IDENTIFICATION

SURVEY _____

A. Establishment Scheduled

Payroll period

(Name)	196__
(Street address)	196__
(City)	196__
(County and State)	196__
(Telephone)	

Name and title of authorizing official	Name and title of official supplying data
196__	
196__	
196__	

B. Central Office (if any)

(Address of office from which information was obtained, if different from above)

(Name)

(Street address)

(City and State)

2. CURRENT PRODUCTS OR SERVICES AND PROCESSES

A. Product or Service (to be used to assign industry classification)

196__	Approximate % annual value	196__	Approximate % annual value	196__	Approximate % annual value

B. Scope of Operations

3. Office Use Only										
Schedule No.	Area	Region	State	City size	SIC code	Special characteristics	Est. size	Weight	Total employment (weighted)	
1-5	6-7	8	9-10	11	12-16	17-19	20	21-23	24-28	
196__										
196__										
196__										

4. ESTABLISHMENT EMPLOYMENT (APPROXIMATE)

(2)

	Total employment	Nonsupervisory production (plant) workers			Nonsupervisory office workers			Other (executive, professional, supervisory, etc.)
		Total	Men	Women	Total	Men	Women	
196__								
196__								
196__								

Office Use Only—Weighted Employment						
	PRODUCTION (Plant)			OFFICE		
	Total 29-33	Men 34-38	Women 39-43	Total 29-33	Men 34-38	Women 39-43
196__						
196__						
196__						

Remarks _____

5. WAGE PRACTICES AND RELATED DATA

If the establishment lacks either production (plant) or office workers, leave corresponding spaces blank on all items.

A. Shift Data—Production (plant) workers only

1. Shift operation:

Does establishment operate extra shift?

Code block for each shift independently

Codes (Blocks 44 and 45)

- 1. Establishment currently operating extra shift
- 2. Establishment not currently operating extra shift but has formal shift premium provisions
- 3. Establishment not currently operating extra shift and has no formal shift premium provisions

2. Shift employment (approximate)—To be answered only if extra shift is being operated:

	2d Shift 44	3d Shift (or other) 45
196__		
196__		
196__		

	Day	Evening (2d)	Night (3d)	Other
196__				
196__				
196__				

Office Use Only—Weighted Shift Employment		
	Evening 46-49	Night 50-53
	196__	
196__		
196__		

Your report will be held in confidence

WAGE-RATE INFORMATION

Industry or survey _____

Establishment name _____

Area _____ Payroll period _____

1. GENERAL WAGE RATE CHANGES

(also including cost-of-living and annual improvement adjustments)

Date decided	Effective date	Retroactive date (if any)	Adjustments		Approximate number of workers affected		Classes of workers affected by wage change
			Cents per hour	Percent	Production (plant)	Office	
A. Wage changes granted since _____ 196__							
B. Wage changes pending to _____ 196__							
	x x x						
	x x x						

2. PROVISIONS FOR COST-OF-LIVING AND ANNUAL IMPROVEMENT ADJUSTMENTS

	Cost-of-Living	Annual Improvement
Production (plant) workers:	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
Office workers:	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>

Remarks _____

3. PROVISIONS FOR WAGE REOPENING

Production (plant) workers _____

Office workers _____

4. OFFICE USE ONLY

Schedule No.	Page No.	Area	Reg.	State	City size	SIC code	Pay period	Est. size	Union	Weight	Special charac.

	Men	Women
Number of Workers Scheduled	Production (plant)	
	Office	
Card count		

ture 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.

Community wage surveys in all except the large metropolitan areas involve personal visits every second year with partial collection by mail in the intervening years. Establishments participating in the mail collection receive a transcript of the job matching and wage data obtained a year earlier by the field economist, 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 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

The sampling design employed is almost always highly stratified. Before the sample is selected, information on all known establishments that might possibly fall within the scope of the survey is compiled from lists provided by regulatory governmental agencies (primarily State unemployment insurance agencies), supplemented by data from trade directories, trade associations, labor unions, and other sources.

Establishments then are stratified as precisely as available information permits. 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. 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, in accordance with the principles of optimum allocation. 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 overrepresentation of large firms, the method of estimation employed avoids the possibility of bias by the assignment of proper weights to the sample establishments.

In the event a sample establishment within scope is unable to supply 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 overall nonresponse rate in published surveys averages about 5 percent, and in exceptional cases reaches 10 percent.

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, community wage surveys are limited to selected metropolitan areas. These areas, however, form a sample of all such areas, and, when properly combined, 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 percentage of manufacturing employment, major industries, and level of earnings in manufacturing. Each area was selected with probability proportionate to its non-agricultural 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 area sample contained about 80 percent of all non-agricultural employment of the metropolitan area complex of the entire country in 1964.

In some strata it was impossible to give some areas their proper chance of selection, because of difficulties in making surveys in these areas primarily due to predominance of single employers. Then, too, some areas were chosen to represent some strata because of interest in the area of itself. These departures from a strict probability design, covering only 14 percent of the total, are believed to be negligible in their effect.

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 employees' 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 workers in each establishment are considered to be covered by the predominant benefit policy in effect, and the entire employment of the establishment is 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 half of the plants were 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 a group where a fourth of all plants were 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.

Establishment	Weight	Total number	Average hourly earnings	Workers in occupation in sample establishments at specified rate	
				Workers	Earnings
A.....	2	40	\$1.50	2×40	2×40×\$1.50
B.....	1	30	1.70	1×30	1×30× 1.70
		20	1.95	1×20	1×20× 1.95
C.....	4	10	1.20	4×10	4×10× 1.20
Estimated universe.....				170	\$258.00

The estimated average hourly earning is thus $\frac{\$258.00}{170}$ or \$1.52.

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:

Establishment	Weight	Actual total establishment employment	Weighted employment	Vacation provisions after 2 years
A.....	2	100	200	1 week.
B.....	1	500	500	2 weeks.
C.....	4	75	300	1 week.
Estimated universe.....			1,000	

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 are weighted to the estimated stratum totals by multiplying by the inverse of the chance of selection. This procedure provides the ratio of non-agricultural 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 community wage surveys are supplemented by a two-part summary bulletin. Part I compiles the results of individual area surveys made during a fiscal year. Part II contains information on occupational earnings, employer practices, and supplementary wage benefits for all metropolitan areas combined and by industry division within the four census regions.

Wage-rate indexes are constructed for broad occupational categories, e.g., office clerical workers, skilled maintenance workers, and unskilled plant workers. These indexes are published annually, separately for all industries and manufacturing, for each metropolitan area studied, and for all metropolitan areas combined and by region. Area pay relatives for the three occupational categories are published annually, permitting ready comparisons of average pay levels among areas. Occupational pay relationships within individual establishments are summarized periodically, as are estimates of labor-management agreement coverage.

Bulletin reports 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. Average pay levels for industry divisions are shown as percentages of the all-industry averages. Salary trend estimates are published for each occupation-work level. Special inquiries have developed estimates of the value of cash bonuses and information on practices in the design and use of salary structures relating to white collar occupations.

Industry and community 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 made available in November.

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 in 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 community 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.

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. That error applies to the smallest breakdown published. Hence, the error present in broader groupings will be somewhat less.

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 4 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

Number

1. Cohen, Samuel E., "Studies of Occupational Wages and Supplementary Benefits." *Monthly Labor Review*, March 1954 (pp. 292-297).

An earlier description of the methods of wage surveys, similar to the present article.

2. Douty, H. M., "Survey Methods and Wage Comparisons." *Labor Law Journal*, April 1964 (pp. 222-230).

A discussion of the uses of wage survey results, and the pitfalls to be avoided. A short discussion of the factors affecting survey methods is also included.

3. Kanninen, Toivo P., "New Dimensions in BLS Wage Survey Work." *Monthly Labor Review*, October 1959 (pp. 1081-1084).

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.

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Office of Wages and Industrial Relations

Chapter 15. Employee Earnings and Hours Frequency Distributions

Background

An extensive program of studies of the frequency distribution of employee earnings has been maintained by the Bureau of Labor Statistics since 1954, and since 1964 frequency distributions of weekly hours of work have been a part of this program. The program of studies was initiated to provide knowledge about the internal structure of earnings and hours which an average does not reveal. For example, distribution studies show whether earnings or hours are dispersed evenly or tend to be clustered around one or more points; they show the gap between the highest and lowest paid workers; they reveal the proportions of employees working short or long hours, and similar information on individual earnings and hours. They serve to locate the employed "poor," i.e., those not sharing in the general rise in living standards available from work.

Although the need for such data had long been recognized and some work had been done in the area, the program did not receive its full impetus until 1955 when Congress, in an amendment to section 4(d) of the Fair Labor Standards Act, directed the Secretary of Labor to include in his annual report an evaluation and appraisal of minimum wages established by the Act and his legislative recommendations.¹ To meet these requirements, the program of employee earnings distributions studies was established.

Description

Studies of employee earnings and hours distributions generally include within their scope all non-supervisory employees. No attempt is made to classify employees by occupation, although at times information is collected separately for some types of employees. The data collected relate to straight-time hourly earnings, excluding premium pay for

overtime work and for work on weekends, holidays, and late shifts. Incentive pay, production bonuses, and cost-of-living payments are included in earnings, but nonproduction bonuses (e.g., Christmas bonuses) are not. Hours information is collected for hours worked during the week and for hours spent on vacations, holidays, or sick leave for which pay is received. Earnings and hours information is obtained for each employee, making it possible to calculate average hourly earnings and weekly hours of work for the entire group as well as to show the distribution of employees by earnings, hours, or both.

Two basic types of distributions studies are conducted—industry and area.² Industry studies may have broad coverage, such as manufacturing or wholesale trade, or they may be limited to specific industries, such as motor carriers. While industry studies usually are conducted on a nationwide basis, they sometimes (especially in the case of specific industry studies) are limited to one or several areas in which the industry is concentrated. Industries are defined on the basis of descriptions in the current Standard Industrial Classification Manual, published by the Bureau of the Budget.³

Area studies are limited in geographic coverage, perhaps to a Standard Metropolitan Statistical Area,⁴ to a county or a group of contiguous counties, or to a region or part of a region. This type of study usually is conducted on a cross-industry basis—that is, earnings and hours data are collected for most industry divisions, including mining; manufacturing; transportation (except railroads), communications and other public utilities; wholesale and retail trade; finance, insurance, and real estate; and services. Minor exceptions may be made.

Data Sources and Collection Methods

Data generally are obtained from employer payroll records, using one of two collection methods. Establishments may be solicited for information by mail or by personal visit. Those establishments contacted by mail receive a questionnaire form and a note requesting cooperation in the survey and

¹ The Bureau's studies conducted in this area prior to 1954 frequently related to selected occupations, or were limited to relatively narrowly defined industries.

² See technical references for a listing of publications containing full descriptions of both types of studies.

³ See appendix B.

⁴ See appendix C.

explaining the nature and purpose of the study. Typically, the questionnaire requests information on the product or service of the establishment and number of employees, as well as other establishment information which may be pertinent to the survey.⁵ The respondent is requested to report each employee's earnings and weekly hours worked—the primary focus of the survey. Provision is made for the reporting of earnings on an hourly basis or on a salary or incentive basis. In the last two instances, the respondent reports the number of hours paid for during the salary or incentive period, thus permitting the computation of average hourly earnings for employees paid on other than an hourly basis.

Certain large establishments, or companies from which data for several establishments are requested, are visited personally by the Bureau's field economists who may prepare the data for the survey from company records, or arrange with the company for the completion of the questionnaire form. In addition, a sample of establishments which do not reply to the mail questionnaire is visited by Bureau field economists to obtain the desired information.

To limit errors caused by incorrect reporting by the respondent, questionnaires received by mail are reviewed for reasonableness and consistency. Where data are questionable, a letter is written to the respondent asking him to review the item to assure its accuracy.

Sampling

Earnings and hours distribution studies are conducted on the basis of a sample of all establishments within the scope of the survey. The sample generally is derived from State Unemployment Insurance (UI) listings which show reporting units with four employees or more by location, number of employees, and industry classification. In industries where establishments with fewer than 4 employees are of numerical importance (e.g., retail trade) the UI lists may be augmented by sources such as other government agencies, or trade directories.

The size of the sample depends on several factors, among which are the size of the universe, the

distribution of establishments by number of employees, the relative dispersion of earnings among establishments, the degree of accuracy required, and the cost of obtaining the data. Estimates of variance based on data from previous surveys also may be used in determining the appropriate size of the sample.

The sample usually is selected using a highly stratified probability sampling design. Establishments are first grouped, or stratified, according to industry, geographic location, and employment size. Establishments in specific industries or areas for which earnings and hours data are to be presented separately are grouped independently of establishments in other strata, and sampled separately.

In order to obtain maximum accuracy per unit cost, the number of establishments in the sample is distributed among the various strata in the most efficient manner, in accordance with the principles of optimum allocation. A fraction of establishments in each stratum is included in the sample, with the sampling fraction diminishing as the employment size of the strata decreases, so that the probability of inclusion in the sample is greater for the large than for the small establishment. Frequently the entire stratum containing the largest establishments is included in the sample.

The following example shows a hypothetical universe of 47 establishments in three employment-size groups. By applying the appropriate sampling ratio to each size group (stratum), the number of sample establishments is determined.

<i>Employment size group</i>	<i>Number of establishments in universe</i>	<i>Sampling ratio</i>	<i>Number of sample establishments</i>	<i>Weight of each sample establishment</i>
Under 25.....	32	1/4	8	4
25-49.....	12	1/3	4	3
50 and over.....	3	1/1	3	1

No assumption is made that the earnings and hours structures of establishments not responding to the mail questionnaire are similar to those of establishments which do respond. Therefore, a sample is taken of the nonrespondents following a procedure similar to the one just described. Establishments in this subsample are visited by Bureau field representatives in order to obtain the required data.

Data are not always obtained for every establishment in the original sample. Generally, approximately 60 to 70 percent of the sample establishments supply usable data to the survey.

⁵ See illustrations, pp. 128-133.

BLS 2834

Budget Bureau No. 44-R1006.5
Approval expires March 31, 1965

Your report will be held in confidence.

U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON, D.C. 20210

EMPLOYEE EARNINGS AND HOURS, MANUFACTURING INDUSTRIES

ESTABLISHMENT IDENTIFICATION:

← This report should cover manufacturing plants, warehouses, and central offices in the county or area designated to the left.

1. TYPE OF MANUFACTURING ACTIVITY:

List separately all products and services for the establishment designated above. The products listed should account for 80 percent or more of last year's sales. Include in sales all receipts of nonmanufacturing activities, if any.

Product	Approximate percent of sales	Product	Approximate percent of sales

2. PAYROLL PERIOD COVERED BY THE SURVEY:

The information requested should correspond to your payroll period (weekly, bi-weekly, or monthly) which includes March 12, 1964.

Indicate the dates for the payroll period used.

From _____, 1964 to _____, 1964.

3. EMPLOYMENT IN ESTABLISHMENT(S) COVERED BY THIS REPORT:

- A. Total _____
Enter total number of employees (full-time and part-time) who received pay for any part of the payroll period. Include nonsupervisory, executive, administrative, and professional employees. DO NOT INCLUDE proprietors, members of unincorporated firms, or unpaid family workers.
- B. Nonsupervisory production and related employees _____
Enter number of employees (full-time and part-time) who were engaged in production jobs below the supervisory level and received pay for any part of the payroll period. Include employees engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping, trucking, hauling, maintenance, repairing, janitorial, watchmen, product development, auxiliary production for plant's own use (e.g., power-plant), recordkeeping, and other services closely associated with the production operations. Also include working foremen (who spend less than 20 percent of their time at supervisory duties), leadmen, and trainees.
- C. Other nonsupervisory employees _____
Enter number of employees (full-time and part-time) who were engaged in other than production jobs below the supervisory level and received pay for any part of the payroll period. Include office, technical, and cafeteria employees, routemen, employees engaged in the installation and servicing of products made in the establishment, and force-account construction employees engaged in construction of major additions or alterations who are utilized as a separate work force. DO NOT INCLUDE outside salesmen, executive, administrative, professional, and supervisory personnel.

Do you want a copy of the Bureau's report on this survey?..... Yes No

Name and title of person furnishing data _____
(Please type or print)

FOR BLS USE ONLY

Schedule number 1-5	Reg. 6	State 7-8	City size 9	SIC 10-12	Est. size 13	Wgt. 14-16	Spec. char. 17-19

2

4. ESTABLISHMENT CHARACTERISTICS:

A. Indicate the premium overtime pay provision for production and other nonsupervisory employees in your establishment. If more than one provision exists, indicate that which applies to the greatest number of employees. Enter "none" if such a provision does not exist.

(1) How many hours during a single day must an employee work before he is eligible for premium overtime pay, and what is the premium rate (e.g., 8 hours - 1 1/2 times regular rate)?

Production employees _____.

Other nonsupervisory employees _____.

(2) How many hours during a week must an employee work before he is eligible for premium overtime pay and what is the premium rate (e.g., 40 hours - 1 1/2 times regular rate)?

Production employees _____.

Other nonsupervisory employees _____.

B. How many of your production employees are paid on an incentive basis (e.g., piecework, bonus)? _____

C. How many of your production employees were employed on late shifts during the payroll period covered? _____

How many received shift differentials? _____

5. EARNINGS AND HOURS OF NONSUPERVISORY EMPLOYEES:

INSTRUCTIONS

(Please read carefully to avoid correspondence)

Separate sections are provided for reporting data for production and related workers and for other nonsupervisory workers. Earnings and hours should be reported separately for each employee unless these data are identical for two or more employees. Exclude premium pay for overtime and for work on weekends, holidays, and late shifts. Do not report aggregate earnings and hours for several workers. For convenience of reporting for employees paid on other than an hourly basis (e.g., salary, incentive), columns 5 and 6 are provided. Instructions for reporting the necessary data in each column are listed below and examples are shown on the enclosed sheet.

<p>Complete columns 1, 2, and 3 for all nonsupervisory employees covered by this report.</p>	<p>Column (1)—Indicate whether the employee is male (M) or female (F). Column (2)—Use a separate line for each employee and enter "1," unless two or more employees of the same sex worked the same number of hours during the selected week, and received identical hourly or salary rates. Data are to be reported individually for each employee whose earnings were based entirely or in part on commissions, bonuses, or incentives. Column (3)—Enter the number of hours paid for during the week of March 9-15, 1964. Include hours paid for sick leave, holidays, vacations, etc. These hours should relate to a 1-week period regardless of the length of the payroll period.</p>
<p>Use column 4 to report earnings of employees paid on an hourly basis.</p>	<p>Column (4)—Enter the base (straight-time) hourly rate. Premium payments for overtime and for work on weekends, holidays, and late shifts should be excluded. This column may also be used to report earnings of employees paid on an incentive or salary basis if average straight-time hourly earnings are available.</p>
<p>Use columns 5 and 6 to report earnings of employees paid on a salary or incentive basis.</p>	<p>Column (5)—Enter for each employee the total straight-time salary and/or incentive earnings for the payroll period (weekly, biweekly, or semi-monthly) which includes March 12, 1964. Include straight-time pay for overtime, but exclude overtime premium. Column (6)—Enter the number of hours paid for during the payroll period (weekly, biweekly, monthly, or semimonthly) which corresponds to the earnings reported in column 5. Include hours paid for sick leave, holidays, vacations, etc.</p>

EMPLOYEE EARNINGS AND HOURS

BLS 2786
(Rev. '66)

Budget Bureau No. 44-6615.
Approval expires 12-31-66.

U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON, D. C. 20212

Your report will be held in confidence

RETAIL TRADE
Individual Hours and Earnings

BLS USE ONLY

1. COMPANY IDENTIFICATION:

State	Area	Ent. sales	SIC	Wgt.

The data, except for Item 2 which relates to the entire company, should cover all establishments (retail stores, warehouses, central offices, etc.) in the county or area designated to the left.

(Check appropriate box.)

2. ANNUAL GROSS SALES FOR THE COMPANY OR ENTERPRISE:

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Under \$250,000	\$250,000 to \$500,000	\$500,000 to \$1,000,000	\$1,000,000 or more

Check the block which indicates the annual gross volume of sales (exclusive of excise taxes at the retail level) from all related activities of the enterprise. Include receipts from stores covered by this report as well as all other related activities. Use the last calendar or fiscal year.

3. ESTABLISHMENT INFORMATION:

Please enter the information requested in the columns below for each separate establishment (retail store, warehouse, or central office) covered by this report. Each retail store in a separate location is considered a separate establishment for the purpose of this survey. However, if the records for main store and suburban branch are kept on a combined basis, they may be considered as one establishment.

- (a) Location: Identify each establishment by its street address and city.
- (b) Type of Retail Activity: Enter for each establishment the major retail activity such as department store, drug store, gas station, etc.
- (c) Employment: Include all full-time, part-time, seasonal, and casual employees who received pay for any part of the payroll period including June 13, 1966. Exclude employees, such as those in leased departments and demonstrators, who received all or a substantial part of their pay from another employer.
Total—Enter total number of employees including officers and other principal executives, such as buyers, department heads, and managers whose work is above the working supervisory level.
Nonsupervisory—Enter total number of employees below the supervisory level, such as salespersons, shipping and receiving clerks, laborers, warehousemen, caretakers, office clerks, driver-salesmen, installation and repairmen, elevator operators, porters, janitors, watchmen, and other employees whose services are closely associated with those listed above. Do not include officers and other principal executives, such as buyers, department heads, and managers whose work is above the working supervisory level.
- (d) Annual Gross Sales for the Establishment: Check the column which indicates the annual gross volume of sales (exclusive of excise taxes at the retail level).

(a) Location (street address and city)	(b) Type of retail activity	(c) Employment for payroll period including June 13, 1966		(d) Gross establishment sales (check appropriate column) Were last year's sales—		
		Total	Non-supervisory	Less than \$150,000	\$150,000 to \$250,000	\$250,000 or more

4. PAYROLL PERIOD:

Employment and earnings data reported should correspond to your payroll period (for example, weekly, biweekly, or monthly) including June 13, 1966. Indicate the dates for the payroll period used. If the length of the payroll period varies among employees, enter the dates affecting the greatest number.

From _____, 19____ to _____, 19____.

2

5. EARNINGS AND HOURS OF WORK OF NONSUPERVISORY EMPLOYEES:

This study is designed to provide information on hourly earnings and weekly hours of work for both male and female nonsupervisory employees and working supervisors for a payroll period including June 13, 1966. The number of employees in each establishment for which earnings and hours data are reported should correspond with the number of nonsupervisory employees shown in item 3(c) on page 1. The information requested should be reported separately for each establishment and the establishment identified. Earnings data for food counter, cafeteria, or restaurant workers in Department, Drug, or Variety Stores should be entered only on the blue supplement provided. Data for all other employees should be reported in Item 5 of this form.

Report earnings and hours separately for each employee unless these data are identical for two or more employees. Do not report aggregate earnings and hours for several employees. For convenience of reporting for employees paid on other than an hourly basis, columns 5 through 8 are provided. Data will not, however, be published separately by various methods of pay. Instructions and examples for reporting the necessary data in each column are listed below.

INSTRUCTIONS

(Please read carefully to avoid correspondence)

Complete columns 1, 2, and 3 for all nonsupervisory employees covered by this report (see examples A-E).	<p>Column (1)—Indicate whether the employee is male (M) or female (F).</p> <p>Column (2)—Use a separate line for each employee and enter "1," unless two or more employees of the same sex work the same number of hours during the selected week, and receive identical hourly or salary rates (see example A). Data are to be reported individually for each employee whose earnings are based entirely or in part on commissions or bonuses (see examples C, D, and E).</p> <p>Column (3)—Enter the number of hours worked during a single week including June 13, 1966. Include hours paid for sick leave, holidays, vacations, etc. These hours should relate to a 1-week period regardless of the length of the payroll period.</p>
Use column 4 to report earnings of employees paid on an hourly basis (see example A).	<p>Column (4)—Enter the base (straight-time) hourly rate. Premium pay for overtime work should not be reported. This column may also be used to report earnings of employees paid on other than an hourly basis if average straight-time hourly earnings are available. For employees paid a commission or bonus in addition to an hourly rate, also complete columns 7 and 8 (see example D).</p>
Use columns 5 and 6 to report earnings of employees paid on a weekly, bi-weekly, monthly, or semimonthly basis (see example B).	<p>Column (5)—Enter for each employee the straight-time earnings for the salary period (weekly, biweekly, monthly, or semimonthly) including June 13, 1966. Include straight-time pay for overtime, but exclude overtime premium. Do not include "draws" against commission as salary.</p> <p>Column (6)—Enter the number of hours worked during the salary period (weekly, biweekly, monthly, or semimonthly). Include hours paid for sick leave, holidays, vacations, etc. For employees paid a commission or bonus, also complete columns 7 and 8 (see example E).</p>
Use columns 7 and 8 to report earnings of non-supervisory employees based entirely or in part on commissions and bonuses (see example C).	<p>Column (7)—Enter for each employee the total commission and/or bonus earnings, including "PM's," "Stims," or any special bonuses based on sales paid quarterly or oftener by the store. These earnings are to be reported for the commission or bonus period including June 13, 1966. If the commissions earned during that pay period are not representative of normal commission earnings, a longer period may be used. If store employees receive both commission and bonus payments for an identical period of time, report the combined figure (see example D). If bonus payments cover a period longer than the commission period, add only the prorated amount of the bonus to the commission earnings that correspond to the commission period (see example E).</p> <p>Column (8)—Enter the number of hours worked during the commission or bonus period. (The hours should refer to the total hours worked during the period (weekly, biweekly, monthly, or semimonthly) and not necessarily only to those hours during which commissions or bonuses were earned.) For employees paid an hourly rate or salary in addition to commissions or bonuses, it is also necessary to complete column 4, or columns 5 and 6 (see examples D and E.)</p>

NOTE: If all the information requested in Item 5 is contained in your payroll, you may, if you wish, send us a copy of your payroll instead of completing Item 5. All other items on the form should be completed and the form should be sent with the payroll. The copy of your payroll will be returned to you if you request it.

EXAMPLES

(See illustrations on next page)

- A. Two women each worked 36½ hours during the selected week, and each was paid a straight-time hourly rate of \$1.05.
- B. One man worked 40 hours during the selected week, and received a salary of \$125, exclusive of premium pay for overtime, for 88 hours worked during the salary period (½ month).
- C. One man worked 32½ hours during the selected week and was paid on a straight commission basis, receiving \$215.70 for 168 hours.
- D. One woman worked 40 hours during the selected week and was paid an hourly rate of \$1.25; she also received \$35 in commissions and \$7.50 in "PM's" for 173.6 hours worked during the commission period (1 month).
- E. One man worked 37½ hours during the selected week, and was paid a weekly salary of \$75; he also earned commissions of \$102 during a 1-month period (162 hours) and \$150 in bonuses during a 3-month period. Only ¼ of the bonus, or \$50 is reported so that the bonus period corresponds to the commission period.

EMPLOYEE EARNINGS AND HOURS

5. EARNINGS AND HOURS OF WORK OF NONSUPERVISORY EMPLOYEES —Continued

BLS USE ONLY				
Sch.	Est. sales	City size	Emp.	Class emp.

Complete these columns for each nonsupervisory employee.			Use this column for non-supervisory employees paid on an hourly basis.	Use these columns for nonsupervisory employees paid other than on an hourly basis.			
(1) Sex (M or F)	(2) Number of employees	(3) Hours worked during a single week including June 13, 1966	(4) Straight-time hourly rate	(5) Straight-time salary for salary period including June 13, 1966	(6) Hours worked during salary period	(7) Total commissions and/or bonus pay	(8) Hours worked during commission period
Illustrations of examples on page 2.							
A. F	2	368	\$1.05	\$		\$	
B. M	1	40.0		125.00	88.0		
C. M	1	32.5				215.70	168.0
D. F	1	40.0	1.25			42.50	173.6
E. M	1	37.5		75.00	37.5	152.00	162.0
DATA FOR EACH ESTABLISHMENT SHOULD BE REPORTED SEPARATELY AND THE ESTABLISHMENT IDENTIFIED.							
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Estimating Procedure

Although a greater proportion of large than of small establishments is included in the sample, any possible bias which might result from this difference is avoided by means of 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. That is, an establishment selected from a stratum in which a sampling ratio of 1 out of 4 is used is assigned a weight of 4, so that it represents itself and 3 other establishments in the stratum (see previous example). Data for each establishment are multiplied by the weight assigned to the establishment. Thus, all establishments, regardless of their size, are represented appropriately in the final estimates.

An establishment in the subsample of nonrespondents 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, if a third were subsampled of a group originally sampled at the rate of 1 out of 2, the weight of 6 would be assigned. In the case of an establishment included in the sample with certainty, another establishment which is similar to the nonrespondent would be weighted to represent it.

In industry surveys, estimated employment totals derived from the weighting process are further adjusted to the employment levels for the payroll period studied, as reported in the Bureau of Labor Statistics monthly establishment employment series.⁶ This adjustment is necessary to reduce the hazards of sampling, and because the State UI listings, which constitute the universe or a large part thereof, are prepared prior to the time of the survey and thus do not account for establishments opened or closed between the compilation of the lists and the date of the survey.

Estimated average hourly earnings and weekly hours of work are the arithmetic mean of weighted individual employees' earnings or hours. Generally, they are derived by totaling weighted individual hourly earnings or weekly hours and dividing the sum by the weighted number of employees in the group. However, in industries such as retail trade, in which hourly earnings frequently

vary by weekly hours of work and in which the length of the workweek covers a broad range among employees, the most representative group average hourly earnings figure is considered to be the quotient of total individual weekly earnings divided by total individual weekly hours worked.⁷

The following example illustrates the more common method of estimating group average hourly earnings. Referring to the sampling scheme described in the preceding example, assume that the eight sample establishments in the under 25 size group had 30 employees, each earning \$1.50 an hour, 20 earning \$2 and 15 earning \$3, and that the 12 establishments in the 25–49 size group and the 3 in the 50- and over-size group had employees with earnings as shown. Making the calculations that follow, estimated group average hourly earnings are obtained.

Weight×	employment=	Weighted employment×	Hourly earnings=	Weighted group hourly earnings
	30	120	\$1.50	\$180.00
4	20	80	2.00	160.00
	15	60	3.00	180.00
	50	150	1.50	225.00
3	40	120	2.50	300.00
	30	90	3.00	270.00
	150	150	2.00	300.00
1	100	100	2.50	250.00
	50	50	3.00	150.00
		920		2,015.00

$$\text{Estimated group average hourly earnings} = \frac{\text{Total weighted group hourly earnings}}{\text{Total weighted group employment}} = \frac{\$2,015.00}{920} = \$2.19$$

If the average is to be computed following the second procedure (such as would be done in retail trade studies), employment would be replaced by weekly hours in the example and the remainder of the calculations carried through. In this case, the ratio now shown in the example would be replaced by the ratio of total weekly earnings to total weekly hours.

Analysis and Presentation

The Bureau generally issues a bulletin on the results of each survey of employees' earnings and hours distributions. The report contains a description and analysis of the survey results as well as tabulations of data collected.

⁶ See chapter 2, "Employment, Hours, and Earnings".

⁷ See *Employee Earnings in Retail Trade, June 1962* (BLS Bulletin 1380, 1963), p. 65.

In industry studies, tabulations are presented for the entire industry and frequently for important segments of the industry. For example, in a survey of manufacturing, in addition to data for the entire industry division, data also might be presented for most or all of the major groups (2-digit SIC codes) for several groups (3-digit SIC codes), and perhaps for some individual industries (4-digit SIC codes). In addition to nationwide presentation, data for all or some of the industry segments generally are shown separately on a regional basis, and frequently on a metropolitan-nonmetropolitan area basis.

Data obtained in area studies, which include most industry divisions, are tabulated for all the industries in the area combined, and then separately for manufacturing and nonmanufacturing industries. Where sufficient data are available, tabulations are presented for selected industry groups as well.

Earnings are tabulated to show the distribution of employees by 5- and 10-cent average hourly earnings intervals. Hours are tabulated to show the distribution of employees by weekly hours of work. The total number of employees, their average hourly earnings and average weekly hours, of course, also are shown. Data also may be presented to show average weekly earnings and cross-tabulations of average hourly earnings by weekly hours of work.

The text accompanying the tabulations gives a description of the area or industry studied and provides a summary and analysis of the survey results. Important relationships and differences among areas and industries are highlighted and, where data are available from earlier surveys, period-to-period changes in earnings and hours are discussed. In addition, a detailed description of

the scope and method of survey is included in the report.

Uses and Limitations

The design of these employee earnings and hours distributions studies makes them particularly useful in the analysis of Federal minimum wage and maximum hours legislation—in analyzing the effects of legislation, in considering new legislation, and in formulating wage and hours policy. The information is used by the executive and legislative branches of government, organized labor, business, academicians, etc. Special tabulations are prepared for the U.S. Department of Labor's Wage and Hour and Public Contracts Divisions for use in the Secretary of Labor's annual report to the Congress required under section 4(d) of the Fair Labor Standards Act. In addition, the data are used in collective bargaining, wage setting, broad economic analysis of labor area and industry wage structures, comparisons of wage levels in various parts of the country, and to show trends in employment, earnings, and hours.

Employment estimates are subject to some error, and in smaller groups this error may be relatively large. Therefore, these estimates frequently are provided to serve only as general guides to the size of the labor force included in the survey and as reference points from which to measure the direction and general magnitude of employment changes.

The average earnings reported are straight-time, and any premium pay for overtime or late shift work is not reflected. Similarly, differences in prevailing supplementary compensation practices ("fringe benefits") among establishments, industries, and areas are not considered.

Technical References

Number

1. U.S. Department of Labor, Bureau of Labor Statistics: *Earnings in Wholesale Trade, June 1958* (Bulletin 1253, 1959).
2. ——. *Factory Workers' Earnings, May 1958* (Bulletin 1252, 1959).
3. ——. *Employee Earnings in Nonmetropolitan Areas of the South and North Central Regions, June 1962* (Bulletin 1416, 1964).
4. ——. *Employee Earnings in Retail Trade, June 1962* (Bulletin 1380, 1963).

Each of these bulletins contains a detailed description of the methodology used in the survey.

—ALVIN BAUMAN

Office of Wages and Industrial Relations

Chapter 16. Union Wage Scales

Background and Description of Survey

Annual studies of union scales of wages and hours are conducted in four industries: Building construction, local transit, local trucking, and printing.¹ Union scales, agreed upon through collective bargaining between employers and trade unions, 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. Originally, information was obtained for 39 cities, but the number was gradually expanded until in 1948, 82 cities were covered.² That number was reduced to 77 in 1949 and to 52 in 1953. The studies were again expanded, after the 1960 Census of Population, to the present coverage of 68 cities with 100,000 population or more. The scope of the information for individual industries has also been expanded. For example, 24 journeymen crafts and nine helper and laborer classifications in the building trades are covered currently, in place of the 13 journeymen and seven helper and laborer classifications in the initial studies.

The study of union scales in the building trades includes virtually all journeymen and helper and laborer classifications. Indexes and other data are shown for each important trade as well as for all trades combined.³

The trucking study embraces motortruck drivers and helpers engaged in local trucking. 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 classifications indicated.

Union scales in the local-transit industry are 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.

In the printing industry, 12 book and job trades and 8 newspaper trades are studied and for the newspaper trades, separate data are shown for day and nightwork. Indexes and other data are presented separately, by type of printing, for each trade and for all trades combined.

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 which 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 which 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.

To insure accurate reporting of data by mail, quality control checks are conducted annually in a number of cities. Checks are made in all cities at least once every 5 years. In these checks, Bureau representatives personally visit local union officials to review and verify data previously re-

¹ The coverage at various former periods also included barbers, linemen, longshoremen, and workers engaged in breweries, laundries, metal trades, millwork, restaurants, soft-drink production, theaters, and bakeries.

² In these studies, data relate to individual cities and contiguous suburban areas, rather than to the much broader Standard Metropolitan Statistical Areas which are used in most other Bureau surveys.

³ In addition to the annual studies in the building trades, a quarterly survey of 7 major construction trades is conducted in 100 cities. Estimated average hourly scales for all trades combined and for each surveyed trade are presented, together with the estimated change during the quarter.

ported by mail questionnaire. Clarifying misunderstandings, if any, of survey definitions and requirements during such reviews enables the Bureau to maintain its standards of reliable data.

Information requested relates to July 1 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, scale 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 are also 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.⁴ The reporting form used for the building trades survey is reproduced on pages 138 and 139.

Sampling and Estimating Procedures

The current series is designed to reflect union wage scales in all cities of 100,000 population or more, excluding Honolulu. All cities with 500,000 population 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 geographic region was considered separately when city weights were assigned.⁵

Scales

An over-all average hourly rate is computed for each of the industries included in the union wage studies. In addition, averages are presented by industry branch, trade, city, and region in building construction and printing; by city and region, in local transit; and by region and city, in trucking.

Average union rates are calculated by weighting each quotation for the current year by the reported membership.⁶ 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 each of the four industries to portray the trend of union scales of rates and weekly hours. In calculating these indexes, the percentage 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. In the 1964 study of building trades, the rate aggregate for all quotations increased 3.7 percent over the previous year. The July 1, 1964, index of union hourly wage rates for all building trades (126.2) is the result of multiplying the July 1, 1963, index (121.7) by the ratio of the aggregates (103.7). 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 and printing industries. In the local trucking and local transit industries, indexes are 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.

The base period for the indexes of union wage scales and weekly hours is the 1957-59 average. The series for the building trades and printing

⁴ See chapter 20. "Collective Bargaining Agreements."

⁵ The cities in the sample were not selected on a probability basis. Continuity of city data has taken precedence over sampling procedure during periods of contraction and expansion in the program.

⁶ Reported membership, as used in this study, is defined as members working or immediately available for work.

U. S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS

Union Scales of Wages and Hours in the Building Trades
(Annual Survey)

PART A.—GENERAL INFORMATION:

Please attach a copy of your agreement in effect on July 1, 1965, and answer the following questions:

1. When did your agreement go into effect? _____
When may it be reopened? _____
When does it expire? _____

2. What is the maximum number of hours that can be worked each day before overtime rate is effective? _____

3. Does your agreement specifically provide for a paid vacation, financed by employer payments—

(A) To a vacation fund Yes No

FUND PAYMENTS DEDUCTED FROM PAYROLL UPON AUTHORIZATION OF WORKERS ARE NOT CONSIDERED EMPLOYER PAYMENTS

(B) To worker each pay period, as part of negotiated scale Yes No

(C) To worker each pay period, in addition to negotiated scale Yes No

(D) Other—(Explain) _____

If answer is YES to any of above, indicate amount of employer payment _____ per hour.
(¢ or %)

4. Does your agreement provide for a health and insurance plan (life insurance, hospitalization, medical, surgical, and other similar types of health and welfare programs) financed—

Entirely by employer? Yes No

In part by employer? Yes No

Amount of employer contribution? _____ per { hour
shift
week

5. Does your agreement provide for a pension plan financed—

Entirely by employer? Yes No

In part of employer? Yes No

Amount of employer contribution? _____ per { hour
shift
week

6. Does your agreement provide for employer payments to other funds, such as holiday, educational, promotional, unemployment benefits? Yes No If YES, list below each type of contribution separately and amount of employer payments (cents or percent).

7. What is the total membership of your union? _____

How many are journeymen? _____

How many are apprentices? _____

How many are helpers and laborers? _____

8. Between July 1, 1964, and July 1, 1965, how many apprentices completed their apprenticeship? (If none enter zero.) _____

9. Between July 1, 1964, and July 1, 1965, how many journeymen became unavailable for work because of death, permanent disability, or retirement? (If none enter zero.) _____

REMARKS—

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 prior to the dates of the index series, indexes were not constructed because of inadequacies in the available data.

Analysis and Presentation

The above mentioned averages and indexes together with other summary data are contained in the bulletins published annually for the individual studies. Included among the information shown for individual trade classifications is the proportion of union members having hourly scales at different rate levels, as well as the proportion of union members having, since the previous study, scale increases of specified amounts in terms of cents per hour and percent. The increase registered by the trade is shown also.

In addition, the union scales of wages and hours in effect on the date of the survey, as reported by union officials, for both the previous and current years are published for each classification by city. These furnish a direct comparison of union scales between the 2 years for each of the industries studied. The scales of wages are indicated as hourly rates and the scales of hours as the weekly hours of work before overtime rates are applicable.

For the building trades and local motortrucking the current studies also present data on employer payments for insurance (health and welfare) and pension payments; in addition employer payments for vacation funds are shown for the building trades. These payments are expressed in terms of cents per hour or as percent of rate.

⁷ It should be noted that membership (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, nor do the data reflect metropolitan area scales.

Uses 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 scales 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 scales 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 scales. For example, if organizational drives in cities having relatively lower scales of wages result in sharp increases in membership, the movement of the scale levels for the affected trades as a whole is naturally retarded. Conversely, increases in membership in cities having high wage scales accelerate the upward movement of averages.⁷

The union rates, it should be noted, are not necessarily the actual rates paid to all workers, nor are the union hours the hours actually worked. Workers with above average experience and skill may be employed at rates above the union scale, especially during prosperous times when a tight job market creates competitive bidding for the better workmen. During periods of depressed business activity, actual hours worked are often less than hours specified in the union agreement.

—JOHN F. LACISKEY
Office of Wages and Industrial Relations

Chapter 17. Current Wage Developments

Background

Since January 1948, the Bureau of Labor Statistics has issued a monthly report listing 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 or more production and related workers in manufacturing and selected nonmanufacturing industries.

The *Current Wage Developments* report was initiated because of the rapid increase in wage rates and prices in the early postwar period and the interest in determining the extent to which settlement patterns spread from industry to industry. It also was prompted by the fact that reductions in available resources made it necessary to discontinue 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 and the frequency with which various types of supplementary benefits were introduced or changed.

Beginning in 1959, another statistical summary was instituted. It is limited to manufacturing,

but includes information on general wage changes and changes in supplementary benefits for nonunion and small union situations, as well as for large collective bargaining situations.¹

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 and benefits in manufacturing firms of all kinds is described as the "manufacturing" series.

The major series describes general wage changes and changes in benefits² in all collective bargaining settlements involving 1,000 or more production and related workers in manufacturing and 1,000 or more nonsupervisory workers in the nonmanufacturing sector, excluding Government.³

Supervisory or professional employees are excluded. Large units of technicians are included even though they are part of a bargaining unit that is predominantly professional.

Contracts covering multiplant firms are included if the agreement as a whole covers 1,000 or more workers even though each individual plant employs fewer. 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 accounting for 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 represents all establishments with four or more employees that adjust wages by means of general wage changes,⁴ regardless of whether the workers are represented by a union.

Wage change data are presented in cents per hour and, since 1959, as a percentage of average straight-time hourly earnings, adjusted to exclude premium pay for overtime work.

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 in the listing.

² Only changes in benefits that represent changes in costs are included.

³ Prior to 1966, the construction service trades and finance industries are also excluded.

⁴ 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.

Two types of information are presented on wage changes: (1) information on changes that go into effect within 12 months of the date on which they are decided or negotiated, thus reflecting the economic climate at the time the changes are decided upon; and (2) all changes effective during the period being summarized whether or not they were (a) decided upon during that period, (b) were deferred—that is, decided upon earlier—or (c) resulted from operation of cost-of-living clauses. 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 with 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 presented in the monthly *Current Wage Developments* listing 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 Office of Labor-Management and Welfare-Pension Reports.⁵ At the end of the year, the BLS contacts, almost entirely by mail, 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 semiannually by a questionnaire mailed to participating establishments.⁶ The information on general wage changes and the types

of benefits that have been introduced, liberalized, or made less liberal is supplemented by the contract filed (unionized establishments) and from newspaper clippings, purchased from a commercial clipping service. At the end of the year, BLS field representatives 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 with 1,000 or more workers in manufacturing and nonmanufacturing industries are included in the major series. It is believed that the current list of nearly 2,000 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., because of a change in business to one outside the scope of the survey, 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 listings (UI) which show reporting units with four or more employees by location, number of employees, and industry classification.⁷ The sample is a highly stratified probability design, with sampling ratios varying from 1 out of 150 establishments with 4 to 19 employees to all of those with 1,000 or more employees.⁸ The ratios are uniform for all industries. Since data are available from secondary sources for all unionized situations with at least 1,000 production and related workers, data for all establishments meeting this criteria also are included in the summary for manufacturing. The sample selected from the UI listings is compared

⁵ Information from contracts supplied on a confidential basis is used only in the statistical summaries, not for the monthly listing.

⁶ From 1959-60, when the series was initiated, through 1964, the questionnaire obtained information each quarter. Beginning in 1965, data were collected semiannually.

⁷ See appendix B, "Industrial Classification." For a more detailed description of unemployment insurance data, see p. 15, chapter 2.

⁸ In the case of a few companies with large numbers of establishments each with 1,000 or more workers, a sample of plants is chosen.

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 4,000 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 followed up by a visit 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 numbers of 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 to 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.⁹ For example, if the estimate of produc-

tion worker employment in an industry group derived from the sample is 100,000 but the Bureau's estimate of employment in that industry group was 110,000 workers, each employment count would be multiplied by $\frac{110,000}{100,000}$ or 1.1. The resulting industry group estimates would be added to provide the estimates for all manufacturing.

The major series for manufacturing and non-manufacturing 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 usually is selected every 2 or 3 years. Establishments with fewer than four workers are omitted because in many States they are not covered by these unemployment compensation programs. After the initial contact, establishments of any size that indicate that they have a policy of adjusting wages on an individual basis, rather than by means of general wage changes, are omitted from further survey.

Presentation and Analysis

Press releases showing preliminary information on general wage changes for the major collective bargaining situations are issued approximately 6 weeks from the end of the quarter. Final summaries of the major data include information on changes in supplementary benefits, and are published for the first 6 and 9 months of the year and for the full year. The 6-month summary also includes separate tabulations of data relating to the first 3 months. All of these summaries are published as supplements to *Current Wage Developments*, with the full-year article usually also published in the *Monthly Labor Review*. The 6- and 9-month summaries are limited to analysis of wage and benefit changes resulting from contract settlements concluded during the year. The yearend summaries present similar information, but in greater detail, and also include data on total effective wage changes—those negotiated in the period plus deferred and cost-of-living changes resulting from settlements in prior years but going into effect in the current year. Information is presented for manufacturing industries, for non-manufacturing industries, and for both combined.

⁹ See chapter 2.

Summary releases of the manufacturing data are published for the first half of each year and for the full year. The article covering the full year also appears in the *Monthly Labor Review*. The 6-month summary stresses the results of settlements or management decisions made during the period, while the yearend analysis is broader and more detailed. The examination of changes in supplementary benefits is not as detailed as the examination of major benefits, because of the need to simplify the information requested by mail. The respondent is asked only if each of the types of benefits—such as holidays, etc.—has been “established, improved, or decreased or discontinued,” rather than to specify the precise types of change.

Because it is based on data both for large and small unionized and nonunionized establishments, the manufacturing analysis can make many useful comparisons of its components. For example, comparisons can be made between the median wage increases in unionized versus nonunionized establishments, or the type and frequency of changes in supplementary benefits.

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.

Because estimates of the cost of supplementary benefits usually are not available, the wage change data must be presented in relation to average hourly earnings, rather than to average hourly labor costs. In 1965, a pilot study was undertaken to find ways to determine such costs in major situations.

Since the sample is relatively small, data are not presented for individual industries.

—GEORGE RUBEN
Office of Wages and Industrial Relations

Chapter 18. Employer Expenditures for Supplementary Compensation Practices

Background

The measurement of employer expenditures for selected supplementary compensation practices 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 war years, employers were encouraged by the policies of the War Labor Board to grant wage supplements instead of wage increases, e.g., vacations, 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 wage supplements 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 1962-63 there were about 33,410 pension plans and 161,750 private pension or welfare plans in America.⁴

Direct wage supplements, such as 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 19th 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 1962, approximately 6 percent of the production worker hours paid for in manufacturing industries were leave hours, almost all of which were vacation and holiday hours.

The growing importance of the supplements in the Nation's wage and salary structure is illustrated by comparing the increase in expenditures for production and related workers in manufacturing with the increase in average hourly earnings. In 1962, manufacturing industry employers had expenditures per plant hour for the selected supplements studied⁵ that were on the average, about 18-percent greater than in 1959, the previous period studied. During the same period the average hourly earnings of production and related workers rose by about 9 percent—a rate of increase approximately one-half that of the increased expenditures for the supplements.

The Bureau has for many years recognized the necessity of studying outlays for supplementary compensation. Early attempts, however, were limited to exploratory work on methodology and the availability of data.⁶ By 1959, many 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 in 1962, by another manufacturing industry study. The 1963 study of expenditures for salaried (white-collar) workers, which covered most nonagricultural 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

¹ *Inland Steel vs. National Labor Relations Board*, 170 Federal Reports, Second Series 247 (1948), 251 (1949).

² This was the first recorded private pension plan in America.

³ Latimer, Murray Webb. *Industrial Pension Systems in the United States and Canada*, Industrial Relations Counselors, Inc., New York, 1932.

⁴ Total active plans for which descriptions had been filed with the U.S. Department of Labor by July 1, 1963, under the provisions of the Welfare and Pension Plans Disclosure Act, as amended (P.L. 85-836 as amended by P.L. 87-420).

⁵ The 1959 and 1962, studies related to employer expenditures for production and related workers and included expenditures for paid leave; premium pay for overtime, weekend, holiday, and shift work; Christmas, yearend, and other irregular bonuses; legally required insurance programs; and private welfare plans.

⁶ *Problems in Measurement of Expenditures on Selected Items of Supplementary Employee Remuneration, Manufacturing Establishments, 1953* (BLS Bulletin 1186, 1956); *Wage Structure: Basic Iron and Steel, January 1951* (BLS Series 2, No. 81, 1951); *Wage Structure: Electric and Gas Utilities, September 1957* (BLS Report No. 135, 1958).

been redesigned to cover all employees in the private nonfarm sector of the economy.

Description of Survey

Employer expenditure studies are limited to selected compensation practices, and are analyzed in terms of percent of payroll and cents per hour. The study program is designed to biennially provide data for all employees, in each of two broad occupational groupings, in the private nonfarm economy and to provide data for specific manufacturing and nonmanufacturing industries in the intervening years.

The composition of the hours-paid-for is described by data on the number of hours spent at the plant and the number of paid leave hours for vacations, holidays, sickness, etc., as proportions of total hours. Survey coverage extends to the 50 States and the District of Columbia and separate data are provided for broad economic regions.

The data relate to cash disbursements of employers and the hours-paid-for during a calendar year. Data for a lesser period of time do not completely reflect the outlays made by employers and the hours-paid-for. Paid leave time, for example, usually is spread unequally throughout the calendar year; similarly, expenditures for many of the legally required insurance programs stop after a specified maximum amount is earned by each worker during the year, resulting in wide variations between expenditures in the early part of the year and in the latter part of the year.

The entire field of supplementary compensation is changing in magnitude and breadth. Practices differ by industry group and new supplementary practices are being added. Each survey is designed to capture the individuality of compensation practices in particular industries without impairing comparability with others. This objective is accomplished by retaining the same basic reference framework.

Expenditures

The expenditure practices studied are considered to comprise the major elements of supplemental compensation in American industry. They do not include all practices which occasion outlays by em-

ployers that result from the employment of workers. The supplementary practices studied fall into two broad groups: payments made directly to the workers; and employer expenditures made on behalf of the workers, some of which expenditures are obligatory.

The direct supplements include that part of gross payroll which consists of payments for paid leave time (vacations; holidays; sick leave; and military, jury, witness, voting, and personal leave), payments of premiums for overtime, weekend, holiday, and shift work, nonproduction bonuses and terminal payments.

The indirect supplements are those outlays not included in the payroll for which the employer irrevocably makes a payment under the provisions of a legally required insurance program or private welfare plan. Generally, the payments are to funds, trustees, insurance companies, or Government agencies which either make a payment to the workers at a later date or provide full- or partial-economic security against a future contingency (e.g., unemployment, retirement, medical expenses). The indirect supplements studied to date include expenditures for social security, unemployment compensation, workmen's compensation, and other insurance for the benefit of the workers required by law; life, accident, and health insurance; pension and retirement plans; vacation and holiday funds; severance and supplemental unemployment benefit plans; 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 plant-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

Although the data on company policies are used primarily in the review and analysis of the expenditure and hours data collected in the survey, these policies also have significance in their own right, and often signal changes in supplementary practices before actual expenditures are incurred. In addition, certain characteristics of American industry are measured on a national basis and the relationships among these characteristics studied. Examples are the actual distribution of workers by amount of vacation and the degrees of unionization.

Data Sources and Collection Methods

The data are obtained from establishment records. Generally, no single record is sufficient and several record sources must be summarized 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, man-hours, or payroll, whichever is most appropriate. Second, 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 form used in the expenditure study is reproduced on pages 148-155.

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 level, 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. Since some States do not cover establishments with fewer than four employees under the unemployment insurance (UI) law, the samples exclude establishments in that size group. (See method of estimation for treatment of the employment in such establishments.) Some establishments in particular industries are exempted from the UI laws even though they employ more than four workers. 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. Since the response rate for those solicited by mail is about 50 percent, and a subsample of about a third is selected, the final sample contains about two-thirds of those originally solicited by mail. Establishments in this subsample are visited personally, instead of being solicited again by mail.

U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON, D.C. 20212

Your reply will be held in confidence.

Employer Expenditures For Selected Compensation Practices, 1965

—

—

Location of unit for which data are requested if different from address.

—

—

1. Major Activity

What was the principal product produced or service provided by this establishment during 1965?

2. Employment

For each employee group listed below, please enter the total number of full- and part-time employees on the establishment's payroll during the pay period including September 13, 1965. PLEASE SEE PAGE 2 FOR DEFINITIONS OF PRODUCTION AND RELATED WORKERS AND NONPRODUCTION WORKERS. Total employment is the sum of these two groups.

Total employment -----

A. Production and related workers -----

B. Nonproduction workers:

1. Professionals, executives, administrators, managers, and other supervisors (excluding working supervisors)-----

2. Outside salespersons (i.e., those whose sales activities are primarily performed outside the establishment)-----

3. Office clerical and other nonproduction workers-----

GENERAL INSTRUCTIONS

Please answer all of the questions which follow by providing calendar year information for PRODUCTION AND RELATED WORKERS and for NONPRODUCTION WORKERS that were employed during 1965 by the establishment identified on the first page of this questionnaire.

PRODUCTION AND RELATED WORKERS are defined to include all nonsupervisory workers and working foremen engaged in building, altering, demolishing, excavating, mining, pumping, fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping, trucking, hauling, maintenance, repair, janitorial, watchmen services, product development, auxiliary production for the plant's own use (e.g., powerplant), recordkeeping and other services closely associated with the above production operations.

NONPRODUCTION WORKERS are defined to include all employees in executive, administrative, and management positions above the working supervisor level. Professional, technical, office clerical, and sales employees are also included in this category.

THE TWO EMPLOYEE GROUPS DEFINED ABOVE EQUAL THE TOTAL FOR ALL EMPLOYEES. Proprietors, members of unincorporated firms, and unpaid family workers are not considered to be employees and therefore are excluded from this survey.

If your records do not provide separate data for PRODUCTION AND RELATED WORKERS and NONPRODUCTION WORKERS please provide carefully considered approximations. If any of the figures reported are approximates, please list on page 8 the items involved and indicate how the approximations were made.

If the only figure available combines data for several lines on this questionnaire, report the combined figure and bracket the lines included or otherwise indicate what is included in the figure reported.

PLEASE DO NOT LEAVE ANY LINES BLANK. IF NO EXPENDITURES OR MAN-HOURS WERE INVOLVED DURING 1965 FOR A GIVEN ITEM, ENTER "0" IN THE APPROPRIATE SPACE.

3. Payments Made Directly to Workers as Part of the 1965 Payroll

In this section please report only those payments that comprised part of the gross payroll of the establishment. Do not report any payments to funds, trustees, insurance companies, or government agencies here; report those payments in section 4.

A. Gross payroll:

Enter the total of wages, salaries, and other payments made during 1965 before any deductions. The amount reported should equal the sum of wages reported on Internal Revenue Service Forms W-2 as being subject to Federal withholding taxes -----

B. Paid leave:

Enter the total payment made directly to your employees for each type of leave. If an employee received both pay instead of time off and pay for work, include only the payments made in lieu of time off in the figure reported here.

- 1. Vacations -----
- 2. Holidays-----
- 3. Sick leave -----
- 4. Civic (military, jury, witness, voting, etc.) and personal leave -----

C. Pay for overtime hours and for extra work on weekends and paid holidays:

Report the total payment for daily and/or weekly overtime hours and for extra work performed on weekends, the 6th and 7th day of the week, on paid holidays or during paid vacation periods. EXCLUDE PAYMENTS, REPORTED IN ITEM B, MADE IN LIEU OF TIME OFF FOR HOLIDAYS OR VACATIONS.

1. Payments at straight-time rates

Report the total straight-time portion of the payments (total payment minus premium pay) here. (The premium portion should be reported in Item 2 below.) -----

2. Premium payments -----

Employer payments to		L I N E
Production and related workers	Nonproduction workers	
\$	\$	1
		2
		3
		4
		5
		6
		7

4

D. Shift differentials:

Report here only the payments above the regular day-shift rates. If 8 hours of pay is given for 7-1/2 hours of work report the total of the 1/2-hour payments -----

Employer payments to		L
Production and related workers	Nonproduction workers	I
\$	\$	E
		8
		9
		10

E. Nonproduction bonuses:

Report the total amount paid for nonproduction bonuses including lump-sum payments made under profit-sharing plans and other irregular or seasonal bonuses (e.g., Christmas, attendance, merit, and suggestion bonuses or awards). Exclude payments for quality or quantity of work -----

F. Terminal payments:

Report the total of all payments made by the establishment to employees because of temporary or permanent severance of employment. (Exclude here payments to funds, and payments to pensioners made under the provisions of pay-as-you-go pension plans. Such payments should be reported in Item 4-A, Private Welfare Plans.) -----

4. Employer Expenditures in Addition to Payroll

A. Private welfare plans:

Report net payments (after deduction of refunds, rebates, and dividends) made during 1965 by the establishment to funds (including labor-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. DO NOT REPORT HERE ANY PAYMENTS ALREADY REPORTED ON LINES 1-10. 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.

1. Life, accident, and health insurance

- a. Life, accidental death and dismemberment, sickness and accident, wage and salary continuance insurance, and death benefits-----
- b. Hospitalization, surgical, medical, major medical, dental, optical, and drug plans. (Exclude expenditures for in-plant medical care and visiting nurses or physicians.) -----

Employer expenditures during 1965 for		L
Production and related workers	Nonproduction workers	I
\$	\$	E
		11
		12

A. Private welfare plans—Continued

2. Pension and retirement plans

Include direct payments to pensioners under a pay-as-you-go pension plan; also include payments under profit-sharing plans deferred until retirement. For funded plans, include payments for past and current service liabilities -----

Employer expenditures during 1965 for		L
Production and related workers	Nonproduction workers	I
		N
		E
\$	\$	13
		14
		15
		16
		17

3. Vacation and holiday funds -----

4. Severance or dismissal pay and/or supplemental unemployment benefit funds -----

5. Savings and thrift plans -----

6. Other private welfare plans-----

B. Legally required insurance programs:

Report the total net liability incurred during the four quarters of 1965 under the provisions of State and Federal laws for each of the program areas listed below. Include payments to government agencies, insurance companies, and payments made directly to employees in addition to payroll. Exclude payments made by or withheld from employees.

1. Unemployment insurance programs

Report payments to State and Federal unemployment compensation funds for 1965 including charges for extended benefit and other special unemployment programs

a. Payments to Federal Government -----

b. Payments to State governments-----

2. Social security and similar legally required retirement income and protection programs -----

3. Occupational injury and illness

Report payments made under the provisions of workmen's compensation and related State and Federal laws -----

4. Other legally required insurance programs, including State temporary disability insurance programs (specify)

Net liability incurred during 1965 for		L
Production and related workers	Nonproduction workers	I
		N
		E
\$	\$	18
		19
		20
		21
		22

6. Establishment Practices and Policies

A. Paid vacations:

Report the number of employees who received vacation pay during 1965 directly from the establishment according to the amount of pay received and not the time taken. If vacation pay was not a direct multiple of weekly or hourly rates report the number of weeks equivalent to the payment. For example: If the amount paid was computed as a percentage of annual earnings report payments of about 2 percent as 1 week's vacation pay; about 4 percent as 2 weeks' vacation pay; etc.

Employee group	Number of employees receiving—						
	No vacation pay	Under 1 week's pay	1 and under 2 weeks' pay	2 and under 3 weeks' pay	3 and under 4 weeks' pay	4 and under 5 weeks' pay	5 weeks' pay or more
Production and related workers							
Nonproduction workers: Nonexempt							
Exempt							

B. Paid holidays observed during 1965:

Enter 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.

		Number of holidays per employee	
		Full-days	Half-days
Production and related workers	-----		
Nonproduction workers	-----		

C. Welfare and pension plans (other than legally required):

1. Were any employees covered by a private plan, as defined in section 4, that was paid for all or in part by the establishment (answer "YES" if there were such plans even though there were no employer expenditures during 1965) that provided—

- a. Life, accidental death, or sickness and accident insurance -----
- b. Hospitalization and other health insurance -----
- c. Pension and retirement plans -----

2. If there was a plan, did the workers contribute to the cost of the plan (answer "NO" if their contributions only purchased additional benefits or dependents coverage)

- a. Life, accidental death, or sickness and accident insurance -----
- b. Hospitalization and other health insurance -----
- c. Pension and retirement plans -----

	Production and related workers	Nonproduction workers
(Check Yes or No for each group)		
1. a. Life, accidental death, or sickness and accident insurance -----	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
b. Hospitalization and other health insurance -----	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
c. Pension and retirement plans -----	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
2. a. Life, accidental death, or sickness and accident insurance -----	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
b. Hospitalization and other health insurance -----	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
c. Pension and retirement plans -----	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>
D. Did collectively bargained agreements cover a majority of the nonsupervisory employees -----	Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>

D. Collective bargaining:

Did collectively bargained agreements cover a majority of the nonsupervisory employees -----

8

List the items here for which data were approximated and indicate the methods used in approximating. Please also include any other pertinent explanation of the data you have reported.

If any part of this report includes data for more than the unit described on the front of this form please indicate the location, major product or service, and employment for the payroll period including September 13, 1965, for each such unit included in the report; the line(s) on which the combined data were entered and the employee groups involved.

Units for which data are reported				Combined data	
Location	Major product or service	Employment		Item or line number	Employee group(s)
		Production and related workers	Nonproduction workers		

Name of authorizing official (please print or type):

Title:

Date:

Do you want a copy of the Bureau's report for this survey? ----- Yes No

Estimating Procedures

Data for each sample establishment are weighted in accordance with the probability of selection of that establishment. For instance, where 1 establishment out of 5 was selected in a size-industry class, it is considered to be representing itself as well as four other establishments, and accordingly is given a weight of 5. Thus, if an establishment had 1,000 hours of vacation leave, 50,000 hours of paid hours of all classes, and had a weight of 5, it would contribute 5,000 vacation hours and 250,000 total hours to the final estimate.

The subsample of nonrespondents is weighted to represent all other nonrespondents in the same industry-size-location stratum. If, for instance, the original weight of the sample units in a stratum is 2, and 1 of 3 such nonrespondents is subsampled, the unit would receive a weight of 6 in the estimating procedure.

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 further adjusted by the level, of total employment or other appropriate measure for the survey year, based on data from the Bureau's monthly establishment employment statistics program, in each of four broad economic regions. For instance, if the level of the aggregates, as derived from the weighting procedures, is 40,000,000 in an industry-region class and the corresponding level as shown by the employment statistics program is 44,000,000, the totals of the survey items would be multiplied by 1.1. The adjusted data represent all establishments, including those with fewer than four employees, in the industries studied.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 Manufactures* and *County Business Patterns* (based on Social Security establishment data).⁸

Analysis and Presentation

The expenditure data are presented as a percent of gross payroll, as a percent of straight-time payroll, in cents per hour paid for, and in cents per plant hour, for all establishments, and for establishments that actually had an expenditure during the survey year. The payroll hours data also are presented in ratio form for all establishments, and show plant and leave hours as a percent of all hours-paid-for.

The expenditure ratios presented in the reports are obtained as follows:

1. Expenditures as a percent of gross payroll=

$$\frac{\text{Expenditure for the practice}}{\text{Gross payroll}} \times 100$$
2. Expenditure as a percent of straight-time payroll=

$$\frac{\text{Expenditure for the practice}}{\text{Gross payroll minus premium payments for time}} \times 100$$
3. Expenditures in cents per hour paid for=

$$\frac{\text{Expenditure for the practice}}{\text{Total hours paid for including hours of paid leave}}$$
4. Expenditures in cents per plant or working hour=

$$\frac{\text{Expenditures for the practice}}{\text{Total hours paid for minus leave hours paid for}}$$

The hours ratios as indicated in the formulas are derived by basically the same techniques as follows:

- $$\text{Plant hours as a percent of total hours} = \frac{\text{Total hours paid for minus leave hours paid for}}{\text{Total hours paid for}} \times 100$$
- $$\text{Leave hours as a percent of total hours} = \frac{\text{Leave hours paid for}}{\text{Total hours paid for}} \times 100$$

The expenditure ratios for all establishments represent the expenditure for the supplement divided by the payroll (or hours) for all establishments—both those with and those without expenditures—whereas the ratios for establishments

⁷ See chapter 2, "Employment, Hours and Earnings".

⁸ U.S. Department of Commerce, Bureau of the Census, *County Business Patterns* (various years).

with expenditures for the practice relate the same expenditure to the payroll (or hours) of only those establishments that reported actual expenditures for the supplement.

The distribution of workers by establishment expenditures ratios is published as well as the average expenditure ratio for all workers. Expenditures are analyzed in terms of establishment characteristics such as size, wage level, and unionization.

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.

The expenditure data can be compared with and combined with average earnings data to obtain estimates of the compensation for labor. (Some

of the supplements studied are integral parts of payroll and caution, therefore should be exercised in combining the ratios and earnings.) The estimates thus derived do not, however, represent the total expenditures for labor. Total labor cost is a more encompassing concept and includes such factors 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.

The practices studied, as indicated earlier, comprise the major elements of supplementary compensation in American industry. Some other practices, which are excluded from the surveys, may occasion important expenditures 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. The omission of establishments with fewer than four employees from the samples may result in some bias, but it is very small since less than 1 percent of the workers in most industries are employed by such establishments.

Technical References

Number

1. U.S. Department of Labor, Bureau of Labor Statistics. *Employer Expenditures for Selected Supplementary Compensation Practices for Production and Related Workers; Composition of Payroll Hours: Manufacturing Industries, 1962* (Bulletin 1428, 1965).
Each expenditure bulletin contains descriptive information on the detailed procedures and techniques used in the study.
2. ——. *Employer Expenditures for Selected Supplementary Compensation Practices for Production and Related Workers, Meatpacking and Processing Industries, 1962* (Bulletin 1413, 1964).
3. ——. *Employer Expenditures for Selected Supplementary Remuneration Practices in Finance, Insurance, and Real Estate Industries, 1961* (Bulletin 1419, 1964).
4. ——. *Employer Expenditures for Selected Supplementary Remuneration Practices for Production Workers in Manufacturing Industries, 1959* (Bulletin 1308, 1962).
5. ——. *Production Workers in Mining Industries, 1960* (Bulletin 1332, 1963).
6. ——. *Problems in Measurement of Expenditures on Selected Items of Supplementary Employee Remuneration, Manufacturing Establishments, 1953* (Bulletin 1186, 1956).

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.

—ARNOLD STRASSER

Office of Wages and Industrial Relations

Chapter 19. 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.¹ 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 1880,² when the Bureau of the Census sent questionnaires to employers and workers involved in all disputes during the year which were noted in the public press. 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 man-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. Studies utilizing basically the same procedures subsequently were made in 1894, 1901, and 1906. 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, the Bureau of Labor Statistics attempted to compile a record of all strikes and lockouts during the year, relying exclusively on printed sources. 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 man-days of idleness, inaugurated the modern series of monthly and annual strike data.³

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, and which 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 which last for but 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 upon 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."

While an employer-employee dispute is implicit in these definitions, there are some inclusions in the Bureau's series which relate only indirectly to this concept. For example, jurisdictional strikes and

¹ Throughout 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.

² On the State level, the Bureau of Labor Statistics of Massachusetts, issued a report in 1880 on strikes in that State since 1825. In 1881, the Bureau of Industrial Statistics of Pennsylvania issued a report on strikes in that State since 1835.

³ For 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).

rival union disputes between two or more unions 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 seamen 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, while the severity and impact of such actions are measured by the number of workers involved, duration, and the resultant man-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.

Man-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 man-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 is currently 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 Bureau of Employment Security 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) firms under contract to the Atomic Energy Commission; and (8) 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 man-days of idleness, because the added stoppages tend to be small.

Following the receipt of notices regarding the existence of work stoppages, the Bureau mails questionnaires to the parties involved so as 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. It must be stressed that the primary function of these reports is to compile statistics, not to keep records on the strike activity of individual firms and

unions. The questionnaire currently used is shown on page 161.⁴

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 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.

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 man-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 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 which were 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 man-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 man-days) that previous experience indicates for such stoppages.

In its preliminary reports, as well as in its final reports, the Bureau relates the man-days of idle-

ness to the total estimated working time of all workers. "Estimated working time" is computed for this purpose by multiplying the average number of employed workers by the number of days worked by most employees. This excludes Saturdays when customarily not worked, Sundays, and established holidays. Total employed workers, as presently used, coincides with the Bureau's figures of nonagricultural employment, excluding government workers. A somewhat different figure for total employment was used prior to 1951; however, tests have shown that the percentage of total man-days of idleness computed on the old and new basis usually differed by less than one-tenth of a point.

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 Bureau of the Budget.⁵ 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, there are stoppages which, for a variety of reasons, are never formally settled. 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

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.

⁵ See appendix B.

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) *Number of establishments involved.* The standard definition of establishment is used. (See appendix B.) An establishment is a single workplace, for example a factory, mine, or store. In a widespread strike of intercity bus drivers, truck-drivers, or railroad workers, the establishment is regarded as the terminal out of which the employees work; in a strike of seamen, the ship is the establishment; and in a strike of dockworkers, the individual dock or loading place is regarded as the place of work.

(4) *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.⁶ In interarea stoppages, a stoppage is recorded in each area affected, and workers and man-days of idleness are allocated proportionately.

(5) 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. Within each of these groups, there are further subdivisions into more specific categories.⁷

(6) 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.

(7) 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."

(8) The assistance of *mediators*, either governmental or private, in the resolution of industrial disputes is recorded.

(9) 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 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.

(10) 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 following the resumption of normal operations.

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 40 days after the end of the month of reference in the form of press releases. Such reports presently are prepared for the first 10 months of each year, with a preliminary estimate of total strike activity during the year being issued a few days after the close of the calendar year.

Selected final tabulations of strike activity are presented in a release which usually is issued in May. This is followed by a summary article, published generally in the June issue of the *Monthly Labor Review*, on strike activity during the preceding year. An annual bulletin,⁸ containing detailed information on the characteristics of work stoppages during the prior year, is published each fall.

Special reports containing historical work stoppage data by industry and area, or an analysis of

⁶ See appendix C.

⁷ 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.

⁸ Since 1949, these bulletins have been titled *Analysis of Work Stoppages (year)*.

a particular aspect of strikes, are issued irregularly. This latter category also may include Bureau reports of a nonstatistical 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.⁹ Whether they serve this elementary purpose today is open to question.¹⁰ 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 man-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.¹¹ The problem is magnified beyond statistical control if secondary costs are to be accounted for.

⁹ For a discussion of the methods used in compiling strike statistics in other countries, see *Methods of Compiling Statistics of Industrial Disputes* (Geneva: International Labour Office, Studies and Reports, Series N, No. 9, 1926). See also A. M. Ross and P. T. Hartman, *Changing Patterns of Industrial Conflict* (New York: John Wiley & Sons, 1960).

Data on work stoppages in other countries are published annually in the *Year Book of Labour Statistics* (Geneva: International Labour Office).

¹⁰ See article by Joseph W. Bloch, "The Strike and Discontent," *Monthly Labor Review*, June 1963, pp. 645-651.

¹¹ A framework for the measurement of the cost of strikes is developed by Neil W. Chamberlain and Jane Metzger Schilling in *The Impact of Strikes: Their Social and Economic Costs* (New York: Harper & Bros., 1954).

Technical References*Number*

1. International Labour Office, *Methods of Compiling Statistics of Industrial Disputes*, Studies and Reports, Series N (Statistics), No. 9, Geneva (1926).
Compares the methods used to compile statistics on industrial disputes, and outlines standards by which some degree of international comparability may be secured.
2. Peterson, Florence, "Methods Used in Strike Statistics," *Journal of the American Statistical Association*, pp. 90-95, 1937.
Summarizes the definitions and methodology utilized by the Bureau of Labor Statistics in its work stoppage statistics program.
3. U.S. Department of Labor, Bureau of Labor Statistics, *Analysis of Work Stoppages (year)*.
The Bureau of Labor Statistics issues annually a detailed statistical bulletin analyzing work stoppages in the United States.
4. ——. *Strikes in the United States, 1880 to 1936*, Bulletin 651, 1938.
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.

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Chapter 20. 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 over 50 years.¹ 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, of necessity, the written agreement itself. The agreement may cover a single plant, a number of plants of a multi-plant 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, leaving much of the administrative details 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, reflecting 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 upwards of 140,000. The number of workers covered by agreements is estimated at about 18 million. The Bureau presently maintains a file of approximately 5,000 current

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.

agreements covering about 9.8 million workers.² All industries are represented in the file with the exception of 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.

The Bureau's quantitative analysis of agreement provisions covers virtually the entire range of issues dealt with in collective bargaining.³ 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.

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,⁴ 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 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 scrupulously observed 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.

Agreement Analysis

The Bureau's utilization of the 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. With the spread of collective bargaining, and the increase in the size and representative character of the Bureau's file, attention was directed towards reproducing and analyzing the variety of agreement clauses relating to similar subjects, culled from a large number of agreements. While 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. It is in this kind of analysis that 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

² During the early postwar period, the number of agreements on file exceeded 12,000.

³ See Program Note by Joseph W. Bloch, "Union Contracts—A New Series of Studies," *Monthly Labor Review*, October 1964, pp. 1184-1185.

⁴ The agreements file is located in the Washington Office of the Bureau's Division of Industrial and Labor 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.

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 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, considering all things, was to base the agreement studies on all agreements covering 1,000 or more workers 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 1,700-1,800) is about 7.5 million, representing a very substantial worker coverage in agreement studies. The number of establishments covered is not known.⁵

A key analysis list containing all agreements covering 1,000 or more workers, while 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 legalistic 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 to be buried.

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 legalistic 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 companies 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 functions (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 supple-

⁵ 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 (I.N.D.), 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.

mentary 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. There are also limitations 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

Number

1. Bloch, Joseph W. *Union Contracts—A New Series of Studies*. *Monthly Labor Review*, October 1964, pp. 1184–1185.
2. U.S. Department of Labor, Bureau of Labor Statistics, *Major Collective Bargaining Agreements* ([BLS] Bulletin 1425 Series).
 - 1425-1, 1964: Grievance Procedures
 - 1425-2, 1965: Severance Pay and Layoff Benefit Plans
 - 1425-3, 1965: Supplemental Unemployment Benefit Plans and Wage-Employment Guarantees
 - 1425-4, 1966: Deferred Wage Increase and Escalator Clauses
 - 1425-5, 1966: Management Rights and Union-Management Cooperation
 - 1425-6, 1966: Arbitration Procedures
3. ——. BLS Bulletin 1353, *Major Union Contracts in the United States, 1961* (1962).

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Chapter 21. Union 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, resulting in 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 U.S. (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 shows State figures as reported by national and international unions. Many of the items referred to above 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 and International Labor Unions in the United States*, unions meeting the criteria noted below are asked to report (see copy of questionnaire on pp. 170-172) the average number of dues-paying members 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. 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 and the Mine Workers. In addition, the *Directory* accounts for all unions of Federal Government employees that have received "exclusive recognition" as specified in Executive Order 10988. Thus, by definition, the Bureau excludes from its *Directory* those unions whose activities are confined to a single locality or to a single employer.¹ Although the Bureau sends questionnaires to all multilocal unions who have submitted reports to the U.S. Department of Labor's Office of Labor-Management and Welfare-Pension Reports, as required by the Labor-Management Reporting and Disclosure Act,² it is possible that some small unaffiliated unions, interstate in scope, escape attention. These inadvertent omissions do not affect membership totals in any significant way.

When some unions are unable to furnish information for one or more of the questionnaire items, estimates are derived from other sources on file, notably union periodicals, convention proceedings, financial statements, and collective bargaining agreements. No sampling procedures are used; the data are based on the entire universe of national and international unions, as defined.

¹ For a membership survey of these unions, see *Unaffiliated Local and Single-Employer Unions in the United States, 1961* (BLS Bulletin 1348, 1962).

² The names of all reporting unions appear in the Department's *Register of Reporting Organizations*, last issued in 1964.

IV. MEMBERSHIP:

1. Indicate annual average dues-paying membership count for 1963 and 1964. If complete returns for 1964 are not yet available, use 9- or 10-month average.

1964 _____ members
1963 _____ members

2. Indicate the formal policy of the union, as expressed in the constitution or other regulations, concerning the dues obligations of members in the categories listed below:

	Full dues	Less than full dues	Dues exempt	No formal policy
Unemployed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Involved in work stoppages	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Armed Forces	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apprentices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Retired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other groups (specify) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. If members in any of the above categories pay *less than full dues*, is the per capita tax to the national or international union for those members—

(check one)
Paid in full
Paid in part

Waived
 No fixed policy

V. CLASSIFICATION OF MEMBERSHIP:

1. Approximate percentage of membership who are women _____%
(If none, enter zero)

2. Approximate percentage of membership who are "white collar" workers (include professional, technical, sales, and office workers) _____%
(If none, enter zero)

3. For any area outside the United States, please indicate the number of dues-paying members and the number of local unions in existence as of the end of 1964 or any other appropriate current period:

Location	Approximate number of union members	Number of local unions
Canada.....	_____	_____
Puerto Rico.....	_____	_____
Canal Zone.....	_____	_____
Other (specify).....	_____	_____

4. Industry composition of union membership. Indicate the approximate percentage of all union members working in establishments in each of the following industry groups:

Manufacturing:		
Food, beverages, and tobacco.....	_____	%
Clothing, textiles, and leather products.....	_____	%
Furniture, lumber, wood products, and paper.....	_____	%
Printing and publishing.....	_____	%
Petroleum, chemicals, and rubber.....	_____	%
Stone, clay, and glass.....	_____	%
Metals, machinery, and equipment except transportation equipment.....	_____	%
Transportation equipment (automobiles, aircraft, shipbuilding).....	_____	%
Manufacturing (classification not available).....	_____	%
Nonmanufacturing:		
Mining and quarrying (include crude petroleum and natural gas production).....	_____	%
Contract construction (building and special trade).....	_____	%
Transportation (include railroads, air, bus, truck and water transportation, and allied services).....	_____	%
Telephone and telegraph.....	_____	%
Public utilities (electric, gas, and water).....	_____	%
Trade (wholesale and retail).....	_____	%
Finance and insurance.....	_____	%
Service industries (include hotels, laundries and other personal services, repair services, motion pictures, amusements and related services, hospitals, educational institutions, nonprofit membership organizations).....	_____	%
Agriculture and fishing.....	_____	%
Nonmanufacturing (classification not available).....	_____	%
Government:		
Federal.....	_____	%
State and local.....	_____	%
Total.....	_____	100%

V. 5. State distribution of union membership. Indicate the approximate number or percentage of members in each of the 50 States. Estimates are for general analysis purposes only and will not be shown for individual unions.

Alabama.....	_____	Nebraska.....	_____
Alaska.....	_____	Nevada.....	_____
Arizona.....	_____	New Hampshire.....	_____
Arkansas.....	_____	New Jersey.....	_____
California.....	_____	New Mexico.....	_____
Colorado.....	_____	New York.....	_____
Connecticut.....	_____	North Carolina.....	_____
Delaware.....	_____	North Dakota.....	_____
Florida.....	_____	Ohio.....	_____
Georgia.....	_____	Oklahoma.....	_____
Hawaii.....	_____	Oregon.....	_____
Idaho.....	_____	Pennsylvania.....	_____
Illinois.....	_____	Rhode Island.....	_____
Indiana.....	_____	South Carolina.....	_____
Iowa.....	_____	South Dakota.....	_____
Kansas.....	_____	Tennessee.....	_____
Kentucky.....	_____	Texas.....	_____
Louisiana.....	_____	Utah.....	_____
Maine.....	_____	Vermont.....	_____
Maryland-District of Columbia.....	_____	Virginia.....	_____
Massachusetts.....	_____	Washington.....	_____
Michigan.....	_____	West Virginia.....	_____
Minnesota.....	_____	Wisconsin.....	_____
Mississippi.....	_____	Wyoming.....	_____
Missouri.....	_____	Number or percentage not accounted for.....	_____
Montana.....	_____		_____

VI. COLLECTIVE BARGAINING AGREEMENTS:

1. Approximate number of basic collective bargaining agreements with employers (do not include various supplements, pension, health, or insurance agreements as separate documents)

United States only.....	_____	agreements
	_____	agreements
2. (a) Approximate number of different employers covered by collective bargaining agreements

United States only.....	_____	employers
	_____	employers
- (b) If more than one employer, are the employers located in at least two States?..... Yes No
3. Approximate number of workers covered by all collective bargaining agreements (include nonmembers in bargaining units)

United States only.....	_____	workers
	_____	workers

VII. UNION STAFF:

1. Approximate number of full-time paid employees (executive, professional, representatives, organizers, clerical, etc.) on the payroll of the national or international union in the United States (omit those on the payroll of local unions, intermediate or other bodies, etc.)..... employees
- May we have your comments regarding the present *Directory* and proposals for changes in future editions?

Name of person reporting

Title

Date

Presentation

The data for each union 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 and unaffiliated unions and cover such questionnaire items 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 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 as compared with earlier periods.

In addition to statistical summaries, the *Directory* also contains appendixes which list, for each union, membership in areas outside the United States, number of women, proportion of white-collar members, and proportion of members in major industry groups.

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 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 union membership arise from (1) the variety of concepts and practices among unions as to the definition and report-

ing of membership, (2) the availability at union headquarters of the various data requested, and (3) the willingness of the unions to make those data available to outsiders.

In an attempt to achieve uniform reporting practices, the Bureau asks unions to report on the annual average number of dues-paying members. Although a worker when joining a union assumes an obligation to pay dues, uniform reporting practices do not result from applying this criterion alone. Unions define eligibility for membership in a variety of ways, with payment of dues being only one of several criteria. Some unions 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 has repeatedly 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 unions could furnish such data, it would be possible to compute the total number of workers who are, at least in some way, still attached to unions. The responses, however, have

³ In 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.

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 to furnish figures on the number of workers involved.⁴

Thus, there is no uniform answer to the deceptively simple question: who is a union member? The answer varies from union to union, as determined by its own policies and practices.

While financial statements may be of some help in arriving at membership approximations, they cannot be used to obtain data on various components of union membership, such as the proportion

⁴ At 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.

of white-collar and women members, those under contract in particular industries, etc. For such data, the Bureau must rely entirely on the cooperation of national unions. These, however, are not always able to furnish the information for the simple reason that it is not compiled at union headquarters. Many national unions are decentralized organizations and do not, as a rule, seek reports on these items from their local unions. Also, some unions in possession of such information may be reluctant to make it public.

Data presently compiled are submitted by officials of national and international unions. Perhaps more accurate data, and certainly more detailed data, could be obtained by contacting local unions, 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.

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Number

1. Troy, Leo. *Distribution of Union Membership Among the States, 1939 and 1953*. New York, National Bureau of Economic Research, 1957.
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.
2. U.S. Department of Labor, Bureau of Labor Statistics. "Membership of Labor Unions, 1897-1950." *Handbook of Labor Statistics*, 1950 ed., Bulletin 1016, 1951, pp. 137-139.
3. ——. *Directories of Labor Unions in the United States*; Bulletins 937 (1948); 980 (1950); and 1127 (1953).
4. ——. *Directories of National and International Labor Unions in the United States*; Bulletins 1185 (1955); 1222 (1957); 1267 (1960); 1320 (1962); and 1395 (1964). In various articles in *Monthly Labor Review*. (Excerpted)
In addition to membership data, the *Directories* also include a brief description of the methods used, and a copy of the questionnaire.
5. Paschell, William, "Limitations of Union Membership Data," *Monthly Labor Review*, November 1955, pp. 1265-1269.
6. Wolman, Leo. *Ebb and Flow in Trade Unionism*, New York, National Bureau of Economic Research, 1936.
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.

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Productivity and Technological Developments

Chapter 22. Output Per Man-Hour Measures: Private Economy

Background and Description of Measures

In order to fill a growing need for information concerning the relationships between productivity, prices, wages, employment, and growth of the economy, the Bureau of Labor Statistics annually publishes indexes of output per man-hour and related data for broad sectors of the economy. Measures have been developed for the total private economy and the agricultural and nonagricultural sectors for the period from 1909 to the present time. Comparable measures have been developed for the manufacturing and nonmanufacturing segments of the nonagricultural sector for the post-war period. These measures, first published in 1959,¹ represent the culmination of a long series of developments in productivity measurement in the Bureau.²

The Bureau of Labor Statistics output per man-hour measures for the total private economy and major sectors refer specifically to the ratio between constant-dollar gross national product (GNP) originating in the private economy, or individual sector, and the corresponding hours of all persons employed. An index of output per man-hour shows the change in the ratio of output to labor input (man-hours).

Two sets of output per man-hour estimates have been developed. One set of estimates is based on labor force data from a survey of households, conducted each month by the Bureau of the Census for the Bureau of Labor Statistics. The other

set is based primarily on a monthly BLS survey of establishment payroll records.

In concept, the output per man-hour estimates based on labor force data are defined as output per hour *worked*, while those based on establishment data are defined essentially as output per hour *paid*. Theoretically, the difference between the two measures is equal to paid vacation time and other paid leave. Actual differences between the two sets of estimates can result from statistical variation and differences in statistical methodology and reporting, as well as differences in concept.

Data Sources and Estimating Procedures

Output. The output concept used in preparing output per man-hour estimates is that of real gross national product originating in the private economy or individual sectors.

Gross national product is the market value of final goods and services produced in the economy within a certain time period. It includes purchases of goods and services by consumers, gross private domestic investment, net foreign investment, and purchases by Government. GNP also is equal to income received by labor and property for services rendered in the current production of goods and services, plus capital consumption allowances, indirect business taxes, and several other minor items.

Gross national product in current dollars cannot be used directly as the output measure since it would reflect price changes in addition to changes in physical volume. The Office of Business Economics, U.S. Department of Commerce, prepares estimates of constant-dollar GNP for the total private economy and major sectors. These estimates are used in developing output per man-hour measures.³

¹ *Trends in Output Per Man-Hour in the Private Economy, 1909-1958*, BLS Bulletin No. 1249, 1959.

² For a detailed description of the historical development of the productivity measurement program of the BLS, see chapter 23.

³ A detailed description of the methods and procedures of estimating gross national product in current and constant dollars is given in the 1954 National Income Supplement to the *Survey of Current Business*, U.S. Department of Commerce. Further information on GNP estimates for major industry sectors is presented in the October 1962 issue of *Survey of Current Business*.

Labor Input (Man-Hours). As mentioned previously, there are two sets of estimates of labor input for measuring output per man-hour. One set is based on labor force data derived from a survey of households; the other set is based on the BLS survey of establishments. Both sets of data are published monthly in *Employment and Earnings* and *Monthly Report on the Labor Force*. Annual summaries also are published for both series.

Labor Force Series Man-Hours. The labor force estimates provide information on the total number of persons engaged in production, including wage and salary workers, self-employed, and unpaid family workers. Since the labor force estimates do not provide detailed industry information, the output per man-hour estimates based on this series are prepared only for the total private economy and the broad sectors of agriculture and total nonagriculture.

The data on employment and hours are obtained from a monthly survey of the noninstitutional civilian population of the United States. The survey is conducted by the Bureau of the Census, but the labor force statistics are processed and published by the Bureau of Labor Statistics. The information is collected by trained interviewers from a scientifically selected sample of about 35,000 households. The data collected relate to the activity of the calendar week including the 12th of the month. For methodology, see chapter 1.

Man-hours estimates for the labor force series are based on an hours worked concept, i.e., hours spent at the establishment, thus excluding vacation and sick leave but including such things as rest periods and standby time. The estimates of total hours worked are derived by multiplying average hours worked times the number of persons at work.

Several adjustments to the basic labor force data are necessary to adapt them for productivity measurement. Since labor force man-hours apply to the whole economy, it is necessary to subtract the man-hours of general Government in order to obtain an estimate for the private economy. An adjustment is made also to eliminate the effect of holidays which occur during the week of the survey. This adjustment is necessary because the data for the survey week are taken as representative of the whole month. Several other minor adjustments are made to provide better comparability of the data over long periods of time.

Establishment Series Man-Hours. In contrast to the broad classes of labor force data, the BLS establishment series provide considerable detail on the industrial composition of wage and salary employment. Their coverage, however, is more limited than the labor force estimates, in that they exclude agricultural employment, household workers, self-employed, and unpaid family workers. Estimates of average weekly hours of production workers and nonsupervisory workers are provided for most of the individual industries and sectors in the establishment survey, but there are significant gaps, particularly in the finance and services industry categories. Average weekly hours data are not available for nonproduction workers. The establishment data are supplemented from other sources in order to fill the information gaps and provide estimates of man-hours for the total private economy.

The establishment hours and employment estimates are based largely on the monthly BLS survey of establishment payroll records. Since this survey does not cover total employment in the private economy, and because there are some gaps in the hours information, it is necessary to use some supplementary data to derive man-hours estimates for the total private economy.

The BLS establishment survey is based on a sample stratified by size of establishment. Within each industry, the sample is an optimum allocation design with the probability of selection of an establishment proportionate to average employment per establishment within each of the strata. The data generally refer to employees who received pay during the pay period including the 12th of the month. For methodology, see chapter 2.

The establishment man-hours estimates are based on an hours paid concept. These estimates include paid holidays, vacations, sick leave (except that paid for under insurance plans) and other time off paid for by the employer, in addition to actual hours worked. Total man-hours figures are derived for each industry and then aggregated to the total private economy or sector level. Industry man hours are estimated by multiplying employment times average weekly hours. While estimates of the number of persons on establishment payrolls are available from the establishment survey, average weekly hours are not reported for some industries. These hours are estimated or derived from other sources, usually the labor force data.

Man-hours information reported in the establishment survey cover only production and related workers, construction workers, and nonsupervisory employees. For all industries except manufacturing, average weekly hours of supervisory and nonproduction workers are assumed to be the same as those reported for production workers and nonsupervisory workers. For manufacturing nonproduction workers, average hours estimates are derived from other sources.⁴

Since the BLS establishment survey covers employees of nonfarm establishments only, employment and hours data for such groups as proprietors and self-employed persons, unpaid family workers, farm workers, and domestic workers in households must be obtained from other sources. Some of these data are taken from the employment series published by the Office of Business Economics, U.S. Department of Commerce, but most are obtained from the labor force survey.

Analysis and Presentation

Indexes of output per man-hour show changes in the ratio of output to labor input (man-hours). Although an output per man-hour index relates output to man-hours, the index should not be interpreted as representing only the contribution of labor to production. Rather, it reflects the combined influence of many things such as changes in technology, capital investment, rate of plant utilization, managerial efficiency, and scale of operations, as well as skill and effort of the work force.

Indexes of output per man-hour also are influenced by shifts in the relative importance of components with different levels of output per man-hour. For example, an increase in the relative importance of a sector with a comparatively high level of output per man-hour will cause a rise in output per man-hour for the total private economy even though output per man-hour in each individual sector remains unchanged. Shifts can occur at all levels of the economy, including occupations, products, plants, industries, or sectors.

It is necessary to consider both long- and short-term trends in output per man-hour and related variables, in addition to annual changes. Trend measures, however, may be affected by such factors as the period selected for measurement and the

type of statistical description used (e.g. least squares or compound interest averages). Therefore, some element of judgment is present in any analysis of trend.

Indexes of output per man-hour and related data are published periodically in BLS releases. The historical indexes and detailed procedures for developing output per man-hour indexes are presented in *Trends in Output per Man-Hour in the Private Economy, 1909-1958*, BLS Bulletin 1249, 1960. Some of the current indexes also are published in the statistical supplement to the *Monthly Labor Review*, the *Statistical Abstract of the United States*, the *Economic Report of the President*, and the *Manpower Report of the President*.

Uses and Limitations

The indexes of output per man-hour are designed for use in economic analysis and policy planning, both public and private. They have applications in such areas as economic growth, manpower requirements, wages, prices, living standards, foreign trade, and measuring effects of technological changes.

One example of the uses of output per man-hour indexes and related data is the study of relationships between productivity, wages, prices, profits, and costs of production. Within the framework of national income and product accounting, gross national product represents the market value of all final goods and services produced in the economy, or the sum of all costs of production, both measured for a specific time period. These costs of production can be separated into labor and nonlabor costs (or payments). An increase in labor costs per unit of output reflects an increase in average hourly compensation in excess of the

⁴ For manufacturing nonproduction workers, average hours are estimated as follows: Estimates of vacation time, holidays, paid sick leave, and personal time off are subtracted from an estimate of scheduled annual hours paid nonproduction workers. Scheduled annual hours are derived by extrapolating the 1959 level of scheduled weekly hours with data from BLS Community Wage Surveys, and then multiplying by the number of workweeks in each year. The 1959 level of scheduled weekly hours for nonproduction workers was calculated from data collected by BLS in connection with the study, *Employer Expenditures for Selected Supplementary Remuneration Practices for Production Workers in Manufacturing Industries, 1959*, BLS Bulletin 1308, 1962. The estimates of vacation time, holidays, sick leave, and personal time off are derived primarily from data from Community Wage Surveys and Social Security Administration studies.

gain in output per man-hour. A decrease in unit labor costs, on the other hand, shows that output per man-hour increased more than average hourly compensation. It is in this sense that output per man-hour is a crucial element in the wage-price relationship. It indicates the extent to which increases in compensation can take place without an increase in prices or a reduction in the share of nonlabor payments or costs.

The Bureau of Labor Statistics prepares indexes of labor and nonlabor payments per unit of output and related measures corresponding to the establishment series output per man-hour measures described in an earlier part of this section.⁵ Labor payments, as used in these measures, are equal to total compensation of all employees in the private nonfarm economy. Nonlabor payments represent the difference between compensation of employees and gross product originating in the private nonfarm economy. The agricultural sector is excluded from these measures because proprietors' income accounts for a large portion of agricultural income and it is difficult to distribute proprietors' income between labor and nonlabor income.

⁵ See pp. 176-177.

The labor and nonlabor payments indexes are published periodically in BLS releases and in the statistical supplement to the *Monthly Labor Review* and *Statistical Abstract of the United States*. Analytical notes concerning these measures appear in the BLS release *Productivity, Earnings, Costs, and Prices in the Private Non-agricultural Sector of the Economy, 1947-56 (Revised)*, dated May 29, 1957. Subsequent releases contain a description of those measures and comments concerning their interpretation.

Certain characteristics of the output per man-hour measures should be recognized when applying them to specific situations. First, the indexes reflect not only changes in the various component industries but also changes in the relative importance of these industries. Second, the indexes are after-the-fact representations of economic events; they do not show causal relationships between the variables. Third, the measures of productivity, output, and input, are limited both by the underlying concepts and the data available for estimation. Therefore, the meaning of index changes should be interpreted with caution, keeping in mind the conceptual and practical limitations as well as the possibilities of statistical error.

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Chapter 23. Output Per Man-Hour Measures: Industries

Background

Studies of output per man-hour for individual industries have long been a part of the BLS program. The first Commissioner of Labor, Carroll D. Wright, conducted a study of 60 manufacturing industries in 1898. The findings in his report on "Hand and Machine Labor," provided striking evidence of the savings in labor resulting from mechanization in the last half of the 19th century. Commissioner Wright's study was prompted by concern on the part of Congress that human labor was being displaced by machinery. The impact of productivity advance upon employment remained an important focus of the BLS program throughout the 1920's and 1930's. It was also during this period after World War I that the Bureau began the preparation and publication of industry indexes of output per man-hour, 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 man-hour developed by the National Research Project of the Works Projects Administration, and published measures for selected industries. This work was reduced in volume during World War II, owing to the lack of meaningful production and man-hour data for many manufacturing industries.

The advent of World War II also caused a change in program emphasis, from problems of unemployment to concern with the most efficient utilization of scarce manpower. 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. Con-

sequently, the preparation of industry measures is limited to those industries where readily available data can be utilized to construct measures.

In recent years, public interest in productivity has grown, and there has been greater recognition that increases in output per man-hour are important indicators of economic progress and the means to higher levels of income, rather than merely a threat to job opportunities.

The Industry Studies program covers a variety of manufacturing and nonmanufacturing industries. For these industries, indexes of output per man-hour, output per employee, unit labor requirements and the related data on output, employment, and man-hours are prepared and published on an annual basis. The indexes are generally available for most years from 1947 to the most recent year for which data are available, and for many industries also for 1939.

Concepts

Industry indexes of output per man-hour measure changes in the relationship between the physical volume of output of an industry and the man-hours expended in that output. Although, traditionally, output per man-hour has been the measure most frequently used, discussion of physical output per man-hour often is simplified if conducted in terms of its reciprocal: man-hour requirements per unit of output (unit man-hours). Therefore, this form of index is used in the following description.

For an industry producing a single uniform output, the unit man-hours index is simply the ratio of the man-hours expended to produce a unit of output over two periods of time. This ratio may be expressed as follows:

$$I_u = \frac{1}{I_p} = \frac{l_t}{l_o}$$

Where I_u represents the unit man-hour index, I_p represents the output per man-hour index, and l_t and l_o denote unit man-hours expended in the current and base periods, respectively.

For an industry producing a number of products—the more typical case—the unit man-hours index is the ratio for two periods of the total hours required for the output of a given composite of products. Indexes of such industries vary with the composite of products 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

$$I_u = \frac{\sum q_t l_t}{\sum q_t l_0}$$

b. Using a base period composite

$$I_u = \frac{\sum q_0 l_t}{\sum q_0 l_0}$$

An index constructed according to (a) compares the man-hours expended in the production of the current composite with man-hours which would have been required to produce the current composite in the base period. An index constructed according to (b) compares the man-hours required in both periods to produce the base period composite. These indexes thus eliminate the effects of variations over time in the relative importance of products on unit man-hours.

In either form, an index of unit man-hours also can be viewed as the quotient of an index of man-hours and an index of output, i.e.,

$$\frac{\text{Man-hours index}}{\text{Output index (Laspeyres)}} = \frac{\text{Unit man-hours index (Paasche)}}{\text{Output index (Laspeyres)}}$$

$$I_u = \frac{\sum l_t q_t}{\sum l_0 q_0} \div \frac{\sum l_0 q_t}{\sum l_0 q_0} = \frac{\sum l_t q_t}{\sum l_0 q_t}$$

$$\frac{\text{Man-hours index}}{\text{Output index (Paasche)}} = \frac{\text{Unit man-hours index (Laspeyres)}}{\text{Output index (Paasche)}}$$

$$I_u = \frac{\sum l_t q_t}{\sum l_0 q_0} \div \frac{\sum l_t q_t}{\sum l_t q_0} = \frac{\sum l_t q_0}{\sum l_0 q_0}$$

The man-hours index measures the change in aggregate man-hours between the base and current periods. The man-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 in the current and the base periods, each weighted by the man-hours expended

per unit produced in a given period. A current period weighted unit man-hours index employs a base period weighted output index divided into the man-hours index. Conversely, a base period weighted unit man-hours index is consistent with an output index which utilizes current period weights.

Methods and Sources

Output Per Man-Hour

The Bureau of Labor Statistics computes an index of output per man-hour by dividing an output index by an index of aggregate man-hours. Measures are prepared separately relating output to (a) all employee man-hours, (b) production worker man-hours, and (c) nonproduction worker man-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. Reciprocal measures of unit man-hours also are prepared.

Output

BLS industry output indexes are primarily based on the physical output of the products of the industry combined with fixed period weights. However, the availability of quantity data on physical output varies among industries, and, for manufacturing and mining industries, may vary depending on whether the data are for a year when a Census was conducted or for a noncensus year. 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 implies use of man-hour weights, and such weights are used whenever possible. In most industries, however, unit man-hour information is not available for individual products. Consequently, the BLS uses substitute weights which are assumed proportional to unit man-hour weights. Generally, when unit man-hour weights are not available, unit value weights are used as substitute weights.

For those industries where unit man-hour weights are used, the unit man-hours data are obtained either from special surveys or are derived from data published for specialized establishments in the *Census of Manufactures*. Where unit man-hours are derived from Census data, the following procedure is used: Man-hours per dollar of shipments are derived for each 5-digit product group from statistics for establishments specializing in that group. Unit values of the products are computed from the "wherever made" data, i.e., the data for all establishments—regardless of industry classification—producing the product. The multiplication of each unit value by the man-hours per dollar of shipments yields an estimate of man-hours per unit. 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.¹

For industries where unit value weights are used, the 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 man-hour index which reflects shifts in value per man-hour of the various products in the industry. Thus, a change can occur in the index without any change in the output per man-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 man-hours if the unit man-hours and unit values of the products are proportional or if there is no correlation between the relative change in quantity and value per man-hour.² There is evidence that unit values are fairly reliable approximations for individual products where wages constitute a large proportion of total value of output. The error generated in the output index by an error in the weights is generally considerably smaller than the error in the weights themselves.

Most published industry indexes have used 1947 weights for 1947–58, 1958 weights for 1959–63, and 1963 weights for years after 1963. The Bureau policy is to revise the weights as more current data become available from the periodic censuses.

Benchmark Indexes. For manufacturing and mining industries, indexes reflecting changes in output between census years are constructed.

For industries where unit man-hour weights are used, the index is based on the weighted aggregates derived from the physical output of primary products "wherever made," and the corresponding weights. No adjustment is made for changes in specialization and coverage ratios since unit man-hour weights are used only where the specialization and coverage ratios are high.

For industries where unit value weights are used, the benchmark index is constructed by the following procedure: A physical quantity output index is derived from quantity data for the primary products of the industry, whether made in the industry or elsewhere. An index of the total dollar value of primary products also is computed. This value index is divided by the physical output index to obtain a price index for the primary products. This primary product price index is then used to convert an index of the value of industry output, i.e., of primary and secondary products, to constant dollar estimates by dividing the value of output index by the price index. The resulting index is comparable conceptually with the physical output index with unit value weights. The use of the primary product price index is based on the assumption that the price movements of all products (primary and secondary) produced by the

¹ The "specialization ratio" is the value of shipments of primary products of plants in the industry as a percent of total shipments of all products (primary plus secondary) made by these same establishments. The "coverage ratio" is the value of shipments of the primary products made by plants classified in the industry as a percent of the total shipments of the industry's primary products made by all producers, both in and out of the specified industry.

² See Irving H. Siegel, "Further Notes on the Difference Between Index Number Formulas," *Journal of the American Statistical Association*, December 1941, pp. 519–524.

industry are the same as the price movements for all primary products wherever made.³

For the mining industries, benchmark indexes are computed from unweighted tonnage data as reported in the *Census of Mineral Industries*.

Annual Indexes. Annual output indexes are constructed by the following described procedures. For manufacturing and mining industries, 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 man-hour or unit value weights. The basic quantity data are generally primary products of an industry classified into product groups; the greatest amount 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 comprising a high percentage of the total value of an industry's output. Coverage varies between 60 and 100 percent. Complete coverage generally is obtained in mining and other well-defined industries with a relatively homogeneous output.

2. *Deflated value.* When adequate annual physical output 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. To derive this index, data on the industry's value of output are divided 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.⁴

Often data on value of production are not 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 inventories are divided by a price index relating to December of each year. The estimated value of shipments in constant dollars is then adjusted by the net change in finished inventories, also in constant dollars, to yield an estimate of the constant dollar value of production.

Sources. Industry output indexes are prepared from basic data published by various public and private agencies, using the greatest amount of detail available.

The Bureau of the Census, U.S. Department of Commerce, is the major source of output statistics for the manufacturing industries. The Bureau of Mines, U.S. Department of the Interior, compiles most of the information for mining, cement, coke, and metals industries. Other important Government sources include the U.S. Department of Agriculture, the Fish and Wildlife Service, U.S. Department of the Interior, the Interstate Commerce Commission, and the Internal Revenue Service. Important sources of trade association data include the Textile Economics Bureau, Inc., National Association of Hosiery Manufacturers, Inc., National Cannery Association, Rubber Manufacturers Association, and the American Iron and Steel Institute.

For deflated value series, industry price indexes are derived from wholesale price indexes published by the Bureau of Labor Statistics.

Man-Hours

An index of man-hours is computed by dividing the aggregate man-hours for each year by the base-period aggregate. Man-hours are treated as

³ See 1954 *Census of Manufactures*, volume IV, "Indexes of Production," chapter 3.

It is currently planned to modify the benchmark procedure to include the actual price movements of secondary products.

⁴ For example:

$$\text{Value index} \div \text{Price index (Paasche)} = \text{Output index (Laspeyres)}$$

$$\frac{\sum p_1 q_1}{\sum p_0 q_1} \div \frac{\sum p_1 q_1}{\sum p_1 q_1} = \frac{\sum p_0 q_1}{\sum p_0 q_1}$$

where p_1 and p_0 represent prices of products in the industry in the current and base periods, respectively. This index requires quantities of all items produced in each year. These data are not available for the particular industries where this measure is used, and quantity data are usually available for the base year only, so that the deflated value indexes employed usually take the following form:

$$\text{Value index} \div \text{Price index (Laspeyres)} = \text{Output index (Paasche)}$$

$$\frac{\sum p_1 q_1}{\sum p_0 q_1} \div \frac{\sum p_0 q_0}{\sum p_0 q_0} = \frac{\sum p_1 q_1}{\sum p_1 q_0}$$

homogeneous and additive with no distinction made between hours of different groups of employees. Data on changes in qualitative aspects of man-hours, such as skill, efficiency, health, experience, age, and sex of persons comprising the aggregate, are not used and generally not available. Man-hours indexes are developed for all employees, production workers, and nonproduction workers.

Sources. Industry employment and man-hours indexes are developed from basic data compiled by the Bureau of Labor Statistics or the Bureau of the Census. 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 man-hours data for production workers and employment data for all employees (including nonproduction workers). The Bureau of the Census provides data in greater industry detail within manufacturing than BLS.

The two sources differ in their definition of man-hours. The Census data include all hours at the plant, 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 man-hours. Differences in the data from the two sources for the same industry, however, also stem from sampling and reporting differences.

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.⁵

Nonproduction Worker Hours. While both the Bureau of the Census and the BLS provide data on production worker man-hours, neither source provides annual data by industry on nonproduction worker nor all-employee man-hours. There-

fore, these measures are estimated.

The estimates of aggregate nonproduction worker man-hours for the manufacturing industries are derived from published employment data, and estimates of average annual hours worked or paid per nonproduction worker.

The estimates of average annual hours worked are calculated by multiplying the number of workweeks 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.

Vacation and holiday trends are based on data from various BLS surveys. Estimates of disability time are based on studies of the Department of Health, Education, and Welfare, and data from BLS surveys. Personal time off has been estimated as a constant from references in relevant publications.

All employee man-hours estimates for manufacturing industries are derived by summing the aggregate man-hours for production workers, and the estimated aggregate man-hours for nonproduction workers.

Comparability of Output and Man-Hours Data

Man-hours data are based on total man-hours of establishments classified in an industry, whether the man-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 man-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 man-hours and output data is indicated by the specialization and coverage ratios which the Bureau of the Census publishes. All industries in the BLS

⁵ For consistency with output indexes, BLS annual employment and man-hours data for the mining industries are adjusted to benchmark levels indicated by the periodic *Census of Mineral Industries*.

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. Man-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, man-hours will increase but there will be no corresponding increase in final output. Thus, output per man-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.

Presentation

BLS indexes are published annually in the release, *Indexes of Output Per Man-Hour, Selected Industries*. Since data for the separate industries become available at different times, interim reports are issued to avoid delaying publication of available information until data for all industries are available. As new industry indexes are developed, special reports are issued which describe in some detail the methods and data used in the construction of the indexes, as well as background information about the industry.

Indexes of output per man-hour also are published in the *Statistical Abstract of the United States*, and some indexes for earlier years are published in *Historical Statistics of the United States*.

Uses and Limitations

Industry measures of output per man-hour are particularly useful for studying changes in manpower utilization, projecting future manpower 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 man-hour be used in conjunction with other industry data. For example, to study technological effects, related data on production and employment are useful; 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 and do not represent the specific contribution of that group of employees.

These industry measures of output per man-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, understatement in others. Fourth, indexes involving nonproduction worker man-hours are subject to a wider margin of error than are the indexes using production worker man-hours because of the technique for estimating average man-hours of nonproduction workers. Errors in estimating man-hours for nonproduction workers, however, have a relatively insignificant effect on the estimates of man-hours for all employees. Fifth, year-to-year changes in output per man-hour are irregular, and, therefore, 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 man-hour.

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Chapter 24. 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 change 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 detailed case studies of changes within a single plant or office; 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.¹

Case Studies

BLS case studies provide detailed information on various aspects of adjustments made to techno-

logical change. The framework of such studies is a single plant or office. A typical case study covers such topics as: management's objectives and results of introducing technological change at the plant or office; extent of displacement and reassignment of employees; practices regarding transferring, retraining, and selecting employees for new occupations; characteristics of employees whose jobs were eliminated and who were assigned to new positions; and implications of automation for older employees. Both qualitative and quantitative data are presented.

The case study approach has also been used to investigate in detail special aspects of adjustments to technological change. Among the topics covered by case studies are: the performance of older workers in industry retraining programs, as shown in four plants in different industries; manpower planning procedures followed in connection with a series of technological changes at a public utility; the adjustments to electronic data processing in a government agency; experience under an adjustment program in the railroad industry; post-lay-off work experience of displaced workers in plants in different industries and regions; and job redesign for older workers at different plants. In these studies, information about single plants is presented, as illustrative, rather than as representative cases.

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

¹ For discussion of various research methods used in studying automation, see technical references 1 and 2.

Policy in 1964. A revised edition covering 40 industries was published in 1966.²

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 man-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 man-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, electric power, transportation, and textiles. These 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 man-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.³ 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 case 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 particular technological developments of industry trends. One objective

² See technical references 10 and 11.

³ See technical references 8, 10, and 11.

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: Bureau of the 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 Machinist 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 man-hour and related series on production, employment and hours; the Bureau of Census data on expenditures on plant and equip-

ment; and the National Science Foundation's estimates of research and development.

Mail Surveys

Because of the complexity of the subject, relatively little use has been made of mail surveys in studying the impact of technological change. This technique, however, is useful in obtaining information on a broad scale not otherwise available, to supplement detailed information collected through case studies. Thus, to determine the extent and manpower impact of computer use in the insurance industry, the Bureau conducted a two-part survey of 400 companies employing most of the employees in the industry.⁴ In the first stage, a brief, 1-page questionnaire covering data on employment and extent of computer use was sent to a group consisting of all large offices, and a sample of small companies. From information received from this screening questionnaire a number of companies were selected to whom a more detailed questionnaire was sent, asking for information about computer uses, number of employees engaged in electronic data processing, planned applications, etc.

The mail survey technique also was used in followup surveys of workers who have been laid off as a result of technological and economic change.⁵ The names and addresses of such workers were obtained from plant personnel records, selecting only a sample in cases where a large number of workers had been displaced. The questionnaire was mailed at least 6 months after the layoff occurred, in order to allow a period of time for some adjustment to take place. Information collected from the mail survey dealt with the personal characteristics of displaced workers such as age, sex, occupation, level of education and skill, post-layoff work experience, such as labor force status at time of survey, type of job held after layoff, source of jobs, etc.

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 individual affected before and after

⁴ See technical reference 5.

⁵ See technical reference 4.

the change; similar data are collected on individuals who are selected for the positions created in connection with automated equipment.⁶

Expert Review

In preparing forecasts of future technological trends, a critical step is the review of preliminary reports with outstanding experts in each industry.⁷ 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."

⁶ See technical references 1 and 6 for use of plant records.

⁷ See technical references 10 and 11 for further detail.

⁸ See technical reference 8 for further discussion.

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 steel-making 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 man-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.⁸ 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 business 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 change 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 up-

grading 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.⁹

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.¹⁰ The limitations of these measures as well as their advantages are important matters studied.

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. Under this act, 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, edu-

⁹ See technical references 1, 6, and 8.

¹⁰ See technical references 1 and 6 for further discussion.

cators, 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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Chapter 25. 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 counteracting 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 on-site man-hours. This series, started in the early thirties, appeared intermittently through the years, but was not based on actual up-to-date 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, dams, etc.). However, only one or two selected types of construction are surveyed in any given year. Selected 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 on-site construction labor.

Description of Survey

The surveys are designed primarily to determine the number of man-hours represented by a fixed dollar volume (\$1,000) of contract construction. Man-hours, as defined by the surveys, include both on-site construction employment and the off-site employment required to produce and deliver materials used in the construction. Data for on-site labor include total man-hours for the supervisory, engineering, clerical, and custodial employees, as well as those for workers in each construction trade at the site of construction. Data for off-site labor include employment in the off-site (e.g., office and warehousing) activities of construction contractors; in building materials and equipment manufacture and distribution; and finally, employment in all the other industries which are affected directly or indirectly by the production and distribution of building materials from raw materials to the final manufactured product. Man-hours are also estimated for the employment created by overhead expenditures of contractors.

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 include construction which is non-federally assisted and/or 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 on-site man-hour information.

For the construction of nonfederally aided projects—those financed entirely by various levels of local government, private individuals or voluntary groups—on-site man-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 man-hour information from payroll records, daily work force reports, or summary time reports.

For those projects financed wholly or in part by Federal funds, on-site employment information generally is obtained from contractors' payrolls submitted to the government under regulations of the Davis-Bacon Act or other Federal legislation covering federally aided construction.

These payrolls furnish the data for estimating on-site man-hour requirements, as well as data on wages for all hourly rated workers on the projects. Data for on-site salaried employees, not accounted for on the payrolls, are obtained by the field agents 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 off-site 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 man-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)¹ and (e) amount of total construction contract (i.e., size of project).

One or more projects 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 off-site 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 the 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, Office of Business Economics.) 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, man-hours are developed by multiplying average producers' value of each construction material by the ratio of manufacturing man-hours per \$1,000 of production. (This ratio is established by using the *Census of Manufactures*.)

Primary man-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 man-hours for each component of transportation and trade are then estimated from labor factors provided by BLS.

¹ For example, elementary or secondary schools.

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 1958 Interindustry Study is used to obtain these estimates.² For each group of materials, the interindustry study provides information on the amount of secondary products required from each of its 78 industry sectors. The product data are converted to man-hours by use of output per man-hour ratios for each of the sectors. Adjustments for price and productivity are made to provide estimates for years subsequent to 1958, consistent with the year of construction and bill of materials.

For each off-site stage (primary and secondary), a man-hour figure per \$1,000 for the construction being studied is obtained. When these man-hours, plus the builders' off-site employment, are combined with the direct or on-site man-hours, the total employment effect, within the definition used by the studies, is determined.

An exact study of the off-site employment of each construction contractor is not attempted, since it is almost impossible to relate accurately such employment to the projects studied. Builders' off-site employment is occupied not only with the sample projects studied, but also with other current or future projects. The estimate of contractors' off-site man-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 on-site 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 man-hours generated per dollar volume of construction expenditures, with subtotals for on-site and off-site man-hours. In presenting the labor and materials

data, the statistical tabulations are supplemented with an analysis of the various factors which apparently affected the man-hour requirements for the specific types of construction studied. The bulletins contain information on the characteristics of the sample projects and the man-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: on-site man-hour requirements by occupation; the employment share of the general and special trades contractors engaged in the construction work; direct on-site wage cost; the distribution of employment by periods of construction time; and the cost of major materials.

When feasible, man-hour and material comparisons with earlier periods and other types of construction are included in the bulletins.

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. Man-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.

² See M. R. Goldman, M. L. Marlmont, and B. N. Vaccara, "The Interindustry Structure of the United States." *Survey of Current Business*, November 1964, pp. 10-29.

—JAMES F. WALKER

Office of Productivity, Technology and Growth

Industrial Safety

Chapter 26. Frequency and Severity of Work Injuries

Background

To the individual, work injuries can mean loss of work time, suffering, bodily limitation, or even death. To his family, they can mean income loss and anguish. To industry, they mean loss of time and product, disruption of work and organization, compensation expense, and the effort and expense of hiring and training replacements. All these results of work injuries illustrate the need for the greatest possible safety precautions in the work place, the goal of the pervasive safety movement of the times. Work-injury statistics serve the safety movement by indicating the extent and nature of the injury problem, arousing interest in it, and providing direction for overcoming it.

Work injuries have always been associated with work, but they have been and are rare in the experience of individuals. So it was the collecting of many workers in one place as well as the greater hazards from power tools that made the factory the first place where these injuries became a matter of general public concern. While Massachusetts began factory inspection as early as 1867, interest was limited until nearly the turn of the century and then centered on compensation for injury rather than prevention of accidents.

In 1893, the Bureau issued its first report relating to work injuries, a study of European workmen's compensation procedures. A series of special reports on workmen's compensation problems followed and to these were added studies of the hazards associated with particular industrial operations.

By 1910, interest both in compensation and in the prevention of accidents and injuries had increased greatly. In the next 10 years, all but eight of the States were to adopt workmen's compensation legislation. Industrywide safety programs were organized in iron and steel production and railroad transportation. In 1910 the Bureau inaugurated a continuing series of annual injury rate compilations for the iron and steel industry. Other industries have been added as it

became possible to compile statistics for them. By 1926, 30 industries were covered; by 1952, over 200. At present, over 650 industries and industry groups in manufacturing and nonmanufacturing are included in the Bureau's publication. For most of these, both injury-frequency and injury-severity rates are given, together with estimates of average days of disability per injury and the percent of disabling injuries resulting in death, permanent impairment, and temporary-total disability.

These statistics have been used mainly by the occupational safety movement, including plant personnel responsible for safe workplaces and the reduction of injury loss, their associations, suppliers, teachers, and advisors. Annual estimates of the total number of work injuries and deaths and of days of disability, made in connection with the compilation of injury rates, have indicated the general magnitude of loss and have contributed to continued interest in and support of safety efforts. These are described under "Uses" in this chapter. The rates available on an increasingly detailed industry basis, have provided those directly responsible for plant safety with an indication of the areas needing increased attention. Also, the rates enable those people directly concerned to measure their success in comparison with others in the same industry having similar problems and hazards. Attention to these measurements was intensified as the result of a war-time development.

Bureau statistics available when the United States entered World War II indicated that in the immediately preceding defense period work injuries had significantly increased in several industries important to the war effort. Conservation of available manpower as well as the continuing reasons mentioned above demanded rapidly available indicators of the number of injuries in those industries. In 1943, the Bureau initiated publication of a monthly series of rates for 53 selected manufacturing industries. Following the war, this series was continued with data available for all months, but with quarterly collection and publication. At

present, the quarterly reports cover 140 manufacturing industries and industry groups.

Data from which the Bureau compiles its rates are provided in voluntary reports from establishments in the industries covered. To reduce the burden of reporting establishments, agreements have been made with 13 States, which also compile similar statistics, to collect the information jointly and obtain from a single report the data needed for both State and national statistics.

Description of Survey

This chapter is concerned with the annual series of statistics for manufacturing and non-manufacturing industries and with the monthly series (collected and published quarterly) for manufacturing only. The annual series include frequency rates, severity rates, average days of disability per case, and percent of disabling injuries resulting in death, permanent impairment, and temporary-total disability, while the quarterly manufacturing release is limited to frequency rates.

The history of these surveys has been intimately connected with efforts to achieve standards and measures which would permit meaningful comparisons of injury experience among establishments and industries. The statistics are important in providing a standard of comparison of the experience of individual establishments and the standards and rates are used as plant or company indicators. These uses, as distinct from the economic and social evaluations of most large-scale statistical surveys, have resulted in a great deal of contact and cooperation with experts from outside the discipline of statistics.

Standardization

Efforts to standardize the method of compiling work-injury statistics were initiated by the Bureau of Labor Statistics in 1911. In 1914, the Bureau called a formal conference of labor and workmen's compensation officials and others interested in this subject. The work of the conference was continued in later years by the International

Association of Industrial Accident Boards and Commissions (IAIABC), culminating in the publication of the first standardized procedures in 1920.¹ In 1926, a sectional committee of the American Engineering Standards Committee, later the American Standards Association, undertook a revision of these procedures. This work led to the publication in 1937 of the first *American Standard Method of Compiling Industrial Injury Rates (Z16.1)*. The 1954 revision of this standard was reaffirmed in 1959 and is reviewed continuously by a sectional committee of the American Standards Association. A second standard, *The American Recommended Practice for Compiling Industrial Accident Causes (Z16.2)* developed under the American Standards Association procedures, was published in 1941 and revised in 1962. These two standards constitute the basis for the concepts utilized in the compilation of all injury and accident statistics by the Bureau of Labor Statistics.

Measures of Injury Frequency and Severity

Injury measures included in the two American Standards are used in these annual and quarterly injury statistics programs and in other injury statistics compiled by the Bureau, as the following describes.

Injury-Frequency Rates. Injury-frequency rates are the primary measures of the incidence of work injuries. They indicate the relative level of injury occurrence prevailing in different establishments, operations, or industries during a specified period of time, and provide a means of determining trends in injury occurrence or of progress in accident prevention.

The standard *injury-frequency* rate is defined as the average number of disabling work injuries for each million employee-hours worked. The lack of comparability inherent in simple injury totals, arising from variations in employment and operating time, is thus overcome by expressing the injuries in terms of a standard unit of exposure.

A *disabling injury* is defined as any injury incurred in the course of and arising out of employment, which (1) results in death or in any degree of permanent physical impairment, or (2) renders the injured person unable to perform any regu-

¹ *Standardization of Industrial Accident Statistics* (BLS Bulletin 276, 1920).

larly established job, which is open and available to him, during the entire time interval corresponding to the hours of his regular shift on any one or more days after the day of injury (including Sundays, holidays, and days on which the plant is shut down). Under this definition, the reportability of an injury for injury-statistics purposes is in no way related to the eligibility of the injured person for workmen's compensation payments. In case of doubt as to whether or not an injured person is able to work, the attending physician's decision is accepted for statistical purposes.

Injury-Severity Measures. The severity of a temporary injury is measured by the number of days during which the injured person is unable to work. For death and permanent impairment, the American Standard provides a table of economic time charges. These time charges, based upon an average working-life expectancy of 20 years for the entire working population represent the part of working ability lost as the result of specified impairments, expressed in terms of unproductive days. For example, death, representing the complete loss of all future production by the injured person, is assigned a time charge of 6,000 man-days (i.e., 20 years of 300 days each). The complete loss or loss of use of an arm is estimated as resulting in an average reduction of 75 percent in working efficiency. By applying this percentage to the 20-year working life expectancy, the time charge for this type of injury is established as 4,500 man-days.

The *standard injury-severity rate* commonly is used as a comparison measure indicating the relative level of economic loss resulting from work injuries. It weights each disabling injury with its established time charge or days of disability, and expresses the aggregate in terms of the average number of days charged for each million employee-hours worked.

The *average severity* is computed by adding the actual days lost for all temporary disabilities and the time charges for all deaths and permanent impairments and dividing the total by the number of disabling injuries. This measure constitutes the basis for direct evaluation of the severity of injuries in different industries, establishments, or operations.

The formulas for these injury measures are:

$$\text{Frequency rate} = \frac{\text{Number of disabling injuries} \times 1,000,000}{\text{Total number of employee-hours worked}}$$

$$\text{Severity rate} = \frac{\text{Total of days lost or charged} \times 1,000,000}{\text{Total number of employee-hours worked}}, \text{ and}$$

$$\text{Average severity} = \frac{\text{Total number of days lost or charged}}{\text{Number of disabling injuries}}$$

Coverage

Industries included in the annual survey cover nearly the whole range of manufacturing and non-manufacturing activity. Domestic service, agriculture, and rail and air transportation are completely excluded and insufficient sample coverage, particularly in nonmanufacturing, makes it impossible to present data for some industries. Currently, rates are presented for 490 manufacturing and 190 nonmanufacturing categories. However, not all these rates are obtained from the BLS survey. Rates for mining and a few closely related processing industries are obtained from a survey of the Bureau of Mines and those for the Federal government from reports to the Bureau of Employees' Compensation. The monthly data compiled from the quarterly reporting program are limited to manufacturing and cover 140 categories. Reports are classified by industry on the basis of the Standard Industrial Classification (SIC).² Beginning with 1958 figures for the annual survey and 1963 figures for the quarterly survey, definitions used are from the 1957 edition of the SIC Manual. Classification for mining and Federal government, however, are those of the collecting agencies and are not strictly comparable to the SIC Manual definitions.

Rates compiled from BLS reports cover all classes of employees (production, operating, and related workers; construction workers; sales, service, delivery, technical, professional, office, administrative, and clerical workers; and all other personnel). Self-employed persons are not included. Rates from Bureau of Mines reports cover workers engaged in production, development, maintenance, and repair work, and supervisory and technical personnel at the operations, but exclude office personnel and employees in stores or affiliated opera-

² See appendix B.

tions not directly connected with mining or refining operations. Working proprietors are included for the Bureau of Mines rates. The Federal government data, based on injuries reported to the Bureau of Employees' Compensation, cover all Federal civilian employees. Areas covered by the rates include the 50 States and the District of Columbia.

Data Sources

Publication of statistics by industry requires that the individuals whose experience is summarized be in the same industry. The establishment, rather than the larger company or corporation or the smaller department or division, is the best reporting unit for work injury surveys. Nearly all the reports included in the compilations of BLS work injury statistics are for establishments.

Three types of information are needed to construct these work injury statistics: number of hours of exposure to hazards of work injury; number and characteristics of injuries and disabilities; and data necessary for classification by industry. Two basic forms, both titled Work Injuries, are used to collect this information, form BLS 1418 in the annual survey and form BLS 1417 in the quarterly survey. Each of these forms provides, first, for the entry of the total number of employee hours worked in the period covered and the total number of employees. The latter figure helps to avoid some errors due to misunderstanding, and also permits classifying the establishment by size. As a further check there is an inquiry about changes in the level of operation. Second, each form asks for a count of injuries in each of several classes of severity (deaths, permanent impairments, and temporary-total disabilities). Because of difficulty in obtaining information to classify hernias as required by the *American Standard Method of Recording and Measuring Work Injury Experience*, the number of hernias is requested separately. Eliminated from the count are first-aid and medical treatment cases which are not disabling under the Standard. A separate line is provided for entering them. To provide for calculation of the severity rate, which is not included in the quarterly reports, the annual report form requests detailed information on the nature and extent of injuries. (See the copy of form

BLS 1418 on pp. 201 and 202.) Third, each of the forms provides for entry of information on the industrial activity of the establishment, its operations, and its products or services.

Collection of the reports is by mail. The person preparing the report for the larger establishments is ordinarily the safety officer. For smaller establishments, which may not have a full-time safety officer, reports usually are prepared in the personnel or accounting departments. Information such as is needed for these reports also is required for other purposes and very few establishments are unable to report because the information is not available.

In a number of cases where a State agency, another Federal agency, or an association compiles similar statistics, arrangements have been made to have one report meet the needs of two or more statistical programs. These arrangements are discussed elsewhere in this chapter.

Collection Methods

Annual Survey

This survey is conducted by mail. Report forms are mailed to a sample of establishments in each of the industries covered. Response is entirely voluntary. Refusals to report are rare; most of the establishments asked to furnish the information are willing to do so because of the usefulness of the resulting statistics to the safety movement and as a standard of comparison for their own experience. The Bureau pledges confidentiality for the individual reports. The information is limited to statistical use and individual reports are never released except within the limits of the cooperative arrangements where one report is used in compiling statistics in two or more agencies. Special care is taken to base published rates on enough reports to prevent the disclosure of either establishment or company information, even by deduction on the part of a reporting competitor.

Report forms are mailed to each establishment at the end of the year of reference. Second requests are mailed about February 15 to all establishments which have not reported by that date. About 90 percent of the reports are received by

B.L.S. 1418

Budget Bureau No. 44-R002.15.
Approval expires Nov. 30, 1968.

WORK INJURIES

1965

U.S. DEPARTMENT OF LABOR
BUREAU OF LABOR STATISTICS
WASHINGTON, D.C. 20212

**Return THIS copy
to above address**

**Please change mailing address if
incorrect—Include Postal ZIP Code**

Please complete this report whether
or not there were any disabling inju-
ries. See separate instruction sheet.

I. EXPOSURE DATA, 1965. (See instructions I.)
(Please complete this section even though there were no disabling injuries.)

1. Average number of employees
(Enter average of year; include all classes of employees)

2. Total hours worked by all employees during entire year

3. Operations: If hours averaged less than 1,500 or more than 2,500 per employee, please supply the following data:

	Average employment	Hours per week per person	Number of weeks
Peak operations	-----	-----	-----
Normal operations	-----	-----	-----
Slack operations	-----	-----	-----
Total number of weeks operated during year	-----	-----	-----
Comment	-----		

II. NATURE OF BUSINESS. (See instructions II.)

4. Principal type of activity of this establishment (i.e., manufacturing, wholesale, retail, construction, public utility, etc.):

5. Enter in order of importance the principal products manufactured, lines of trade, specific services, or other activities.

	Percent of total annual sales value or receipts, 1965
(a) -----	-----%
(b) -----	-----%
(c) -----	-----%
(d) -----	-----%
(e) -----	-----%

6. If manufacturing, please indicate:

(a) Principal materials used (e.g., Aluminum castings, machined parts, assembled parts; rayon staple, wool yarn, cotton fabrics, etc.—in the form brought into plant; do not list materials produced in this plant.)

(b) General types of operations performed (e.g., foundry, machine shop, assembly; spinning, weaving, sewing, etc.)

III. INJURY SUMMARY, 1965. (See instructions III.)
Report all disabling (or "lost-time") injuries arising out of employment; include occupational diseases.
DO NOT count any case in more than one section.
If no disabling injuries during year, enter "0" on line 11.

Injuries resulting in—	Number of cases	Time charges (see over)
7. Deaths (All deaths resulting from 1965 work injuries, regardless of time between injury and death.) (Describe over)	-----	-----
8. Permanent-total impairments (Describe over)	-----	-----
9. Permanent-partial impairments (Also include unrepaired inguinal hernias.) (Describe over)	-----	-----
10. Temporary disabilities (All work injuries, not reported above, which disabled worker for 1 full calendar day or more after the day of injury.)	↓ DAYS OF DISABILITY (Total days lost, including Saturdays and Sundays)	-----
(a) Disabilities of 1, 2, or 3 days each		
(b) Disabilities of 4 or more days each (except inguinal hernias)		
(c) Hernias, inguinal, repaired		
(d) Disabilities of unknown duration (Describe over)		
(e) Sum of items 10(a), (b), (c), and (d)	-----	-----
11. Grand total—All disabling injuries (Sum of items 7, 8, 9, and 10(e). If no disabling injuries, enter "0")	-----	-----
12. Medical treatment cases (Injuries requiring only first-aid or medical treatment. If records of these cases are not readily available, enter "N.A." DO NOT include in count of disabling injuries above.)	-----	-----
	Frequency rate	Severity rate
13. Injury rates (for office use only)	-----	-----

(SEE OVER)

B.L.S. 1418

SUPPLEMENTARY DESCRIPTIONS AND COMMENTS

Describe below all deaths, permanent impairments, and cases of unknown duration. If there is any question as to how or whether a case should be reported, please describe fully.

7. Deaths (Include all deaths resulting from work injuries which occurred during report year, regardless of the time between injury and death. See instructions III—Item 7.)

Case No. (a)	Date of injury (b)	Date of death (c)	Description (Describe circumstances, and indicate in what way death was work-connected.) (d)	Z16.1 Time-charge (e)
Example—	2/18/65	3/23/65	Scratched finger while loading truck; infection developed; died of blood poisoning..	6,000
1.				

8 and 9. Permanent impairments (Include amputations, permanent loss of use of members or parts of members of the body, permanent impairment of functions, and unrepaired inguinal hernias. See instructions III—Items 8 and 9.)

Case No. (a)	Nature of injury (Amputation, dislocation, fracture, strain, silicosis, etc.) (b)	Part of body injured (Arm, hand, finger—specify digit and joint—leg, eye, etc.) (c)	Actual days of disability (d)	Percent permanent loss of use of body part (e)	Z16.1 Time-charge —if known (f)
Example—	Amputation.....	Middle joint, index finger.....	25	100%	200
Example—	Crushed bones and torn ligaments.....	Hand.....	125	25%	750
1.					

10(d) Cases of unknown duration (For cases still open, give total days lost to date and doctor's best estimate of additional days before employee will be able to work, or extent of probable permanent impairment. For other cases, give as many details as possible.)

Case No. (a)	Nature of injury (Amputation, dislocation, fracture, strain, silicosis, etc.) (b)	Part of body injured (Arm, hand, finger—specify digit and joint—leg, eye, etc.) (c)	Actual days of disability to date of report (d)	Estimate of future disability (e)	Do not use (f)
Example—	Strain.....	Back.....	15	30	
1.					

(If additional space is needed, attach another sheet.)

Comments:

.....

.....

.....

Report prepared by..... Position..... Date.....

April and acceptance of reports is terminated about June 30.

In early 1966, cooperative arrangements were in effect with 11 State agencies—Labor Departments or Industrial Commissions. These agencies are in Alabama, Connecticut, Florida, Indiana, Maine, New Jersey, New York, Pennsylvania, South Carolina, Virginia, and Wisconsin. BLS provides these State agencies with report forms and postage and with technical assistance. The State agencies return to BLS completed report forms for establishments in their States.

Data for the automobile industry are obtained through the Automobile Manufacturers' Association, which cooperates in securing reports from its membership. For gas utilities and pipelines, by a special arrangement of BLS, the Bureau of Mines, and the American Gas Association, report forms sponsored by the two Federal agencies are used by the Association to collect data meeting the statistical needs of all three organizations. As was just indicated, rates for mining industries and related processing industries are obtained from the Bureau of Mines and for Federal government agencies from the Bureau of Employees' Compensation.

Quarterly Survey

The monthly rates obtained in the quarterly survey also are based on voluntary reports collected by mail. Again, individual reports are held in confidence.

Report forms are mailed to cooperating establishments at the end of each quarter. After 4 weeks, second requests are sent to those who have not responded by that time and seven weeks from the first mailing the tabulations are closed. The four quarterly reports of establishments cooperating in this survey are combined at the end of the year and the summary of the twelve monthly entries is used in the annual survey.

The Iowa Bureau of Labor and the Michigan Department of Labor have cooperative arrangements and participate in the quarterly program in the way described above for the 11 State agencies participating in the annual program. In all other areas, the Bureau of Labor Statistics contacts the reporting establishments directly.

In both the annual and quarterly surveys, the completed reports are edited in the BLS office,

that is, they are examined for completeness, internal consistency, and reasonableness. When a questionable entry is found, the person making the report is asked by letter to review the entry and either confirm or correct it. Special notes have been prepared for the most common difficulties, furnishing reporting establishments with a more detailed explanation of what is wanted than can be included in the instructions accompanying the original request.

Sampling

Collecting injury-rate information from all establishments in the United States would be prohibitively expensive and would place an unwarranted burden on the business community. Therefore, a sample of establishments is asked to report. The total size of the sample is determined by the need of a fairly large number of hours of exposure to hazards for each industry which is to have rates published. Injuries are statistically rare events and rates based on small numbers of hours of exposure are liable to extreme fluctuations. The operating rule of the Bureau is that an industry rate cannot be published which is based on less than 5 million man-hours (1 year for 2,500 full-time employees).

The samples for both the annual and quarterly surveys are made up of continuing panels of respondents. The sampling plan for the annual survey calls for the inclusion of all establishments with over 500 employees and of a sample from smaller size classes. As reports are lost to the survey, an attempt is made to replace them with reports from another establishment of the same size class. Some of the cooperating State agencies require reports from all establishments in the State. In these cases a sample of the reports to the State is used in the national compilation. Reports for about 115,000 establishments are included.

The sample for the quarterly survey is limited to 15,000 establishments and in 1965 was somewhat below that figure. The survey is limited to manufacturing, where large establishments are more common. Also, to obtain a sufficiently large man-hour base to publish monthly rates, it is necessary to include many large establishments. As a result the proportion of large establishments is greater than in the annual survey and the sample of small

establishments smaller. As larger establishments characteristically have lower frequency rates, adjustments are made in the estimating process to correct this deficiency.

Estimating Procedures

In editing, all the reports are reviewed and those with questionable entries returned for confirmation or correction. Annual survey reports go through another process at the same time. The severity rate which is included in the statistics published in the annual survey requires determination of time lost or charged for each injury. When the employee has returned to work, the time actually disabled is used as reported. For cases of unknown duration the number of days is estimated based on days of disability at the time of the report, the doctor's estimate of future disability as reported, and arbitrary but reasonable number of days, based on the Bureau's past experience with reports on similar injuries. For deaths and permanent impairments, time charges are assigned as defined in the *American Standard Method of Recording and Measuring Work Injury Experience*.

For individual industries, the rates are calculated as simple averages. The rates published for industry groups and divisions are calculated by a weighting procedure which gives each industry a weight equivalent to its estimated total employment.

The computed rates in the quarterly survey are characteristically low because of the large proportion of large establishments in the sample. They are adjusted to levels determined in the more comprehensive and more adequately balanced annual survey for the same industries. Preliminary adjustments are made on the basis of relationships in the previous year's surveys and final adjustments are made when the annual survey rates for the year of reference become available. These adjustments correct the level of the monthly and quarterly rates, but preserve the month-to-month fluctuations and short-term indications.

Analysis and Interpretation

Mail surveys cannot collect information on the underlying or immediate causes of injuries. Uses

of these statistics fall into two broad classes; they are used as general indicators of the level and trend of injury experience to indicate the success of general safety work and areas needing greater efforts, and as basis of comparison for individual establishments. Therefore, analysis is limited to comparisons of broad trends and identification of industries with high or low and growing or shrinking rates. Meaningful analysis of individual industry rates is impossible currently because of their large number, but the industry coverage of each rate is carefully specified in terms of the Standard Industrial Classification (SIC) code numbers, to permit comparisons with individual establishment rates.

Presentation and Uses

The annual survey provides injury-frequency rates for 490 manufacturing and 190 nonmanufacturing categories. The other measures published for a majority, but not all, of these industries are: injury severity rates; average days of disability per case for all disabling injuries and separately for permanent partial and temporary total disabilities; and percent of disabling injuries resulting in death, permanent impairment, and temporary total disability. For the years 1959-62, a period of revision of the series on the basis of the 1957 edition of the SIC Manual, average days of disability per case are available only for all disabling injuries and the distribution by severity class is not available.

The annual data are published in a press release available late in the year following the year of reference and in the *Monthly Labor Review*.

Injury-frequency rates only are available from the quarterly survey. They are available for 140 industry categories. The rates are published for each month, accompanied by a rate for the entire quarter. Cumulative rates for six and nine months and annual rates are published during the year. These rates are published in a press release available about 2½ months after the quarter of reference and in the *Monthly Labor Review*.

The annual work injury rates constitute the basic measures of work-injury occurrence in the United States. A potentially rich source of similar information lies in Workmens' Compensation

statistics. This latter source does not meet current needs, however, because of omission of injuries when disability is of short duration, variation in coverage under State laws, differences in interest in and resources for the development of statistics, and lack of coordination in techniques and procedures for producing statistics. Other statistics are available for some sectors of the economy, but these, too, are incapable of combination to form national indicators.

The BLS annual survey, therefore, presents the only comprehensive data available. The sectors it does not cover are sometimes covered by similar statistics (as in mining, transportation, and Federal government) and sometimes lacking in indicators (as in agriculture and domestic service). Rates from the survey permit comparison of the incidence of injuries and of the resulting losses in the various industries and industry groups covered. In year-to-year comparisons, they indicate the basic trends in injury occurrence and severity. They point out the industries in which accident prevention needs to be intensified and provide measures of the success or failure of industrywide safety programs. Most important, they provide a norm or basis of comparison against which management can evaluate the disabling injury experience of individual establishments.

The monthly rates from the quarterly survey provide measures of seasonal variations in injury occurrence. They also give early indications of trends of injury frequency. The data on which these rates are based are used also in compiling the annual rates. Their greatest importance in the safety movement, however, is that their existence helps to maintain interest in safety records in the periods between the basic annual surveys and provide current norms for comparison with the experience of individual establishments.

Annual Estimates of Volume of Injuries

Annual and quarterly survey results also serve the important internal function of supporting the estimates of the total volume of work injuries which the Bureau publishes annually. These estimates cover all employees in the United States except domestic service workers. The estimates cover the total number of disabling injuries and the number of deaths for all workers and for em-

ployees only. Separate estimates are provided for agriculture; mining; contract construction; manufacturing; transportation and public utilities; trade; and finance, service, government, and miscellaneous industries. Estimates of permanent impairments and of temporary-total disabilities are provided for contract construction, manufacturing, and trade.

These annual estimates of work-injury volume and of the resulting manpower losses are prepared in cooperation with the National Safety Council. They represent the combined judgment of the technical staffs of the two organizations based upon a pooling of all data available to either group.

In the absence of a centralized system of reporting work injuries in the United States, the accumulation of data providing national totals must be based upon the assembly of many bits of data drawn from a wide variety of sources. These basic data frequently overlap or omit entirely certain segments of employment. Additional problems are introduced by a lack of uniformity in the reporting and compilation procedures of the organizations from which the basic data are obtained.

The State workmen's compensation agencies and certain Federal agencies constitute the primary sources of the data on which the estimates are based. In the Federal service, work-injury data for particular segments of the economy are regularly compiled by the Bureau of Labor Statistics, the Bureau of Mines, the Interstate Commerce Commission, the Office of Vital Statistics, and the Bureau of Employees' Compensation. The Department of Agriculture and the Coast Guard provide intermittent data for operations under their jurisdiction. The Interstate Commerce Commission, the Coast Guard, and the Bureau of Employees' Compensation have compulsory reporting requirements and obtain practically complete reporting in accordance with their respective regulations. The other Federal agencies operate on a voluntary reporting basis yielding sample coverage. Reporting requirements of the State compensation agencies vary widely, but reporting is compulsory and reasonably complete within the respective regulations.

Data drawn from the National Safety Council surveys and from surveys conducted by various trade associations, such as the American Petroleum

Institute and the Portland Cement Association supplement the data from the public agencies. (Some association data are used in the compilation of frequency and severity rates to avoid having the Bureau make duplicate requests for information already available.)

The estimating procedure requires reconciliation of the various available data with standard reporting definitions, evaluation of the coverage in each segment of the economy, and direct expansion of the adjusted data to the total estimated employment in each area of industrial activity.

The estimates constitute an overall evaluation of the magnitude of the occupational injury problem in the United States. They indicate the aggregate social and economic losses resulting from work injuries and emphasize the national interest in advancing accident-prevention activities.

The estimates for mining and quarrying, manufacturing, and rail transportation are based upon very comprehensive data and are considered as having a high degree of accuracy. The estimates for construction, public utilities, miscellaneous transportation, trade, and for finance, service, government, and miscellaneous industries are based upon less comprehensive data, but are considered reasonably accurate. The estimates for agriculture are based upon fragmentary data and may reflect a comparatively high degree of error. Tests have indicated that underreporting is prevalent in respect to agricultural injuries. The estimating error, therefore, is probably that of underestimating rather than of overestimating.

Limitations

The Bureau's injury-rate surveys provide information on a broad national basis. Because of coverage limitations, however, the data cannot be presented in State or local breakdowns. Supplementary State details are available in a few States from similar surveys conducted by the State labor departments.

From an accident-prevention standpoint, it is recognized that the most useful injury and accident information is that relating to particular processes and operations. Operating requirements, however, restrict the presentation of quarterly and

annual injury-rate data to the standard industrial classifications. Reporting establishments are classified according to the money value of their leading products or services, rather than in terms of processes or operations.

Because of resource limitations, only a small proportion of the nonrespondents in the mail surveys can be called or visited to determine the possible bias due to nonreporting. Although there is no "contest" incentive element involved in the Bureau's surveys, there is a possibility that establishments with unusually high injury rates may be reluctant to report their experience. Some establishments with no disabling injuries in the report period may assume their reports are not wanted, even though a note on the report form states that the data are wanted.

No studies have been conducted to determine the net effect of nonresponse on the published rates. However, both the sampling plan and patterns of response tend toward higher representation of large than of small establishments in the sample. Large establishments tend to have lower injury frequency and severity rates than smaller ones. Therefore it is thought that the published rates are more likely to be minimums than maximums.

The estimates of total work-injury volume are measures of the injury problem as of a given time. From period to period, however, they reflect changes in the volume of employment, shifts in industrial activity, and technological changes in industry as well as changes in the level of work safety. They are not, therefore, fully satisfactory measures of progress or retrogression in accident prevention, particularly in long-term comparisons.

The injury rates for manufacturing are based upon broad and well-distributed samples and are presented in relatively detailed homogeneous classifications. In some areas of nonmanufacturing, however, coverage limitations prevent the presentation of rates in the most significant detail and thereby impose some limitations upon the data as the basis for evaluation of an individual establishment's experience.

No injury-severity data are collected in the quarterly survey, since the final degree of disability for many injuries cannot be determined in the short period allowed for reporting after the end of the quarter.

Technical References

Number

1. *American Standard Method of Recording and Measuring Work Injury Experience*. New York: American Standards Association, Z16.1—1954 (Reaffirmed 1959).
Defines terms, establishes standard measures of accident experience, and provides interpretations and guiding examples for use in applying the various standard indexes of safety performance.
2. *American Standard Method of Recording Basic Facts Relating to the Nature and Occurrence of Work Injuries*. New York: American Standards Association, Z16.2—1962.
Describes basic concepts, definitions, analytical categories, and the rules to be followed in selecting the categories for accident analysis purposes. Includes detailed series of coded analytical categories for use in classifying accident information.
3. Blake, R. P., *Industrial Safety*, 3rd ed. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963.
Contains chapters describing methods used in appraising safety performance and identifying injury sources and causes.
4. National Safety Council, *Accident Prevention Manual for Industrial Operations*, 5th ed. Chicago, Ill.: National Safety Council, 1964.
The chapters on "Accident Records and Injury Rates" and "Accident Investigation, Analysis, and Costs" are of special interest.
5. Simonds, R. H., and J. V. Grimaldi, *Safety Management*, revised ed. Homewood, Ill.: Richard D. Irwin, Inc., 1963.
Chapter 8 describes methods for locating and defining accident sources.

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Office of Productivity, Technology and Growth

Chapter 27. Work Injuries in Maritime Activities

Background

The Longshoremen's and Harbor Workers' Compensation Act, administered by the Secretary of Labor, provides a system of compensation for death or injury suffered by employees engaged in maritime employment upon the navigable waters of the United States (including any drydock). Employees covered by the act are largely employed in longshoring and in ship and boat construction or repair. These are industries which have had extremely high work-injury rates, as revealed by occasional BLS studies over many years. In 1958, Public Law 85-742, amending the section of the act which relates to safety regulations, was enacted to aid in the reduction of these extremely high rates. It placed in the Department of Labor some new administrative functions which are carried out by the Bureau of Labor Standards (LSB). The amended act authorizes the Secretary of Labor to issue regulations or orders which will protect the life, health, and safety of covered employees. Among the regulations issued under this authority are those requiring the maintenance of records and the making of reports which will permit preparation of standard work-injury frequency and severity rates. BLS acts as the agent of LSB in collecting reports and compiling rates under the regulations.

Collection of standard work-injury data for maritime employment was begun early in 1960. BLS has been collecting statistics for LSB since that time, covering workers subject to the act. Provisions of the act are limited generally to employees aboard vessels afloat or in drydock. Many of the establishments included in the survey are also included in the BLS basic work injury surveys, which cover all employees.¹ In order to reduce the number of requests for information, BLS requests on one report form both the information needed to serve LSB and the information for all employees of the reporting establishments, whether or not they are subject to the provision of the act.

Description of Survey

There are three parts to this survey; two closely resemble the BLS quarterly and annual surveys, the third collects information for classification by activity. All three parts are conducted by mail. However, field personnel of LSB are available to advise respondents on problems in reporting. At the beginning of the year, respondents are asked to provide information necessary to classify the establishment in the Standard Industrial Classification system² and also the information necessary to classify the activity of the group of employees subject to safety and health provisions under the Longshoremen's and Harbor Workers' Compensation Act. Each quarter respondents are asked to provide injury and employment data basic to injury-frequency rates for each of the 3 months of the quarter for the entire establishment and separately for employees subject to the act. At the end of the year, they are asked for data required to compile injury-severity rates, again for the entire establishment and for employees subject to the act.

As in the similar basic BLS surveys, the *American Standard Method of Recording and Measuring Work Injury Experience (Z16.1)* defines the measures used in the maritime survey. The frequency rate used is the number of disabling injuries per million employee-hours worked, and the severity rate is the number of days lost or charged per million employee-hours worked. In addition, the average number of days lost or charged per case and the percent of disabling injuries resulting in death, permanent impairment, and temporary-total disability are computed.

Injury and employment data are collected in two sections of the forms. Section A, identified as "Employments subject to the safety and health

¹ BLS basic work injury surveys are annual and quarterly surveys in manufacturing and selected nonmanufacturing industries. See chapter 26, "Frequency and Severity of Work Injuries", pp. 197-207.

² See appendix B.

regulations issued pursuant to the Longshoremen's and Harbor Workers' Compensation Act" must be completed to meet provisions of the act, but section B, covering all employees, is intended to meet BLS needs for the basic surveys and response to it is voluntary.

Data Sources

There are about 2,000 establishments in the United States with employees in activities that make them subject to the act. Certain of these, with less than 6,000 employee-hours per year subject to the act, are administratively excused from reporting by administrative rule. The remaining 1,600 establishments provide the information in the survey. From employment and injury records, they provide information on the number of employees, the total number of hours worked, and the number and kinds of injuries. Additional information on the duration of disability is obtained at the end of the year, together with necessary information for determining time charges for cases of permanent impairments. The information on number of employees, number of hours worked, and number of deaths and of other disabling injuries must be obtained for each month of the year to permit calculation of monthly injury-frequency rates. The collection of this information is quarterly, however, and data for each of the three months are obtained at one time. Data for the computation of severity rates are needed only once during the year. Therefore, at the end of the year a summary of the number of disabling injuries is obtained in somewhat greater detail than in the quarterly reports. For many cases in which the full duration of disability was not known when the quarterly reports were submitted it can be accurately reported at the end of the year. For cases still open at the end of the year, additional information on the characteristics of the injury and on the estimated total duration of disability is needed. Additional information on permanent impairments also is needed at this time to assign time charges as required by the Z16.1 Standard for the calculation of severity rates. In all of these matters information is needed separately for hours and injuries coming under the act, as the amendments to the act require, and for all

hours and injuries of the establishment to be used in the basic BLS programs. Submittal of the latter information is voluntary.

Collection Methods

Three report forms are used to collect the information outlined above as necessary in this program. BLS 2672-A requests information of the services or products of the entire establishment and for identification of specific maritime operations and services performed with an indication of which of them accounts for the largest number of man-hours. It also provides for a description of the estimating procedure, if it is necessary to estimate the number of man-hours worked in employments subject to the act. This form is completed early in each year, with the activities described referring to the previous year. BLS 2672-B requests for each month of a quarter the number of disabling work injuries (deaths and others separately) and the numbers of employees and man-hours. It is collected in the month following the end of each quarter. BLS 2672-C requests all the additional information indicated above as being needed at the end of the year and is submitted in the 6 weeks following the end of the calendar year.

The Bureau of Labor Standards furnishes the Bureau of Labor Statistics with lists of employers required to report in the program. Report forms are mailed to them by BLS and all returns are by mail. However, field personnel of LSB are available to advise respondents on problems of reporting. At the end of the period allowed for submitting reports, BLS gives LSB the names of employers from whom the required portions of the reports have not been received so that a follow-up may be made and the required reports obtained.

Estimating Procedures

As the completed report forms are received they are reviewed for completeness, internal consistency, and reasonableness. Questionable reports are returned for confirmation or correction. From the information on BLS 2672-A, an industry code is assigned to the entire establishment—

from the 1957 edition of the *Standard Industrial Classification Manual* and its 1963 Supplement—and an activity code to operation under the act—from the list appearing on the form. In connection with this editing of BLS 2672-C, time charges are assigned for cases of permanent impairment and predictions of total days of disability made for cases not yet closed. The time charges are assigned as defined in the *American Standard Method of Measuring and Recording Work Injury Experience*. The necessary approximations of total days of disability are made on the basis of all information available, the doctor's prediction of future disability and experience with similar cases.

The assigned codes and edited data are transferred to punch cards. Summaries are made and rates computed on data processing equipment. The measures computed are:

$$\text{Frequency rate} = \frac{\text{Number of disabling injuries} \times 1,000,000}{\text{Total number of employee-hours worked}}$$

$$\text{Severity rate} = \frac{\text{Total days lost or charged} \times 1,000,000}{\text{Total number of employee-hours worked}}$$

$$\text{Average severity} = \frac{\text{Total number of days lost or charged}}{\text{Number of disabling injuries}}$$

Rates are calculated for a considerable number of regions, districts, and ports. These rates are not published by BLS, but are transmitted to LSB for publication and internal use. While BLS advises LSB of the technical characteristics of the rates substantive analysis is done entirely by LSB. Using these rates and a wealth of other information gained in carrying out its responsibilities in the area of maritime safety, LSB has been able to provide a considerable amount of safety guidance to employers. In the first 5 years of the program significant reductions in injury rates have been accomplished.

While the principal presentation of the data has been through LSB, data reported for entire establishments have been incorporated in rates compiled in the basic BLS programs. Also, rates for the marine cargo handling industry have been published in a separate BLS release. This industrial classification is a new one, appearing for the first time in the 1963 Supplement to the *Standard Industrial Classification Manual*.³ A full range of rates for 1963 was published for five regions and for three activities in the new industry.

Uses and Limitations

The largest use of these rates has been that for which the program was designed, assistance to the Bureau of Labor Standards in carrying out its responsibilities under the safety and health provisions of the Longshoremen's and Harbor Workers' Compensation Act. Not only the statistical results, but also the activities of the LSB field staff in assisting respondents, have been useful in accomplishing this objective. Further, the results of the surveys have been available directly to employers and to their safety officers as indicators of the nature and extent of the injury problems, aids in directing safety efforts, and measures of success or failure.

Full-establishment reports have strengthened the basic BLS injury statistics, notably in the marine cargo handling and ship and boat construction and repair industries. As was mentioned above, BLS has been able to publish rates for the new marine cargo handling industry in a separate release.

The rates obtained in these surveys are intended for administrative use in area of responsibility of LSB. They represent high-hazard activities within industries and cannot be compared directly with the whole-industry rates which are available from the basic BLS surveys. The special-purpose nature of the rates limits their comparability to general-purpose statistics in two ways: The activities classified are not Standard Industrial Classification industries and the units reported are not establishments as defined in the *SIC Manual*. Thus the relation of the coverage in these surveys to the coverage in other surveys cannot be stated with precision. Again, the geographic areas represented by most of the rates coming from the surveys are administrative areas. Statistics for more generally used areas cannot be matched with these areas for comparison. To the extent that full-establishment reports from the surveys can be used in the basic BLS compilations, these limitations are made less important.

³ Industry 4463, "Marine cargo handling", includes establishments engaged in activities directly related to marine cargo handling from the time cargo, for or from a vessel, arrives at ship-side, dock, pier, terminal, staging area, or intransit area until cargo loading or unloading operations are completed. This industry includes the operation and maintenance of piers, docks, and associated buildings and facilities; but lessors of such facilities are classified elsewhere.

Technical References

Number

1. *American Standard Method of Recording and Measuring Work Injury Experience, Z16.1*, Approved December 16, 1954, Reaffirmed June 23, 1959. New York, American Standards Association.
Basis of the injury frequency and severity rates compiled for maritime activities and for basic injury statistics.
2. *Recording and Reporting Work-Injury Frequency and Severity Data Concerning Repairmen and Other Harbor Workers*, 29 Code of Federal Regulations, Part 1506.
Legal requirement for the statistical activities.
3. U.S. Department of Labor, Bureau of Labor Standards, *Safety and Health Regulations for Longshoring* June 1960 (and Supplement, 1961).
This publication, and the three below include Public Law 85-742 and regulations.
4. U.S. Department of Labor, Bureau of Labor Standards, *Safety and Health Regulations for Ship Breaking, Safety and Health Regulations for Ship Building, Safety and Health Regulations for Ship Repair*. 1965.

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Office of Productivity, Technology and Growth

Chapter 28. Injury Rates and Accident Causes

Background

The risks to health and safety faced by workers because of their occupations were among the earliest subjects of interest to the Bureau. Accident records were cited in reports on various industries before the turn of the century, and by the First World War, a number of reports had been published on dangerous machinery, lead poisoning, and other industrial hazards. While the small number of industries for which the basic recurring injury surveys were conducted was slowly increasing, occasionally more intensive surveys could be made. In the twenties and thirties, a few specific industry accident experience reports were prepared on the basis of special mail surveys. Industries chosen were those with high-frequency rates in the Bureau's continuing annual injury statistics program.

During the Second World War, similar special studies were made for foundries, longshoring, and the slaughtering and meat-packing industry. For these studies, the mail survey of injury incidence was supplemented by personal visits to plants to determine the nature of injury and the causal factors associated with the individual accidents leading to the injuries. These studies proved to be very valuable in planning safety work. The series of studies was continued after the war, and they make up the present special studies program.

Description of Survey

These intensive studies collect disabling injury data in more detail than is possible in the Bureau's recurring surveys. In addition, they gather information on the nature and causes of the accidents producing the injuries, on characteristics of the injured worker, and on the environment in which he was working when injured. The number of studies is limited and each covers a selected industry or occupation over a specified period of time. In recent years, one industry a year has been covered.

Injury-Incidence Data

The basic measures of injury incidence are the injury-frequency rate, the injury-severity rate, and average severity. These are discussed in chapter 26 and defined in the *American Standard Method of Recording and Measuring Work Injury Experience* (Z16.1). The injury-frequency rate measures the number of disabling injuries per million man-hours of exposure. The injury-severity rate is the number of days lost, or, for permanent disabilities and death, charged according to a prescribed scale, per million man-hours of exposure. Average severity is the number of days lost or charged per disabling injury.

In the detailed special surveys, it is possible to compute these measures for a number of sectors of the industry covered. Some of the sectors may be geographic regions, departments common to establishments in the industry, occupational groups, or groups classified by size of establishment (number of employees).

Collection by mail survey of information basic to these measures from establishments in the industry covered is the first of two parts of a typical special study, and the report on the survey is the first of two reports.

Accident Cause Data

While the incidence rates indicate the location and seriousness of hazards in workplaces, the identification of the nature and causes of accidents constitutes the first substantial step toward elimination of hazards. This step is taken in the second part of the special studies, the "cause studies," and in the reports that come from them.

The statistics and analysis based on the cause studies are intended to assist the accident preventionist by identifying the events and circumstances which most commonly lead to the occurrence of injuries. They identify the most significant hazards and indicate the specific accident-prevention activities which most need to be emphasized. This is accomplished by cross tabulations of characteristics of the accidents and of the injuries they produced.

As is the case of definitions of injury frequency and severity rates, the commonly accepted analysis procedure is contained in an American Standard, the *American Standard Method of Recording Basic Facts Relating to the Nature and Occurrence of Work Injuries* (Z16.2). Bureau staff members had an important part in the development and updating of this Standard, which is in general use in the United States. Under the Standard, eight characteristics of the injury and accident are recorded, without reference to which are of greatest importance in the particular case.¹ Standard terms for the item recorded, with tabulating codes, are included in the Standard in some detail and proper use of the standard analysis requires fairly close adherence to them.

These surveys cover the coterminous United States. Usually they relate to Standard Industrial Classification categories. In some cases, as school lunchrooms and hospitals, both Government and private establishments are included.

Experience indicates that the most effective safety activities are those carried out on an industrywide basis. For this reason, the special studies are planned with the possibility of an industry safety campaign in mind. Of two industries with equally high-frequency rates, the one which has a trade association or some other industry group to organize and support a safety program will be considered the better prospect for a special survey.

Data Sources

Information required for the first part of these surveys is very similar to that required for the recurring surveys of the frequency and severity of

¹An example from the Standard will indicate briefly the nature of the characteristics recorded:

"A circular-saw operator reached over the running saw to pick up a piece of scrap. His hand touched the blade, which was not covered, and his thumb was severely lacerated.

<i>Analysis category</i>	<i>Record</i>
Nature of injury-----	Laceration
Part of body affected-----	Thumb
Source of injury-----	Circular saw
Accident type-----	Struck against
Hazardous condition-----	Unguarded
Agency of accident-----	Circular saw
Agency of accident part-----	Blade
Unsafe act-----	Cleaning, adjusting moving machine."

work injuries described in chapter 26, except that it is in much more detail.

Nearly all the information required for the measures of injury incidence is collected by mail, although data for a few large establishments that are virtually certain to fall in the smaller sample for the cause part of the survey are requested in personal visits in connection with that part. The mail-report form asks for three kinds of information. First, details on a number of characteristics of the reporting unit—the establishment—are requested. These vary considerably with the industry covered and are those characteristics which a priori seem to be related to differences in hazards. They usually will include location and details of operation, product, or service. Second, the average number of workers and the total number of hours of exposure for a 1-year period are requested, not only for the establishment as a whole but also for departments, operations, or occupational groups within the establishment. Third, provision is made for entry of information about the injury and the injured person for every disabling injury during the year studied.

This information is requested from a large sample of establishments, or, if the industry is fairly small, from all establishments in the industry. This permits calculation of injury frequency and severity rates in great detail and some analysis of characteristics of injuries for industry sectors.

Information required for the second part is much more complex. Individual case records must be obtained covering each of the characteristics considered by Z16.2. Where establishment records do not include all the facts desired, it is frequently possible to obtain them by interviewing the persons injured or their supervisors or by observation of the place of the accident.

Information for this part of the studies is obtained in personal visits to the reporting establishments by Bureau analysts. Because the visits are costly, the sample for the cause part of the survey generally is limited to about 200 establishments.

Collection Methods

As in the similar recurring surveys, information for the first part of the surveys most often is transferred from establishment records to the mail-

report forms by safety or other personnel of the establishments. Report forms and explanatory materials are mailed to the establishments following the end of the year to be covered. A second mail request is sent to those not replying to the first. If less than 70 percent of those solicited reply, further requests are made. Completed reports returned to the Bureau are reviewed for completeness, internal consistency, and reasonableness. When a questionable entry is found, the person making the report is asked by letter to confirm or correct the entry.

The information in the second part of the surveys is considered too complex for successful collection by mail. The Z16.2 Standard is newer and less generally used than the Z16.1 and many establishments do not use it or keep records of all the facts it requires. Therefore, Bureau analysts collect this information in personal visits to the establishments. They record on worksheets all the information available in company records and supplement this by interviewing the injured persons, their supervisors, plant medical or first-aid personnel, and others; and by observing the place of the accident. The analysts have the mail report listing all disabling injuries for the period studied, and so, know in advance the number of records required.

Sampling

Because of the detail in which the data are presented, the special studies require larger samples than do the recurring surveys. The high-rate industries covered are frequently small in total number of establishments and employees. When this is true, it is often possible and advantageous to cover the entire industry in the mail survey. Where the total number of establishments is very large, a sample is selected for the mail portion of the survey. The number of establishments in the mail survey is usually between 5,000 and 10,000.

In the second part of the study, field agents collect the data. Since a large sample would be prohibitively expensive and would demand more

analyst time than is available, a sample of about 200 establishments is selected from all establishments reporting injuries for this part of the survey. Because the mail reports are available for the selection of this sample, a selection may be made which guarantees a sufficient number of cases for analysis in each stratum at minimum cost.

Estimating Procedures

The reports received by mail are edited and any questions arising in them are settled through correspondence with the reporting establishment. Codes are assigned for the establishment characteristics included in the report and to the departments or occupational groups for which hours worked and injuries are reported. Frequency and severity rates² and counts of injuries are cross tabulated by the coded characteristics.

The records made by analysts visiting establishments in the second part of the survey are reviewed in the Bureau's office. Codes are assigned for the eight "analysis categories" of the American Standard and for some 10 to 15 other characteristics of the establishment, injury, and the injured person, for each case. The final tabulations group the cases according to these factors and provide a large number of analytical cross classifications. These tables, running 50 to 60 pages, are used in the Bureau's analysis and reproduced in the report on the survey.

Analysis and Presentation

The written report is intended to assist in the prevention of accidents by indicating the nature and extent of the problem, the frequency of various kinds of injuries, and the circumstances most frequently associated with accidents and resulting injuries.

Frequency and severity rates for injuries are compared with those of other industries. Rates for sectors of the industry also are compared. This permits an assessment of the seriousness of the general injury problem in the industry and identification of the geographic, industry, occupational, and other areas in which corrective action

² The formulas for these injury measures are:

$$\text{Frequency rate} = \frac{\text{Number of disabling injuries} \times 1,000,000}{\text{Total number of employee-hours worked}}$$

$$\text{Severity rate} = \frac{\text{Total of days lost or charged} \times 1,000,000}{\text{Total number of employee-hours worked}}$$

is most needed. The nature of injuries and parts of the body injured most frequently in the various sectors also are identified.

Better understanding of the nature and causes of injuries is possible through analysis of data from the second part of the study. The greatest number of meaningful cross classifications of such characteristics as nature of injury, part of body affected, activity at time of injury, and so on can be selected; the comparative importance of the various injuries explored; and the nature of the more and less severe injuries established. The second part of the study increases the understanding of factors involved in accidents resulting in injuries. If factors frequently present in, and possibly necessary to, accidents can be eliminated, repetition of the accidents may be avoided. The analysis is aimed not at understanding of the underlying causes of injuries, but at breaking chains of events which have led to injury through accidents. Unsafe acts and hazardous conditions associated with accidents are the material of this analysis. Those most commonly related to injuries in various sectors of the industry, to injuries of various kinds, and to various activities are explored. Hypotheses concerning relationships among variables associated with accidents are tested statistically.

The analyses emphasize the circumstances and combinations of circumstances which call for accident-prevention activities at every work site. They also point out situations of high-accident potential which, though less common, may be important in individual establishments.

A BLS "Report" is prepared for each of the two parts of the survey. A summary of the most important findings is followed by a description of the survey with particular attention to the definitions and standards used and the nature and limitations of the statistics presented. This is followed by the analysis just described and many detailed tables of data.

While the "Report" is the principal medium for releasing the survey results, several other means are used to insure the widest possible distribution of the information in the safety movement, where it may be effectively used. A summary of the findings is published in the *Monthly Labor Review* and the findings are freely available for publication in trade or professional journals. A copy of

the report is sent to each respondent on request. When possible, the staff member in charge of the survey reports directly to interested groups in the industry in speeches to conferences or conventions.

Uses and Limitations

The ultimate purpose of these surveys is to stimulate and assist in the prevention of accidents and their resulting injuries. They aim to satisfy this purpose by establishing the importance of work injuries in the industry, identifying the industry sectors where problems are most severe, and providing a first step to elimination of accidents by identification of the factors involved in them.

For the safety man in the individual establishment, the report provides a number of leads to accident prevention and provides an industry summary as a basis of comparison for the experience in his own departments and occupational groups. It also provides him with an indication of potential accident problems, identifying general hazards which have produced injuries in other establishments but not yet in his own.

There is some evidence of the success of the surveys. In 1963 a number of charts were made of the trends of frequency rates in industries covered by special studies, before, during, and after the special study. They showed reductions in rates not only following publication of the reports, but also during the time the studies were in progress. Presumably, receipt of the report form and discussion of the survey in trade journals, as well as the reports themselves, provided an impetus to greater safety efforts.

Because of the small number of special surveys that are conducted, the detail and analysis given in the reports cannot be available for the great majority of industries. Also, as safety campaigns are conducted and conditions in the industries change, the reports become less applicable. After a few years, frequency rates tend to rise from the low levels achieved during and just after the surveys, but only in rare cases is it possible to repeat a survey within 15 years.

Although the reports identify hazardous conditions and unsafe acts frequently associated with accidents, they do not provide a judgment as to which were most important or whether it was the unsafe

act or the hazardous condition that was the major contributing cause; in most cases, both were found to have been present. Neither can the analysis determine underlying causes of accidents beyond the immediate circumstances. The American Standard Z16.2 consciously avoids making these judgments on the premise that a survey cannot successfully identify underlying causes. Again, the reports do not provide engineering solutions to accident prevention, but are limited to providing the safety engineer with clues and indications to conditions that merit his attention because of frequent association with accidents. Safety engineering practices, safety codes, and built-in safety fac-

tors in equipment are not within the scope of the Bureau's work injury studies.

The large samples used minimize sampling error. However, there is a problem of bias of nonresponse. A response of 70 percent or more is used as a signal to discontinue followups, though reports received above this level are used. No survey of nonrespondents is made to determine their injury experience. The sample results are considered as slightly understating the levels of frequency and severity rates.

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Other Programs

Chapter 29. Foreign Labor Conditions and International Comparisons

Background

Almost from its inception, the Bureau of Labor Statistics has conducted research on labor conditions and developments abroad. Analysis of research data on labor in foreign countries and the making of international comparisons constitute only two of the international activities carried on by the Bureau,¹ but from the point of view of technique they are the ones of most interest to users of research reports. The United States undertook these research programs because (1) information on labor conditions published by a majority of these countries is not available in English; (2) summary information is often not available at all and is seldom available in a form readily usable by American businessmen, labor unions, Government officials, and others; (3) the sheer variety of source materials from nearly 200 independent countries and dependencies is impossible for most users to keep up with; and (4) it is often impossible for anyone but an expert to have trustworthy judgment of the quality of source materials.

Description of Reports

The foreign labor research reports published by the Bureau are partly general and partly statistical. The principal types may be listed as follows:

1. *Labor Developments Abroad*, a monthly publication covering not only important developments in labor abroad, but also the principal labor and price statistics in leading important countries.

2. Labor monographs on single countries, including general labor summaries and labor law and practice reports. These reports are factual, but not primarily statistical.

3. Brief labor digests on single countries.

4. Bibliographies, chiefly for a country or an area and often with annotations or brief summaries.

5. International comparisons presented in feature articles and bulletins. These are statistical in nature and contain, within limitations of the medium, a careful adjustment for differences in definitions and methods. So far, principal comparisons published have concerned labor cost, unemployment, job vacancies, and worktime required to buy selected consumer goods and services.

Data Sources and Collection Methods

The Bureau receives a mass of statistical and other material on labor developments abroad and maintains this material in files classified by country and by subject. The material includes (1) current reports from labor attachés and other officers of the Foreign Service in American diplomatic missions and consular offices throughout the world; and (2) periodicals and other publications issued by labor ministries, bureaus of statistics, and other governmental agencies of foreign countries, the International Labour Organization and other international organizations, and by banks, economic research organizations, and other private agencies in the United States and foreign countries. When specific supplementary information is needed, the Bureau often requests it through Foreign Service reporting channels.

The Bureau also maintains contact with research institutions and individual scholars specializing in international labor, and with U.S. firms which employ labor abroad. In addition, staff members of the Bureau are briefed by labor attaches and other Foreign Service officers, when these officers arrive in Washington from their overseas posts; and, from time to time, members of the

¹ Other major BLS activities in the international field include providing orientation and factual advice to U.S. policy and program officers on labor in foreign countries, and providing training or orientation to foreign statisticians and other foreign visitors (especially participants in exchange programs and technical cooperation programs), on U.S. labor statistics methodology and on the economic conditions of American workers.

research staff study foreign labor conditions at first hand on carefully planned trips abroad.

Analysis and Uses

With the exception of international comparisons, the major classification criterion in the presentation of reports is geographic. For an individual country, the organization is by subject. The sequence and coverage of subjects varies somewhat in different reports, but usually includes the following general headings: (1) social, economic, and political background; (2) manpower (including labor force, employment, unemployment, manpower planning and utilization); (3) labor law and administration; (4) wages, supplementary benefits, hours and working conditions (including prices and real earnings); (5) labor organizations; (6) management organizations; and (7) labor-management relations.

Most reports are concerned with either the basic situation at the time the report was written or with a recent development or trend. With a few exceptions, of which real wages is one, less attention is given to historical development of long-term trends. The extent of material to be covered is so great that country monographs and, indeed, all but the most summary information often can be written for a given country only about every 10 years, and many countries have never been covered. Reports often contain an annotated bibliography for those interested in more detail.

International comparisons studies were begun in 1960 on a regular basis. They differ from other foreign labor reports in being primarily statistical in method. In purpose and uses they also differ, since their chief ultimate objective is learning from foreign experience findings which may be useful in the United States. The international comparisons are prepared by subject, and the methodology is intricate, requiring specific information about details of definition. This information is seldom, if ever, fully covered by regular Foreign Service reporting or published sources, and great reliance is therefore placed by the Bureau on specific requests to the Foreign Service for required information.

Among the subjects the BLS has covered in

international comparisons is labor cost. Articles containing basic information on "The Role of Labor Cost in Foreign Trade" and on "International Comparisons of Unit Labor Cost: Concepts and Methods" have been published. No absolute comparisons have yet been issued for any industry, but trend data in index form have been published for all manufacturing in eight principal trading partners of the United States. Relative labor cost trends are useful for analysis of the balance of payments. Other topics studied have included unemployment, work stoppages, and job vacancies. Articles on worktime required to buy selected consumer goods and services were published in the period 1949 to 1952. This is a subject in which the Bureau has had a continuing interest.

Unit labor cost is the ratio of total labor cost (or expenditure), expressed in money terms, to total output produced by the labor (in concert with other factors of production), in physical terms. The unit of measurement may be expressed as, for example, dollars per ton or francs per gallon. The greatest problem involved in comparing unit labor cost among countries arises from the fact that labor cost data are available by industry, whereas output is reported by product, and since nearly all industries produce a number of products, the question of labor cost allocation (or product synthesis) arises. Previous efforts suggest that the most fruitful approach probably will be cost per unit of output on an industry-by-industry basis.

The trend data published for all manufacturing were taken, in most cases, from official statistical reports issued by the individual countries. Because the data are not entirely comparable from country to country and because more than one set of data exists for most free industrial countries, considerable effort was spent on preparing estimates from different sets of data and analyzing the differences in results before selecting the series finally used. In most countries where it was available, the Bureau decided (1) to use as the measure of labor cost the compensation of employees in manufacturing, from the national accounts, and (2) to use as the measure of total output the real gross national product originating in manufacturing. The chief reason for this decision has been the greater comparability and comprehensiveness of these measures.

As regards unemployment, the interest in international comparison centers on the percentage of the labor force which is unemployed. Data published by the individual countries on a current basis is of different types, but most industrial countries of the free world have made one or more sample surveys of the labor force, using definitions and methods fairly comparable to those in the United States. These latter data, adjusted as carefully as feasible to uniform definitions and brought up to date by the best data currently available, form the basis for the international comparisons of unemployment rates published by the Bureau.

For both international comparisons studies and reports on foreign labor conditions, businessmen are the largest single group of recipients, and their uses of foreign labor information lie in two chief areas: (1) their own actual and prospective opera-

tions abroad; and (2) the competition which they are experiencing or can expect from abroad. The uses of Government officials, labor unions, research institutions, and others are more varied and often less direct. But every year the world grows smaller as Government-to-Government and people-to-people contacts become more frequent and close knit. Adequate manpower planning, development, and utilization are crucial to economic progress in developing countries. The AFL-CIO and its affiliated component unions are assisting directly and through international organizations literally hundreds of labor unions in Latin America, Asia, and Africa. Knowledge of the labor and manpower activities of other countries is thus increasingly important.

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Chapter 30. Economic Growth Studies

Background

The U.S. Department of Labor, in cooperation with other Government agencies and private research organizations, has undertaken an extensive program of economic growth studies. These studies are aimed at providing a more comprehensive and integrated framework than previously has been available for analyzing the problems of long-run economic growth in relation to employment opportunities.

Because this program has important implications for many agencies of the Government, an interagency planning and coordinating committee provides the guidelines for the program. The chairman of the committee is from the Council of Economic Advisers; other members come from the Departments of Labor, Commerce, and the Bureau of the Budget. Many elements of the projections are being developed by other agencies of the Government and by private research groups. The integration of these separate projects into a consistent set of projections has been undertaken by the U.S. Department of Labor, operating under the guidelines of the interagency coordinating committee.

A primary objective of the program is to develop projections, under alternative assumptions, of the rate and patterns of growth in the economy. These would then provide a framework for assessing a number of important economic problems, including problems of manpower utilization over the next decade. The projections will cover both the supply of and demand for labor in considerable industry detail.

The estimated supply of labor will be based on interrelated projections of the population, by age and sex; school and college enrollment; educational attainment of the work force; household and family formation; and labor force participation rates by age and sex.

The demand for labor will be based on projections, under alternative assumptions, of total income and output of the economy and how this output may be distributed among the various categories and detailed components of final demand

for consumption, investment, government expenditures, and foreign trade.

Estimates of final demand will then be converted into direct and indirect output of all the supporting industries which contribute materials, parts, components, fuels, and transportation and distribution services embodied in the final products. The basis for such computations is provided by a study of interindustry sales and purchases in the economy, and the projection of these interindustry relationships over the next decade to reflect anticipated changes in technology and, if possible, relative costs. These interindustry relationships can then be used to convert projections of end-product deliveries to estimates of output requirements for each industry, covering intermediate as well as final products. The industry output requirements, along with projections of hours of work and unit labor requirements, will provide the basis for deriving comprehensive and consistent estimates of the demand for labor on an industry-by-industry basis. In addition, the projections of population, labor force, industrial output, etc., along with projections of unit capital requirements, will be used to derive estimates of public and private investment and capital stock required by an expanding economy.

The final stage in the program is the translation of the industry employment estimates into occupational requirements based on projections of occupational patterns, by industry. These data can be used to evaluate potential areas of substantial surplus or shortage, and provide the basis for occupational guidance and development of longer-run training programs.¹

The elements in the integrated set of projections previously indicated are being developed by various units of the U.S. Department of Labor and other Government agencies and private research organizations. In particular, the Office of Business Economics, U.S. Department of Commerce, has prepared the table of interindustry relationships which play a central role in the projections. Some of these elements are products of the regular economic and statistical research activities of the agencies involved, but a substantial proportion are

¹ See chapter 7, "Industry-Occupational Matrix."

being developed to meet the specific needs of this program.

These research projects include the following:

Bureau of Labor Statistics: Labor force projections, productivity projections, industry price indexes, capital flow table.

Office of Business Economics: Projections of capital-output ratios, residential construction projections, balance-of-payments projections, and projections of income and product accounts.

U.S. Department of Agriculture: Projections of inputs, for farm sectors and demand for farm products.

Bureau of Mines: Projections of inputs, for mining sectors.

Harvard Economic Research Project: Projections of consumer expenditures, and projections of inputs for selected manufacturing industries.

George Washington University and Council of State Governments: Projections of State and local government revenues and expenditures.

National Planning Association: Projections of Federal Government revenues and expenditures.

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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 perceptible.

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 methodology as well as in other areas. Using an electronic 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.¹ Subsequent improvements in methodology 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 methodology 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 could affect any portion of the series. It was difficult to accept a process by which the addition of recent information could significantly affect 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 described² as they were introduced. The method introduced in January 1964 is described in the sections which follow.

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 observations.³ (See illustration in charts 1 and 2.) The BLS method differs from other similar methods in the following respects:

1. The initial trend cycle is improved by restoring to it any residual trend-cycle which may have found its way into the irregular component. This adjustment for the deficiency in trend-cycle is developed explicitly and is available for review in the form of a table of trend-cycle correction values.

2. The BLS method provides for changes over time in the producing mechanism (changes in samples, method of collection, method of estima-

¹ Julius Shiskin, *Electronic Computers and Business Indicators*. New York, National Bureau of Economic Research, 1957, Occasional Paper No. 57.

² See U.S. Department of Labor items in the list of Technical References at the end of this appendix.

³ A parallel method assuming an additive relationship among the components has also been prepared for experimental use.

tion) or in economic factors (introduction of guaranteed annual wage plans, etc.).⁴

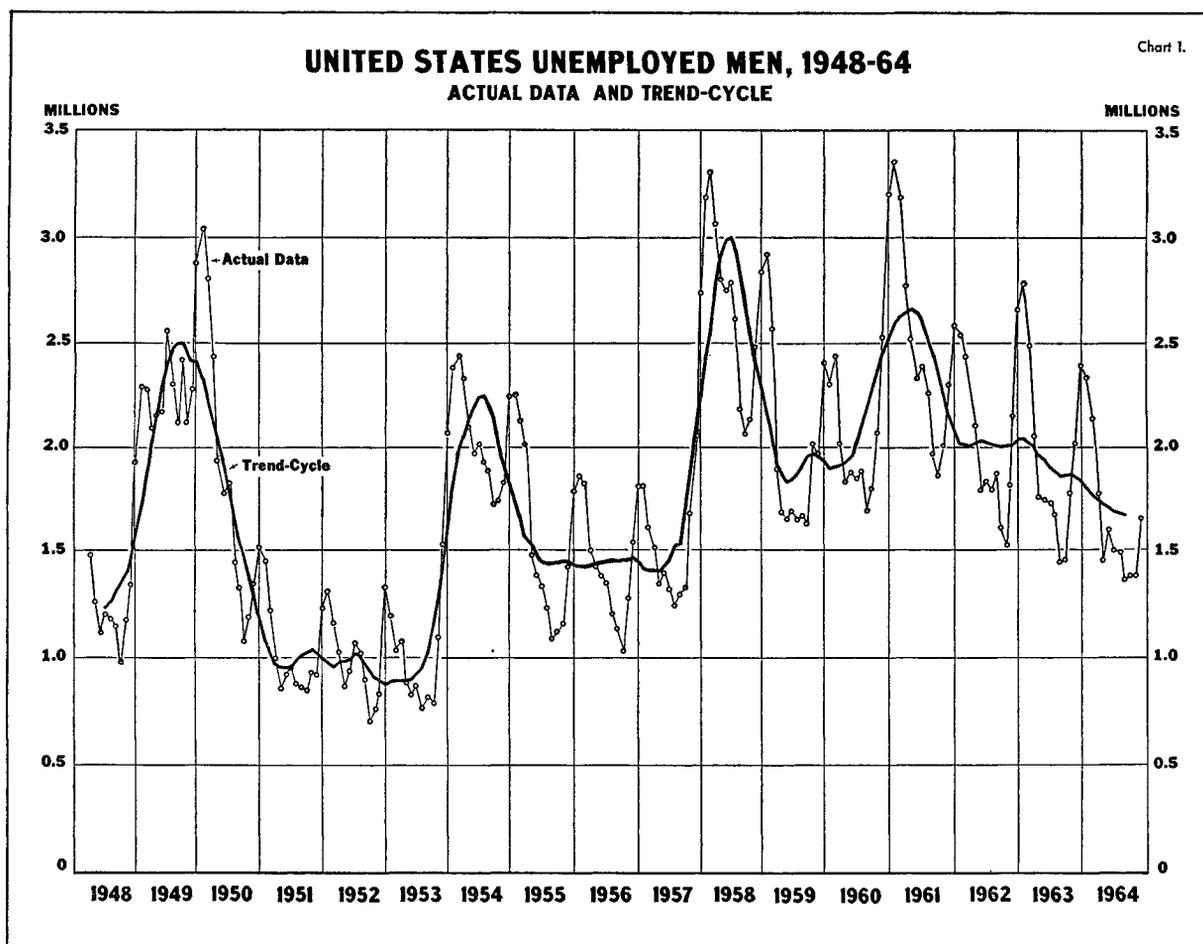
3. The BLS method calibrates each observation in order to assign a supplementary weight which is used in the various averaging processes. These "credence factors" reduce the impact of observations having large irregularities. They increase the smoothness with which the seasonal factors change over time, and they also keep large irregularities out of the final trend-cycle.

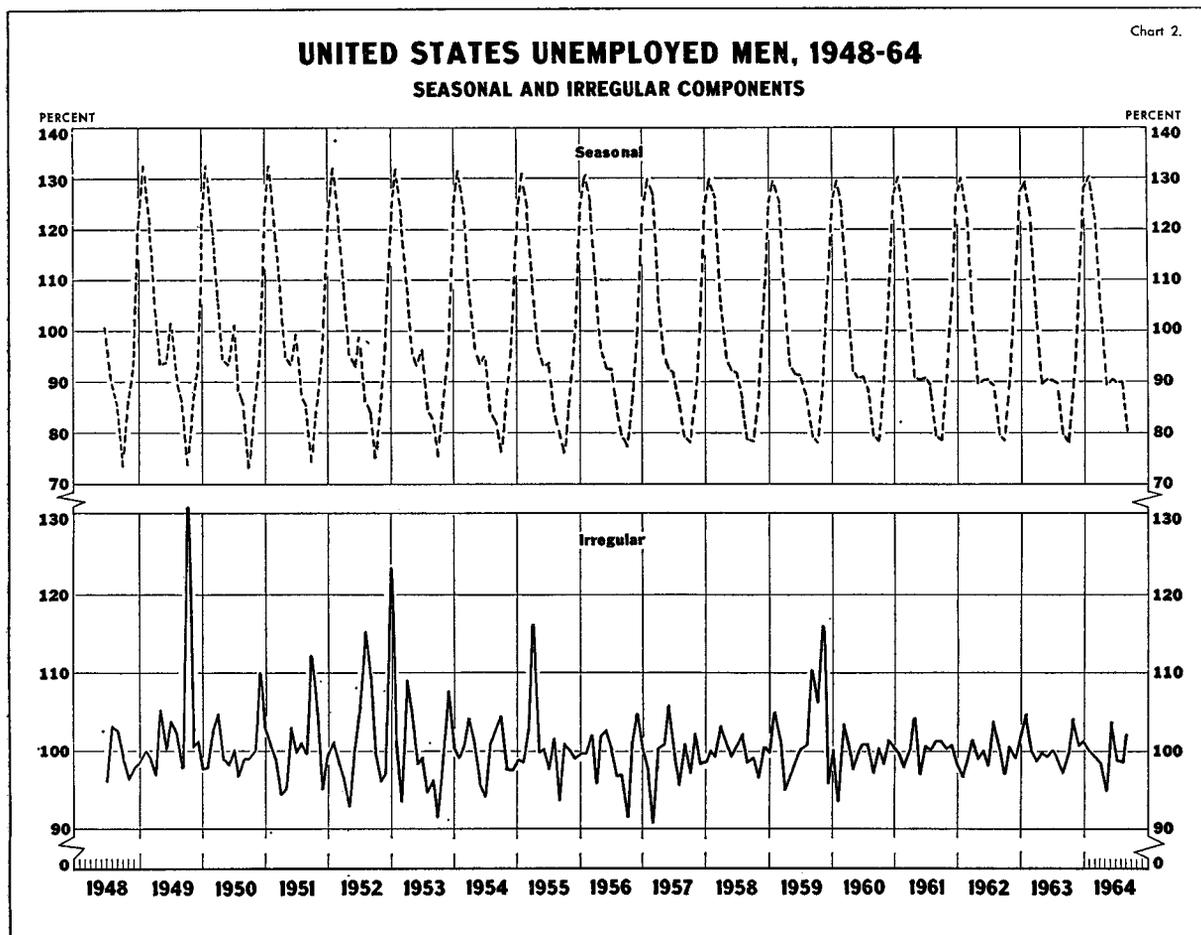
4. A second way in which the BLS method attempts to protect the final trend-cycle from large irregular fluctuations is by using modified original values for computing the centered 12-month moving average in the later stages of the procedure. The credence factors are used in obtaining the modified original values.

The BLS method is complicated and requires a very large number of arithmetic operations. Such a procedure would not be practical without an elec-

tronic computer. Since an earlier version of the BLS method has been accepted by State agencies, foreign governments, and private industrial concerns, the method has been programmed for a small computer system which is widely available. Special emphasis has been placed on keeping the handling and clerical requirements to an absolute minimum, on providing as many aids as possible for analysts or others using the results, and on making the application of the computer program as simple and efficient as possible. Only the data

⁴ A 5-year moving period is used to reflect such changes. The use of the 5-year moving period allows the full impact of a change to be reflected in a relatively short period of time. A review of the basic U.S. labor force series, for example, indicates that in the early 1960's the standard deviation of the irregular component is only 0.6 as large as it was in the early 1950's. This reflects the improvements made in the survey, such as the expansion in the number of sample areas, the increase in the number of households covered, the changes in the estimating methods, and the improvements in the design of selecting households so that there would be a three-quarters overlap in adjacent months and a one-half overlap over the year.





and one specification card are needed to produce a set of completely labelled tables for each series. Any number of series with varying characteristics (length of series, starting and ending dates, magnitude of original observations, final table patterns desired) can be processed in a single running without manual intervention. The computer program for applying the BLS procedure is available upon request.⁵

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 sub-cyclical 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, with each successive iteration providing an improved estimate for each of the components of the original series.

⁵ Upon request, at nominal cost, the Bureau of Labor Statistics will make its seasonal factor computer program available in the following manner: (1) A deck of punched cards (2321 cards) containing the program instructions (in condensed instruction format); (2) A deck of punched cards (11 cards) containing a test problem (data and specifications) which produces 18 tables for checking purposes; (3) Two copies of a document to be used as an operating guide and reference manual.

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 are then 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 impact of large irregularities in the original observations. These are supplementary weights in which observations with small ⁶ 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 year and moving 7-term weighted averages ⁷ (S') are secured (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.⁸ 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.⁹ To separate the residual trend-cycle from the truly random variation contained in the irregulars, a 9-term weighted moving average ¹⁰ (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 (the centered 12-month moving average of original observations) 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

⁶ References to "large" or "small" irregulars have to do with the deviation of the irregular component from 1.000 in relation to the standard deviation of such irregulars. A value of 1.423 or .577 would usually be considered large, while .997 or 1.003 would be small.

⁷ The weight patterns used are:

Seasonal	Weight pattern assigned to seven consecutive seasonal-irregular ratios						
1st year.....	<u>.281</u>	.270	.242	.207	----	----	----
2nd year.....	.213	<u>.221</u>	.213	.191	.162	----	----
3rd year.....	.160	.179	<u>.185</u>	.179	.160	.137	----
Middle years.....	.120	.141	<u>.157</u>	<u>.164</u>	.157	.141	.120
3rd from end.....	----	----	.137	.160	<u>.179</u>	<u>.185</u>	.179
2nd from end.....	----	----	----	.162	.191	<u>.213</u>	<u>.221</u>
End year.....	----	----	----	----	.207	.242	<u>.270</u>
							<u>.281</u>

The underlined value indicates the year to which the weighted average applies.

⁸ 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 (through the first December value) to provide the forced seasonals for the incomplete year 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.

⁹ 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 ratios all on the same side of the base reference ratio of 1.000 instead of being scattered above and below this base.

¹⁰ The weight patterns used are:

Month	Weight pattern assigned to nine consecutive irregulars								
1st month.....	<u>.370</u>	.341	.256	.115	<u>-.082</u>	----	----	----	----
2nd month.....	.254	<u>.276</u>	.254	.191	.086	<u>-.061</u>	----	----	----
3rd month.....	.160	.214	<u>.231</u>	.214	.160	.072	<u>-.051</u>	----	----
4th month.....	.067	.150	.199	<u>.216</u>	.199	.150	.067	<u>-.048</u>	----
Middle months.....	.050	.071	.157	.209	<u>.226</u>	.209	.157	.071	<u>-.050</u>
4th month from end.....	----	----	.048	.067	.150	.199	<u>.216</u>	.199	.150
3rd month from end.....	----	----	----	.051	.072	.160	.214	<u>.231</u>	.214
2nd month from end.....	----	----	----	----	.061	.086	.191	.254	<u>.276</u>
End month.....	----	----	----	----	----	.082	.115	.256	<u>.341</u>
									<u>.370</u>

The italicized weight indicates the month to which the weighted average applies.

(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 (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.¹¹

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 (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 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 com-

¹¹ 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 (end) of the series, the first (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 and 2.800 the credence factor is 1.555-.555 times the standardized irregular. The 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.

¹² 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.

ponent 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 11) 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.¹² 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 seasonals.) The forcing process is then applied to yield seasonals (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 foot-

note 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 11). Then a new modified original series is secured in the same manner as before (see footnote 12), 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.¹³ As supplementary information to aid

¹³ 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.

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 is usually preferable if their seasonal patterns are different, provided the increased measurement errors in the components are not excessive and that the amount of work does not proliferate unduly.

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 subjective 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.

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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) of industries based on principles set forth by a technical group made up of government and industry experts.¹ The Bureau of Labor Statistics took part in the development of the SIC over a long period of years and continues to work actively with the Bureau of the Budget and other agencies in seeking to improve the system.

Four basic principles were followed in developing the classification:²

(1) The Classification should conform to the existing structure of American industry. (2) The reporting units to be classified are establishments, rather than legal entities or companies. (3) Each establishment is to be classified according to its major activity. (4) To be recognized as an industry, each group of establishments must have significance from the standpoint of the number of persons employed, volume of business, and other important economic features, such as the number of establishments.

As there are thousands of products and activities, the system 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.³

Using the SIC as a guide, the Bureau classifies the reports received from each factory, shop or store according to major product or activity. The SIC is used in the same way by the agencies supplying the Bureau with its 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 "major 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 following a common set of principles of application do not always result in identical industry classifications of a given establishment by all agencies, or even by all programs within BLS. Therefore, any major deviations from the normal method of handling industrial classification will be described in the chapters on BLS establishment statistics, such as those on employment, work injuries, and the like.

The standard definition of establishment is stated as follows:

An 'establishment' is an economic unit which produces goods or services—for example, a farm, a mine, a factory, a store. In most instances, the establishment is at a single physical location; and it is engaged in only one, or predominately one, type of economic activity for which an industry code is applicable.

Where a single physical location encompasses two or more distinct and separate economic activities for which different industrial classification codes seem applicable, such activities should be treated as separate establishments and classified in separate industries, provided it is determined that: (1) such activities are not ordinarily associated with one another at common physical locations; (2) no one industry description in the Standard Indus-

¹ U.S. Bureau of the Budget, *Standard Industrial Classification Manual*, 1957.

² *Ibid.*, p. 2.

³ The SIC provides for different levels of aggregation. The broadest level divides the economy into ten Divisions: A. Agriculture, forestry and fisheries; B. Mining; C. Contract construction; D. Manufacturing; E. Transportation, communications, electric, gas, and sanitary services; F. Wholesale and Retail Trade; G. Finance, insurance, and real estate; H. Services; I. Government; and J. Nonclassifiable establishments. At the 2-digit level all products and services are combined into 79 "major groups." Thus, in the Manufacturing Division, establishments engaged in manufacturing machinery, apparatus and supplies for the generation, storage, transmission, transformation, and utilization of electrical energy are combined into Major Group 36, "Electrical Machinery, equipment and supplies."

The 3-digit level provides several hundred categories. In the electrical machinery major group the SIC provides 8 groups of industries: 361. Electric transmission and distribution equipment; 362. Electrical industrial apparatus; 363. Household appliances; 365. Electric lighting and wiring equipment; 365. Radio and television receiving sets, except communication types; 366. Communication equipment; 367. Electronic components and accessories; 369. Miscellaneous electrical machinery, equipment and supplies.

Thousands of products and activities are distinguished at the 4-digit level. For example, in Group 367, 4 industries are defined: 3671. Radio and television receiving type electron tubes, except cathode ray; 3672. Cathode ray picture tubes; 3673. Transmitting, industrial and special purpose electron tubes; 3679. Electronic components and accessories, not elsewhere classified.

trial Classification includes such combined activities; (3) the employment in each such economic activity is significant; and (4) reports can be prepared on the number of employees, their wages and salaries, and other establishment type data. An establishment is not necessarily identical with the business concern or firm, which may consist of one or more establishments. Also, it is to be

distinguished from organizational subunits, departments, or divisions within an establishment. Supplemental interpretations of the definition of an establishment are included in the industry descriptions of the Standard Industrial Classification.⁴

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⁴ *Ibid.*, p. 2.

Appendix C. Geographic Classification

United States and States

Since the publication of the previous edition, two States have been added to the Union. All statistical series of the Bureau were expanded in 1959 to include Alaska and Hawaii. Due to the relatively small populations of these new States, the effect on national time series was small. Where statistics are published by States, data for these States and other small States are shown where reliable data are available.

Generally speaking, BLS assigns an establishment to the State in which its employees are reported for payroll tax purposes, since these sources are used both for deriving benchmark levels and for drawing samples.

Standard Metropolitan Statistical Areas

Some of the Bureau's data are presented not only on a national and State basis, but also for selected metropolitan areas. Comparability of area statistics among Federal agencies is maintained by means of a set of published standard definitions.¹ Defining metropolitan areas for statistical purposes is done on the basis of information about population and about economic and social ties among cities. To qualify as a Standard Metropolitan Statistical Area under current rules, an area must have at least one city with 50,000 or more inhabitants, or two contiguous cities meeting certain other criteria.² Which counties are to be included in the standard area is determined on the basis of criteria relating to metropolitan character and extent of economic and social communication among counties.³

The Bureau of Labor Statistics is represented on the Federal Committee on Standard Metropolitan

Statistical Areas, and plays an active role in the Technical Committee on Area Definitions. Both interagency groups are under the chairmanship of the Bureau of the Budget.

State Economic Areas

State economic areas are relatively homogeneous subdivisions of States developed by the U.S. Department of Commerce's Bureau of the Census, in cooperation with the U.S. Department of Agriculture's Bureau of Agricultural Economics, and several State and private agencies. They consist of single counties or groups of counties which have similar economic and social characteristics. The boundaries of these areas have been drawn in such a way that each State is subdivided into relatively few parts, with each part having certain significant characteristics which distinguish it from adjoining areas.⁴

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¹ U.S. Bureau of the Budget, *Standard Metropolitan Statistical Areas*, 1964.

² The population criteria are:

1. Each standard metropolitan statistical area must include at least:

(a) One city with 50,000 or more inhabitants, or
(b) Two cities having contiguous boundaries and constituting, for general economic and social purposes, a single community with a combined population of at least 50,000, the smaller of which must have a population of at least 15,000.

2. If two or more adjacent counties each have a city of 50,000 inhabitants or more (or twin cities under 1(b)) and the cities are within 20 miles of each other (city limits to city limits), they will be included in the same area unless there is definite evidence that the two cities are not economically and socially integrated.

³ *Ibid.*, pp. 1-2.

⁴ U.S. Bureau of the Census, *Census of Population 1960*. Report PC(1) 1A. Number of Inhabitants. U.S. Summary, p. XXVII.

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