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1. ECONOMIC GROWTH

III

**Staff Reports
on Research
Under Way**

PRODUCTIVITY, EMPLOYMENT, AND PRICE LEVELS

Among the major goals of every free society, it has become almost conventional to say, are a high rate of economic growth, a low rate of unemployment, and a stable general price level.

The significance for human welfare of economic growth and low unemployment is clear. Almost as obvious is the desirability of avoiding the arbitrary changes that inflation brings in the distribution of income and wealth.

What is not at all obvious is how to reach these goals, or even that it is possible to reach all of them. It is not surprising, therefore, that economists debate among themselves the existence or extent of "trade-offs" between rates of inflation and levels of unemployment, and how to alter the trade-off rates. And they argue, also, over trade-offs between rates of growth and rates of inflation, and even over trade-offs between rates of growth and levels of unemployment.

Many economists, for example, while agreeing that inflation is an evil, question whether stability of the general price level is compatible with growth and high employment. Some, on the other hand, consider a stable price level to be a necessary condition for maintaining steady growth at high employment. And still others believe that what matters is not whether the price level is stable, rising, or falling, but whether it maintains a steady pace and whether adjustments to that fact have been made in institutions and in people's thinking.

With the aid of a grant from the Alfred P. Sloan Foundation, and supplementary funds from other sources, including the Walgreen Foundation of the University of Chicago, several members of the staff of the National Bureau are engaged in various studies bearing on the scientific issues that arise in this range of problems.

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Stigler and Kindahl have been collecting information on the wholesale prices of various industrial commodities, and making comparisons with the corresponding prices published by the U.S. Bureau of Labor Statistics.

Kendrick is reviewing the official concepts and measurements of national product and its division between consumption and investment, and assessing the effect on the measurements of various reasonable departures from the official concepts (see Section 3). He is also revising and bringing up to date his earlier estimates of output, labor and capital input, and productivity ratios.

Cagan is studying intercycle trends in the level of hourly earnings and the relation between changes in these trends and various factors—including the past changes in prices that influence the expectations that inevitably enter into the determination of wages.

Fabricant is critically examining the information available on the general price level in the United States since the Civil War, and in some other countries since World War II; is studying the relation between trends in the general price level and the degree of national prosperity; and is pursuing various factual and theoretical questions concerning the wage-price guidepost policies (or incomes policies) that have been followed in recent years in efforts to stabilize price levels.

Reports on these studies are given immediately below. Related studies by Friedman and Schwartz, Nadiri, Nordhaus, and by Kravis and Lipsey, are described in other sections.

PRICE TRENDS
AND ECONOMIC GROWTH

Work continues along two related lines. The first is concerned with the secular and cyclical behavior of prices; the second is an analysis of wage-price guidepost policies.

1. *Domestic and Foreign Prices: Data and Behavior*. The following series were computed for the United States:

Index of wholesale prices, all commodities other than farm and foods, monthly, 1850–1913 (based on Warren and Pearson indexes 1850–

1890, and BLS indexes 1890–1913; carries back to 1850 the corresponding BLS series available since 1913).

Index of consumer prices, all items other than foods, monthly, 1913–1935 (based on BLS indexes; carries back to 1913 the corresponding BLS series available since 1935).

Diffusion index, indexes of wholesale prices, approximately 23 manufacturing industries, monthly: 1-month span, 1913–1948; 6-month span, 1919–1939 (based on BLS indexes; carries back the corresponding indexes available since 1948 and published in *Business Cycle Developments*).

The above series, and a number of price series already available—some extending back into the 19th century, but most given only for shorter periods—have been, or are being, subjected to the NBER cyclical and trend analysis (Electronic Computer Memorandum No. 2). Included among the series are certain major groups of the BLS wholesale and retail price indexes, major components of the BAE indexes of farm prices, the Lipsey-Commerce index of the prices of imports, and the Long-Rees-BLS index of gross average hourly earnings of production workers in manufacturing.

These computations, it is reasonable to expect, will help provide historical background useful for understanding the more recent price changes with which we are primarily concerned.

An example of one of the results of the analysis is given in the table on page 42. The example chosen shows the cyclical behavior of the index of wholesale prices, excluding farm products and foods. Because this is essentially an index of the prices of industrial materials and processed goods, it is largely free of the effects of crop fluctuations and therefore reflects changes in current business conditions and prospects better than does the general index of wholesale prices.

Persons who still find it difficult to believe that the average level of prices can rise well before aggregate productive capacity has become fully utilized will find the table instructive. It shows that the prices of industrial materials and processed goods have advanced, more

often than not, even during the early stages of business expansions, when the percentage of capacity utilized is relatively low, and that the rate of price increase did not tend to accelerate as business expansion proceeded. Further, these prices usually declined on the average even during the early stages of business contraction, when the percentage of capacity utilized is still relatively high. The table reveals also that the exceptions to this "normal" cyclical behavior were frequently associated with the prevailing intercycle price trend. Average prices during business expansion showed little or no rise more often when the price trend was down than when it was up; and average prices during business contractions showed little or no fall more often when the price trend was up than down. But there are also exceptions that presumably can be explained by the special features that characterize each business cycle.

It is true also, however, that the price indexes have changed in composition and coverage, not only because the economy has changed but also because the indexes have been improved. To that extent, the indexes of different periods are inconsistent with one another, and this inconsistency may account for some of the differences in cyclical behavior. For example, the sample of prices used in computing the index of wholesale prices includes a greater proportion of highly processed goods in recent than in earlier years, and—as McAllister pointed out in the Stigler committee report— this would tend to make the index appear somewhat more rigid in recent years.

Changes in coverage and other inconsistencies are not the only sources of difficulty in interpreting available price information. Economists concerned with the measurement of national output, input, and productivity — Kendrick and Fuchs, to mention members of the National Bureau's staff currently working on these subjects—have been drawing attention to biases in the price indexes of public and private services, and of new houses and other forms of construction, which arise from the use of input prices as substitutes for the more relevant but hard-to-obtain output prices. These

biases distort the measured trend in the general price level. The same must be said of the well-known failure to take adequate account of quality changes, a problem currently being tackled by Kravis and Lipsey. And there are also the deficiencies in the reported prices of standardized goods, the subject of the study by Stigler and Kindahl, and in the prices reported during the OPA and other periods of price regulation, a problem stressed most recently by Friedman and Schwartz.

To understand what the data tell about the behavior of the general price level in the United States since the Civil War—one of my objectives—I am making use of the fresh information as it appears. The story of the U.S. price level will be followed by a necessarily briefer discussion of price level changes in other countries during the post-World War II period.

2. *Wage-Price Guidepost Policies.* An analysis of the relation between changes in price and changes in labor productivity in individual industries, begun last year, has been extended in order to distinguish between those industries whose production is concentrated in a few enterprises and other industries. The information, taken from the Censuses of Manufactures for 1954, 1958, and 1963, has the advantage of being very detailed. It is clear that changes in labor productivity and changes in prices are correlated, and to the same degree and in the same manner among concentrated as among unconcentrated industries. But it is also clear that there is a great deal of scatter around the regression lines. Subject to certain qualifications, this has obvious implications for the validity with which relative productivity changes can be used as guideposts for relative price changes. I am drafting a paper on "Price Guidelines: The Problem of Exceptions."

A rather different question, somewhat neglected in discussions of the guideposts, is posed by changes in the quality of labor. Because changes in national output per man-hour —the wage guidepost—reflect these changes in the quality of labor (among other factors), the question is whether or to what extent the index of labor productivity is appropriate for "guiding" wages in occupations or industries which

TABLE III-1

RATES OF CHANGE DURING BUSINESS CONTRACTIONS AND EXPANSIONS: WHOLESALE PRICES OF COMMODITIES OTHER THAN FARM PRODUCTS AND FOOD

(seasonally adjusted, 1957-59 = 100.0; peak-to-peak reference cycle analysis[a])

Cycle Dates			Stage to Stage Change of Cycle Relatives, Per Month								Percentage Change on Base of Average of Given and Preceding Cycle, Per Month
Peak	Trough	Peak	I-II	II-III	III-IV	IV-V	V-VI	VI-VII	VII-VIII	VIII-IX	
1857 6	1858 12	1860 10	-.65	-1.83	-.19	-.45	.40	-.14	.03	-.32	
1860 10	1861 6	1865 4	-.45	-.70	.09	.04	.65	1.93	3.21	-.22	.75
1865 4	1867 12	1869 6	-1.13	-.62	-.78	-1.37	.37	-.13	.18	-.30	.40
1869 6	1870 12	1873 10	-.18	-1.49	-.80	-.39	.55	.73	.07	-.89	-.32
1873 10	1879 3	1882 3	-1.14	-.61	-.74	-.58	1.31	.47	-.14	.25	-.36
1882 3	1885 5	1887 3	-.04	-.52	-.69	-.60	.00	-.19	.05	.10	-.19
1887 3	1888 4	1890 7	.04	-.14	.54	-.29	-.20	-.21	-.26	-.28	-.19
1890 7	1891 5	1893 1	.00	-1.30	-.14	-.32	-.75	-.55	-.01	.25	-.33
1893 1	1894 6	1895 12	.19	-.90	-.67	-.49	-.45	.64	1.26	-.08	-.24
1895 12	1897 6	1899 6	-.63	-.40	-.45	-.74	.06	.44	.74	2.04	-.01
1899 6	1900 12	1902 9	1.96	1.08	-1.79	-.71	.05	-.05	.10	2.04	.40
1902 9	1904 8	1907 5	1.67	-.75	-.37	-.17	.27	.51	.49	.61	.19
1907 5	1908 6	1910 1	-.52	-1.79	-1.06	-.11	.20	.26	.96	.37	.03
1910 1	1912 1	1913 1	.07	-1.02	-.50	-.17	1.16	1.12	.81	1.62	-.03
1913 1	1914 12	1918 8	-.49	-.19	-.36	-.21	.68	2.17	1.78	1.26	.50
1918 8	1919 3	1920 1	1.36	-.03	-2.43	-1.69	-.02	3.21	2.41	4.68	.97
1920 1	1921 7	1923 5	3.29	-1.99	-6.52	-3.04	.06	.43	.62	-.05	-.25
1923 5	1924 7	1926 10	-1.74	-.39	-.12	-1.03	.43	.33	-.29	-.25	-.44
1926 10	1927 11	1929 8	-.97	-.73	-.18	-.35	.06	-.06	-.07	-.20	-.21
1929 8	1933 3	1937 5	-.68	-1.07	-.54	-.61	1.37	.20	.23	.84	-.29

(continued)

TABLE III-1 (concluded)

Cycle Dates			Stage to Stage Change of Cycle Relatives, Per Month								Percentage Change on Base of Average of Given and Preceding Cycle, Per Month
Peak	Trough	Peak	I-II	II-III	III-IV	IV-V	V-VI	VI-VII	VII-VIII	VIII-IX	
1937 5	1938 6	1945 2	-.19	-.61	-.42	-.33	.00	.38	.29	.10	.15
1945 2	1945 10	1948 11	.16	.21	.05	.03	.69	1.71	.87	.44	.45
1948 11	1949 10	1953 7	-.46	-.53	-.41	-.20	.59	.65	-.14	.18	.45
1953 7	1954 8	1957 7	-.04	-.07	.05	-.07	.13	.36	.31	.19	.16
1957 7	1958 4	1960 5	.04	-.03	-.06	-.04	.11	.19	.04	-.02	.17
Average			-.02	-.66	-.74	-.55	.31	.57	.54	.49	.07
Average deviation			.72	.51	.71	.43	.38	.60	.62	.77	.31
Weighted average			-.14	-.70	-.76	-.60	.38	.61	.55	.36	.076
Averages Excluding the War Cycles[b]											
Average			-.04	-.75	-.77	-.59	.29	.25	.25	.30	-.10
Average deviation			.76	.54	.71	.40	.39	.32	.34	.57	.20
Weighted average			-.16	-.76	-.80	-.64	.37	.27	.19	.28	-.119

[a] For a description of the reference cycle analysis, see A. F. Burns and W. C. Mitchell, *Measuring Business Cycles*, New York, NBER, 1946.

[b] The war cycles include:

Peak	Trough	Peak
1860 10	1861 6	1865 4
1913 1	1914 12	1918 8
1918 8	1919 3	1920 1
1937 5	1938 8	1945 2
1945 2	1945 10	1948 11

employ labor of a relatively constant quality. The problem has interesting theoretical as well as factual aspects, to which I am devoting attention. To check some of the estimates of change in average labor quality made by Kendrick and Denison, use is being made of the detailed occupational data in the 1950 and 1960 Censuses of Population.

When other tasks permit, I hope to review critically the results of the several efforts that have been made to determine the impact of the guidepost policy on the behavior of price and wage levels since 1962.

SOLOMON FABRICANT

THE RELATIONS BETWEEN WAGES AND PRICES IN MILD INFLATIONS

A puzzling aspect of mild inflations is that they often persist during periods when business activity is slack. A widely heard explanation is that union bargaining pushes up wages, and thus prices, whether aggregate demand warrants the increase or not. As popular as this explanation is, it has the deficiency of not readily accounting for inflationary wage increases which occur throughout the economy, as they usually do, and not solely in unionized industries. An alternative explanation is that wages are influenced by expectations of price changes, based in part on the past behavior of prices; and during inflationary periods, nominal wages gradually rise at a faster rate which persists for a time even when aggregate demand slackens.

My work on this study has so far been devoted to a statistical analysis of price expectations and wages, both for the total manufacturing sector and for individual industries. The accompanying chart shows secular rates of change for wages, cost of living, and related variables. The rates of change were computed as the slope of a line fitted by least squares to the average level of the variables for successive triplets of phases. A phase is the period of expansion or contraction in business activity between National Bureau reference peaks and troughs. This method is designed to suppress cyclical fluctuations in the series and to highlight the average rate of change from cycle to cycle. The slope for each triplet is centered on the middle phase. Rates of change computed from successive triplets of periods from midphase to midphase (not shown here) give a similar pattern.

These data give evidence of the past influence of prices on wages. An example is the multiple regression of the rate of change of wages (dW) on the rates of change of the cost of living index (dC), labor productivity (dP), the labor force (dL), and the ratio of union members in the labor force (dU). For the period 1891–1960, with 35 observations, the regression is:

$$dW_t = 1.25\,dC_t - .42\,dC_{t-1} + .17\,dC_{t-2}$$
$$\quad\;\;(14.6)\qquad(3.4)\qquad\quad(1.8)$$

$$+ .37\,dP_t + .72\,dU_t - .63\,dL_t + \text{constant.}$$
$$\;\;(2.5)\qquad(2.6)\qquad(1.7)$$

The numbers in parentheses are the statistical values of t (significance at the .05 level requires $t \geq 2.0$). The lags in the cost of living are for previous phases, which vary in duration from several months to several years.

The coefficients of the three cost-of-living terms in this regression have the equivalent form:

$$.54\,dC_t + .29\,dC_{t-1} + .16\,dC_{t-2} + .71\,(dC_t$$
$$- dC_{t-1}) - .01\,(dC_{t-1} - dC_{t-2}).$$

The first three terms form the major part of an exponentially declining average of current and past changes in the cost of living; the fourth term is an extrapolation of the latest change in the rate of change. The fifth term is a lagged extrapolative term, which turns out to have a coefficient of approximately zero.

The results suggest that price expectations are formed from past experience in two parts, an estimate of long-run trend (the exponentially weighted average) plus an estimate of short-run movements based on an extrapolation of recent changes.

In addition to the lagged cost of living, the regression results indicate that growth in labor productivity, the labor force, and union mem-

bership also affect wage changes. The unemployment rate (shown at the bottom of the chart) had virtually no effect in an earlier re-

CHART III-1

Secular Rates of Change of Wages, Cost of Living, and Related Variables, and the Unemployment Ratio, Based on Phase Triplets, 1890–1961
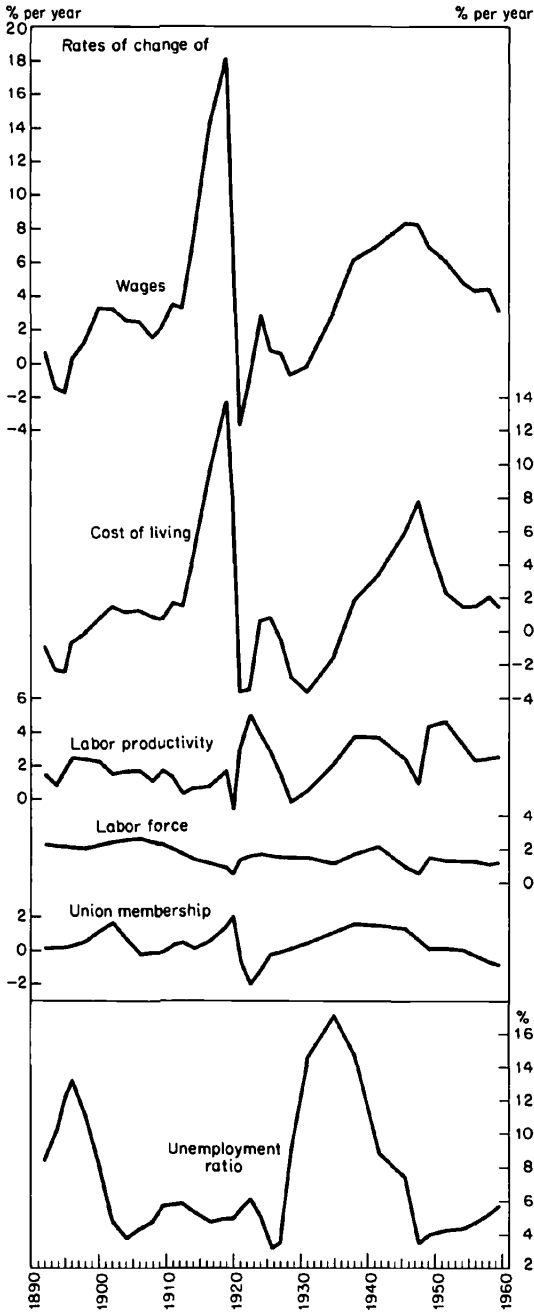
gression and was subsequently omitted. Unemployment is related mainly to the intracyclical variation of wages.

One shortcoming of the preceding regression is that the concurrent wage and price variables may interact. That is, the coefficient of dC_t may partly reflect the influence of wages on prices. One way to handle the difficulty is to hold constant the effect of wages on prices in each industry. This requires that the data be subdivided by industries, an extension of the study which is currently underway.

PHILLIP CAGAN

THE BEHAVIOR OF INDUSTRIAL PRICES

Our study of industrial prices is directed to the construction of the histories of the prices of about 70 commodities from 1957 through 1966. These are actual transaction prices, which may, and often do differ substantially but nonuniformly from quoted prices. The indexes will be compared with those of the Bureau of Labor Statistics. The study should illuminate the problem of cyclical price flexibility in markets for steel, petroleum products, drugs, paper, and other commodities. Financial support for the study comes from the Walgreen Foundation of the University of Chicago, as well as the Alfred P. Sloan Foundation.

The basic processing of the industrial price data we collected has been completed, and we now possess price indexes and various descriptive parameters for each price series. The nature of the material is illustrated by the price

NOTE TO CHART III-1

Coverage of series: Wages = total hourly compensation of manufacturing production workers; cost of living = consumer price index for all commodities; labor productivity = total output per manhour; labor force = total civilian labor force; union membership = total union membership as percentage of nonagricultural employees; unemployment ratio = total unemployment as percentage of total civilian labor force.

series for caustic soda, although the behavior of the series may or may not be typical.

The basic NBER index assigns equal weight to each price reporter. The Bureau of Labor Statistics gives equal weight to each price reporter for a given commodity, and comparability with their practice governs our practice. However, weights were obtained from many price reporters and we shall also examine the behavior of the (logically much superior) weighted price indexes. Our unweighted index for caustic soda, along with that of the Bureau of Labor Statistics, is presented in Chart III-2.

In our tabular reports we also present several numbers descriptive of our indexes (see Table III-2). The first is the number of price series

CHART III-2
Indexes of the Price of Caustic Soda
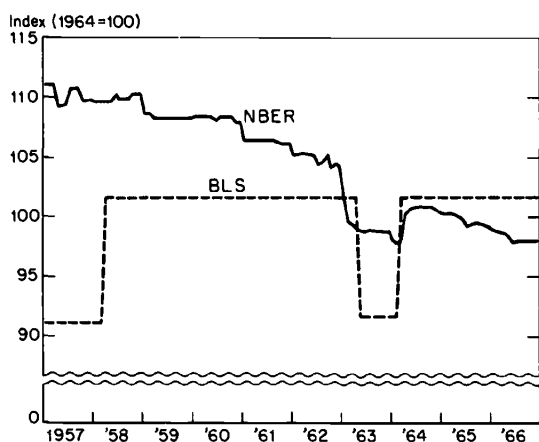
upon which the index is based—a number which may change each month but is reported as of June. The second is a measure of the homogeneity of the price measures. The difference between the movement of a price from one month to the next and the corresponding movement of the price index of which it is an element, or

$$\left[\frac{P_t}{P_{t-1}} - \frac{I_t}{I_{t-1}} \right],$$

is squared, summed over all individual prices in the index, and then divided by the number of price changes to get

$$\sigma^2{}_t = \frac{1}{n} \sum_{i=1}^{n} \left[\frac{P_{t,1}}{P_{t-1,i}} - \frac{I_t}{I_{t-1}} \right]^2,$$

and $\sigma^2{}_t$ is averaged over the months within the year. This variance is a useful measure of the cohesiveness of the price movements within an index (and an excellent clue to errors in the calculation of the index). Sample numbers for caustic soda are given in Table III-2.

TABLE III-2
DESCRIPTIVE DATA ON NBER INDEX OF
PRICE OF CAUSTIC SODA

Year	Number of Reporters	Standard Deviation of Monthly Price Changes
1957	15	3.18
1958	15	1.64
1959	20	1.00
1960	25	1.44
1961	34	.85
1962	36	2.67
1963	39	2.07
1964	42	1.94
1965	42	1.41
1966	30	.99

The comparisons with the BLS indexes will take three basic forms.

First, the secular trends of the NBER and BLS indexes will be compared for the ten-year period. Constant percentage rates of increase are calculated from regression equations fitted to the data (that is, $I_t = a + b \log t$). In the example of caustic soda, the NBER index fell 1.3 per cent a year, whereas the BLS index rose 1.2 per cent a year.

Second, the direction and amplitude of the changes in two indexes are calculated during NBER reference dates for cyclical expansions and contractions (Table III-3). The indexes are averaged over three months centered upon the

dates; the three months centered upon November 1966 is chosen as an arbitrary end-of-period peak because our data stop with December 1966 and no reference date has been established within the period from February 1961 to December 1966.

TABLE III-3
CYCLICAL CHANGES IN THE INDEX OF PRICES
OF CAUSTIC SODA

	Percentage Change	
Reference Date	NBER	BLS
July 1957, Peak	—	—
April 1958, Trough	−0.6	7.7
May 1960, Peak	−1.2	3.6
February 1961, Trough	−1.7	0.0
November 1966, Peak (see text)	−7.9	0.0

Third, the correlation between the two monthly price indexes is calculated.

The analysis of the differences between the BLS and the NBER indexes, and the relationship of these differences to differences in type of commodity, degree of concentration of production, and similar characteristics is our present occupation.

GEORGE J. STIGLER and JAMES K. KINDAHL

PRODUCTIVITY TRENDS

Maude Pech and I have completed the bulk of our revised and updated estimates of output, inputs, and productivity ratios for the period 1948–66, and have begun writing an appendix on sources and methods. Our estimates are based on the same concepts as those published in *Productivity Trends in the United States,* and follow much the same methodology. The appendix notes, therefore, are relatively brief; we elaborate only when the previous approach has been modified. We hope to complete the estimates, basic tables, and appendix notes shortly, and then proceed to some analysis of the post-1948 productivity changes in the private domestic economy, by major industry

group. I plan to complete the text of the proposed report before the end of 1968. The paper will cover chiefly the period 1948–1966, but there will be some comparisons with developments prior to 1948 which were described in the earlier volume.

JOHN W. KENDRICK

PRODUCTIVITY IN THE SERVICE INDUSTRIES

This project, undertaken with the financial assistance of the Ford Foundation, should be completed this year. Seven publications have appeared thus far; several others are now in the final stages of preparation.

David Schwartzman's report on productivity in retailing has been reviewed by a staff reading committee, and he is now working on revisions. He presented some of his results in a paper, "The Growth of Sales Per Man-Hour in Retail Trade, 1929–1963," given at the Conference on "Production and Productivity in the Service Industries," Ottawa, Canada, on October 20, 1967. (For details on the Conference see page 36.) I am preparing a summary for the conference volume.

Reuben Gronau is revising his proposed Occasional Paper, "The Value of Time: The Demand for Passenger Air Transportation."

Irving Leveson read two papers at professional meetings in December, 1967, in Washington. The first, "Definition and Measurement of the Nonfarm Self-Employed," was presented to the Social Statistics Section of the American Statistical Association. The second, "The Supply of the Self-Employed, A Study of Retail Managers," was presented to the Industrial Relations Research Association. Leveson gives some of his findings in the following report.

I have prepared a summary volume, *"The Service Economy,"* which is now being revised in the light of comments from the staff. The contents of the book are:

1. Summary
2. The Growing Importance of Service Employment

Victor R. Fuchs

THE NONFARM SELF-EMPLOYED AND THEIR EARNINGS

Interest in the nonfarm self-employed grew out of the work on service industries, in which they are relatively numerous, and out of the National Bureau's concern with problems of measuring economic activity. Difficulties in defining and measuring the self-employed and their earnings, coupled with a lack of detailed information, have hampered studies of economic growth and distribution and discouraged analysis of the activities of the self-employed. Recently available information from the Current Population Survey (CPS) and the 1/1000 sample of the 1960 Census of Population has made improved comparisons of alternative measures possible.

The Office of Business Economics (OBE) and the CPS estimates of nonfarm self-employed are reconciled for 1960 in Table III-4. Prior to 1967, household surveys, such as the CPS, were unwillingly including about three-quarters of a million proprietors of corporations because information on legal status was not being elicited. Since proprietors of small corporations are similar in function and behavior to proprietors on unincorporated businesses, the groups should be combined for many problems of analysis. If we follow the CPS procedure of classifying persons according to their primary labor force activity, the 400,000 self-employed who are wage and salary workers on primary jobs should be deducted from the OBE count. An alternative is to define class of worker according to total activity, allocating the employment, earnings, etc., over activities in accordance with the amount of time spent in each. This method, which provides an employment series comparable to one for entrepreneurial income, is also shown.

An approximate reconciliation of earnings is shown in Table III-5. Self-employment income in this table is income earned from self-employment regardless of the primary activity of the worker. Earnings of the self-employed are total earnings of persons whose primary activity is self-employment, whether or not those earnings were derived from self-employment. Self-employment income includes returns to property used in the proprietor's business, returns to his labor, and returns to the labor of unpaid family workers. The OBE series as published is the sum of income of unincorporated enterprises and the inventory valuation adjustment for unincorporated enterprises. The former is based on income tax returns with an adjustment for underreporting. For the household series we begin with a total derived from the 1/1000 sample. When adjusted for the undercount of the number of self-employed in the *Census of Population,* the series based on the household reports shows substantially higher income because of the inclusion of corporate proprietors. Removal of this source of noncomparability reduces but does not eliminate the excess over the OBE series (see line 5 of Table III-5). The earnings of the excluded corporate self-employed are assumed to be the same as the earnings of those not in corporations, calculated from the 1/1000 sample.

Self-employment income (line 5) overstates the earnings of persons whose major activity was self-employment (line 8), since wage and salary workers earned more self-employment income on secondary jobs (line 6) than the self-employed earned in wage and salary income in secondary jobs.

Table III-6 incorporates data on annual

TABLE III-4
ALTERNATIVE ESTIMATES OF THE NUMBER OF NONFARM SELF-EMPLOYED, 1960
(millions)

Line		Derivation of Estimates Based on Primary Activity		Derivation of Estimates Based on Total Labor Force Activity	
		OBE	CPS	OBE	CPS
1.	Number of self-employed as published	5.94	6.37	5.94	6.37
2.	Less corporate self-employed	—	−.74	—	−.74
3.	Less wage and salary workers who were self-employed on secondary jobs	−.40	—	—	—
4.	Adjustment of wage and salary workers with secondary jobs as self-employed to full-time equivalent self-employed	—	—	−.20	.08
5.	Less adjustment of self-employed with secondary jobs as wage and salary workers to full-time equivalent self-employed	—	—	−.04	−.04
6.	Number of self-employed in unincorporated businesses	5.54	5.62	5.71	5.67
7.	Plus corporate self-employed	.74	.74	.74	.74
8.	Total number of self-employed	6.28	6.37	6.45	6.41

Source by line

1. U.S. Office of Business Economics, *The National Income and Product Accounts of the United States, 1929–1965, Statistical Tables*, Tables 6.4 and 6.6, and U.S. Bureau of Labor Statistics, *Labor Force and Employment in 1960*, Special Labor Force Report No. 14, Table C-4.

2. U.S. Bureau of Labor Statistics, "New Definitions of Employment and Unemployment," reprinted from *Employment and Earnings and Monthly Report on the Labor Force*, February, 1967, Table 11.

3. U.S. Bureau of Labor Statistics, *Multiple Jobholders in December, 1960*, Special Labor Force Report No. 18, Table 1.

4. For the OBE data many proprietors with fewer than 15 hours are omitted. The 399,000 included who are also wage and salary workers are assumed to spend half their time in self-employment. The CPS counts all with secondary jobs as self-employed or wage and salary workers. It is assumed here that one-fifth of their time is spent in self-employment.

5. Same as line 3. It was assumed that 80 per cent of the hours of proprietors with secondary jobs were in self-employment.

6. Sum of lines 1-5.

7. Same source as line 2.

8. Line 6 plus line 7.

hours from the 1/1000 sample in order to compare man-hours, annual earnings, and hourly earnings from the two sources under alternative definitions. The OBE- and CPS-based estimates would be brought closer together by allowing higher earnings for corporate proprietors, but to remove the differences entirely it would be necessary to assume that the corporate self-employed earned about double what was earned by the noncorporate self-employed. In any case, the earnings of all nonfarm self-employed are higher than the average hourly earnings of $2.50 for all nonfarm employed persons in the 1/1000 sample, and are also higher than the 1959 OBE compensation of $5,100 per full-time equivalent nonfarm employee. This is opposite to what is found in comparisons of earnings of all (farm as well as nonfarm) self-employed and wage and salary workers.

IRVING LEVESON

TABLE III-5
ALTERNATIVE ESTIMATES OF THE EARNINGS OF THE NONFARM SELF-EMPLOYED, 1959
(billion dollars)

Line		Derivation of Estimates Based on Primary Activity		Derivation of Estimates Based on Total Labor Force Activity	
		OBE and 1/1000 Sample	CPS and 1/1000 Sample	OBE and 1/1000 Sample	CPS and 1/1000 Sample
1.	Self-employment income as published	34.8	37.6	34.8	37.6
2.	Plus self-employment income of omitted proprietors	—	6.5	—	6.5
3.	Self-employment income adjusted for undercount	34.8	44.1	34.8	44.1
4.	Less self-employment income of corporate proprietors	—	−5.2	—	−5.2
5.	Estimated self-employment income of unincorporated self-employed	34.8	39.0	34.8	39.0
6.	Less self-employment income of wage and salary and unpaid family workers	−6.9	−6.9	—	—
7.	Plus wage and salary income of self-employed in unincorporated businesses	4.9	4.9	—	—
8.	Estimated earnings of the unincorporated self-employed	32.8	37.0	34.8	39.0
9.	Plus earnings of the corporate self-employed	5.2	5.2	5.2	5.2
10.	Estimated earnings of all self-employed	37.9	42.1	40.0	44.2

Source by line

1. U.S. Office of Business Economics, *The National Income and Product Accounts of the United States, 1929–1965, Statistical Tables,* Table 6.8, and U.S. Bureau of the Census, *U.S. Censuses of Population and Housing:* 1960, 1/1,000 sample.

2. Estimated as excess of CPS over *1960 Census of Population* average number of self-employed times the 1/1,000 sample self-employment income per self-employed person with earnings.

3. Line 1 plus line 2.

4. Table III-4, line 2 times average annual earnings of self-employed as given by the 1/1,000 sample.

5. Line 3 minus line 4.

6. 1/1,000 sample.

7. 1/1,000 sample. Data for all self-employed reporting, assumed to be unincorporated.

8. Line 5 minus line 6, plus line 7.

9. Same source as line 4.

10. Line 8 plus line 9.

TABLE III-6

ESTIMATES OF ANNUAL AND HOURLY EARNINGS OF SELF-EMPLOYED IN UNINCORPORATED
BUSINESSES AND ALL SELF-EMPLOYED, BASED ON ALTERNATIVE DEFINITIONS
AND SOURCES, NONAGRICULTURAL INDUSTRIES, 1959

	Self-Employed in Unincorporated Businesses		All Self-Employed	
	OBE	CPS and 1/1000 Sample	OBE	CPS and 1/1000 Sample
Based on Primary Labor Force Activity				
Number (thousands)	5.5	5.6	6.3	6.4
Average annual hours	2,230	2,230	2,230	2,230
Man-hours (millions)	12.4	12.5	14.0	14.2
Earnings (billion $)	32.8	37.0	37.9	42.1
Average annual earnings (thousand $)	5.9	6.6	6.0	6.6
Average hourly earnings ($)	2.65	2.95	2.71	2.97
Based on Total Labor Force Activity				
Number (thousands)	5.7	5.7	6.4	6.4
Average annual hours	2,230	2,230	2,230	2,230
Man-hours (millions)	12.7	12.6	14.4	14.3
Earnings (billion $)	34.8	39.0	40.0	44.2
Average annual earnings (thousand $)	6.1	6.9	6.2	6.9
Average hourly earnings ($)	2.74	3.09	2.78	3.09

NOTE: The average earnings of all self-employed are not the same as for self-employed in unincorporated businesses because a single figure of $6,900 for corporate proprietors based on the 1/1,000 sample unadjusted data was used throughout.

SOURCE: Tables III-4 and III-5. Average annual hours are for all self-employed at work in April 1960 with earnings in 1959, from the 1/1,000 sample.

TAX POLICIES FOR ECONOMIC GROWTH

This study, supported by grants from the Rockefeller Brothers Fund and the Life Insurance Association of America, has pursued two principal lines of investigation. One concerns the consequences of various features of business income taxation on the growth of enterprises. The second deals with the effects of personal income taxation on personal effort, saving, and investment, and on the willingness and financial ability of individuals to undertake business ventures. The following discussion sketches some of the results to date and prospects for 1968. My own time has recently gone chiefly into assistance on some of the studies nearing completion, but I expect now to concentrate on the preparation of a summary volume on tax structure and economic growth and to complete a first draft by the end of the year.

CONFERENCE REPORTS

The initial products of the study were two conferences held jointly with the Brookings Institution in October and December 1963. One dealt with *The Role of Direct and Indirect Taxes in the Federal Revenue System* and the other with *Foreign Tax Policies and Economic Growth* in selected countries. The reports of both of these conferences have been published, the first in mid-1964 and the second in 1966.

In the first of these conferences, two questions were dominant. One of these was the extent to which the relatively heavy reliance by the federal government on direct taxation (i.e., income taxes) depresses growth functions in the economy. The focus was not on the total burden of taxation, but on the comparison of the impact of a given amount of direct taxes with that of an equal amount of indirect taxes on the supply of labor and the rate of capital formation. Viewed in this way, the emphasis is on the so-called price or substitution effects of alternative taxes, i.e., on the responsiveness of individuals who supply labor services to tax-induced changes in the relative price of effort and leisure and on the responsiveness of investment to tax-induced changes in the cost of capital or, equivalently, in the rate of return to capital.

While the conference afforded little empirical basis for the view that the nature of the tax structure is significant in these respects, it did clarify the assumptions upon which this view or the contrary belief is based. Subsequent work in the National Bureau's studies and elsewhere has been concerned with developing and appraising evidence on the importance, if any, of substitution effects. For example, How would capital formation be affected by a change in the tax structure involving a reduction in the rates of tax on the returns to capital? or How would reductions in the marginal rates of tax on personal income affect the supply of personal effort?

A second major concern in the first conference was the effect of a change in the tax structure on international trade and capital flows. Here, too, the major contribution of the conference was the identification of some of the analytical issues to be resolved, rather than evidence on the magnitude of effects. The pertinence of this focus of the conference for one of today's major public policy problems is evident. One of the principal inferences which may be drawn from the conference is that, whatever the long-run significance for the U.S. balance of payments of a shift from corporate income taxation to, say, value-added taxation, short-run effects are apt to be quite limited.

In planning the conference on tax policy and economic growth in selected countries, the importance of placing the analyses in an empirical framework was stressed to the contributing authors. The results afford abundant evidence of the difficulties encountered in attempting to do so. Although not solidly supported by empirical analysis, one of the conclusions suggested by the papers and discussion was that the various special tax measures which had been adopted in the countries under study had been effective not only in directing investment into certain favored sectors of industry but also in raising the general level of investment. Moreover, the representatives of the participating countries almost unanimously held the view that tax differentials rather than general tax reduction were the key to this favorable impact on capital formation. This view, of course, is an alternative way of expressing the dominance of substitution effects of taxation.

BUSINESS INCOME TAXATION

In our research on business income taxation, my study, *Accelerated Depreciation in the United States, 1954–60,* which was published early last year, together with the Hall and Stanback studies now under way, tend to confirm the view that business investment decisions are significantly responsive to tax changes. I found that the number of businesses adopting accelerated depreciation methods for eligible depreciable properties increased significantly between 1954 and 1960, particularly among "small" companies, giving evidence of the operation of a learning process. Moreover, the use of these accelerated methods made a substantial difference in the amount of internally generated funds and in the profitability of investment in depreciable assets. Assuming anything but the most limited responsiveness to these factors, a significant increase in the amount of capital outlays, compared to what otherwise would have obtained, must have occurred.

Stanback's and Hall's interview studies support this view. Thomas Stanback, whose "Tax Changes and Modernization in the Textile Industry" is being prepared for press, concludes

that a large proportion of the firms he interviewed were influenced in their modernization programs by the effect of depreciation liberalization on measured profitability of investment and on internal cash resources. Challis Hall's study, "Corporate, Taxation and Corporate Growth Policies," similarly shows that, in decisions on capital outlays, large companies are quite sensitive to the effects of various types of tax changes on aftertax returns and cost of capital. A redraft of Hall's study should be completed shortly.

PERSONAL INCOME TAXATION

In our investigation of the personal income tax, we have been concerned with the impact of the tax on the supply of certain highly specialized resources and on the efficiency of their use. These resources are so diverse that a single, adequate label for them is difficult to find, but we may subsume them under the heading of executive-entrepreneur. The persons serving in this role warrant attention because they are responsible for the direction of a large portion of the total economic activity of the nation and for the conception and execution of a large fraction of the innovations in products and processes contributing to the economy's growth. In addition, their income position exposes them to the upper end of the rate schedule where the substitution effect of income taxation should be most pronounced and obvious. Whether the level of the marginal rates of tax applicable to the rewards of these persons reduces their zest for achievement, whether it diverts their attention to tax-minimizing activity, whether, in short, it reduces the quantity or quality of executive-entrepreneurial effort or distorts its allocation has long been and continues to be a central concern of tax research.

The initial question to be investigated in this area is how taxes have affected the rewards of executive-entrepreneurs. Wilbur Lewellen undertook this inquiry under the general direction of Daniel Holland. His report, *Executive Compensation in Large Industrial Corporations,* was recently published. Briefly, Lewellen finds that a major shift in the composition of the executive pay package has occurred since 1940. It is apparent that tax considerations significantly influenced this shift; the principal change has been the de-emphasis of fully taxable cash salary and bonus payments and the increasing use of tax-sheltered deferred compensation, particularly common-stock-based plans, and stock options. Whereas cash salaries and bonuses were about 75 per cent of total compensation in the early 1940's, they have more recently been only half that proportion, while stock options and stock-based deferred compensation have amounted to about 47 per cent of the total in recent years. Another finding was the real value of after-tax compensation of top executives was no higher in 1963 than prior to World War II and has not kept pace with that of other professional groups.

In his research on this topic, Lewellen found also that the equity interest of top executives in the firms employing them was generally large, and that returns in the form of realized and accrued capital gains and dividends swamped their compensation as components of their total income. This finding challenges the widely held view that, by virtue of the divorce of corporate ownership and management, it is inappropriate to base analysis of the behaviour of the firm on the assumption that profit-maximization is its principal objective. Lewellen is pursuing this investigation into the characteristics of ownership and income of senior corporate executives, and reports separately on it. This research will not be considered part of the tax study, atlhough it is an outgrowth of it.

While Lewellen was investigating the impact of the personal income tax on executive compensation, Daniel Holland was conducting an interview study of the effects of the income tax on the nature and amount of effort undertaken by upper-income individuals. A note on some tentative results of his inquiry is given below.

The strategic role of the tax treatment of capital gains and losses in personal saving, investment, and portfolio decisions has been frequently stressed in the literature of public finance. We had hoped that our studies would go beyond abstract reasoning in this regard and provide some solid empirical evidence con-

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cerning the weight of capital gains taxation. Roger F. Miller, of the University of Wisconsin, undertook this assignment, intending to exploit to this end the continuing sample of Wisconsin state income-tax payers. The sample file, covering a period of fourteen years, was to afford the fundamental data input for a complex econometric model of household investment in financial assets. These data were to be supplemented by information from Social Security records and from interviews and questionnaire responses of a subsample of the basic tax file. Based on these data, the portfolios of the individuals in the sample would be reconstructed. Attempts were then to be made to associate changes in the portfolio with a number of financial and demographic variables, such as total income, marginal tax rates, age, and employment status.

To date, the research effort has been balked by data difficulties. While a substantial amount of data have been put into usable form on magnetic tapes, and while these data have been and will continue to be exploited in other research undertakings, the portfolio reconstruction—the critical step for the capital gains study—still remains to be done. There have been, however, some useful products of the undertaking. The project generated a paper by Miller and one of his colleagues, Harold W. Watts, "A Model of Household Investment in Financial Assets," which was delivered to the Universities-National Bureau Conference on *Determinants of Investment Behavior*. In addition, Miller's project has yielded the basic input for another inquiry in the tax study, that by C. Harry Kahn on the tax treatment of income from unincorporated businesses. Kahn reports below on the progress made in his research.

NORMAN B. TURE

EFFECT OF TAXATION ON PERSONAL EFFORT

The derivation of valid generalizations from my interviews with 125 business executives is proving to be a difficult process and is not yet completed. The comments offered below on various aspects of the problem, though inadequately qualified, are to be taken as tentative and are subject to reappraisal in the light of a fuller study of the interview responses.

1. Very few decisions that business executives make about their careers and how hard to work seem to be determined primarily, or even importantly, by tax considerations. This finding, familiar from earlier studies, is completely consistent with what is well-known to be the pervasive influence of taxation on the form which transactions assume and on specific kinds of activity undertaken. But, so stated, this finding on effort is also misleading, suggesting a weaker role for taxes than they may actually play, because this apparent weakness may result from the strength of countervailing factors.

2. Most of the major decisions executives make about jobs and the effort devoted to them must take a number of goals into account and are subject to various constraints. Tax considerations are seldom obviously dominant, and the search for their influence in the midst of numerous other factors is not easy. There is a logical appeal in the distinction developed by students of public finance between income effects and substitution effects of income taxation: i.e., on the score of income deprivation the taxpayer is expected to work harder, while because of the decline in the cost of not working he is expected to substitute leisure for effort. But the problem is to get a sense of how large these effects are relative to one another and to other factors that affect effort. It is not surprising that their weights vary with the particular individual, his personality, age, stage in family cycle and career cycle, and other characteristics. Moreover, it turns out that "leisure" is not an adequate designation of his alternatives. More meaningful would be a tripartite delineation: working for business, all other financially remunerative work, and recreation. Even more categories may be appropriate. My interviews suggest that, where the income tax produces a substitution effect, it is in a push from business to all other work, or vice-versa,

rather than between business and recreation, or between all other work and recreation.

3. Tax management on personal account appears to command little of the time of most executives, certainly not enough to make them less effective in their job. There are a number of reasons for this, the most important being: (a) they regard their executive function as their main job and give their personal portfolio and related concerns only residual time, and (b) the availability of specialized tax services has increased substantially over the years—many executives simply turn their personal tax affairs over to accountants and lawyers.

4. Although these specialized tax services are also available for handling business tax affairs, it is not possible for top executives fully to delegate responsibility for managing their business taxes. The top managerial group must be alert to the problems and choose among the alternatives presented by their advisers. How great a diversion of effort these responsibilities entail depends on individual executive style, size of firm, and other demands on top executives' time.

5. Scholarly analysis has concentrated on the income and substitution effects of taxation on the inducement to work. But there is another possible effect via the individual's (or firm's) financial ability to support and extend his activity. This kind of effect was most apparent in the responses of the owner-managers of smaller companies and real estate developers. These indicated that the lower rate of tax on capital gains permitted them, upon completion of a project, to maintain intact most of their "capital," which they could apply to the financing of a new venture on a scale not possible if they had had to pay regular tax rates or had to rely more heavily on outside finance (which they might not have wished nor been able to obtain). The effect of taxation on activity through its effect on financial capacity showed up also in responses to questions on the tax cuts of 1962 and 1964. Virtually no one saw any substitution effect on effort in the personal tax rate cuts (which were not insubstantial); on the other hand, a number of executives explained that, because of the corporate rate cut (and the in-

vestment credit and shortening of depreciable lives), their cash flow was enhanced and they were then busier than before in planning and acquiring new projects.

6. The differentially low rate on capital gains is extremely important for the range of activities I was concerned with. Obviously, effort is induced to flow into low tax-rate lines. The wide variety of such transformations of activity associated with or attributed to the capital gains tax differential is impressive. There is evidence not merely that effort is diverted from one line to another, but also that its total flow is somewhat increased and that growth-supporting activities are encouraged. Earlier investigations by others had stressed this effect, although they focused on personal portfolio management. My interviews suggest that the capital gains tax differential cuts a much wider swath, serving to encourage the formation of new enterprises, their financing and ultimate sale, and serving also to move managerial talent from large firms to smaller firms.

DANIEL M. HOLLAND

AVERAGING OF INCOME FOR TAX PURPOSES

The objective of my project is to determine whether or not there is a significant tax bias in the present federal income tax against income from an unincorporated business because of the size of the fluctuations in such income. The further objective is to determine how effectively alternative averaging schemes would deal with any such bias.

The principal data for the study are derived from the files of Wisconsin state income-tax payers as a subsample for individuals reporting income from an unincorporated business. A substantial investment of personnel and machine time has been required to rid the magnetic tapes conveying these data of errors and programming barriers. We believe that these difficulties are now behind us. The computer program is being organized so that its output will flow into a prearranged set of tables pro-

viding the foundation for the analysis. These tables are organized into six sets which will yield: (1) measures of income variability; (2) measures of the efficacy of loss carryovers; (3) evaluation of the 1964 Revenue Act averaging provision and variants thereof; (4) simulation of periodic five-year averaging; (5) simulation of simple cumulative averaging; and (6) summary tables. I am aiming for completion of the programming by late spring and data output soon thereafter.

C. HARRY KAHN

EXECUTIVES AS OWNERS AND AS MANAGERS

Following completion of my study *Executive Compensation in Large Industrial Corporations* (see note by Norman B. Ture) and taking the sample used in that study as a point of departure, I have begun investigating a related phenomenon: stock holdings in their own firms by the senior officers of large manufacturing companies. Interest in this topic arises from the assertion frequently made that management and ownership are widely divorced in our present-day economy, and that, therefore, the interests of shareholders are not likely to be pursued by top executives as vigorously as in a simpler industrial environment. This assertion casts doubt on the assumption, underlying much of the theory of the firm, that firms seek to maximize profits.

The evidence examined so far contradicts the view just noted. It indicates that top executives in large, publicly held firms receive substantially more income each year from ownership in the form of dividends and realized or accrued capital gains than the compensation they enjoy as managers. On this basis, we would expect management, even though composed of "professionals," to seek much the same objectives as shareholders and to aim at the maximization of profits and share prices.

These conclusions are based on data for the five highest-paid executives in fifty of the nation's largest manufacturing firms. I am now compiling information on other sectors of industry and examining other aspects of the phenomena that have emerged. A first draft of the study should be ready in the latter part of 1968.

W. G. LEWELLEN

OTHER STUDIES

The Theory and Empirical Analysis of Production, Murray Brown, editor; *Determinants of Investment Behavior,* Robert Ferber, editor; *National Economic Planning,* Max F. Millikan, editor; and *Imports of Manufactures from Less Developed Countries,* by Hal B. Lary, were published. *Population, Labor Force, and Long Swings in Economic Growth: The American Experience,* by Richard A. Easterlin, is in press. New studies of agricultural productivity, by Franklin M. Fisher and Peter Temin; the measurement of capital, by Robert J. Gordon; and the diffusion of industrial technology, by Alfred H. Conrad and Donald S. Shoup, are reported on in Part II.

2. HUMAN RESOURCES

INVESTMENT IN EDUCATION

Our proposed volume concerning the effects of human capital on the personal distribution of income contains three essays: a revision of Barry Chiswick's Ph.D. dissertation entitled "Human Capital and the Distribution of Personal Income by Region," a revision of Jacob Mincer's dissertation entitled "A Study of Personal Income Distribution," and my Woytinsky Lecture, "Human Capital and the Personal Distribution of Income: An Analytical Ap-

proach" (published in the fall of 1967 by the Institute of Public Administration, University of Michigan).

Recently we have begun some studies of the effects of human capital on consumption. This is one of the most serious gaps in the work on human capital undertaken in the last decade. Either these consumption effects have been ignored or an assertion of their importance has been made without any supporting evidence. Our approach builds on earlier work that introduced the notion of household production functions (see, for example, my "A Theory of the Allocation of Time," *Economic Journal,* September 1965, and K. Lancaster, "A New Approach to Consumer Theory," *Journal of Political Economy,* April 1966). Instead of consuming passively, households are assumed to be active producers of commodities that enter their preference functions through the combination of inputs of various purchased goods and their own time. Additions to human capital are assumed to affect consumption not by changing these preferences, but by changing the efficiency with which inputs are combined. Human capital becomes an "environmental" influence in these household production functions, along with the climate, the consumer's ability, age, and so forth.

Some studies have begun to test various implications of this approach. Robert Michael is analyzing data on consumption expenditures from the 1960 BLS survey and from other sources. He has found (under certain assumptions) that an increase in education, "permanent" money income held constant, should increase the consumption of goods that have income elasticities greater than unity, and decrease the consumption of those with elasticities less than unity. His results are generally consistent with this implication. In addition, he is making some crude estimates of consumption rates of return to education, and relating these to money rates.

Some parts of Michael Grossman's study of the demand for health are also relevant. Health is clearly a "commodity" that is produced by a person's medical care, diet, exercise, inheritance and other inputs. Grossman is trying to determine, among other things, whether education does affect the efficiency with which health is produced, and from this, he hopes to determine the demand for medical care and other inputs (see his report below).

Our studies of education have been supported since their inception by grants from the Carnegie Corporation of New York.

GARY S. BECKER

EDUCATION AND OTHER FACTORS UNDERLYING NEGRO-WHITE UNEMPLOYMENT RATE DIFFERENTIALS

The purpose of my research has been to explain the differential incidence of unemployment among Negro and white workers. Some initial work showed that such objectively measurable factors as schooling completed, age, city-size, and migrant-nonmigrant status could account for roughly one-half of the observed differential in the average level of unemployment for adult males. Subsequent research has focused on using available bodies of data in an attempt to measure possible racial differentials in labor quality within given age and years-of-schooling groups. Two very different approaches have been used. One utilizes census data on racial differentials in occupational distributions within schooling and age classifications. The other uses data on the scores for the Armed Forces Qualification Test made by a sample of young men, cross-classified by schooling and race.

Some preliminary computations suggest that racial differentials in labor quality within schooling classes can explain about one-half of the within-schooling-class differential in the average level of unemployment for adult males. Thus it appears that about 75 per cent of the racial unemployment rate differential can be explained by factors that generate differential unemployment incidence among the population of white workers.

I am now in the process of analyzing data on the duration of unemployment. I expect this

analysis to yield some insights into the role of labor market discrimination in residual racial differential in unemployment. It would appear on a priori grounds that any effect of discrimination on observed unemployment rate levels would operate primarily through increasing the *duration* of unemployment rather than its overall incidence.

DAVE O'NEILL

ECONOMICS OF HEALTH

Our research program in the economics of health is currently focused upon the relation between health services, socioeconomic factors, and health itself. The problem is viewed in terms of both the production of health and the demand for health services. Reports by the study directors on the objectives and methods of each study are presented below.

A paper by Irving Leveson and me, "Motor Accident Mortality and Compulsory Inspection of Vehicles" was published in the *Journal of the American Medical Association*, August 28, 1967. I presented a paper on "The Basic Forces Influencing the Costs of Medical Care" at the National Conference on Medical Care Costs in Washington, June 27, 1967. This paper was reprinted in *Modern Hospital*, September, 1967 and in *Medical Economics*, February 5, 1968. I presented an address, "The Growing Demand for Health Services," at the Second National Congress on the Socio-Economics of Health Care, sponsored by the American Medical Association in Chicago, March 22, 1968. This paper will be published by *The New England Journal of Medicine*.

The research program is assisted by grants from the Commonwealth Fund and the U.S. Public Health Service. A multidisciplinary advisory committee, under the chairmanship of Dr. George James, Dean of Mount Sinai Medical School, provides valuable guidance and assistance. The other members of the committee are: Gary S. Becker, Columbia University and NBER; James Brindle, Health Insurance Plan of Greater New York; Norton Brown, M.D.; Eveline Burns, Columbia School of Social Work; Philip E. Enterline, University of Pittsburgh; Marion B. Folsom, Eastman Kodak Company; Eli Ginzberg, Columbia University; William Gorham, Department of Health, Education and Welfare; David Lyall, M.D.; Melvin Reder, Stanford University; Peter Rogatz, M.D.; Gus Tyler, International Ladies' Garment Workers' Union.

Elizabeth Rand has joined the program as a research analyst and Suzanne Kaufman is secretary to the Program.

VICTOR R. FUCHS

RELATIONSHIPS BETWEEN DEATH RATES, MEDICAL SERVICES, AND ENVIRONMENTAL FACTORS

Revisions of the paper "The Production of Health, an Exploratory Study," are near completion. Suggestions of the staff reading committee and the health advisory committee have been implemented.

The purpose of the study is to determine the effect of changes in the quantity of medical services and environmental factors on age-adjusted death rates. This has been accomplished by a multiple regression analysis across states for 1960. The analysis was restricted to whites in order to control for the effects, if any, of race. The observed relationship will depend on the effects of varying supply and demand conditions, which creates a problem of simultaneous equations bias. Therefore, a model is formed which includes a demand curve for medical care and supply curves of factors of production. Estimates are made by instrumental variables, using the exogenous variables in the model as instruments. Medical service is alternatively measured by expenditures per capita or by the output of a Cobb-Douglas production function combining physicians, drugs, capital, and paramedical personnel.

A sketch of the findings follows:

1. The elasticity of the death rate with respect to medical services is about −.1; that is, a 10 per cent increase in medical services reduces the death rate by about 1 per cent. This

coefficient is obtained with either measure of medical services, and is stable in alternative specifications.

2. At similar levels of income, medical services, and other conditions, states with a relatively high level of education tend to have relatively low death rates.

3. At similar levels of other variables, states with relatively high levels of income per capita tend to have *high* death rates.

The last finding has been examined in great detail since it is contrary to the expectations of many. It should be borne in mind that the analysis holds constant the effects of medical care and education, which ordinarily increase with income. Also, unlike comparisons with individual observations or data grouped by income, use of state averages reduces the tendency for some persons to have low incomes because their health is poor. Even without taking these considerations into account, there are many reasons why income and mortality might be positively related. High income might be associated with unfavorable diets, lack of exercise, psychological tensions, etc.

The observed relation between high incomes and high death rates could go a long way toward explaining the lack of any large decline in the national death rate in recent years. Adverse factors associated with growth in income may be nullifying beneficial effects of increases in the quantity and quality of medical care. This would contradict the view that we have reached a biological limit to the death rate. It would also suggest a need for further research on environmental control as a means of improving health.

RICHARD AUSTER, IRVING LEVESON,
AND DEBORAH SARACHEK

SPATIAL VARIATIONS IN MORTALITY BY RACE AND SEX: AN ECONOMETRIC ANALYSIS

PURPOSES OF STUDY
The study is concerned with several aspects of mortality; the primary motivation is the desire to identify the factors responsible for the well-known discrepancy in the health status of whites and Negroes in the United States. Whether we examine mortality rates (Table III-7) or disability days (Table III-8), it is clear that whites enjoy better health than Negroes. We hope to gain some insights concerning the roles of economic and sociological factors in this differential. Such knowledge would contribute to the evaluation of alternative policy measures.

DATA AND STATISTICAL TECHNIQUES
The study makes use of spatial data (census divisions, states, and standard metropolitan statistical areas) for the United States in the 1959–61 period. The data are drawn from a variety of published and unpublished sources but primary reliance is placed upon *Vital Statistics of the United States* and the *1960 Census of Population*. Health status is measured by age-adjusted mortality rates classified by race and sex. A summary of the extent and pattern of a spatial variations in mortality rates is provided in Table III-9.

The statistical techniques employed include single-equation least squares, two-stage least squares, and factor analysis.

THE MODEL
The variables to be studied and the corresponding statistical measures include variables in the demand function for "health," as well as other variables. Economic, taste, and information variables are considered in the demand function for health.

It is recognized that there are important differences between health and the more conventional consumer goods, but it is felt that placing health in a choice (demand) framework will yield valuable insights. The choice framework is meaningful because health provides psychic income to the household and is produced in part by scarce resources whose quantity is subject to rational calculation (i.e., not rigidly determined by cultural and technological factors).

A great deal of attention is paid to the estimation and interpretation of elasticities of

TABLE III-7
Age-Specific Death Rates in the United States
(rates per 1,000 population in each age group)

Age	1900[a]		1963[b]		Percentage Decrease, 1900–63[b]		Absolute Decrease, 1900–63[b]	
	White	Nonwhite	White	Nonwhite	White	Nonwhite	White	Nonwhite
All ages	17.0	25.0	9.5	10.1	44.1	59.6	7.5	14.9
Under 1	159.4	333.9	22.3	41.7	86.0	87.5	137.1	292.2
1– 4	19.4	43.5	0.9	1.8	95.4	95.9	18.5	41.7
5–14	3.8	9.0	0.4	0.6	89.5	93.3	3.4	8.4
15–24	5.7	11.5	1.0	1.6	82.5	86.1	4.7	9.9
25–34	8.1	12.1	1.3	3.2	84.0	73.6	6.8	8.9
35–44	10.1	14.8	2.6	6.5	74.3	56.1	7.5	8.3
45–54	14.8	24.3	6.8	13.2	54.1	45.7	8.0	11.1
55–64	27.0	42.1	16.2	27.9	40.0	33.7	10.8	14.2
65–74	56.2	68.9	37.5	52.9	33.3	23.2	18.7	16.0
75–84	123.3	120.9	85.8	74.6	30.4	38.3	37.5	46.3
85 & over	262.0	215.2	215.8	145.7	17.6	32.3	46.2	69.5

SOURCE: Helen C. Chase, "White-Nonwhite Mortality Differentials in the United States," in U.S. Department of Health, Education and Welfare, *Indicators,* June 1965, Table 2.

[a] Death registration states included 10 states and the District of Columbia.

[b] Excludes New Jersey since no provision was made for white-nonwhite distinction on death certificates.

TABLE III-8
Disability Days Due to Chronic or Acute Illness in the United States
July 1962–June 1963

Color	Age-Adjusted Restricted activity Days[a] Per Person Per Year	Age-Adjusted Bed Disability Days Per Person Per Year	Age-Adjusted Work-Loss Days Among Currently Employed, Per Person Per Year
White	15.8	6.4	5.8
Nonwhite	20.8	9.1	8.9
Percentage excess of nonwhite over white	27.3	34.8	42.2

SOURCE: Geraldine A. Gleeson and Elijah L. White, "Disability and Medical Care Among Whites and Nonwhites in the United States," in U.S. Department of Health, Education and Welfare *Indicators,* October 1965, pp. 28–31, and Table 4.

[a] Restricted activity days are those days on which illness caused persons to cut down on the things they usually do; they represent the broadest measure of disability used in the Health Interview Study. This measure refers not only to the disability associated with acute and chronic illness but also to any reduction of activity that interferes with a person's routine for as much as a day. Included are: (1) days on which persons stayed in bed all or most of the day; (2) days of work loss for currently employed persons 17 years and older, and (3) days lost from school for persons 5-16 years of age. There was no appreciable difference in the rate of school-loss days in the two groups.

TABLE III-9

AGE ADJUSTED MORTALITY RATIOS, BY RACE AND SEX,
FOR U.S. CENSUS DIVISIONS, 1959–61 PERIOD
(U.S. whites and Negroes equal 1)

Census Division	Males White	Females White	Males Negro	Females Negro
Northeast	1.23	.81	1.64	1.15
Middle Atlantic	1.27	.84	1.78	1.23
East North Central	1.20	.79	1.62	1.20
West North Central	1.12	.72	1.60	1.19
South Atlantic	1.20	.72	1.79	1.27
East South Central	1.19	.74	1.55	1.19
West South Central	1.16	.69	1.45	1.08
Mountain	1.18	.73	1.66	1.13
Pacific	1.17	.72	1.49	1.01
Coefficient of variation (%)	3.38	6.17	6.80	6.41

NOTE: Age adjustment is by the "indirect method." For each state, national age-specific death rates for whites and Negroes of both sexes were applied to the actual population distributions by race and sex to obtain "expected" deaths. The "expected" deaths for a given race and sex were divided into the corresponding number of actual deaths to obtain a mortality ratio, i.e., the age adjusted death rate in index number form (U.S. whites and Negroes equal 1). National age-specific rates including both races and sexes were utilized in order to make comparisons of levels of mortality among races and sexes.

SOURCES: For mortality, U.S. Department of Health, Education and Welfare, Public Health Service, National Vital Statistics Division, *Vital Statistics of the United States,* 1959, Tables 62 and 71; 1960 and 1961, Tables 5-4 and 5-9. For population, U.S. Bureau of the Census, *Census of Population,* 1960, Volume I, Characteristics of the Population, Part 1, United States Summary, Table 158 and Parts 2-52 (State Volumes), Table 96.

health with respect to family income and various prices, but the roles of information (measured by formal education) and of taste factors, such as marital status, fertility rates of married women, and region, are not ignored. A large number of other variables are studied, including rural or urban residence, occupation, per cent of population that is Negro, proxy measures of psychological pressures, climate, air pollution, cigarette consumption, and population density. At the present time the major portion of my time is being directed to the collection and processing of the necessary data.

MORRIS SILVER

SOCIOECONOMIC DETERMINANTS OF HOSPITAL USE: A MICROANALYSIS

The objective of this study is to examine how economic and social characteristics of hospital patients influence the amount and type of services they receive for given diagnoses. Hospital use is measured by length of stay, number and type of services, and total hospital bill.

The data are based on the medical records of 9,600 patients admitted to twenty-three short-term, voluntary hospitals in Allegheny County, Pennsylvania, during 1963. The data collected by Blue Cross of Western Pennsylvania include: sex, age, type of accommodations, socioeconomic level (based upon Census Tract of place of residence), marital status, type of employment, length of stay, living arrangements, prior hospitalization, primary diagnosis, operations, hospital insurance coverage, hospital bill, pay source, category and number of services received, and other items.

Some of the specific questions asked in the study are: What is the gross relationship between income and hospital use? How much of the gross income elasticity of demand is in fact the effect of the taste factor associated with income level? Does the alternative cost of the

time an individual is hospitalized influence mainly the total amount of hospital care he receives or mainly his choice of the type of care; e.g., service-intensive vs. time-consuming? Which measure or measures of "costs" exert the most influence on the amount of hospital use—the out-of-pocket payment, the income foregone, the insurance premium, the alternative cost of the time hospitalized, or a combination? Is the demand more sensitive to costs when substitutes for hospital care are more readily available? What are the causes behind the association between hospital use and such basic demographic variables as age, sex, and race? In seeking answers to these questions, regression analysis will be the principal method used. With the assistance of Susan Crayne, a preliminary analysis of the data has been made and we have begun to test the major hypotheses. At this stage of the study, the findings we can report here are tentative, and they deal with a marginal area of our inquiry. They are described in detail in the first four chapters of the manuscript in preparation.

There is a trade-off between service-intensive types of care and time-consuming types. The greater the number of services performed per day for the treatment of a given illness, the shorter the length of time a patient stays hospitalized. This paves the way for testing the hypothesis that the greater the alternative cost of one's time hospitalized, the more one uses service-intensive types of care in preference to time-consuming types.

The variations in hospital use by demographic characteristic—age-sex-race—are largely a reflection of the variations in the incidence of illness by these variables. When adjusted for differences in the diagnostic categories, many of these variations disappear. For those variations still remaining, there are no consistent patterns among different illnesses, except that older people usually use more hospital care than younger people for all illnesses. Explanations for this phenomenon will be sought by testing three hypotheses. One is that proportionately more older people live alone and, therefore, substitution for hospital care of acute illness is not readily available to

them outside the hospitals. The second is that proportionately more older people are not gainfully employed and, therefore, alternative costs to hospitalization for them, in terms of income foregone, are small or none. The third considers age as constituting a bonafide medical condition and, therefore, the variations by age reflect difference in the medical need for hospital care.

When the relationship between hospital use and the interaction terms among age-sex-race is examined, some combinations of sex-race variables are found to be significantly related to hospital use, although sex or race variables alone had been shown to be not significantly related. This seems to support the recent sociological discussions predicting different behavior patterns among sexes for Negroes and whites. This study will be directed toward disentangling the interrelationships between socioeconomic variables and sex-race variables. In all of our examinations of the relations between hospital use and these demographic variables, the objective is not to acquire a knowledge of the effects on hospital use of physiological or genetic difference between sexes, ages, or races, but to isolate these effects so that the relation between hospital use and socioeconomic variables can be clarified.

Another factor studied as a preliminary step to clarifying the association between hospital use and socioeconomic variables is the role played by the hospital which admits the patient. The hospital is relevant because our model of consumer behavior considers the physician and hospital as the intermediary agents through which a patient purchases hospital care. In their role of bringing together the consumer and the final product, they influence consumer decisions. Significant variations among hospitals in hospital use for the same illnesses appear to exist and to be related by such characteristics of the hospital as its size, capacity utilization, and the type of training programs it offers. This finding does not invalidate the hypothesis that hospital use can be analyzed through a study of consumer behavior patterns. It indicates that the place where hospital care is purchased should be recognized as playing a role in the

demand equation.

From this examination of the relationship between hospital use and the "hospital variable," a new hypothesis is formulated, namely, that the hospital is a part of the whole package which a consumer purchases as the cure of disease. Just as the shop from which one buys a commodity is, to some consumers, as important as the commodity itself, the hospital at which a patient is treated is regarded by some to be as important as the content of care itself. In the hospital industry, the choice of hospital is limited to a few at which one's physician has staff privileges. However, to the extent to which one's selection of physician is influenced by his hospital affiliations, most consumers consciously choose the hosiptals they wish to enter. A preliminary test of this hypothesis shows that the interaction term among income, education, and occupation of a patient is systematically related to his choice of hospital.

Kong Kyun Ro

THE ROLE OF HUMAN CAPITAL IN CONSUMER DEMAND FOR HEALTH

This study is an application of Gary Becker's approach to consumer demand theory.[1] The commodity "good health" is assumed to be produced by the consumer who uses as inputs various amounts of market goods and his own time. The market goods include medical care, diet, exercise, recreation, cigarette smoking, and alcohol consumption. The last two are believed to have negative marginal products, and, in this sense, the commodities associated with them are substitutes for health. Becker's approach seems particularly relevant to medical care because it is not normally demanded for its own sake. Rather, medical services are intermediate products that are desired only because they are expected to make a positive contribution to good health.

The model hypothesizes that the stock of

[1] See "A Theory of the Allocation of Time," *Economic Journal,* September 1965, pp. 493–517.

human capital, and, in particular, such factors associated with human capital as education and age, may affect efficiency in the production of health by raising the marginal products of the inputs. One presumption is that formal education improves productivity, since it may stand for factors such as more knowledge, the ability to seek and accept advice, and willingness to obtain preventive medical care. In a similar manner, old age is treated as a negative efficiency parameter. As an individual ages, he acquires new knowledge and experience, but after a point this addition may become negligible or even negative. In addition, the strength of the body and its resistance to disease weakens. Put differently, the stock of human capital begins to deteriorate or depreciate after a certain age.

How does a shift in human capital influence the demand for health and the derived demand for medical care? An increase in, say, education reduces the absolute prices of health and the other commodities produced by the household by raising the outputs secured from a given set of inputs. Holding money income fixed, a higher level of education expands the opportunities at the disposal of the consumer. It may also alter the terms of trade between commodities, if productivity is augmented more in some activities than in others. Consequently, the model predicts a positive education effect in the demand curve for health which is directly related to the income elasticity of demand for health and, assuming that the relative price of health falls, to the price elasticity. Education's role in the derived demand for medical care is to close the gap between the percentage change in health demanded by the household for a 1 unit change in education and the percentage change in health supplied. The greater the income and price elasticities the more likely that medical expenditures will rise with this variable.

In order to estimate the effect of human capital on the demand for health, on the derived demand for medical expenditures, and on the production function, some measures of health are necessary. Both mortality rates and healthy days will be employed in the study,

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though so far we have concentrated on the latter measure. Two variants of healthy days are available. These were obtained from the 1963 health interview survey conducted by the National Opinion Research Center for the University of Chicago's Center for Health Administration. These are (1) 365 days minus restricted activity days and (2) 250 days (50 weeks times 5 days per week) minus work-loss days for members of the labor force. The samples include 7,803 and 2,559 persons, respectively.

Preliminary results indicate positive and significant relations between healthy work days and education in both the demand curve and the production function. An assessment of the productivity of education in health suggests that increasing the average amount of schooling by as much as one year would reduce work loss by 9 per cent. Since the health characteristic has a negative income elasticity, the positive education effect in the demand curve means that this efficiency parameter is biased toward health.

Future research will provide comparable estimates for the mortality index. Moreover, the age-adjusted death rate for states of the United States will be related not only to income and education but also to earnings of doctors and prices for cigarettes and alcohol. The function fitted will provide the price elasticity of demand for health and the cross elasticities of demand with respect to the prices of two closely related substitutes—the commodities associated with cigarette smoking and alcohol consumption.

Michael Grossman

OTHER STUDIES

Richard A. Easterlin's *Population, Labor Force, and Long Swings in Economic Growth: The American Experience* is in press. Several studies of aspects of the labor market are reported by Cagan in Section 1 and by Mincer, Nadiri, Nordhaus, and Rosen in Section 4.

3. NATIONAL INCOME, CONSUMPTION, AND CAPITAL FORMATION

THE DESIGN OF NATIONAL ECONOMIC ACCOUNTS

This project is concerned with designing national economic accounts that will (1) provide a framework for transactions information, (2) divide the economy into economic sectors in terms of both technological producing and consuming units and decision-making units, (3) develop economic constructs which are more meaningful for economic analysis, and (4) provide a framework for integrating the different forms of economic accounting.

With respect to the form of the economic accounts, it is proposed that production accounts, capital formation accounts, income and outlay accounts, changes in assets and liabilities, and balance sheets be created for classifying transactions. The relation of this accounting structure to that used in the United States and to the proposed revision of the United Nations systems is examined.

The economic sectoring involves the introduction of an enterprise income and outlay account that treats the enterprise sector of the economy in a manner symmetrical with households and general government. Such an account would lead to a better understanding of the role that enterprises play in the distribution and retention of income and in the financing of capital formation that takes place in the enterprise sector. Nonprofit institutions are explicitly included as a subsector of the enterprise sector rather than as a part of the household sector. Each sector is provided with a capital formation account as well as an income and outlay account.

Among the economic constructs which are

developed are more comprehensive measures of both consumption and capital formation. Expenditures for consumption are recognized for enterprises as well as for general government and households. Consumption goods that are provided at business expense are treated as consumption provided by business. For example, estimates are to be made for television, radio, and other mass media consumed by the public but supported by advertising expenditures. Other business consumption expenditures, such as subsidization of eating facilities, recreation facilities, and travel expense accounts are to be included.

For capital formation, nontangible development expenditures such as research and development, education and training, and some health expenditures are recognized explicitly as investment by the different sectors. To a considerable extent, this work depends on the other National Bureau work carried out by Kendrick, Goldsmith, and Juster. Specifically, Kendrick's work on investment expenditures and imputed income in gross national product serves as a basis for developing the new constructs of investment and imputation of income. Juster's work on household capital formation and saving serves as a basis for developing the household capital formation account. Finally, the part of the accounting system relating to national wealth and balance sheets is heavily dependent on the work done by Raymond Goldsmith, as well as that done by the Committee on Measuring the Nation's Wealth and the National Accounts Review Committee.

This research is being conducted in consultation with the Office of Business Economics of the Department of Commerce. Also, the recommendations contained in the proposed revision of the United Nations system are being taken into account as much as possible. In developing the proposed system of accounts, however, consideration is being given to the fact that much of the future output of national economic accounting data will be computerized. Special consideration is being given to how sample data, e.g., that on household income and expenditures, can be fitted directly into the framework of the economic accounting system.

A preliminary manuscript containing a discussion of the treatment of these problems and the outline of a proposed system has been completed. Comments from a staff committee and from the Office of Business Economics have been received, and on the basis of these the manuscript is undergoing substantial revision. After the completion of this manuscript, it is hoped that a serious attempt can be made with the help of the Office of Business Economics, to fill out part of the proposed system for a series of years, so that data for the new economic constructs can be compared with the existing measures of related concepts.

NANCY RUGGLES AND RICHARD RUGGLES

STUDIES IN THE NATIONAL INCOME ACCOUNTS

Estimates of total gross investment—tangible and intangible and by major type and sector—have been revised and extended to 1966, using the latest Commerce Department estimates and collateral sources. Preliminary estimates of real gross stocks of capital, including human capital, in the total economy and the private domestic business sector were completed for the period 1929–66. The real gross investment and stock estimates were presented for selected years in a paper prepared for the December 1967 meeting of the American Statistical Association. The paper, "Total Investment, Capital, and Economic Growth," will appear in the 1967 *Proceedings* of the Business and Economic Statistics Section, A.S.A. As indicated in one of the tables accompanying the paper, both real gross product and real gross wealth in the United States domestic business economy approximately doubled from 1948 to 1966, the ratio of real product to real wealth rising only fractionally, from 14.7 to 14.9 per cent.

During 1968, our main emphasis will be on estimating depreciation, net investment, and net stocks of capital, in current and constant dollars by type and sector, and preparing notes on sources and methods of estimation.

We have almost completed estimates for imputed values of labor and capital services not now included in the official national income and product estimates. These are required for consistency with the total investment estimates. In 1968, we shall continue work on other possible imputations; in particular, Elizabeth Simpson is estimating the value of unpaid household work, and Harold Wolozin plans to complete his study of volunteer labor.

We hope to have completed estimation by 1969; we will then analyze the data and prepare a final report.

JOHN W. KENDRICK

HOUSEHOLD CAPITAL FORMATION AND SAVINGS

Research on this project, now in its second year, has been focused on two major studies: (1) An analysis of the time series behavior of durable goods purchases and aggregate changes in durable goods stocks, using quarterly data from 1949 through 1966; (2) development and analysis of anticipations data relating to consumer expenditures (for durables, houses, and certain services) and consumer financial savings.

During 1967 we put relatively more resources into the analysis of time series data on expenditures than into the development and analysis of anticipation data. A considerable amount of effort has gone into refinement of the basic data, especially on quarterly changes in household stocks of durables. We have completed series extending from 1949 through 1966 on beginning-of-quarter stocks of automobiles, other durables, and total durables, and on quarterly changes in stocks. These estimates are benchmarked on Goldsmith's work *(Postwar Wealth of the United States)*, from which are taken 1947 household stocks and the year-by-year relation between stocks at the beginning of the year and depreciation in the following year. Quarterly estimates of household stocks are built up by subtracting depreciation (as interpolated from annual relation-

ships) and adding gross investment. The annual depreciation relationships estimated by Goldsmith are extrapolated beyond 1958 by regression methods. Thus we now have a quarterly series for change in stocks of durables which can be kept current.

The quarterly estimates just described have also been used to prepare a quarterly series on consumption, defined as the sum of consumer expenditures on perishable and semidurable goods, consumer expenditures on services, and depreciation on household stocks of durable goods. The resultant quarterly series for consumption and saving are defined to include net investment in durables as an element of saving rather than of consumption.

Using these new estimates, we have begun to construct a quarterly model of durable goods demand. The ultimate aim is to formulate a relationship which explains (and perhaps also predicts) quarterly changes in both total household saving and in the durable goods component of saving (change in durables stocks). Some progress has been made towards this objective. At present, the model explains changes in stocks of durables as a lagged adjustment to the difference between actual and desired stocks, with desired stock being a function of "expected" income, relative price, instalment contract maturity, unemployment rate, and average weekly hours.

Along with development of the quarterly time series model discussed above, we have continued with some time series analysis of the currently available data on consumer anticipations. One object of this supplementary program is to see how, if at all, anticipatory variables can best function within the context of a comprehensive demand model. Some results from this phase of the study are now in manuscript form. One paper, "Consumer Anticipations and Models of Durable Goods Demand: The Cross-Section, Time Series Paradox Re-examined," is to appear in a volume on "Forcasts and Anticipations" (see Section 4). Another paper, "Experimentation with the Census Bureau Survey of Consumer Anticipations: Results to Date and Plans for the Future," was presented at the December 1967

meetings of the American Statistical Association, and will be published as part of the 1967 *Proceedings* of the Business and Economic Statistics Section.

The second major study—the development and analysis of new data on consumer anticipations—involves an extensive new series of field surveys planned in cooperation with the U.S. Bureau of Census. The objectives are:

1. To test, under experimental conditions, a number of variables designed to improve our existing measures of anticipated expenditures on durables.

2. To analyze the usefulness and accuracy of measures of anticipated expenditures on certain cyclically variable services (vacations, travel, etc.).

3. To analyze the usefulness and accuracy of ex-ante measures of consumer's anticipated financial saving.

4. To study the basic determinants of the above measures.

5. To explore the structure of family income expectations in terms of the relative importance for income variation of changes in the earnings of supplementary workers (working wives, etc.), of changes in earnings due to overtime hours or second jobs, and of changes in non-wage income.

6. To explore the impact on household savings of the monetization of housing equity. Such changes often accompany the decision to sell one house and buy another; they always accompany the decision to negotiate an increase in the mortgage on an existing house.

7. To explore the impact on savings of prospective but distant commitments which involve heavy costs, e.g., the probable cost of educating children.

A draft of the proposed survey is now in preparation. John McNeill and Thomas Stoterau of the Census Bureau staff have been actively involved in the preparation and planning for this new survey, which is expected to cover some 6,000 households in three selected urban locations. We are presently planning four successive reinterviews, spaced six months apart.

An Advisory Committee has been formed for this project, consisting of the following members: Robert Ferber, University of Illinois; James C. Byrnes, U.S. Department of Commerce; John A. Frechtling, Ford Motor Company; Gary Fromm, The Brookings Institution; Raymond Goldsmith, Council of Economic Advisers; George Jaszi, U.S. Department of Commerce; George Katona, University of Michigan; Helen H. Lamale, U.S. Department of Labor; E. Scott Maynes, University of Minnesota; Milton Moss, Bureau of the Budget; Frederick N. Sass, Pennsylvania Railroad Company; Tynan Smith, Board of Governors of the Federal Reserve System; and Harold W. Watts, University of Wisconsin.

Financial support for this study is being provided by a grant from the National Science Foundation. The U.S. Bureau of the Census is a joint sponsor of the survey project, and is conducting the field surveys and providing staff support. The project staff at present comprises NBER research assistants Avrohn Eisenstein and Paul Wachtel and Census Bureau staff members John McNeill and Thomas Stoterau.

F. THOMAS JUSTER

PROBLEMS IN THE MEASUREMENT OF NONRESIDENTIAL FIXED CAPITAL

The present study is a detailed attempt, in the light of recent criticisms, to revise existing NBER and OBE capital estimates for use in long-run growth studies. The NBER-OBE estimates, the critics claim, have been calculated with price indexes which take insufficient account of technical change in the construction of capital goods and of improvements in capital's ability to produce output; the service lifetimes used to cumulate investment flows into capital stocks have erroneously been assumed constant; long-term changes in the utilization of capital have been ignored; and the values of different categories of capital have incorrectly been aggregated with asset prices rather than service prices as weights.

In research during 1967, I proposed a new

construction price index for 1919–66 based on a detailed evaluation of primary data. Another study presented measurements of the multi-billion dollar stock of government-financed assets operated by private firms—assets which contribute to the output of the U.S. private sector but which have never before been included as part of private capital input. The next stage of the study, to be completed by mid-1968, will concern changes since World War I in the service lives of capital equipment and in its "normal" utilization. The study will also include a critical evaluation of the concept of capital input recently proposed by Griliches and Jorgenson.

By the end of the summer of 1968 the data studies should be completed and the revised capital stock series will be ready for publication. Attention will then shift to the application of the new estimates to several important empirical topics, including the sources of long-run economic growth, the burden of the national debt, the long-run incidence of the corporation income tax, forecasts of future investment demand, and the utilization of capital.

ROBERT J. GORDON

PHILANTHROPY

Frank Dickinson worked on the final stages of his study of "The Changing Position of Philanthropy in the American Economy" while suffering from what proved to be a mortal illness. He managed, however, to complete a draft of a mansucript, and then to respond to some of the suggestions made by a staff reading committee. He was also able to look over an introduction to the study prepared by Solomon Fabricant.

Dr. Dickinson's death in September 1967 made more difficult and more time consuming than usual the task of checking and editing the manuscript. But with the help of Maude Pech and Joan Tron, the work has gone forward. It is expected that a draft of the manuscript, together with Fabricant's introduction, will shortly be ready for submission to the Board of Directors.

Ralph Nelson reports below on the status of his work on corporation giving.

CORPORATION GIVING

A revised draft of a manuscript on "Economic Factors in Corporation Giving," which takes account of comments by a staff reading committee, has been completed and is being reproduced for submission to the Board. The Table of Contents is as follows:
1. Introduction and Summary
2. The Level and Growth of Corporation Giving
3. Economic Analysis of Corporation Giving
4. Company-Sponsored Foundations
   Appendixes

RALPH L. NELSON

OTHER STUDIES

The Theory and Empirical Analysis of Production, Murray Brown, editor, *Determinants of Investment Behavior,* Robert Ferber, editor, and *Industrial Composition of Income and Product,* John W. Kendrick, editor, were published. Conferences being planned by the Conference on Research in Income and Wealth are discussed in Part II.

4. BUSINESS CYCLES

GENERAL STUDIES

Plans are well advanced for a volume of essays by Arthur Burns entitled "The Business Cycle in a Changing World." It includes the following:

1. The Nature and Causes of Business Cycles
   (from *International Encyclopaedia of the Social Sciences,* Spring 1968)
2. New Facts on Business Cycles
   (from 30th *Annual Report* of NBER, 1950)
3. Progress Towards Economic Stability
   (from the *American Economic Review,* March 1960)
4. Dealing with Recession and Inflation
   (from *Prosperity Without Inflation,* 1957)
5. The New Environment of Monetary Policy
   (from *Prosperity Without Inflation,* 1957)
6. Economics and our Public Policy of Full Employment
   (from *The Nation's Economic Objectives,* 1964)
7. The Problem of Unemployment
   (from *The Management of Prosperity,* 1966)
8. Aggregate or Structural Approaches to Full Employment
   (from *Twentieth Anniversary of the Employment Act of 1946: An Economic Symposium.* Joint Economic Committee, Feb. 1966)
9. The Quest for Full Employment and Economic Stability, 1960–1966
   (from *Full Employment, Guideposts and Economic Stability,* 1967)

An article entitled "What is a Recession?," which describes the National Bureau's method of identifying and dating business cycle peaks and troughs, was published in the *American Statistician,* October 1967. It provides a more complete statement of the procedures used and their rationale than has been available since the appearance of *Measuring Business Cycles* by Burns and Mitchell (1946). In view of the wide use of these dates in research reports and the press, a contemporary explanation of their derivation was thought to be desirable.

Julius Shiskin and I prepared a brief explanation of the several composite indexes of leading, coincident, and lagging indicators that have been published from time to time in National Bureau reports—initially in Shiskin's *Signals of Recession and Recovery* (1961). A chart showing the behavior of the indexes from 1948 through 1967, and a table illustrating the method of computation, accompanied the article, which was published as a supplement to the first issue of *National Bureau Report.* Some correlation studies developing the relationships among these indexes are under way.

Hanna Stern and Esther Reichner have completed a new edition of the Catalog of Business Cycle Series, which lists, by economic classification, some 2,400 of the monthly, quarterly, and annual series in our files. About 2,100 of the series are for the United States; the rest pertain to Britain, France, and Germany. A number of the more important U.S. series are on punch cards; the collection as a whole exists in the form of handwritten data sheets which can be photocopied. The catalog gives the title of the series, the period covered, the time unit, and the source agency, and indicates which series are available on punch cards.

Some experiments with combinations of data on inventories on hand and on order, stimulated by Ruth Mack's new book, *Information, Expectations, and Inventory Fluctuations,* have been carried out. New and unfilled orders, though reported by manufacturers who receive the orders, also represent orders placed by retailers, wholesalers, other manufacturers, other industries, and government agencies. What has been ordered but not delivered, as Mrs. Mack points out, is part of a stock—a very flexible part because of the speed with which an order can be placed or cancelled, and a part that can be closely adjusted to what is desired. Actual inventories on hand cannot be so closely adjusted, and the stock on order can be and is used to offset undesired accumulation or depletion of stock on hand. Hence the total of stocks on hand and on order represent a desired "inventory" more closely than either component alone. As a result, also, of the flexibility of orders and their role as a first step in

CHART III-3

Investment in Inventories on Hand and on Order, 1947—67

Bil. dol., ann. rate
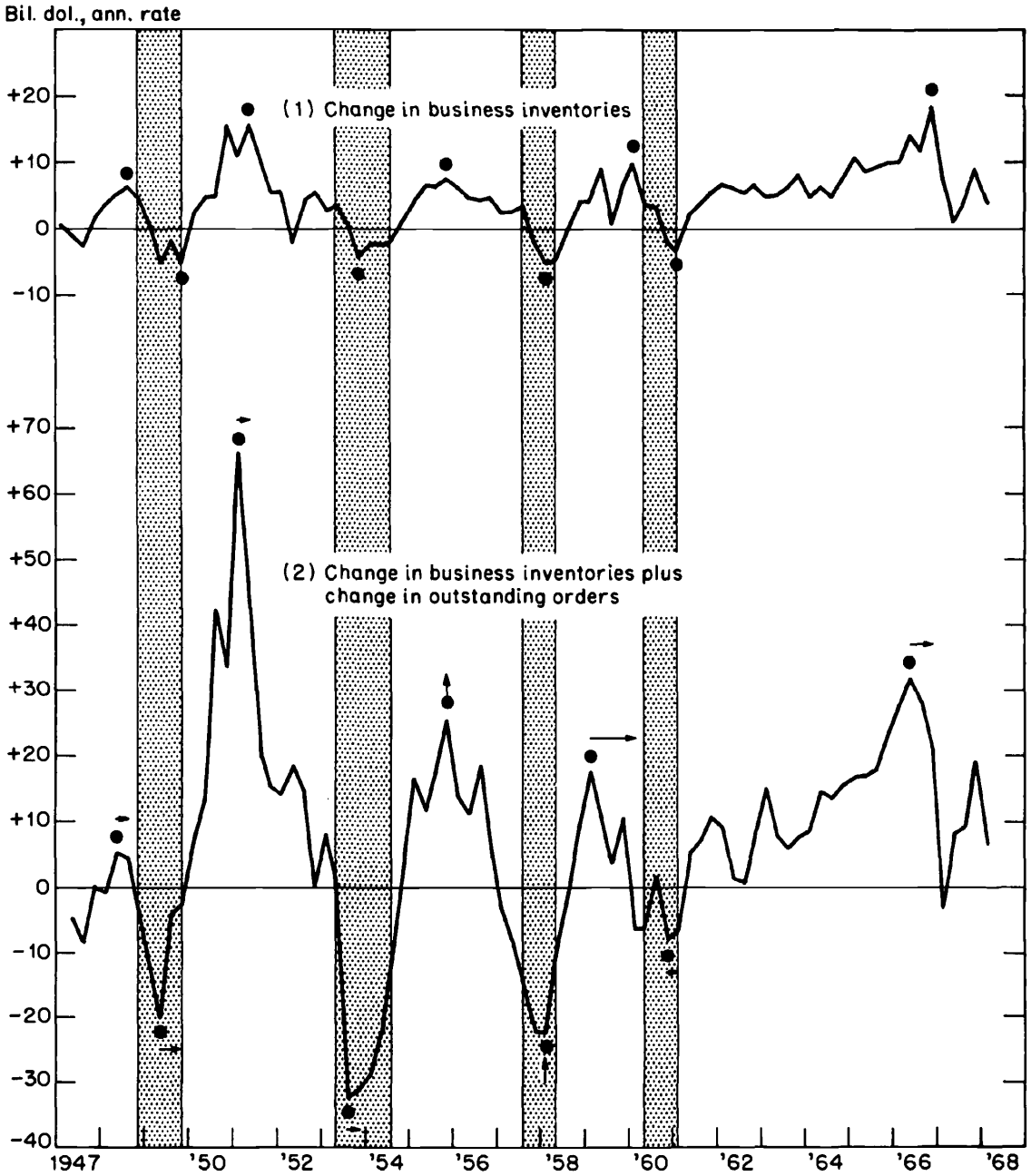
NOTE: Shaded areas represent business cycle contractions; unshaded areas, expansions. Dots mark cyclical turning points. Arrows represent the lead of series (2) at the turning points of series (1).

SOURCE: National Bureau of Economic Research, Inc., from Department of Commerce data.

attempting to change the inventory position, the inventory of goods on hand and on order is likely to experience cyclical swings in advance of those of inventories alone.

One of the questions that arises in attempting to use the available data on orders received is how to exclude (assuming it is desirable) orders for goods that will not enter into business inventories, e.g., machinery and equipment that is ordered by the final user for installation in his plant. One approximation is to eliminate from total manufacturers' unfilled orders those received by industries producing defense products and machinery and equipment. The remainder may be taken to represent orders of goods for processing or resale by business enterprises—goods of the same type they hold in inventory. This may, however, exclude too much—some orders received by firms in the excluded industries may be for inventory. Whether the exclusions are made or not, the combined totals of manufacturing and trade inventories and unfilled orders behave in much the same way. They are more nearly coincident with business cycles in their cyclical timing than is the inventory component alone, which generally lags. Moreover, the ratio of inventories plus unfilled orders to total manufacturing and trade sales is more nearly constant over the business cycle than is the ratio of inventories to sales. In both respects this behavior suggests that the total of stocks on hand and on order reflects a desired position more nearly than stocks on hand do.

The month-to-month changes in the comprehensive series on stocks on hand and on order are smoother than the changes in inventories alone, and usually show longer leads at business cycle turns. A comparison using quarterly data is shown in the following chart. The top line is the GNP component, change in business inventories (after the inventory revaluation adjustment), while the second line combines this with the change in unfilled orders. The change in inventories on hand and on order shows far wider cyclical swings and has usually led inventory change by one or two quarters (see arrows on the chart). Since inventory change is itself a "leading indicator,"

the change in inventory on hand and on order is an even better one. Comparison of the two series brings out the point that statistics on orders placed can be of considerable assistance in analyzing inventory movements and prospects.

GEOFFREY H. MOORE

ECONOMETRIC MODEL OF BUSINESS CYCLES

An econometric model of business cycles has been formulated through the joint efforts of Arthur F. Burns, Geoffrey H. Moore, and myself. The strategy in the first stage is to formulate and test a highly aggregative model which is aimed at capturing the most essential elements in economic fluctuations. The present version consists of twenty-three structural equations.

The model, which emphasizes the price-wage-profit mechanism in business fluctuations, is divided into five major sectors: demand for and supply of final goods and services, demand for and supply of factors, and a monetary sector. This is very similar to a Walrasian system. The price level of final products is determined by demand and supply, and so is the wage rate. A production function, while not explicitly contained in the model, is used to obtain an aggregate supply function and derived demand functions for labor and materials. The investment function brings out the commitment stage (orders and contracts) and allows for the influences of profits and the change in profits, thus treating the demand for capital goods differently from the demand for inputs in the theory of the firm. The model provides a basis for testing the importance of expectational variables and diffusion indexes, as well as other variables which have occupied the attention of the National Bureau. Ex ante concepts are stressed, as in defining the demand for and supply of labor, and aggregate demand (to include the backlog of unfilled orders).

At present, empirical knowledge about this

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model is confined mainly to previous studies of various sectors or equations. Data are being gathered and parameters in the entire system are being estimated, with the assistance of An-loh Lin. When the dynamic characteristics of the completed model have been studied, we hope to compare the results with those of other models formulated for the planned conference on econometric models of cyclical behavior.

GREGORY C. CHOW

CONFERENCE ON ECONOMETRIC MODELS OF CYCLICAL BEHAVIOR

The Social Science Research Council's Committee on Economic Stability has long believed that an interchange of research ideas between builders of econometric models and cycle analysts at the National Bureau would enrich the research efforts of both groups. In May 1966, Geoffrey Moore proposed to the Committee that it sponsor a conference on econometric models of cyclical behavior, and his proposal was discussed at a meeting of the Committee and other interested economists in March 1967. It was agreed that the Committee should organize such a conference, and a planning committee was appointed consisting of Lawrence Klein, Geoffrey Moore, and myself. At its June 1967 meeting, the Committee decided to invite the Conference on Research in Income and Wealth to cosponsor the conference, and this invitation was accepted. Zvi Griliches was asked to join the planning committee. Present plans for the conference, to be held in the autumn of 1969, are as follows:

I. The first set of papers would consist of business cycle simulation studies of quarterly econometric models. The simulations would be of the following types and characteristics:

A. Historical ex-post predictions during the (postwar) sample period.

    1. Single equation predictions from the structural equations explaining important business cycle indicators.

    2. Complete model predictions using ex-

post values of exogenous variables and initial conditions at the beginning of the sample period.

    3. Complete model predictions using ex-post values of exogenous variables but with new initial conditions one year prior to each business cycle turning point.

    4. Complete model predictions of the types already mentioned but using autoregressive extrapolations of exogenous variables.

B. Ex-post forecasts for one or two years beyond the sample period with initial conditions from the end of the sample period.

C. Stochastic simulations beyond the sample period for assumed trends, cycles, or random movements in the exogenous variables and with the model equations subject to random shocks over time.

D. To assure greatest comparability, the simulations for all models would be for the same historical periods, and all the stochastic simulations would be run for the same number of periods and method of generating stochastic shocks.

E. Potential models and authors include the following (some of the studies might be combined to reduce the number of papers):

    1. Brookings–SSRC model

    2. Wharton-EFU model

    3. OBE model

    4. FRB-MIT model

    5. NBER model. This model is under construction and it may not be possible to complete the program of simulations outlined here. However, at a minimum, a progress report on the model will be presented.

F. The model builders would offer such interpretations of the simulation results as thought desirable by them. The simulation results themselves, although not necessarily their interpretation by the model builders, would have to be available well before the scheduled date of the conference to permit the independent analyses suggested under II and III.

II. The second set of one or more papers would consist of NBER analyses of the results of the foregoing model simulations. The simulation re-

sults would be studied with respect to turning point timing relationships, amplitudes, conformity to reference cycles, reference and specific cycle patterns, behavior of indicators, and diffusion phenomena, using standard NBER techniques. These analyses would reveal the extent to which the models can endogenously generate cyclical relationships consistent with those observed in NBER business cycle studies.

III. Another paper would compare the various models with respect to causal interpretability in the light of business cycle theory. The paper would draw upon the simulation results, as well as on analysis of the structural models (including their recursive structure), in an attempt to provide a literary interpretation of the working of the models.

IV. The remaining papers would not necessarily deal with the models studied under I-III. The following papers are suggested in this miscellaneous category:

A. A single econometric model would be fitted to monthly, quarterly, and annual data to determine the effects of the time unit on the lag structure and dynamic behavior of the model.

B. A comparison of ex-post forecasts from several models fitted by the same estimating method to a common set of data.

C. One or more papers evaluating ex-ante forecasts from econometric models and from cyclical indicators or other techniques.

D. An interpretation and appraisal of the NBER approach to cyclical analysis through its treatment of time series behavior.

BERT G. HICKMAN[1]

STUDY OF SHORT-TERM ECONOMIC FORECASTING

The first two reports of the study were published in the spring of 1967: Moore and Shiskin's *Indicators of Business Expansions and Contractions* and Zarnowitz' *An Appraisal of Short-Term Economic Forecasts*. Fels and

Hinshaw's "Forecasting and Recognizing Business Cycle Turning Points" is in press. Rosanne Cole's "Errors in Estimates of Gross National Product" is being edited. Mincer is editing a collection of essays on economic forecasts and expectations. A report on "The Short-Term Forecasting Ability of Econometric Models" by Jon Cunnyngham is in preparation. A new study of econometric forecasts, by Yoel Haitovsky and Michael Evans is being planned. A joint conference with the National Association of Business Economists, on Forecasting and Recognizing Turns in the Business Cycle, was held on March 28, 1968.

Financial grants in support of this research project were made by several industrial companies and the Relm Foundation, and other funds of the National Bureau were also used. Many individuals and institutions provided and helped to interpret forecast data.

FORECASTS OF AGGREGATE ECONOMIC ACTIVITY

This study is in its final phase: records of a large number of forecasts of various types have been assembled and processed, and the direct results of the analysis as well as their implications are now being evaluated. The following areas of research are encompassed:

1. Types and sources of economic forecasts. How forecasts differ according to the method or method mix used and according to the relevant characteristics of the forecaster.

2. The relative accuracy of forecasts of different variables and of forecasts in different periods. The variables include GNP, its major components, employment, industrial production, and wholesale and consumer price indexes. The periods covered differ in regard to rates of growth, cyclical features, the nature and frequency of turning points, the importance of political disturbances and other imponderables. Related topics are the interdependence of economic forecasts at one time and over time, and how variations in uncertainty and business confidence are reflected in the temporal incidence of forecast errors.

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3. The structure and internal consistency of forecasts. How relations between predicted variables compare with relations between the corresponding actual values.

4. The distributions of actual and predicted changes and forecast errors. Comparisons of such distributions can contribute to appraisals of predictions from different sources, for different variables, etc. It would be particularly helpful if forecasters stated the odds they attach to the expected outcomes, but probabilistic distribution forecasts are rare in business and economics, where point predictions represent the bulk of all quantitative predictions.

The preceding paragraphs provide a tentative outline for a book. Sections on some of the subjects have been drafted, and the possibility exists of submitting them for earlier consideration as separate publications. One of these papers deals with price level predictions, which are shown as distinctly weak components of many recent forecasts, judgmental and econometric alike. Another extends and brings up to date earlier work on turning point predictions, and shows how their importance as an aspect of the quality of forecasts depends on the attributes of the predicted variable, the span of forecast, and the definition and characteristics of the turning points under study.

VICTOR ZARNOWITZ

FORECASTS AND ANTICIPATIONS

Two papers on economic forecasts have been thoroughly revised and amplified. "The Evaluation of Economic Forecasts," written jointly with Victor Zarnowitz, deals with methods of assessing the accuracy of business forecasts compiled by the Short-Term Economic Forecasting Project. The degree of predictive accuracy is measured both in absolute and in relative terms. Errors are decomposed into systematic and random components, as well as into extrapolative and "autonomous" components. Relative errors are measured by the ratio of actual forecast error to the error resulting from a linear autoregressive extrapolation of the series. The analysis is extended to multi-span forecasting—that is, to forecasts in which predictions for several successive periods are available at a given time.

The second paper, "Models of Adaptive Forecasting," is addressed to the question, Can we learn from available data that represent forecasts, how these forecasts were generated? The answer is positive, within limits, for alternative models of adaptive, or "error-learning" forecasting behavior. The models are restricted to linear extrapolations. One such model, the very popular exponential extrapolation, is a special case in this class. Regressive forecasting, here defined as "convex," is shown to be nonexponential though adaptive. In devising methods for discriminating between exponential and other adaptive forecasting models, special attention is given to the presence of nonextrapolative components in forecasts.

Three other papers are joined to the two already mentioned to form a proposed book on forecasts and anticipations. These are: Rosanne Cole's paper on effects of data errors on forecasting accuracy, Stanley Diller's analysis of the forecasting content of the term structure of interest rates, and F. Thomas Juster's analysis of surveys of anticipations of purchases of consumer durables. The studies follow a related framework in investigations of expectational behavior and in assessments of forecasting accuracy. The full collection is now being edited.

In preparing a contribution to another collection of essays, I have completed the processing of the 1960 Census earnings and family income data available in detail in the 1/1,000 sample. The focus of this work is a "human capital" analysis of the distribution of personal income. The results bring up to date and supplement my earlier findings (in a Columbia Ph.D. dissertation) on the relation between education, age, family labor force structure, and income distribution. The companion pieces in the proposed volume are described by Becker in Section 2.

JACOB MINCER

GNP REVISIONS AND FORECASTING ACCURACY

This study has a twofold purpose: to appraise the accuracy of an important body of data upon which forecasts typically rely, and to determine how much of the error in forecasts might be attributed to data errors.

Though it is widely recognized that most economic statistics contain measurement errors, relatively little is known about the nature of the errors or their importance as a source of forecast error. Such knowledge, however, is essential for a proper evaluation of forecasting accuracy. For example, conclusions about the quality of a set of forecasts (and hence of the model generating them) would vary according to whether data errors were found to be a major or a negligible component of forecast error. Moreover, an analysis of data errors can indicate the potential for improving forecasts by improving the accuracy of the underlying data.

Estimates of GNP and its components are the data reviewed in this study. They were chosen partly because most short-term economic forecasts rely to some extent on the national accounts estimates and partly because the successive revisions of these estimates provide some indication of the accuracy of the provisional figures. It should be kept in mind, however, that the study's emphasis on errors in this one body of data inherently risks obscuring an important fact: frequent revisions of a given set of estimates are by no means an indication that it is less reliable than a series that is rarely or never revised. While it is true that revisions indicate shortcomings in the provisional figures, it would be wholly unwarranted to conclude that the provisional estimates are without value or that they are necessarily less dependable than other series of comparable scope.

Two reports have been completed. The first, "Errors in Estimates of Gross National Product," reviews the nature and magnitude of the revisions in provisional estimates of GNP and its components. The revisions are a measure of one type of error—that resulting from lags in the availability of primary data. Estimates of GNP are built up from detailed component estimates. The comprehensive data underlying many of the components are available only at infrequent intervals and long after the fact. These data are used to construct benchmark estimates. To provide continuous, up-to-date, quarterly series, the movements of related series are used to interpolate between the benchmarks and to extrapolate beyond them. There are then four major sources of error in the provisional estimates: (1) errors in the benchmark estimates; (2) measurement errors in the related series; (3) errors arising from an inexact or misspecified relation between the two variables; and (4) errors arising from extrapolations of past benchmark values.

The revisions (i.e., the difference between the provisional and the revised estimates) are shown to be primarily a measure of the extrapolation errors. Not surprisingly then, the largest revisions are found in those GNP components which show considerable variability and weak serial correlation, and which are, therefore, the most difficult to extrapolate accurately.

Hence the provisional estimates can be viewed as predictions, based on partial information, of the values of GNP and its components, and our analysis of their accuracy emphasizes their resemblance to forecasts. The questions considered are: the size of the error relative to other forecast and extrapolation errors, how rapidly it is reduced, and whether the accuracy of the estimates has improved over the years.
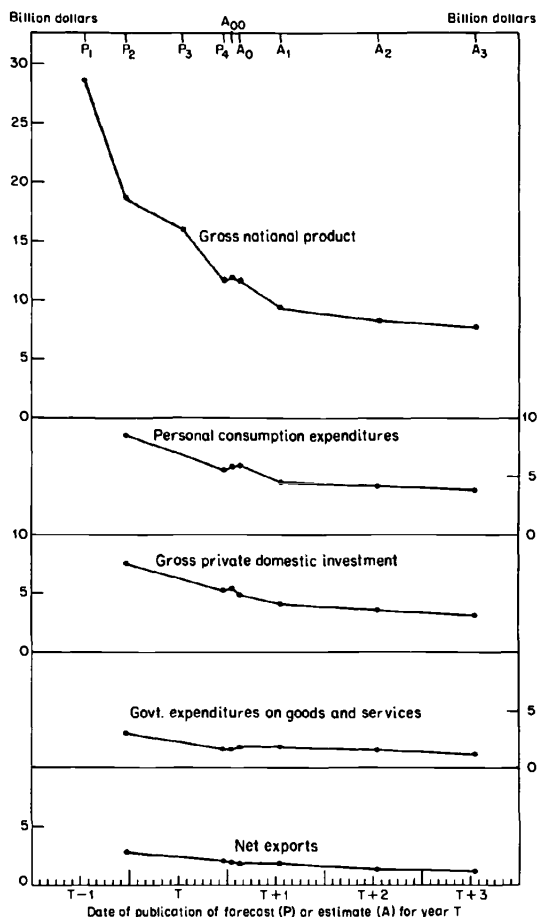
As Chart III-4 shows, the provisional GNP estimates (A_{00} and A_0) for year T, the year just ended, are substantially more accurate than an average of business forecasts of GNP for the same year (which, for forecasters, is the year ahead—P_1, P_2, and P_3). This is true both of total GNP and of its major components for the 1953–62 period. The provisional figures are, however, not much more accurate than an average of forecasters' estimates of current annual levels (P_4)—even though the forecasters publish their estimates several months earlier than the official data.

While in the first report we ask how large

are errors in the provisional estimates relative to forecast errors, the question is turned around in the second report, "Data Errors and Forecasting Accuracy." There we ask how much of the error in forecasts can be attributed to errors in the provisional estimates. The use of preliminary rather than revised GNP data im-

CHART III-4

Average Errors of Successive Forecasts (P) and Estimates (A) of Gross National Product and Its Components, Annual Levels, 1953–62

error—they were the primary source of the bias in only three of the sixteen sets. They did, however, cause a considerable reduction in forecast efficiency. It is estimated that data errors accounted for 50 to 70 per cent of the variance of the error in seven of the sixteen forecasts.

Data errors affect not only the variables underlying a forecast (the direct effect); they affect the estimates of the parameters of the relationships among these variables as well (the indirect effects). A well-known quarterly consumption function was used to illustrate the indirect as well as direct effects of data errors. Consumption forecasts were generated from preliminary and from the 1965 revised data. The use of preliminary rather than revised data led to a doubling of the forecast errors. The direct effects accounted for 70 per cent of the increase; the remaining 30 per cent was due to the indirect effect of data errors on the parameter estimates.

These results suggest that there is considerable scope for improving forecasting accuracy by improving the accuracy of preliminary data.

ROSANNE COLE

paired forecasting accuracy and by a substantial amount: The accuracy of business forecasts is estimated to have been reduced by nearly 40 per cent for the 1953–63 period.

The business forecasts examined are sixteen forecast sets from the Zarnowitz sample. Data errors were not the major source of systematic

EVALUATION OF QUARTERLY ECONOMETRIC MODEL FORECASTS

Plans have been prepared for an evaluation of short-term forecasts by quarterly econometric models of the United States. Michael Evans, University of Pennsylvania, is collaborating on the project and George I. Treyz, Haverford College, will also be engaged in part of the work. The prediction record of four to six econometric models will be investigated and analyzed. Their "true" ex ante unconditional predictions will be compared with the conditional estimations, and both will be compared with various formulations of "naive" extrapolations and with single equation predictions. We hope that the analysis will help provide answers to such basic questions as, for example, (1) What are the properties of a sound short-term predictive model and how does it differ

from a structural model? (2) What are the desirable properties of measures of goodness of predictions? (3) Can corrective measures for future prediction be taken on the basis of the prediction record? (4) Do large-scale models perform better than small-scale ones in forecasting GNP and its major components? (5) Are predictions from econometric systems superior to noneconometric or single equation forecasts? (6) To what extent are the predictions sensitive to the initial conditions? (7) Should past data be given the same weight as more recent data?

I have completed a paper entitled "Regression Estimation from Grouped Observations," which will soon be submitted for review to the National Bureau's Board of Directors, and have also written a "Note on the Maximization of $\overline{R}^2$." In addition, I have circulated first drafts of two papers which grew out of my work as statistical consultant to econometric studies at the Bureau. These papers are: "Measure of the Explanatory Power of Two Competing Models" and "Estimation of Regression Equations When a Block of Observations is Missing." Other studies in progress are on the problem of prediction with misspecified regression equations and the estimation of regression parameters when the dependent variable is a product of two (or more) variables, each of them a linear function of some independent variables.

YOEL HAITOVSKY

CONFERENCE ON FORECASTING AND RECOGNIZING TURNS IN THE BUSINESS CYCLE

A conference jointly sponsored by the National Association of Business Economists and the National Bureau was held on March 28, 1968 at Long Island University. At a session chaired by Geoffrey Moore the following papers by members of the National Bureau staff were presented:

The Record of Turning Point Forecasts in GNP and Other Major Aggregates, by Victor Zarnowitz.

Turning Point Recognition in Business Outlook Statements, by Rendigs Fels.

Dating Postwar Business Cycles: Methods and Their Application to Germany, by Ilse Mintz.

Frank P. Murphy, General Electric Co., and Evan W. Maude, Economic Minister, British Embassy, discussed the papers. At another session of the conference a number of business economists described applications of cyclical analysis in their companies.

TURNING POINTS IN FOREIGN BUSINESS CYCLES

Economists in business, government, and universities have made extensive use of the NBER business cycle chronology for the United States. Yet, for most foreign countries such benchmarks are not available. The purpose of my project is to supply such chronologies for several countries.

How should business cycles be defined in this context? It seems that the traditional concept of rises and declines in aggregate economic activity requires modification. Fluctuations in aggregate economic activity have been milder in the postwar period than in earlier days. Improvement here as elsewhere raises standards; as a result, present attitudes toward retardation of growth resemble those previously reserved for actual declines.

Modification of the concept requires modification of statistical methods. New criteria must be set up in order to distinguish periods of greater-than-average and less-than-average growth. Two approaches to this problem are used in this study. One is to adjust economic indicators for their long-term upward trends and to select peaks and troughs in the trend-adjusted series. The other approach is to identify turns in the growth rate rather than in the series proper.

But the highest and lowest points in a series of growth rates cannot serve, like their counterparts in the series itself, to delimit cycle phases.

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Growth rates frequently reach their peaks and troughs near the beginning, rather than at the end, of periods of high and low growth. If a cycle phase were taken to end with a growth rate peak it would usually include only the beginning of a period of high activity. Hence, in order to fit common views, business cycles must be defined as alternations of high and low rates, rather than as alternations of rising and falling rates. A method for classifying rates into above and below average ones has been devised and applied by Friedman and Schwartz in their work on money and has been refined and modified for computerization by Bry and Boschan. Essentially the method consists in selecting "steps," i.e., periods of relatively high and low growth, in such a way that the variances between the mean rates in successive steps are maximized. The last month or quarter in each step is the turning point. The minimum durations are six months for one step and fifteen

months for two successive steps. Each high step must be succeeded by a low step and vice versa.

With respect to the other approach, the crucial problem is the selection of the trend to be removed. After experimenting with several methods, we decided upon a seventy-five-month moving average. This has the advantage of being more flexible than a fitted trend, yet is long enough to iron out most fluctuations. The missing items at either end of the moving average are supplied by extrapolation. The percentage deviations of an indicator from its moving average are then analyzed by the new NBER computerized program for the selection of cyclical turning points.

Twenty-one German indicators—eight quarterly and thirteen monthly—have been selected for the analysis, 1950 to 1966. The quarterly series are from the national income accounts and have been furnished directly by the Deutsches Institut fuer Wirtschaftsforschung.

CHART III-5

German Business Cycles, 1952-66

(net per cent in expansion, twenty-one indicators)
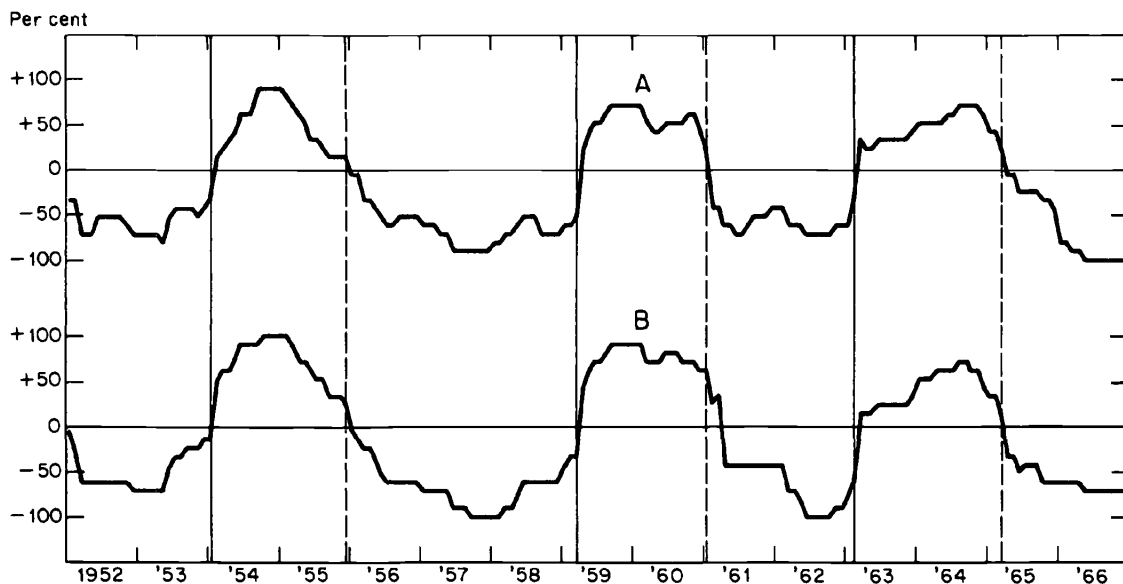
NOTE: Curve A is based on high and low steps in growth rates of indicators; curve B, based on rises and declines in indicators' deviations from their trends.

Solid vertical lines indicate business cycle upturns, broken vertical lines, business cycle downturns, based on series A.

See text for explanations of concepts.

Compilation of the monthly series was rendered relatively laborious by the fact that German series as published are broken at various dates due to the incorporation of the Saarland and of Berlin. In many instances a search had to be made in order to splice the parts of a series together.

Both step cycles and deviation cycles have been identified independently in each indicator. On the basis of these specific turns German business cycle turns have been determined, following a rule that the last month with a majority of the twenty-one series in expansion (on a high step) is the cyclical downturn, and correspondingly for the upturn.

The chart on page 78 shows six clearly defined cyclical turns and two and a half well-marked cycles. The dates of five of the six turns are exactly the same by both methods, while at the sixth there is a difference of two months. This agreement of results obtained by different methods is, of course, most reassuring.

These methods and findings will be written up and submitted for publication as an Occasional Paper. Next, French and British business cycles will be analyzed in the same fashion.

ILSE MINTZ

MONEY

As a sequel to *A Monetary History of the United States, 1867–1960,* we planned one further volume that was to have a dual function: to describe in greater detail than we have heretofore the sources underlying the new estimates and the methods used to construct them; and to present a statistical analysis of the characteristic behavior of the stock of money in relation to other economic magnitudes, as revealed by the new estimates.

As we progressed with the draft of that projected volume, it got out of hand. We finally decided that it would have to be subdivided into three parts: a first, which presents the statistical estimates, their sources, and methods of estimation; a second, on monetary trends; and a third, on monetary cycles.

The change in plan has been enforced by a broadening of the scope of the material covered. In the volume on monetary statistics, in addition to the detailed description of sources, methods, and supplementary tables, we have added an examination of the definition of money and a survey of earlier estimates.

We have broadened the scope of the volume on trends to cover the United Kingdom, in order to test the results obtained for the United States. In the volume on cycles, we plan to include some comparative data for a number of countries.

We hope the first two volumes will be ready for review by the Board of Directors in 1968.

MILTON FRIEDMAN AND ANNA J. SCHWARTZ

THE EFFECTS OF RELATIVE PRICES AND RATE OF UTILIZATION ON THE LEVEL OF EMPLOYMENT

The study pertains to the analysis of the determinants of the level of employment in the U.S. manufacturing sector. The employment model used as a basis for the research is derived explicitly from the neoclassical theory of factor demand and will be fitted to the postwar quarterly data for the total manufacturing sector and its seventeen subindustries. The main objective of the study is to discover the effects of relative prices, i.e., real wages and user costs, capital stock, and rate of utilization, on the level of employment. The preliminary results are very encouraging for both production and nonproduction workers' employment functions. Another aspect of the study is to investigate the adjustment process underlying employment behavior in different industries. I intend to enlarge the scope of the study somewhat by formulating a model which incorporates the employment and investment decisions of the firm. Satisfactory progress is being made in formulating and estimating the demand for capital services. Effort is being made now to formulate the determinants of the rates of utili-

zation of labor and capital stock. The inter-action of these simultaneous decisions will be traced at the end of the manuscript.

The data for the study have been collected for the period of 1947 I to 1964 IV, and will be continued through 1967. I hope that the first draft of the manuscript will be ready this summer; in the meantime, two papers have been prepared which report the main features of the employment and capital stock investment models developed in the study.

M. I. Nadiri

A STUDY OF PRICE AND WAGE BEHAVIOR

This theoretical and empirical study of price and wage behavior in the United States began in June 1967. The first stage was the formulation of a model to put the standard theory of the firm in testable form. It is assumed that firms are faced with neoclassical production functions and conventional demand functions. They use these to maximize profits, which defines product price as a function of factor prices and parameters of the system. The results of this investigation have been described in a draft manuscript, "A Theoretical and Empirical Study of Price and Wage Behavior: Part I. A Model of Pricing."

The preferred long-run price equation utilizes a Cobb-Douglas production function and a log linear demand function. More general functions are also described. The equation thus derived is given by

$$p = a + bt + cw + di + ev + fy + u,$$

where all the variables are expressed in logarithms and p = price, t = time, w = wage, i = cost of capital, v = material costs, y = income, u = disturbance. The parameters are determined by the shape of production and demand functions and are identifiable. In the short run, adjustment to the long-run equilibrium price is assumed to take place according to a distributed lag.

The second part of the study is designed to use the theoretical results in estimating a set of price and wage equations. The first part of the empirical work examines aggregate price and wage behavior. The equation shown above is fitted to the postwar quarterly data. Both ordinary least squares and two-stage least squares estimates were made, since there are important interactions between wages and prices.

The preliminary results indicate that (a) the model outlined above cannot be rejected as the appropriate structure; (b) the parameters of the system are quite sensitive to changes in specification; and (c) contrary to other studies, the simultaneous equation estimates appear to differ significantly from the ordinary least squares estimates.

The second task is to apply the theory to individual sectors of the economy.

William D. Nordhaus

SHORT-RUN VARIATIONS IN EMPLOYMENT AND HOURS IN MANUFACTURING INDUSTRIES

This is to be a study of the demand for factors of production in the short run, with special emphasis on the demand for labor. Labor has at least two dimensions, the number of employees and the hours they work. First, time series demand functions for these two components will be specified and estimated. Particular attention will be paid in these specifications to the manner in which employment and hours of work interact with each other and also with other employment flow characteristics, such as various aspects of labor turnover, with respect to timing and amplitude of fluctuations. An attempt is being made to formulate a decision framework that will take account of all these variables and be capable of generating their joint time paths with a small degree of error. For example, given the costs of adjusting the number of employees, an optimum level of hours per man is implied. However, hours of work are clearly varied not only in response to their own demand conditions, but also to incorporate any slack in the adjustment of em-

ployment to its desired level. Similarly, it may be true that the adjustment of employment is also influenced by the hours adjustment. Expectations will clearly play an important role in these simultaneous adjustments, and various expectations models will be tried. Data will be restricted to manufacturing industries, and a major portion of the analysis will be devoted to explaining interindustry differences. The time period to be studied is 1947–66.

In addition, Nadiri and I are engaged on a more general analysis of short- and long-run demand functions for factors of production that will jointly explain variations in capacity utilization, as well as stock adjustment, along these same lines.

SHERWIN ROSEN

JOB VACANCIES

A draft manuscript on "Fluctuations in Job Vacancies—An Analysis of Available Measures" was referred to a staff reading committee and has since been revised in response to many valuable suggestions.

The study deals primarily with such indicators of vacancies as job openings pending at U.S. Employment Service offices and help-wanted advertisements in newspapers. Recent sample surveys of vacancies are examined; conceptual problems arising in the empirical determination of vacancy levels are discussed; and the behavior of vacancy indicators is compared with that of unemployment. Furthermore, the relationship between vacancies and unemployment is studied in the framework of a theoretical model designed to distinguish between their aggregate and structural components. Data for Great Britain, Germany, and the Netherlands are examined, as well as for the United States.

Apart from substantive findings—such as the inverse relationship between vacancies and unemployment, the downward rigidity of each variable when it is at a low level, and the usefulness of the ratio of job openings to unemployment as an economic indicator—the study

demonstrates the potential analytic value of reliable statistics on job vacancies, if such were to become available.

CHARLOTTE BOSCHAN

CYCLICAL BEHAVIOR OF ORDERS, PRODUCTION, AND INVESTMENT

A manuscript under this title has been completed. Its table of contents is as follows, except for Chapters 1 and 14, which provide an introduction and a comprehensive summary. respectively. There are also several appendixes.

Part One. The Relationships between New Orders, Production, and Shipments

2. The Role of Orders in Industrial Production

3. Size and Frequency of Fluctuations

4. Timing Comparisons

5. Regression Analysis

Part Two. Causes and Implications of Changes in Unfilled Orders

6. Unfilled Orders and Industrial Activity

7. Unfilled Orders, Delivery Periods, and Price Changes

Part Three. The Behavior of Investment Commitments and Expenditures

8. Indicators and Stages of Investment in Plant and Equipment

9. Factors Influencing Investment Commitments and Realizations

10. Orders, Production, and Inventory Investment

Part Four. Orders and Related Processes during Business Cycles

11 and 12. Cyclical Conformity and Timing

13. Types of Cyclical Behavior and Diffusion Indexes

VICTOR ZARNOWITZ

ELECTRONIC COMPUTER PROGRAMS FOR BUSINESS CYCLE ANALYSIS

A manuscript on "Cyclical Analysis of Time Series—Selected Procedures and Programs" has been subjected to the critical review of a staff reading committee and revised. The manuscript is now being edited.

The study contains three parts: an approach to programmed determination of cyclical turning points; a review of the standard business cycle analysis of the National Bureau and its programmed version; a discussion of recession and recovery analysis and the associated programs. Illustrative output and technical instructions for all three parts are provided in an appendix.

The project is supported by a grant from the International Business Machines Corporation and by other funds of the National Bureau.

GERHARD BRY AND CHARLOTTE BOSCHAN

OTHER STUDIES

Cyclical Fluctuations in the Exports of the United States since 1879, by Ilse Mintz; *Information, Expectations, and Inventory Fluctuations,* by Ruth P. Mack; *and Determinants of Investment Behavior,* Robert Ferber, editor, were published.

5. 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 had chief responsibility for planning and directing the project until his death in April 1965. Jack M. Guttentag is now director of the project.

Publications to date include Conard's initial report on the project as a whole, *The Behavior of Interest Rates: A Progress Report; The Cyclical Behavior of the Term Structure of Interest Rates,* by Reuben A. Kessel; *Changes in the Cyclical Behavior of Interest Rates,* by Phillip Cagan; and *Yields on Corporate Debt Directly Placed,* by Avery Cohan. Other work nearing completion includes two papers by Stanley Diller, "The Seasonal Variation of Interest Rates" and "Expectations and the Term Structure of Interest Rates"; a paper by Avery Cohan, "The Quality of Direct Placements, 1951–1961"; a paper by Bruce Fredrikson "The Geographical Structure of Mortgage Yields"; a monograph by Jack Guttentag and Morris Beck on "Residential Mortgage Yields Since 1961" (described below); and a monograph by Phillip Cagan, "The Channels of Monetary Effects on Interest Rates." The first of two volumes of essays on interest rates will shortly be submitted for Board review. This volume includes the following papers:

Phillip Cagan
   The Influence of Interest Rates on the Duration of Business Cycles
Jack M. Guttentag
   The Behavior of Residential Mortgage Yields since 1951
Royal Shipp
   The Structure of the Market for Multifamily and Nonresidential Mortgages
Phillip Cagan
   A Study of Liquidity Premiums on Federal and Municipal Government Securities
Joseph W. Conard and Mark W. Frankena
   The Yield Spread Between New and Seasoned Corporate Bonds, 1952–67
Phillip Cagan
   Interest Rates and Bank Reserves—A Reinterpretation of the Statistical Association

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, Yale University; Sidney Homer, Salomon Brothers & Hutzler; Norris Johnson, formerly of First National City Bank of New York; Robert G. Link, Federal Reserve Bank of New York; Roger F. Murray, Teachers Insurance and Annuity Association; James J. O'Leary, Lionel D. Edie, Inc.; Roy L. Reierson, Bankers Trust Company; Eli Shapiro, Harvard University; Henry C. Wallich, Yale University; and C. Richard Youngdahl, Aubrey G. Lanston and Company.

THE MORTGAGE MARKET

"Residential Mortgage Yields Since 1951," by Jack Guttentag and Morris Beck has been extensively revised. The book describes and assesses new time series on residential mortgage yields and terms, based upon loans authorized by some large life insurance companies during 1951–63. The report includes some analysis of cyclical behavior. Appendix tables provide monthly averages and standard deviations of the following characteristics of FHA and conventional loans covering the United States: contract rate, effective yield, discount, maturity, loan-value ratio, and loan size. Quarterly data are available for thirteen regions (the Census nine-region and four-region breaks) and eight states.

A regression analysis of residential mortgage yield determinants during a few short periods of time has entered a new phase with the reprocessing of data on loan characteristics, obtained from the Federal Reserve Bank of Chicago, to generate information previously unavailable. This includes information on the lender, the purpose of the loan, expected disposition of the loan, the ratio of mortgage payment (calculated at a standardized interest rate) to borrower income, and the ratio of loan balance after five years to current property value. Other variables employed in the analysis are: maturity, loan-value ratio, income, income-to-loan ratio, property value, and loan size. Three separate periods are being analyzed: May 1960–January 1961, May 1961–January 1962, and May 1962–January 1963. During two of these periods rates were stable, while rate movement in the third is taken account of by dummy variables. A separate manuscript is being prepared on this study.

In the study of nonresidential mortgages, Royal Shipp has now developed time series on rates and characteristics for a number of separate property types, loan-value groups, etc. The series cover the period 1951–65 and some of them can be extended by means of the current series compiled by the Life Insurance Association of America beginning in 1965. The analysis of these data is just beginning.

JACK M. GUTTENTAG

THE QUALITY OF DIRECT PLACEMENTS, 1951–61

The yield differential between a new corporate debt issue and a government bond of the same maturity would measure precisely the expected loss rate on the corporate issue, and would therefore be an excellent measure of its ex ante quality—if the yield differential reflected nothing but the difference, between the two bonds, in the risk of default. But, unhappily, yield differentials can be affected by differences between the risky and the riskless bonds in nonquality characteristics such as marketability, convertibility, and call provisions. They can also be affected by differences in transactions cost, by differences in the organization of the markets in which the two types of bonds are traded and, not least, by risk preference on the part of lenders. These nonquality differences will make the yield differential between the two bonds larger or smaller, as the case may be, than it would be if it measured merely the risk that the risky bond would default. This means, of course, that the raw differential between the

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yield on a corporate and the yield on a government of the same maturity is not a precise measure of the expected loss rate on the corporate.

This study does, essentially four things:

1. It attempts to assess the effect on the yield differential between corporates and governments of the differences between them in nonquality characteristics.

2. It suggests two new measures of the quality of new corporate debt issues: (a) the probability that the yield realized on the corporate issue will be equal to the yield promised on that issue and (b) the expected loss rate on the corporate issue.

3. It computes these two measures quarterly for a large sample of the direct placements bought by life insurance companies during the period 1951–61. Direct placements are long-term loans made directly to business by life insurance companies and pension and mutual funds.

4. It adjusts the results for what appears, in fact, to be the most important difference between governments and direct placements—namely, the effect on direct placement yields of risk-aversion on the part of the life insurance companies.

The findings will perhaps be of interest to monetary authorities, students of the business cycle, regulatory agencies and investors—and also to those scholars and practitioners who are interested in developing better measures of the quality of both new and outstanding credit instruments.

Findings are as follows:

1. Of the various nonquality characteristics, only one is likely to affect yield differentials in a significant way for the present purpose, namely, differences in call provisions when yields are generally high and expected to fall.

2. Nevertheless, because the life insurance companies are risk-averse, yield differentials are highly sensitive to fluctuations in the volume of lower-grade financing. In 1955–57, for example, when the volume of lower-grade financing was very heavy, the life insurance companies required yields on direct placements which were substantially higher than necessary to compensate for the risk of default alone. When the effect on yield differentials of the volume of lower-grade financing was removed (by use of regression techniques), yield differentials declined by as much as 80 basis points.

3. The quality of direct placements apparently deteriorated slightly during the period under study: (a) The average probability, as defined previously, for the direct placements bought in 1951–53 was .787 for industrials and .789 for utilities. In 1959–61, these probabilities had declined to .743 for industrials and .746 for utilities. (b) Average expected loss rates on the direct placements bought in 1951–53 were 131 basis points for industrials and 109 basis points for utilities. In 1959–61, these average expected loss rates had risen to 171 basis points for industrials and 126 basis points for utilities.

4. For the period as a whole, average expected loss rates were 125 basis points for industrials and 124 basis points for utilities. Harold Fraine found, using Hickman's data for the period 1900–43, that the actual loss rate realized on Baa-rated corporate bonds was 90 basis points for industrials and 80 basis points for utilities. For corporate bonds rated Ba, the actual loss rate, 1900–43, was 270 basis points for industrials and 250 basis points for utilities.

Thus, the average expected loss rates found here, for the direct placements bought during 1951–61, are somewhat higher than the loss rates actually realized on Baa's during 1900–43 but substantially lower than the loss rates actually realized on Ba's during that period.

AVERY B. COHAN

PERFORMANCE OF BANKING MARKETS

The major impetus for this study is derived from the continuing controversy about the relationship between structure and performance of banking markets. The two sections of the study reported here are supported by a grant

from the American Bankers Association. Both studies have greatly benefited from the Association's aid in gathering necessary data from a substantial number of cooperating banks.

PERFORMANCE OF BANKING MARKETS IN THE PROVISION OF SERVICES TO BUSINESS

As an initial phase of the study, a model of bank pricing of business services was constructed. The model assumes that banks act to maximize long-run profits and that they operate subject to regulatory prescriptions on adequacy of capital and liquidity, a prohibition on the explicit payment of interest on demand deposits, and a ceiling on the interest rate that can be paid for time and savings deposits. Since the constraint on the payment of interest on demand deposits requires banks to barter services in order to compete for deposits, observed market prices of individual services have a downward bias which is mainly a function of the size of the deposit balance but is also affected by the composition of the package of services purchased by the business customer. The model further assumes that banks seek to earn a certain rate of return on the customer's banking business as a whole, rather than a profit on each transaction.

Tests of validity of the model and parameter estimates, therefore, require data on a customer basis. A questionnaire to gather such a body of data was developed and sent to a sample of banks. The sample consisted of all banks with assets between $40-$400 million, which are domiciled in standard metropolitan statistical areas. Larger banks were excluded because a substantial part of their activities involves customers whose banking relationships are not confined to narrow bank market definitions. Smaller banks were excluded because the required detailed customer information could not be supplied from available records.

Responses containing profiles of approximately 9,000 customers were received from 164 banks in 111 standard metropolitan statistical areas. We are now in the process of analyzing these data.

It is now planned that the completed report will consist of three sections. The first section presents the theoretical context for the empirical study. A general macroplanning model for a bank is developed and its implications for pricing of business services analyzed. This is a necessary step to measuring the effects of bank market structure on performance. The section also sheds light on the controversy over the role of the prime rate and compensating balance provisions in bank pricing strategy.

The second section contains estimates of the parameters of the bank pricing model utilizing the customer data collected in our survey. The effect of structure on market performance is probed by determining if concentration variables or a proxy variable depicting branching restriction explain the residual variance in the price regressions.

The third section is devoted to an analysis of the expected effects of computer developments on bank structure and market performance. The increasing use of computers has already changed long-standing methods of operation in the banking industry. This trend will certainly continue as computer hardware and software improve and become cheaper.

DONALD P. JACOBS

BANKING STRUCTURE AND PERFORMANCE IN CONSUMER CREDIT MARKETS

This study is designed to compare the performance of banks in consumer credit markets under different types of banking structures. Information on price and nonprice performance has been obtained from a sample of about 550 banks representing 98 selected metropolitan areas and 292 counties outside these metropolitan centers. The editing and preliminary tabulations of the results of this survey have been completed. These data will be integrated with demographic and economic information from a number of other sources in the search for meaningful and significant relationships.

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Comparisons of performance indexes developed from the survey suggest a number of interesting but tentative conclusions. Statewide-branching states reported the highest finance charges on consumer loans but in general provided the most liberal services in all types of markets. Unit-banking states reported the lowest rates and the least liberal services in metropolitan areas but compared favorably with limited-branching states in the markets outside metropolitan centers. However, the adjustment of the data for legal ceilings on rates and for the influence of other variables may modify these preliminary results or suggest economic or demographic reasons for the differences.

PAUL F. SMITH

THE QUALITY OF CREDIT
IN BOOMS AND DEPRESSIONS

Financial support for the quality of credit research program has come from many sources, including the Association of Reserve City Bankers, the Merrill Foundation for the Advancement of Financial Knowledge, the Board of Governors of the Federal Reserve System, the Federal Reserve Bank of New York, the U.S. Savings and Loan League, the Mortgage Bankers Association, the National Association of Mutual Savings Banks, Bankers Trust Company, the Alfred P. Sloan Foundation, the University of Wisconsin, and the general funds of the National Bureau. Organizations supplying invaluable special data for the studies include several of those already mentioned and also Dun and Bradstreet, Inc., Robert Morris Associates, the Investment Bankers Association, the Farm Credit Administration, and several other federal government agencies.

Four of the studies included in the program are now published:

The Quality of Bank Loans: A Study of Bank Examination Records, by Albert M. Wojnilower (1962); *The Quality of Trade Credit,* by Martin H. Seiden (1964); *Trends in Corporate Bond Quality,* by Thomas Atkinson (1967); *The Quality of Consumer Instalment Credit,* by Geoffrey H. Moore and Philip A. Klein (1967).

"Some Measures of the Quality of Agricultural Credit," by George K. Brinegar and Lyle P. Fettig is in press, and "Home Mortgage Delinquency and Foreclosure," by John P. Herzog and James S. Earley will soon be submitted for Board review.

Edgar Fiedler, with the assistance of Maude Pech, is revising the report "Measures of Credit Quality," which is a compendium of time series statistics on credit quality. (See his report which follows.) George Hempel is in the process of completing his study of postwar state and municipal bond quality. Avery Cohan has completed a paper on "The Quality of Direct Placements," as a by-product of the study of interest rates. (See his report under that study.) I am in the late stages of final revision of "The Quality of Credit in the United States: A Summary Volume," which attempts to summarize the credit quality studies as a whole.

JAMES S. EARLEY

MEASURES
OF CREDIT QUALITY

The purpose of this study is to bring together into a single volume a comprehensive set of statistical time series pertaining to the quality of credit, including series on loan and borrower characteristics known to be related to credit risk and series on repayment difficulties. At present, these data are widely scattered and not well known; such a volume should therefore help serve the informational needs of economic researchers and analysts of current business and financial conditions. The book will also contain a discussion of some of the conceptual aspects of credit quality: its meaning and importance, its impact on economic behavior, the availability of important credit quality measures and gaps that remain, the validity of the series and problems of their interpretation.

We have located some 700 time series, a great many more than originally anticipated. Quite a number of these, however, are of lim-

ited value in one or another respect: some are duplicative in their coverage, some are not available on a current and continuing basis, and others are restricted to a very narrow sector of the credit market or are otherwise of marginal interest. The compendium, therefore, will include historical data for about 200 of the most useful of these series. From these, a short list of perhaps 50 series will be selected as the most meaningful for continuing review by observers of current economic and financial developments. All 700 of the series, with sources, will be listed in the compendium, however.

A draft manuscript, entitled "Measures of Credit Quality," has been completed and reviewed by a staff reading committee. The task of composing source notes for all of the series is now in progress. The next step is to revise the manuscript based on the comments and suggestions of the reading committee and others who reviewed the first draft. In the compilation of data and source materials I have had the major assistance of Maude Pech.

The Board of Governors of the Federal Reserve System and Bankers Trust Company have contributed substantially to the support of this study.

EDGAR R. FIEDLER

CONSUMER CREDIT

The consumer credit study, now in its final stages, has centered its attention on 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 two studies still in progress are my investigation of the rate structure in automobile financing and Richard Selden's analysis of the flows of funds to finance companies. Completion of both studies is expected this year.

We have received a number of requests for a quarterly series of new-automobile finance rates to be used in various econometric models of the U.S. economy. Table III-10 breaks down the annual estimates of new-auto finance rates between 1954 and 1965 into quarterly and semiannual intervals, which, with minor differences, are consistent with the series originally published in my report, *New-Automobile Finance Rates, 1924–62,* and revised in the *Forty-Fifth Annual Report* of the National Bureau (June 1965).

ROBERT P. SHAY

OTHER STUDIES

Roger F. Murray's *Economic Aspects of Pensions: A Summary Report,* and *Pension Funds of Multiemployer Industrial Groups, Unions, and Nonprofit Organizations,* by H. Robert Bartell, Jr., and Elizabeth T. Simpson, were published in *Old Age Income Assurance,* December 1967, by the Joint Economic Committee Subcommittee on Fiscal Policy. Both reports will shortly be issued separately by the National Bureau.

Determinants of Investment Behavior, Robert Ferber, editor, *Balance-of-Payments Adjustment Policies: Japan, Germany, and the Netherlands,* by Michael Michaely, and *Employee Compensation Under the Income Tax,* by C. Harry Kahn, were published. *The Personal Exemptions in the Federal Income Tax,* by Lawrence H. Seltzer, is in press. Reports on studies of tax policies for economic growth and on a study of executive stock ownership are in Section 1, and Section 4 includes a report on the study of secular trends and cyclical fluctuations in the money supply.

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TABLE III-10
NEW-AUTO CUSTOMER FINANCE RATES, 1954–65,
FOUR LARGE SALES FINANCE COMPANIES

Year	Quarter or Month	Average Customer Finance Rate (%)	Year	Quarter or Month	Average Customer Finance Rate (%)
1954	1st	11.34	1960	Feb.	12.47
	2nd	11.36		May	12.42
	3rd	11.26		Aug.	12.48
	4th	11.23		Nov.	12.54
	Yr. 1954	(11.35)[a]		Yr. 1960	12.47
1955	1st	11.22	1961	Feb.	12.55
	2nd	11.40		May	12.42
	3rd	11.40		Aug.	12.48
	4th	11.54		Nov.	12.45
	Yr. 1955	(11.41)[a]		Yr. 1961	12.45
1956	May	11.87	1962	Feb.	12.43
	Sept.	11.94		May	12.23
	Yr. 1956	11.90		Aug.	12.06
1957	May	12.31		Nov.	12.05
	Sept.	12.38		Yr. 1962	12.16
	Yr. 1957	12.35	1963	Feb.	11.97
1958	Feb.	12.52		May	11.86
	May	12.35		Aug.	11.65
	Sept.	12.23		Nov.	11.56
	Nov.	12.48		Yr. 1963	11.76
	Yr. 1958	12.39	1964	Feb.	11.39
1959	Feb.	12.51		May	11.28
	May	12.38		Aug.	11.32
	Sept.	12.37		Nov.	11.38
	Nov.	12.50		Yr. 1964	11.34
	Yr. 1959	12.43	1965	Feb.	11.26
				May	11.23
				Aug.	11.21
				Nov.	11.18
				Yr. 1965	11.21

SOURCE: Robert P. Shay, *New-Automobile Finance Rates, 1924–62*, New York, NBER Occasional Paper 86, p. 21, and *Forty-Fifth Annual Report*, pp. 80, 81.

[a] Annual estimate includes contracts with finance rates 30 per cent or higher which were excluded from the quarterly series.

6. INTERNATIONAL ECONOMIC RELATIONS

INTERNATIONAL PRICE COMPARISON STUDY

The task of computing indexes for the comparison of United States and foreign countries' international price levels and price movements is now virtually completed. The next few months will be spent in the preparation of a final report which will discuss the problems of price measurement in international trade and the application of the methods developed in the study. For a summary of the principal results, see the essay in Part I, above. In addition to the publications cited there, twenty-five mimeographed papers relating to specific commodity groups have been circulated to firms in the industries concerned for comment and criticism. Most of these papers will be incorporated in the final report.

Marianne Lloris, Zenaida Mata, Christine Mortensen, and Doris Preston have assisted the authors in the collection and analysis of data during the year and Beatrice Grabiner has been the secretary for the project.

IRVING B. KRAVIS AND ROBERT E. LIPSEY

RELATION OF U.S. MANUFACTURING ABROAD TO U.S. EXPORTS

This study, which is financed by grants from the National Science Foundation and the Ford Foundation, is an investigation of the effect of U.S. direct investment in manufacturing in foreign countries on the export trade of the United States. A reduction in the outflow of direct investment funds has been the object of several recent restrictive measures aimed at improving the balance of payments, but there has been a great deal of controversy regarding the indirect effect of these restrictions, particularly on U.S. exports. Views on this subject range from the belief that manufacturing plants located abroad tend to replace U.S. exports to the belief that they are a necessary concomitant

to exports in many fields and bring about a higher level of U.S. exports than would be possible without them.

The effect of direct investments on trade is important not only for the lending country but also for the borrowing country. However, the result considered favorable by one may be considered unfavorable by the other. The countries receiving U.S. direct investment may desire import substitution and additions to their exports, both of which could imply replacement of U.S. exports. Often, permission for the investment is predicated on some reduction of imports or increase in exports.

Congressional hearings and earlier studies relating to the balance-of-payments impact of U.S. direct investment reveal that there is very little factual basis so far for estimating the trade effects.[1]

Given the limitations of the data and the difficulty of defining some of the problems, it is unlikely that firm answers will emerge to all of the questions in which we are interested. Among those we wish to investigate are:

1. Does manufacturing by foreign affiliates replace U.S. parent-company exports to the country in which the affiliate is located?

2. Does such production replace U.S. exports to that country by U.S. firms other than the parent?

3. Does it replace domestically owned production or exports by foreign countries other than the U.S.?

4. Does some or all of the affiliate's production involve not a replacement of other suppliers' sales but an addition to consumption that would not otherwise have been supplied by imports or domestic production?

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[1] See for example, U.S. Senate, Committee on Finance, *Revenue Act of 1962*, Hearings, pp. I-II, and 184–189; National Industrial Conference Board, *U.S. Production Abroad and the Balance of Payments*, by Judd Polk, Irene W. Meister, and Lawrence A. Veit, 1966, p. 10; and G. C. Hufbauer and F. M. Adler, *"Overseas Manufacturing Investment and the Balance of Payments,"* U.S. Treasury Department, Washington, D. C., 1968.

5. To what extent do investments in affiliates or increases in production by affiliates raise U.S. exports of capital goods, components, raw materials, spare parts, or related products which would not otherwise be exported?

6. What factors account for differences among countries or industries in the answers to the previous questions?

7. What is the influence of tariffs, quotas or domestic-content requirements, and other trade control measures on the establishment of U.S. manufacturing affiliates abroad and on U.S. trade with them after they are established?

8. Can we explain the establishment of affiliates and their trade orientation in terms of the characteristics of the industry in the United States and abroad, the characteristics of the parent firms, or the characteristics of host countries?

The first stage of the study has involved NBER cooperation with the Office of Business Economics of the Department of Commerce in their effort to improve the basic data on purchases of U.S. products by foreign affiliates of U.S. companies. These data will then be linked with other reports on sales and investment expenditures by the overseas affiliates.

The analytical study will use the OBE data in conjunction with information from a variety of other sources. These will include detailed U.S. and foreign export and import data collected by the U.S. Department of Commerce and the United Nations, which will be used to test propositions relating U.S. and other countries' exports of particular commodities or commodity groups to the activities of U.S.-owned affiliates. Other tests of causal relationships will probably involve building up estimates of domestic production of some products in a number of foreign countries to which the United States exports.

In addition to published trade data, we plan to make use of information from the National Bureau's study of international prices and price trends, which, for some products, may provide clues to the reasons why U.S. firms locate plants in foreign countries for the supply of U.S. or third-country markets.

A further source of information, we believe, should be reports from host countries. There have been studies in Canada and Australia of the trade activities of foreign-owned companies, mainly American, and other countries have probably assembled such data in connection with import-substitution programs or decisions to accept or reject investment proposals. However, we have not yet investigated these sources extensively.

Christine Mortensen and Doris Preston have been or will soon be working on this study at the National Bureau, and Stephen Sind and Susan Tebbetts have been working with Marie Bradshaw of the Office of Business Economics at the Department of Commerce in Washington.

ROBERT E. LIPSEY AND MERLE YAHR

IMPORTS OF MANUFACTURES FROM LESS DEVELOPED COUNTRIES

The area covered by this project, which has been financed under a grant from the Ford Foundation, is indicated by the chapter headings of the report published in January 1968:

1. The Problem and a Summary of Findings
2. Factor Intensities in the United States
3. International Comparisons of Factor Intensities
4. Trade in Labor-Intensive Manufactures
5. Commercial Policies of Developed Countries.

The selection of "labor-intensive" manufactures is made on the basis of value added by manufacture per employee, computed for different industries in considerable detail from censuses of manufactures for the United States and other countries. This measure is taken as a proxy for inputs of human capital (as reflected in the average of wages and salaries per employee) and physical capital (as reflected in the remainder of value added per employee). On this basis, the higher the value added by manufacture per employee, the more capital-intensive the industry; the lower the value

added per employee, the more labor-intensive the industry. This distinction is made on the assumption that the less developed countries are likely to find their comparative advantage in industries of the second type, given the general shortage of capital and skills in these countries.

Import data for 1966 compiled after completion of the study indicate a continued rapid increase in imports of labor-intensive manufactures by developed nations from less developed countries. The accompanying table shows a cumulative average annual rate of increase of 13.1 per cent in these imports from 1953 to 1966. Excluding Hong Kong, the largest single supplier, the rate of increase was lower but still impressive at 10.5 per cent. Taking only the change from 1965 to 1966, the rise was 16.8 per cent including imports from Hong Kong and 16 per cent excluding imports from Hong Kong. The increased rate of growth on the latter basis reflects the rapid rise in imports of labor-intensive manufactures from certain other countries, notably South Korea, Taiwan, Pakistan, Brazil and Mexico. It seems likely, however, that the increase in imports since 1966 will prove to be much slower, either including or excluding Hong Kong, given the economic recession in West Germany and less buoyant business conditions in most other developed countries.

Among the importing countries identified in the trade, the United States is by far the largest in the absolute amount of its imports and shows a rate of increase from 1953 to 1966 somewhat above the average for the group. Even faster

TABLE III-11

IMPORTS OF LABOR-INTENSIVE MANUFACTURES BY DEVELOPED COUNTRIES
FROM LESS DEVELOPED COUNTRIES IN 1966 AND RATE OF INCREASE SINCE 1953

Importing Country	Value of Imports in 1966 ($ million, f.o.b.)		Percentage Increase Per Year Since 1953 (compound)	
	Including Imports from Hong Kong	Excluding Imports from Hong Kong	Including Imports from Hong Kong	Excluding Imports from Hong Kong
Developed countries total	2,832.1	2,023.4	13.1 [a]	10.5 [a]
United States	1,236.6	865.3	14.7	11.9
Canada	98.9	67.4	11.3	8.9
United Kingdom	473.0	283.3	7.7	4.0
Other EFTA	152.0	106.9	19.9 [b]	17.2 [b]
West Germany	352.2	264.4	22.9	20.3
France	138.7	132.2	7.7	7.3
Other EEC	183.1	152.3	16.2	15.0
Japan	80.9	72.1	26.3 [c]	25.6 [c]
Australia	89.0	63.3	5.4 [d]	2.8 [d]
New Zealand	27.7	16.1	n.a.	n.a.

NOTE: For detailed list of items included, see Hal B. Lary, *Imports of Manufactures from Less Developed Countries*, New York, NBER, 1968, Table C-1, pp. 191–213. Imports of countries reporting on a c.i.f. basis have been adjusted to an approximate f.o.b. basis by a uniform reduction of 10 per cent.

[a] Excluding Australia, Japan, New Zealand, and Switzerland.
[b] Excluding Switzerland.
[c] Since 1955.
[d] Since 1957.

rates of increase, though from relatively low levels in some cases, are shown by Japan, West Germany, other EEC countries except France, and EFTA countries other than the United Kingdom. The last is still the second largest importer of labor-intensive manufactures from less developed countries, but its imports have fallen back from the peak reached in 1964.

Further work on this subject, or closely related topics, is planned or under consideration, including analyses of the export performance of individual less developed countries in relation to the "outward" or "inward" orientation of their policies; problems created by "low-wage" imports in the United States and other developed countries; further international comparisons of the structure of manufacturing as reflected in value added per employee in different industries, and application of the value added criterion to the Leontief Paradox.

Hal B. Lary

BALANCE-OF-PAYMENTS ADJUSTMENT POLICIES

This study investigates the postwar balance-of-payments experience of nine countries: Belgium, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom, and the United States. These are all industrially developed countries and together account for roughly three-fifths of world trade. The study aims to find, for each country, the manner in which policy measures were taken in response to balance-of-payments disturbances and whether or not the major financial policy instruments used were employed in the service of balance-of-payments adjustment. Once the policy patterns in each country are delineated, a comparison and synthesis of the individual patterns should help to reveal the main attributes of the international monetary system.

The study is nearing its final stage. The separate country analyses have been completed, while the international synthesis is now being prepared and is scheduled for completion in the summer of 1968. An interim report on the

study, *Balance-of-Payments Adjustment Policies: Japan, Germany, and the Netherlands,"* was published as Occasional Paper 106. It discusses the general approach and method of the study as well as the policy patterns of the three countries.

The study has benefited from discussions with its advisory committee, which consists of Peter B. Kenen (Chairman), Arthur I. Bloomfield, J. Marcus Fleming, George Garvy, Gottfried Haberler, Charles P. Kindleberger, Irving B. Kravis, Fritz Machlup, and Robert Triffin. Financial support for the study, as part of the National Bureau's program of research in international economics, has been granted by the Ford Foundation.

Michael Michaely

UNITED STATES PERFORMANCE IN INTERNATIONAL COMPETITION

The work on this project, financed by a grant from the National Science Foundation and by Bureau funds, has continued along several lines. The single most important recent task has been to add data for four more years to the statistical materials already assembled, thus bringing the study up to 1967.

Interindustrial country[1] trade has been further analyzed, especially with a view to assessing the ultimate impact of several developments that have taken place in the international economy. Market shares and trade-concentration ratios have been computed for economic regions (EEC and EFTA), as well as for individual countries, and the effect of prices and incomes has been also examined in each case.

An updated occasional paper is soon to be submitted for internal review.

H. G. Georgiadis

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[1] Countries included in the study, in addition to the United States, are Austria, Belgium-Luxembourg, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, Norway, Sweden, and the United Kingdom.

OTHER STUDIES

Ilse Mintz' book, *Cyclical Fluctuations in the Exports of the United States Since 1869,* was published. J. Herbert Furth has prepared a revised draft of his study on foreign holdings of dollar balances.

Various research and related activities concerning topics of an international nature are noted in other sections of this report: (1) Ilse Mintz reports in Section 4 on her study aimed at identifying turning points in foreign business cycles. (2) The section on Conferences on Research outlines plans for a Conference on Technology and Competition in International Trade to be held in October 1968. (3) The section on New Studies describes an exploration, conducted in cooperation with several European research institutes, into the possibility of a joint project on comparative rates of diffusion of technology.

A staff committee, under the chairmanship of Hal Lary, has been developing plans for research in the international area for some years ahead. Studies being considered include not only topics in international trade and finance narrowly defined, but also subjects of international concern where the comparative experience of several countries seems likely to be illuminating.