Preface

Productivity—the relation between physical output and input—has been studied for many years in the Bureau of Labor Statistics. Such studies and research are conducted in the Bureau’s Office of Productivity and Technology. The interest in productivity derives from a number of concerns—the pace of technological change and its effects on employment and skills; the trend in prices and costs; and the rate at which additional goods and services become available. Thus, the study of productivity is essential to understand the factors giving rise to variations in income and wealth, and to determine economic policy.

This bibliography, the fourth in a series, is intended to facilitate such study. It covers a large selection of books and articles that were published between 1971 and 1975. It provides annotated references for nearly 1,000 publications dealing with concepts and methods, measurement of levels and trends, the sources of productivity change (such as technology and economic growth), and the relation of productivity to the economy as a whole and to economic variables such as wages and prices. The previous BLS bibliographical bulletins on productivity include Bulletin 1226 (1958), Bulletin 1514 (1966), and Bulletin 1776 (1971).

Major sources drawn upon were the U.S. Department of Labor Library accessions list; the Journal of Economic Literature; and Dissertation Abstracts International—Humanities and Social Sciences, published by Xerox University Microfilm, Ann Arbor, Michigan.

Barbara Koch and James Urisko, under the supervision of Horst Brand, in the Division of Industry Productivity Studies, performed most of the work on this bibliography. Mary Robinson, James York, and James Mead also contributed.
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annotated listing</td>
<td>1</td>
</tr>
<tr>
<td>Concepts and measurement</td>
<td>1</td>
</tr>
<tr>
<td>Measures</td>
<td>11</td>
</tr>
<tr>
<td>Total economy and private sectors</td>
<td>11</td>
</tr>
<tr>
<td>Industries</td>
<td>15</td>
</tr>
<tr>
<td>Public sector</td>
<td>21</td>
</tr>
<tr>
<td>International</td>
<td>22</td>
</tr>
<tr>
<td>Factors affecting productivity</td>
<td>27</td>
</tr>
<tr>
<td>Labor, education, and hours</td>
<td>27</td>
</tr>
<tr>
<td>Management and organization</td>
<td>41</td>
</tr>
<tr>
<td>Technological change</td>
<td>50</td>
</tr>
<tr>
<td>Research and development</td>
<td>65</td>
</tr>
<tr>
<td>Productivity, prices, and costs</td>
<td>69</td>
</tr>
<tr>
<td>Productivity and employment</td>
<td>74</td>
</tr>
<tr>
<td>Productivity and economic growth</td>
<td>80</td>
</tr>
<tr>
<td>Bibliographies, annual reports, etc.</td>
<td>93</td>
</tr>
<tr>
<td>Author index</td>
<td>95</td>
</tr>
<tr>
<td>Subject index</td>
<td>104</td>
</tr>
</tbody>
</table>
Annotated Listing

Concepts and methods


A comprehensive text covering the design, construction, and use of index numbers, including detailed discussions of problems encountered, and much illustrative material.


Discusses the effect of differing valuation periods on the trend in constant-dollar GNP.


The authors present the background of the current program of productivity measurement in the Federal sector; concepts; methods used; productivity trends; unit labor costs; measurement problems; and future plans.


Describes the work performed in measuring productivity in the Federal sector. Discusses the history of the project and the findings. Concludes that future work involves extending the data base, expanding the coverage, and refining procedures.


Asserts that when economics and ecology are integrated, they can provide the basic information needed to make astute decisions. Stresses the necessity to align mankind’s laws with natural law in order to plan viable lifestyles. Believes that high productivity would result.


The authors examine the productivity effect of five parasitic diseases, focusing on schistosomiasis in particular. They conclude that parasitic infection has few statistically significant adverse effects on agricultural labor productivity, and offer several explanations for this finding.


Seeks to demonstrate the theoretical superiority of the CES function, and develops a technique for reducing its statistical complexity.


The authors derive various types of production functions assuming neutral technical change, and a linear relationship between growth rates of the capital-labor ratio, the capital-output ratio, the wage rate, the profit rate, and the profit share. They apply these relationships to 2-digit industries.


Deals with the problem of representing production possibilities by index number formulas. Focuses on intertemporal measures for a given country and on comparative measures for two countries at a given time.

Analyzes hospital production processes, and reviews the literature on hospital outputs, productivity and efficiency, cost of operations and demand for and utilization of hospital services. Suggests restructuring medical sector to assure high quality and efficiency.


The authors derive new estimates of embodiment from the Solow-Cobb-Douglas approach. They find embodiment to be an important component of productivity change, contrary to the findings of prominent researchers.


Develops a model of investment behavior to examine the determinants of capital appropriations and to explain deviations between actual and intended capital expenditures.


Reviews the concepts and sources of scale economies. Examines various analytical techniques. Designs a model to focus on scale economies at the subplant level.


The authors outline conceptual difficulties surrounding the measurement of capacity utilization, discuss recently employed statistical methods and the use to which the statistics have been put. They make suggestions for further study.


Tests the effects of scale on the elasticity of substitution, assuming a constant capital-labor ratio. Estimates of elasticity of substitution for 3-digit SIC's are computed. Concludes that it is impossible to reject the hypothesis that the elasticity of substitution is equal to unity.


A collection of papers reporting on the developments in, and applications of, input-output techniques throughout the world. Papers stress structural analyses of such areas as demography, occupational transition, and urban problems; international and interregional trade; methods of forecasting technological change; and theoretical aspects of input-output analysis. Applications in various countries are also discussed.


Discusses various definitions of efficiency. Defines the notion of inefficiency. Offers various efficiency measures.


Investigates the relationship between land tenure status of farm operators and their level of use of inputs, cropping patterns, average yields, farm income and productivity. Establishes the superiority of owner-operated farms.


Discusses certain measurement issues, including index number procedures, value added vs. gross output, and underlying economic assumptions.

Identifies and analyzes sources of productivity change, 1939-1972. Investigates the contribution of research and extension activity, the weather, and farmers' educational level. The role of the public sector in stimulating technical change is also examined.


Addresses the question as to whether there is a theoretical method for analyzing the economic effects of improved physical measurements, and whether their economic value can be estimated. Investigates the impact of the introduction of quantitative chemical analysis of stainless steel on the reduction of wastage in the industry.


Assesses the estimating procedures used to measure capital inputs. Suggests that the stock of capital should be measured so as to exclude the contribution of technological progress to its growth.


Develops a concept of “preventive efficiency,” based on minimizing costs of providing “preventive” services and the probability of damages due to inadequate levels of protection.


The authors estimate inpatient and outpatient demand for hospital care. They conclude that policymakers of national health insurance plans cannot count on near-zero elasticities.


Formulates guidelines for classifying the determining factors in economic growth. Argues that any such classification must identify cause and effect relationships, and that factors which do not change over time do not contribute to economic growth.


Presents a response to the article by Jorgensen and Griliches, “Issues in Growth Accounting: A Reply to Edward F. Denison,” in the same issue.


Comments on an article by Jorgenson and Griliches in the same issue. Examines reasons why large differences exist between these authors’ findings and his own concerning output per unit of input over time.


The authors argue for the restructuring of the national accounts so that human capital formation is treated as investment rather than consumption. They suggest schooling as a point to start the revision.


Analyzes variability and determinants of expenditures for replacement and modernization, and for expansion, using McGraw-Hill survey data. Concludes that expansion expenditures were related to past and expected sales changes, while replacement and modernization expenditures were related to depreciation charges and profits.

Examines the influence of manufactured imports on domestic manufacturing productivity. Develops a model where productivity is a function of demand, the level of industry output and the level of competing imports. Concludes that the optimal rate structure of tariffs can be derived on the basis of these variables.


Explores the implications of the downward sloping demand curve for factor inputs in a two-factor model. Analyzes the effect of changing factor prices, output levels, and competitive conditions on the demand for the factors of production. Concludes that when there is imperfect competition in the factor market, no general statement can be made about the shape of the firm's demand curve for inputs.

1.032 Emanuel, Carlos J. *Input-Output Analysis in Underdeveloped Countries: The Case of Ecuador.* Doctoral thesis presented to the University of South Carolina, 1972, 218 pp.

Develops input-output tables for practical application in economic planning.


Raises questions about the significance of the current revisions in economic growth attributable to gains in productivity. Highlights the data, concepts, and methods that underlie the productivity estimates and offers suggestions for further research.


Views the hospital as producing varied intermediate goods, combined by the physician to produce a final output—needed medical care. Develops a cost model for the maternity unit to demonstrate his method, and finds that economies of scale exist in such units.


Constructs a model in which money is treated as a factor of production. Discusses the implications of putting real balances into the production function.


The authors find that the state of the art varies greatly in the collection of both quantitative and qualitative data on local government output. Solid waste collection and recreation are two examples cited for the problems involved. Increased interest by various groups may lead to better, affordable methods of data collection by local government.


The authors seek to clarify the notion of efficiency derived from production functions. They consider static efficiency measures in conditions of structural change based on putty-clay production structures and embodied technical progress.


Presents a model of the capital theory of each protagonist in the debate. Discusses the significance of the debate.


The authors explore the potential for utilizing microeconomic data as a basis for econometric analyses of production functions.

Reviews the meaning and measurement of efficiency in hospitals. Suggests ways of promoting this efficiency.


Examines the relation between factor endowments and changing factor prices under the pressure of the U.S. Federal minimum wage, and the effects on the employment-generating capacity of the manufacturing sector.


Constructs a measure of U.S.-Canadian comparative advantage. Presents estimates consistent with the cost and productivity findings of previous studies. Develops a model to estimate the effect of free trade agreements.


Finds Paul A. David’s value-added index to be a good supplement to, but not a substitute for, the double-deflation method. David’s index includes terms of trade gains and losses for the enterprise or industry studied, while the double-deflation method separates terms of trade gains or losses from changes in physical production, allowing measurement of physical productivity of primary factors. Concludes that the two indexes are not contradictory, and are relevant for different purposes.


The authors survey the major technical problems in measuring local government productivity, as well as current measurement practices. They present illustrative productivity improvement possibilities.


The authors introduce a new statistical series on capacity utilization. They discuss the uses of capacity utilization measures, and their meaning and measurement.


Derives the relationship between diminishing returns in different sectors and diminishing returns for the economy as a whole. Shows that the relation between the two depends on the proportion of capital used in each sector, the distributive shares of labor, and the elasticities of substitution. Concludes that the balanced growth theory is valid.


Explores the long-run implications of the embodiment hypothesis. Contrasts the short-run behavior of an economy with embodied technical progress and one with disembodied technical progress. Concludes that investment is not more profitable in the embodied case.


Discusses the relation between centralized planning of the economy and the efficiency requirements of the individual production unit. Sets up criteria for these requirements, taking the influence of price levels and international economic developments into account. Proposes certain efficiency indicators, especially computed interest.


The authors attack criticisms of Divisia index numbers. They conclude that these indexes provide a satisfactory basis for measurement of total factor productivity.

The authors present further explorations on the relation of input and output, and the productivity "residual," comparing their approach to Denison's.


The authors examine the hypothesis that growth in total output is largely explained by growth in total input, and that if real product and real factor input are accurately accounted for, the observed growth in total factor productivity is negligible.


The authors continue the debate whether postwar economic growth resulted from increased productivity or increased factor inputs. Revised estimates bring the two theories closer together but substantial differences remain on the treatment of capital.


The authors criticize the sources of growth methodology for determining the importance of capital formation in economic growth. They find capital formation to be an important element in economic growth. They conclude that low income countries should not be misled into believing that capital accumulation is of minor importance.


Describes the results of his research on total investment and capital stock, tangible as well as intangible, and its implications for the growth of factor productivity and real GNP. Summarizes some preliminary findings.


Incorporates into the conventional production function the comparative advantage resulting from research and development.


Provides a framework for analyzing probable balance-of-trade effects of various types of productivity increases. Derives guidelines for selecting industries where productivity gains should be stimulated to enhance the terms of trade.


The authors discuss the conceptual and practical difficulties of defining and measuring police output. They argue that police services are not a final output but are intermediate to the overall production of law enforcement. A number of approaches to the measurement of police output are examined.


Tests the usefulness of CES vs. VES production functions. Finds both to be unnecessary generalizations of the Cobb-Douglas form for industries with stable relative factor shares. Finds that, for industries requiring generalization of the Cobb-Douglas form, the CES specification appears more useful.


Reviews the scientific methods and achievements of Simon Kuznets.

Constructs a Cobb-Douglas production function model to analyze factors affecting the performance of a mass transit system. Comments on the factors influencing unit costs and labor productivity.


Tests the Jorgenson hypothesis that the increase in the share of savings depends on a significant increase in the agricultural surplus but not on the presence or absence of disguised unemployment. Studies such a relationship in the Indian economy for 1953-65, upholding the Jorgenson hypothesis.


Investigates the demand for labor and capital. Formulates a set of demand functions which depict the input accumulation process. Finds that input adjustment behaves differently in various industries as a result of each industry’s particular characteristics.


Recommends that police resources be allocated on the basis of cost weights, reflecting the social costs of crime. Also discusses the contracting-out of police functions to private firms.


Surveys existing measures and theories bearing on the subject. Attempts to rectify paucity of empirical tests by developing such tests for selected Canadian manufacturing industries, 1940-69.


Attempts to show how imperfect product markets affect factor substitution and output levels. Derives implications for defining substitutability and complementarity between inputs.


Discusses ways of determining and measuring outputs, and other managerial questions, including the quantification of service outputs, work measurement, and work load forecasting. Presents applications to hospitals, legal firms, meat inspections, and other service units or organizations.


Analyzes the performance of the economy in relation to potential output. Develops capital-output ratios for aggregate and sectoral production functions. Identifies the sources of growth in terms of total factor productivity and factor accumulation.


The authors analyze interdependent adjustment among factor input stocks and utilization rates to test lagged responses of input stocks to output changes. They find consistent lag patterns for specific inputs or utilization rates across industries. They demonstrate that sales dominate over factor-cost ratios in the short run in explaining input response to output changes.


Presents a discussion of the measurement of economic growth in terms of welfare-oriented concepts, rather than in terms of production or activity.

Argues that busy-season and slack-season labor inputs must be treated as distinct variables in developing production functions for backward agricultural economies. Using data from the Punjab, the author estimates seasonal marginal productivity coefficients of labor. Finds productivity of busy-season labor is always positive, while slack-season labor productivity seldom differs from zero.


Presents papers on such subjects as the measurement of productivity; the relation of productivity and research; managing adjustments to technological change; and the relation of productivity to economic growth and inflation.


Discusses problems of measuring police services, as well as such subjects as the measurement of patrol productivity, productivity in crime prevention programs, and the managing of police personnel.


Discusses the measurement of collection productivity, major collection problems, and tools for productivity improvement. Presents recommendations.


Describes analytical techniques for methods improvement and work measurement. Outlines applications and implementation.


Presents articles on such subjects as the meaning and measures of productivity; productivity measures in the Federal Government; management effectiveness in the Federal Government; productivity measures for local governments; public capital expenditures and productivity advance; etc.


Presents total factor productivity measures for ten industries with the labor input adjusted for quality change. Disaggregates the contributions to growth from productive inputs and technological change.


Analyzes production technologies as part of computing hedonic price indexes for the industry.


Discusses how the costs of excluding potential beneficiaries, the degree of choice in whether to consume the product or not, and the divisibility of the product all affect the availability and validity of agency records for use in measuring output.


Presents a detailed theoretical account of the formation and movement of systems of concentric agricultural zones around markets. Applies the von Thuenen model to the expansion of American agriculture in the northern United States.


Summarizes statements concerning police productivity made at the conference.


Features articles dealing with the measurement of productivity in the Federal Government, means of applying productivity analysis to improving efficiency, work measurement, etc.


Presents articles on productivity issues in government, and summaries of symposium workshops.


Investigates the potential for using microeconomic data in production function estimation. Examines possible sources of bias and errors of measurement, and assays econometric methods to correct for them.


The authors discuss the problems of defining productivity and related concepts for public services. They survey the scope of the public sector and examine approaches to measuring outputs and inputs. A number of case studies are introduced.


Examines concepts of productivity and problems of public sector productivity measurement. Reviews existing studies, which he finds faulty as to their appraisal of quality changes. Develops techniques for analyzing work load, costs, and quality, testing them by applying them to New York State and New York City.


Argues against neoclassical measures of total factor productivity which do not consider the increasing efficiency of capital goods. Argues for measures which do not exhibit this deficiency.


The authors argue that the behavior of time series of output, capital, and labor has strong implications concerning the elasticity of substitution between capital and labor. They develop an econometric model in which output per employee-hour increases or decreases with employee-hours per unit of capital, depending on the range within which the straight-time real wage moves.


Discusses conceptual and other difficulties in measuring real output changes in service industries. Also discusses productivity changes in services, and intersectoral labor productivity changes.


Argues that estimates of the elasticity of substitution from labor productivity-wage rate relationships are upwardly biased, and that after such bias is corrected, the elasticity of substitution is considerably less than one.

Argues that productivity is higher in large cities because of the dynamic effects of urban concentration. Develops a production function model which shows that increased city size is associated with gains in labor productivity. Concludes that modern economies are highly urbanized because of relatively high returns to scale in cities.


Features articles on productivity measurement problems, productivity management in the Federal Government generally, as well as in defense supply, and in certain States and localities and their agencies.


Discusses the difficulties involved in measuring productivity in the government sector, and the new measurement efforts being undertaken.


Criticizes studies analyzing the effects of population control on per capita income when total factor productivity growth is held constant. Suggests that total productivity growth and population growth are positively related and if there is a decline in population growth there would be a lower rate of growth of output.


Discusses the need for production function theory to differentiate between types of labor. Derives elasticities of substitution between types of labor based on job performance required and education received.


The authors compute indexes of output of refrigerators using hedonic methods to adjust for quality change. They find that price indexes rise more slowly when this method is applied.


Contains testimony on measuring and enhancing productivity in the government sectors by members of a task force and the National Commission on Productivity.


Explains what productivity is, why its application can make government better, and how improvement of Federal productivity is being accomplished.


Presents analyses of such functions as citizens’ records, loans and grants, reference services, overhaul and repair, etc. Also presents case studies of mail processing in certain agencies; internal revenue service branches; and others.


Discusses approaches to quality measurement used by various private and government organizations, and the problems involved in developing measures of quality.


Presents the results of a study by the Committee on Federal Laboratories of performance measures related to R & D output. Also reviews the pertinent literature, and presents an annotated
bibliography. In addition, the volume presents a discussion of methods for determining internal productivity measures of grants and awards administration, with applications to specific agencies.


Sets forth characteristics common to work measurement applications. Also provides guidance for the implementation and utilization of work measurement systems.

1.103 Omitted.


Summarizes the existing knowledge of health care delivery. Discusses factors influencing medical care demand, and measurement of output and productivity.


Reviews the difficulties encountered in attempts to measure the static efficiency of economic systems. Highlights the theoretical models and the empirical results.


Argues that economic growth is overstated because externalities are not accounted for, and no distinction is made between intermediate and final output. Also, nonmarket behavior is not measured. Presents estimates of housewives’ production, concluding that its inclusion in the GNP would lower the growth rate.

Measures

**Total economy and private sectors**


Estimates the contributions of capital and labor to the aggregate growth of the State using a Cobb-Douglas production function and marginal productivity analysis. Finds the major factors contributing to productivity gains were the labor inputs, and the shift from agricultural to industrial employment. Asserts that the contributions of technology to growth were small.


The authors present estimates of future capital requirements in the American economy. They analyze the claims on output by sectors, as well as the financial market implications.


Studies capacity utilization in the context of the one-sector neoclassical growth model. Demonstrates that efficient utilization is a decreasing function of the economy’s capital-labor ratio.


Extends the estimates and analysis of his earlier work. Finds that the postwar sources of growth have resided chiefly in more rapid capital accumulation, and acceleration in the growth of knowledge.


Presents some results of a new approach to the estimation of potential output.

Examines the shift in employment to the service sector and the possible retarding effect on U.S. productivity. Specific attention is given to households, government and institutions. Finds the concern over retarded productivity due to the employment shift to be exaggerated.


Studies productivity and costs of nonfinancial corporations. Reviews trends in output, input, and productivity since 1948 and discusses concepts and methodology.


The authors analyze the effects of shifts in sector employment shares on secular trends and cyclical fluctuations in productivity. They find that the shift from industrial to service employment affects aggregate productivity changes in the short run rather than in the long run.


The authors present estimates of partial elasticities of substitution among reproducible capital, labor, and an input aggregate of natural resource products.


Presents detailed results, including extensive tables, of the study of input-output relations by the Bureau of Economic Analysis, Department of Commerce.


Examines the productivity performance of the service sector. Examines factors which contribute to the low productivity in services.


Presents and analyzes output, input, and productivity data for the economy as a whole and for major industry groups. Relates productivity change to changes in output, capital, education, R & D, etc. Discusses the extent to which postwar trends represent a continuation of earlier trends of a break with the past.


Discusses movements in total factor productivity and labor productivity in the U.S. for the post-World War II period. Presents data for major industries. Discusses the outlook.


The authors present projections of gross national product, income and demand composition, input-output relations, productivity, and employment.


Provides projections of the size and composition of the labor force; productivity; hours of work; gross national product and its sectoral distribution; industry output and employment.

Describes the construction of new regional input data series and their combination with existing farm output series to generate regional productivity series. Considers major technologies as factors in productivity improvement.


Analyzes the declining relative share of labor in the agricultural sector. Attributes the decline to the increasing capital-labor ratio adjusted for changing efficiency of factors, and to an elasticity of substitution greater than unity.


Argues the use of electrical energy data as a measure of capital services.


Reports on new or improved BLS statistical programs in the areas of prices, wages, employment, construction, productivity, occupational health and safety, and some prospective initiatives in these areas.


Presents an empirical analysis of American manufacturing, taking economies of scale, rate of technological progress, degree of factor substitution, and allocation of mobile resources into account.


Discusses revisions in the three measures of price change of the GNP used by the Bureau of Economic Analysis.


Examines the argument that American manufacturing shifted towards heavier industries of metals and machinery in the latter half of the 19th century. Uses empirical evidence to support this claim and to show that labor productivity growth closely coincided with the industry patterns of growth.


Develops a model of productivity for 12 sectors of the economy. Concludes that the slowdown in productivity growth is due to a shift in the composition of output toward low-productivity sectors, and that the dominant effect is the shift between industries of high and low levels of productivity rather than between industries with high and low rates of productivity growth.


The authors discuss recent trends in terms of postwar cycles. Trends for economic sectors and nonfinancial corporations are analyzed separately.


Employs Cobb-Douglas production functions to account for national and regional gaps in farm productivity, and to analyze the efficiency of regional resource allocation.

Compares the predictive performance of measures of capacity and operating rates in manufacturing—the FRB index, the Wharton School index, and two McGraw-Hill survey measures.


Explores the relation between the GNP and its proximate determinants—labor productivity, and potential man-hours of labor input.


The authors provide detailed information on the industry composition of producers' durable equipment output, including the trade and transportation costs associated with marketing the products of each industry category.


Deals with the relation between output changes and movements in labor productivity. Derives from theoretical arguments and empirical data a “model pattern” of aggregate cyclical productivity behavior for Swedish industry.


The authors assess the current status of research on agricultural capacity and the difficulties of estimating it. They offer suggestions for measuring capacity and capacity utilization in agriculture.


The authors derive a quarterly series on the workweek of capital in manufacturing on an SMSA basis from 1951 through 1968. They find that this series displays behavior different from that of the available capacity utilization indices.


Presents estimates of input substitution among capital, labor and natural resources. Computes the rates of technological change. Finds that, in many industries, capital is less readily substitutable than labor for natural resource products.


Presents annual estimates of gross and net capital stocks, depreciation, discards, and average ages of gross and net stocks by major industries and detailed types of equipment and structures.


Presents graphs together with text covering output per employee-hour trends; the relation between productivity growth, prices, and costs; and some factors affecting productivity growth.

Projects population, the labor force, changes in occupation, and gross national product, together with income and employment, to 1985. Discusses underlying assumptions, and certain implications for policy.


Presents evidence on the proportion of observed labor productivity that can be attributed to factor substitution. Casts doubt on the validity of the simple version of the labor scarcity hypothesis which states that increasing capital intensity is responsible for observed productivity growth.


Presents estimates of the composition of value added, by industry. Also shows how these data can be used to assay the impact of changes in GNP on the industrial composition of value added.

Industries


The authors refine the University of Maryland’s model of the U.S. economy to project demand for specific products. Projections are based on input-output matrices, projections of productivity growth, and government fiscal policy.


Presents data on, and discusses, 1971-1972 movements in output per employee-hour indexes in selected industries. Notes a decelerating productivity growth in more than half of the industries studied.

3.003 Ball, Robert; Ludwig, Larry; and Finn, Joseph T. Labor and Material Requirements for Construction of Private Single-


The authors report on changes in onsite and offsite requirements of employee-hours, and analyze the occupational patterns of onsite requirements, as well as the characteristics of houses. They also examine the distribution of costs, and indirect employment requirements.


One in a series of construction labor requirement studies designed to evaluate the employment-generating effects of various types of construction activities. Presents data on employee-hours and jobs generated, onsite and offsite, per dollar of construction expenditure, and per square foot of space.


Estimates onsite and offsite manhours required per $1,000 of highway expenditures from 1958 to 1970. Finds that employee-hour requirements have dropped 30 percent.


Develops input-output relationships to show the effects of changes in scale, technology, and factor supplies on the costs of production. Demonstrates how large-scale operations result in cost savings and are applicable to other industries.


Presents a critical review of the report issued by the Task Force on Railroad Productivity. Emphasizes the measurement of
labor productivity change, the study of technological trends, and their impact on employment.


Assesses productivity in the pharmaceutical industry, 1963-72. Discusses output and demand, employment, research, product development, technology, capital expenditures, and the outlook for the industry. Includes tables which compare output per employee-hour and related data, and occupational distribution in the pharmaceutical industry.


The authors refute certain criticisms of the BLS intercity trucking productivity measure.


Examines productivity trends and the factors affecting productivity change in the telephone communications industry. Argues that growth of demand for the services of the industry, and technological innovations have been major factors in productivity change over time.


The authors argue that the administrative costs of health insurers decrease with firm size. They draw implications for national health insurance.


Discusses the subject in light of possible improvements in typewriter machine design; design of inputs used by typists (such as the manuscript or audio cassette); improvements in letter layouts and layout of other typed documents; and relation of executive to typist.


Measures productivity growth in the metal cans industry from 1947 to 1971. Discusses factors contributing to this growth such as changing patterns in demand, improvements in technology and increases in capital expenditures.


Traces the growth of output per employee-hour in the industry, 1954-1971. Reports that increased emphasis on quality control, the inability to mechanize many of the key production operations, and frequent changes in product specifications contributed to low productivity growth during the period.


Introduces two measures of productivity for the intercity trucking industry, 1954-72. Discusses key factors affecting demand for the industry’s services, and major technological developments.


The authors examine productivity and safety in relation to seam thickness in underground bituminous coal mines.


Investigates factors in the productivity of workers picking apples by hand, and being paid on a piece-work basis. Finds residence and experience to be the characteristics which differentiate slow from fast pickers.


Analyzes factors related to the productivity of workers being paid on a piece-work basis for hand harvesting apples. Argues that by identifying worker characteristics associated with higher labor productivity, growers could recruit the more productive workers.


Criticizes and attempts to refine the BLS’s measure of productivity trends in intercity trucking.


Reports that output over the 1967-1972 period remained practically unchanged while man-hours dropped due to automation and improved materials-handling systems.


Finds that frequent styling changes prevent a small manufacturer from achieving economies of scale in differentiated products. Predicts that as styling changes diminish in importance, small producers will benefit.


Discusses the computation of an index of capacity, and revised procedures for computing aggregate utilization for major materials.


Discusses recent trends and underlying reasons, after briefly introducing the index from which the trend measure has been derived.


The authors investigate the impact of group practice on output per physician and on the degree to which physicians are able to generate demand for their own services. They find that physicians exert strong control over their own output.


Documents a continuing decline in onsite employee requirements per $1,000 of highway construction expenditures since 1970. Also computes direct and indirect employment engendered by highway construction.


Examines public housing expenditures in terms of labor and materials requirements. Presents analysis of onsite and offsite labor requirements and distribution of costs.

Comparing changes in unit labor requirements, average size and cost of apartments, distribution of onsite man-hours, and average construction time in public housing projects from 1960 to 1968. Estimates that onsite employee-hours declined over 2 percent a year.


The authors present an economic analysis of the ocean transportation industry. Topics covered include demand and supply, technology, labor relations, and productivity.


The authors discuss trends in output and productivity, changes in size and structure of the industry, manpower trends, factors influencing productivity, and the outlook for the industry.


The authors investigate the influence of labor scarcity, and of changes in sales volume, on labor productivity.


Estimates economies of scale in hospital production, and the effect of intern and residency programs. Selects an index of hospital output, and develops estimation techniques.


Discusses trends in productivity and output, industry structure, technology, capital expenditures, and employment, in the industry. Reports that productivity growth between 1958 and 1972 was relatively low due to slow introduction of improved technology and slackening demand.


Presents indexes of productivity growth for selected industries for 1967-1971. Comments on industries which experienced the more notable productivity movements.


Proposes methods for developing a total factor productivity measurement system that allows monitoring of changes in the efficiency of input uses.


The authors discuss long-term trends in the industry, together with output and employment. Changes in technology, capital expenditures, and industry structure, as they bear upon productivity change, are also analyzed.


The authors examine some of the determinants of productivity improvements in the industry, including output and technological changes. They present statistics of output per employee-hour over time and of related variables.

Presents papers on the measurement of productivity in motor carrier and railroad transportation, data needs, and concepts.


Illustrates the value of microdata by analyzing the relationship between productivity and firm size for all establishments within 42 manufacturing industries.


The authors hypothesize that the returns to scale parameter in a Cobb-Douglas production function varies with firm size in the trucking industry. Firms with fifty or fewer employees exhibited constant returns to scale; firms with more employees exhibited increasing returns to scale.


Comments on a new innovative "base budget cut for productivity" rule recently incorporated in the University of Wisconsin's legislative appropriation, which reduced the base by 2.5 percent in the first year of the biennium, and 5.0 percent in the second.


Examines the relation between costs of producing hospital services and the efficiency of producing them, based on a sample of hospitals.


Measures the rate of total factor productivity growth in the steamboat industry and examines its sources. Concludes that the initial shift to steampower has been over-emphasized in explaining the productivity growth rate.


Argues that the high cost of operating hospitals arises from institutional factors, such as the separation of physicians from hospitals, nonprofit status, and third-party medical insurance.


Reviews productivity in the total private economy, 1973-74: Current developments, long-term perspective, variation among industries, and productivity developments in six industrialized countries.


Contains papers from a conference, including workshop reports. Subjects covered include the measurement of labor requirements in construction; interproject comparisons; measurement of productivity in specific craft occupations; and measurement of the productivity of masons.


Seeks to determine the proportionate amounts of production time spent by selected building trades working on typical single-family and low-rise apartment con-

Based on a cross-section of retail stores in Israel, the study estimates the effects of scale in retail trade, using a Cobb-Douglas production function.


Presents long-term productivity growth rates for the industry, discussing differences between subperiods influenced by cyclical factors.


Presents managers' opinions about the appropriate relations between productivity, capacity, and profitability, as well as about various measures of productivity.


Argues the need for information on the proportions of the different illnesses which constitute a hospital patient census. Examines approaches to the weighting of outputs. Shows that detailed utilization data by diagnostic categories can be readily employed along with the more common hospital use measures.


Derives the long-run cost curve for British automobile producers and shows the optimal level of least-cost production. Notes that U.S. labor productivity is twice that of the U.K., because of technical economies from high output levels. Shows that firms with the largest output volumes are the most efficient.


Reports on a rise in productivity and wages. Attributes the rise in productivity to the continued use of automated machines.


The authors discuss changes in output, demand, employment, technology, and output per employee-hour for the years 1958 to 1971. They find modest productivity growth, related to the level of overall activity in the construction industry.


Uses linear programming techniques to estimate an industry frontier production function. Calculates measures of technical, price, and economic efficiency.


The authors analyze inputs and outputs of high-yielding rice and wheat for different size farms. They show that costs and yields per hectare rise as farm size rises.


Presents estimates of labor, material, and mortgage requirements for building 500,000 housing units.


Presents measures reflecting the relationship between output and related labor time,
and the changes from year to year in the amount of labor time required to produce a unit of output. Contains indexes of output per employee-hour and output per employee.


Discusses trends in output and demand; employment; factors affecting productivity; industry structure; and the outlook for the lodging industry. Presents data on productivity, output and hours for 1958 to 1973.


Measures capital-labor substitution, with emphasis on the roles of wages and cost of capital. Also examines the relation between size of hospital and capital in terms of capital per bed.

Public sector


The authors discuss the obstacles to obtaining reliable and valid measures of output of urban criminal courts, in terms of defining outputs, outcomes of the criminal process and the present and future availability of data. They argue that computerization may decrease the availability of data.


Discusses recent trends in Federal, State and local purchases of equipment and structures, in current and constant dollars.


Discusses how and why productivity in the Federal sector is being measured. Estimates the effect of a government measure on the rate of productivity growth in the entire economy.


The authors estimate production functions for public and private collection of garbage. They find the public sector had greater labor productivity at all output levels but that capital productivity was less at small scales of operation, higher at large scales.


Presents detailed estimates of investment financing and spending, by function.


Measures the industry effects of government transfer payments and grants-in-aid. Also compares these effects with the industry effects of government purchases.


Describes the design of the Federal Government's permanent measurement system. Reports on the research into the factors of recent productivity change. Analyzes the use of productivity measures in employment and budget planning. Also features a study of capital investment as a means to improving productivity. Presents appendices detailing the organizational background of the measurement system.


Describes the nature of the Federal workload in terms of certain classification structures and associated employee-years, and the measured sample of Federal employee-years for which pro-
ductivity indices were constructed. Defines the techniques used.


A directory of Federal organizational elements and outputs for fiscal year 1972. Features mission statements, and description of work, and of the measure of output used.


The volumes represent the second annual report. Vol. 1 presents data on Federal productivity trends, FY 1967-74, and the reasons for changes. It also comments on current activities in the program and future needs for productivity improvement. Vol. 2 discusses human resource management and management systems and their relation to productivity improvement, as well as techniques and technologies to attain it. The supplement, compiled by the Bureau of Labor Statistics, details the bases for the output data and measurements.


Volume 1 reports on recent Federal productivity trends and reasons for changes, covering such functions as citizens' records, agriculture and natural resources, postal service, loans and grants, etc. Volume 2 presents studies of such topics as the development of productivity measures for Air Force medical services, the Defense Supply Agency, the Farmers Home Administration, and other agencies. The supplement, compiled by the Bureau of Labor Statistics, represents a description of the elements and outputs included in the measurement data base.


Develops a systematic classification of outputs, inputs and costs, and measures their interactions.

**International**


Discusses productivity trends in the jute, cotton textile, match, and cigarette industries. Finds capital resources misused, with the process of capital-labor substitution extended beyond profitable substitution possibilities.


Uses input-output tables to examine changes in demand, output, and input between 1948 and 1968. Analyzes productivity at industry and aggregate economy levels, and relates it to growth rates.


Examines causes for America’s superior industrial efficiency in the textile sectors. Concludes that higher capital intensity was favored in the U.S.


Estimates a production function in terms of technical rather than monetary measures of capital. Uses a horsepower measure of capital to derive the elasticity of substitution. Concludes that Australian industry is becoming more energy intensive over time.


The authors review and analyze comparative trends in manufacturing in the U.S., Canada,
France, Germany, and the United Kingdom, emphasizing the patterns in recent years.


Measures and analyzes efficiency in 26 Swedish manufacturing industries. Elaborates on the effects of tariffs and 4-firm concentration ratios on efficiency, economies of scale, and specialization.


Compares levels of productivity in the United States and France for 1958-1963. Shows that on the average U.S. productivity was twice that of France. Finds that differences in size of markets mostly account for higher productivity in the U.S.


Uses empirical data from Manchuria to show that when farmers are limited to traditional factors of production, growth and productivity stagnate. Concludes that this holds true in the long run under any market conditions.


Examines international differences in efficiency in the steel industry. Analyzes these differences with a view to variations in industrial structure and scale of production.


Presents papers on such subjects as international comparisons of real income and prices; uses of data; comparative national incomes of the U.S. and the Soviet Union; economic integration; and others.


Compares several measures of productivity derived for Australia’s public and private airlines and shows that the measures derived for the private firms uniformly exceed those for the public firm.


Estimates and compares the marginal productivity of capital in 18 Soviet regions between 1960 and 1968. Also compares regional wage bills and labor productivity indexes. Concludes that investment policy in the 1960’s was dominated by a desire to develop the Asian hinterland.


The authors discuss and measure the efficiency of resource allocation by peasants in three villages located in the grain-producing area of North China. They show that, despite increasing market uncertainty, peasants were allocating their land and labor efficiently.


Estimates Cobb-Douglas and CES functions for twenty industries in 1968. Finds that the relative importance of increasing, constant, and decreasing scale returns is fairly balanced, and substitution elasticities between labor and capital are relatively high.


The authors examine the effect on output of severe imperfections in the Colombian labor market. They suggest that reallocation would give a maximum increase in output of 2 percent.

5.016 Farley, Noel J. “Capital Formation, Technical Change and Labour Productivity Improve-

Analyzes 44 Irish manufacturing industries from 1953 to 1967 using labor, capital and output series to examine the course of improved labor productivity. Discusses patterns of technical change in groupings of industries.


Presents a detailed analysis and measurement of Israeli capital stock from 1950 to 1965. Utilizes his capital stock measures to estimate total factor productivity.


 Discusses Canada’s productivity measures for nonprofit industries (education, hospitals, welfare organizations, private households, and public administration and defense). Discusses problems in constructing such measures.


Analyzes the extent of dependence of manufacturing on regional resources, degree of regional diversification, locational advantages, and competitive productivity of manufacturing industries.


Examines the effective use of resources in Canada’s educational sector based on a study of 49 universities for the period 1956-57 to 1967-68. Focuses on the problems of calculating total output and total inputs. Presents a measure of productivity change.

5.021 Hoogvliet, W. “Production Adjustments and Productivity in the Australian Sheep Industry.”


Discusses the development of Japan’s steel industry. Also covers its current structure of production, distribution system, pricing, finance, labor costs, and productivity.


Calculates Cobb-Douglas production functions for 29 sectors of manufacturing. Finds that high rates of output growth result in high rates of technical change.


Presents productivity trends in 42 industries. Investigates inter-industry differences in growth rates and evaluates factors influencing productivity change.


Examines changes in the structure of capital and output in the Canadian economy, 1926-67. Finds that the net effect of these changes has been a considerable decline in the business and economy-wide capital coefficients.


Develops total factor and labor productivity indexes for the years 1951-72. Comments on the results and the factors influencing productivity.

The authors investigate the relationship between the costs of producing wheat and the size of the wheat-growing enterprise in certain regions of Australia. They examine the impact of seasonal variations and new technologies. They calculate the optimal size for a wheat farm.


Presents estimates of the growth rates of commodity output from 1870 to 1915 in Canada.


Examines the manufacture of fertilizer in India by companies with the same basic production organization. Analyzes the productivity of each firm, and explains differences in the level of output per employee-hour.


The authors examine the trend in productivity in the Zambian mining industry for 1954-1966. They explain the derivation of total factor productivity, and consider implications for Zambian economic growth.


Discusses the results of studies on total factor productivity over the period 1950-1965 in twenty-five countries. Also discusses explanations of acceleration and retardation of the growth rate of economies.


Uses regression analysis to relate various industry characteristics (location, plant size, concentration, and market structure) to each other and to performance indicators (changes in output, labor productivity, and costs).


Discusses productivity, potential output, and the margin of unused resources in the British economy. Explain factors contributing to the productivity growth rate, and discusses the problems of measuring productivity.


Presents and compares indexes of industrial productivity and real wages in France, Germany, Sweden, the U.K., and the U.S.A. Shows substantial agreement in relative movements, except for France.

5.035 Omitted.


Presents cross-country studies, by sector, to determine patterns of relationships.


Develops a model and method to measure sources of industrial productivity and inter-industry productivity growth differentials for two periods—1947-56 and 1957-67.


Uses four types of index numbers, relating output, labor, capital, and depreciation allowances to analyze productivity growth.

5.039 Ruckman, Paul Edward. *An Analysis of the Effects of the Common Agricultural Policy on Productivity and Wages in the European Economic Community.* Doctoral dissertation pre-
Evaluates the success of the E.E.C. in increasing productivity and raising farm incomes. Calculates productivity for owner labor, hired labor, land, and capital.


Focuses on the rising capital-output ratio of the Soviet chemical industry. Finds that the Soviet Union faces a dilemma of either increasing the rate of investment, or decreasing the incremental capital-output ratio in order to sustain high growth rates. Concludes that poor planning is one of the primary causes of the slackening of economic growth in the Soviet Union.


In contrast to earlier studies, the author finds no differences in economic efficiency or price between small and large wheat farms.


Investigates whether economies of scale favor common markets among developing countries attempting to industrialize. Finds a correlation between size of plant and labor productivity in a sample of developed and developing countries. Concludes that developing countries are able to pool markets to achieve economies of scale in industrial production and in size-biased technical change.


Examines the increased output flowing from the high-yielding seed varieties. Finds a large segment of the rural population has not shared in the gains of the new technology. Develops a production function model for agriculture. Traces the income effects of the Green Revolution and summarizes its effectiveness.


Chartbook showing productivity trends in the United States and five other industrial countries; the effect of productivity on costs and living standards; and the trends in sources of productivity growth. Data cover selected years, 1950-72.


Examines the relation between total factor productivity derived from national income accounts and total input productivity based on input-output accounts, on a sectoral basis, for the Japanese economy.


The authors investigate input-output relations as factors in productivity change, and calculate the contribution of inputs to such change.


The authors estimate the productivity of purchased factors of production. They find the rate of increase to be less than the rate of increase in total factor productivity. They note changes in scale of operation, intensity of production, managerial efficiency, and a changing output mix.


Computes an index of average productivity, using a ratio method based on the Solow approach for the period 1948-1968. Analyzes factors contributing to productivity growth.
Factors affecting productivity

Labor, education, and hours


Outlines ideas on the educational tasks for the 1970's, the brain drain, and the role of education in economic development and politics.


Basing himself on experiments made in Swiss enterprises, the author examines the main features of the flexible working day, including prescribed hours of work and make-up time, and how absences and overtime are dealt with. Advantages and drawbacks are also discussed.


The authors compare the costs and returns of graduate education, using salaries of college and university faculty members. They conclude that the social and private real rates of return to graduate education in general are either zero or less than one percent.


The authors attempt to measure the contribution of experience to productivity. Using cross-section data from Israeli kibbutzim, they use the age of each collective as a proxy for experience. They present evidence that experience contributed to the growth of productivity in kibbutz farming, although its effect diminished over time.


The authors examine advantages and disadvantages of flexible working hours; time recording; design and installation of a scheme; experience with such schemes; and trade union attitudes.


The authors demonstrate the increasing role of management in meeting individual needs through job redesign. They conclude that the major impact has been on absenteeism, turnover, tardiness, and product quality.


Surveys the effects on earnings of schooling, on-the-job training and other knowledge. Examines rates of return and the incentive to invest. Analyzes pertinent data.


Discusses a case study in Florida where disabled persons were rehabilitated to become productive work force members. Finds that the cost to rehabilitate is much less than the person subsequently adds to output flow.


Estimates benefit-cost relationships for various groups of disabled persons, using regression analysis. Concludes high-productivity groups benefit most from rehabilitation services.


The authors present a life-cycle model of investment in human capital with leisure choices explicitly incorporated.


Evaluates a union-management project designed to increase shop floor participation of workers. Notes that the diffusion of new forms of work organization in Norway has been disappointing, and analyzes the reasons, including the basically management-oriented practice of job redesign.


The authors argue that the theory of human capital is based on technical relationships which exclude the relevance of class conflict and other social phenomena. They urge that reference be made to the social requirements needed to reproduce the capitalist class structure from period to period. They discuss implications for growth theory, income distribution, and public policy.


Addresses the treatment of human resources in the application of capital and growth accounting. Argues that conventional national income accounting is biased against considering human resources as a form of capital. Calls for experimentation with measures that correct for such biases and provide a more adequate base for assessment of long term economic performance.


Explores the implications of technological change for the nature of work, and the composition and differentiation of the working class. Covers such topics as labor and management, science and mechanization, and the increasing number of blue-collar occupations.


Attempts to quantify the number of U.S. workers who hold jobs which permit discretion. Finds more than half of the labor force hold challenging jobs but the proportion has remained stable for 20 years.


Estimates net social and private returns to education for a selected list of black college graduates. Finds college education to be more profitable to blacks than to whites. Also finds that colleges such as Florida A & M are comparatively efficient in developing human capital.


Analyzes the effects of general education and occupational training on the productivity of students after they have left college, and on the distribution of earnings in society at large.


Estimates the contribution of human capital to Japan's economic growth by the use of a Cobb-Douglas production function, and compares it with the growth of physical capital. Defines human capital to include education, medical care and nutritional improvements. Notes the importance of joint strategies of investment in both human and physical capital.

Digitized for FRASER  
http://fraser.stlouisfed.org/  
Federal Reserve Bank of St. Louis

Analyzes union practices that retard and stimulate productivity. Finds that unions can significantly affect productivity but that labor productivity does not vary systematically with union strength.


Part of a debate on the pro’s and con’s of the 4-day, 40-hour workweek (see the entry under Hunter Simpson, W. for the position in favor). The authors discuss the reasons for the 8-hour day, and stress the impact of a longer workday on workers’ private lives. They argue that loss of overtime resulting from the 4-40 workweek spells a reduced share of labor in the gains from productivity improvement.


Examines the effects of investment in education from a sample of workers employed at a Venezuelan steel plant, applying theories developed by Becker, Reder, Doreinger, and Piore. Finds decreasing returns for increasing education. Also finds human resource investment to be competitive with physical investment.


The authors discuss the individual performance of engineers, using data from six companies. They conclude that the most productive years occur early in an engineer’s career and that engineering productivity thereafter declines because of new educational advances. They suggest ways to keep the engineer’s productivity high.


The authors estimate private internal rates of return to formal schooling in Japan, using cross-sectional data for 1966. They find that Japanese rates of return are similar to U.S. estimates.


A collection of papers on the enhancement of the quality of working life; defining and measuring it; changing it; technology affecting it; and as a central issue in industrial relations.


The authors present case studies on such subjects as Swedish experiments in industrial democracy; joint worker-management consultation; changes in organizational structure; participative management; and job design. The case study methods are thoroughly assessed.


Examines reasons for the decline in the rate of productivity growth in the U.S. Discusses such factors as changes in worker attitudes, changing composition of the work force, the arms race, and environmental concerns. Also describes efforts to increase productivity growth, including job enrichment and a shorter workweek.


Tests hypotheses concerning the treatment and performance of the work force in the post-Civil War South.

Discusses the results of the March 1972 survey of educational attainment of workers 16 years old and over. Reports that the proportion of workers who completed at least 4 years of high school more than doubled in the preceding 30 years—from 32 to 69 percent.


Reports that the educational gap in average years of school completed by workers, both by sex and race, has narrowed steadily since 1940.


Formulates a learning-by-schooling function and tests it on U.S. data for the 1909-60 period. Finds that a 1 percent increase in schooling produces a 1.6-percent increase in labor efficiency.


Offers a two-region model in which the distribution of production between regions over time is determined by interregional differences in learning rates.


Examines learning by the worker and the firm as a factor in productivity increase. Finds that time and experience are needed to acquire knowledge. Concludes that subsidies during the learning period may be advisable.


Seeks to show through a hypothetical example that increased productivity due to mechanization in a low-income country can be detrimental.


Quantifies stocks and flows of human capital for 9 Census divisions, 1955-60 and 1965-70. Determines migration of human capital by age and level of education, and by sex and race.


Investigates why the relative wage rates of educated workers did not fall between 1939 and 1960 despite the rise in their number relative to less educated workers.


Examines experience, formal education, and aggregate demand as determinants of productivity in 20 countries. Concludes that experience is most important by far.


Presents essays on such subjects as worker discontent, worker participation in decision-making, job enrichment, the implications of a “service society” for meaningful work, together with various case studies. Also includes essays on women in the work place, child care, and worker exchange programs.


The authors argue that previous estimates of elasticities of substitution between educated and less educated labor are too high. They present evidence that physical capital
is more complementary to educated labor. They also show that inter-country differences in productivity are due more to differences in physical capital than in human capital.


Hypothesizes that U.S. exports are more human-capital intensive than import replacements when human capital represents the educational investment embodied in the labor force. Tests this hypothesis for the years 1947-1951.


Seeks to acquaint organizations with the concept of Flexitime, and to help them determine its feasibility. Offers guidance in instituting Flexitime schedules.


The authors argue that workers’ desires for nonpecuniary rewards increase as fast as for pecuniary rewards, and that if the “mix” is not satisfied, the resulting “disequilibrium” expresses itself in employee dissatisfaction, and hence lower productivity, more absenteeism, and greater frequency of strikes.


After briefly discussing the pressures towards a shorter workweek, the author offers suggestions as to the kind of shorter workweek to choose, and how to convert to a shorter workweek. The advantages and disadvantages of “flexible work time” are also discussed.


Seeks to explain the behavior of industrial workers in terms of the technical constraints of work operations in four automobile plants differing in the degree of technical complexity.


Compares the ability and job satisfaction of urban and rural women performing repetitive clerical tasks. Finds no difference in ability, but less satisfaction on the part of the urban women.


After reviewing the decline in college enrollments and the financial problems this poses for institutions of higher learning, the authors discuss trends in the relative starting salaries and incomes of college graduates, as well as in their employment opportunities. Some of the long-term factors impinging on higher education, and possible responses of public policy also are discussed.


Focuses upon the relationship between the educational system and the targets of a given economy. Projects demand for different levels of educated labor based upon the target of minimum unemployment. Develops a model for forecasting the manpower and technological structure of a given economy.


Argues that the new workweek concept has been accepted without critical analysis. Cites disadvantages, such as increased fatigue and lower levels of productivity. Suggests alternative approaches centered around flexible time, optimum workforce mix, and job enrichment.

Predicts that dull work is likely to increase in the foreseeable future. Suggests that routinized jobs can be made more productive through the strategies of better personnel selection and job redesign. Concludes that the solution rests with imaginative supervision.


Examines the higher nonwhite unemployment rate in terms of education and occupation variables. Finds that higher nonwhite unemployment is largely due to educational differentials.


Examines the current state-of-the-art on work systems designed to improve the quality of life at work which will yield greater productivity and job satisfaction. Discusses problems encountered in developing such work systems and offers guidelines for successful implementation.


Takes issue with some of the claims of behavioral scientists concerning the productivity-raising effects of job redesign.


Explores the empirical links between social variables and reports the evidence from 29 countries. Finds that higher education is influenced by social structure and largely unaffected by economic development.


Theorizes that the factors which motivate a worker the most are derived from work itself. Argues that money is not the prime motivator and that workers rather want more responsibility and a sense of accomplishment.


The authors investigate the role of experience in relation to earnings. They discuss various concepts of experience, and their significance in quantitative terms.


Reviews the concept of human capital as viewed by Petty, Cantillon, and Darjes.


Investigates the impact of housing improvement on worker productivity, health, and absenteeism. Rehousing changed workers' marginal productivity in household work, and raised the opportunity cost of working, bringing about substantial changes in absenteeism and a short-run increase in on-the-job productivity.


Reports on the first national survey of the number of days usually worked by wage and salary employees who typically work full time. Discusses overall patterns, current developments, workers on shorter workweeks, the 4-day workweek by industry and major occupational group, growth of 5-day workweeks, and extended workweeks.

Discusses the new arrangements or "patterns" of working time appearing in many industrialized nations, and their expected impact on management, workers, and family life.


The authors discuss the mix of educational resource inputs which will best assure higher student achievement. They consider the input factors of teacher characteristics, class size, administration, and educational technology. They conclude that the major manpower implications relate to salary schedules and teacher selection.


Seeks to provide a conceptual framework for estimating productivity increases in manufacturing occurring through improvements in the quality of work. Provides measures for such productivity-retarding factors as absenteeism, tardiness, grievances, machine repair, etc.


Summarizes the main problems encountered in establishing a 4-day week. Discusses the results of union-management sponsored pilot programs; union and employee attitudes; scheduling difficulties; pay problems; overtime, holiday and vacation scheduling; and legal aspects, particularly those involving wage-hour laws.


The authors compare the costs of education and labor market performances of vocational and comprehensive high school graduates who did not go on to college. They conclude that monetary returns to vocational technical graduates were higher.


Part of a debate on the pro's and con's of the 4-day, 40-hour workweek (see the entry under Clayman, Jacob and Hannigan, Thomas for rebuttal). The author recites such advantages of 4-40 as elimination of overtime by use of staggered work schedules; more intensive use of plant and equipment; and more leisure available to employees, discounting the effects of fatigue from a longer (10-hour) workday.


Contains papers presented at a seminar on the quality of working life and worker participation in industry. Covers such topics as the Swedish industrial relations system, reorganization of the workplace, participatory management by government employees, occupational safety and health, and experiments with new-style factories.


Deals with such questions as what the economically feasible conditions for redesigning the assembly line are; whether employees resist job redesign and whether they prefer monotonous work; and what the impact of culture and the political system is on job redesign. Case studies are presented.

Explores the employment relationship within a firm when the productivity of an employee whom it would be costly to replace cannot be measured. Develops a model leading to a dichotomization of the labor force into two classes, and rejects conventional labor supply analysis that there is perfect substitution between leisure and income.


The authors evaluate studies of job satisfaction and productivity, and examine how both may be enhanced by changing patterns of job responsibility, control, and compensation.


Address the problem of how productivity and job satisfaction can be enhanced together.


Shows that productivity growth enhances the comparative advantage of large farms and that rising operator education implies scale economies in the use of information. Presents an empirical model for measuring cost inefficiencies.


A collection of articles based on the assumption that expenditures on man which lead to future increases in productivity are investments in human capital and that it is useful to treat them as capital formation.

6.072 Omitted.


Presents evidence supporting the hypothesis that the better educated, the younger, and the middle-income groups of migrants are more mobile than the less educated, the older, and the very low, or very high-income groups; also that blacks are less mobile than whites in periods of high unemployment.


The authors trace the evolution of work within the framework of the division of labor. They discuss such aspects as ancient agriculture and industry, the industrial revolution, mass production, and the impact of automation.


Addresses improved distribution of personnel as a method of reducing labor turnover, strengthening discipline, and increasing the utilization of labor. Offers suggestions to combat the manpower shortage in the Soviet Union and discusses the factors associated with improved working conditions.


Criticizes Denison’s analysis of the contribution of education to national income growth, citing an error in Denison’s index of labor force quality. Argues that Denison exaggerates the contribution of education to growth.

The authors examine the skill of workers engaged in the cutting of diamonds, the skill of their managers, and the way these skills vary with experience. They find a strong correlation between productivity and experience.


Argues that the currently pervasive "income difference" measure of the return on human capital investment is upwardly biased. Attempts to develop tests for "shortage" and "surplus" conditions which correct for this bias.


Examines the large human capital outflow involved in United States investment abroad. Determines that the outflow is a result of international factor endowments rather than discrimination against available local personnel.


Reports on educational attainment of the labor force in March 1974, by years of school completed, labor force status, unemployment rate, age, sex, race, ethnic origin (Spanish, all others), and occupation.


Summarizes the results of a pilot study designed to examine the effect of a 4-day workweek on productivity, absenteeism, recruitment, scheduling, use of facilities, and overtime.


Discusses lagging productivity growth, manpower shortages, unfavorable migration of the population, and new targets of the current five-year plan. Suggests more rational use of the workforce, utilizing labor resources more effectively.


Comments on the manpower shortage in the USSR as a restriction on the growth of labor productivity. Reviews the decline in Russia's birthrate and population growth. Calls for new technologies, improved planning, and better management of enterprises as ways to combat the labor shortage, increase productivity, and enhance output growth.


The authors use an international sample of iron and steel industries to consider the quantitative impact of investments in education on production and productivity, and the impact of increased factor inputs and scale economies on wages. They compare the effects of investment in human capital with the effects of physical investments. They find that labor productivity and human capital productivity are significantly influenced by capital intensity and scale economies.


Examines the two basic current approaches to international trade theory—human capital, and the product cycle. Tests both approaches statistically, and discusses the future role of the U.S. in international trade.

Addresses the rapid change in the occupational and skill structure of labor resulting from technological revolution. Argues that increased control over the allocation of labor resources is necessary to avoid slowdowns in productivity growth.


Examines the effect of personal attributes of farm operators on profitability. Concludes that factors such as age, experience and education are associated to a significant but limited extent.


Discusses the welfare effects of international labor migration, focusing on foreign students who enter the United States for study. Argues that students who work temporarily in United States and then return may maximize world welfare.


A collection of conference reports covering such topics as the pattern of working time, the life-time distribution of working time, flexible working time, shift work and length of working day, and working hours per week and day.


Presents evidence of changing worker attitudes as reflected in higher rates of absenteeism, society's regard for leisure, declining productivity, and public opinion polls showing worker discontent. Argues that these attitudes must be seen in light of modern conditions involving more education and rising levels of worker expectations.


Reports on progress made in Leningrad to increase labor productivity across all lines of industry. Examines efforts to curtail migration to large urban centers.


Argues that the current arrangement of work and leisure time contributes to economic stagnation and the strains of urban life. Suggests a revised workweek schedule that increases productivity in capital intensive countries, and improves the quality of life.


Discusses job design as a tool in the effective use of manpower resources. Offers a theory of job development, together with case studies. Suggests future opportunities for job design programs.

6.094 Perez, Jose Ramon. The Rate of Return to Educational Investments With Special Reference to Puerto Rico. Doctoral thesis presented to The University of Michigan, 1973. 166 pp.

Critically reviews the pertinent literature. Measures the benefits of schooling by observed earnings differentials of earnings recipients at a given age but with different years of schooling completed. Finds that maximum social rates of return are insufficient, and that public investment in fields other than education might be preferable.


Explores questions of worker frustration on the job. Discusses changes in worker attitudes, effects of occupational change,
and steps taken by various companies to deal with the problem. Training, new careers, and midcareer development are also discussed.


The authors find that high substitution possibilities exist among developed countries and that decreases in the ratio of higher educated to secondary-school educated labor results in narrower earnings differentials for developing countries.


Discusses such topics as the effects of variations in school quality; monopoly elements in earnings from education, and others. Finds that quantity and quality of education have a strong impact on earnings differentials.


Links the theory of investment in human capital to economic growth by measuring returns to a labor function.


Reviews health manpower policies and surveys proposals to improve physician productivity. Analyzes health care production in private medical practice. Offers recommendations, bearing particularly on health manpower substitution.


Discusses policies management needs to adopt to deal with changing values, attitudes and motivations of workers. Cites many examples.


Outlines a growth model incorporating an endogenously determined index of the quality of labor. Constructs a neoclassical model with a labor reproduction function. Offers an analysis of labor within the tradition of Malthus, Ricardo and Marx.


Discusses how the economic and social situation of the lower-middle class worker, as well as attitudes, moonlighting, pension plans, incentive systems, and occupational safety affect productivity.


Presents a survey of fifty British organizations which introduced flexible working hours in an office environment. Discusses the reasons for introducing the scheme and highlights its effects on workers and management.


The authors argue that Israeli (and other) workers adopt practices which lead to inefficiency, and that the attitudes of the work force and not the means of production are the key to productivity. They hold that group incentive systems are the best way to boost productivity.


Discusses training practices within an organization which enhance productivity. Draws upon a comparative analysis of seven large-scale organizations to develop basic
principles. Concludes that productive results occur when training programs are applied to real programs and work goals.


Measures the economic value of high school graduation in terms of augmented lifetime earnings on an occupational basis. Finds that the value of high school completion is negative for some occupations.


Summarizes the author's contributions to the field of human capital. Stresses the pervasive and heterogeneous nature of human capital, the changing nature of foregone earnings, rates of return to formal education, and research and development expenditures.


Discusses occupational data needs. Provides a concise analysis of the characteristics of existing data and their limitations.


Presents estimates of formal education attained by the population and labor force, and of expenditures on, and real resource costs of, education. Relates educational effort to economic growth, and offers comparisons with the U.S.


The authors deal with the growing dissatisfaction of blue-collar workers with their jobs. They argue that certain types of jobs are undesirable, not only for the individual but also for society as a whole. The relationships between work, authoritarianism, and political attitude are discussed. Different segments of the labor force and their relation to work are considered.


Compares the relation between earnings and experience of different labor force segments in the U.S. and Japan. Examines three aspects—aggregate earnings over time; blue- and white-collar occupations; and large- and small-scale industries.


Presents estimates of capital formation by education. Finds differences between the estimates, which he attributes to different concepts of foregone earnings used.


Evaluates recurrent education as an alternative to existing systems of sequential education. Presents cost-benefit analyses, and discusses recurrent education from the viewpoint of equity and efficiency. Also cites examples from programs of recurrent education.


Provides a perspective on the discussion of the subject. Argues that most workers
are satisfied with their work, although they react favorably to more challenging tasks; and that job redesign schemes have limited effects.


Draws together studies attempting to evaluate vocational and related manpower programs in an economic context.


Discusses the objectives for adopting the revised workweek schedules. Describes types of schedules adopted by the firms; effects of the revised schedules; employees' attitudes; and the nature and adequacy of the data available.


Examines wage differentials in terms of such variables as age, sex, education, and occupation. Compares Japanese with U.S. wage differentials. Quantifies qualitative factors in determining labor quality changes.


Surveys pertinent provisions of collective bargaining agreements covering 1,000 or more workers. Interprets contract clauses related to the conditions under which employers will pay overtime or weekend premium rates. Presents data by industry.


The authors measure the impact of parasitic diseases on mortality rates, scholastic performance, and labor productivity. They conclude that diseases' effects on economic development are modest.


Foreign Labor Brief presenting a report on the 7-day production week proposed by the Indian Labor Minister to relieve his country's economic difficulties.


Presents position papers by various Federal agencies, including the Department of Labor and the Civil Service Commission, as well as statements by interested parties, and a series of articles dealing with the question under review.


Presents statements by experts and others on a bill to provide for research for solutions to the problem of worker alienation; and for pertinent technical assistance to companies and State and local governments.


Describes experience of firms which have adopted flexible working hours. Examines the origins of the practice, varieties, time recording systems, and effects.


Estimates the quality change per employee-hour for workers in selected U.S. manufacturing industries from 1952 to 1967.

Seeks to develop a measure for the output of high schools and the impact on students' future income.


Argues that balanced growth is necessary as between human and physical capital, and that labor-embodied technical progress is of particular importance for the success of economic development, and reductions in discrepancies in per capita income among countries.


Examines quantitatively the heterogeneity of labor resulting from differences in educational background, skill, etc. Provides a quantitative appraisal of the improvement of labor quality. Proposes development of a "standard efficiency unit" to solve the problem of how to adjust the unweighted sum of man-years for the heterogeneity of labor force participants.


Investigates aspects of the utilization and distribution of educational resources in the context of educational production functions; analyzes efficiency; and examines technological changes.


Documents the growth of technician employment. Determines annual salaries, relating them to education. Finds that various types of training programs provide viable alternatives to college education. Examines occupational definitions in detail.


Examines the relationship between scholastic achievement and job performance of college graduates working in large corporations. Finds the relationship, as measured by rate of salary increase, to be significant.


Surveys the characteristics of the American labor force, and its industrial and technological environment. Discusses patterns of mobility and migration, unemployment, and poverty. Also discusses economic policies and manpower policies, as well as their effectiveness. Concludes with a chapter on work and leisure.


Addresses the issue of whether formal schooling serves to augment worker productivity as opposed to conveying information to employers about the probable productive capabilities of prospective workers. Develops theoretical models and offers tests. Concludes that the evidence supports the productivity-augmenting view of schooling rather than its use as a screening device.


A collection of policy-oriented papers. Topics addressed are: technology; worker attitudes; responses of industry, government and unions; and future requirements for education and training.

6.135 Work in America. Report of a Special Task Force to the Secretary of Health, Educa-

Analyzes the quality of working life. The central theme is redesign of jobs. Topics addressed are: the functions of work in bringing meaning to life; work problems; physical and mental costs of jobs; training; and Federal manpower policies.


Presents a survey of return migrants in terms of economic, social, and demographic information. Finds significant occupational upgrading of such migrants. Concludes that the return migration process is related to human capital improvements.

Management and organization


Employs a systems approach to productivity problems in the food processing industry and examines the many influences—legal, technological, economic and institutional—which impinge upon the distribution system and ultimately determine the rate of productivity improvement.


Examines unionization in municipal sanitation, and the effects of unions upon productivity. Discusses conditions favorable to productivity improvement, bargaining about productivity, and subcontracting.


Presents lectures on the effects of recommendations for improving productivity, and the need for continued productivity growth.


Using a case study approach, the authors develop a measure of total productivity for a firm or industry. They discuss each variable in their model and show the differences from other systems of calculating company productivity.


The authors review and analyze the current state of strategies on job satisfaction, industrial organization, and productivity, based on an examination of the literature.


Develops a model of capacity utilization in an industry where price and entry are regulated. Assesses the efficiency of airline regulation.


The authors relate bargaining behavior of managers in seven industrial countries to working days lost because of industrial disputes. They suggest management behavior is related to patterns of industrial strife.


Theorizes on the role of wholesale trade in a socialist economy as a means of planned distribution. Asserts that the development of the wholesaling function presupposes intensification of centralized planning. Incorporates the wholesale trade industry into the framework of the USSR’s five-year plans.

The authors review central themes pertinent to the subject, including the role of industrializing elites, the degree of adaptability of labor, the concept of industrial relations, strategies of human resource development, and costs of industrialization.


Traces the transition of economic theory from the “absolute” scarcity concept, associated with the classics and with value doctrines, and “relative” scarcity, associated with the economizing goals of individuals and societies.


Develops objective criteria for allocating research funds based on a rate-of-return concept. Estimates the value of medical output; examines consumer demand; and identifies disease areas where underinvestment has occurred.


Assesses the reliability of nuclear and fossil-fired generator units in terms of availability of service and capacity utilization. Reviews factors reducing availability, and recommends steps to improve it.


Analyzes the impact of managerial techniques, labor unions, and government regulation on the industry. Develops total productivity indexes and finds no comparative disadvantage. Concludes the industry decline is a result of government policy which leads to high costs of operation.


Analyzes the causes of agrarian reform in Mexico, stressing their political aspects. Shows that agrarian policies continue to be dominated by political rather than economic considerations, although these were gaining in importance from the thirties forward.


Presents views of 30 participants from business, law, education, and government.


Argues that productivity improvement is based on “company politics,” with high-ranking management support needed for a plan to work. Describes examples of company productivity improvement plans.


Examines the industry’s position, within both the Greek economy and the international market for shipping services. Discusses industry structure and assesses government policy toward the industry.


Examines management as a factor of production in the output of large-scale manufacturing enterprises. Models of management are developed. Compares managerial selection, careers, practices, behavior and incentives in American, French, English and Soviet business enterprises.


Seeks to determine the influence of certain factors on production time requirements in British and U.S. aircraft industries. Examines hypotheses relating to industry structure, procurement policy, and experience possessed by each.


Examines the types of rural institutional services required by traditional producers to gain access to improved farming inputs, production credits, and agricultural knowledge. Develops a theoretical framework of a strategy for modernizing subsistence agriculture. Critically evaluates the U.N. system.


Argues that economic forces shape tenancy patterns, that productivity is not adversely affected by tenancy, and refutes the proposition that rental levels are exploitative.


Papers by eight agricultural economists on resource allocation in American agriculture. Topics studied include capital utilized by the agricultural sector, payments to factors of production, output, and the size and mix of land.


Reviews recent empirical evidence which supports the theory that firms expand the labor force to the point where marginal productivity equals marginal factor cost. Concludes that firms in the long run attempt to adjust their workforce so as to maximize profits.


The authors examine the question of whether rivalry spurs or retards technical progress.


The authors study the investment decisions of a firm under the supposition that the firm foresees better technology becoming available. They find that the anticipation of technical advance tends to delay investment.


Differentiates between the economic definition of productivity and the management definition which is confined to efficiency and performance of the individual organization. Argues that the most important factors in improving productivity depend on management. Reviews survey results and offers approaches to increasing productivity.


Discusses the importance of productivity in the decision-making process of the Russian economy. Argues that investments decisions should be made with a view to increasing productivity. Examines methods to evaluate the effectiveness of investment decisions. Illustrates the importance of higher education and scientific research in improving productivity.


Argues that production function models place too much emphasis on the capital-output ratio in economic development. States that increased labor productivity depends not only on capital accumulation but chiefly on the effective use of capital.


Argues that undirected, general productivity advances, including those spurred by government, may contribute to deterioration in the balance of trade. Develops a selective productivity-trade balance model, designed to help improve the trade balance. Also takes account of the social costs implicit in this model.

Examine the decisionmaking process whereby hospitals acquire inputs. Concludes that because of insufficient attention to the demand for services, resource misallocation has taken place, resulting in hospital cost inflation.


Gives views on economic planning and on how to optimize planning. Discusses economic reforms in the U.S.S.R. in the mid-1960's.


Discusses ways to improve productivity, focusing on specific areas, such as manpower, plant and machinery, organization, systems and planning, and others. Also deals extensively with worker attitudes, job enrichment, and training for productivity improvement.


Assesses the relation between the rate of output and total volume on costs. Finds that auto body manufacturers are not large enough to exhaust even the purely technical economies of scale.


Examines the joint production function which characterizes intra-post office activities. Finds that post office allocation of labor and capital is suboptimal in terms of productivity.


Examines labor-managed cooperatives and finds them to be more restrictive than the entrepreneurial firm. Concludes labor-managed cooperatives are viable where economies of scale are not important, the production process is labor intensive and there are no barriers to entry for competing cooperatives.


Examines the accumulation of nonfarm capital in cattle feeding, and the concentration of ownership in the industry.


The authors describe the productivity improvements programs of five major companies.


Addresses the question whether improvements in productivity will eliminate such threats to rising living standards as inflation, unemployment, and foreign competition. Discusses principal factors in productivity change, particularly technology, managerial approaches, and job design.


Describes the impact of the Scanlon Plan on productivity in a specific case. Emphasizes the suggestion system introduced. Presents a review of the literature, and an evaluation.


Argues that the concept of technical efficiency differences is unsatisfactory from a production theory point of view. Develops a model in which differences in information obtained by management may explain productivity differences between firms. Presents estimates from a sample of dairy farms to show the specific impact of information.


Attempts to integrate the concept of technical efficiency—as opposed to allocational efficiency—into the theory of the firm. Postulates differences in the levels of information available to managers,
and measures the impact of these differences upon output.


Describes a project that consisted of attitudinal surveys, personnel surveys, and a study of productivity bargaining, focused chiefly on productivity improvement within a framework of close labor-management participation.


Deals with the basic concerns of the Commission, including labor-management relations bearing on productivity; job security; education and training; technology and capital investment; and government regulation.


Surveys practices of State and local governments. Discusses examples such as attendance incentives, competition and contests, job enlargement, performance bonuses and merit increases.


Presents an economic overview of the industry. Outlines five areas of opportunities for productivity improvement.


A medium for transmitting information on implemented methods of productivity improvements among State and local jurisdictions, divided by major services such as general administration, inspections, libraries, and parks and recreation.


Reports on some of the problems encountered in attempts to improve productivity in public service. Also reports on incentives, information problems, and organizational constraints.


Describes experiences in repair and maintenance shops in the District of Columbia; in the New York transit system; in the Defense Supply Agency; among Washington State nurses and administrators; in the Memphis joint health and safety committees; in the Denver schools; and others.


Describes the current objectives, functions and operations of national productivity centers in a number of countries.


Argues the need for a methodical productivity program; how to implement and manage it. Discusses related themes.


The authors examine how cost and quality of care vary by type of hospital. They conclude that while size alone apparently lowers per unit costs, increased scope of services and teaching, which occur in large hospitals, increase costs and quality of care.


Argues efficiency and equality can be increased if inequalities of opportunity are removed. Exam-
ines pertinent national policies. The role of the market place is emphasized.


Finds that the Federal sector is capital intensive relative to private industry and the service sector. Suggests that the low productivity of the federal sector is due to behavioral differences between public agencies and private firms, not labor intensity.


The authors suggest techniques to improve productivity in the industry. They hold that productivity problems are a task for management.


The authors examine the argument that recent U.S. productivity performance has been poor, as well as the public policy recommendations addressing this problem.


Presents interviews with Federal Government officials involved in the Nation’s quest for higher productivity.


Seeks to identify the effects of auxiliary personnel and of the mode of practice (solo or group) on the rate of output of physicians. Finds that American physicians could increase their hourly rate of output by 25 percent by employing roughly twice the number of aides that they currently employ.


Examines the effectiveness with which Cuba pursued income redistribution, reduced unemployment, spurred economic growth, and attempted to make itself less dependent on sugar and a hegemonic partner.


Examines ways of increasing productivity in education and medicine, including study by computer methods; employment of paraprofessionals, and preinterview filling out of forms by physicians’ clients.


A collection of papers by economists from Communist bloc countries and Western nations on planning and economic reform, international development, productivity, efficient utilization of capital and decisionmaking in industry.


Asserts that the factors spurring productivity in the private sector are not operating in government. Calls for the empirical measurement of productivity in State and local governments. Suggests that use of modern managerial techniques, employment of better trained workers, more emphasis by suppliers of technology, and a revised system of reward will lead to productivity improvement.


Argues that low productivity does not result from job boredom, but from managerial waste and poor attitude toward workers and their equipment.


Presents papers comparing managerial problems arising in different types of economic systems. Contributions cover problems of managing an entire economy to problems concerned with managing firms.

The authors argue that increased labor productivity is accompanied by some form of human cost. They show that collective bargaining is a framework for determining the compensation of human costs, and a restriction on labor productivity in fluid milk delivery.


Formulates hypotheses regarding the effect of worker participation on worker well-being and firm productivity. Examines the empirical evidence concerning the relation between participation and productivity. Among findings is that there are many alternatives to the traditional autocratic pattern of work organization.


Finds that plants with equivalent levels of capital intensity are less efficient in Mexico and Puerto Rico than in the U.S., owing to differences in labor and managerial efficiency and economies of scale.


Discusses recent growth in government spending and the concomitant need to measure and improve productivity in the government sector. Suggests more capital investment, research and development, and education and training. Also argues that timely financing and audits of results of investments would improve productivity.


Examines the integrative role of productive tasks performed by groups. Deals with the performance of groups undertaking certain types of tasks. Also deals with the effects of group size on productivity, the consequences of group composition, and group-related motivation.


Discusses some of the difficulties of introducing productivity norms in municipal services. Examines steps used in doing so in New York City, such as linkage of productivity to pay, scheduling of sanitation pickups and handling of health insurance claims.


Attempts to isolate the effects of differences between the economic systems prevailing in the two areas on the level of growth of output per capita and factor productivity.


Analyzes the failure of the British economy to meet productivity and balance of payments objectives as outlined in the National Plan. Criticizes the plan for failing to demonstrate how projections could be used by industrial decision-makers and for failing to indicate how productivity growth was related to demand and investment.


Surveys the changing markets for rail freight transport, the financial position of railroads, and rail productivity. Recommends policies to improve the railroads’ performance, including containerization, rationalization of light-density lines, modernization of regulatory processes, and changes in the industry’s corporate structure.


Focusing on TV sets and refrigerators, the study evaluates such factors as engineering and
design, product service requirements, product warranties, service agency operations, service technician training, and repair service productivity. Forecasts of service requirements are presented.


Describes the steel industry's problems in improving productivity and in relation to steel imports. Also describes the contract provisions, objectives, and guidelines concerning the Joint Advisory Committee.


Deals with the process of technological innovation, and the factors contributing to its success on the company level. Examines strategies for research and development, and technological forecasting. Also discusses financial evaluation of research and development projects.


 Discusses a productivity improvement plan used in Kansas City. Shows that municipalities can improve productivity by applying methods used in private industry.


Surveys systems and measures used by 12 well-managed companies in terms of case studies. Includes such studies as service quality improvements under a wage incentive program; uses of standard unit costs; employee rewards; and post-audits of capital investments.


Discusses productivity factors and measurement, and the feasibility of productivity improvement through collective bargaining. Presents guidelines for the planning, development, and implementation of productivity bargaining.


Examines Federal agencies’ problems in financing productivity-enhancing capital investments. Concludes that there is a need for agencies to improve the sophistication of their entire capital budget decision-making process.


Papers on management auditing, and its conceptual basis and usefulness in determining whether program goals have been met with economy and efficiency.


Discusses the principal functions of work measurement systems. Also discusses controls that must be considered to assess a system’s effectiveness.


Presents documents produced by the Joint Productivity Project Team on the productive use of human resources. Includes proceedings from the Workshop on Improving Organizational Productivity in the Federal Government, and an overview of the Social Security Administration Work Environment Improvement Project.


Reviews and evaluates existing agency policies and programs with regard to the acquisition and management of productivity-enhancing capital equipment. Develops a model capital equipment investment program.

7.084 U.S. General Services Administration. *Enhancing Productivity Through Improved Acquisition

Contains 5 appendices to the GSA report on enhancing productivity through capital equipment investment. Includes discussions of funded and unfunded capital equipment investments; trends in Federal capital equipment investments; financing capital equipment investment opportunities; and capital equipment investment case studies.


Summarizes findings from hearings held on the declining rate of productivity improvement. Recommends actions to be taken by the National Commission on Productivity and other agencies of the Federal Government to cope with the “productivity crisis.”


Presents statements on trends in and factors affecting recent changes in productivity, including worker attitudes and measurement practices, and on the relation of productivity and inflation.


Contains statements by public and private witnesses concerning the National Productivity Act of 1975 and the National Center for Productivity and Quality of Working Life Act.


Concerns the National Productivity Act of 1974 and the National Center for Productivity and Economic Competition Act. Contains statements by government, labor, and industry experts on productivity and work quality.


Explores the Relations between firm size, R & D, and technical change. Concludes that larger pharmaceutical firms incorporate technical change more successfully.


Maintains that productivity is increased by delegating responsibility to the worker. Draws upon his experience with a typewriter manufacturer and outlines plans for enhancing productivity and job satisfaction.


Updates and extends performance studies of conglomerate firms. Concludes that an important function of conglomerate firms was to improve the utilization of economic resources.


Studies the impact of reforms on the planning systems of East European states. Examines management, prices, incentives, productivity, banking and finance, and other subjects.


Discusses mass production systems, including automation and mechanization of assembly lines, in terms of operational efficiency and the behavioral implications of the system. Examines types of work groups and their relation to flow lines. Seeks to formulate principles for the design of mass production jobs satisfying both operational and behavioral considerations.

Argues that opportunities to purchase technological information may induce economies of scale even though the technology of physical production has no scale economies. Concludes that the monopolistic behavior of dominant firms in an industry is the result of information acquisition that cannot be tempered by the possibility of free entry.


Analyzes the reform measures introduced by the Yugoslav leadership to explain the structure of investment financing, and to determine the roles of economic units in that structure.


The authors extend earlier work on the causes for the greater economic efficiency of small farms. They conclude that both large and small farms are price efficient, and establish the superior technical efficiency of small farms. They hold that the usefulness of the model need not be restricted to the farm sector.


Reprint of a classic study of the effects of the enclosure of free land around English villages upon land uses and productivity, the laborers who formerly worked the land, and land owners.


The authors relate the growth in purchased inputs of Australian farms to gains in productivity and income. They find that purchased inputs rose at a lesser rate than productivity over the 20-year period studied.

**Technological change**


Presents papers covering recent developments in the fabrication and distribution of textiles.


Compares production structures of the manufacturing sectors in socialist and private enterprise systems. Finds considerable differences in structure and productivity growth rates.


Reports on new technological advances which have increased productivity in certain industries, and discusses future possibilities. Also discusses the computer in boosting productivity.


Attacks the hypothesis that slavery is necessarily associated with technological retardation and therefore slows progress.


Examines the relative importance of differences in the rates of diffusion of innovations, unit labor costs, and the size of the domestic industry. Constructs models of the steel industry for developing and developed countries. Finds a developing country must generate sufficient demand to allow an industry to exploit internal and external economies of scale.


Argues that U.S. steel firms were slow in adopting continuous casting, and discusses the reasons, including confusion on patent rights; variation of product quality of steels made by continuous casting, etc. Calculates the impact of continuous casting on competitiveness.

Contains five articles on issues relating to labor relations, collective bargaining processes, and technological change.


Examines the trends in, and problems associated with, technical collaboration agreements. Also examines the impact of the transfer of know-how on Indian industrial productivity.


Examines the inputs associated with high-yielding rice varieties. Also discusses current research efforts to tailor new rice technology to fit the inadequate resources found on most Asian farms.


Argues the lack of productivity growth for clerical employees. Discusses technology geared to take over some office work.


The authors, analyzing Mexican data, relate the technologies of the “Green Revolution” to the improvement of the agricultural sector. They find that large farms have greatly increased productivity, income, and output since the fifties, while small farms have not fared so well.


The authors present the views of international executives on such topics as the price of technology; the level of technological sophistication; the ways technology should be transferred; and the government’s role.


Examines the impact of technical change on output in post-revolutionary Soviet agriculture. Concludes that because of the organizational factors of collective farms, technical progress can lead to a decrease in output.


Argues that automation tends to be expansionary in terms of spending and employment. Bases discussion on the literature and on general theory.


Examines the “Green Revolution” crop technology and its diffusion. Analyzes the means by which technical change alters the pattern of inequality among broadly defined interest groups. Concludes that the causes of changes in inequality are only partially explained by the nature of innovations.


Analyzes the shift from goods to services in terms of employment and impact on industrial structure. Examines the growth of knowledge and technology, and its effect on class structure. Also investigates the corporation, planning, and power shifts.


Presents papers, mostly in the form of case studies, dealing with the impact of changing technologies on culture.


Compares high-yielding Mexican wheat to Indian wheat. Finds that output per hectare increased greatly, yielding higher net profits despite higher costs of production.

Discusses lagging productivity growth in the food industry, and barriers to technological innovations. Describes a program designed to overcome these barriers initiated at MIT.


A collection of essays updating techniques of technological forecasting. Topics include new theories and concepts, examples of forecasts, and approaches to improving forecasting.


Argues that there are regional and national factors in diffusion unrelated to market conditions or government policies. Also argues that the creative contribution of individuals in diffusion is of fundamental importance.


Reviews the factors which have affected the U.S. competitive position vis-a-vis European countries and Japan. Suggests that the technology gap between the U.S. and the industrial countries has been closing since the middle 1950’s. Agrees that technological advance has slowed in the U.S., but argues that this is a trend which will be experienced by the rest of the world.


Argues that invention responds, like natural resources, to demand pressures, and that technological diffusion responds to the same forces as efficiency, and is most rapid where efficiency is most highly regarded.


Attempts to integrate trade and development theory to provide a growth strategy for developing countries. Finds developing countries should rely on the price mechanism rather than on direct controls to allocate resources.


Investigates the effect of a number of variables on farm output, including such factors as farm labor, fertilizer use, fuel and others. Also derives the rate of technological progress, and projects non-renewable resources to the year 2000.


Refutes the Ohkawa-Rosovsky explanation of the rapid increase in Japanese agricultural output after 1878.

8.027 Church, R. A. “Nineteenth Century Clock Technology in Britain, the United States and Switzerland.” *Economic History Review*, Vol. 28, No. 4, November 1975, pp. 616-630.

Shows that British preeminence was destroyed by the more efficient American and Swiss manufacturers, with differences in factor endowments and systems explaining the rise of the American industry, and sensitivity to consumer needs and technical ingenuity explaining the rise of the Swiss industry.


Focuses on the impact of new technology on productivity, employment, and occupational requirements, and describes methods of adjustment. Includes firsthand information on the impact on production and manpower of electronic computers, phototypesetting equipment, web-offset printing, and other innovations.


Presents information on the current employment, education and training characteristics of computer occupations. Explores the impact of advancing computer technology on computer manpower and education. Projects computer occu-
pational requirements and their implications for training.


Examines the diffusion of information in industrial markets as a social process, particularly that of the continuous casting process in steel. Finds that an informal communications network linked firms, and was instrumental in diffusing the technology.


Explores the employment and output capacity of agriculture under technological change and different income redistribution proposals. Applies input-output techniques. Finds that agriculture can be more productive and labor intensive, and can provide a more equal income distribution.


The authors analyze how the choice of different technological innovations affects the long-run average cost of servicing demand deposits. They consider situations where the banks use conventional bookkeeping machines, computers, punched card tabulators, off-line sorters and electronic bookkeeping machines.


Traces some of the changes in the organization of China’s innovative activity. Examines the economic consequences of such changes in each stage, emphasizing the capital construction industries. Also discusses the design reform movement, 1964-66.


Analyzes case studies of the NASA technology transfer programs in the light of past studies of technology transfer. Concludes that a program of market-oriented transfer of technological advances to firms which could benefit from them would be superior to the present program of literature dissemination.


Investigates the impact of technical change on aggregate output, capital-value, and share of profits, within a one- and two-sector model. Applies the analysis to long-run U.S. data.


Argues that a weakness of economic incentives rather than social considerations is responsible for the reluctance of African farmers to adopt new techniques.


Investigates the choice of developing countries between using labor or capital-intensive machinery for heavy earth-moving operations. Concludes that capital-intensive methods contribute to skilled and unskilled employment, higher productivity, and reduced costs.


Examines the effect of different propensities for saving and investment on technical progress. Argues that the rate of investment and the rate of technical progress are closely linked.


 Discusses alternative models of the diffusion of agricultural technology, particularly in the sugar cane industry. Develops a model for cereal grain technology for the post-World War II period.

Investigates the impact of productivity growth of the industry on wages, prices, and employment and the distribution of gains among the factors of production. Develops a measure of technical progress.


Presents a qualitative characterization of production; characterizes technological change as a directly observable qualitative phenomenon; and demonstrates how single technological changes can be related to production processes so that measures of technological change can be constructed.


Argues that the transfer of space technology must incorporate cultural, political and economic considerations. Transfer mechanisms and an institutional framework must be developed. Holds that space-age technology can be applied to the problems of developing countries.


Analyzes the characteristics of U.S. agriculture that have obstructed farm labor organizational efforts. Shows how recent technological trends have generated changes in the farm labor force, which, together with the example of the Chavez “model,” promise success for such efforts.


Investigates rates of diffusion of numerical control machine tools within comparable samples of Canadian and U.S. firms. Finds that R & D was closely linked to subsequent adoption of numerical control machines.


Explores interactions between technological change and economic variables. Provides analytical guides for evaluation issues which innovations give rise to.


Reports on the leading themes of the conference which dealt with technology and its impact, and the social repercussions of automation, with specific reference to dock labor.


Focuses on the relation between technology, institutions, and people at the community level, as part of dealing with the political economy of technical change in agriculture and its impact on rural income distribution. Examines development patterns in Pakistan and Bangladesh.


Surveys some classic perspectives—those of Smith, Marx and Durkheim—on the relation between technology and the social division of labor. Presents empirical evidence tending to bear out these perspectives.


The authors examine labor productivity of new factories in relation to the average productivity of an industry, and to future productivity move-
ments. They find little deviation of the new factories from the industry average, and no predictive value.


The authors analyze six industries for possible fuel savings. They conclude that fuel consumption can be reduced using existing technology, and urge more research in industrial processes that use less fuel per unit of output.


Considers the impact of two major technological changes on urban problems in the United States: the mechanization of southern agriculture, and the interstate highway system.


Identifies the conditions for the diffusion of location-specific agricultural technology. Contrasts the “Green Revolution” in South and Southeast Asia with the development of rice technology in Japan, Taiwan and Korea.


Presents eight case studies examining the reasons why U.S. firms transfer their industrial technology to East Europe, focusing on anticipated gains, including those of recipients.


Examines the pollution problems created by the techniques used to boost agricultural productivity. Mentions fertilizers and pesticides as examples. Suggests that market prices do not capture the full cost of agricultural output to society since the cost of pollution and environmental damage are not fully accounted for.


Theorizes that social change is the consequence of a forerunning technological change. Discusses solutions for the developmental problems facing technologically retarded societies.


Investigates the impact of human factors on the process of technological change.


Describes and evaluates operational activities in selected Federal agencies for promoting the diffusion and utilization of technological developments resulting from Federal applied R & D.


Summarizes the highlights of the 1971 session of the Building, Civil Engineering, and Public Works Committee of the ILO, which focused on the economic and social impact of prefabrication.


Basing himself on an article by J. E. Brittain, the author lists additional modes of diffusion, such as the study tour and patent literature. Also examines the adaptation of the steam engine to differing environments.


Presents papers examining the use of automation as a development strategy; the reaction to advanced technology, now and historically; the skills and organizational requirements associated with the introduction of advanced technologies; and other pertinent subjects.
Attempts to explain the processes by which firms' market shares change through time. Argues that technological change is deconcentrating, and that growth in demand and technological change destabilize market shares. Develops models of how innovating firms can be expected to grow over the product life cycle.


Investigates in terms of prices, location, and size of plant the effects of an innovation enabling the industry to produce two to three times as much output per plant. Notes the structural changes that preceded the innovation, and the locational changes that followed it.


The authors consider the origins of technical progress and its contribution to output growth. They discuss embodied models of capital, as well as the origins of technical progress in relation to research and development, invention and innovation.


Examines technological change, public policy, and economic behavior in Brazil's agricultural sector, with emphasis on their implications for international trade.


Explores the diffusion of ten selected production processes. Finds the introduction of the oxygen process in steel manufacture, for example, was delayed by large investments in earlier technologies; that the introduction of numerically controlled machine tools was delayed by the need to import them; and that the introduction of the float system in the production of sheet glass was slowed because the process was covered by patents and could only be adopted by licensed firms.

Examines features of the pharmaceutical industry bearing on technology transfer to developing countries, and which affect their trade and health policies. Policy recommendations are offered.


Argues that the question of adjustment in the neoclassical growth model is a special case where technical improvements are more embodied than disembodied. Contends that greater embodiment of technical progress need not always lead to faster adjustment given an initial disequilibrium. Shows that embodied and disembodied models will close a given disequilibrium in the same period of time.


Examines the scope of computer-assisted instruction. Deals with such topics as the research uses of computers; administrative and library uses; campus computer services; the technology of computing; and the economics of computer use in instruction.


Seeks to uncover the salient features of Marxian theory, and compares it with neo-Keynesian theories. Considers the Marxian analysis of technical progress, and relates it to competition, concentration of capital and the growth of firms.


The authors appraise some of the major technological changes emerging among selected American industries and discuss the impact of these changes on productivity and occupations over the next 5 to 10 years. They report on the following six industries: textile mill products, lumber and wood products, tires and tubes, aluminum, banking, and health services.


Argues that the economic future may depend on the nature of relations between management and labor and the role of government in handling technological development and its possible negative aspects. Explores characteristics of the postwar society and modern technology, the nature and composition of the labor force, methods of wage payment, and the attitudes of organized labor toward the role of government in collective bargaining.


The authors examine the laws that deal with the consequences of certain technologies. They discuss law in space; environmental law; law and the computer; and other topics.


Expands the one-sector model of the theory of induced technical progress, focusing on the steady-growth solution to the model.


Measures the extent and nature of technological change, and compares the results with those of other countries. Develops production functions to estimate the investment required to sustain various rates of output growth.


Calculates output, input, and technological change in describing the unique development of Victoria in comparison with the remainder of Australia.

Discusses the international diffusion of new technology. Notes that the process has received little theoretical or empirical analysis. Suggests an approach to measure the cost of transferring technology, other than the value of purchased equipment and materials.


Studies the terms and conditions under which Sri Lanka has acquired technology over the last 30 years. Concludes that technologies transferred were inappropriate and that costs exceeded benefits. Draws implications for developing countries as a whole.


Discusses the relative inability of multinational corporations to adapt production technologies to conditions in developing countries. Ascribes this inability to the fixity of production processes, distorted price relations in factor markets, imperfect competition, and ignorance of market conditions.


A collection of case studies on developing countries in their efforts to mechanize agriculture. The studies show that there has been an undesirable substitution of capital for labor, creating a surplus labor force in agriculture that cannot be absorbed by the industrial sector. Elements of a proper mix for intersectoral growth are developed.


Challenges the assertions that technology has an autonomous momentum and direction. Argues that technology is determined by economic and social factors.


Reports on aspects of shutdowns and closures. Finds that few workers are protected by either employers or the bargaining contract. Notes that aggregate economic statistics mask the social costs of such shutdowns.


Narrates the historical milestones in technological developments and discoveries. Offers proposals to humanize the purposes of technology.


Examines technical and economic changes in the livestock industry, and their output-increasing and resource-substituting relations. Also explores relations between livestock and crop-raising enterprises.


Examines the reasons why corn yields in an area representative of the Pampean region have remained virtually unchanged over the past 40 years. Finds high prices for chemical technology and lack of research in developing fertilizer-responsive hybrids among the factors limiting corn yield increases.


Argues that technological change has been and remains a determinant of low returns to farm labor, unemployment and underemployment. Tests the argument (or hypothesis) by estimating the effect of technology on the farm labor market.


The authors examine past developments in energy use in terms of production processes and technology. They identify future developments in these processes and technologies, and determine probable energy demands. They also discuss in-
dustries facing particularly serious energy problems. Extensive data on energy per output unit and related magnitudes are presented.


Ten studies which examine and compare the diffusion processes of technological advances in various countries.


Based on a symposium and workshop, the report presents papers on such subjects as productivity improvement in education; technology and productivity in the health field; and New York City operations and service requirements.


Presents papers on such topics as energy systems, conservation programs, coal gasifying techniques, transmission systems, geothermal energy, solar energy, and various types of threats to the environment. Also features papers on public sector productivity, technology transfers, and automation.


Examines views of development economists and natural scientists on the role of the scientific community in furthering development. Asserts both disciplines have misperceived the role of science in economic development and offers alternative approaches.


Studies the subject by means of production functions.


Analyzes the impact of science and technology in OECD member countries. Investigates differences between industries, government roles, and the status of university science and industrial technology.


Describes the postwar experience in assimilating Western technology and developing an R&D base. Notes that the agricultural sector played a passive role in Japan’s economic growth, and that agricultural productivity gains were a byproduct of industrialization. Draws implications for U.S. trade policy in the area of high technology.


Argues against the hypothesis that some mechanization can lead to results which make a country worse off. Uses the banana handling industry as an example, and compares the use of labor-intensive means of production with capital-intensive means.


Deals with the effects of technological superiority of the operations of multinational corporation subsidiaries on other firms in the host country. Concludes that for Australian manufacturing, research intensity which leads to greater foreign operations also leads to greater relative size of multinational corporation subsidiaries in an industry, and greater concentration of foreign ownership.


Explores the assimilation of new production functions by less developed countries. Demon-
strates that the adaptation of a technique is less costly than discovery and development. Draws implications for developing countries on the issue of whether to foster domestic innovation or acquire technology from abroad.


Finds that innovations led to a revival of the industry between 1947 and 1969. Examines the gains in labor productivity as resulting from increased capital per worker, intensive utilization of capital, and more modern equipment. Notes that productivity increases and improved technologies offset rising prices, and permitted carriers to hold unit costs steady.


Presents and examines estimates of regional technology. Also presents data on statewide output, employment, and payrolls in 1947, 1958, and 1963.


Considers factors influencing the transfer of technology between countries at different stages of development.


Reviews differing patterns of mechanization and reasons for it in the face of ample supplies of labor. Finds that in some cases, mechanization has not increased production but was adopted by large landowners to reduce dependence on tenants or casual labor.


Assesses the magnitude of technological change, 1949-71, and factors accounting for it. Estimates costs and returns associated with the use of modern inputs. Examines the distribution of gains between and within regions. Also discusses relevant policies.


Discusses technical progress resulting from the experience of producing, i.e., “learning by doing.” Develops an equilibrium model which treats technical progress as an endogenous variable.


Presents a theoretical formulation of natural resource production taking endogenous technical progress and environmental costs into account—in contrast to conventional studies which treat these variables as being exogenous.


Examines the contribution of the neutral and non-neutral components of technical change to economic growth. Uses a VES production function and focuses on the elasticity of substitution.


Investigates the consequences of Egypt’s integration into the world market for the distribution of land ownership and the formation of social classes; the impact of technical change on farm output and peasant welfare; and the process of diffusion of agricultural techniques.


Discusses how knowledge of the steam engine was transmitted by such means as books, models, conversation, industrial espionage and bribery. Argues that the slow diffusion of the steam engine outside England was due to inefficiencies in the steam engine as well as unfavorable resource endowments and entrepreneurial failure.

8.113 Romeo, Anthony Asta. *Interindustry Differences in the Diffusion of an Innovation*. Doctoral

Studies the spread of numerical machine tools throughout ten industries, based largely on statistical analyses of a survey.


Offers new approaches for research in assessing the role of technological change in generating productivity increases. Asserts that the economic impact of inventions is a process of slow diffusion rather than Schumpeterian in nature.


The authors trace the diffusion of major medical technologies, including postoperative recovery rooms, intensive care units, open heart surgery units, and therapeutic radiology facilities. They also discuss cost aspects.


Investigates the determinants of the choice of farm power and the factors accounting for the time-series pattern of tractor technology diffusion. Generalizes from the U.S. experience, and finds that the prospects of spreading capital-intensive techniques to less developed countries are diminished.


Traces the assimilation of modern Western manufacturing into the Japanese cotton textile industry from the late 1860’s to the early 1930’s. Finds the cost of acquiring technological information for any single firm to be low by international standards. Links the high turnover in the labor force to the technological uniformity of the industry which resulted in few firm-specific skills, and a concomitant low level of investment in skill training by the firms.


Reports on activities to make self-help technology available to underdeveloped countries. Urges that labor-saving, capital-intensive technologies of rich countries are not appropriate to the conditions of poor people in poor countries.


Surveys the issues associated with the choices of technology, discussing concepts of employment and efficiency, and pertinent measurement problems.


Measures and explains changes in inputs of capital and labor related to changes in production processes due to innovations.


Asserts that the changes in output, and capital and labor inputs in a sample of manufacturing plants were due to technology and improvements in X-efficiency. Concludes that a new approach to specification of production functions is needed.


Examines the implications of product improvement for weapons acquisition. Applies the concept of “level of technology” to jet engines, and investigates the effect of product improvement on technology and performance. Also studies cost impacts.


Reports on the opposition of union tradesmen to labor-saving prefabricated homes. Discusses the implications of this type of action.

Identifies the sources of technological advances, together with major innovations. Finds that large utilities do not perform better than small ones with regard to relative innovative output.


Investigates the selection of factor-augmenting innovations in the regulated firm. Finds that regulation distorts resource allocation, and that the regulated firm will overcapitalize.


A collection of papers on the processes and agencies of technological change in relation to economic development.


Examines the technological drag in the industry. Estimates productivity change over the period, and discusses the institutional and economic forces that retard the introduction of new technologies.


Examines technological change in the printing industry, applying the Marxian model of technological change, which he views as providing an analytical framework for explaining the relation between production workers and changing techniques, which complement rather than replace them.


Using cross-section data, the authors attempt to measure changes in the relative factor shares in Indian agriculture following the “Green Revolution.”


The authors examine changes in income distribution which coincide with the diffusion of new farm practices. Most examples relate to India, but the analysis is pertinent to similar problems encountered by other developing countries.


Presents a model comparing a fully computerized with a noncomputerized economy. Argues that process control computers have no effect on labor, and that the main effects are confined to management information systems. Finds that computers’ impact on labor demand has remained small, and will likely continue to be small.


Examines two obstacles to diffusion of applied knowledge-communication, and absence of suitable technologies. Recommends policies for closing these gaps.


Assesses the technical collaboration of foreign firms in Indian economic growth.


Describes plans to increase farm production by using more mechanized equipment and more electrical power, and making better use of chemicals and fertilizers. Focuses on mechanization and the importance of producing more equipment and parts.

Presents an overview of the development of modern technology and of its political and social consequences.


Considers the limited substitutability of factors when modern technologies are adopted, and the substantial economies of scale they offer. Develops a theory to deal with problems of attempts to transplant modern techniques into labor surplus environments.


Indicates that unless there is a massive agrarian reform program, the income benefits of increased agricultural production will continue to enrich the few who hold the bulk of the area's resources, while the poor will fall further behind.


Argues that transfer of technology is a more effective alternative for promoting productivity gains than the indigenous development of a technological base. States that the means to maximize the benefits of technology transfer is to utilize equipment through "learning by doing." Presents data on the Nigerian experience.


Argues that the transfer of technology promotes productivity gains more effectively than the indigenous development of technology. Examines learning by doing in light of various theories.


Presents three case studies of diffusion—in the U.S., Europe and Japan. Argues that diffusion is determined by the availability of technology; economies of scale and capital requirements; and the role of government. Finds great differences in the way these variables affect the diffusion process.


Presents data on computer uses and personnel in selected developing countries, as well as descriptive details. Also discusses the potential of the computer use in planning, education, and national policy generally.


Evaluates the economic effects of the "brain drain" in terms of the benefits lost by the developing countries and the benefits gained by the developed countries. Outlines the methods used in calculating gains and losses.


Examines the scope of research and development on the State and local level, and the impact of Federal policies on the scientific activities of States and localities. Formulates relevant recommendations.


Surveys the functions and structure of the Office of Technology Assessment. Presents a summary of the provisions of the law setting it up, and a legislative history.

<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Title and Author(s)</th>
<th>Source</th>
<th>Pages</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.155</td>
<td>Wilson, Robert Woodrow. <em>The Sale of Technology through Licensing</em>. Doctoral dissertation presented to Yale University, 1975. 220 pp.</td>
<td>Theorizes that licensing is a strategic decision in oligopolistic rivalry with respect to the physical attributes of products, involving the creation of technical knowledge. Identifies the characteristics of firms’ environment influencing the granting of licenses.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sets forth the role assigned to technological change in the theory of major economists and schools of thought. Highlights the relationship between technology and sociopolitical issues. Examines the aspects of technological change with which contemporary economists must deal if their models are to have relevance.


Finds that high rates of technical change accompany relatively low population growth. Also finds that nonfarm technical change has contributed more to growth than agricultural technical change.


Examines the channels of technological transfers, as well as the processes by which they occur. Views multinational corporations and the product cycle as explanations for the kind and direction of technological transfers.


Examines the effects of technological change on manpower utilization, job content, and employment levels. Finds that although capital expenditures are increasing, the industry is characterized by outmoded equipment and high labor intensity.

Research and development


Presents a measure of pharmaceutical innovation involving the number of original pharmaceutical compounds produced, weighted by the degree of market success, and degree of therapeutic advance. Relates research input to output.


Part of an effort to document historically the significant events in the process of several technological innovations of high social impact, this report presents case studies of the development of the heart pacemaker, hybrid grains, electrophotography, input-output analysis, and others. Generalizing analyses and conclusions are drawn from the case studies.


An abridged version of the Institute’s *Interactions of Science and Technology in the Innovative Process: Some Case Studies*. See the pertinent entry.


Indicates how the relative size of R & D expenditures depends on the economic size and the level of economic development of a country.


Attempts to ascertain the principles which explain the behavior of scientists. Focuses on informal groupings. Examines the distribution of rewards in terms of recognition.


Tests the hypothesis that R & D results in higher sales. Uses time-series data from the Fortune 500. Concludes that sales growth from R & D is not especially rapid, but that the long-run impact is substantial.

9.007 Bredahl, Maury E. *The Productivity and Allocation of Research at U. S. Agricultural Experi-
Investigates the effects of public agricultural research on agricultural output. Develops production function estimates for four types of farms, and calculates marginal products and rates of return on research.


The authors focus upon the spatial diffusion of innovation within the rural hinterland of an urban center. They present a model and apply it in the analysis of commercial dairying in Aguascalientes, Mexico, from 1958 to 1968.


Argues that scientific activities in less developed countries are a form of consumption because of their dependence on foreign technology. Western technology may be inappropriate also because it makes intensive use of resources which are scarce in less developed countries.


The authors develop various measures of agricultural research output to explain increases in yield-per-unit land in 75 countries.


Examines the impact on the income distribution of the factor-saving effects of inventions, on the one hand, and of rising capital-labor ratios on the other. Hypothesizes that the latter tend to raise labor's relative share, while the former tend to reduce it.


Examines the reasons for the less-than-expected results from Canada's attempt to lessen her dependence on foreign know-how through an expanded R & D program. Finds the link between R & D expenditures and innovations in Canada is tenuous compared to the U.S., due to Canada's lower rate of utilization of patents.


Criticizes various attempts to expand on Schumpeter's hypothesis that there are increasing returns in R & D both as to size of R & D establishment and as to firm size.


Focuses on resource access and bibliographical control problems of large, research-oriented libraries. Deals with such aspects of library technology as computers, photocopying, and facsimile transmission.


Argues that America's once unchallenged scientific and technological superiority has deteriorated. Surveys current state of R & D, and examines the nature of industrial innovation. Also examines foreign experience. Concludes with recommendations for appropriate government policies.


Examines basic methodology for the measurement of growth, and the impact of science and technology on growth. Uses empirical evidence from Russia and other European countries showing that progress in science and technology makes higher growth and productivity.

9.017 Globerman, S. "Market Structure and R & D in Canadian Manufacturing Industries." *Quarterly

Seeks to determine the empirical relationship between different market structure characteristics and the overall research intensity of an industry by regression analysis. Finds that research intensity increases with increased foreign ownership and decreased concentration for technologically progressive industries; and that a reverse relationship obtains for technologically less progressive industries.


Analyzes the effects of market structure upon technical change, and the reasons why R & D per unit of sales increases, then decreases with sales.


Discusses problems encountered in measuring productivity of R&D. Highlights the differences between perceived outputs in manufacturing and in R&D. Concludes that counts of output media, such as publications or citations, do not reliably measure productivity.


Examines agricultural development in Japan, Taiwan, and Korea prior to World War II. Discusses such factors as lifting of feudal restraints on farmers; the land tax revision granting titles to farmers; and scientific research and education by the government.


Discusses computer-based information storage and retrieval systems and photocopying technologies in terms of their costs and benefits to knowledge-producing and -using circles in American society, and the legal and policy issues they have been raising.


Discusses previous research on the incentive to invent. States that what determines the degree of research effort is the expected marginal, not the total return.


The authors examine the relation between firm size and some variables related to the number of patent applications by firms. They find the theory that large firms are responsible for a larger proportion of inventions than their market share cannot be generally supported.


Reviews the structure of R & D organizations in England. Attempts to determine the factors influencing an industry’s support of research associations.


The authors review the literature on the relationship of resource allocation to R & D and technical advance. They cover such topics as research inputs, monopoly power, firm size, market structure, and inventive output.


Investigates the factors responsible for increases in productivity and the relative importance of each. Stresses technological progress. Compares the views of Western and Soviet authors on such matters as quantity of capital per worker and role of education.

Classifies innovations on the basis of modern economic growth. Outlines the adjustments which technological innovations call for.


The authors examine the viability of industrial R & D as a result of a significant decline in R & D staff, and fund reductions, since 1968.


A comparison of the innovative process in ten British industries with similar industries in the U.S. and continental Europe. The authors' concern is with the proper utilization of British engineers and scientists. Industries studied include aircraft manufacturing, vehicle engines, semi-conductors, color television, nuclear power, and others.


The authors develop a theory of the role of research and development in influencing regional growth. They discuss the various R & D strategies normally pursued by States and the concepts they imply concerning the relationship between R & D and regional growth.


Examines the problems of measuring the relation of R & D to economic growth. Finds that the attempts at quantifying the relationship have remained inconclusive.


Questions whether the theory of induced innovation can be used to introduce technological change into the neoclassical growth models. Argues that it is based on a restrictive microeconomic assumption that technological knowledge is costless. Concludes that the theory operates only in a special case where the natural drift of technology is Harrod-neutral (purely labor-augmenting).


Analyzes the patent system as an instrument for internalizing external economies and diseconomies of technological change. Shows that profit-motivated research and development conducted by private enterprise is necessarily biased toward reducing internal costs and neglects the external costs of technological change.


Develops a model to explain the effects of R & D on the future discounted costs of capital, labor, and research services. Finds that R & D is capital-saving.


Describes Watt’s view of patent laws and how they should be reformed, in addition to his struggles over patent rights.


A collection of essays dealing with total factor productivity, technological change, and the relation of inventive activity to market structure and industrial organization, as well as the relation between technological change and the economic system. Extensive time series on patent statistics are also presented.


The authors present the results of an investigation of research and development in 21 U.S. manufacturing industries from 1948 to 1968. Their study reveals a significant relationship between R & D and output per employee-hour.
from 1953 to 1963. They find no statistically significant relationship for the period 1963 to 1968.


The authors assess the British experience in terms of whether patent monopolies result in net benefit or loss to the economy. Case studies indicate that the existing system modestly outweighs compulsory licensing. They find that more data are needed before firm conclusions can be reached.


Comments on William N. Leonard's 1971 study of R & D and industrial growth. Contradicts Leonard's conclusion that industry growth is not a determinant of the intensity of industry R & D expenditures. Finds the causality to be two-way.


Lists patents issued, 1969-1973, by industry and company or government agency. Also lists patents for the more active classes, as well as in nuclear energy, coal gasification and oil shale.


Presents information on particularly active patent classes where patenting by foreign inventors has been high. Also presents patent activity by standard industrial classification.


A compendium of text and graphs covering resources for R & D; basic research and the resources devoted to it; industrial R & D and innovation, together with the outputs and returns generated by it; science and engineering personnel, and their characteristics and employment status; and international comparisons.


Deals with the problem of forecasting expenditures needed to accomplish set goals in scientific research. Investigates the problems faced by the Soviet Union in allocating resources which will maximize the effectiveness of scientific research and development efforts.


The authors present an empirical model of R & D determinants. Their findings indicate that R & D outlays increase with firm size but are inelastic with respect to profitability. They draw implications for rate regulation as an effective tool to stimulate R & D expenditures.


A collection of papers on such subjects as the contribution of science and technology to economic development; research expenditures and growth accounting; technological forecasting; financing of new science and technology; determinants of the speed of diffusion; and others.

Productivity, prices, and costs


Describes purpose and structure of the Committee. Discusses long-range goals, and the future of the basic steel industry.


Examines ecological considerations in economic decision making. Argues that the price system fails to capture all the costs to society of producing
output. Holds that total productivity will rise when society identifies, and eliminates as far as possible, the hidden costs of human technological activity.


The authors demonstrate how the behavior of households and firms under conditions of suppressed inflation produces a multiple contraction in output and employment. They show that excess demand leads the household to increase savings and decrease its effective labor supply. They develop a supply multiplier similar to the conventional demand multiplier.


Surveys the issues and indicates sources of information on incomes policy. Explains the changes in emphasis during periods of widespread application from World War II up to recent years. Suggests a rationale for incomes policy at the present time.


The authors discuss comparative trends in productivity, hourly compensation, and unit labor costs in the years 1960-1972.


Examines the shortcomings of the wage-price guidelines imposed under the New Economic Policy. Argues for an incomes policy which allows more rapid expansion of hourly wages when increases in labor productivity offset them and less rapid expansion when such increases are not forthcoming.


Surveys experiences with joint committees, and examines their characteristics. Presents case studies. Discusses recent initiatives.


After reviewing the causes of current inflation, the authors define productivity and describe an econometric model that explains the relation between the long-term productivity trend and trends in the price level.


The authors review and analyze cyclical patterns in productivity and related measures (output, man-hours, unit labor costs, compensation per man-hour, and prices) in the private sector of the economy.


Considers the assumptions underlying standard guideline theory. Presents a two-sector model which shows that wage-price guidelines tend to destabilize rather than stabilize.


Presents indexes of productivity and unit labor costs for 12 industrial countries for the period 1960-74. Notes that the United Kingdom had the worst experience, Japan, the best.


 Argues that increased productivity is needed to slow inflation. Suggests a new dialogue between workers and managers; innovative thinking about training based on motives; new group incentives; and job enrichment.

Outlines the role of BLS productivity data in the stabilization program by providing some of the basic measures used by the Price Commission for determining price changes. Discusses the output per employee-hour and unit labor cost measures prepared by the BLS.


Reviews productivity, employment, and cost trends in 1971, comparing them with other recovery years. Finds that increased productivity was largely due to a decrease in man-hours rather than a growth in output.


Discusses principal uses of, and fallacies about, the factor of productivity in collective bargaining. Underscores the need for the Pay Board to base wage guidelines on long-term productivity trend rates, rather than quarterly or yearly rates.


Papers presenting an appraisal and critique of wage controls in the Economic Stabilization Program of the Nixon administration; and on the possibilities of improving productivity through collective bargaining.


The authors examine how management, unions, and the government handle problems resulting from technological innovations in the transportation sector. They formulate public policy recommendations.


Analyzes the role of labor and labor-management relations in the U.S. transportation industry. Includes information on compensation trends, union structure, bargaining patterns, work rules, and labor productivity.


Reports on union practices known as “feather-bedding” which lower productivity and in most cases raise unit-labor costs. Cites examples of many different unions in the construction industry using practices which raise costs and lower productivity.


The authors discuss the development of, and reasons for, productivity bargaining in Britain.


The authors discuss productivity bargaining as a means of improving efficiency and lowering unit labor costs, while also giving workers significant economic gains. Reasons for its adoption are reviewed. Suggestions for its more widespread use in the U.S. are offered.


Discusses various bases for cost calculation, including intensity of care, and economies of scale, as well as the effects of inflation on costs. Presents case studies.


Discusses productivity, hourly compensation, unit labor costs, and prices in the total private, nonfarm, and manufacturing sectors for 1974. Presents annual rates of change in productivity and related measures 1969-74 for the total private economy, the nonfarm and manufacturing sectors, and nonfinancial corporations.

Argues that productivity is diminished because the military preempts capital and technical resources, eroding the economy's cost-reducing potential.


Examines the effect of the business cycle on productivity, costs, profits, and prices with particular attention to the 1961-73 period.


Compares unit labor costs in U.S. manufacturing with eight European countries, Canada, and Japan. Finds that U.S. manufacturing experienced the lowest average annual percent change in unit labor costs, output per man-hour, and hourly compensation over the 1960-1971 period.


The authors discuss recent productivity trends. They find that a slowdown has occurred since 1966, which they attribute to shifts in employment to higher from lower productivity sectors.


Tests the hypotheses that high inflation rates inhibit growth, and that the effect of inflation on growth depends on the level of economic development and price anticipations.


Examines the simple average productivity wage adjustment rule as it functions as a part of anti-inflationary wage policy. Finds it to be misleading even as a rule of thumb.


Discusses factors of productivity change, such as education, research, and capital formation. Also discusses the impact of productivity changes on labor costs. Gives his view of the role of trade unions in improving productivity.


Argues that the U.S. needs productivity bargaining because of poor productivity in the sixties accompanied by high unit labor costs, leading to inflation. Discusses English experiences with productivity bargaining.


Examines the effects of a pay system change on productivity, quality of performance, absenteeism, personnel turnover, and general employment climate. Finds that shifts to the premium payment system increased productivity from 5 to 35 percent.


Outlines the links between productivity, unit costs and prices, as well as the concept and measurement of productivity. Discusses effects of rising productivity. Relates instances of productivity bargaining.


Argues that the accelerationist hypothesis has neglected the role of productivity in wage determination. Incorporates productivity in a short-run model of the real wage rate and employment. Finds a direct relationship between unemployment and unit labor costs.


The authors examine the concept and operability of productivity bargaining in the context of a public sector enterprise. They argue that productivity

72
bargaining can help eliminate wasteful practices, and link wage increases to cost reductions.


The authors examine the relations between movements in money wages, real wages, unit cost and productivity, and raise issues relevant to the formulation of incomes policy.


Presents an econometric model of the Italian economy. Argues against the use of incomes policy. Finds a cost-push effect on wages, and asserts a shift in income distribution toward wage and salary earners.


Presents a factual and critical overview of Phase II of the price control program of the Nixon Administration.


Presents productivity and cost data, supplementing the data for the total private sector and some of its components.


Examines reasons for the deterioration in the U.S. trade balance since the mid-sixties. Particularly investigates inflation, declining productivity, and certain changes in the characteristics of U.S. products for exports, and in imported products.


Reports on the assembly industry of many Caribbean countries, noting the use of low cost labor as compared to the U.S., and high productivity, as the main factors which attract assembly plants to the area. Discusses the economic impact on the different countries and the benefits of locating plants outside the U.S.


Urges a reduction in the rapidly increasing expenditures on road goods transported in the U.K. Suggests that improved pricing and operational coordination will increase transport efficiency.


Presents highlights of conferences on labor-management cooperation to improve productivity and work life quality, together with a discussion of the factors that have led to the need for more such cooperation.


Examines the impact of financing capital formation by an inflationary budgetary deficit in a developing economy. Investigates the trade-off relation between inflation and output increases.


The authors explore the relationship between wage rates and prices and estimate the influence of price, unemployment, and productivity upon wage changes. Disaggregation techniques are used to analyze major sectors, thereby pinpointing influences that are masked by aggregation.


Compares Canadian productivity and unit labor costs with the experience of the United States over the period 1970-74. Finds the Canadian position has been deteriorating as a result of large wage gains and the slowdown in the world’s economy. Draws implications for future income levels in Canada.
Productivity and employment


Investigates the link between output growth and labor absorption. Focuses on prices and wages as possible sources of slow labor absorption.


Analyzes the structure and functioning of the labor market for scientists and engineers, developing a pertinent theoretical model. Finds great inefficiencies in the operation of this market despite sophisticated methods of job search. Offers remedial recommendations.


The authors note that the closing of the land frontier, coupled with an increasing agricultural labor force and limited nonfarm employment opportunities, requires an increase in the productivity of the land base. They detail the factors affecting productivity such as increasing crop yields, mechanical technology, the rate of diffusion of mechanical equipment and government programs, all of which have led to sharp increases in labor productivity over the period 1966-70.


Presents case studies of technological choices open to developing countries. Discusses conceptual and measurement issues bearing on alternative technological possibilities. Focuses on the analysis of detailed technological information, usually overlooked in general equilibrium planning models.


Explores relations between productivity and employment. Argues that strong productivity gains will lead to higher unemployment, and that an expanded public employment program to absorb the unemployed is advisable.


Argues that the “Green Revolution” can be organized so as to spread agricultural employment more evenly over the year; that it creates new nonfarm jobs; and that land reform is necessary to its success.


Discusses the effectiveness of tractors and other mechanized tools. Shows that tractors are ineffective for the small farmer because of high costs of operation and the small revenues brought in by additional crops.


Investigates the effects of teacher-paraprofessional employment on the kind and amount of instruction performed. Finds that though the routine work load of the teacher was not reduced, much additional work was done with disadvantaged children.


The authors expand the Harris-Todaro two-sector model of urban unemployment. They introduce capital mobility between sectors in response to differential rates of return. They analyze output levels, the effects of economic expansion, and arguments for wage and output subsidies.

Develops a model based on comparative cross-section analysis, the results of which comport with dynamic time-series models. Finds that the chief determinants of the demand for labor in a retail industry are relative input prices, the level of output, and the quality of labor.


The authors describe the supply and demand of low-skilled labor by State. Their estimates indicate that demand is slightly inelastic, while the supply function is backward bending for heads of households and other family workers.


Reports on discussions at an ILO seminar concerning such topics as the choice of technology, the promotion of employment in small scale industries, incomes policy as an element in employment strategy, and education and training policies.


Examines productivity increases in the upswing period of five business cycles, comparing increases in output to increases in output per worker. Concludes that the secular rate of increase of productivity in Britain may well be increasing.


Examines the economic and social aspects of pollution control in their broader aspects. Uses an interdisciplinary approach to the environmental problems arising from industrial activity.


Reviews studies of productivity, and employment and output growth in the service sector. Stresses the importance of continued study, inasmuch as the sector accounts for an expanding share of employment.


Examines the contribution of scientific manpower to the rate and nature of economic change; the impact of change on labor markets; and the determination of the number of persons employed in generating scientific and technical change.


Attempts to quantify the determinants of the shift in employment to services, using Australian data. Finds that the faster growth in service employment is due to differences in elasticities of demand for the outputs of the two sectors, and changes in input-output-coefficients.


Develops criteria for selecting development programs achieving an optimal growth path with respect to the economic growth rate and per-capita income and employment.


The authors develop a model of earnings determination. They present evidence that structural changes in employment opportunities took place in the sixties. They find that one-half of the gain in the nonwhite-to-white ratio is due to the exit of older nonwhites from the workforce, combined with the entry of younger, better prepared nonwhites.


After presenting data on the decline of farm employment in selected countries, the author addresses the problem of low agricultural productivity growth in Poland, which is associated with
a low rate of employment decline in agriculture. Examines the absorptive capacity of the industrial sector. Suggests planning measures to optimize migration out of agriculture.


Draws implications from the Japanese experience which apply to developing countries. Discusses such factors as investment, changes in employment structure and conditions of work. Concludes that a developing economy should have diversified input-output relationships among its industries so that a stimulus given to one spreads to all.


Argues that underemployment and unemployment have tended to rise as a result of the limited expansion of labor demand generated by relatively small internal markets, especially for capital-intensive products manufactured as import substitutes.


Measures service employment growth, and evaluates alternative explanations. Finds that while service industry output has remained unchanged relative to total output, service employment has expanded rapidly. Also finds that the quality of labor employed in services has improved more slowly than in general.


Argues the need for Russia to attain a higher level of productivity to meet the future needs of the economy. Points out that employment growth will slow and, at the present rate of productivity, future output is unlikely to meet demand.


Presents an analytical survey of the pertinent literature. Discusses the impact of output composition and of choice of techniques on employment, examining such subjects as intraindustry product mix, small-scale industry, capital utilization, and others. Concludes that the growth of manufacturing cannot in itself be expected to solve unemployment and underemployment problems.


Examines the impact of factor combinations or choice of techniques on employment. Finds that technological progress in Kenya has been labor-saving, and encouraged by capital subsidies. Urges adoption of measures conducive to the adoption of more labor-intensive technologies.


Attempts to measure the resource pool created by immigration and its effect on economic growth. Uses a counterfactual model to evaluate the demographic and economic effects that would have resulted in the absence of immigration.


The authors analyze the scope of computerized communications, and their effects on employment. They discuss prospective structural changes in the telecommunications industry, and the computer's impact on privacy. They also examine the role of trade unions in planning the extension of computerized networks.


The authors criticize the approach to employment and educational planning which subordinates manpower and education to the production plan. They propose a simultaneous approach.

Questions that capital deepening necessarily lowers employment absorption. Finds that capital substitution in primary production processes has minimal impact on employment. Also finds that the elimination of excess capacity of labor and capital spurs productivity growth.


Explores the possibilities for substituting labor for capital in the production process. Bases data on observations at the firm level. Results indicate higher substitution possibilities than have usually been found. Considers policy implications.


Reports on efforts to measure the relation between growth and employment. Discusses factors contributing to the underutilization of labor such as the unevenness of technology and productivity differentials.


Tests the hypothesis that long-run excess supply of labor exists in Hawaii. Shows that most of the employment expansion in the State in the past 20 years has been in the service sector. Examines the conditions under which the supply of labor will outrun employment opportunities.


The authors argue that engineering influence is as important as distorted factor prices in explaining why production tends to be more capital-intensive in developing countries. They present evidence from a study of Ethiopia and Ghana and conclude that labor-intensive processes provide more employment.


Develops a cross-section model on the association between output and employment by sector in 12 countries. Finds high correlation between productivity and output growth. Devotes considerable attention to the Italian experience.


Points out the possible trade-off between employment, consumption and economic growth. Argues that Indian planning performance failed in the area of income distribution but not growth. Offers a model to achieve a socially optimal level of employment.


The authors estimate the supply for farm labor inputs, and the demand for farm output. They find that changes in technology and prices are the major exogenous influences, and that 90 percent of farm program benefits accrue to landowners.


Argues for a reorientation of the economic development process so as to absorb the unemployed and lessen income inequality. Holds that the belief of policymakers that a lack of capital hindered development led to the adoption of labor-saving methods, worsening the problem of unemployment. Offers remedial recommendations, centering on labor-intensive investments and agricultural reforms favoring small farmsteads.


Examines the argument that labor supply is a constraint on the potential growth of productivity in manufacturing. Presents a statistical analysis of the theory. Concludes there is no significant
relationship between productivity growth and labor input growth over the period 1950-65.


Discusses the overgrowth of service industries in developing countries. Compares Colin Clark's thesis with his own findings. Also discusses the demand for services, and the choice of techniques in producing them.


Finds that mechanization was heavily subsidized by the state, at negative real interest rates. Also presents other findings bearing on the financial advantages of substituting capital for labor, making the absorption of labor in agriculture more difficult.


Evaluates the employment-expanding prospects in the service industries in light of the dilemma of increasing employment and production without adding to inflation. Concludes that the service industries have only a limited potential for absorbing unskilled labor.


Links employment and labor productivity trends in India with the development strategy followed since 1959. Finds that labor absorption in services is poor, and that while labor productivity in large-scale manufacturing, utilities, and railways has increased, it declined in agriculture. Holds that the strategy to shift resources to agriculture can raise the rate of economic growth without worsening the distribution of income.


Presents a model identifying causes of high rates of rural emigration. Argues that the institutional system of tenure subjects rural-agricultural labor to limited employment opportunities. Outlines situations of economic stress.


Investigates the relationship between changes in output and labor input. Finds that production worker hours fully adjust proportionately to changes in output within six months. Production worker employment, however, adjusts to output changes with a somewhat longer lag.


Analyzes two dimensions of physician supply: hours worked per week and weeks worked per year. Finds that evidence to support a backward-bending supply curve is weak, and that physician input is not responsive to wages. Draws policy implications on price control and physician preference for shorter workweeks.


Presents data on civilian employment by sector in 10 countries at 5-year intervals from 1950 to 1970. Finds that employment disparities among the 10 countries narrowed significantly.


The authors present comparative statistics on labor force, employment, and unemployment for the United States and eight foreign countries—including Canada, Great Britain, France, Japan, and Germany, 1968-72.


Discusses the employment problem of less developed countries as one of providing sufficient demand to employ available labor, rather than one of identifying and mobilizing surplus labor supply. Examines the relation between the goals of raising
output and of achieving full employment, and offers policy suggestions.


Examines the impact of low-productivity, low-skill, low-wage workers on national output. Evaluates demand and supply factors, and presents a remedial program.


Analyzes employment problems as deriving from a dualistic form of development with modern capital-intensive and high-productivity technology in one sector accompanied by traditional low-productivity technology in the other. Defines and examines the characteristics of appropriate technology for developing countries. Offers policy suggestions.


The authors investigate whether maximizing output levels is consistent with maximum employment objectives. They conclude that policies which spur output growth are compatible with the growth in employment. They note that rapid output increases have been realized with no increase in employment in some less developed countries due to the productivity of capital; the failure to channel higher savings into investment; rising real wages; and repatriation of foreign owned profits.


Examines the effects of agricultural mechanization on employment, land and labor productivity, and production efficiency, in three typical farm resource situations.


Discusses the disemployment effects of telephone communications automation, and offsetting developments. Holds that essentially the mechanization of telephone switching has tended to stabilize employment. Examines the impact of telephone automation on collective bargaining in the industry.


The authors draw implications for future U.S. economic activity resulting from a reduced birth rate. They assert that new models must be developed to explore the effects of low population growth and constrained economic growth.


The authors contend that there is a significant and inverse relationship between the labor force participation rate and the percentage of the labor force employed in the service sector. They develop a model to test observations from each State. They conclude this relationship will aid the study of sectoral distribution of employment.


Examines the "push" and "pull" factors commonly cited as contributing to the brain drain in the context of the controversies surrounding the issue. Finds that U.S. immigration laws are the main contributing factor.


Argues that official labor force statistics obscure part of the rise in wage-earning employment because they ignore small urban establishments. Analyzes the determinants of growth of these establishments. Recommends steps to stimulate this growth.

Examines the concurrent growth of the urban population and the service workforce. Concludes that population redistribution has had a strong influence on the growth of the service sector between 1840 and 1900.


Examines the difficulties facing developing nations with urban unemployment and underemployment. Tests several models of labor absorption with Philippine manufacturing data.


Shows that the optimal level of capital utilization is an economic variable that depends on relative factor prices that have rhythmic patterns, and on elasticities of substitution. Describes the impact of capital utilization on employment. Draws implications for the underdeveloped countries with low levels of capital utilization and employment growth.


The authors use production function analysis to estimate the potential contribution of physician assistants in medical care delivery. They find that in the most productive cases, the assistant can replace half of the full-time output of a physician.

Productivity and economic growth


The authors are concerned with the impact of knowledge on productivity change. They find that knowledge (i.e., the productivity residual) had little effect in the 19th century. The rise in the productivity residual in the 20th century has tended to reverse the upward movement of the capital-output ratio typical for the 19th, and has exerted a capital-augmenting effect.


Examines the conditions under which a successful leading sector for development is established. Establishes the conditions under which tourism becomes a leading sector, by examining the characteristics of international demand for tourism. Presents a detailed survey of the Greek tourist industry and its impact on the Greek economy.


The authors attempt to identify sources of growth, other than labor and capital, which accounted for 50 percent of productivity growth in Japanese agriculture. They introduce education and research into the agricultural production function, reducing the residual to a negligible magnitude.


Examines the role of the external payments balance in the growth of the Japanese economy. Tests the hypothesis which attributes Japanese growth to government-backed cartels. Finds that growth can best be explained in terms of the foreign exchange market, the labor market, and the capital market.


Examines the problem of widespread unemployment, and its causes, and the influence of world views which constrain development policies. Presents extensive statistical appendices.

Analyzes reasons for the high productivity growth rate in Japan and its economic and social impact. Concludes that the economic aspects of high productivity growth are generally favorable, but that society and the environment have undergone extreme changes, not always beneficial.


Offers a critique of current approaches to project evaluation. Argues that such evaluation must take account of internal and external political and economic structures. Advances a strategy of development emphasizing the production of wage goods.


The authors identify a series of stages in the industrial development of Brazil revealing the forces behind it. They attempt to clarify the impact of development on the structure and functioning of the Brazilian economy.


Develops partial and total factor productivity measures and presents subperiod analyses of growth trends.


Presents patterns of change as measured by certain “developmental” indicators across 38 countries classified as either “industrialized” or “nonindustrialized.” Covers two time periods: 1865-1966 and 1946-1966.


Explores the neoclassical growth model and derives conditions for the stability of the balanced growth path in the presence of Hicks-technical progress which may be neutral or non-neutral.


The authors survey basic social and political factors impinging on their subject, such as population growth, natural resources, the role of nationalism and of government, and labor and capital.


Investigates the long- and short-run relations between exports and economic growth in postwar Japan. Concludes that the export sector contributes to growth because of its high rate of technological change, and its ability to provide foreign exchange to finance imports.


Examines “steady-state” growth using Marxian, classical, linear, and neoclassical models. Stresses the continued scope of technological progress and discusses resource allocation within a growth context.


Examines several growth models incorporating various assumptions about savings. Models with heterogeneous capital goods and models of optimal growth are also examined. Also discusses the role of technical progress in economic growth.


Relates energy inputs to economic growth. Finds that the energy coefficient falls from infinity to unity with increased use of fuel as a country passes from primitive forms of output to the ultimate stage of energy-intensive production.

Holds that the major source of growth in South Korea was government policy permitting prices (including the exchange rate and interest rate) to reflect actual opportunity costs. Uses a Harrod-Domar framework in discussing sources of growth.


Finds that the missions stressed the improvement of agriculture and transportation facilities and that they discouraged government operation of industrial plants, recommending credit facilities, sites, tax incentives, and training programs instead. Also reports that the missions held orthodox views regarding international trade as a transmitter of growth.


Presents a quantitative model of economic growth by which to explain the rates achieved by several industrial nations. Attempts to identify the sources of growth during the period reviewed.


Investigates empirically the relation between aggregate rates of fixed investment and rates of economic growth in 77 countries. Also investigates the sectoral allocation of fixed investment expenditure.


Develops a model to appraise the effects of pollution abatement on the rate of economic growth. Considers structural changes tending to reduce the long-term growth potential. Suggests adaptive responses to temper the impact of environmental constraints.


The authors argue that distributional objectives should be treated as an integral part of development strategy; and that these objectives should be formulated in terms of income and consumption gains of different social strata, special weight being given to low-income groups.


Presents the first comprehensive analysis in English of North Korean economic development. Evaluates and reconciles data from various sources.


Develops a total factor productivity index, adjusting labor input for quality change. Identifies the sources of growth, and decomposes the contributions attributable to expansion of input stocks and productivity.


Analyzes economic development strategies in historical perspective. Focuses on the post-1963 period, when planning by the state began to be emphasized. Examines the impact of the most recently adopted strategies on long-term growth.


Describes Russia’s aid to China’s steel industry, 1950-57, and the contrast in technological pattern followed by the Chinese thereafter. Compares Japanese experience in the use of Chinese raw materials early in the century. Also introduces other international comparisons.

Examines the possible effects of income redistribution on savings, imports, and "economies of scale", and the consequences on demand for labor and capital.


Assesses the relative contribution of capital and labor to economic growth in the Soviet Union, and the role of factor productivity in the decline of this growth during the sixties. Uses the calculated shortfall from the optimal efficiency frontier as approach.


Analyzes the impact of waste discharge controls on growth of production capital. Concludes that there is an upper limit on the degree of waste treatment that can be imposed.


Discusses the conditions under which mature economies have grown. Develops a theory of growth and stability. Analyzes trends in economic aggregates in the United States and the United Kingdom.


The authors examine the relation of economic growth to output, employment, and the rate of investment in 12 economies. They test the hypotheses that growth results from increased resource inputs or better allocation of resources.


Measures the contribution of labor, capital and total factor productivity to the growth of two-digit manufacturing industries. Presents estimates of elasticities of substitution. Finds that the contribution of input factors to output has exceeded that of total factor productivity.


A collection of essays exploring the conflict between theories of unlimited economic growth (with emphasis on production), and a stationary, no-growth economy (with the central concept being distribution). Articles discuss economic and social constraints, and ethical considerations.


Finds no conclusive relationship between a State's style of banking and its economic growth. Indicates that any advantage a particular type of banking structure might have in attracting capital and increasing saving would be outweighed by Federal Reserve national policy.


Investigates the patterns of output, input, and productivity in the Indian agricultural and non-farm sectors, 1955-71.


The authors seek to explain economic growth, particularly in the United States, in terms of arrangemental change—the innovation, mutation, and demise of institutions. They argue that for institutions to be innovated, the innovator must be able to internalize profits without the costs of the innovation exceeding the benefits. They interpret the evolution of various facets of American economic growth in terms of their theory.


Nine papers dealing with such subjects as output growth, changing consumption patterns, labor, technology, and manufacturing. The authors apply the methods of cliometrics in arriving at their conclusions.

Examines the position of women in developing countries under changing conditions of agricultural technique. Holds that women perform much agricultural work when such techniques are primitive, while men perform the work as techniques advance.


Argues that the process of development cannot be adequately couched in purely functional relations, such as savings and income or population changes, and that the social and institutional climate must be taken into account. Examines the economic transformation of Puerto Rico in light of the government’s development policies and inputs.


Discusses land reform in relation to agricultural employment, investment, and productivity. Theories on relationships between land reform and economic development are discussed.


Analyzes Turkish industrialization in terms of international comparisons over time, and of production functions of manufacturing industries.


The authors analyze the stages of economic growth of Manchuria, particularly the effect on growth of the relation between population, farm production, and exports prior to 1950; and industrialization, supplemented by Soviet credits, after 1950.


Examines Canada’s growth potential to 1985. Considers the development of Canada in terms of current policies. Also deals with the performance of the Canadian economy in 1974, and with some of the factors accounting for the slowdown in Canadian economic growth.


Discusses labor force participation, population growth, and international trade.


Presents a reconstruction of the work of Quesnay. Discusses first the basic assumptions leading to the Tableau Economique and its successive versions. Then, investigates the effects of departures from the Tableau’s equilibrium proportions, and the conditions giving rise to growth or decline in economies.


Discusses neoclassical and neo-Keynesian growth theories. Presents a model of equilibrium growth, incorporating technical progress. Also discusses disequilibrium growth, and the relation between actual and equilibrium growth.


Documents the environmental feedbacks on labor supply, capital depreciation, and total factor productivity which untreated waste emissions can have.


A collection of papers examining the impact of cultural, economic, and political factors on development.

Discusses the labor market in Japan, touching on many subjects including productivity. Also discusses the future of Japan’s economy. Predicts that productivity will decline somewhat as a result of a slowdown of growth and technology.


A collection of papers dealing with such subjects as the political and social consequences of economic reforms; the interrelations of science and technology in the Soviet Union; and income distribution and its measurement.


A collection of essays dealing with problems in the theory of economic growth; planning and the market; and with growth in historical perspective.


Investigates the extent to which economic growth is influenced by improved factor allocation. Presents evidence from a production function model which suggests that increased efficiency in the factor markets is of slight importance to economic growth.


Analyzes the relationship between farm size and productivity for two Indian districts. Finds that the medium size farms are the most efficient in the use of capital and labor. Notes that the factor intensity of the small farm is greater than that of the large, wage-based farms. Concludes that growth will not be enhanced simply by increasing farm size.


Argues that it is possible to maintain economic growth together with a viable environment in terms of certain models—the substitution of capital and labor for pollution emissions; a “technical change frontier” between pollution abatement and output increase; fixed resource proportions in output.


Studies the effects of a zero-growth level of pollution control on output growth and per capita output by means of an econometric model. Suggests a tax on pollution as a means of controlling it. Finds such a tax will slow output growth.


Examines the role of agriculture, capital, foreign trade, and technology in economic growth. Reviews some theories of growth and development and describes historical experiences of growth and structural change.


Examines the short run regional employment spread effects of national economic development in the U.S. since the Korean War. Concludes that the growth center spread effects were related to the rate of growth of economic activity but largely independent of city size or the degree of industrial diversity of the city.


Argues the “unique” character of U.S. economic growth, much of it representing extraction of rich natural resources as a form of production. Believes that U.S. economic growth cannot serve as a model for developing countries.

A selection of 17 articles, essays, and lectures on the industrial revolution. Discusses how the nature of economic growth has changed. Analyzes productivity and growth, and the resultant changes in the standard of living.


The authors hypothesize that an efficient economic development strategy depends critically on the achievement of rapid technical change leading to productivity growth in agriculture. They present a comparative analysis of agricultural development in the U.S. and Japan.


Examines the relation between industrialization and regional inequality in England, Wales, Scotland and Ireland from 1851 to 1961. Finds no contribution by industrialization to the national development through gradual elimination of regional inequality.


The author summarizes his views on capital, wages, and invention. Clarifies his concept of the “impulse” of an invention.


Argues that the Vargas regime was committed to structural changes in the economy via industrialization, for political and economic reasons—contrary to prevailing interpretations.


Analyzes a neoclassical growth model in which capital equipment once installed cannot be shifted. Considers the growth of the world economy with and without capital movements, and examines the effects of migration on steady-state per-capitas consumption.


Analyzes the economic growth of Israel in light of Israel’s unique population transplantation and capital importation.


Analyzes the role of agriculture in economic development drawing from British, Indian and African experience. Argues that agriculture is not a declining industry, and that productivity in agricultural methods releases workers to other sectors of the economy, allowing development and thereby increases in the standard of living.


Determines the importance of exports in U.S. economic development, together with interregional differences. Develops a predictive model of the interregional transfer of goods prior to exportation, and presents a description of the regional developmental process in terms of regional commodity exports.


Examines the intersectoral transfer of labor and capital between agriculture and industry in a labor-surplus, developing economy. Argues that labor-intensive technology must not be forced into agriculture. Concludes that the agricultural sector is a reservoir of labor, and generates capital resources for the industrial sector of developing countries.


Investigates the technology, economics, and institutions surrounding the market for used machinery and the relation of the market to the
welfare of less developed countries. Concludes that used machinery currently makes a marginal contribution, and that its role should be substantially increased.


Finds that development strategy is based on the concept of “balanced growth.” Examines its defects and performance record. Examines the relation between the economy’s absorptive capacity and planning strategy.


Uses a method borrowed from Denison to analyze Japan’s economic growth. Finds that the contributions of labor, capital, and “residual” factors to economic growth are higher for Japan than for the U.S. or Europe.


Compares Turkey’s railroad development with Great Britain, the U.S. and Russia. Finds that the economic consequences were unique to Turkey, and were largely confined to the agricultural sector of the economy.


Discusses the economic renaissance of Ireland since 1958. Examines government policies aimed at spurring economic growth with special emphasis on regional development schemes.


Focuses on the contribution of population to economic development. Presents evidence to support the Kuznets thesis that population size is associated with increasing returns to scale in inventive activity. Concludes that the benefits of population have diminished over time and are insignificant today.


Presents measures of net and gross investment in terms of all outlays augmenting income- and output-producing capacity, i.e., of both tangible and intangible capital investment. Discusses relation to GNP, composition of investment by type, gross capital stocks and returns on total capital. Recommends steps to improve capital productivity.


Uses regression analysis to explain the causes of labor productivity improvements in Irish industry from 1926 to 1966. Concludes that output expansion and technical change, rather than improvements in the quality of the labor force, are primarily responsible for productivity improvements.


The authors develop a model of optimal capital utilization to show that the rise in capital productivity implies underutilization of capital stocks in poor countries. They show that capital productivity will decline with development, as the increased stock of capital accompanies a decline in the optimal utilization of capital.


Summarizes his findings on six characteristics of economic growth: high rates of growth of per capita product and population; rate of rise in productivity; rate of structural transformation; change in structures of society and ideology; spread of modern economic growth; and limited economic performance of less developed countries. Discusses some social implications of modern economic growth.

Presents essays on the broader features of modern economic growth, capital formation in historical perspective, the gap between the rich and the poor countries, and related themes.


Investigates the interrelations between economic, social, and political behavior in the development of Appalachian counties, applying factor analysis.


A collection of papers discussing such topics as long-term capital markets; the impact of technology on economic efficiency; comparisons between the British and the American economy; and productivity in the capital goods and services sector.


Reviews the attempts to explain sectoral growth, and analyzes the growth experience of Punjab in the light of these theories.


Presents a quantitative model of growth in the U.S. and eight European countries. Stresses investment and trade liberalization. Includes materials on growth of capital stock.


Examines gross fixed capital formation, the role of government spending, foreign sector influences, and resource exhaustion as contributors to economic growth. Finds that increased urbanization and domestic unrest accompany higher rates of growth.


Reviews the relation between Britain's growth problem and foreign trade and payments problem over the past 100 years. Explores the two-way interaction between growth and international trade and comments on how foreign trade affects productivity, investment, and demand.


Traces origins and development of the cotton industry in Northern Italy. Notes its rapid growth, technological innovation, and creation of new patterns of taste and consumption in Europe.


Examines the changing role of economic and institutional devices in the transfer of resources among sectors. Discusses the relationship between such resource flows and technological change in the agricultural sector.


The authors examine the structure of the industry in a socioeconomic context. They conclude that the decline in cattle is due to government policies adverse to innovation and long-term investment.


Develops a model of early modern industrialization, derived from theories of labor surplus economies. Shows that large labor pools are conducive to rapid capital accumulation in the modern sector of an economy. Explains the development of the Low Countries over the period reviewed on the basis of the model.
12.090 Newbery, D. M. G., and Atkinson, A. B. “Invest­
ment, Savings and Employment in the Long
No. 3, October 1972, pp. 460-475.

The authors examine differences in the time
paths by which various economic agents interact,
and how these differences affect long-term growth.
They present a range of models with the economy
not always in equilibrium, and how they differ
from conventional models which assume equi­
librium of economic interactions.

Minneapolis, University of Minnesota Press,

Evaluates economic and social changes under
Castro. Devotes some attention to the agricultural
sector, issues of labor incentives, and productivity.

Theory from an Evolutionary Perspective:
The Differential Productivity Puzzle.” *American
Economic Review*, Vol. 65, No. 2, May 1975,
pp. 338-344.

The authors report on efforts to integrate
processes of technical change at the level of the
firm with what is known about technological
advance as reflected in industry or economy-wide
time series data on output and inputs. They
develop a model to explain cross-industry and
intersectoral differences in growth.

12.093 Noho, Yoshio. “Population Growth, Agricultural
Capital, and the Development of a Dual Econ­
yomy.” *American Economic Review*, Vol. 64,
No. 6, December 1974, pp. 1077-1085.

Examines the effects of agriculture upon
economic development. Concludes technology
assists developing countries in escaping stagnation.
Suggests policy alternatives which flow from a
development model incorporating agricultural
capital.

12.094 Nyilas, A. “The Efficiency of Real and Human Re­
sources in Hungarian Industry.” *Review of In­
come and Wealth*, Vol. 20, No. 4, December
1974, pp. 469-482.

Attributes economic growth to structural
change, increased labor input, and productivity
gains. Attempts to break down the development of
the country’s industry into its capital and human
resource components.

12.095 Ohkawa, Kazushi, and Rosovsky, Henry. *Japanese
Economic Growth: Trend Acceleration in the
Twentieth Century*. Studies of Economic
Growth in Industrialized Countries, Stanford,

The authors analyze the impact of labor, tech­
nology, demand, and the foreign sector on growth.
They also present a growth model designed to ex­
plain long swings and trend acceleration in this
century.

12.096 Olson, Mancur, and Landsberg, Hans H., editors.
*The No-Growth Society*. New York, Norton,

Reprint of 12 essays on zero population growth
and the steady-state economy. Ways of channeling
development for the improvement rather than the
destruction of the environment are discussed. The
editors compare opposing views to evaluate the
growth versus no-growth controversy.

12.097 Onoh, J. K. *Strategic Approaches to Crucial Poli­
cies in Economic Development. A Macro Link
Study in Capital Formation, Technology and
Money*. Portland, Oreg., International Scholarly

Surveys economic development theories focusing
on the problems related to capital allocation,
acquisition of technological capability, and money
supply. Evaluates recent trends in several African
nations.

12.098 O’Relley, Zoltan Edward. *Major Currents in the
Postwar Economic Development of Hungary:
Goals, Achievements, and Reforms*. Doctoral
dissertation presented to the University of

Critically reviews the impact of traditional
planning on the economic growth rate, prior to the
planning reform of 1968. Examines the impediments
it presented to continued high growth. Also examines the reformed planning mechanism,
and compares it with the Soviet Union.

12.099 Organization for Economic Cooperation and De­
velopment. *The Industrial Policy of Japan*.

Examines Japan’s industrial policies in light of
its growth experience. Includes statistical data for
the 1960’s, and projections for the 1970’s.

12.100 Perkins, Dwight, editor. *China’s Modern Economy
in Historical Perspective*. Stanford, Stanford
A collection of essays dealing with such subjects as the evolution of the textile industry; reasons for lack of technological innovation among Chinese artisans; reasons why, generally, China's industrial development was relatively slow.


Examines such factors as embodied technical progress, economies of scale, and movement of labor from low productivity to high productivity industries. Concludes that British management has not remained sufficiently abreast of methods for increasing efficiency, and British labor has been too prone to strikes and restrictive work practices.


Analyzes growth trends in the U.S. Concludes that the U.S. experienced retardation in growth in the first third of the twentieth century.


Develops a general theory of institution-building for economic growth, giving some developing Latin American countries as examples.


The authors develop a model to explain the decline in unit labor requirements in British agriculture. Variables considered are changes in technology, the quality and cost of inputs, and the volume and composition of outputs.


Reports on a study showing that relative inequality as well as absolute levels of living of the poorest deciles of the population worsened, even while per capita consumption of the population improved.


A collection of papers discussing such topics as human resources as factors in development; problems of planning and the quality of life; technology; income distribution; and constraints on development.


Examines economic growth models in light of certain physical laws, e.g., the exhaustibility of resources, in terms of both the long and short run. Argues that the price system is not adequate for reconciling short-run and long-run demands upon resources. Urges adoption of policies incorporating energy budgets and materials flow analysis. Offers critique of existing policies bearing on the subject.


Examines the impact of canals on the economic development of the West between 1820 and 1840. Argues that their immediate impact was to stimulate the production of agricultural staples.


A collection of essays on such themes as the postulate of the small farmer's economic behavior; the agricultural labor surplus; the generation and diffusion of agricultural technology; agriculture as a resource reservoir for development; and others.


Examines a 30-year experience in 12 Latin American countries. Deals with problems of institutional adaptation and agricultural productivity. Concludes that U.S. assistance programs rate low in effectiveness and significance.

Examines the value of the engineering consultant industry to developing countries which have an industrial base. Concludes there are some conditions under which the high cost of establishing such an industry is justified.


Develops a sources of growth analysis based on a cross-section regression study of thirty-nine less developed countries. Compares his results with Edward Denison's and the few time series studies available.


Examines the sources of Brazilian economic growth. Argues that success in spurring growth was linked to defining areas of development priority, use of market decisions and implementation, and foreign investment.


Deals with the interrelations of decelerating growth sectors, phases of scarce and abundant foodstuffs and raw materials, and international migration waves.


Relates 50 variables to economic growth in four geographical regions of the U.S. by means of regression analysis and factor analysis.


Seeks to demonstrate that there are many operational policies to achieve full employment, industrialization, and self-sustaining growth. Presents two models which apply these policies, one holding population constant, the other accounting for population and employment.


Discusses the use of waterways and railroads in the Californian San Joaquin Valley. Estimates costs and revenues. Analyzes the growth for each means of transport.


Argues by using input-output data that Federal aid to the depressed areas of Appalachia has been based on faulty theory, i.e., growth center strategy, and that the stagnation and decline of the region has been linked to concomitant developments in the industries on which its economy has been based.


The authors discuss the role of overseas trade and transportation improvements and their effects on the development of colonial North America. They study colonial economic development and trade, and the sources and consequences of productivity changes in distribution facilities and shipping.


The authors argue that improvements in shipping and other distribution activities were an important source of productivity advances in colonial America.


Analyzes reasons why economic growth has primarily benefited the well-to-do. Argues that fundamental political transformation is required, involving drastic redistribution of income, if growth is to benefit the poor.

Argues that by far the most significant factor in Soviet economic development has been the absorption of Western technology and skills. Covers a broad area of industrial technology, and finds that no fundamental industrial innovation of Soviet origin can be identified between 1917 and 1965, nor in the latter part of the sixties. Deals with the question why this is so.


Analyzes the human capital approach to the size distribution of earnings when investments are restricted to formal schooling. Focuses the model on the investor in human capital as a profit-maximizer. Concludes that the relative rates of increase of physical capital, natural labor, and technology determine whether incomes become more equally distributed over time.


Examines the relation of exports of tin and rubber to economic growth. Finds that a high proportion of export income is retained locally, and that the quality of labor has improved.


Analyzes demographic and monetary factors in causing long cycles in investment, productivity, and real income since 1840. Examines black migration to America from 1870, and the trans-Atlantic brain drain since 1950.


Compares political and economic developments in South Africa with similar developments in Tsarist Russia, Imperial Germany, and the American South. Considers the effect the South Africa mining compound had on the process of urbanization.


Presents a two-sector growth model to explain Japan’s process of development, and to provide perspectives on future growth potential.


Argues that exponential growth carries the germ of its deceleration; that the future of industrial growth may partly depend on societal pressures for enhanced quality of life and on the manner in which scarce resources are allocated.


Traces the technical and institutional changes in India which resulted from the British government’s efforts to raise agricultural productivity. Cites benefits and failings of this effort.


Draws from economics, sociology, history and anthropology to put forth a theory of development. Asserts that ecological disequilibrium is the spur to economic development.


Attempts to explain equipment replacement decisions during periods of rapid growth, technological improvement and variable tariff policies, and to identify the sources of improved produc-
tivity. Determines the relative importance of each source of labor productivity.


The authors comment on an article by Gordon C. Winston on capital utilization, criticizing his use of the capital-output ratio of real value of assets to value added unadjusted for capacity use, as an inappropriate explanatory variable. They argue that both the size of the firm and the capital intensity of production have a positive effect on the level of capacity utilization.


Discusses the role small industries played in capital accumulation on the local level in China. Analyzes how the building of water conservation works and power stations by labor-intensive techniques contributed to agricultural productivity and stimulated local industrialization by providing a cheap power source. Shows how small industry at the local level promotes farm mechanization.


Discusses labor surplus theory and the general structure of closed and open economies. Examines the agricultural sector in detail. Presents empirical data on agricultural output in India.

Bibliographies, annual reports, etc.


Selected literature on the historical relationship between technology and social change is summarized and discussed. Covers such areas as technology and economic growth, the forces of diffusion and resistance, and the effect of single technologies on social change.


Presents as an appendix of this survey article an authoritative bibliography of works bearing on the title theme.


A bibliography on the subject is appended to the article on the pages indicated.


The Commission’s Annual Reports present discussions of recent and long-term trends in productivity, and data bearing on them, as well as of the work performed by the Commission during the year covered by the Report.


Annotations of 126 research reports on sources of productivity change, effects of job improvement, personnel management, and the relationship of productivity to the economy as a whole.


Monthly publication presenting graphs on changes in prices, wages, costs, profits, and productivity in the U.S. economy, in their historical setting.


Monthly publication featuring household data on the labor force, total employment and unemployment; jobseeking methods used by the unemployed; establishment data on employment, hours, earnings, and turnover rates; output per hour, hourly compensation, and unit labor costs; insured unemployment; special articles presenting data on various phases of labor force.


Contains time series on BLS statistics, including productivity and unit labor costs. Also presents explanatory notes covering the statistics.


Outlines BLS programs, including those covering productivity and technology.


Regularly publishes original articles on concepts, trends, and the sources of productivity, as well as on other subjects relating to productivity and technological change. Also lists new publications on productivity each month.


Provides annotated references for nearly 800 publications published between 1965 and 1971, dealing with concepts and methods, measurement of levels and trends, the sources of productivity change, and the relation of productivity to the economy as a whole, and to economic variables such as wages and prices.


Presents data on productivity, hourly compensation, and unit labor costs in the total private sector as well as separately for the nonfarm and manufacturing sector.


Presents an annotated compilation of Government publications, reports, and manuals, concerning the design and the use of work/productivity measurement systems, and of capital investment opportunities.
## Author Index

(Authors of theses and dissertations are not included)

<table>
<thead>
<tr>
<th>Author Name</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abed, George T.</td>
<td>11.001</td>
</tr>
<tr>
<td>Abel, I. W.</td>
<td>10.001</td>
</tr>
<tr>
<td>Abramovitz, M.</td>
<td>12.001</td>
</tr>
<tr>
<td>Acheson, K.</td>
<td>12.133</td>
</tr>
<tr>
<td>Adiseshiah, Malcolm S.</td>
<td>6.001</td>
</tr>
<tr>
<td>Akino, M.</td>
<td>12.003</td>
</tr>
<tr>
<td>Alamad, Q. K.</td>
<td>5.001</td>
</tr>
<tr>
<td>Alexandrakis, Nicos E.</td>
<td>12.002</td>
</tr>
<tr>
<td>Aliber, R. Z.</td>
<td>12.004</td>
</tr>
<tr>
<td>Allen, R. G. D.</td>
<td>1.001</td>
</tr>
<tr>
<td>Allenspach, Heinz</td>
<td>6.002</td>
</tr>
<tr>
<td>Almon, Clopper, Jr.</td>
<td>3.001</td>
</tr>
<tr>
<td>Anders, Gerhard</td>
<td>12.005</td>
</tr>
<tr>
<td>Andrews, W. H.</td>
<td>3.016</td>
</tr>
<tr>
<td>Andrieux, Pierre</td>
<td>11.028</td>
</tr>
<tr>
<td>Angilley, A. S.</td>
<td>9.001</td>
</tr>
<tr>
<td>Anwarugzaman, C.</td>
<td>5.001</td>
</tr>
<tr>
<td>Arai, Joji</td>
<td>12.006</td>
</tr>
<tr>
<td>Ardolini, Charles W.</td>
<td>1.003, 1.004, 3.002</td>
</tr>
<tr>
<td>Armstrong, Alan</td>
<td>5.002</td>
</tr>
<tr>
<td>Armstrong, Douglas</td>
<td>13.001</td>
</tr>
<tr>
<td>Asher, E.</td>
<td>5.003, 8.002</td>
</tr>
<tr>
<td>Athreya, Venkatesh</td>
<td>12.007</td>
</tr>
<tr>
<td>Atkinson, A. B.</td>
<td>12.090</td>
</tr>
<tr>
<td>Aufhauser, R. K.</td>
<td>8.004</td>
</tr>
<tr>
<td>Ault, David</td>
<td>8.005, 8.006</td>
</tr>
<tr>
<td>Azevedo, Ross Eames</td>
<td>11.002</td>
</tr>
<tr>
<td>Backman, Jules</td>
<td>8.007</td>
</tr>
<tr>
<td>Baer, Werner</td>
<td>12.008</td>
</tr>
<tr>
<td>Bailey, Duncan</td>
<td>6.003</td>
</tr>
<tr>
<td>Balasubramanay, V. N.</td>
<td>8.008</td>
</tr>
<tr>
<td>Baldwin, Robert E.</td>
<td>1.006</td>
</tr>
<tr>
<td>Ball, Robert</td>
<td>3.003, 3.004, 3.005</td>
</tr>
<tr>
<td>Ban, Sung Hwan</td>
<td>12.009</td>
</tr>
<tr>
<td>Bandurski, Bruce L.</td>
<td>1.005, 10.002</td>
</tr>
<tr>
<td>Banks, Arthur S.</td>
<td>12.010</td>
</tr>
<tr>
<td>Barkai, H.</td>
<td>6.004</td>
</tr>
<tr>
<td>Barker, Randolph</td>
<td>8.009, 11.003</td>
</tr>
<tr>
<td>Barr, D. W.</td>
<td>8.010</td>
</tr>
<tr>
<td>Barr, Terry Noel</td>
<td>1.007</td>
</tr>
<tr>
<td>Barraclough, S.</td>
<td>8.011</td>
</tr>
<tr>
<td>Barro, R. J.</td>
<td>10.003</td>
</tr>
<tr>
<td>Barron, Theodore E.</td>
<td>12.088</td>
</tr>
<tr>
<td>Basche, James R. Jr.</td>
<td>8.012</td>
</tr>
<tr>
<td>Batra, Raveendra N.</td>
<td>8.013, 12.011</td>
</tr>
<tr>
<td>Baum, Stephen J.</td>
<td>6.005</td>
</tr>
<tr>
<td>Beach, E. F.</td>
<td>8.014</td>
</tr>
<tr>
<td>Beatty, Richard W.</td>
<td>6.006</td>
</tr>
<tr>
<td>Becker, Gary S.</td>
<td>6.007</td>
</tr>
<tr>
<td>Beckman, M. J.</td>
<td>1.008</td>
</tr>
<tr>
<td>Bell, Clive</td>
<td>8.015</td>
</tr>
<tr>
<td>Bell, Daniel</td>
<td>8.016</td>
</tr>
<tr>
<td>Bellante, Donald M.</td>
<td>6.008, 6.009</td>
</tr>
<tr>
<td>Ben-Porath, Yoram</td>
<td>9.004</td>
</tr>
<tr>
<td>Bergson, A.</td>
<td>1.009</td>
</tr>
<tr>
<td>Berki, Sylvester E.</td>
<td>1.010</td>
</tr>
<tr>
<td>Bernard, H. Russell</td>
<td>8.017</td>
</tr>
<tr>
<td>Bhaleras, M. M.</td>
<td>8.018</td>
</tr>
<tr>
<td>Bhalla, A. S.</td>
<td>11.004</td>
</tr>
<tr>
<td>Bhattachasali, B. N.</td>
<td>12.012</td>
</tr>
<tr>
<td>Bhattachasali, G.</td>
<td>12.012</td>
</tr>
<tr>
<td>Bieler, Thomas Albert</td>
<td>2.001</td>
</tr>
<tr>
<td>Black, H.</td>
<td>11.056</td>
</tr>
<tr>
<td>Blair, Roger D.</td>
<td>3.011</td>
</tr>
<tr>
<td>Blase, Melvin G.</td>
<td>8.130</td>
</tr>
<tr>
<td>Blau, Judith R.</td>
<td>9.005</td>
</tr>
<tr>
<td>Blinder, Alan S.</td>
<td>6.010</td>
</tr>
<tr>
<td>Bloom, Gordon F.</td>
<td>7.001, 8.019</td>
</tr>
<tr>
<td>Blumenthal, T.</td>
<td>12.013</td>
</tr>
<tr>
<td>Boddy, Raford</td>
<td>1.011</td>
</tr>
<tr>
<td>Bogan, Elizabeth Chapin</td>
<td>1.012</td>
</tr>
<tr>
<td>Bolweg, Joep F.</td>
<td>6.011</td>
</tr>
<tr>
<td>Bosworth, Barry</td>
<td>2.002</td>
</tr>
<tr>
<td>Bowles, S.</td>
<td>6.012</td>
</tr>
<tr>
<td>Bowman, Mary Jean</td>
<td>6.013</td>
</tr>
<tr>
<td>Boylan, Myles Gerald Jr.</td>
<td>1.013, 3.006</td>
</tr>
<tr>
<td>Branch, Ben</td>
<td>9.006</td>
</tr>
<tr>
<td>Brand, Horst</td>
<td>3.007, 3.008, 3.009, 3.010</td>
</tr>
<tr>
<td>Braun, R.</td>
<td>10.004</td>
</tr>
<tr>
<td>Braverman, Harry</td>
<td>6.014</td>
</tr>
<tr>
<td>Bredahl, Maury E.</td>
<td>9.007</td>
</tr>
<tr>
<td>Brems, Hans</td>
<td>12.014</td>
</tr>
<tr>
<td>Bright, James R.</td>
<td>8.020</td>
</tr>
<tr>
<td>Brimmer, Andrew F.</td>
<td>11.005</td>
</tr>
<tr>
<td>Briscoe, Geoffrey</td>
<td>1.014</td>
</tr>
<tr>
<td>Brite, R. L.</td>
<td>1.015</td>
</tr>
<tr>
<td>Brittain, E.</td>
<td>8.021</td>
</tr>
<tr>
<td>Britto, Ronald</td>
<td>12.015</td>
</tr>
<tr>
<td>Broad, Michael</td>
<td>3.037</td>
</tr>
</tbody>
</table>
Brody, A. 1.016
Brooks, George 7.002
Brooks, H. 8.022
Brooks, L. G. 12.016
Brown, Gilbert T. 12.017
Brown, Julius S. 6.015
Brown, Lawrence A. 9.008
Browne, Basil Alexander 12.018
Burger, Philip 7.007
Burke, Carol S. 6.015
Burney, Robert Eart 6.016
Burnham, Donald C. 7.003
Buss, James Arthur 12.020
Cairncross, A. 8.023
Calvo, G. A. 2.003
Canning, B. W. 3.012
Capdeville, Patricia 5.005, 10.005
Carey, John L. 3.013, 3.014, 3.030
Carlsson, Bo Axel Wilhelm 1.017, 5.006
Carnes, Richard B. 3.009, 3.015
Carter, Anne P. 12.021
Carter, A. P. 1.016
Catanese, Anthony Vincent 6.017
Cepeda, Michel 11.006
Chandrasekar, K. 5.007
Changyoung, Jeong 8.024
Chawdhry, Muhammad Arshad 1.018
Chellappa, H. V. 10.036
Chen, Nai-Ruenn 5.008
Chenery, Hollis 12.022
Cherns, Albert B. 6.024, 6.025
Chin, Sean Bun 8.025
Choi, Kee Il 8.026
Christensen, Laurits R. 1.019
Christensen, C. L. 3.016
Chuang, Liu-Hsiung 6.018
Chung, Joseph Sang-Hoon 12.023
Chung, William Kuei-Yong 12.024
Church, R. A. 8.027
Ciller, Tansu Ucuran 12.025
Clark, Gardner 12.026
Clark, Robert Louis 6.019
Clayman, Jacob 6.020
Clayton, Eric S. 11.007
Cline, Philip Lee 1.020
Cline, William R. 12.027
Cluff, A. T. 10.006
Cockerill, Anthony 5.009
Conant, Eaton H. 11.008
Conger, Darius John 12.028
Contreras Uzcategui, Ascander 6.021
Converse, A. O. 12.029
Cooper, Charles 9.009
Corden, W. M. 11.009
Cornwall, John 12.030
Cotterill, P. 11.010
Craig, Charles E. 7.004
Crandall, R. W. 11.011
Crane, Garry Mitchell 1.021
Creamer, Daniel 1.022
Crestani, I. 5.047, 7.098
Cripps, T. F. 12.031
Crisostomo, Cristina M. 11.003
Critchlow, Robert V. 8.028, 8.029
Crompton, Rosemary 8.151
Cubukcu, Tugrui Naci 12.032
Cummings, T. G. 7.005
Cusakden, Charles Michael 3.018, 3.019
Czamanski, Daniel Zeev 1.023
Czepl, John A. 8.030
Daicoff, Darwin W. 3.020
Dalton, Gene W. 6.022
Daly, D. J. 5.010
Daly, Herman E. 12.033
Dambe, Gunars 8.031
Daniel, Donnie L. 8.032
Danielsen, Albert N. 6.023
Darnell, J. D. 12.034
Dasgupta, Ajit K. 12.035
David, P. A. 12.001
Davies, David G. 5.001
Davis, Karen 1.024
Davis, Lance E. 12.036, 12.037
Davis, Louis E. 6.024, 6.025
Dean, Genevieve 8.033
Deans, Ralph C. 6.026
Debbaut, H. 6.084
De Canio, S. 6.027
De Houghton, Charles 9.029
Denison, Edward F. 1.025, 1.026, 1.027, 1.052, 2.004, 2.005, 2.006
Deutermann, William V. 6.028, 6.029
DeVany, Arthur S. 7.006
Devindra, Sharma 1.028
de Vries, Margaret G. 12.038
Diaz-Lopez, Felix 12.039
Dienes, L. 5.012
Dittrich, Scott R. 5.013
Diwan, R. K. 6.030
Dixon, Roger A. 9.019
Doctors, Samuel I. 8.034
Doktor, Robert 7.007
Donges, J. B. 5.014
Dorner, Peter 12.040
Dougherty, C. 5.015
Dougherty, C. R. S. 8.035
Douty, H. M. 10.007
Dowling, J. M. 12.102
Doyle, C. J. 8.036

Digitized for FRASER
http://fraser.stlouisfed.org/
Federal Reserve Bank of St. Louis
Doyle, Phillip M. 3.021
Dreiblatt, David 8.037
Drogichinskii, N. 7.008
Dudley, Leonard 6.031, 6.032
Duerr, Michael G. 8.012
Duff, Bart 11.003
Dunlop, John T. 7.009
Dworaczek, Marian 13.001, 13.002

Easterlin, Richard A. 12.037
Ebert, Robert R. 3.022
Ecevit, Leyla Ugur 12.041
Eckstein, A. 12.042
Eckstein, Otto 10.008
Edmonds, James Albert 12.044
Edmonson, N. 3.023, 3.024
Eisenberg, William M. 10.009
Eisenstein, James 4.001
Eisner, Robert 1.029
Eliastam, M. 11.062
Elkan, P. G. 1.030
Elkan, Walter 6.033
Else, P. K. 1.031
Elitis, Walter A. 8.038, 12.045, 12.046
Elzie, Leonard Thomas 7.010
Emanuel, Carlos J. 1.032
Emmerij, Louis 11.012
England, Richard William 12.047
Epstein, T. Scarlett 12.048
Ernst, Morris L. 8.078
Eshelman, John Denison 7.011
Evan, Harry Zvi 11.014
Evans, R. G. 3.025
Evans, Robert, Jr. 12.049
Evenson, James Albert 6.034
Evenson, R. E. 8.039, 9.010

Fabozzi, Frank Joseph 6.035
Fabricant, Solomon 1.033
Fabrycy, Mark Z. 6.036
Fairfield, Roy P. 6.037
Fallenbuchi, Zbigniew M. 12.050
Fallon, P. R. 6.038
Fareed, A. E. 6.039
Farley, Noel J. 5.016
Faucett, Jack 3.040
Feinstein, C. H. 12.051
Felderer, Bernhard 12.052
Feller, I. 9.030
Fellner, William 9.011
Ferguson, C. E. 10.010
Fernandez, Anibal 8.040
Fettner, Lee 7.013
Figueras, Juan Antonio 7.014
Findlay, R. 11.009
Finger, Diane S. 3.026
Finn, John Joseph 1.034

Finn, Joseph T. 3.003, 3.027, 3.028
Firestone, O. J. 9.012

Gaathon, A. L. 5.017
Gahtan, David 6.046
Gannon, Martin J. 6.047
Garston, Gordon J. 5.018
Gay, David Edward Ryan 1.038
Gellerman, Saul W. 6.048, 7.016
George, K. D. 3.031
Ghosh, Arabinda 12.053
Giannakouros, George 7.017
Gies, Joseph 6.074
Gifford, Adam, Jr. 12.054, 12.055
Gilpin, Robert 9.015
Gilroy, Curtis Lloyd 6.049
Gintis, H. 6.012
Glaser, Edward M. 6.050
Glaizer, L. 9.016
Globerman, S. 8.044, 9.017
Gold, Bela 8.045
Goldberg, Joseph P. 8.046, 8.047
Goldberg, Lawrence 9.018
Goldstein, Ken 10.011
Goodwin, Jack 13.003, 13.004, 13.005
Gomberg, William 6.051
Gorman, John A. 2.007
Gort, Michael 1.011
Gotsch, Carl H. 8.048
Gottschalk, P. 2.032
Gould, J. D. 12.056
Grandjean, Burke D. 6.052, 8.049
Granick, David 7.018
Grayson, C. Jackson 10.012
Greenblatt, Alan D. 6.053
Greenfield, Harry I. 1.040
Gregory, R. D. 8.050
Griliches, Zvi 1.039, 1.049, 1.050, 1.051, 1.052
Grossman, H. I. 10.003
Grossman, M. 2.008
Gruebele, James W. 7.064
Gusen, P. 7.089
Gutierrez-Sanchez, Elias Ruben 1.041
Gwartney, J. 11.019
Gyftopoulos, Elias P. 8.051

Haig, B. D. 11.017
Hale, Carl W. 8.052, 12.057
Hall, John T. 9.019
Halstead, Donald Paul 1.042
Handy, Charles R. 3.036
Hannigan, Thomas 6.020
Hansen, B. 1.043
Hansen, W. Lee 6.054
Harju, Melvin William 12.058
Harlow, Christopher 9.029
Harris, R. Clark 7.004
Harris, S. A. 12.104
Hartley, K. 7.019
Hartwell, R. M. 12.059
Harvey, Andrew S. 5.019
Hatry, Harry P. 1.044
Haulk, Charles Jakie 11.018
Haulman, C. A. 6.055
Haworth, C. 11.019
Hayami, Yujiro 8.053, 9.020, 12.003, 12.060
Hayden, Eric Wylie 8.054
Headley, J. Charles 8.055
Heady, Earl O. 8.129
Healy, Robert G. 6.056
Hechter, Michael 12.061
Hedges, Janice Neupert 6.057, 6.058
Heim, John 6.059
Helling, Fred Joseph 3.032
Helmberger, P. 11.037
Henry, Nicholas L. 9.021
Herer, Wiktor 11.020
Herman, Arthur S. 3.033, 3.034, 3.035, 8.028, 10.013
Herman, Shelby W. 10.014
Herrick, Neal Q. 6.060
Hertzberg, Marie P. 1.045
Hettich, Walter 5.020
Hetzler, Stanley A. 8.056
Hicks, J. 12.062
Hiestand, Dale L. 8.057
Highton, Frank E. 10.015
Hilton, S. E. 12.063
Hinchcliffe, K. 6.096
Hjalmarsson, L. 1.037
Hoffman, Eileen B. 6.061
Hohenstein, Jeffrey 1.003
Holcombe, Arthur Norman 7.020
Holmman, Herbert J. 6.045
Hoogvliet, W. 5.021
Hori, Hajime 12.064
Horowitz, David 12.065
Hough, Granville W. 8.058
Howe, Eric C. 3.036
Howenstine, E. Jay 8.059
Hsiao, F.S.T. 1.046
Hu, S. C. 1.047
Hu, Sheng Cheng 9.022
Hu, Teh-wei 6.062
Huang, Yukon 7.021
Huffstutler, Clyde E. 3.037, 3.038
Hughes, T. P. 8.060
Humphrey, David Burra 2.009
Hunter, L. C. 10.020
Hutchinson, Sir Joseph 12.066
Hutchinson, William Kenneth 12.067

Inoue, Keichi 11.021
Ishikawa, Shigeru 8.063

Jackson, Jerry R. 3.011
Jacob, Herbert 4.001
James, Dilmus D. 12.069
James, D. W. 8.050
Jarkovsky, V. 1.048
Jeremy, D. J. 8.064
Johannisson, Bengt 9.023
Johl, S. C. 12.068
Johnson, Glenn L. 7.022
Johnson, P. S. 9.024
Johnson, Richard 8.065
Johnson, Thomas 6.066
Jones, Graham 8.066
Jorgenson, Dale W. 1.049, 1.050, 1.051, 1.052
Kadhim, Mihsen 12.070
Kallek, S. 3.041
Kamerschen, David R. 7.023
Kamien, Morton I. 7.024, 7.025, 9.025
Kanamori, Hisao 12.071
Kaplan, Daniel Peter 8.067
Karkar, Yaqub N. 12.072
Kato, Roy 8.068
Katsuji, Okachi 6.023
Katzell, Mildred E. 7.026
Katzell, Raymond A. 6.067, 6.068
Kawahito, Kiyoshi 5.022
Kearns, Kevin C. 12.073
Kelley, Allen C. 1.053, 12.074
Kendrick, John W. 1.054, 2.012, 2.013, 6.070, 12.075
Kennedy, Charles 8.069, 13.007
Kennedy, Kieran A. 12.076
Kessel, N. 5.030
Khachaturov, T. 7.027
Khalidi, Nabil 6.069
Khromov, P. 7.028, 9.026
Kiker, B. F. 6.071
Kim, Y. C. 12.077
Kislev, Y. 9.010
Klein, R. W. 1.055
Knight, Peter T. 8.070
Kosters, Marvin 10.016
Kottis, Athena 6.073
Kranzberg, Melvin 6.074
Krengel, Rolf 5.023
Kretzmann, Alfred Martin 1.056, 7.029
Kumar, T. K. 8.002
Kuprienko, L. 6.075
Kutscher, Ronald E. 2.014, 2.015
Kuznets, Simon 9.027, 12.078, 12.079

Lacci, I. 8.071
Ladenson, M. L. 3.042
Lall, Sanjaya 8.072
Lambert, Leland Don 2.016
Lampman, Robert J. 3.043
Robock, Stefan H. Brazil 12.113
Rochart, J. F. 7.059
Rogers, Everett M. 8.126
Roman, Zoltan 5.038, 7.060
Romeo, Anthony Asta 8.113
Rosen, Sherwin 1.068
Rosenberg, Nathan 8.114
Rosenbloom, R. S. 7.061
Rosine, J. 11.037
Rosner, Monroe Herman 11.038
Rosovsky, Henry 12.095
Roum, Jerome M. 6.102, 10.031
Ross, John Perry 1.085, 1.086
Rostow, W. W. 12.114
Rousham, Sally 6.103
Rowthorn, R. E. 11.039
Ruckman, Paul Edward 5.039
Rushing, F. W. 5.040
Russell, Louise B. 1.024, 8.115
Rutten, Vernon W. 12.060
Ruttenberg, Harold J. 6.104
Rymes, F. K. 1.087

Sabolo, Yves 11.029, 11.040
Saint, Avice M. 6.105
Sample, C. James 12.115
Sanders, John Houston 11.041
Sargent, Nicholas Peter 8.116
Sargent, Thomas J. 1.088
Sato, R. 1.008, 12.116
Saxxonhouse, G. 8.117
Sayles, Leonard R. 7.062
Schatan, J. 8.011
Schmookler, Jacob 9.036
Schneiderman, Paul 4.005
Schotta, Charles 6.003
Schultz, Theodore W. 6.107
Schumacher, E. F. 8.118
Schwartz, N. L. 7.024, 7.025
Schweitzer, Stuart O. 6.106
Scilly, F. 3.025
Scoville, James G. 6.108
Searing, Majorie Ellen 6.109
Sedlmeier, Edward John 6.110
Seifer, Daniel M. 11.042
Seitz, Wesley D. 3.057
Selowsky, M. 5.015
Sen, Amartya 8.119
Sethuraman, S. V. 11.043
Seton, Francis 7.063
Setzer, Florence Orletta 8.120
Shaw, J. A. 9.037
Shaw, John A. 12.117
Shaw, Paul R. 11.044
Shellhammer, Kenneth Lee 12.118

Shen, T. Y. 8.121
Shepherd, James F. 12.119, 12.120
Sheppard, Harold L. 6.111
Sheskin, Eytan 6.077
Shields, Nikki 10.008
Shimada, Haruo 6.112
Shishko, Robert 8.122
Shourie, Arun 12.121
Shukla, B. D. 3.058
Shupack, M. 1.008
Sidhu, Suryk S. 5.041
Silverston, Aubrey 7.063
Silverston, Z. A. 9.038
Simon, Nancy W. 2.029
Simpson, Hunter W. 6.063
Smits, C. A. 11.045
Singh, S. B. 8.107
Sleigh, Lynn G. 7.064
Slezak, Lester 10.032
Sloan, Frank A. 11.046
Smith, Anthony D. 1.089
Smith, Arthur B. 8.123
Smith, Brett Alan 7.065
Smith, Bruce Ainslie 8.124
Smith, V. Kenny 8.125
Snoonian, Paul Edward 7.066
Soderstrom, H. T. 2.030
Solo, Robert A. 8.126
Solomon, L. C. 6.113
Sonny, Jacob 8.127
Sorrentino, Constance 11.047, 11.048
Southworth, Gayle Frederick 8.128
Sperling, JoAnn 9.028
Spielmann, Heinz 2.031
Srivastava, Uma K. 8.129
Staats, Elmer B. 7.067
Stansell, Stanley R. 9.044
Stark, Harry F. 10.033
Staub, William J. 8.130
Steel, William F. 11.049
Steiner, Ivan D. 7.068
Stern, Gary 10.034
Stern, Irving 4.006
Stetson, Damon 7.069
Stewart, Charles T., Jr. 11.050
Stewart, Frances 11.051, 11.052
Stitzlein, John Noel 11.053
Stoga, A. J. 3.042
Stoikov, Vladimir 6.114
Stonemon, P. 8.131
Strauss, George 6.115
Streeten, Paul P. 8.132, 11.052
Stromsdorfer, Ernest W. 6.116
Sturm, Peter Hans 7.070
Subrahmanian, K. K. 8.133
Sufrin, Sidney C. 11.055
Sullivan, Michael Fuller 11.054
Suri, G. K. 10.035, 10.036
Surrey, M. J. C. 7.071
Suslov, I. 8.134
Susskind, Charles 8.135
Sutton, Anthony C. 12.122
Sveikauskas, Leo 1.090, 1.091
Swan, C. 3.059
Swerdloff, Sol 6.117
Sylos-Labini, Paolo 10.037

Tachibanaki, Toshiaki 6.118
Tamura, Shuji 8.136
Tannen, Michael Barry 12.123
Tarling, R. J. 12.031
Taubman, P. 2.032
Taylor, C. T. 9.038
Taylor, James 13.011
Taymans, A. L. 10.038
Teitel, S. 5.042
Temin, P. 9.013
Thiesenhusen, William C. 8.137
Thirwall, A. P. 1.094, 8.069, 13.007
Thoburn, J. T. 12.124
Thomas, Brinley 12.125
Thomas, D. Babatunde 8.138, 8.139
Thomas, Eleanor 7.055
Thompson, G. R. 11.056
Thompson, Paul H. 6.022
Thrasher, Bruce 7.074
Tillery, Winston L. 6.119
Tilton, John E. 8.140, 9.039
Tinbergen, Jan 1.095
Toevs, Alden Louis 2.033
Trapido, Stanley 12.126
Triplet, E. J. 1.096
Truscott, Michael Hugh 11.057
Tuckman, Barbara Hauben 5.043
Turcotte, Fernand 7.051
Twiss, Brian C. 7.075

Ueno, H. 12.127
Urie, John M. 7.076
Urisko, James A. 3.061
Uselding, P. J. 2.037, 11.027

Vanagunas, Stanley 4.012
van Dam, Andre 12.129
Van Houten, J. 10.041
Veger, D. 9.043
Vernon, J. M. 7.089
Vernon, Robert F. 4.004
Vickery, Mary L. 8.147
Villella, Annibal 12.008
Vogel, Ronald J. 3.011
Vough, Clair F. 7.090

Wade, Michael 6.124
Wagner, Abraham 11.055
Walderhaug, Albert J. 2.038
Waldorf, W. H. 6.125
Wallace, Neil 1.088
Wallace, Robert Bruce 6.126
Walsh, William D. 8.148
Walton, Gary M. 3.045, 12.119, 12.120
Ward, Richard A. 1.104
Ward, T. 3.031
Warke, Thomas Wilton 6.127
Warner, Kenneth Edgar 8.149
Watanabe, Tsunehiko 5.045, 6.128
Waters, Joseph Paul 8.150
Watrin, Christian 1.105
Webb, Michael 10.042
Weckler, A. N. 7.037
Weddaburn, Dorothy 8.151
Weeks, Eldon E. 2.031
Weeks, John 11.058
Weinberg, Edgar 10.043
Weinrobe, Maurice 1.106
Weisbrod, Burton A. 1.006, 6.054, 6.120
Weiss, Thomas 11.059
Weiss, Yoram 6.010
Welch, Jonathan Bruce 8.152
Wells, Stuart Jay 6.129
Weston, J. F. 7.091
Whang, Byung-Joon 10.044
Whitcombe, Elizabeth 12.130
Wicks, John H. 4.004
Widmer, Thomas F. 8.051
Wilczynski, Jozef 7.092
Wild, Ray 7.093
Wilder, Ronald P. 9.044
Wilford, W. T. 10.045
Wilkins, M. 8.153
Wilkinson, Richard G. 12.131
Williams, B. R. 9.045
Williamson, Jeffrey G. 1.053, 8.154, 11.060, 12.132
Willmore, L. N. 12.133
Willmot, D. G. 10.046
Wilson, Robert Woodrow 7.094, 8.155
Winnick, Andrew Jay 6.130
Winnie, Richard E. 1.036
Winston, Gordon C. 11.061, 12.077
Winter, Sidney G. 12.092
Wise, D. A. 6.131
Wisman, Jon Donald 8.156
Wisnewsky, Edward 6.104
Wolfbein, Seymour L. 6.132
Wolfenbarger, James Larry 7.095
Wolpin, Kenneth I. 6.133
Worthington, Paul N. 3.062
Yamaguchi, Mitoshi 8.157
Yankelovich, Daniel 6.067, 6.068
Yap, L. Y. L. 11.011
Yoshihara, K. 5.046
Yotopoulos, P. A. 7.096
Young, Arthur 7.097
Young, Ben E. 8.158
Young, McEwan W. 6.005

Young, R. 5.047, 5.048, 7.098
Yu, C. L. 12.134

Zarembka, Paul 12.135
Zeckhauser, R. 11.062
Zeisel, Rose N. 8.159
Zottola, Armand Joseph 6.136
Subject Index

(Theses and dissertations are not included.)

Agriculture. See Farm

Air transportation, 5.011, 7.006

Aircraft, 7.019

Aluminum, 8.076

Ammonia, 8.068

Argentina, 8.090

Australia
  employment distribution, 11.017
    farm, 5.021, 5.027, 5.048, 7.098, 8.081
    manufacturing, 5.004, 8.101

Automation. See Technological change

Automobiles. See Motor vehicles and equipment

Bakery products, 3.038

Bangladesh, 5.001

Banking, 8.032, 8.076, 12.034

Bargaining. See Collective bargaining

Brazil
  economic growth, 12.008, 12.063, 12.113
    farm, 8.070, 11.041, 11.053

Canada
  capital productivity, 5.025
  earnings, 10.046
  economic growth, 5.028, 12.005, 12.043
  productivity measures,
    education, 5.020
    manufacturing, 5.019, 5.037
    nonprofit, 5.018
  research and development, 9.012, 9.017
  technological change, 1.064

Capacity utilization, 2.003, 2.030, 3.052, 12.133

farm, 2.031
hospitals, 1.010
major materials, 3.023, 3.024
manufacturing, 1.045, 2.027, 2.032

Capital, 1.038, 7.028
  demand for, 8.079
  measurement, 1.087
  measures, 2.018, 2.022, 2.034, 3.040, 5.017, 5.025, 12.075

Capital investment
  determinants of, 1.012, 1.029, 8.154
  economic growth, 10.044, 12.020
  effectiveness of, 7.027
  government, 4.002, 4.005, 7.079, 7.083, 7.084
  projections, 2.002
  technological change, 7.025, 8.038

Capital productivity, 1.054, 1.087, 6.070, 8.079, 12.075
  developing countries, 6.033
  economic growth, 11.061, 12.077
  economies of scale, 4.004

Capital stock. See Capital

Chemical industry, 5.040, 8.136, 11.014

Chile, 11.022

China
  farm, 5.013
  economic growth, 5.008, 12.026, 12.042, 12.100, 12.134
  output measurement, 1.083
  technological change, 8.033, 8.063

Clock industry, Britain, 8.027

Coal. See Mining

Collective bargaining, 7.007, 7.078, 8.007, 10.015, 10.016, 10.033, 10.035
  Britain, 10.020, 10.021, 10.031
  telephones, 11.054
  transportation, 10.017, 10.018
India, 1.067, 8.133, 11.036, 11.043, 12.035, 12.082, 12.105, 12.130
Iraq, 12.070
Ireland, 12.073, 12.076
Israel, 12.065
Japan, 6.018, 8.099, 8.157, 12.004, 12.024, 12.060, 12.071, 12.095, 12.099, 12.127
Korea, 8.024, 12.009, 12.017, 12.023
Malaysia, 12.124
Netherlands, 12.089
Paraguay, 12.088
Turkey, 12.025, 12.032, 12.041
United Kingdom, 5.002, 12.085, 12.101
United States, 12.036, 12.057, 12.058, 12.067, 12.102, 12.108, 12.115, 12.117, 12.119, 12.120, 12.128
U.S.S.R., 6.083, 7.092, 12.028, 12.122
Zambia, 5.030

Economic systems, 12.050
   centralized planning, 1.048, 7.008
economic growth, 7.070
factor substitution, 8.002
management, 7.063

Economies of scale
   developing countries, 5.042
   farm, 3.058, 5.027, 5.041, 12.053
   health insurance, 3.011
   hospitals, 1.034
   iron and steel, 1.013, 3.006, 5.009
   manufacturing, 3.041
   motor vehicles and equipment, 3.022, 3.054, 7.033
   production functions, 1.039
   retail trade, 3.050
   technological change, 7.094, 8.136
   trucking, 3.042

Ecuador, 1.032

Education, 6.030, 6.036
   cost-benefit analysis, 6.003, 6.016, 6.021, 6.023, 6.062, 6.094, 6.114, 6.116
   earnings, 6.007, 6.017, 6.035, 6.045, 6.097, 6.106, 6.126, 6.131
   economic growth, 6.001, 6.076, 6.109, 12.001
   employment, 6.046, 11.008
   engineering, 6.022
   experience, 6.032, 6.105
   farm, 6.069
   output measurement, 5.020
   production function, 6.059
   quality of work force, 6.028, 6.029, 6.038, 6.080, 6.096, 6.133
   technicians, 6.130
   technological change, 7.059, 8.074, 8.094, 9.014
   unemployment, 6.049

Egypt, 8.111

Elasticity of substitution. See Factor substitution

Electric power
   nuclear, 7.012
   production function, 3.057
   research and development, 9.044
   technological change, 8.021, 8.060, 8.097, 8.124

Electric utilities. See Electric power; Steam power

Emigration. See Migration

Employment, 6.132, 11.039
   computers, 8.029, 8.031
   construction, 3.049
   demand/supply, 11.011, 11.050, 12.089
   economic growth, 12.044
   Japan, 12.049
   research and development, 11.016
   retail trade, 11.010
   sectoral distribution, 11.009, 11.047
      farm, 2.001, 2.024, 3.018, 3.019, 11.006, 11.020, 11.044, 12.038
      service, 2.006, 2.008, 2.011, 8.016, 11.017, 11.023, 11.033, 11.040, 11.042, 11.056, 11.059
      technological change, 8.062
      unemployment, 11.005, 11.022, 11.048

Energy inputs, 8.051, 8.092, 8.095, 12.016

Environmental factors, 1.005
   economic growth, 12.021, 12.029, 12.047, 12.054, 12.055
   energy-producing industries, 8.095
   natural resource industries, 8.109
   socioeconomic costs, 10.002, 11.014, 12.006
   technological change, 8.045

Europe, 5.039

Exports. See International trade

Factor demand, 1.031, 1.062, 1.065, 1.068, 6.099, 7.023

Factor substitution, 2.037
   cyclical factors, 1.088
   developing countries, 8.136
   economic growth, 8.110
   economic systems, 8.002
   farm, 2.017
   hospitals, 3.062
   industry structure, 1.065
measures, 1.015, 1.090, 2.009, 2.033
quality of labor, 6.038, 6.096
technological change, 1.041, 8.120

Farm
capacity utilization, 2.031
economic growth, 1.061, 1.079, 7.020, 8.081, 12.035, 12.040, 12.066, 12.068, 12.093, 12.107, 12.109, 12.135
economies of scale, 3.058, 5.027, 5.041, 7.096, 8.011, 12.053
education, 6.069
employment, 8.085, 11.020, 11.038, 12.038
environmental factors, 8.055
factor shares, 8.129
income shares, 5.043, 8.137, 11.037
input-output analysis, 8.031
labor productivity, 3.018, 3.019
livestock, 7.036, 8.089
organizational factors, 1.018, 7.021, 7.097, 8.013, 11.044, 12.110
productivity measurement, 1.019
productivity measures, 2.016, 2.026, 7.098
research and development, 8.009, 8.018, 8.090, 9.007, 9.010
resource allocation, 5.013, 7.022
socioeconomic, 1.006
sources of growth, 1.020, 5.008, 7.014, 9.020, 12.003, 12.104
technological change, 8.025, 8.134
economic growth, 8.048, 8.130, 12.087
employment, 8.043, 8.091, 11.006, 11.007, 11.041, 11.053
technology transfer, 8.015, 8.026, 8.036, 8.039, 8.053
total factor productivity, 5.039, 5.047
trade, 8.070

Federal Government. See Government, Federal

Firm, theory of, 8.067, 8.075

Flour milling, 3.021

Food, 8.019
distribution, 7.054
processing, 3.036, 7.001, 7.045

Forecasting. See Projections

France, 5.007

Fringe benefits, 6.041

Gasoline stations, 3.030

Germany, 5.023, 7.070

Government, 1.082, 1.092
capital investment, 4.002
private vs. public efficiency, 4.004, 7.053
productivity measurement, 1.075

Government, Federal, 7.056
capital investment, 7.079, 7.083, 7.084
improvement programs, 7.067, 7.082, 7.085, 7.086
Post Office, 7.034
productivity measurement, 1.081, 1.097, 1.098, 1.102, 4.007, 7.080, 7.081
productivity measures, 1.003, 1.004, 1.099, 4.003, 4.008, 4.009, 4.010, 4.011

Government, State and local, 7.061
capital investment, 4.005
expenditures, 1.023
improvement programs, 1.074, 7.042, 7.044, 7.046, 7.047, 7.069, 7.076
output measurement, 1.036, 1.078, 4.001
production function, 1.091
productivity measurement, 1.044, 1.085, 1.086, 4.012

Government impact, 7.056
airline industry, 7.006
collective bargaining, 8.077
Mexico, 7.014
patents, 9.033, 9.035, 9.038
research and development, 8.143
resource allocation, 4.006, 8.125
shipping industry, 7.013, 7.017
technology, 8.078

Greece, 12.002

Gross national product, 1.002, 1.005, 2.021, 2.028

Growth. See Economic growth

Guideposts. See Wage-price guideposts

Health services
costs, 10.022
physicians, 3.025, 6.099, 7.057, 7.059, 11.046, 11.062
productivity measurement, 1.104
research and development, 7.011
technological change, 8.076, 8.094, 8.115, 8.149

Hospitals, 1.010
costs, 1.034, 3.044, 3.046, 7.051
factor substitution, 3.062
inpatient/outpatient, 1.024

107
production function, 3.032
productivity measurement, 1.040, 3.053
resource allocation, 7.030

Hours of work, 6.057, 6.058, 6.089, 6.092
flexible hours, 6.002, 6.005, 6.040, 6.042, 6.103, 6.117, 6.122, 6.124
440 workweek, 6.020, 6.047, 6.061, 6.063, 6.081
India, 6.121
overtime, 6.119

Household production, 1.106

Human capital, 1.054, 6.007, 6.010, 6.012, 6.016, 6.026, 6.055, 6.066, 6.071, 6.107
cost-benefit analysis, 6.078
disease, 6.120
economic growth, 6.018, 6.098, 6.127
education, 6.001, 6.017, 6.021, 6.028, 6.029, 6.038, 6.039, 6.049, 6.052, 6.080, 6.084
experience, 6.004, 6.036, 6.054, 6.077
farm, 6.087
housing, 6.056
international comparison, 6.112
measurement, 6.013, 6.070, 6.078, 6.113, 6.136
migration, 6.073, 6.110
obsolescence, 6.022
rehabilitation, 6.008, 6.009

Hungary, 5.038, 6.109, 12.094, 12.098

Immigration. See Migration

Imports. See International trade

Improvement programs, 6.025, 6.105, 7.003, 7.005, 7.015, 7.016, 7.026, 7.032, 7.037, 7.043, 7.049, 7.055, 7.077
construction, 3.049
electric powerplants, 7.012
farm, 7.020
food service, 7.054
government, 1.044, 1.072, 1.073, 1.074, 7.042, 7.044, 7.046, 7.047, 7.050, 7.061, 7.067, 7.069, 7.076, 7.082, 12.118
health and education, 7.059
Israel, 6.104
Norway, 6.011
police, 1.072
railroad, 7.072
sanitation, 1.073
Scanlon plan, 7.039
U.S.S.R., 6.091

Income shares, 6.027
developing countries, 12.022, 12.027
economic growth, 12.121, 12.123

Incomes policy. See Wage-price guideposts

Index numbers, 1.001, 1.009, 1.019, 1.049, 1.077

India
farm, 1.061, 5.041, 8.106, 8.107, 8.129, 12.053, 12.130
economic growth, 11.036, 11.043, 12.082, 12.105
fertilizer industry, 5.029
productivity measures, 12.035
sources of growth, 1.067
technology transfer, 8.008, 8.133
work week, 6.121

Industrial organization, 5.032, 7.036, 7.091, 8.101

Inflation. See Price stability

Information acquisition, 7.040, 7.094, 8.117, 9.032

Input-output studies, 1.016, 12.045
developing countries, 1.032
durable equipment, 2.029
farm, 8.031
government expenditures, 4.006
projections, 3.001
United Kingdom, 5.002
United States, 2.010
value added, 2.038

Insurance, health, 3.011

International comparisons (see also specific countries)
capital, 5.003, 6.038, 12.020
company productivity, 7.066
earnings, 6.112, 6.118
economic growth, 12.010, 12.126
economic systems, 7.070, 8.002
industrial management, 7.063
iron and steel, 5.009, 8.006
management, 7.007, 7.018, 7.063
prices and output, 5.010
productivity measures, 5.003, 5.007, 5.031, 5.034, 5.044
research and development, 8.098
technological change, 8.005, 8.022, 8.027
textiles, 5.003
unemployment, 11.048
unit labor costs, 5.005, 10.005, 10.011, 10.026

International trade, 1.030, 1.042, 1.056, 6.085
balance of, 7.029, 10.040
economic growth, 12.013, 12.044, 12.067, 12.085, 12.119, 12.120, 12.124
human capital, 6.085
technology transfer, 8.117, 8.158
total factor productivity, 1.076

Job enrichment. See Quality of working life

Kenya, 11.026, 11.030

Korea
economic growth, 12.009, 12.017, 12.023
technological change, 8.024

Labor-managed firms, 7.035

Labor-management relations, 7.009, 8.007, 10.007, 10.043
ternational comparisons, 7.007
public sector, 7.048
technological change, 8.077, 8.151
transportation, 10.017, 10.018

Labor productivity, 2.019, 2.035, 3.002, 6.026
capital, 7.028
developing countries, 1.070
fertilizer, 5.029
iron and steel, 6.084
public vs. private, 4.004
United Kingdom, 11.013

Labor quality. See Quality of workforce

Labor utilization, 6.075, 7.052
marginal productivity, 7.023
physicians, 7.057
rehabilitation, 6.008, 6.009
scientific personnel, 9.029, 11.002
underutilization, 11.032

Laundry and dry cleaning, 8.147

Lodging industry, 3.061

Lumber and wood products, 8.076

Management, 7.009, 7.016, 7.026, 7.062, 7.077
employees' attitudes, 6.095, 6.100
groups, 7.068
international comparisons, 7.007, 7.018, 7.063
job design, 6.006, 6.048, 6.093, 7.090
labor participation, 6.011, 7.065
quality of working life, 6.024, 6.025, 6.037, 6.050, 7.005
technological change, 7.075, 8.045

Manufacturing, 2.020, 3.052
capacity utilization, 1.045, 2.027, 2.030, 2.032
costs, 5.005, 10.005, 10.026
economic growth, 2.023
factor substitution, 1.041
production functions, 5.023

Metal products, 3.013, 6.032

Mexico
farm, 5.043, 7.014
industrial efficiency, 7.066
service sector, 11.023
technology transfer, 8.158

Migration, 6.110, 6.132
brain drain, 6.088, 8.142, 11.057
certainty of, 6.073
economic growth, 11.027, 12.114, 12.125
investment abroad, 6.079
measurement, 6.034
technology transfer, 6.136
urban, 6.091

Mining
coal, 3.016
Zambia, 5.030

Motor vehicles and equipment, 3.022, 3.054, 7.033

Nigeria, 8.138, 8.139

Nonfinancial corporations, 2.007

Norway
job design, 6.011
production functions, 1.039, 1.084

Occupational structure, 6.014, 6.026, 6.086, 6.108, 6.125, 6.130

Office work, 3.012, 8.010

Paints and allied products, 3.034

Pakistan, 1.018

Paraguay, 12.088

Petroleum, 8.040

Pharmaceuticals
productivity measure, 3.008
research and development, 7.089, 9.001
technology transfer, 8.072

Philippines, 11.003

Poland, 6.109

Police, 1.057, 1.063, 1.072, 1.080

Population growth, 1.094, 11.055, 12.044, 12.074

Post Office, 7.034, 11.028

Price indexes, 1.043, 1.096, 2.021

Price stability, 1.071, 10.008, 10.012, 10.033
business cycle, 10.025
economic growth, 10.028, 10.044
international comparisons, 10.040
Italy, 10.037
wage-price guideposts, 10.010, 10.029

Printing and publishing, 8.028, 8.128

Production functions
alternative models, 1.007, 1.008, 1.035, 1.058
economic growth, 12.019
economies of scale, 1.015
education, 6.059, 6.129
factor substitution, 1.095
Germany, 5.023
hospitals, 3.032
India, 1.067
iron and steel, 6.084
manufacturing, 1.039, 1.084, 5.004, 12.041
power, 3.057, 8.124
Spain, 5.014
technological change, 1.011, 1.037, 1.064, 7.028, 8.121
transportation, 1.060

Productivity improvement programs. See Improvement programs

Productivity measurement, 1.017, 1.043, 1.071, 3.052
China, 1.083
courts, 4.001
economic systems, 1.105
education, 6.126
farm, 1.019
government, 1.066, 1.092, 1.093, 5.018
Federal, 1.003, 1.081, 1.098, 1.099, 1.102, 4.003, 4.007, 4.008, 4.009, 4.010, 4.011
State and local, 1.036, 1.044, 1.078, 1.085, 1.086
health care, 1.010, 1.040, 1.104, 3.053
households, 1.106
human capital, 1.028
police, 1.057, 1.072
price indexes, 1.096
railroads and trucking, 3.007, 3.039
research and development, 1.101, 9.019
services, 1.066, 1.089, 5.018
solid waste collection, 1.073
total factor productivity, 5.045, 7.004

Productivity bargaining. See Collective bargaining

Productivity measures (see also Productivity measures, foreign countries), 2.013, 2.025, 3.047, 10.009, 10.014, 10.023, 10.027, 10.039
airlines, 5.011
bakery products, 3.038
capital productivity (see Capital productivity)
coal, 3.016
construction, 3.048
  highway, 3.005, 3.026
  housing, 3.003, 3.004, 3.027, 3.028
copper, 3.051
farm, 2.016, 3.018, 3.019, 5.047, 8.081
Federal government, 1.003, 1.004, 4.003, 4.008, 4.009, 4.010, 4.011
flour, 3.021
gasoline stations, 3.030
hotels and motels, 3.061
international comparisons, 3.047, 5.034, 5.044, 8.002, 10.011, 11.035
iron and steel, 3.014, 6.084
labor productivity (see Labor productivity)
metal cans, 3.013
paints, 3.034
pharmaceuticals, 3.008
physicians, 3.025
railroads, 3.007
ready-mixed concrete, 3.056
selected industries, 3.002, 3.033, 3.035, 3.060
shipping, 3.045
structural clay products, 3.037
telephones, 3.010
total factor productivity (see Total factor productivity)
trucking, 3.009, 3.015, 3.020

Productivity measures, foreign countries
Australia, 5.021, 5.048
Bangladesh, 5.001
Canada, 5.018, 5.020, 5.037
Europe, 5.039
France, 5.007
Hungary, 5.038
India, 12.035
Ireland, 5.016, 5.032
Israel, 5.017
Italy, 5.024, 5.026, 11.035
Japan, 5.022, 5.045, 5.046
Korea, 12.009
Sweden, 5.005, 5.006
U.S.S.R., 5.012

Profits, 10.025

Projections, 2.014, 2.015, 2.036, 3.001
capital, 2.002
  employment, 3.017, 2.002, 6.046, 11.029
technological, 7.075, 8.020, 9.045
  United Kingdom, 7.071

Puerto Rico, 1.041, 7.066, 12.039

Quality of the work force
earnings, 6.118, 11.019
economic growth, 6.076, 6.101
  education, 6.022, 6.028, 6.029, 6.080, 6.131
elasticity of substitution, 1.095, 6.038, 6.096
  employee attitudes, 6.026, 6.090, 6.100
  experience, 6.077
  farm, 6.087, 12.038
  measures, 6.125, 6.128
  output, 11.050

Quality of working life, 6.015, 6.024, 6.025, 6.037, 6.050, 6.064, 6.067, 6.068, 6.074, 6.134, 7.038, 7.087, 7.088, 7.090, 8.087, 10.043
  employee attitudes, 6.044, 6.111, 6.123
  job design, 6.006, 6.048, 6.051, 6.053, 6.060, 6.065, 6.093, 6.115, 6.135, 7.093
technological change, 6.014
  workweek, 6.092

Railroads
  improvement programs, 7.072
  productivity measurement, 3.007, 3.039
technological change, 8.065
  Turkey, 12.072

Regional development, 12.115
Appalachia, 12.080, 12.118
British Isles, 12.061
Canada, 5.019, 12.005
  exports, 12.067
  growth centers, 12.057
South, 6.027
  statewide, 8.104
  West, 12.108, 12.117

Research and development (see also Invention and innovation), 1.071, 7.075, 9.004, 8.005, 9.022, 9.028, 9.037, 9.042
capital costs, 9.034
developing countries, 9.009
  employment, 11.016
  England, 9.024
  farm, 8.009, 9.007, 9.010, 9.020
  firm size, 9.013, 9.023, 9.044
government impact, 8.143
health care, 7.011
industrial growth, 9.006, 9.039
international comparisons, 8.098, 9.012, 9.015, 9.026, 12.050
market structure, 9.017, 9.018, 9.025
pharmaceuticals, 9.001
production function, 1.055
productivity measurement, 1.101, 9.019
U.S.S.R., 9.043

Resource allocation
armed forces, 10.024
conglomerates, 7.091
economic growth, 12.014, 12.052
farm, 5.013, 7.022
health care, 7.030
labor, 5.015, 6.086
Post Office, 7.034
production function, 6.129
regulated firms, 8.125

Retail trade, 3.031, 3.050, 11.010

Sectoral analysis, 2.024, 2.025, 10.023
economic growth, 11.009, 12.092
farm, 2.001, 2.017, 11.020, 12.087
international comparisons, 5.036, 11.035
nonfinancial corporations, 2.007, 10.039
private vs. public, 4.004, 5.011, 7.053
services, 2.006, 2.008, 2.011, 8.016, 11.015, 11.017

Semiconductors, 8.140

Service industries, 8.094, 11.015
developing countries, 11.023, 11.040
economic growth, 11.033
employment, 11.042, 11.056
employment shift, 2.006, 2.008, 2.011, 8.016, 11.017, 11.059
productivity measurement, 1.066, 1.089, 5.018
repair services, 7.073

Shipping, 3.045, 7.013, 7.017, 8.103

Socioeconomic factors, 6.102
economic growth, 12.006, 12.012, 12.039, 12.048, 12.080, 12.088, 12.129
education, 6.052
food, 7.001
slavery, 8.004
technological change, 8.017, 8.052, 8.086, 8.156

Solid waste collection, 1.036, 1.073, 4.002, 7.002

Sources of growth, 1.025, 1.026, 1.027, 1.050, 1.051, 1.052, 2.004

Canada, 5.037
capital, 1.054, 5.003
developing countries, 1.053, 12.112
factor substitution, 2.037
farm, 1.020, 2.016, 2.026
India, 1.067
technological change, 1.011, 1.047
Turkey, 12.032
United Kingdom, 5.033

Spain, 5.014

Sri Lanka, 8.083, 8.106

Steam power, 8.060, 8.112

Steel. See Iron and steel

Stevedoring, 8.046, 8.047

Structural clay products, 3.037

Sweden

business cycles, 2.030
earnings, 10.032
manufacturing, 1.017, 5.006
quality of working life, 6.064

Technological change (see also Technological change, by industry), 1.071, 7.075, 8.007, 8.035, 8.075, 8.088, 8.108, 8.109, 8.120, 8.135, 8.144, 8.146, 8.150, 8.156, 9.036
automation, 8.014, 8.062
biased, 1.064
China, 8.063
comparative systems, 8.049, 8.075, 9.026
developing countries, 6.033, 8.037, 8.061, 8.066, 8.100, 8.102, 11.004, 11.051
diffusion, 8.023, 8.044, 8.067, 8.117, 8.130, 9.008, 9.032
economic growth, 8.073, 8.079, 8.126, 12.092
embodied/disembodied, 1.011, 1.047
employment, 8.077, 8.119, 11.003
information systems, 9.021
international comparisons, 8.022, 8.080, 8.098
market structure, 7.024
measurement, 8.041
organizational structure, 8.101
output, 8.069
production function, 8.121
quality of working life, 6.014
service sector, 8.094
socioeconomic variables, 8.017, 8.045, 8.078, 8.086, 8.135, 10.002
Technological change, by industry
aluminum, 8.076
ammonia, 8.068
armaments, 8.122
banking, 8.032, 8.076
chemicals, 8.136
computers, 8.003, 8.029, 8.131, 8.141, 8.145
construction, 8.059, 8.123
education, 8.074, 8.094
electric power, 8.097, 8.124
farm, 8.011, 8.013, 8.015, 8.025, 8.036, 8.043,
     8.048, 8.055, 8.070, 8.081, 8.089, 8.090, 8.091,
     8.106, 8.107, 8.111, 8.129, 8.130, 11.007, 11.053
food, 8.019
health care, 8.076, 8.094, 10.022
iron and steel, 1.021, 8.006, 8.057, 8.148
laundry and cleaning, 8.147
library, 9.014
longshore, 8.046, 8.047
lumber and wood products, 8.076
printing and publishing, 8.028, 8.128
railroad, 8.065
telephones, 8.152, 11.028, 11.054
textiles, 8.001, 8.076, 8.159
tires and tubes, 8.076
tool and die, 8.127
transportation, 10.017

Technological forecasting. See Projections, technological

Technology transfer, 8.012, 8.023, 8.034, 8.058, 8.082,
     8.105, 8.114, 8.132, 8.153
     Canada, 8.044
     developing countries, 8.042, 8.072, 8.083, 8.096,
     8.102, 8.116, 8.118, 8.138, 8.139, 9.008
     Eastern Europe, 8.054
     farm, 8.015, 8.039, 8.053
     health care, 8.115, 8.149
     India, 8.008, 8.113
     international comparisons, 8.093, 8.140, 8.158
     Italy, 8.071
     Japan, 8.026, 8.117
     migration, 6.136
     numerical machine tools, 8.113
     regional, 6.031
     steam and electrical power, 8.021, 8.060, 8.112
     steel, 8.030
     textiles, 8.064

Telecommunications, 11.028

Telephones
productivity measure, 3.010
technological change, 8.152, 11.054

Textiles
capital investment, 8.154
economies of scale, 12.132
international comparison, 5.003
Italy, 12.086
technological change, 8.001, 8.076, 8.159
technological diffusion, 8.064, 8.117
Tires and inner tubes, 8.076

Tobacco products, 3.055

Tool and die, 8.044, 8.127

Total factor productivity
capital, 1.022
economic growth, 1.054
elasticity of substitution, 2.033
India, 1.067
international comparison, 5.031
Israel, 5.017
Japan, 1.076
measurement, 1.049, 3.036, 5.045, 7.004
measures, 1.050, 1.051, 1.052, 2.004, 2.012, 2.013,
     6.070
production function, 1.087

Trade unions, 6.019, 10.030
construction, 10.019
farm, 8.043
sanitation, 7.002
telecommunications, 11.028
transportation, 10.018

Transportation
collective bargaining, 10.017, 10.018
economic growth, 12.117, 12.119, 12.120
mass transit, 1.060
ocean transport, 3.029
productivity measurement, 3.039

Trucking, 10.042

economies of scale, 3.042
productivity measurement, 3.039
productivity measures, 3.009, 3.015, 3.020

Turkey
economic growth, 12.025, 12.032, 12.041
railroad, 12.072

Unions. See Trade unions

United Kingdom, 7.071, 12.081
capacity utilization, 1.014
collective bargaining, 10.020, 10.021, 10.031
economic growth, 5.002, 12.030, 12.061, 12.085,
     12.101
farm, 12.104
output, 5.033
productivity measures, 11.013
research and development, 9.024, 9.029
technological change, 8.131
textiles, 5.003
trucking, 10.042

U.S.S.R., 7.060, 12.050
capital investment, 7.027
economic growth, 5.040, 12.028, 12.122
farm, 8.013
improvement programs, 6.091
labor utilization, 6.083, 11.024
planning, 7.031, 7.092
productivity measures, 5.012
research and development, 9.043
wholesale trade, 7.008

Venezuela, 6.021, 8.040

Wage-price guideposts, 10.004, 10.006, 10.010, 10.012, 10.015, 10.016, 10.029, 10.036, 10.037, 10.038

Wages. See Earnings; Costs

Workplace, 3.016

Workweek. See Hours at work

Yugoslavia, 7.095

Zambia, 5.030
**Regions VII and VIII** are serviced by Kansas City

**Regions IX and X** are serviced by San Francisco

Digitized for FRASER
http://fraser.stlouisfed.org/
Federal Reserve Bank of St. Louis