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Volume Title: The Task of Economics

Volume Author/Editor: Solomon Fabricant

Volume Publisher: NBER

Volume URL: <http://www.nber.org/books/unkn65-1>

Publication Date: 1965

Chapter Title: Staff Reports on Research Under Way

Chapter Author: Various

Chapter URL: <http://www.nber.org/chapters/c5234>

Chapter pages in book: (p. 39 - 90)

**PART IV**

**Staff Reports  
on Research  
Under Way**

## **1. ECONOMIC GROWTH**

### **TAX POLICIES FOR ECONOMIC GROWTH**

Our studies of the relation of taxation to the processes of economic growth have pursued two major lines of inquiry. We have directed part of our research, with the support of a grant from the Rockefeller Brothers Fund, to improving our knowledge of the effects of various features of business income taxation on the capacity and incentives of business enterprises to innovate and grow. We are also investigating the impact of the individual income tax on personal effort, saving, and investment, and on the willingness and financial capability of individuals to undertake business ventures. Support for this group of investigations comes from a grant from the Life Insurance Association of America.

The business income tax studies include the investigation by Challis A. Hall, Jr. (Yale University), of the effects of the federal corporation income tax on business policies affecting the pace and nature of corporation growth, on total private saving, and on the labor and capital shares of income originating in manufacturing corporations in the short run. A study by Thomas M. Stanback, Jr. (New York University), deals with the investment response of companies in the textile manufacturing industry to changes in 1954 and in 1961-62 in the tax rules governing depreciation. My survey of the use of alternative depreciation methods since 1954 also falls in this group.

In the individual income tax area, Roger F. Miller (University of Wisconsin) has under way an econometric analysis of capital gains taxation in relation to patterns of individual saving and investing. Daniel M. Holland (Massachusetts Institute of Technology) is measuring the extent of effective progression in tax liabilities of top corporate executives

and, in an interview study, is attempting to assess the impact of graduation in marginal tax rates on the amount and character of effort by high-bracket individuals. C. Harry Kahn (Rutgers University) is analyzing the operation of the loss carry-over provisions in the case of unincorporated businesses and the effectiveness of alternative averaging systems in offsetting the bias against risk assumption inherent in a graduated income tax.

At midyear the report of the joint National Bureau-Brookings Institution conference, *The Role of Direct and Indirect Taxes in the Federal Revenue System*, was published. The report includes the papers prepared for the conference by John F. Due, Arnold C. Harberger, Richard Musgrave and Peggy Brewer Richman, Douglas Eldridge, and Otto Eckstein (assisted by Vito Tanzi); the formal discussions by E. Cary Brown, William Fellner, Harvey Brazier, Ronald Welch, Carl Shoup, Lawrence Krause, Fritz Neumark, and Dan T. Smith; and a summary of the conference discussion prepared by Samuel B. Chase, Jr.

Forthcoming in 1965 will be the report on a second joint conference of the National Bureau and the Brookings Institution, *Foreign Tax Policies and Economic Growth*. This volume will include papers by Francesco Forte, Cornelis Goedhart, Karl Hauser, Ryutaro Komiya, Leif Mutén and Karl O. Faxén, Pierre Tabatoni, and Alan Williams; discussions by Paul Senf, Fritz Neumark, Siro Lombardini, Lars Nabseth, Claes Sandels, J. Van Hoorn, Jr., A. J. van den Tempel, Sumio Hara, Makoto Yasui, Alan R. Prest, Robert Liebau, D. de la Martinière; and a summary of the conference proceedings by E. Gordon Keith.

#### SURVEY OF THE USE OF ALTERNATIVE DEPRECIATION METHODS UNDER THE INTERNAL REVENUE CODE OF 1954

This survey examines the extent to which business income taxpayers have adopted the accelerated depreciation methods (declining balance or sum of years-digits) provided in

the Internal Revenue Code of 1954. It is clear that the effects of such provisions on investment in depreciable facilities depend on how fully they are used.

The most recent data available and covered by this survey are for the taxable year 1960. In that year, about 24 per cent of corporate returns indicated use of the declining-balance method, compared with 14.6 per cent in 1957 and 7.6 per cent in 1954. On the other hand, the proportion of returns showing use of the sum of the years-digits method changed only slightly. It rose from 4.8 per cent in 1954 to 6.6 per cent in 1957, then fell to 5.9 in 1960. The rough estimate of the proportion of corporations using only the straight-line method fell from about 86 per cent in 1954 to 78 per cent in 1957 and 70 per cent in 1960. The proportionate amount of depreciation allowances computed under the accelerated methods also increased—from 26.6 per cent in 1957 to 39.2 per cent in 1960 (Table IV-1). As was the case for 1957, we also discovered in the 1960 corporation returns that the proportion of corporations using the accelerated methods increased with company size. So, too, did the amount of depreciation computed under accelerated methods (Table IV-2).

The amount of depreciable property to which each depreciation method is applied is in some respects a surer indicator of the extent of use of the accelerated methods than either the number of businesses showing use of these methods or the amount of depreciation generated thereby. In 1959, about 71.5 per cent of all corporate depreciable facilities then on hand were in straight-line accounts, 15.6 per cent were under declining-balance depreciation, and 10.3 per cent were in sum of the years-digits accounts (Table IV-3). The corresponding proportions for partnerships in 1959 were 63.5 per cent, 16.2 per cent, and 2.2 per cent. Corporate assets can be divided very roughly between those acquired before and those acquired after the end of 1953. Since only the latter are eligible for the accelerated methods, the respective proportions for these assets are a more useful indication of corporation response to the availability of the

TABLE IV-1

NUMBER OF CORPORATIONS AND AMOUNT OF DEPRECIATION BY  
DEPRECIATION METHODS, 1957 AND 1960

Method of Depreciation	1957		1960	
	Number of Corporations	Amount of Depreciation (millions of dollars)	Number of Corporations	Amount of Depreciation (millions of dollars)
Straight line	720,693	11,888	769,515	11,223
Declining balance	108,646	2,630	194,913	4,673
Sum of years-digits	49,084	1,870	47,810	2,859
Other methods	4,410	537	4,485	473
Total	743,863	16,926	816,417	19,228
		(percentage distribution)		
Straight line	96.9	70.2	94.3	58.4
Declining balance	14.6	15.5	23.9	24.3
Sum of years-digits	6.6	11.1	5.9	14.9
Other methods	0.6	3.2	0.5	2.5
Straight line only <sup>a</sup>	78.2	—	69.7	—

SOURCE: For 1957, U.S. Treasury Department, Internal Revenue Service, special tabulation. For 1960, Joint Economic Committee, *Federal Tax System, Facts and Problems*, 1964, p. 256.

<sup>a</sup>The total number of corporations is less than the sum of the individual entries, since any one corporation may use different methods of depreciation for different assets. Only one method, however, can be used for any particular asset, so that the details do add to the totals shown in the columns on amount of depreciation.

Because of duplication noted between entries giving number of corporations, the percentage figures for those using only the straight-line method are minimum estimates obtained by subtracting the percentages for other methods from 100.

accelerated depreciation provisions. Of such facilities, only 45 per cent was in straight-line accounts and all but 1.5 per cent of the remainder was under accelerated methods. It seems likely that similarly larger proportions of the post-1953 facilities of partnerships were under the accelerated methods.

Among partnerships a pronounced tendency is evident for the proportionate amount of the property under the accelerated methods to increase with company size. Corporations show a similar tendency with respect to assets acquired after 1953. To a large extent, this reflects the proportionately greater use of the sum of the years-digits method by large than by small corporations. Thus, corporations with total assets of \$25 million and over held 25.2

per cent of their post-1953 assets in sum of the years-digits accounts, while the corresponding figure is only 5.6 per cent for corporations with total assets of less than \$1 million. The proportions relating to the use of the declining-balance method by the two groups on post-1953 assets are not so far apart.

Substantial differences in the proportionate amounts of property under the accelerated methods are also found among industries. In the partnership group, companies in the finance, insurance, and real estate division—which incidentally held larger amounts of depreciable facilities than any other division in 1959—had the largest proportion of such facilities in accelerated-method accounts, fol-

TABLE IV-2

PERCENTAGE DISTRIBUTION OF CORPORATIONS AND OF AMOUNT OF DEPRECIATION  
BY METHOD OF DEPRECIATION AND BY SIZE OF TOTAL ASSETS, 1960

Size of Total Assets	<i>Method of Depreciation</i>				
	Straight Line	Declining Balance	Sum of Years- Digits	Other	Straight Line Only <sup>a</sup>
	NUMBER OF CORPORATIONS				
Under \$100,000	94.6	16.6	2.8	0.3	80.3
100,000 to under 500,000	93.6	30.9	7.8	0.6	60.8
500,000 to under 1,000,000	94.0	38.6	12.3	0.8	48.4
1,000,000 to under 5,000,000	94.3	40.7	16.2	1.6	41.5
5,000,000 to under 10,000,000	96.9	37.8	19.3	2.3	40.6
10,000,000 to under 50,000,000	97.5	37.5	21.0	3.5	38.1
50,000,000 to under 100,000,000	98.0	40.9	28.9	6.7	23.5
100,000,000 and over	97.2	46.7	34.8	11.0	7.6
Total	94.3	23.9	5.9	0.6	69.7
	AMOUNT OF DEPRECIATION <sup>b</sup>				
Under \$100,000	79.7	16.2	2.6	0.4	—
100,000 to under 500,000	67.7	25.7	5.0	0.5	—
500,000 to under 1,000,000	63.0	29.1	6.5	0.6	—
1,000,000 to under 5,000,000	58.6	29.6	9.5	1.8	—
5,000,000 to under 10,000,000	57.3	25.9	13.9	2.7	—
10,000,000 to under 50,000,000	56.9	25.6	14.9	2.5	—
50,000,000 to under 100,000,000	52.2	26.2	18.3	3.3	—
100,000,000 and over	52.9	22.6	21.0	3.5	—
Total	58.2	24.2	14.8	2.5	—

SOURCE: See Table IV-1.

<sup>a</sup>See footnote a, Table IV-1.

<sup>b</sup>Detail will not add to 100 per cent because of the exclusion of small amounts of so-called additional first-year depreciations.

lowed by construction and mining, with manufacturing partnerships ranking sixth in the nine divisions. Among corporations, on the other hand, manufacturing companies held over two-thirds of their post-1953 facilities in accelerated-method accounts (Table IV-4). Public utilities actually held a slightly larger proportion of such facilities in declining-balance accounts, but a smaller proportion under sum of the years-digits method, than did manufacturing corporations.

The alternative measures—number of com-

panies, amount of depreciation, and amount of assets—employed in examining the use of accelerated depreciation methods result in differing conclusions about the extent to which these methods have been adopted. In terms of both the amount of depreciation and the amount of property, the shift from straight-line to the accelerated methods has been extensive. From the point of view of number of companies, one must conclude that use of these methods, though increasing, remains narrowly confined.

TABLE IV-3

COST OF DEPRECIABLE ASSETS OF CORPORATIONS BY METHOD OF DEPRECIATION  
AND BY SIZE OF TOTAL ASSETS, ALL ASSETS ON HAND IN 1959 AND  
ASSETS ACQUIRED AFTER 1953 AND ON HAND IN 1959

Size of Total Assets	<i>Method of Depreciation</i>				Total
	Straight Line	Declining Balance	Sum of Years- Digits	Other Methods	
A. ALL ASSETS ON HAND IN 1959 (thousands of dollars)					
Under \$1,000,000	14,489,931	4,008,979	751,795	14,575	19,265,280
1,000,000 under 25,000,000	4,894,480	2,047,776	399,134	15,363	7,356,753
25,000,000 and over	135,646,467	27,811,915	21,078,505	5,767,294	190,304,181
Total	155,030,878	33,868,670	22,229,434	5,797,232	216,926,214
(percentage distribution)					
Under \$1,000,000	75.2	20.8	3.9	0.1	100.0
1,000,000 under 25,000,000	66.5	27.8	5.4	0.2	100.0
25,000,000 and over	71.3	14.6	11.1	3.0	100.0
Total	71.5	15.6	10.3	2.7	100.0
B. ASSETS ACQUIRED AFTER 1953 AND ON HAND IN 1959 (thousands of dollars)					
Under \$1,000,000	9,007,570	3,627,003	743,276	14,244	13,392,093
1,000,000 under 25,000,000	2,642,074	1,740,006	393,228	7,466	4,782,774
25,000,000 and over	34,006,310	26,875,843	20,979,641	1,526,414	83,388,208
Total	45,655,954	32,242,852	22,116,145	1,548,124	101,563,075
(percentage distribution)					
Under \$1,000,000	67.3	27.1	5.6	0.1	100.0
1,000,000 under 25,000,000	55.2	36.4	8.2	0.2	100.0
25,000,000 and over	40.8	32.2	25.2	1.8	100.0
Total	45.0	31.8	21.8	1.5	100.0

SOURCE: Internal Revenue Service, *Life of Depreciable Assets Source Book*.

NOTE: Detail will not add to totals because of rounding.

The data suggest a positive association between company size and both the proportion of companies using the accelerated methods and the proportion of assets in accelerated-method accounts. Use of the accelerated methods does not appear to be systematically associated with industrial division, type of asset, or service life of the facilities. No obvious explanation for this association between

company size and use of accelerated depreciation methods is suggested by the data. None of the constraints imposed by statute and regulation on the use of these methods can be reasonably construed as exerting a bias against their adoption by small companies. Whatever the explanation, the fact revealed by these data is that the advantages of accelerated depreciation have accrued primarily to

TABLE IV-4

COST OF DEPRECIABLE ASSETS OF CORPORATIONS ACQUIRED AFTER 1953 AND ON  
HAND IN 1959, BY METHOD OF DEPRECIATION AND BY INDUSTRIAL DIVISION

Industrial Division	<i>Method of Depreciation</i>				
	Total	Straight Line	Declining Balance	Sum of Years-Digits	Other Methods
(millions of dollars)					
Agriculture	363	301	57	6	a
Mining	2,091	1,387	434	52	218
Construction	944	590	301	53	a
Manufacturing	41,394	13,215	13,557	14,178	444
Public utilities	38,624	19,116	12,788	5,874	846
Trade	4,948	3,095	884	940	29
Finance, insurance, real estate	10,359	6,279	3,322	749	9
Services	2,814	1,652	899	262	1
Not allocable	25	23	2	a	a
Total	101,563	45,656	32,243	22,116	1,548
(percentage distribution)					
Agriculture	100.0	82.8	15.6	1.5	0.1
Mining	100.0	66.3	20.8	2.5	10.4
Construction	100.0	62.4	31.9	5.6	a
Manufacturing	100.0	31.9	32.8	34.3	1.1
Public utilities	100.0	49.5	33.1	15.2	2.2
Trade	100.0	62.6	17.9	19.0	0.6
Finance, insurance, real estate	100.0	60.6	32.1	7.2	0.1
Services	100.0	58.7	31.9	9.3	a
Not allocable	100.0	90.8	7.8	1.1	0.4
Total	100.0	45.0	31.8	21.8	1.5

SOURCE: Internal Revenue Service, *Life of Depreciable Assets Source Book*.

NOTE: Detail will not add to totals because of rounding.

<sup>a</sup>Less than \$500,000 or less than .05 per cent.

a relatively small number of large companies. Our estimate is that corporations with total assets of \$25 million or more account for all but an insignificant part of the roughly \$2.5 billion difference between actual corporate depreciation allowances in 1959 and the amount that would have been claimed had only the straight-line method been available.

NORMAN B. TURE

CORPORATE PROFITS TAXATION  
AND ECONOMIC GROWTH

My efforts during the past year have been directed toward summarizing the results of interviews with executives on the effects of the corporation income tax on company growth. The growth-oriented activities include capital expenditures, introduction of new

products and processes, and research and development activities.

During the interview phase of the project, I collected a great deal of material on corporate growth activities, including company reports, sections from capital expenditure manuals outlining methods of calculating the rate of return on new investment, and other aspects of capital budgeting. The interviews alone have provided very extensive information.

This material must be condensed and organized by categories before company practices and attitudes can meaningfully be delineated and compared. During the year I was also able to compile from annual reports descriptive statistical material on almost all fifty companies in the sample. For some forty-five of these companies, I examined and summarized the rate-of-return formulas and the responses to interview questions on this subject.

This work of summarization and organization will be completed shortly. It will then be possible to start tabulating the replies to questions for the whole sample of companies.

CHALLIS A. HALL, JR.

#### EFFECT OF CHANGES IN TAX LAWS ON MODERNIZATION EXPENDITURES IN THE TEXTILE INDUSTRY

There are two principal avenues by which acceleration of depreciation for tax purposes may influence modernization expenditures. (1) It may serve to increase the demand for modern equipment and plant. (2) It may increase the supply of funds which the firm finds it justifiable to spend for such purposes. Both routes depend upon tax savings which occur in the earlier years of life of the new asset as a result of acceleration. The increase in demand may occur as a result of an increase in the expected rate of return, a reduction of the after-tax payback period, a reduction in optimum serv-

ice life and shortening of replacement cycle, and a reduction of the period in which funds are at risk. An increase in the supply of available funds is important if the firm has an aversion to use of long-term debt or deems the cost of such funds significantly higher than the opportunity cost of using internally generated funds.

In practice, some of the effects indicated may come through a change in management attitudes and objectives relating to modernization expenditures. Management acts in a world of uncertainty and under conditions in which there are competing demands for funds. Frequently the budget for modernization expenditures is not determined by rate-of-return calculations; when this is the case, the amount of depreciation charged is likely to provide an important basis for its determination. If the firm accepts tax depreciation as the basis for its regular (book) depreciation charges, an acceleration of depreciation will affect the modernization budget. As another example, management may tend to look at the amount of undepreciated book value when deciding whether or not an asset should be replaced. Accelerated depreciation practices, if they alter book depreciation, serve to reduce undepreciated book value of plant and equipment more rapidly, thereby diminishing this deterrent to replacement.

This study is an investigation of such possible effects of recent changes in depreciation provisions and of the introduction of the investment tax credit on modernization in the textile industry. The industry was selected for examination because the provision for shorter service lives for tax depreciation purposes was made by the authorities a year earlier than in other industries, and because a relatively large proportion of the industry's equipment was widely thought to be in need of replacement at the time of the change.

The investigation has been conducted principally by interviewing executives of twenty-five textile firms and five leading textile machinery manufacturers. In addition, data relating to borrowing, cash flow, and capital expenditures of the reporting firms and of



certain other textile firms are being analyzed in order to verify or supplement, where possible, the evidence obtained from the interviews.

The objective of the study is to determine the extent to which accelerated depreciation, or the investment credit, has influenced modernization expenditure decisions via any of the routes mentioned above. In general, evidence points to the following:

1. Only a minority of firms use after-tax computation of rate of return on investment, discounted cash flow, or payback which would permit an explicit recognition of the increased after-tax returns available as a result of such tax revisions.

2. On the other hand, all firms recognize that provisions for accelerated depreciation increase internal cash flow. A large majority are averse to any long-term borrowing or borrow only occasionally for major expansion in capacity or ventures into new product lines. Although a few firms appear to have been virtually unaffected in their expenditures by increased cash flow, a much larger number seem to have been significantly influenced. Some of these firms testify to having labored under continuing cash limitations. Others appear to carry out the decision-making process under conditions in which cash constraints are only one of a number of constraints, which include managerial limitations and uncertainties as to market possibilities and anticipated rate of technological obsolescence. Cash flow from depreciation is therefore only one of several variables and its exact effect is difficult to pin down. Both the interviews and the statistical evidence, however, point to a positive relation with investment decisions.

3. There is considerable evidence that accelerated depreciation alters managerial attitudes and objectives. In most of the firms, "book" depreciation is made to conform to tax depreciation. Depreciation charges in many instances provide at least an informal basis

for preliminary allocation of funds to modernization expenditures. Moreover, in a number of cases executives and directors are influenced in their willingness to replace equipment by the amount of undepreciated value that remains on the company's books.

A draft is in preparation, and it is expected that a manuscript will be ready for a reading committee within the next two months.

THOMAS M. STANBACK, JR.

#### PERSONAL CAPITAL GAINS TAXATION AND ECONOMIC GROWTH

This is an econometric investigation of the nature and magnitude of the impact of the present tax treatment of capital gains and losses on individuals' decisions with respect to the total volume of their personal savings, transferring accumulated savings among alternative earning assets, the riskiness of their portfolios, and the manner in which their current savings are translated into real investment. The study uses detailed panel data on incomes and their major components, including dividends and realized capital gains, obtained from a sample of Wisconsin individual income tax returns, 1947-59, supplemented by data on some of the same individuals from other sources.

During the past year we have gone a long way toward completing the acquisition of the data and processing them into usable form. The names of the companies paying dividends and interest to each taxpayer, and the amounts each taxpayer received from each company, have been coded, punched, and put on tape in order to allow capitalization of the receipts and determine the number and value of securities held. Supplementary data on age, race, covered incomes, and covered quarters have been obtained for most of the sample from the Social Security Administration.

A major accomplishment was the interview survey carried out last spring and summer.

The survey provided some detailed asset and income information not shown on returns as well as replies to some motivational questions. Reasonably complete responses were received from a stratified sample of approximately 1,100 persons. These responses have been coded and edited, and the keypunching is well along.

Our current efforts are largely devoted to the integration of the data derived from different sources into single consistent records for each individual. Some frustrating delays in programming have been experienced, but are being slowly overcome.

ROGER F. MILLER

#### THE TAX TREATMENT OF FLUCTUATING INCOMES

During the past year work has gone forward on writing a program to test the efficacy of various types of provisions designed to mitigate the effect of fluctuating incomes on income tax liability. At least initially, my empirical research effort is concentrated in the area of the individual income tax, where a bias against fluctuating incomes is most evident in view of the imposition of tax at graduated rates. In the corporate sector the problem may be less acute, since for the most part the corporate tax has no graduation. The program referred to is to test current loss carry-over and averaging provisions on a sample of returns for identical Wisconsin taxpayers filed during the period 1947-59. A tape containing a preliminary sample of Wisconsin taxpayers was obtained during the year to test the program, but difficulties with it caused some unforeseen delays. A new tape is expected soon.

In the meantime I have turned my efforts to writing an exposition of the several conceptual problems relative to loss carry-overs and averaging that require clarification and discussion at the outset. It is hoped that this

exposition will furnish a draft for the first chapter of the final monograph summarizing this study.

C. HARRY KAHN

#### EFFECT OF TAXATION ON PERSONAL EFFORT

Our study of the effect of taxation on executives' effort follows three main lines of investigation:

1. Wilbur G. Lewellen has assumed primary responsibility for the investigation of what top executives—the four or five most highly paid officers in the biggest companies—have received as additional nonsalary compensation over the last twenty-five years. To this end, a method of placing the major nonsalary components of compensation—pensions, other deferred compensation, and stock options—on a basis comparable with salary has been developed. A program for deriving these salary equivalents has been written, and data for over 500 executives in 50 companies have been assembled and edited and are ready for processing. There are between 200 and 250 executives for whom we shall have, for every year from 1939 through 1962, an estimate of total after-tax compensation, as well as the proportions accounted for by salary, bonus, prospective pension benefits, stock options, and other deferred compensation arrangements. In addition to this information, other points can be illuminated by these time series. For example, knowing each executive's age, we will be able to ascertain the changes in the span of working life and in retirement age. A first draft should be finished by the end of June, and a full version by the end of September.

2. The second approach concerns a broader sample of executives. The data are cross-sectional and permit us to calculate effective rates of tax of persons who can be identified roughly from tax returns as business executives. For both 1960 and 1962, samples of about 100,000 personal income tax returns

are available. To designate all persons with wages and salaries of over, say, \$25,000 as executives is, of course, arbitrary, but it probably comes fairly close to the mark. For this group of returns we can calculate, for example, the effective rates of tax, the importance of capital gains and deductions in determining this result, and the dispersion of effective and marginal rates. A program for this purpose has been written, and the results will soon be ready for analysis.

3. The third line of inquiry comprises interviews with business executives designed to discover what influence taxes may have on such matters as the choice of a business career, decisions to accept or reject promotion and to remain with a firm or join another, the form in which compensation is arranged, and the effect which these questions, in turn, may have on other decisions and activities, including time devoted to both personal and business tax questions. The interviews have been my main concern over the year and will continue to be so through May or June. I expect to complete a first draft of a report on them over the summer and to have a first draft of a report on the whole project before the end of the year.

DANIEL M. HOLLAND

### **PRODUCTIVITY IN THE SERVICE INDUSTRIES**

This study, undertaken with the aid of a Ford Foundation grant, is aimed at measuring and analyzing inputs, outputs, and productivity in the service sector. We are attempting to identify the factors responsible for productivity change as well as those that inhibit improvements in efficiency in this sector. Our work has been organized along three major lines. First, we have undertaken studies of individual industries. Second, we have planned studies of problems that cut across all or most of the service industries. Finally, I am attempting to view the sector as a whole and to contrast it with the rest of the economy.

The first publication resulting from the project was my *Productivity Trends in the Goods and Service Sectors, 1929-61: A Preliminary Survey* (Occasional Paper 89), which appeared in October 1964. I am presently revising a draft of a second paper, "The Growing Importance of the Service Sector." My contribution to Part II of this report draws on portions of this paper. A talk based on an earlier draft was given at the annual meeting of the American Statistical Association in Chicago in December 1964.

During the past year I began a study of productivity in health. We have been collecting data concerning inputs such as hospital facilities and employment; our principal attention, however, has been given to the problem of measuring the output of the health industry. This has customarily been measured by number of physician-visits and number of hospital patient-days, but it seems to me that output should be reflected in the *health* of the population.

One important, readily available, and objective measure of health is the death rate. I am investigating the relations over time and among states and countries between death rates and inputs of health resources, income, industrialization, and other economic and social variables. The problem is complicated because neither death rates nor any other index alone or in combination provides a completely acceptable measure of health. Moreover, there are many things that affect health other than the efforts of the health industry. Nevertheless, I anticipate that some useful insights into the economic aspects of health will emerge from this approach.

As is often true of research in relatively unexplored areas, our work in the service sector has raised a number of questions the importance of which was not obvious to us at the inception of the project. We find that we need to know more about the elasticity of substitution of skilled for unskilled labor, the income elasticity of demand for services, the role of the consumer in the production of services, the effects on productivity of self-employment and part-time employment, and

the relation between productivity and transaction size. We expect to begin work on some of these questions in the near future.

Harry Gilman is studying changes in labor input in the service industries, with special attention to quality of labor and hours of work. Reports by other members of the project follow.

VICTOR R. FUCHS

### PRODUCTIVITY GROWTH IN DISTRIBUTION

Progress is being made both in the measurement and analysis of changes in output, input, and productivity in retailing and wholesaling over the period 1929-58. One of the major elements in the increase in productivity in distribution, especially in the retailing of food, has been the increase in the average size of transaction. I present here the argument and the evidence concerning this increase.

The length of a production run is an important variable affecting productivity, as Armen Alchian suggested in a paper some years ago. Associated with each run is an element of fixed cost, e.g., setting up and closing a run and the delay between runs. Productivity therefore increases as the length of runs increases. Output changes usually consist of both changes in the length and in the number of runs; increases in output therefore usually raise productivity.

Both in retailing and in wholesaling, the "run" is a single transaction; costs of selling, billing, collecting, and delivering vary with the number as well as the dollar value of purchases. Several studies of checkout operations in food stores have established that the sales volume per man-hour, or labor productivity, as usually measured for any type of store, rises rapidly with the average size of transaction. Quantity discounts in wholesaling explicitly recognize the economies of transaction size.

The average size of transaction varies with the prices and the quantities of items purchased at any one time and, therefore, with the

level of income. Gary Becker has maintained, moreover, that time has a price which increases with wages; time-consuming activities will decline as wages rise. Shopping for food is more frequent than shopping for other goods; therefore, assuming equal income elasticities of demand, the average size of purchases of food will rise more as income rises than the average size of purchases of other goods. Finally, the growth in the use of automobiles and the improvements in home storage facilities also contributed to the tendency toward larger purchases, particularly of food, which in large quantities becomes bulky.

The Super Market Institute reported that the average size of transaction in 1958 in supermarkets was \$4.58. Even after correcting for the higher price level, this is much larger than the average purchase in food stores during the thirties, which amounted to about 50 cents. Supermarkets have been successful because they have facilitated large purchases, and they accomplished this by instituting self-service, by supplying a large assortment of goods, and by providing parking facilities. The appeal of the early supermarkets in the twenties and early thirties was based solely on price; during and after the forties their rapid growth was primarily a response to changes in consumers' shopping preferences.

The importance of transaction size in food retailing is demonstrated by a finding that sales per person engaged are directly related to family income and automobile usage. A regression analysis of sales per person engaged in food stores, as reported by the Census of Distribution for 188 Standard Metropolitan Statistical Areas in 1958, produced the following results:

$$p = 2.99 + .47i + .19g - .04d \quad (1)$$

$$R^2 = .50$$

(0.05) (0.04) (0.01)

All variables are expressed in logarithms, and  $p$  = sales per person engaged in food stores

$i$  = median family income

$g$  = gasoline sales per family

$d$  = population per square mile

The variables  $i$  and  $g$  are highly significant.

The objection may be made that average sales per store rise with sales and therefore with income; economies of scale are realized where incomes are high. If only the level of sales mattered, sales per family should have at least as large an effect as family income on sales per person engaged in food stores. When we substitute sales per family ( $f$ ) for family income ( $i$ ) in equation (1), we obtain the following results:

$$p = 4.71 + .16f + .31g - .001d \quad (2)$$

(0.06) (0.04) (0.009)

$$R^2 = .26$$

While  $f$  is highly significant, its effect on  $p$  is much smaller than that of  $i$ .

Among food stores, sales per person engaged vary with size of store as measured by sales. The relationship usually is attributed to the indivisibility of the small staff and the frequent lack of self-service in small stores. Another important element is the association between sales size and average value of transaction, because customers wishing to make a large purchase will seek a store where a large assortment is conveniently displayed. Small purchases are still made in small and more conveniently located groceries. That this is so can readily be determined by adding the variable, average sales size of food stores ( $s$ ), to equation (1). The results are as follows:

$$p = 2.89 + .29i + .06g - .04d + .15s \quad (3)$$

(0.06) (0.04) (0.01) (0.03)

$$R^2 = .62$$

The interrelation of  $s$  with  $i$  reduces the regression coefficient associated with  $i$ , and similarly with  $g$ . Large food stores succeed where incomes and automobile usage are high, and their success reflects the effect of these variables on transaction size rather than economies of scale.

As incomes have risen, the variety of foods consumed, particularly of prepared foods, has increased. As a result, the proportion of total

food purchases which are unplanned has risen; today more items are being selected by the purchaser while shopping than planned in advance. The display of a large variety of goods is a major attraction, and the competition of supermarkets, therefore, takes the form of increases in the number of items, which, in turn, reduce inventory turnover and increase space requirements. The staples of the trade have a high turnover, but represent a declining fraction of total business.

The survival of the corner grocery seems to be partly accounted for by this development. Those that survive are in a far stronger competitive position than the average small store of thirty years ago. Supermarkets are burdened by their slow-turnover merchandise, while the corner grocery caters to the demand for staples. This is one reason the small stores' operating expense ratios today are not much out of line with those of large stores.

The change in average transaction value in other types of store is being investigated. It does not appear to have been nearly as great as in food stores. Transaction values have risen in wholesaling with the increase in the average size of stores, and they probably explain a large part of the increase in productivity.

I am also investigating changes in the quality of labor. Increases in labor quality in retail trade have lagged behind those in other industries. The level of education of employees has not risen as rapidly, and the importance of teenage labor has increased more than elsewhere. The change in average weekly hours also is being measured. In addition, I shall estimate the change in the quantity of capital.

DAVID SCHWARTZMAN

#### STATE AND LOCAL GOVERNMENTS

The importance to the national economy of raising productivity in state and local government operations is considerable. Employment at this level now accounts for 77 per cent of

all civilian government employment, 15 per cent of the total service sector, and 8 per cent of total U.S. employment. Moreover, it has been the most rapidly growing area of the economy in recent years, as may be seen in Table IV-5.

I find that there has been little substitution of capital for labor in state and local government operations; physical capital per worker is approximately the same as in 1929. This suggests that there may not have been much technological change either, because such change in other industries has usually been accompanied by an increase in capital per worker.

I am preparing a manuscript that will describe trends in employment and other inputs since 1929; report the result of interstate cross-section analysis for 1942, 1952, and 1962; and discuss inferences about productivity that are suggested by the trends and interstate differences.

ERNEST KURNOW

#### BARBER AND BEAUTY SHOPS

I am completing a manuscript on productivity and employment in barber and beauty shops. These two personal service industries have experienced quite different trends in output, employment, and productivity, as may be seen in Table IV-6. Much of my paper is concerned with exploring the reasons for this difference.

Barbering has been a relatively static industry in which the few important changes, such as the development of the safety razor, have had their major impact on output and productivity in the home rather than in the market. Beauty shops, on the other hand, have benefited from numerous technological advances (e.g., the cold wave, improved hair dyes), a sharply expanded demand (related to changes in technology, income, and fashion), and the growing use of part-time workers to minimize the waste of idle labor.

One interesting by-product of the study is the discovery that the observed high prices for haircuts do not result in high hourly earn-

TABLE IV-5

GROWTH OF EMPLOYMENT IN STATE AND LOCAL GOVERNMENT AND OTHER SECTORS OF THE ECONOMY, 1947-63

	<i>Persons Engaged</i>		<i>Average Annual Rate of Change 1947-63</i>
	1947	1963	
	(thousands)		(per cent)
State and local general government	3,053	5,841	4.1
Education	1,364	2,886	4.8
General government, excluding education	1,689	2,955	3.6
Federal civilian government	1,416	1,772	1.4
Total service sector	26,320	37,962	2.3
Total economy	57,652	69,411	1.2

SOURCE: U.S. Department of Commerce, Office of Business Economics.

ings for barbers. As Table IV-7 shows, barbers earn much less per hour than would be "expected" on the basis of their age, education, color, and sex. This is not true of beauticians. Part of the explanation seems to be that barbers suffer from large amounts of idle time.

JEAN WILBURN

#### LONG SWINGS IN THE GROWTH OF POPULATION AND LABOR FORCE

The purposes of this study, conceived within the framework of Abramovitz' inquiry into long swings in the economy as a whole, are, first, to describe long swings in the growth of population and labor force of the United States over the past century; second, to determine as far as possible the factors responsible for these swings; third, to see what light the long-swings approach can throw on the determinants of population and labor force growth in recent decades; and fourth, to consider the implications of the findings for projections to 1970 and later. Previous publica-

tions are *The American Baby Boom in Historical Perspective*, Occasional Paper 79, and "Influences in European Overseas Emigration before World War I," in *Economic Development and Cultural Change*, April 1961. Since July 1, 1963, the study has been supported by funds provided by the Office of Manpower, Automation and Training.

The plan of work in the past year has been to prepare three papers which distill the main conclusions of the study and provide the framework for a summary monograph. The first of these was presented last June to the Population Association of America, entitled "Long Swings in U.S. Demographic and Economic Growth: Some Findings on the Historical Pattern." The paper summarizes our findings on the nature of long swings in the growth of U.S. population and labor force, and on their apparent cause-effect relations in the period prior to World War I to similar movements in the rate of economic development. It will be published in Volume II of the Association's new journal, *Demography*.

TABLE IV-6

#### EMPLOYMENT, OUTPUT, AND PRODUCTIVITY IN BARBER AND BEAUTY SHOPS, 1939-58

	<i>Barber Shops</i>			<i>Beauty Shops</i>		
	1939	1958	Average Annual Rate of Change, 1939-58 (per cent)	1939	1958	Average Annual Rate of Change, 1939-58 (per cent)
Employment (thousands of full-time equivalents)	141	139	-.1	189	246	1.4
Receipts (current dollars in millions)	231	783	6.6	250	1,028	7.7
Receipts (constant 1948 dollars in millions)	439	486	.5	458	831	3.2
Prices (1948 = 100)	52.6	161.2	6.1	54.6	123.7	4.4
Real output per man (line 3 ÷ line 1)	3,110	3,490	.6	2,420	3,380	1.8

SOURCE: U.S. Bureau of Census, *Census of Business, Selected Services, 1939, 1958*; U.S. Bureau of Labor Statistics, *Consumer Price Index*.

TABLE IV-7

COMPARISON OF ACTUAL AND "EXPECTED" AVERAGE HOURLY EARNINGS OF  
BARBERS AND BEAUTICIANS, 1959

	<i>Hourly Earnings</i>		Actual ÷ Expected
	Actual	Expected	
Barbers	\$1.69	\$2.34	.72
Beauticians	1.62	1.79	.91

SOURCE: U.S. Bureau of the Census, *U.S. Census of Population and Housing: 1960, 1/1,000, 1/10,000*.

NOTE: Expected hourly earnings are based on classifying all workers into 144 groups according to age, education, color, and sex, and applying the "all industry" hourly earnings rate for each group to the number of barbers and beauticians in each group. "All industry" earnings rates calculated by Harry Gilman for the NBER service industry project.

A second paper, focusing on the period since World War I and considering implications for the future, is now in preparation. A third, "On Swings in Demographic and Economic Growth," provides an overview of the study and considers some of the more general aspects of the Kuznets-cycle concept. This paper, which will be presented at the United Nations World Population Conference in Belgrade in September 1965, has been completed and submitted to the U.N. In addition, a preliminary memorandum on the methodological aspects of the framework used in analyzing manpower change has been prepared. This will ultimately form part of the appendixes of the summary monograph. A draft of the monograph itself is planned for June 1965.

RICHARD A. EASTERLIN

## LONG SWINGS IN URBAN BUILDING ACTIVITY

My manuscript on long swings in urban building was reviewed by a staff committee, in the course of which the scope of the work, its internal layout, and the analysis at critical points were considered. The upshot was a decision to confine the forthcoming monograph to a treatment of long swings in urban building and associated developments in realty markets and demographic activity, but to defer work, for the time being, on national swings. I have

since reworked the manuscript to exclude, where applicable, the treatment of national swings and to order the flow of analysis of local long swings in some thirty urban areas.

The new order of presentation results in six chapters in the following sequence:

1. Introduction and Summary
2. Procedures, Sources, and Techniques
3. Long Cycles in Building Activity
4. Long Cycles in Real Estate Market Activity
5. Migration, Marriage, and Vacancy
6. Value and Price Adaptations

Chapters 3 and 4 deal with what happens in the realm of new building both as a whole and by types, and with accompanying shifts in real estate purchases, mortgage lending, lot development, and foreclosure. Chapters 5 and 6 trace the processes of long swings in a way that sheds light on the causal forces at work. In Chapter 5 these causal forces are related to the surging tides of demographic growth and the alternating waves of over- and underbuilding reflected in the systematic behavior of vacancies. In Chapter 6 these causal forces are related to the differential response of price and value levels and their crucial margins, which in turn reflect and grow out of varied patterns of market behavior and price formation and varied elasticities of supply.

In addition to revision of the manuscript, which is now being retyped, I have during the



year prepared two papers related to the research project. One of these will be included in the forthcoming volume of the Conference on Research in Income and Wealth as a study of "Ohio Building, 1837-1912." A second paper, "New Measures of Value of Nonfarm Building U.S.A. Annually, 1850-1939," to be published in the *Review of Economics and Statistics*, amplifies my earlier Technical Paper 17 and its estimates of a new nationwide series of nonfarm residential unit construction between 1840-1939 by providing new estimates for the value of total nonfarm building for most of the same years.

MANUEL GOTTLIEB

## ECONOMIC GROWTH OF THE SOVIET UNION

The object of this study, begun in 1954 under a grant from the Rockefeller Foundation, is to set forth and analyze the evidence bearing on the rate of economic growth of the Soviet economy. The work was undertaken in full recognition of the inherent difficulty of arriving at an answer and of the special problems in securing reliable information.

To date, publications resulting from the study include the following: *Some Observations on Soviet Industrial Growth*, by G. Warren Nutter (Occasional Paper 55, New York, NBER, 1957); *Freight Transportation in the Soviet Union: A Comparison with the United States*, by Ernest W. Williams, Jr. (Occasional Paper 65, New York, NBER, 1959); *Soviet Statistics of Physical Output of Industrial Commodities: Their Compilation and Quality*, by Gregory Grossman (Princeton University Press for NBER, 1960); *Small-Scale Industry in the Soviet Union*, by Adam Kaufman (Occasional Paper 80, New York, NBER, 1962); *Growth of Industrial Production in the Soviet Union*, by G. Warren Nutter (Princeton University Press for NBER, 1962); *Freight Transportation in the Soviet Union, Including Comparisons with the United States*, by Ernest W. Williams, Jr. (Princeton Uni-

versity Press for NBER, 1962). In addition, a *Statistical Abstract of Industrial Output in the Soviet Union, 1913-1955* (Parts 1-5, offset, 1957) was made available to scholars working on Soviet statistics.

Work continues on the agricultural sector, on industrial production, and on a summary volume.

With regard to agriculture, present plans include several papers—one on output, another on income, and a third on labor input. Under the direction of D. Gale Johnson, Arcadius Kahan is devoting his attention to output and income, and Douglas Diamond to labor. A more detailed statement on the work on Soviet agricultural labor is given below.

Indexes of industrial production originally published in *Growth of Industrial Production in the Soviet Union* have been revised and brought up to date in accord with information released in the last few years. An Occasional Paper discussing these revisions is being prepared.

The summary volume will combine the major findings for individual sectors and discuss such other matters as population, employment, construction, and standard of living. Work on the summary volume has been delayed by continuing difficulties in completing the study of the agricultural sector, largely because of problems raised by gaps and changes in the Soviet statistics of agriculture. It is hoped, however, that a preliminary report, now being written in the form of an Occasional Paper, will soon be available, and that it will be followed by the summary volume itself, as soon as the agricultural monographs are completed.

G. WARREN NUTTER

## USE OF LABOR IN SOVIET AGRICULTURE

The objective of the study is to develop measures of employment in Soviet agriculture extending from the precollectivization period, 1925-29, to the early 1960's. To this end alternative series of the labor force in agriculture have been derived, differing in concept

of employment. In addition, a series of workdays expended in agricultural production activity has been obtained.

The labor force principally or only occupied in farming was reduced by one-half between 1928 and 1962 (present-day boundaries). On the other hand, the measure of the input of labor expressed as workdays shows only a small decline—less than 5 per cent—between the two years. The strong divergency in trend between the size of the labor force and the measure of work done is primarily due to two phenomena: (1) an increase in the number of days per year worked by the average person in the farm labor force, and (2) a great expansion of the number of persons with a secondary employment in agriculture. The latter group, *principally* employed in nonfarm activity, is estimated at 36 million in 1958, a number equivalent to three-fourths of the 47 million principally or only occupied in farm work. Thus some 83 million persons, or more than one of every two persons in the population age 12 and over, participated at some time during the year in farm work.

Most of the labor force secondarily employed in agriculture reside in urban or suburban areas, and farming activity for this group is mostly limited to private holdings of a kitchen garden and livestock. This type of private subsidiary economy has been permitted

to rapidly expand since the precollectivization period and provides an important supplement to the country's food production.

Both the summary paper and main body of the report will be concluded in 1965.

DOUGLAS B. DIAMOND

#### OTHER STUDIES

The following reports concerned with economic growth were published: *Evidences of Long Swings in Aggregate Construction Since the Civil War*, by Moses Abramovitz (Occasional Paper 90); *The Behavior of Income Shares: Selected Theoretical and Empirical Issues* (Studies in Income and Wealth 27); and *Measuring the Nation's Wealth* (Studies in Income and Wealth 29).

Three reports are in press: *Output, Employment, and Productivity in the United States after 1800* (Studies in Income and Wealth 30); *Determinants and Effects of Changes in the Stock of Money, 1875-1960*, by Phillip Cagan; and *Trade Union Membership, 1897-1962*, by Leo Troy (Occasional Paper 92).

Plans for a broad program of studies of productivity, employment, and price levels are described in Part III A. For other studies of economic growth, see section 2 and Juster's report in section 4.

## 2. NATIONAL INCOME, CONSUMPTION, AND CAPITAL FORMATION

#### INVESTMENT IN EDUCATION

In December 1964 my book *Human Capital* was published. It contains the theoretical and empirical results of my study of the economic effects of various kinds of human capital, especially education.

Among other things, the book outlines a theory relating human capital to the personal distribution of income, and promises more work to come. To make good on this promise, a more intensive theoretical and empirical investigation of income distributions has been

started. The theoretical analysis relates the distribution of earnings to rates of return on human capital and to the distribution of investments in human capital as well as to the distribution of luck and ability.

Rates of return and investments in human capital are in turn related to the degree of equality of opportunity, the functioning of capital markets, the demand for skilled personnel, and other institutional factors. For example, equality of opportunity is said to be greater the more alike are the effective supply curves of investment funds to different persons. The greater the equality of opportunity, therefore, the more is the distribution of investments in human capital dominated by differences in expected rates of return. Since "ability" is essentially defined by these rates, one can conclude that the greater the equality of opportunity, the more is the distribution of investments determined by the distribution of ability.

The theory is developed in such a way as to make the more important influences amenable to empirical analysis. For want of data, however, the empirical analysis relates the distribution of earnings to only one kind of human capital, formal education. The study is focusing on comparisons among geographical areas, specifically states and regions of the United States and different countries; information has already been collected for states and regions, and, is now being obtained for several countries. A preliminary analysis indicates that differences in educational opportunities play an important role in explaining differences among areas in the inequality and skewness of earnings. For example, more than a third of the differences in inequality among states in 1959 is apparently explained either by differences in rates of return or in the degree of inequality in the distribution of education.

Personnel on the project includes Barry Chiswick, who is writing his Ph.D. dissertation on this subject, and Linda Kee, who is providing general research assistance.

GARY S. BECKER

## CONSUMER PURCHASE PLANS

This project, which was regarded as completed with the publication of my *Anticipations and Purchases* monograph, has been reactivated on a small scale to permit the analysis of a body of experimental survey data provided by the U.S. Bureau of the Census. One of the main conclusions of the monograph was that surveys of consumer intentions to buy durable goods probably constituted an inefficient and relatively inaccurate way to obtain an estimate of prospective purchase rates for durables, and that a survey of explicit purchase probabilities might well represent an improvement. In July 1964 the Census Bureau reinterviewed a sample of households that had participated the previous week in its regular survey of buying intentions, using an experimental survey designed to provide a measure of the respondent's purchase probability for a list of consumer durables. A further reinterview to determine actual purchases was undertaken in January, roughly six months after both the intentions survey and the probability survey were taken.

The object of this experiment is to contrast the efficiency with which the two surveys—the regular intentions survey and the roughly contemporaneous experimental survey of purchase probabilities—can predict differences in purchase rates among sample households. The only possible source of difference, given the experimental design, lies in the way that respondents react to the alternative survey questions. The regular intentions survey asks, "Do you expect to buy a [car, washing machine . . .] during the next [6, 12] months?" while the experimental probability survey asks, "What are the prospects [chances] that you will buy a [car, washing machine . . .] during the next [6, 12] months?" The intentions question is open-ended, in that the respondent says whatever he thinks appropriate and the interviewer then codes the answer into a classification consisting of definite, probable, maybe, don't know, and no. The probability question must be answered from a list of possible responses; these consist of a 10-through-0 scale accompanied by both descrip-

tive adjectives (10 = certain or almost certain, 0 = no chance or almost no chance) and quantitative equivalents (10 = 99 in 100, 0 = 1 in 100).

The design of the experiment will permit a cross classification of buying intentions with purchase probabilities, enabling us to pinpoint the source as well as the extent of any differences that emerge. Since the experimental survey constitutes an empirical test of a set of propositions already developed at some length in the *Anticipations* monograph, the results should be available quite rapidly—within a few months after the data have been obtained from the Census Bureau.

In addition to facilitating a direct comparison of the alternative surveys, the experiment is designed to permit analysis of the influence on purchases of both the contemporaneous expectations and attitudes of sample households, and of unexpected (wholly or partly unforeseen) changes in their financial circumstances. The hypotheses to be tested here are also developed at length in the *Anticipations* monograph.

Financial support for the project has been provided by a grant from the Automobile Manufacturers Association, Inc.

F. THOMAS JUSTER

#### **THE IMPACT OF PUBLIC AND PRIVATE PENSION SYSTEMS ON SAVING AND INVESTMENT**

We are now engaged in revising the various study papers and the summary of major findings. The process of review by our advisory committee and by the Board of Directors of the National Bureau should be completed this year. Phillip Cagan's study paper on the impact of pensions on aggregate personal saving is now being reviewed by the Board, and the status of Daniel Holland's projections of pension programs in the future is reported below.

The project has been supported by the Maurice and Laura Falk Foundation and by a supplementary grant from the Life Insurance Association of America.

ROGER F. MURRAY

#### **PROJECTIONS OF PRIVATE PENSION PLANS, 1962-82**

A revised draft of the manuscript that sets out the projections, explains their derivation, and discusses their implications has been completed. The present version incorporates changes made in response to the suggestions and criticisms of the pension study's advisory committee and other students of the subject. The main consequence has been a proliferation of projections as account was taken of alternative possibilities. The study is concerned particularly with projections of pension funds and annual changes therein, but other projections required in their derivation—coverage, benefits, and beneficiaries—are also of interest in their own right. Projections have been made of private industrial plans in the aggregate and broken down into insured and noninsured, and of the state-local government plans as well.

DANIEL M. HOLLAND

#### **PHILANTHROPY IN THE AMERICAN ECONOMY**

Our study is approaching completion. A first draft of the manuscript for Chapters 1-7 and 9 is in hand and work has begun on Chapter 8.

The chapters are entitled:

1. Introduction
2. Income of Private Domestic Philanthropy
3. Recipient Institutions of Private Domestic Philanthropy
4. Private Foreign Aid

5. Social Welfare and Public Philanthropy
6. Veterans' Benefits
7. Other Public Domestic Philanthropy: (A) Public Aid, (B) Other Welfare, (C) Health, (D) Free Schools
8. Social Insurance and Public Philanthropy
9. Nonmilitary Foreign Aid
10. Summary and Conclusions

FRANK G. DICKINSON

#### ESTIMATES OF PRIVATE GIVING

Over the past year my work on two papers, supplementing the report described by Dr. Dickinson, has been proceeding on a part-time basis.

The first deals with the estimates of total private giving. A preliminary manuscript has been revised and updated. In the process additional data sources have been consulted, and the estimates have been refined and made more comparable in concept. The estimates as here presented are therefore somewhat more reliable than those presented in previous reports.

In 1960 the amount of giving from non-governmental sources to organizations supported in part or in full by such giving was estimated to be in the range of \$9.8 to \$11.5 billion (Table IV-8). In 1950 total giving was estimated to be from \$4.5 to \$5.1 billion. This 122 per cent increase in private giving compares to an increase in gross national product, over the same period, of 77 per cent.

This comparison does not include most philanthropic income in kind, such as the services of buildings, laboratories, libraries, and other physical assets acquired through past donations. Were the implicit rental income from these assets to be counted, total 1960 philanthropic income might be increased by a billion or more dollars.

For the 1950's, the total based on data derived from recipient categories ranged between 85 and 88 per cent of that derived from donor categories. Attempts to reconcile the

difference have uncovered reasons for discrepancies, but no precise measures of the separate magnitudes involved. Part of the discrepancy arises from differences in concept and definition. Part may arise from the time lag between the initial act of giving and the receipt of the gift by the ultimate donee. Over a period of regular increases in giving, this would make recipient totals consistently lower than donor totals. Another part arises from incomplete coverage of the multitude of recipient organizations and from the fact that some organizations report receipts net of fund-raising and administrative costs. Part may represent overstatements of the religious and charitable deductions claimed on tax returns, which would inflate the estimates based on donors' data.

Recent reports by the Bureau of Labor Statistics on the 1960-61 *Survey of Consumer Expenditures* provide greatly expanded data for the analysis of family giving. It is hoped that the new data will permit me to measure more conclusively the effects on giving of such family characteristics as income, age, occupation, and education.

A second manuscript, on economic aspects of corporation giving, has been read by a staff reading committee and is being revised in the light of the comments received.

RALPH L. NELSON

#### OTHER STUDIES

*Evidences of Long Swings in Aggregate Construction Since the Civil War*, by Moses Abramovitz (Occasional Paper 90); *The Flow of Capital Funds in the Postwar Economy*, by Raymond W. Goldsmith; *Research in the Capital Markets*, by the National Bureau's Exploratory Committee on Research in the Capital Markets; and *The Measurement of Corporate Sources and Uses of Funds*, by David Meiselman and Eli Shapiro (Technical Paper 18), were published. Also published

TABLE IV-8

## THE COMPOSITION OF PRIVATE GIVING, 1950 AND 1960

(dollars in millions)

Sources (Donors)	1950	1960	Uses (Recipients)	1950	1960
Living donors (persons and families)	4,359	9,183	Religious organizations <sup>a</sup>	1,961	4,550
Bequests	274	951	Private, primary and secondary schools	438	970
Corporations <sup>b</sup>	217	465	Higher education	447	1,199
Foundations <sup>c</sup>	150	701	Secular health	532	990
Endowment income			Secular welfare	742	1,315
Higher education	100	205	Other	295	790
Health and hospitals	10	20			
Total	\$5,110	\$11,525		\$4,415	\$9,814

<sup>a</sup>Includes church-supported health and welfare, and excludes parochial schools.

<sup>b</sup>Adjusted for the effect of company-sponsored foundations on the flow of corporation giving.

<sup>c</sup>Excludes the expenditures of company-sponsored foundations.

were Volumes 27, 28, and 29 of *Studies in Income and Wealth: The Behavior of Income Shares: Selected Theoretical and Empirical Issues; Models of Income Determination; and Measuring the Nation's Wealth*.

Conferences on Investment Behavior and on Industrial Composition of Income and Product are being arranged (see Part V). For other studies concerned with consumption and investment consult sections 1, 3, and 4.

### 3. BUSINESS CYCLES

#### GENERAL STUDIES

It is hoped that arrangements can be made to reprint Arthur F. Burns's lengthy paper on business cycles, prepared for the new *International Encyclopaedia of the Social Sciences*, together with charts and tables setting forth measures of the cyclical behavior of economic time series. Work on the preparation of these statistical materials for publication is under way.

#### STUDY OF SHORT-TERM ECONOMIC FORECASTING

This project, which is supported by grants to the National Bureau from several industrial companies, has as its main purpose an evaluation of short-term forecasts of economic developments in the United States.

The following manuscripts have reached the first-draft stage and are now in the process of being revised: "An Appraisal of some

Aggregative Short-Term Forecasts," by Victor Zarnowitz; "The Short-Term Forecasting Ability of Econometric Models," by Jon Cunningham; and "The 1965 NBER Indicators: An Expanded Analytical Scheme," by Geoffrey H. Moore and Julius Shiskin. Summaries of these three papers were presented at the December 1964 meeting of the American Statistical Association.

Similarly advanced are "Recognition of Cyclical Turning Points," by Rendigs Fels; "On Some Criteria of Evaluation of Forecasts," by Jacob Mincer and Victor Zarnowitz; and "Variable Span Diffusion Indexes: A Tool for Analysis of Current Economic Change," by Geoffrey H. Moore and Julius Shiskin. Rosanne Cole is preparing a draft of a paper on revisions in the official estimates of gross national product and their effects on forecast accuracy.

Our work has benefited greatly from the advice and assistance of many individuals. We cannot list them all here, but must mention in particular the debt we owe to those men and institutions who represent the sources of our forecast materials: without their cooperation, most of the data could not have been assembled and processed. We are especially indebted, also, to Gordon McKinley, McGraw-Hill Publishing Company, Inc., and Daniel B. Suits, University of Michigan, for their helpful comments on the three papers presented at the American Statistical Association meeting.

Fuller accounts of selected parts of the study appear in Part II. The individual reports that follow describe briefly the state of research in other areas covered by the project.

VICTOR ZARNOWITZ

#### ECONOMETRIC MODEL FORECASTS

The first report of the NBER study of short-term econometric model forecasting was presented in December at the annual meetings of the American Statistical Association. It analyzed published reports of 46 forecasts of

GNP and its major components in the post-war period from econometric models of the United States. The analysis suggests that econometric models have not been able to forecast the *levels* of aggregate economic activity as well as have some general business forecasts. This negative finding is due primarily to the imputation to these models of price movement forecasts which, although included in the published reports, were not usually generated from within the model. In forecasting *changes* in aggregate economic activity which exclude these price movements, econometric models have been about as accurate as the better business forecasts.

In addition to the analysis of published econometric forecasts reported in December, a more comprehensive set of *ex post* forecasts have been computed from the published models. A detailed evaluation of these models is being undertaken to identify factors which promote successful econometric forecasting. The forecasts are designed to provide the standardized structures of classification needed for analyzing the constraints which currently differentiate these forecasting models.

#### ANNUAL ECONOMETRIC FORECASTS

A comparison of errors in forecasting levels and changes for published annual econometric model forecasts of GNP and six major components is presented in Table IV-9. For each year the forecast values of the annual level and change for that year from the estimated level of the previous base year (usually estimated early in November) have been compared with the actual figures as reported in the first February issue of the *Survey of Current Business* following the year to which the forecast applies. These figures were used in preference to current reports from the Department of Commerce because it was felt that they tend to be more consistent with the predetermined variables which were available at the time of forecast.

Occasionally, several forecasts were made for a particular year with no clear preference of the forecaster, express or implied. In 1958,

TABLE IV-9

ANALYSIS OF ERRORS IN ECONOMETRIC FORECASTS OF  
GROSS NATIONAL PRODUCT AND SELECTED COMPONENTS, ANNUALLY, 1953-63  
(billions of current dollars)

Year	Model	Total GNP		Consumption Expenditures		Residential Construction		Gross Private Investment		Plant and Equipment Expenditures		Corporate Profits		Inventory Investment	
		Level	Change <sup>a</sup>	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change	Level	Change
1953	1-A	11.91	-0.89	0.37	-3.14	—	—	1.36	-3.96	—	—	-5.86	0.19	—	—
1954	2-A	28.40	5.20	4.40	0.56	—	—	6.60	0.56	—	—	0.10	5.96	—	—
1955	3-A	-22.37	-20.75	-15.15	-14.85	—	—	-4.57	-2.77	—	—	-7.90	-1.20	—	—
1956	1-B	-12.44	-4.08	-1.36	-3.07	—	—	7.33	7.41	—	—	2.85	7.49	—	—
1957	2-B	0.94	6.40	-0.52	0.33	1.81	1.85	4.33	5.63	0.81	1.34	3.24	6.78	1.80	2.59
1958	3-B	-0.26	8.31	-0.78	-0.89	-4.01	-3.93	11.32	10.97	9.26	9.25	5.40	5.84	6.43	6.03
1959	4-B	-18.65	-11.26	-12.90	-11.90	-3.91	-3.46	-8.67	-6.24	0.87	1.09	0.73	5.19	-5.36	-3.66
1960	5-B	0.53	-7.19	-11.70	-5.64	1.65	1.11	1.64	1.12	1.15	0.76	4.46	3.84	-1.12	-0.90
1961	6-B	-9.24	-3.36	-2.00	-1.75	1.17	1.25	1.80	0.75	0.89	0.71	-0.05	-1.66	-0.30	-1.21
1962	7-B	2.93	0.12	-3.88	0.57	-2.46	-1.77	-4.42	-2.86	-2.62	-2.04	-0.56	-0.28	0.58	0.88
1963	8-B	-2.67	-5.93	-3.66	-0.45	-1.14	-1.14	-5.08	-5.26	-1.45	-1.05	-0.30	0.61	-2.14	-2.60
SUMMARY STATISTICS															
Arithmetic mean error		-1.90	-3.04	-4.29	-3.66	-0.98	-0.87	1.06	0.49	1.27	1.44	0.19	2.98	-0.01	0.16
Standard deviation		14.19	8.42	6.21	5.21	2.56	2.34	6.17	5.52	3.80	3.66	4.06	3.47	3.64	3.32
Root mean square error		14.32	8.95	7.54	6.36	2.74	2.49	6.26	5.54	4.01	3.93	4.07	4.57	3.64	3.32

<sup>a</sup>Excludes error of forecast price change.



for example, the data were selected from a group of three distinct forecasts: one taken from the econometric model itself, a second obtained by inserting a single prediction of gross capital formation in place of the investment equation, and a third obtained by assuming about a 5 per cent decline in the level of investment from that of the previous year. Given the discretion involved in selecting the appropriate forecast and observed values, one should regard this table of forecast errors as tentative.

In the table, the figures shown are all expressed in current dollar values, even though the models from which the data derive were largely formulated and the forecasts themselves usually expressed in terms of changes in constant dollar values. A striking result is the lack of relation visible between these econometric models' ability to forecast GNP and their ability to forecast the GNP components. For example, when a model forecasts very well, such as in 1953 and 1962, the corresponding errors in the components are not reduced correspondingly: errors of change in consumption expenditures rank eighth and fourth, respectively, and errors of change in gross private investment rank sixth and fifth, out of a possible eleven. The worst forecast of all (in 1955) did equally badly forecasting consumption expenditures, but did fourth out of eleven in forecasting both gross private investment and corporate profits.

Another result, shown in Table IV-10, is an analysis of how well the forecast directions of change in GNP and its components correspond with the directions of change actually observed. Such an analysis for variables which change direction frequently, such as gross private investment and corporate profits, is a measure of their turning-point correspondence. Since some variables, such as total GNP and consumption expenditures, seldom show any declines on an annual basis, the directions of changes in the rate of change of forecast values are also compared in the table. These differences, represented by  $\Delta^2$ , may be of some importance because of their relation to business recessions and recoveries.

On this basis, the econometric forecasts of total GNP and plant and equipment expenditures have the best record. However, it should be noted that the forecasts of the latter were often not derived from the set of simultaneously solved equations representing the econometric model. The worst set of forecasts on the basis of turning-point correspondence, as shown in Table IV-10, is the forecasts of residential construction. Their first and second difference forecasts behave in an almost random fashion with respect to the differences actually observed.

Perhaps the single most important contribution econometric models can make to the advancement of the forecasting art is the ability to work back from the final forecast to the initial projections and assumptions concerning the exogenous variables. It is in this way that the consistency of each variable with the others and with the entire system of equations can be exposed to the best analytic power the forecaster can bring to bear. In these econometric models the contribution of each variable entering the forecast will be related to the final forecast of each endogenous variable. Given this information, the effects of autonomous shifts may be calculated; the stability of the final forecasts estimated from the variability of the inputs; and the more sensitive input variables revealed.

#### AUTOREGRESSIVE EXTRAPOLATION

In pursuit of the newer and more glamorous econometric techniques, it is easy to overlook that the older methods of extrapolation, trend projection, cyclical analysis, and correlation still produce good results for experienced statisticians. In order to gauge the relative forecasting power of current econometric models against these older and proven techniques, we have designed a purely statistical model which incorporates some of these methods in a statistical decision rule structure. The final result, presented in the December paper, is a general form of autoregressive extrapolation.

TABLE IV-10

CORRESPONDENCE OF FORECAST AND ACTUAL DIRECTIONS OF CHANGE  
IN GROSS NATIONAL PRODUCT AND SELECTED COMPONENTS, ANNUALLY, 1953-63

Variable	Annual Correspondence of Direction											Average Corre- spondence (per cent)	
	53	54	55	56	57	58	59	60	61	62	63		
Total GNP	Δ	+	+	+	+	+	+	+	+	+	+	+	91
	Δ <sup>2</sup>	+	+	-	+	+	+	+	+	+	+	+	80
Consumption expenditures	Δ	+	+	+	+	+	+	+	+	+	+	+	100
	Δ <sup>2</sup>	+	-	-	+	+	-	-	+	+	+	+	60
Residential construction	Δ				-	-	-	-	+	+	+	+	57
	Δ <sup>2</sup>				-	-	-	+	+	+	-	-	50
Gross private investment	Δ	-	+	+	+	-	-	+	+	+	+	+	73
	Δ <sup>2</sup>	+	+	-	+	+	+	+	+	+	+	+	90
Plant and equipment expenditures	Δ				+	+	+	+	+	+	+	+	85
	Δ <sup>2</sup>				+	+	+	+	+	+	+	+	100
Corporate profits	Δ	+	+	+	-	-	-	+	+	+	+	+	64
	Δ <sup>2</sup>	+	+	+	+	+	+	+	-	+	+	+	90
Inventory investment	Δ				+	-	-	+	+	+	+	+	72
	Δ <sup>2</sup>				+	-	-	+	+	+	+	+	67

NOTE: Δ = Correspondence of directions of change; Δ<sup>2</sup> = Correspondence of directions of change in rate of change; + = Positive correspondence;  
- = Inverse correspondence.

This yardstick of forecasting performance may be thought of as the extrapolation of a nonstationary stochastic process consisting of three components: a systematic component represented by a linear combination of quantities over time, a linear autoregressive and moving average component measuring the significance of the interaction of the economic indicator with its recent history at a point in time, and a random component. One measure of the forecasting ability of the econometric models analyzed in this study will be their performance relative to this autoregressive forecasting model.

JON CUNNYNGHAM

#### RECOGNITION OF CYCLICAL TURNING POINTS

For the eight business cycle peaks and troughs from 1948 through 1961, I have studied reports on the business outlook in more than a dozen periodical business and financial publications. The purpose was to appraise the published record with respect to early warning and prompt confirmation of cyclical turning points. I have written a report for consideration as an Occasional Paper.

In an interval beginning some time before a cyclical peak or trough and extending as much as six months after it, there is a more or less regular pattern in reports on the business outlook as analysts become increasingly aware of first the possibility, then the probability, and finally the certainty of a turning point. Confirmation comes between three and six months after the peak or trough.

Geoffrey Moore, writing in 1950 about "the usual lag in recognizing revivals or recessions *that have already begun*," said that "this lag is clearly not negligible. If the user of statistical indicators could do no better than recognize contemporaneously the turns in general economic activity denoted by our reference dates,

he would have a better record than most of his fellows."<sup>1</sup> My study confirms Moore's observation. To "forecast" turning points regularly with no more than a zero lead would be to exceed the general run of publications I have studied.

Since World War II, anticipation of upturns has been better than of downturns. Forecasters have generally expected each contraction to be short, and to be milder than such major contractions of the past as 1920-21, 1929-33, and 1937-38. Although they were not able to pinpoint when the trough would come, they were basically right.

Forecasts, especially those based on national income analysis, can go badly astray as a result of faulty estimates of a single statistical series. In 1947, a poor seasonal adjustment of industrial production led to false confirmation of a downturn. In 1957, the preliminary estimate of inventory investment for the first quarter had the wrong sign, leading some forecasters to expect continued cyclical expansion instead of the downturn that actually occurred.

The study tends to confirm the value of business cycle indicators. Although they have sometimes given false signals, at times (notably in 1957) the indicators have enabled those forecasters who relied on them to recognize the turning point faster than anyone else.

RENDIGS FELS

#### BUSINESS CYCLE INDICATORS

A comprehensive review of the NBER cyclical indicators, covering conventional economic time series and diffusion indexes, was carried out during the past year.

The first list of NBER indicators was issued

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<sup>1</sup>*Statistical Indicators of Cyclical Revivals and Recessions*, Occasional Paper 31, New York, NBER, 1950, p. 76.

in 1938. The list was revised in 1950 and again in 1960. Periodic revisions are required because of the appearance of new economic time series, new findings of business cycle research, and the changing structure of the American economy. About 115 series were covered in the present review, including those that came out well in previous studies and other series that appear promising for this purpose. This review of the indicators was concerned with two aspects of their use: (1) quality of the series as cyclical indicators and (2) organization and classification. It is limited to the role of economic time series as business cycle indicators, and may not be relevant to their other uses.

The current review has extended the use of explicit criteria and objective standards employed by Mitchell, Burns, and Moore in establishing previous lists. This has been accomplished by a plan for assigning scores to each series, within a range of 0 to 100. The scoring of each series reflects our desire to make as explicit as possible the criteria for selecting indicators, as well as to increase the amount of information available to the user to aid in evaluating the current behavior of the indicators.

The scoring plan includes six major elements: (1) economic significance, (2) statistical adequacy, (3) historical conformity to business cycles, (4) cyclical timing record, (5) smoothness, and (6) promptness of publication. Subclassifications are included under most of these elements, with some twenty different properties of series being rated in all. This list of properties provides a view of the many different considerations relevant to an appraisal of the value of a statistical series for current business cycle analysis.

In classifying indicators into groups useful for purposes of business cycle analysis, it is desirable to take account of both their economic interrelationships and their cyclical behavior. Consideration therefore has been given to various criteria for such a classification, including type of economic process, consistency of conformity to business cycles, and

timing at business cycle peaks and troughs. The advantages of providing both a relatively short list of indicators as well as a much longer list have also been considered.

Our tentative conclusions on these points are:

1. To use as a major principle of classification the fourfold grouping: Leading, Roughly Coincident, Lagging, and Unclassified by Cyclical Timing. The first three categories take into account timing at both peaks and troughs, but within them we plan to distinguish peak from trough timing where they are significantly different. The fourth category includes economic activities important for business cycles, but which have displayed a less regular relation to them.

2. To use as a secondary principle of classification the type of economic process represented by the series, having in mind particularly the processes that are important for business cycle analysis. The following nine categories have been selected: employment and unemployment; production, income, and trade; fixed capital investment; inventories; prices and costs; money and credit; foreign trade and payments; federal government activity; production and prices in other countries.

3. To develop both a short list of about 25 indicators as well as a longer list of 75 to 100. The short list would contain little duplication and would be convenient for summarization. The long list would fill more of the needs of the analyst.

A paper incorporating these ideas, "The 1965 NBER Indicators—An Expanded Analytical Scheme," was presented at the December 1964 meetings of the American Statistical Association. A revised draft, which will include the new list and classification, is being prepared.

Our review of diffusion indexes considered existing knowledge of their properties and investigated the effects of computing diffusion indexes over long spans. A paper, "Variable Span Diffusion Indexes—A Tool for the Analysis of Economic Change," is being prepared.

(An initial draft was presented at the April 1964 meeting of the New York Chapter of the American Statistical Association.)

The new findings concern the relative advantages of diffusion indexes computed over short and long spans, and of cumulated diffusion indexes and moving averages. As a result of this work, a new collection and arrangement of diffusion indexes was introduced in the Department of Commerce monthly publication, *Business Cycle Developments*. A pair of diffusion indexes is shown for each economic activity, one long-span (six or nine months depending upon irregularity) and one short-span (one month or quarter). The long-span index is smoother and portrays cyclical movements more clearly. However, it does not show changes that have taken place within the span. While the short-span indexes are usually very erratic, they reveal widespread changes promptly. Since such changes often occur around cyclical turning points, the one-month indexes will sometimes give an earlier and more precise indication of a cyclical turning point than the corresponding longer-term index.

JULIUS SHISKIN  
GEOFFREY H. MOORE

#### GNP REVISIONS AND FORECASTING ACCURACY

The poor quality of the available data is often cited as one of the sources of error in forecasts of business conditions. This part of the forecasting study appraises one aspect of the quality of the data used in forecasts of future values of gross national product: the accuracy, as indicated by successive revisions, of the provisional estimates of GNP.

The provisional estimates are those values of quarterly GNP which are available one or two months after the close of the quarter covered. They are estimates of the latest levels of GNP which are known to the forecaster

at the time he makes his forecasts. Typically, they are used to form the base of his forecasts and, to the extent that they are extrapolations of past changes in GNP, his forecasts of change. Shortcomings in the provisional estimates are thus likely to be transferred to the forecasts.

Estimates of such an aggregate as GNP call on a variety of data sources. Since few of these sources were initially developed as parts of a reporting system designed for estimating current GNP, not all of the data relevant to the period covered are available in time to be incorporated in the first estimates. As new data become available, the initial estimates of a given quarter are periodically revised.

The provisional estimates are themselves a type of forecast in that they are based on only partial information. As might be expected, the revisions of these estimates share many of the characteristics of bona fide forecast errors. The revisions indicate that the provisional estimates of quarterly GNP in the postwar period have been too low, on the average. Further, the magnitude of the revisions increases as the span of months from first to revised estimate increases. That is, new data relevant to the estimate of a given quarter continue to become available some three years (or more) after the time the provisional estimate of GNP was published. For the period studied, 1947-61, data available approximately one year later indicate that the provisional estimates of quarterly GNP averaged \$3 billion too low, after two years averaged \$3.7 billion too low, and after three years the new data showed them to be an average of \$4 billion too low. Finally, as Zarnowitz finds for errors of bona fide forecasts, the variability about the average is related to the cyclical characteristics of the quarter for which GNP was estimated. The average upward revision of the provisional estimates was greatest during the first year of a business cycle expansion (\$5.5 billion), somewhat less during later expansion (\$3.9 billion), and least during periods of contraction (\$2.5 billion).

Unlike forecasts, which Zarnowitz finds underestimate change, the first available esti-

mates of peak-to-trough change have substantially exaggerated the severity of the decline in GNP during each of the four postwar contractions. In every case, overestimates of the decline were the result of underestimating the rise in personal consumption expenditures and overestimating the decline in gross private domestic investment (particularly the change in business inventories).

The revisions of the provisional estimates show the difficulty of measuring GNP on a current basis and therefore provide some notion of tolerable forecast error. The periods most difficult to measure are likely to be those which are also difficult to forecast. Generally, it is suggested that forecasts of GNP should be compared with the first estimates available rather than the values as they appear today, because the forecaster should not be held responsible for the revisions of the estimates which will occur in the future. This procedure only partly eliminates the effects of the revisions (errors in the provisional estimates) on forecast accuracy. In addition, errors (as indicated by subsequent revisions) in the data available at the time forecasts are made are likely to be incorporated in the forecasts. How much these errors influence the forecasts depends on the autoregressive properties of GNP and the extent the forecaster relies on them. Some attempts have been made to estimate the effect on forecast accuracy of using the poorer-quality data available at the time forecasts are made.

The revisions of the provisional estimates of the major GNP components have also been reviewed. Future work on this part of the project includes an analysis of the consequences of this type of measurement error for estimates of the parameters of some single-equation models which include GNP or its major components as variables, and for the accuracy of the forecasts of these models. In addition, it is hoped that the final report will include recommendations for improving the quality of the provisional estimates of GNP.

ROSANNE COLE

## STATISTICAL INDICATORS

A review and evaluation of the NBER list of business cycle indicators was carried out, as reported under the study of short-term economic forecasting.

Among the indicators constructed or investigated during the year, two that appear to be the most useful are the following:

1. A monthly index of profit margins and total profits in manufacturing. The index of margins was constructed by adjusting the ratio of wholesale prices to labor cost per unit of output (series 17 in *Business Cycle Developments*) so that its cyclical amplitude approximates that of profits per dollar of sales of manufacturing corporations (series 18 in *BCD*). This was done by a simple mathematical formula. The monthly index of margins was multiplied by a monthly index of manufacturing sales (Department of Commerce) to obtain the index of profits. Despite differences in coverage and concept, the monthly index corresponds fairly closely with the quarterly data on profits of manufacturing corporations (Federal Trade and Securities and Exchange Commissions). The monthly figures can be kept more nearly up to date, and the separate effects of changes in output per man-hour, hourly compensation, wholesale prices, and sales can be observed. This is not possible with the quarterly data derived from financial reports.

2. A quarterly index of labor cost per unit of real corporate gross product (series 68 in *BCD*). This index, covering the entire corporate sector, is more comprehensive than the monthly index of unit labor cost in manufacturing (series 62 in *BCD*), and it is to a large extent statistically independent of the latter. Hence it provides another observation on the movement of this important factor. By omitting agriculture and other unincorporated business, private households, and government, a considerable improvement in the statistical adequacy of the data is secured as compared with the previously published index of labor cost per unit of real gross national product.

GEOFFREY H. MOORE

## FLUCTUATION IN STOCKS OF PURCHASED MATERIALS ON HAND AND ON ORDER

Eight chapters of the manuscript have been read by a staff committee. These pages start with an analysis of the functions that inventories serve in business organizations and examine the behavior, as evidenced in data for durable goods manufacturers and department stores, of stocks of purchased materials both on hand and on order and their sum, which we term "ownership." The final chapter of the main body of the work turns to causal explanation, combining two sources of information: business practice or management expertise and time series.

The first source says that stocks do not need to rise as much as sales rise, and that they may respond to shifts in a wide variety of costs (opportunity costs). The second source, the time series, says that stocks on hand actually rise faster than sales about half the time that sales are in rising specific cycle phase, times when the rise in stocks is likely to be intentional. During business cycle expansions from 1948 to 1961, specific cycles in the stock-sales ratios were in rising phase (stocks rising faster than sales) 64 per cent of the months covered for durable-goods manufacturers and 63 per cent for department stores.

To understand this pattern of behavior of stocks on hand, it is necessary to look at the behavior of materials stocks both on hand and on order. Two major sets of influences are at work. The first is demand, as evidenced by retailers' sales or manufacturers' shipments, and, particularly, their rates of change. The second is change in the one set of opportunity costs that can be traced: actual and expected conditions in the markets in which materials or stock in trade are purchased. These costs reflect conditions of supply and its interaction with demand. The first set of influences, sales, seems strongly responsible for the routine timing and the second for the extent and occasional timing of changes in

stocks on hand and on order. The evidence of these two major influences is instructively different for the two sorts of enterprises, retail stores and manufacturers, and for the two sorts of stocks (on hand and on order).

For department stores, for which the enforcement of sharply defined stock objectives must carry high management priority, the evidence is in accord with the following grossly simplified story: Retailers buy to achieve an end-of-month inventory objective based on recognized seasonal patterns of sales over the purchasing horizon (the "season"), expected sales for the month, and a judgment about delivery (or price) conditions during the "season." Sales expectations rely heavily on sales of the recent past or corresponding months of the previous year.

If sales turn out to be higher than expected, merchants tend to do three things: (1) place "at once" orders to restore stocks (drawn down by the higher sales) to the desired level very promptly; (2) if the higher sales are not attributed to an ephemeral cause, they place more advance orders to revise the pattern of build-up of stock in line with changed sales expectations; (3) they may place additional advance orders in expectation of market tightness.

Because of the speed with which it operates, device 1 largely erases in end-of-month statistics the inverse impact on stocks of the rate of change in sales. The impact of devices 2 and 3 appears in the lagging correspondence between fluctuations in the rate of change in sales and in stocks (inventory investment); they are in like phase 81 per cent of the post-war months after allowing for a three-month lag of stocks. But the impact can be seen more sharply in the synchronous correspondence between the rate of change in sales and in materials ownership (stocks both on hand and on order), for which 84 per cent of months are in like phase. (A notion of the meaning of this figure is suggested by the fact that since twelve turns occur in the 186 months, if all were matched, an average deviation of no more than two and one half months would be implied.) But though the rate of change in sales

goes a long way toward explaining the timing of stock changes, factors 2 and 3 also occasionally influence the timing of turns and usually influence the amplitude of fluctuation. This is greater than that of sales, whereas an efficient sales link would cause it to be smaller. The evidence takes many forms; for example, the ratio of ownership to sales is in rising phase 70 per cent of the months when sales are rising.

Finally, 1, 2, and 3 are all reflected in the association between new orders proper and change in sales. All turns, twelve, are matched and six, five of which are troughs, are virtually synchronous (within plus or minus one month). At peaks, new orders tend to turn down two or three months after sales have stopped rising at an increasing rate. However, on two occasions the lag was quite long and these, according to the data collected by the Chicago Purchasing Agents Association, were both times when markets were unusually tight. The one substantial lag at a trough also occurred (late in 1953) when slackness was sharply evident.

The net result is that new orders lead sales by substantial intervals and have about twice their amplitude of fluctuation. Thereby they convey a cyclical whip and acceleration to the demand at earlier stages of production relative to that of the consumer. New orders placed by department stores usually turn *earlier* than new orders received by all durables goods manufacturers. For the ten turns marked since 1947 in both series, department store orders lead in seven cases, lag in two, and synchronize in one.

Space does not permit a sketch of the equivalent explanation for materials buying by durable goods manufacturers. Suffice it to say that the twofold influence of sales and market conditions is evident, though they have quite different forms and relative importance.

Manufacturers are not willing to pay the opportunity cost of keeping materials stocks in close conformity to a precise sales-linked objective in the first instance. For this reason, and perhaps also because of the character of the objective, changes in sales and in stocks

have an inverse association. However, manufacturers do respond to the presence of too much or too little stock, defined very crudely as materials that represent more and less, respectively, than about one month's supply. The stock-sales ratio, then, is the link between the rate of change in sales and new buying of materials. From 1948 on, all ten turns in the stock-sales ratio and in new orders placed for materials are matched inversely. Six of these matched turns are within two months of one another, but in 1948, 1951, and 1956 new orders continued to rise for five months or more after the stock-sales ratio had reached a trough (i.e., stock deficiencies had started to subside). These were just the occasions in which spot-market prices of metals were rising rapidly to unusual highs. The lag at the 1949 trough occurred also at exactly the time when the most abrupt postwar drop in these prices was underway. On some of these occasions, though not all, new orders for final products were also rising (or falling).

Market expectations, then, on several occasions were important determinants of the time when reversals in previous "trends" in buying occurred. But for durable goods manufacturers far more than for department stores, they regularly influence the amount of materials stocks held on hand and particularly on order; for this there are good and sufficient reasons. Fluctuation in the stocks on order (and also in the total) are large and have a close association with an entirely independent source of information on market conditions developed by the Chicago Purchasing Agents Association. I attribute a not inconsiderable part of the fact that increases in stocks were so moderate during the expansion starting in 1961 to the absence, at least until 1964, of expectation of market tightness. This does not deny that control techniques associated with computerization also helped to validate the sales-linked stock objectives. These would in any event tend to dominate, in the absence of worry about lengthening delivery periods or other shifts in opportunity costs of stock (such as the labor cost of flexible production schedules).



These findings seem to bear out the hunch with which the study started: Examination of materials stock on order, viewed along with materials stock on hand, can contribute much to the understanding of the process of stock accumulation and purchasing. If this analysis is correct, the provision of statistics for stocks on order, classified by industry placing the order, warrants a status equal to that accorded the provision of data for stocks on hand. The recent discontinuance of the department store data discussed above was a serious retrogression from this point of view, and I hope it will not prove permanent.

In the wake of the findings here mentioned, along with many others, the usual unanswered questions bubble and churn. For one thing, the study lives in a world of orders in which an explanation of production in terms of new orders is vacuous unless changes in orders themselves are explained. In this world, an insistent fact is the lead of orders placed by the department stores relative to consumer buying, and the fact that those orders, if anything, turn earlier than those for durable goods. This lead of department store orders, in which rates of change in sales as well as market expectations seem to play an important part, raises a question whether the role of capital formation in bringing on business reversals is really paramount. At the same time, it suggests that a deeper understanding of factors that influence the pace of economic change and its governance throughout business expansion might have a bearing on that important question, how to promote long-lived expansion by means other than stiff-arming downturns by fiscal measures.

The study also lives in a world of expectations. The fact that expectations about market conditions ebb and flow, and their apparent association with changes in demand as well as with conditions of supply, raises questions about how these waves in sentiment and related buying come about. Obviously it involves a process which feeds upon itself. But does it also pack an inherent reciprocating mechanism? How? The concluding section of this study touches on these matters.

RUTH P. MACK

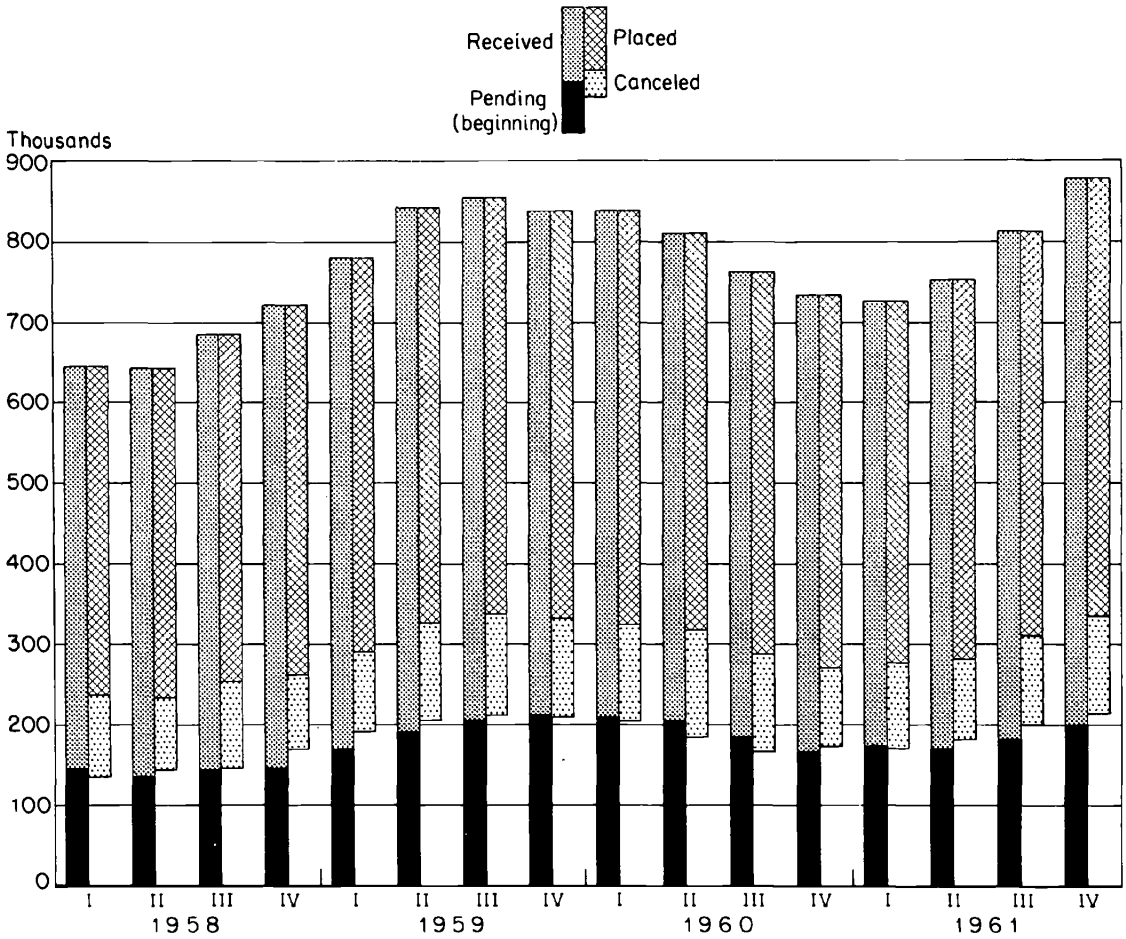
## LABOR TURNOVER

Two sections of a report on the cyclical behavior of labor turnover, those dealing with cyclical conformity and timing, have been completed, and a third section, on amplitudes, is in preparation. One of the most interesting findings pertains to the consistently long leads of accession rates (gross accessions, net accessions, new hires) at business cycle peaks. During the postwar period these leads were always longer than those of new orders for durables, and their extraordinary length may be associated with the fact that the first phase of recovery in general business activity usually shows the sharpest rise. The subsequent deceleration is reflected in a decrease of the rate of addition to the number employed and in a decline of accession rates. Leads of accession rates before business cycle troughs are also long relative to leads of other activities. However, the leads are not as long as at peaks, partly because of the shorter duration of contractions.

In the course of our work on labor turnover, we had occasion to study Bureau of Employment Security data on job openings received, placements, job openings pending, and job openings canceled. Chart IV-1 illustrates, for the 1958-61 cycle, how these measures are related to one another. Perhaps its most interesting aspect is the small size of the stock of job openings pending, relative to the flow of job openings received. The stock-to-flow ratio is about one third. By contrast, the corresponding ratio of insured unemployment to the flow of initial claims for unemployment insurance is approximately three to one. This implies that the average duration of a job opening is one third of one month, while the average duration of insured unemployment is three months. However, these findings for job openings pending at employment offices cannot be readily transferred to job vacancies in the economy at large, since only a small fraction of all job vacancies but a very large fraction of all job seekers are registered at employment offices. This makes the filling of job openings at employment offices relatively easy and the stock of openings pending rela-

CHART IV-1

Components of Job Openings Pending, 1958-61



tively low. A paper dealing with these and other measures of labor demand, entitled "Job Openings and Help-Wanted Advertising as Measures of Cyclical Fluctuations in Unfilled

Demand for Labor," was prepared for the Conference on Measurement and Interpretation of Job Vacancies.

CHARLOTTE BOSCHAN

## **MONEY AND BANKING**

Work on "Trends and Cycles in the Stock of Money" is proceeding along lines described in last year's Annual Report. There are no substantive results as yet to report on the statistical investigations that are under way.

MILTON FRIEDMAN  
ANNA J. SCHWARTZ

## **SOURCE BOOK OF STATISTICS RELATING TO INVESTMENT**

This source book is a compilation of the principal monthly, quarterly, and annual time series on fixed investment in the United States. Its preparation has been supported by a grant from the National Science Foundation.

The National Bureau's collection of historical data on investment forms the main basis of the source book, but it has been necessary to bring up to date or revise most of the series, and many new ones have been added.

All the data published will be accompanied by descriptions of sources and methods of compilation. For monthly and quarterly series, seasonally adjusted as well as original data will be presented, and summary measures of cyclical behavior will be given for some of the more important categories of investment.

Work during the past year has been concentrated on series pertaining to construction activity. Almost one hundred monthly and quarterly series in this area have been compiled and most have been seasonally adjusted. The National Bureau's cyclical analysis is being completed for a selection of these, and the whole group is being prepared for IBM printing. In addition, more than sixty annual construction series are included in the collection.

Descriptions of sources and methods have been prepared for almost all of the monthly and annual series on construction. These, together with the data described above, will

form the first installment of the source book, to be completed in 1965.

ROBERT E. LIPSEY  
DORIS PRESTON

## **ELECTRONIC COMPUTER APPLICATIONS**

Progress was made on a proposed Technical Paper dealing with the application of electronic computers to different aspects of business cycle analysis. A draft of the part relating to the standard National Bureau analysis is far advanced.

In the field of program development, we wrote a program computing binomial distributions, provided a subroutine for ranking observations, and made numerous improvements in existing programs. Also, we modified the general Data Processing and Multiple Regression Program of the International Monetary Fund to suit our needs, added to our inventory of working programs the Generalized Stepwise Linear Regression Program written by Jon Cunyningham, and adapted the Bureau of the Census program for computing diffusion indexes. During the past year, the needs for special-purpose programs were more pressing than those for new general-purpose ones, although the existing general programs were used extensively. We wrote special-purpose programs for various NBER studies, including C. Harry Kahn's on the tax treatment of fluctuating incomes, H. G. Georgiadis' on international trade, Victor R. Fuchs's on productivity in the service industries, George R. Morrison's on corporate bond and stock financing, and Jack M. Guttentag's on mortgage interest rates.

We have a considerable backlog of programs which we hope to write during the current year, if time permits. Among the more important ones are two approaches to the determination of cyclical turning points. One, devised by Milton Friedman, is based on the minimization of variances; the other is more closely related to currently used National Bu-

reau methods.

The use of electronic data processing in the National Bureau has expanded rapidly. There were scarcely any studies this past year that did not use electronic computing in one form or another, and some studies involved massive use of data processing and analysis. Altogether, the computer resources available to us are being heavily utilized.

The activities of the electronic computing unit are being supported by a grant from the International Business Machines Corporation as well as by general funds of the National Bureau.

GERHARD BRY  
CHARLOTTE BOSCHAN

#### OTHER STUDIES

A paperback reprint of Chapter 7 of Friedman and Schwartz' *Monetary History*, entitled *The*

*Great Contraction, 1929-33*, was published by Princeton University Press.

Reuben A. Kessel's *The Cyclical Behavior of the Term Structure of Interest Rates* (Occasional Paper 91) and *Models of Income Determination* (Studies in Income and Wealth 28) were published. Thor Hultgren's *Cost, Prices, and Profits: Their Cyclical Relations*; Phillip Cagan's *Determinants and Effects of Changes in the Stock of Money, 1875-1960*; and Philip Klein's *Financial Adjustments to Unemployment* (Occasional Paper 93) are in press. Victor Zarnowitz' manuscript, "Orders and Production in Manufacturing Industries: A Cyclical Analysis," is nearing completion.

A conference on Measurement and Interpretation of Job Vacancies was held in February 1965 (see Part V). Other studies concerned with aspects of business cycles are reported by Cagan, Morrison, Juster, and Earley in section 4 and by Mintz in section 5.

## 4. FINANCIAL INSTITUTIONS AND PROCESSES

#### INTEREST RATES

This study, undertaken with the aid of grants from the Life Insurance Association of America, is concerned with the behavior, determinants, and effects of interest rates. Joseph W. Conard, who died on April 5, 1965, had chief responsibility for the planning and direction of the project. He had virtually completed a summary report on the study as a whole, entitled "The Behavior of Interest Rates: A Progress Report," and it will shortly be ready for Board review. Revision of another manuscript by Conard, "Yield Differentials Between Newly Issued and Seasoned Securities," is

nearly completed and will be carried out by William H. Brown, Jr., and others on the project staff.

Jack M. Guttentag has been appointed director of the project. His own areas of interest, as well as other studies in progress, are described separately below. In addition, two other studies are under way. William H. Brown, Jr., with the assistance of Stanley Diller, is investigating seasonal variations in interest rates, their measurement, and their determinants. F. Thomas Juster has begun an exploratory study of the effects of interest rates on economic activity, with a view to develop-

ing plans for new work on this subject. Other studies in progress are described separately below.

The study is benefiting from the advice and assistance of an advisory committee whose members are W. Braddock Hickman (chairman), Federal Reserve Bank of Cleveland; Julian D. Anthony, Hartford Life Insurance Company; Daniel H. Brill, Board of Governors of the Federal Reserve System; Lester V. Chandler, Princeton University; George T. Conklin, Jr., The Guardian Life Insurance Company of America; Milton Friedman, University of Chicago; Raymond W. Goldsmith, National Bureau of Economic Research; Sidney Homer, Salomon Brothers & Hutzler; Norris Johnson, First National City Bank of New York; Robert G. Link, Federal Reserve Bank of New York; Roger F. Murray, National Bureau of Economic Research; James J. O'Leary, Life Insurance Association of America; Roy L. Reiersen, Bankers Trust Company; Eli Shapiro, Harvard University; Henry C. Wallich, Yale University; and C. Richard Youngdahl, Aubrey G. Lanston and Company. W. A. Clarke was a member of the committee until his death on February 8, 1965.

#### THE MORTGAGE MARKET

The study of the mortgage market is proceeding along two fronts: a time series study that is compiling new historical data from the records of life insurance companies and perhaps other lenders, and a cross-section study of the principal factors influencing the structure of mortgage yields, which employs existing data provided by the Federal Reserve Bank of Chicago and other sources.

The task of compiling time series on residential mortgage yields and terms for the period January 1951–June 1963 is completed except for tabulation. Last-minute changes in our computer program have delayed the tabulations, but they should be available soon. The

series will cover FHA, VA, and conventional loans, separately as well as combined, and some will carry nine-region and four-region breaks. Among the loan characteristics for which monthly and quarterly averages as well as standard deviations will be computed are contract rate, net discount, effective rate, effective rate net of service fee (for loans acquired through correspondents only), term to maturity, loan-value ratio, and loan size.

During the summer we began to collect data on "nonresidential" mortgages, which include loans secured by multiple-family residential structures. Data are being provided by fifteen life insurance companies active in this field. Information broadly comparable to that obtained on residential loans is being drawn for every nonresidential loan authorized by these companies since 1951. (For the residential series, in contrast, we drew a sample of loans from participating companies, except for two benchmark months for which coverage was complete.) In addition, for loans authorized during each of three separate quarters during the period, we are obtaining a wider range of information covering borrower characteristics. These data should be particularly valuable for cross-section analysis. Roughly half of the data-collecting job was completed during the summer. The balance is to be completed by this spring.

In the cross-section study of yield determinants, a new approach is being employed to study the problem of risk. This method focuses on two measures which are designed to capture "borrower risk" and "property risk" respectively. Borrower risk refers to the probability that the borrower will be unable to service the loan, and it is measured by the ratio of his mortgage payment to his income. Property risk refers to the probability that the value of the underlying property will, at some time over its life, fall below the outstanding loan balance, thus encouraging default and increasing loss to the lender if default occurs. Property risk is measured by the ratio of outstanding loan balance after five years to the initial property value. Property risk is thus influenced by both the original loan-value

ratio and the maturity. The mortgage payment-income and balance-value ratios are calculated on the basis of a standardized contract rate, rather than the actual contract rate on individual transactions. This avoids the difficulty of two-way causation between the contract rate and the risk measures.

The main reason for the new procedure is to avoid some serious problems involved in analyzing the rate effect of the loan maturity. The loan maturity affects both property risk and borrower risk, but in divergent ways. A longer maturity, for example, reduces the borrower's monthly mortgage payment, thus raising the income coverage and reducing borrower risk. However, a mortgage of longer maturity also implies a smaller accumulated repayment of principal after any given period and therefore a smaller margin between outstanding debt and property value, which raises property risk. In addition, the maturity is related to the liquidity of the mortgage. In the new procedure the risk effects of the maturity are automatically incorporated in the two calculated measures and any residual influence of maturity on rate can be ascribed to liquidity effects.

I expect to have a draft of a Technical Paper describing the time series ready by summer, and a progress report on cross-section studies later in the year.

JACK M. GUTTENTAG

#### YIELDS ON DIRECT PLACEMENTS

The prime purposes of this study have been (1) to construct series, homogeneous through time, on yields on direct placements, 1951-61, and (2) to ascertain whether, over the same period, the underlying characteristics of direct placements have changed and, if so, in which direction and to what extent. The major portion of the support for the study has come from the Life Insurance Association of America. Supplementary support has been provided

by the Graduate School of Business Administration and the Research Computation Center, University of North Carolina, and the Institut pour l'Etude des Methodes de Direction de l'Entreprise (IMEDE), Lausanne, Switzerland.

In general, cross-section regression analysis has been used to isolate those characteristics of direct placements which tend to be responsible, at a given time, for differences in yield. From these results two types of quarterly yield series have been constructed: series based on original observations cross-classified by the more significant variables, and series computed from the quarterly regression equations. Both types have already been constructed for industrials and utilities. Construction of a third type of series for both industrials and utilities is under way, namely, a computed series based on *weighted averages* of the quarterly cross-section regression coefficients. Use of weighted-average regression coefficients should, in principle at least, eliminate the effect of the sampling error present in the original cross-section coefficients.

After the cross-classified series were completed, a preliminary comparison was made between yields on high-grade direct placements and yields (to the issuer) on comparable public offerings. This comparison suggested that yields on direct placements tend to be somewhat higher than yields on public offerings. This finding should be regarded with caution, however, because we do not yet know whether the issues compared are, in fact, strictly comparable in every essential respect. And, in any case, for high-grade issues, i.e., for those which clearly have unobstructed access for either market, any yield differential in favor of public offerings would merely represent the price issuers have shown themselves willing to pay to avoid the uncertainty and other tribulations of the public market.

With respect to public utilities, the significant variables are as follows: earnings before interest and taxes, times charges earned, total capitalization, average term, type of security, industrial class, size of issue, debt-equity ratio, maturity, and years nonrefundable.

Drafts of the following chapters for the report on the study have been completed, except for parts of Chapter VII. The final draft is expected to be finished before July.

- I. Introduction and Summary of Findings
- II. Methodology
- III. Yields on Industrials
- IV. Yields on Public Utilities
- V. Yields on Direct Placements compared with Yields on Public Offerings
- VI. The Changing Characteristics of Direct Placements
- VII. Conclusions and Suggestions for Further Research

AVERY B. COHAN

#### CYCLICAL BEHAVIOR OF INTEREST RATES

A paper analyzing changes in cyclical behavior since 1878 is being revised and should be ready soon for submission to the Board. The main finding is that cycles in interest rates have tended to have greater amplitude over time and shorter timing lags behind business cycles. At recent turning points, some rates even turn before business activity does. A section of this paper explores the effect of variations in growth of the money stock on cycles in interest rates. The analysis suggests that those variations help explain the changes in cyclical behavior of interest rates.

I am presently extending the study of monetary factors to analyze the separate effects of bank loans and investments on interest rates, and to examine the causal relation between banks' free reserves and interest rates.

The main direction of future work on the cyclical behavior of rates has not been definitely settled, but the work is expected to bring in the role of nonbank financial institutions and government debt issues, and to examine patterns in the sequence of turning points among various interest rates, in order

to shed light on how factors affecting capital markets influence business investment.

PHILLIP CAGAN

#### TRENDS AND CYCLES IN CORPORATE BOND AND STOCK FINANCING

The objectives of this study are threefold: first, to conduct a cyclical analysis of fluctuations in corporate debt and equity financing for the period 1900-1963; second, to evaluate the influence of stock and bond yield variations as determinants of cyclical patterns in the debt-equity structure of financing; third, to estimate the secular trends in the structure of corporate financing and assess the factors contributing to these trends. Support is being provided under the grant by the Alfred P. Sloan Foundation for the Research Fellow program.

Currently in progress are the first two stages, which extend to the postwar period. W. Braddock Hickman's study of the cyclical behavior of bond and stock financing (Chapter 3 of *The Volume of Corporate Bond Financing since 1900*). Reference cycle and specific cycle analyses of Hickman's data for the period 1900-1943 are being revised to incorporate improvements in seasonal adjustment techniques, changes in reference cycle dating, and use of yield series as alternatives to security price series. The basic financing series being examined are Hickman's monthly corporate bond offerings, extinguishments, and net change in outstanding bonds; the SEC's quarterly new corporate issues, retirements, and net cash change; and the SEC and the *Commercial and Financial Chronicle* monthly series on common and preferred stock offerings. An attempt will be made to develop monthly or quarterly refundings series covering most of the time span of the study. Industry detail will be limited to three broad groups: industrials, railroads, and public utilities.

Seasonal adjustment of these corporate financing data presents difficulties because the

unadjusted series display extremely large random variations. It turns out that an adaptation of existing "additive" and "multiplicative" adjustments, in order to select from them minimal seasonal adjustments, produces satisfactory results. A compilation of the seasonally adjusted corporate financing series and a description of the new minimum seasonal adjustment technique will be incorporated in the report on the study.

GEORGE R. MORRISON

### **BANKING MARKETS AND BANK STRUCTURE**

An exploratory study is being undertaken, with the aid of a grant from the American Bankers Association, to develop plans for research in banking structure, markets, and performance. Among the topics to be considered will be the effects of bank structure on the pricing of banking services, on cost behavior, on competition, and on the availability of credit to local areas.

The immediate objective of this endeavor is the formulation of one or more specific research proposals, if the exploration suggests their desirability and feasibility. Such projects would involve an analysis of the influence of differential banking structure and regulatory policies upon the performance of banks in the economy, but they would be focused on the development of essential facts and relationships, not on the formulation of policy proposals.

As part of the exploratory program, an advisory committee has been appointed to suggest research topics and to review proposals developed by the staff. The members are Lester V. Chandler, Princeton University (*chairman*); David A. Alhadeff, University of California; John J. Balles, Mellon National Bank and Trust Company; Milton Friedman, National Bureau of Economic Research; Raymond E. Hengren, Federal Deposit Insurance Corporation; Donald R. Hodgman, University of Illinois; Robert C. Holland, Board of Gov-

ernors of the Federal Reserve System; Clifton H. Kreps, Jr., University of North Carolina; Wesley Lindow, Irving Trust Company; Thomas G. Moore, Carnegie Institute of Technology; Roger F. Murray, National Bureau of Economic Research; Almarin Phillips, University of Pennsylvania; Roland I. Robinson, Michigan State University; Marvin E. Rozen, Pennsylvania State University; Edward S. Shaw, Stanford University; Robert P. Shay, National Bureau of Economic Research; Charles E. Walker, American Bankers Association.

DONALD P. JACOBS  
GEORGE R. MORRISON

### **CONSUMER CREDIT**

The general objective of this study is to assess the role of consumer credit in the economy of the United States. Attention is centered on analysis of consumer behavior, the level and structure of finance rates and costs, and the functioning of credit markets as affected by economic and legislative forces. The study is supported by general grants from several finance companies.

Five publications have resulted from the study to date, and several more are expected in the near future. Already published are:

*Cost of Providing Consumer Credit: A Study of Four Major Types of Financial Institutions*, by Paul F. Smith (Occasional Paper 83)

*Trends and Cycles in the Commercial Paper Market*, by Richard T. Selden (Occasional Paper 85)

*New-Automobile Finance Rates, 1924-62*, by Robert P. Shay (Occasional Paper 86)

*Consumer Sensitivity to Finance Rates: An Empirical and Analytical Investigation*, by F. Thomas Juster and Robert P. Shay (Occasional Paper 88)



*Consumer Credit Costs, 1949-59*, by Paul F. Smith (Studies in Consumer Instalment Financing 11)

An Occasional Paper by Philip A. Klein, *Financial Adjustments to Unemployment*, is in press. The monograph by Wallace P. Mors, "Consumer Credit Finance Charges: Rate Information and Quotation," will go to the printer soon.

In addition to the studies in progress, described below, a summary report on the entire study is planned.

ROBERT P. SHAY

#### CONSUMER FINANCES

A manuscript with the tentative title "Trends in Consumer Investment and Consumer Credit, 1897-1962" has been circulated to a staff reading committee. The first section of the report is a conceptual and empirical analysis of trends in gross fixed capital formation, using alternative definitions of capital formation. It is argued that an appropriately broad definition of capital formation yields estimates with a markedly different long-term trend than the narrower definitions that have been more traditional. Treating outlays on major consumer durable goods and government structures as capital formation leads to the conclusion that gross fixed capital formation has persistently risen relative to gross national product. If, in addition, outlays on certain types of services (education plus research and development) are also treated as capital formation, the rise has been even more rapid in recent decades.

The second section compares the cyclical variability of household fixed investment with that of investment by business enterprises. The data indicate that the absolute variability of household investment became considerably larger than that of business investment during the period after 1945, while the reverse had been true in earlier periods. The third section contrasts the degree to which the household and business enterprise sectors borrow funds

in the capital market in order to finance investment outlays. Again, in the early decades after the turn of the century, household borrowing was relatively unimportant compared to business borrowing, but during the postwar period the two sectors drew on capital markets to roughly the same extent. Probably at least some part of the very rapid growth of household borrowing must be attributed to a secular decline in the cost of borrowing. Not only have mortgage and instalment finance rates declined but, more importantly, the maturities available on all types of consumer credit contracts have shown a marked tendency to lengthen. The latter phenomenon can be viewed as a decline in effective borrowing costs.

A considerable amount of work—both data compilation and equation fitting—has been done on the relation between credit terms and outlays for consumer durables, which had originally been planned as part of the above-mentioned manuscript. Difficulties in interpreting the results—caused in part by the question of which price index for certain durables (autos and housing, mainly) is most accurate—has slowed the progress of this research. Some interesting results have been obtained, and I am now testing the results of alternative stock and flow demand equations that use official price indexes as well as some newer ones that make explicit allowance for the alleged underestimate of quality change in the official indexes.

One incidental outcome of this research is the finding that many studies of the price elasticity of demand for durables make use of price indexes that are conceptually inconsistent with the quantity series used. Another incidental but interesting finding is that immense variation exists in estimates of price change for some durables—notably automobiles. For example, the official price indexes show that automobile prices rose by roughly 150 per cent between 1929 and 1962. Reasonable quality-adjusted price indexes can be constructed that show a rise of only 30 per cent over the same span.

F. THOMAS JUSTER

## RATE STRUCTURE IN AUTOMOBILE FINANCING

Revisions of the annual new-auto finance rate series published in *New-Auto Finance Rates, 1924-62* (Occasional Paper 86) have been carried out to obtain consistency between quarterly estimates and the annual series, correct a posting error affecting the 1954-55 base-year period, and extend the series back from 1924 to 1919. Table IV-11 compares the revised series with the series published in the Occasional Paper.

Research during the past year has been devoted to analysis of the extensive regression computations undertaken in earlier years. Further research was undertaken to strengthen the analysis of 1954-55 direct bank loan contracts when it became apparent that a large proportion of the explained variation had been captured inadvertently by state legal-ceiling variables which did not show expected relations to height of the ceiling. Consequently other state variables, such as the legal status of branch banking and number of banks, were substituted successfully in place of the legal-ceiling variables. In comparison with unit-banking states, unlimited branch banking was associated with lower rates; but among those states with unlimited branch banking, states with larger numbers of branches per 1,000 population charged significantly higher rates. Finance rates in states with limited branch banking did not prove significantly lower than in unit-banking states, nor was the corresponding relation for the number of branches significantly higher. The size of metropolitan area was consistently associated with rates of charge, with lower rates especially noticeable in metropolitan areas composed of 500,000 or more population.

The remaining work to be completed involves improvement of the mathematical model used in empirical investigation of the demand for new automobiles between 1929 and 1962, analysis of finance rates in used-car financing, and consideration of the division of the finance rates between automobile

dealers and sales finance companies in both new- and used-car financing. One basic obstacle hampering the time series analysis of the demand for new automobiles is the lack of satisfactory price indexes which can be used to investigate relative price changes as a factor affecting unit sales. The problem is discussed more fully in Juster's report, above.

ROBERT P. SHAY

## FINANCE RATE CEILINGS

The effects of legal ceilings upon finance rates in new- and used-automobile financing is the subject of this proposed Occasional Paper. Chapters dealing with new-auto financing in 1954-55 and 1958-59 are ready for internal staff review. The remaining chapter analyzes used-car financing and will be ready for staff review shortly.

WALLACE P. MORS

## THE QUALITY OF CREDIT IN BOOMS AND DEPRESSIONS

I have now completed a draft of what is presently planned as a small book, "The Quality of Postwar Credit in the United States." It summarizes the highlights of the several quality-of-credit studies that have been supported in large part by a grant from the Merrill Foundation for the Advancement of Financial Knowledge. The manuscript is being revised, and I hope it will be ready for staff review this summer. Its chapter titles are as follows:

- I. Introduction
- II. The Changing Weight of Postwar Debt
- III. Credit Characteristics and Performance
- IV. Credit Quality and Postwar Business Cycles
- V. The Postwar Trend in Quality Characteristics
- VI. The Postwar Performance Record
- VII. Some Tentative Conclusions

TABLE IV-11

NEW-AUTO FINANCE RATE ANNUAL ESTIMATES, 1919-64,  
FOUR LARGE SALES FINANCE COMPANIES

Year	<i>Average Finance Rate</i> (per cent)		<i>NBER Index</i> (1954-55=100)	
	Old Series	Revised Series	Old Series	Revised Series
1919	n.a.	13.99	n.a.	123
1920	n.a.	13.51	n.a.	119
1921	n.a.	14.36	n.a.	126
1922	n.a.	13.75	n.a.	121
1923	n.a.	15.09	n.a.	132
1924	15.23	15.33	135	135
1925	14.09	14.19	125	125
1926	14.09	14.19	125	125
1927	15.09	15.19	133	133
1928	15.23	15.33	135	135
1929	15.23	15.33	135	135
1930	15.23	15.33	135	135
1931	14.95	15.05	132	132
1932	16.94	17.05	150	150
1933	16.94	17.05	150	150
1934	16.51	16.62	146	146
1935	14.40	14.40	127	126
1936	11.74	11.74	104	103
1937	11.74	11.74	104	103
1938	11.63	11.63	103	102
1939	11.63	11.63	103	102
1940	11.63	11.63	103	102
1941	11.63	11.63	103	102
1946	11.20	11.28	99	99
1947	11.20	11.28	99	99
1948	11.98	12.07	106	106
1949	11.76	11.84	104	104
1950	11.09	11.16	98	98
1951	10.98	11.05	97	97
1952	11.09	11.16	98	98
1953	11.20	11.28	99	99
1954	11.20	11.35	99	100
1955	11.42	11.41	101	100
1956	11.90	11.90	105	104
1957	12.35	12.35	109	108
1958	12.36	12.39	109	109
1959	12.41	12.43	110	109
1960	12.46	12.47	110	109
1961	12.44	12.45	110	109
1962	12.15	12.16	107	107
1963	n.a.	11.76	n.a.	103
1964	n.a.	11.34	n.a.	100

## NOTES TO TABLE IV-11

SOURCE: Same as Table 8, page 21, *New-Auto Finance Rates*, with the following additions and corrections:

1919-24: Representative transactions were obtained from records of one large sales finance company, and estimates of finance rates for each year were calculated. An index of this company's rates in terms of its 1936-38 base-period average rate was linked to the four-company NBER index (1954-55=100) by multiplying each year of the single-company index by the ratio of the 1924 value of the NBER index to the 1924 value of the single-company index. The product was multiplied by the 1954-55 base-period four-company average finance rate (11.39 per cent) to obtain the four-company finance rate estimates.

1924-41: The 1936-38 average rate (11.703 per cent) was 0.81667 of the base-period (1924-41=100) index average. So, solving  $11.703 = 0.81667x$ , the 1924-41 average for the period was 14.330, and estimates of finance rates were computed by multiplying this figure by the Haberler index (*Consumer Instalment Credit and Economic Fluctuations*, New York, NBER, 1942, p. 91) as adjusted for each year.

1946-55: The 1954-55 average rate (11.39 per cent) was equivalent to the Federal Reserve index average of 101 (1946=100), and rates in other years were computed by multiplying 11.39 per cent by  $x/101$ , where  $x$  is any given value of the Federal Reserve index.

Plans for a summary statistical volume bringing together the various monthly, quarterly, and annual series on credit quality that have been used or developed in our investigations have been drawn up. The volume will include historical data pertaining to both the terms on which credit has been extended and the financial status of the borrowers, together with descriptions of the sources and nature of the statistics and a guide to their interpretation. Edgar Fiedler will take charge of this work, beginning this spring, and the Bankers Trust Company has offered to bear a substantial share of the costs.

Two reports in this program of studies have been published: *The Quality of Bank Loans: A Study of Bank Examination Records*, by Albert M. Wojnilower (Occasional Paper 82); and *The Quality of Trade Credit*, by Martin H. Seiden (Occasional Paper 87). The status of the remaining studies on individual credit sectors follows:

1. The manuscript by Geoffrey Moore and Philip Klein on consumer instalment credit quality is almost completed in its revised form.
2. Thomas Atkinson is revising and extending his manuscript of an Occasional Paper, "Postwar Corporate Bond Quality," following staff review.
3. George Brinegar and Lyle P. Fettig have submitted manuscripts dealing with the quality

of Federal Land Bank farm mortgages and Production Credit Administration short-term loans to farmers. It is hoped that these two manuscripts can be summarized in an Occasional Paper for early publication.

4. A brief report on the current study of the factors affecting residential mortgage delinquency and foreclosure appears below.

JAMES S. EARLEY

### THE QUALITY OF MORTGAGE CREDIT

Much of the past year has been spent in gathering and putting into comparable form data received from the United States Savings and Loan League, the Mortgage Bankers Association, and the National Association of Mutual Savings Banks' delinquency surveys. With the receipt of the NAMSBS figures in November, the data-gathering phase of the project was completed. Some minor difficulties remain, however, in getting the information in such a form that it can be handled as pooled data by our electronic data processing systems.

The analytical phase of the work has been largely devoted to preliminary analyses of the data we have had on hand, in order to determine what statistical models are likely to work best, given the nature of the data. As a result

of these studies, we plan to employ multiple regression techniques, chi-square analysis, and possibly multiple discriminant analysis to derive and test various "indexes" of mortgage quality. We plan this summer to finish a draft of an Occasional Paper incorporating these results, together with other material relating to postwar residential mortgage quality.

The study has been supported by grants from the above-mentioned organizations as well as by other funds of the National Bureau.

JAMES S. EARLEY  
JOHN P. HERZOG

#### **INCOME FROM EMPLOYMENT UNDER THE PERSONAL INCOME TAX**

Extensive revisions in this manuscript, which was reviewed by a staff reading committee in 1963, have been made and the text will shortly be ready for review by the Directors.

The study is essentially in three parts: (1) the coverage of employment income on tax returns, (2) the pattern of income reported on the returns with wages and salaries, and (3) the tax liability attributable to employment income and how specific provisions applicable to wages and salaries have affected this share in tax liability. Most of the revisions made in the past year were concentrated in the last part, which is also the most extensive of the three.

I find that the impact on tax liability of specific provisions applicable largely, or entirely, to income from employment has not been very large, on the average. The mean effective rate of income tax on estimated total wages and salaries (adjusted to conform to income tax definitions) for 1960 was 11.1 per cent. If the income tax concept of wages

and salaries is expanded so as to encompass all forms of employee compensation, such as employer contributions to retirement systems, payments in kind ordinarily not construed as taxable, sick pay and employer-financed medical care insurance, and so on, the mean effective rate drops to 10.4 per cent. As part of the revisions of the past year, the mean effective tax rate on total property income—also defined to include both realized and unrealized amounts—was computed in addition to that on total employee compensation. Both sets of effective rates were estimated by income groups to eliminate the influence on over-all effective rates of differences in the income size distribution of employee compensation and property income.

C. HARRY KAHN

#### **OTHER STUDIES**

The following reports were published: *Research in the Capital Markets*, National Bureau Exploratory Committee on Research in the Capital Markets; *The Flow of Capital Funds in the Postwar Economy*, Raymond W. Goldsmith; *The Measurement of Corporate Sources and Uses of Funds*, David Meiselman and Eli Shapiro; *The Quality of Trade Credit*, Martin H. Seiden; and *Determinants and Effects of Changes in the Stock of Money, 1875-1960*, by Phillip Gagan.

Lawrence H. Seltzer is revising his study, "The Personal Exemptions in the Federal Income Tax," for submission to the Board.

Other studies of financial institutions and processes are reported by Ture and others in section 1; by Murray, Holland, Dickinson, and Nelson in section 2; by Friedman and Schwartz and by Lipsey and Preston in section 3.

## **5. INTERNATIONAL ECONOMIC RELATIONS**

#### **EXPORTS OF MANUFACTURES BY LESS DEVELOPED COUNTRIES**

As part of a study of exports of manufactures by less developed countries, I am seeking to identify the products in which these countries

might be expected to hold or to gain a competitive advantage. If this information can be developed on the basis of objective criteria, it would be useful both as a check list for appraising the present status of the trade and as

a guide to possible future trends.

By definition, the less developed countries have little accumulated capital. Any competitive advantage which they may have in manufacturing, apart from resource-based industries, must come largely from their low wages. Such an advantage is likely to be found in industries with a strong labor orientation—defined here as industries which, compared with other industries, employ labor possessing easily acquired skills and use little machinery and other capital. These two characteristics come to much the same thing: low capital requirements per worker whether in the form of education and training (i.e., human capital) or in the more tangible form of plant and

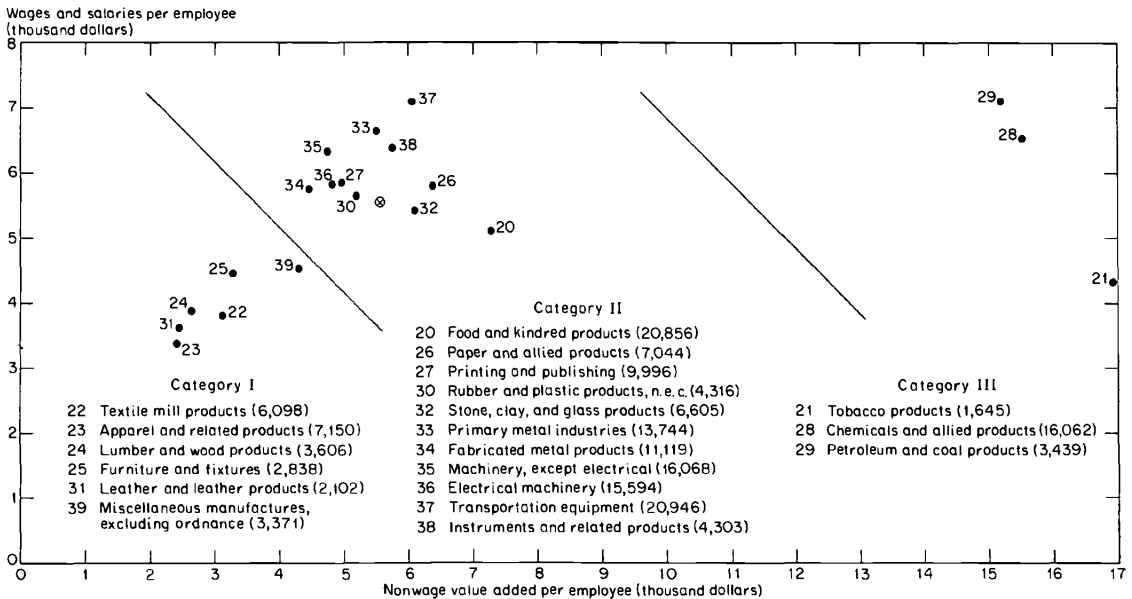
equipment.<sup>1</sup>

A basis for the ranking of industries according to their requirements of both types of capital is readily available for the United States and many foreign countries in the form of value added by manufacture per employee. This measure has the advantage of giving the relevant data in a single series which can be broken down into (1) average wage and salary per employee as an index of input of human capital and (2) average nonwage value added per employee as an index of input of physical

<sup>1</sup>It is assumed, as seems reasonable, that the technological gap between less developed and developed countries would not be greater, and might well be less, in labor-oriented industries than in more capital-intensive industries.

CHART IV-2

Value Added per Employee in U.S. Manufacturing Industry,  
by Major (2-Digit SIC) Industry Groups, 1962



SOURCE: 1962 Annual Survey of Manufactures, U.S. Bureau of the Census.

⊙Average for all manufacturing industries.

NOTE: Figures in parentheses after industry groups show value added in millions of dollars.

capital.<sup>2</sup>

In Chart IV-2 the twenty major industry groups are plotted according to these measures as derived from the U.S. *Survey of Manufactures* for 1962. The points seem to fall into three distinct groups. Six are clustered in the lower left-hand area of the chart designated as Category I. They average only \$6,700 in value added per employee, including a wage component of \$3,800 and a nonwage component of \$2,900. These low figures suggest a strong labor orientation.

The eleven major industry groups in Category II have an average value added per employee of \$11,600. All of them are higher than the highest in Category I in both wage and nonwage value added, and, on these criteria, require much more human and physical capital per worker.

The three industry groups in Category III in the chart yield the high average of \$22,000 for value added per employee and are all very close to this average. They are not above the range of the industry groups in Category II in average wage (and one, tobacco, is in fact below that range), but they are very distant indeed in nonwage value added, which alone averages \$15,600 per employee. This figure doubtless reflects the high capital investment (including inventories in the case of tobacco) required to manipulate and process the materials used in these industries. Differences in the cost of labor seem likely to play less of a role in the location of these industries than differences in the cost and availability of capital. But the latter in turn depends heavily in many cases on where the raw materials are found, on the costs of exploiting them and of

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<sup>2</sup>Differences in average wage and salary per employee are here taken as measuring differences between industries in the quality of labor employed (including not only "production workers" but also managers, engineers, scientists, and other salaried personnel) and not as measuring interindustry differences in the cost of labor of a given quality. No attempt is made in this note to examine the rationale of this and other assumptions involved in the present approach. Among the questions requiring further study is how industries rank in capital intensity by the method followed here compared with other measures.

transporting them in crude or refined state, and on other conditions determining access to markets. It seems justified therefore to regard industries in Category III as largely resource-oriented.

The individual industries composing the groups in Category I are relatively homogeneous with respect to both wage and nonwage value added. Very few of them fall beyond the range indicated for the category.<sup>3</sup> Some of the interesting exceptions of a more capital-intensive nature are knit fabrics and tufted carpets in the textile group, prefabricated products in the lumber and wood products group, and metal office furniture in the furniture and fixtures group. The industries making up the groups in Category III are also very homogeneous, though a few items, including agricultural chemicals and paints and varnishes, are in the range given for Category II, and one, cigars, falls into Category I.

Category II is not only much larger than the other two in total value added but also much more heterogeneous in composition. A few of the components which, in a more detailed breakdown, fall in Category I (and which, by their names, suggest a relatively strong labor orientation) are greeting cards, rubber footwear, tiles, pottery, office computing machines, electronic components, and motorcycles and bicycles. An important and strongly resource-oriented industry which moves up to Category III is primary non-ferrous metals out of the primary metals group.

Until a few years ago, it had come to be generally accepted in economic theory that a grouping of industries by factor intensities based on observations for one country, such as that given in Chart IV-2, would probably be generally valid for other countries as well, even for those with a quite different relation

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<sup>3</sup>The 45-degree lines marking the boundaries between the categories connect points of equal value added per employee (sum of the wage and nonwage ordinates) and are drawn midway between the overall averages of the categories on either side.

between wage costs and capital costs.<sup>4</sup> To be sure, countries with plentiful manpower and low wage rates would tend to employ more labor in relation to capital than other countries. But this would be a general phenomenon characterizing the whole range of industry without significantly altering from one country to another the ranking of industries in terms of their relative factor intensities. These were thought to be determined mainly by the technical conditions of production, so that, for instance, the capital per worker required in steel compared with that in textiles need not vary appreciably with differences in relative wage and capital costs.

Except to the extent that some of them might be favored with resource-oriented industries, poor countries with abundant manpower and little capital would therefore tend to specialize in labor-oriented industries of the type here placed in Category I, while more highly developed countries would specialize in industries requiring more equipment and more highly qualified manpower. How far this specialization proceeded and how much effect it had in equalizing returns to labor and capital internationally would depend on the extent of obstacles to trade, including transport costs, tariffs, quantitative restrictions, and hidden barriers. It would also depend on any special obstacles within countries impeding the development of industry in accordance with comparative advantages.

Recent research has produced arguments and some empirical results at variance with the view just summarized and has given prominence to possibilities previously regarded as interesting but probably minor exceptions to the rule.<sup>5</sup> This newer approach, if sound, would have among its consequences that one could not confidently rank industries accord-

ing to their relative requirements of labor, capital, and other factors of production, nor look at the relative factor endowments of different countries for clues to the likely composition and development of international trade.

In view of their potentially important implications for expectations and policies concerning international trade and economic development, these conflicting views need to be carefully examined. Chart IV-3 presents some relevant data drawn from a recent United Nations publication giving summary statistics for a number of countries according to the International Standard Industrial Classification (in which, it must be noted, code numbers and industry group definitions differ from those of the United States Standard Industrial Classification used in Chart IV-2). Unfortunately, comparable and adequate data are lacking for many countries which one would like to include, notable examples being France and Italy among the industrially developed countries. The group of less developed countries shown in the chart consists of only eight, in which India alone has a weight of almost 50 per cent. Another disadvantage for present purposes is that the national data have been condensed into only thirteen industry groups of widely differing size and homogeneity. Comparisons between countries, especially between developed and less developed countries, are likely to be thrown off by differences in the products and product mix of what is ostensibly the same industry group.<sup>6</sup>

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<sup>6</sup>The rubber products industry (group 30 of the ISIC) illustrates the problem. In the United States in 1962, value added per employee was \$14,810 in tires and tubes compared with \$7,900 in rubber footwear and \$10,330 in other rubber manufactures. The extraordinarily high rank of this industry in the less developed country series (heavily influenced in this respect by India) may therefore reflect the success which a number of these countries have had in inducing the large American and European tire manufacturers to establish plants in their areas.

Another noticeable deviation from the U.S. pattern is the high average value added in basic metals (34 of the ISIC) in several of the foreign series. In Japan this result stems mainly from relatively high wages and salaries in this industry in relation to the average level in that country. In the other industrial

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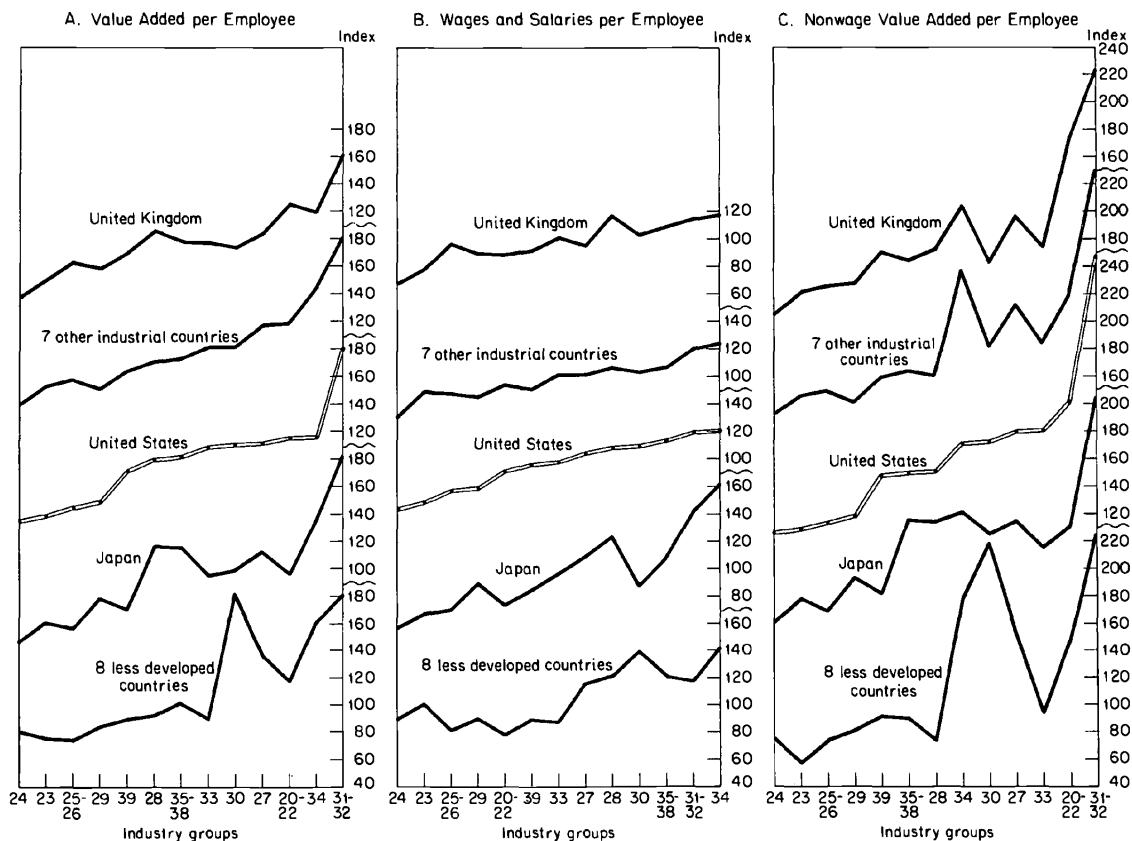
<sup>4</sup>For a fuller statement of this view and of the criticisms of it discussed below, see Michael Michaely, "Factor Proportions in International Trade: Current State of the Theory," *Kyklos*, Vol. 17, 1964.

<sup>5</sup>See particularly Bagicha Singh Minhas, *An International Comparison of Factor Costs and Factor Use*, Amsterdam, 1963.



### CHART IV-3

#### Comparative Structure of Manufacturing in the United States and Selected Foreign Countries with Respect to Value Added (Wage and Nonwage) per Employee in Thirteen Industry Groups (ISIC), 1958 (average for all manufacturing industry in each country or country group = 100)<sup>a</sup>



SOURCE: Computed from country tables in *The Growth of World Industry*, United Nations, 1963.

NOTE: *Industry Groups*: The industry groups specified in the chart are from the International Standard Industrial Classification as consolidated in the UN source noted below. The sequence in each panel is the ascending order for the United States.

- |  |   |
|--|---|
| 20-22. Food, beverages, and tobacco          | 30. Rubber products   |
| 23. Textiles                                 | 31-32. Chemicals and chemical, petroleum, and coal products |
| 24. Clothing, footwear, and made-up textiles | 33. Nonmetallic mineral products                            |
| 25-26. Wood products and furniture           | 34. Basic metals  |
| 27. Paper and paper products                 | 35-38. Metal products                                       |
| 28. Printing and publishing                  | 39. Other manufacturing                                     |
| 29. Leather and leather and fur products     |   |

<sup>a</sup>The indexes for the two country groups are obtained by combining the national indexes weighted according to total employment in manufacturing in each country. The composition of the country groups and the weights assigned to each member are as follows:

Seven industrial countries: Australia (8.9), Canada (11.3), Denmark (2.8), Germany (57.6), Netherlands (9.8), Norway (2.5), Sweden (7.1).

Eight less developed countries: Argentina (15.9), Brazil (21.4), Chile (2.9), Colombia (3.1), India (48.3), Pakistan (5.5), Peru (1.6), and Venezuela (1.3).

In a few exceptional and minor cases, the index number for a particular industry is based on less than the full number of countries listed for the group.

Under these circumstances, the similarity of the industrial profiles for different countries or country groups in Chart IV-3 is impressive. The comparison of value added per employee in panel A is the most pertinent, since the division between the wage and nonwage components may vary from country to country or, within countries, from industry to industry for both institutional and statistical reasons. Even so, in all three series relatively high coefficients of rank correlation (Spearman) are obtained between the data for the United States and those for other countries, to wit:

Correlation Between the United States and	Value Added per Employee		
	Total	Wages and Salaries	Other
United Kingdom	.912	.874	.907
Japan	.835	.907	.742
Seven other industrial countries	.978	.956	.918
Eight less developed countries	.901	.725	.791

Scrutiny of the chart shows, moreover, that the principal deviations in the patterns concern industries in the middle and upper ranges of the value added scale. If one focuses on the five industry groups on the left side of panel A, it will be seen that they all rank below other industry groups in each of the foreign series, as they do in that for the United States. And these are the industries which correspond, *grosso modo*, to those in Category I of Chart IV-2; i.e., apparel, textiles, wood products and furniture, leather and leather products, and miscellaneous manufactures.

An analysis of the type briefly sketched above is intended to serve as the point of departure for a systematic examination of the

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country group and the less developed country group, however, the difference in rank arises mainly in non-wage value added and may reflect a high share of nonferrous metal production compared with steel production, value added per employee being substantially higher in the first than in the second (according to details for the United States).

actual development of exports of manufactures by less developed countries to the United States and Western Europe. Particular attention will be given to differences in the results for different products and for different exporting and importing countries. It is hoped that the study will also throw light on the nature of the obstacles, on either side, to the development of this trade and will help to indicate its potentialities.

HAL B. LARY

#### UNITED STATES PERFORMANCE IN INTERNATIONAL TRADE

The collection of the data required for this project, which has been supported by a National Science Foundation grant, has been completed, and drafting of the manuscript reporting on the findings has begun. It is divided into three parts. Part I deals with changes in the composition of U.S. exports. Part II deals with an analysis of interindustrial country trade; more specifically, it analyzes changes in the imports of each industrial country from every other industrial country. In Part III an attempt is made to establish relations between foreign trade and domestic variables for each industrial country with a view to providing explanatory hypotheses for the changes in trade found in the other parts. The period covered is 1953-55 to 1960-62.

H. G. GEORGIADIS

#### INTERNATIONAL PRICE COMPARISON STUDY

This project attempts to develop methods for evaluating the price competitiveness of an industrial economy in world trade and to apply these methods to measuring the competitive position of the United States in machinery, vehicles, and other metal products since 1953. The study has been financed by two grants from the National Science Foundation.

Data for price measurements are being collected from over 150 American firms that buy

or sell these products in international markets, from U.S. government agencies which receive bids by both domestic and foreign suppliers, and from sources in foreign countries, both governmental and private. Two sets of data collected from foreign sources have now been turned in and a third is nearing completion. There is a possibility that one or two additional foreign price collections will be undertaken. Some further data gathering from both government and private sources will still be required to bring the measurement of price relationships down to 1964 and to fill gaps revealed in the course of the analysis.

A discussion of the study's aims and methods, with preliminary data on iron and steel products, is in press as an Occasional Paper. A summary of this paper was presented at a joint meeting of the American Economic Association and the American Statistical Association in December 1964. Some of the tentative findings on iron and steel are shown in Table IV-12.

Price indexes for internationally traded iron and steel products, composed of export prices for products exported by each country and domestic prices for other products, are shown in the first section of the table under the heading "international price indexes." Prices of the U.S., the U.K., and the EEC countries moved in the same direction in all but one of the periods shown. They all rose in 1953-57 and 1963-64, and fell between 1961 and 1962. The exception was 1957-61, when U.K. and EEC prices fell substantially from their Suez-crisis levels, while U.S. prices were comparatively stable.

European price levels for iron and steel products, shown in the second part of the table, were lower than U.S. prices in every year listed. The gap was greatest, at about 20 per cent, in 1962 and 1963, and then, according to very preliminary estimates, narrowed to about 15 per cent in 1964. The U.S. position was more favorable in 1953 and 1957, when European prices were about 10 per cent below those of the United States.

Since international price relations are often inferred from domestic price data, we have

made some computations on that basis for comparison. Conclusions from these prices could be quite different from those drawn from the NBER international price indexes. The domestic price indexes indicate a much smaller decline in European prices between 1957 and 1963, and no rise from 1963 to 1964, when the NBER indexes point to an increase of 12 to 13 per cent. Judging by the domestic price indexes, therefore, one would find much less of a relative increase in U.S. prices between 1957 and 1962. From 1963 to 1964, the domestic prices suggest a further deterioration in the competitive position of the United States (as measured by price movements), and the NBER international price series suggest a turn toward improvement.

During 1965 this study will be concerned mainly with analysis of the large volume of data we have now collected, with greater emphasis on the study of the machinery and vehicles areas, and then the preparation of a report on the project as a whole. Elizabeth Durbin, who has been responsible for much of the data collection from American companies, will now shift to the collating and summarizing of this material with the help of Jocelyn Coburn, who joined the study in the summer.

IRVING B. KRAVIS  
ROBERT E. LIPSEY  
PHILIP J. BOURQUE

#### **FOREIGN TRADE AND BUSINESS CYCLES**

Instability of earnings from exports has long been of concern to policy makers; yet the sources and nature of this instability are only vaguely perceived, and proposals for stabilization thus rest on shaky foundations and are highly controversial. Is it true, for instance, as often claimed, that the main trouble is with primary exports, while exports of industrial products are fairly stable? Or that the gyrations of primary export receipts are to be attributed to prices rather than volumes? Several interesting investigations bearing on these

TABLE IV-12

INDEXES OF INTERNATIONAL PRICES, IRON AND STEEL, SITC DIVISION 67

	1953	1957	1961	1962	1963	1964
INTERNATIONAL PRICE INDEXES (1962 = 100)						
U.S.	86	100	101	100	98	103
U.K.	96	108	103	100	98	109
EEC	96	117	105	100	98	110
INTERNATIONAL PRICE LEVELS (U.S. = 100)						
U.S.	100	100	100	100	100	100
U.K.	94	91	84	81	81	85
EEC	89	92	82	80	79	85

NOTE: The International price indexes are derived solely from time-to-time price relatives. These are aggregated from four-digit and, occasionally, five-digit SITC classifications, using world trade weights.

The 1962 international price levels are aggregates of place-to-place price comparisons. For other years the price levels were not derived by aggregating place-to-place data but were, instead, calculated from our "indexes of price competitiveness." These can be derived either by dividing the time-to-time index for the U.S. by the corresponding U.K. index, for example, or by dividing the ratio of U.K. to U.S. price levels for one year by the ratio for another year. Since the indexes of price competitiveness measure changes in the place-to-place ratios, they imply, given one year's ratio as a starting point, place-to-place indexes for the other years. The indexes of price competitiveness used for this computation were calculated from a mixture of place-to-place and time-to-time data, and therefore do not precisely match the international price indexes shown.

questions have been published lately, but the empirical evidence they provide is still tentative and partly contradictory.

The last chapter of my own study of cycles in U.S. exports reveals certain new facts on export instability which agree with common notions but disagree in other important respects. It presents measures of the instability of quantity, price, and value series for the four major commodity classes of U.S. exports (finished manufactures, semimanufactures, crude materials, and foods). The measures cover two periods: 1879-1913 and 1921-61. But curiously, the instability of exports is so persistent over time that most of its features hold for the entire period covered.

The most widely accepted view of the nature of these relations seems to be that fluctuations in export proceeds of primary producers are largely fluctuations in prices, while exports of manufactures are characterized by rigid

prices and large swings in quantities. Furthermore, quantity and price of all export classes are thought to move in the same direction, and values hence to fluctuate more than quantities. My findings agree with these expectations in some respects. For instance, the behavior of exports of manufactures is as expected in the sense that quantity changes far more than price, and that both move together so that value is more unstable than quantity. That prices of primary goods (crude materials and foods) have wider swings than prices of manufactures is also confirmed. But the agreement ends when we turn to the measures of instability of the quantities of semimanufactures, crude materials, and foods exported from the U.S. We find that quantities of all classes are a great deal more variable than the corresponding prices. (The average annual rates of change of the former are two to three times as high as those of the latter.)

Further, the quantities and values of non-manufactures are not less but far more volatile than those of manufactures, though the latter also are far from stable. But the movements in manufactures of 10 to 15 per cent a year on the average do not match the 19 to 36 per cent a year variations in the remaining classes.<sup>7</sup> That semimanufactures moved nearly twice as much as finished manufactures but still not as much as crude materials argues for the internal consistency of these measures.

We are thus faced with the question: Why do our findings and those of some others conflict with plausible views on export instability and with evidence supporting such views? Why are the swings in export quantities far larger than those in prices in all commodity classes, according to our measures, and why do manufactures quantities fluctuate less, not more, than those of other classes?

The answer is partly that the contrary views and the evidence on which they are based are drawn from the extraordinary cycles caused by the world wars and the great depression, but do not hold for normal short business cycles. Major cycles, when included, dominate the picture, and this is even more true where the role of mild swings is reduced by the use of annual data. The opposite holds for our measures from which the extraordinary cycles are excluded.

That the behavior of exports differs between normal and unusual business cycles is plausible for two reasons. First, supply responds relatively more strongly to mild changes in foreign demand than to enormous ones. Second, shifts in supply play a greater role in normal than in extraordinary cycles. As regards the first point, it is true that supply of primary goods cannot expand in proportion to tremendous war demands or plunge as deeply as demand did in the 1930's. The fact that these demand changes were expected to be transitory may also have contributed to the unresponsiveness of supply. But this does not

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<sup>7</sup>Measured by expressing the annual change from trough to peak to trough in the quarterly series as a percentage of its average level during the same cycle.

mean that normal fluctuations in foreign demand for primary goods cannot encounter sufficient supply elasticity for large variations in export quantities to occur. Stocks can be built up or drawn down, and domestic consumption of export goods can be expanded or contracted. The last point plays a particularly large role in the United States, but would not hold for countries which do not consume their own export goods.

This explanation derives further support from another set of our measures: when we isolate that part of the total cyclical movement which can be regarded as determined by foreign demand, we again find that quantities fluctuate more than prices in U.S. exports of crude materials and foods.

A second factor to which differences among findings may be attributed is the effect of the degree of aggregation on the degree of instability. Quantities of different export commodities are likely to reach their peaks and troughs at different times, which reduces the amplitudes of swings in large-quantity aggregates. The timing of price movements, on the other hand, shows less diversity, and thus their amplitudes are less affected by aggregation. Hence, studies of world trade find the quantity of primary exports more stable relative to price than studies of individual countries or individual commodities, and the prevailing view may hold for total world exports but not for exports of most individual countries.

ILSE MINTZ

## OTHER STUDIES

Herbert B. Woolley's manuscript "Measuring Transactions Between World Areas" is now in press.

Walther P. Michael has completed a revision of his manuscript "International Capital Movements, 1950-54."

A new study of balance-of-payments adjustments in various countries in the postwar period, to be undertaken by Michael Michaely, is described in Part III.