PART IV

Staff Reports on Research Under Way

1. ECONOMIC GROWTH

The National Bureau's studies of economic growth run along three main lines: (1) reviews of existing data and new factual investigations, designed to provide a frame or basis for economic analysis and to help improve current guides to economic policies; (2) historical and comparative studies of the rate and character of economic growth and analytical studies of the sources and consequences of economic growth; (3) analysis of policies for promoting growth in order to deepen understanding of the feasibility of these policies, their effectiveness, and their costs in terms of other national objectives.

Pursuing one or more of these lines of investigation are the groups of studies under way on productivity, employment, and price levels: by Friedman and Schwartz on the relationship among trends in the supply of money, the general price level, and national income in the United States since the Civil War; by Stigler and Kindahl on industrial price data, in which they are testing the practicability of developing more accurate information on this important group of prices; by Fabricant on changes in the structure of prices and their relation to changes in the general price level and the rate of economic growth in the United States and a few other countries, and the implications for price stabilization policy; by Cagan on the apparent change in the cyclical behavior of prices since World War II, by making use of detailed data of prices and output; and by Kendrick on ways to improve the usefulness of estimates of national product for the study of economic growth by expanding the coverage of national product measurements to include activities not now covered and redefining investment to cover education and other current outlays designed to increase productive capacity.

Also within this area is one in a series of

National Bureau studies of long swings in economic growth, the study by Easterlin of trends in population and labor force; the program of studies of the hitherto largely neglected service industries by Fuchs and his coworkers which deal with changes in the output, employment, productivity, and earnings of the service industries and the factors determining these changes; and the program of studies of tax policies for economic growth by Ture and his colleagues. These studies are described below, in this section, with the exception of Kendrick's study, which is reported in section 2.

Section 2 also reports progress made in some other National Bureau studies related to economic growth, including, among others, the studies of investment in education directed by Becker, Juster's study of household capital formation and saving, and Fuchs's study of the economics of health. Other studies bearing on the question of growth are Mincer's on the labor force (section 3) and Lary's factor intensities and exports of less-developed countries (section 5). Mention should be made also of several conferences. *Output, Employment, and Productivity in the United States After 1800, Foreign Tax Policies and Economic Growth, The Theory and Empirical Analysis of Production,* and *National Economic Planning* were published. A conference on The Industrial Composition of Income and Product was held in March 1967, and one on Production and Productivity in the Service Industries is planned for October 1967.

PRODUCTIVITY, EMPLOYMENT, AND PRICE LEVELS

The achievement of a high rate of economic growth, a low rate of unemployment, and a reasonably stable price level is generally taken to be one of the major economic goals of a free society. What can be learned from recent experience and historical studies of the United States and other countries about the nature of this problem and the possibilities for its solution? What improvements in statistical information are needed if economic policy is to be directed intelligently toward this goal?

Several studies directed to these questions are presently under way in a research program supported by a grant from the Alfred P. Sloan Foundation. Stigler and Kindahl are engaged in an effort to improve our knowledge of the actual behavior of industrial prices by obtaining information from buyers and sellers on the prices they actually paid and received in recent years. Kendrick is developing new measures of gross national product that may, by taking better account of the investment activities of consumers and government and of the production that takes place outside the customary limits of the market, improve comparisons of rates of economic growth over time and among countries. He is also bringing up to date the widely used estimates of output, capital and labor input, and productivity by industry group in his *Productivity Trends in the United States* (1961), and expects to prepare a paper presenting these data this year.

Fabricant's study of the changing structure of prices is designed to illuminate and interpret the historical record of prices in the United States and some other countries. His study of price, wage output, and productivity trends in individual industries is directed toward some of the problems epitomized in the wage and price "guideposts." Cagan is beginning a study concerned with whether prices have become more stable relative to output, especially in the downward direction, since this is commonly alleged to be one of the factors biasing the economy toward inflation. Friedman and Schwartz have, in the course of their study of the monetary factor in business cycles, developed some analytical and empirical observations on the relations between secular changes in output and prices, as influenced by the stock of money, the level of unemployment, and other variables.

Reports on these studies are given below (except for Kendrick's, which is discussed in section 2).

Price Trends and Economic Growth

Work during the year was largely concentrated on studying changes in the structure of prices, particularly their relation to changes in the general price level.

By changes in the structure of prices we mean changes in the proportions that different prices, or different groups of prices, bear to one another at any given time—or, to fix on a common denominator, changes in the ratio of any price or group of prices to some average or general price level. There is, of course, a very large number of different prices: we deal only with a limited number of the grosser groupings.

Changes in the *structure* of prices are of interest in a project aimed at understanding the nature and effects of changes in the *general* price level, for several reasons:

1. To judge the adequacy of commonly used measurements of the general price level, it is necessary to know something about the differences in behavior among the various sections of the population of price changes of which the general price index is supposed to be a meaningful average.

2. There are grounds for supposing that the response of different parts of the price system to changes in money supply or other general factors is uneven. Various sections of the price system then get out of balance with one another—allowing, of course, for alteration in the "normal" relations among prices. Even after factors causing change in the general price level have apparently ceased to operate, adjustments of imbalances in the price structure continue for awhile. These adjustments may take on the guise of independent forces when they are, at least in part, only links in a chain of phenomena that began in an earlier period. To understand the relation between changes in a nation's general price level and the state and rate of advance of the nation's prosperity, then, we need to study the changes in the structure of prices that accompany or follow changes in general price levels.

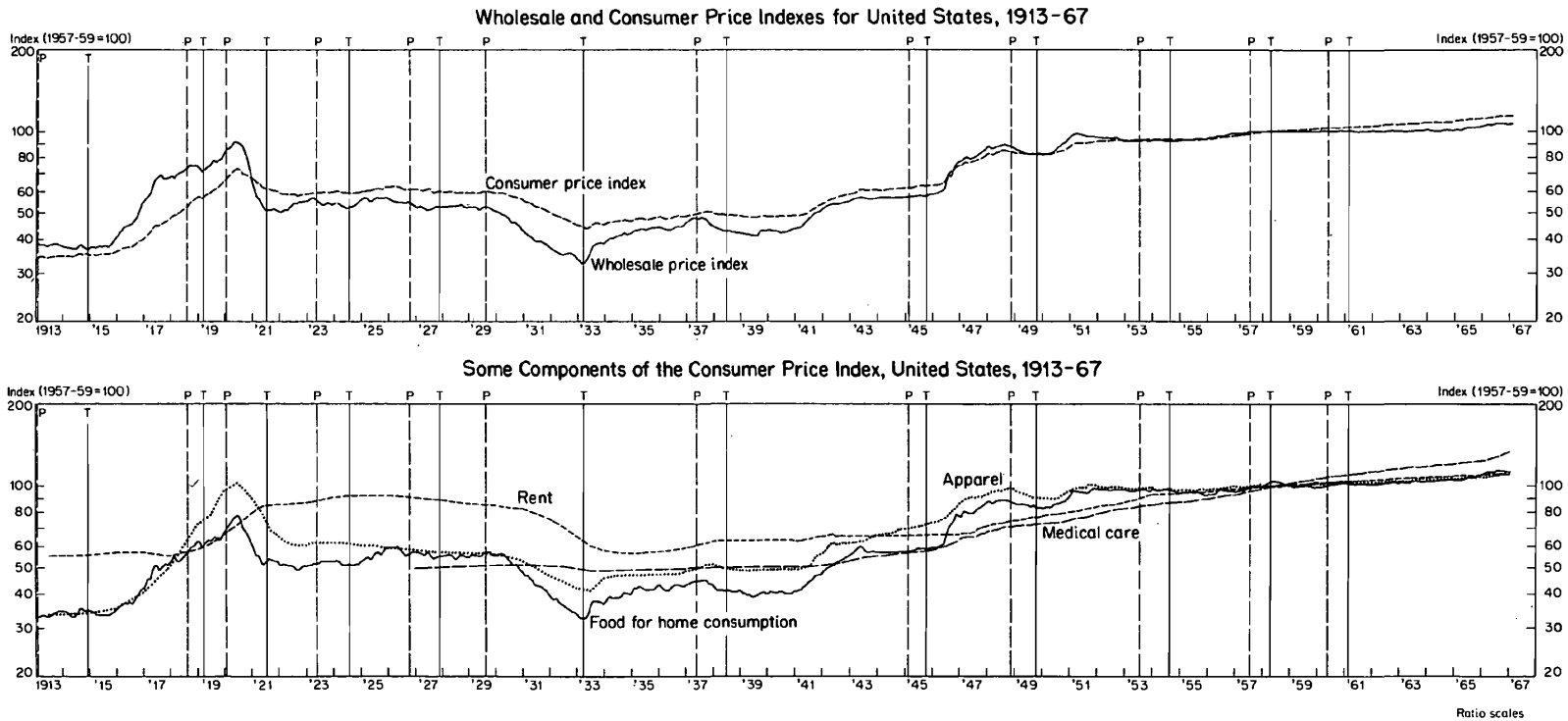
3. Changes in the general price level bear unevenly on different groups of the population, partly because of differences in debtor-creditor relationships, but also because of the lags in the response of sections of the price system to general factors. The inequities developed raise problems of policy. To know how serious these problems are, it is necessary to know something about the character and magnitude of changes in the price structure.

4. Efforts to stop or slow down inflation encounter serious difficulties because the adjustments set in motion by these efforts bear especially heavily on particular groups. When, as is often the case, the efforts to cope with inflation involve something of a "freeze" of the existing structure of prices—which may still be in disequilibrium because of the prior inflation—the resulting inequities add to the difficulties. This problem of policy also makes desirable a study of the structure of prices.

Were differences in the behavior of various groups of prices small, they would deserve only fleeting attention. But this does not appear to be the case. Even the simple comparison in the first panel of Chart IV-1 reveals substantial differences in the cyclical timing and amplitude of wholesale prices and consumer prices, two of the many groups of prices that make up the price system of the United States.

When developments between successive business cycles are examined, one gets the further impression that the response of some parts of the price system to the forces making for general change in prices is so slow that adjustments are not completed even during periods as long as those marked off by business cycle peaks or troughs. The data suggest, for example, that the strong inflationary and then deflationary forces generated during and immediately after World War I were still working out their effects in the sphere of consumer prices well into the 1920's. This seems to have been the case also of the inflationary forces generated during the period bounded by World War II and the Korean War.

CHART IV-1



SOURCE: U. S. Bureau of Labor Statistics and National Bureau of Economic Research.

NOTE: Business cycle peaks and troughs are represented by broken and solid vertical lines respectively.

This impression is strengthened by the information in the second panel of Chart IV-1, which helps to identify some of the parts of the retail price area in which long lags appear to be characteristic.

The impression needs to be confirmed and the facts refined. The rise during the past decade in consumer prices relative to wholesale prices may reflect, for example, not only a belated response of consumer prices to earlier inflationary pressures but also a slower rate of increase in productivity or a faster rate of increase in demand in the so-called service industries than in other industries.

It is not easy to disentangle the lagged responses from other sources of differential price trends. The task is complicated by imperfections, and differences in the degree of imperfection, in the quality of the data available for different groups of goods and services. These may inject "statistical" or spurious differences (or sometimes similarities) in price behavior which are hard to distinguish from the "true" differences. Thus, as already implied, the prices of services have generally risen more rapidly than the prices of commodities. But this difference is spurious in part because the prices of services are measured (inadequately) by the prices of the labor used to produce the services rather than by the prices of the services rendered. As a result, change in amount of service rendered per worker and change in quality of service rendered are not reflected by the price index. A blatant example is in one of the components of the implicit price index (IPI) used to express GNP in constant prices, namely, the component that is supposed to measure the prices of the services rendered by government workers. This, we know, measures not the prices of government services but the salary rates paid government workers, which have generally moved up in relation to other prices. It is not surprising, therefore, that in virtually every country the IPI excluding government shows a smaller rise than the IPI including government over the period since 1953.

Examination of the more detailed information not given in the accompanying charts poses other questions about the accuracy of the price indexes. Omissions of certain categories of prices throughout (or in the earlier decades of) the period covered, for example, must have some effect on the trend and fluctuations reported by the wholesale and consumer price indexes. While the CPI of the United States is "available" on a monthly basis since January 1913, for example, monthly price data were collected only for foods during 1913–18, and the nonfood prices component is essentially an index only for December, with interpolations along a straight line providing estimates for the other months. And there are other questions about the underlying price data. For example, the virtual stability of the medical-care price series during the 1930's (shown in the second panel of Chart IV-1) makes it difficult to accept the series as a true picture of what happened to medical-care prices (apart from the problem of what the prices mean), even though we may expect long lags.

As already mentioned, changes in the structure of prices in other countries bear a resemblance to those in the United States. Over the ten- or twelve-year period beginning with 1953, for example, the CPI rose more rapidly than the WPI in twenty-three of the thirty countries for which the data are available; and the IPI rose more rapidly than the CPI in twenty-three of thirty-seven countries.

It is worth noting that the deficiencies in the prices of services mentioned could bias comparisons among countries in rates of economic growth as well as price increase. Thus, the information for 1953–63 for twenty-four countries indicates a significant positive correlation (0.7) between (a) the rate of increase in real gross domestic product per capita and (b) the difference between the rates of increase in the CPI and the WPI, referred to above. Accepting the indexes at their face value, this could mean that the more rapidly growing countries were increasing their expenditures on services (the rela-

tive price of which has been rising) at a faster rate than the more slowly growing countries. If, however, the "true" relative price of services has not been rising as rapidly as the indexes show, then the differences among countries in rates of economic growth are bigger than the available figures suggest; and the price indexes of the more rapidly growing countries are overstated more than the price indexes of the countries growing more slowly.

It should be mentioned, further, that countries differ in their methods of estimating current and deflated national product and therefore also in their national product implicit deflators. As a result—even apart from differences in quality of data—measures of price change in different countries may be less comparable than is usually assumed. Illustrations of this (which we owe to Edward F. Denison) are the introduction of a productivity factor in the estimate of government output in one European country's national accounts and in the estimate of construction in the national accounts of another—factors absent in the accounts of the United States and probably other countries. This makes the "corrected" real national products grow somewhat more rapidly, and the corresponding IPI's less rapidly, than they otherwise would. One of our tasks for the coming year is to determine the importance of these and other differences among the implicit price indexes of various countries.

We are planning to put some of the material being gathered into two Occasional Papers. One will provide a concise history of "the general price level" in the United States since the Civil War. It will attempt to describe general price-level changes, to discuss critically the character of the price indexes utilized, and to explain the differences among them and explore the significance of these differences. The focus will be on the price data and the story they tell. However, useful information will be provided incidentally also on the character of the data on economic growth, for estimates of the latter—as summarized in indexes of real national product—are intimately related to the estimates of the price indexes.

The other paper will bring together similar information on price changes and related information on economic growth in a number of different countries during the postwar period.

A preliminary exploration was begun of the possibility of developing a statistical report on "money, wages, and prices" for use in tracing current and prospective trends in the general price level. It would focus on evidence of broad demand and supply pressures in markets for commodities and services, for physical and financial assets, and for labor. Such a report could be a helpful supplement, occasional or periodic, to the monthly report of the Bureau of the Census, *Business Cycle Developments,* and other publications.

Another portion of our project is described below.

SOLOMON FABRICANT

TRENDS IN MONEY, INCOME, AND PRICES

Our investigation of the influence of money in the economic system covers both long- and short-term aspects. Here we report some findings concerned with long-term relationships. (For our report on short-term relationships, see section 3.)

Current monetary theories do not provide a satisfactory explanation of the division of a change in nominal income between price changes and real output changes. Some arbitrary assumption about the division is appended to theories that deal either with the real magnitudes or the nominal magnitudes. Our statistical studies this past year throw some light on this important question.

We have computed trends in nominal national income, real national income, and the implicit price index from "phase averages," 1882 to 1961—i.e., from series consisting of averages for business cycle expansion and contraction phases. The trend in

prices accounted for a bit more than a third of the trend in nominal income, though the trend in real output accounted for a bit less than two-thirds. However, the proportions varied greatly. For example, up to the mid-1890's, prices were falling and nominal income rising, and therefore prices accounted for a negative fraction of the trend in nominal income. For the entire pre-World War I period, the trend in prices accounted for only one-eighth of the growth in nominal income; for the period from World War I on, it accounted for about the same fraction—i.e., one-third—as for the whole period from 1882 to 1961.

The variation is, of course, far greater from phase to phase, as is clear from Chart IV-2, which is a scatter diagram of rates of change in prices and real income, computed from groups of three successive phase averages. If the two rates of change varied in strict proportion, the points would lie along a straight line through the origin. If, as is sometimes assumed in rigid versions of the quantity theory, the changes in real output were strictly independent of changes in prices, the points would display no correlation. If, as is sometimes assumed in rigid versions of the income-expenditure theory, changes in prices were small until the "point of full employment" and thereafter absorbed the whole of any change in nominal income, the points would lie along a reverse-L, clustering around a horizontal line through zero until the maximum feasible rate of change in output, and then clustering around a vertical line at that point. The actual points resemble most the second set of specifications—no correlation. Yet they correspond closely to none of these specifications. They show a definite positive correlation (.50), contrary to the second specification, yet nothing like so high a correlation as is implied by the first, and no reverse-L pattern at all. A more satisfactory hypothesis than any of these strictly mechanical ones is clearly desirable.

One explanation suggested by much current discussion of price behavior is to allow for the influence of the level of utilization of capacity. Perhaps the reason the reverse-L pattern is not manifest is that the "maximum feasible rate of change in output" is not a constant but itself depends on how fully the economy is exploiting productive capacity.[1]

A serious handicap in investigating that explanation is the absence of reliable statistical information on rate of capacity utilization. After much experimentation, we settled on two different approximate measures: (1) The ratio of real income per capita to an exponential trend fitted to the period, 1882–1961, i.e., the deviations of the logarithms of phase values of real income per capita from their exponential trend values. The trend value is intended to allow for slow changes in productive capacity, the deviations from trend to allow for shorter period changes in rate of utilization. We interpret a large positive deviation as meaning a high rate of utilization of capacity, and conversely. We refer to this measure as the output ratio. (2) The average fraction of the labor force employed during each phase, as computed from annual estimates beginning in 1890.[2] We interpret a high fraction as meaning a high rate of utilization of capacity, and conversely.

Neither measure is satisfactory, the first because a single exponential trend is an unduly crude representation of the long-run change in productive potential, the second because it refers to only one category of

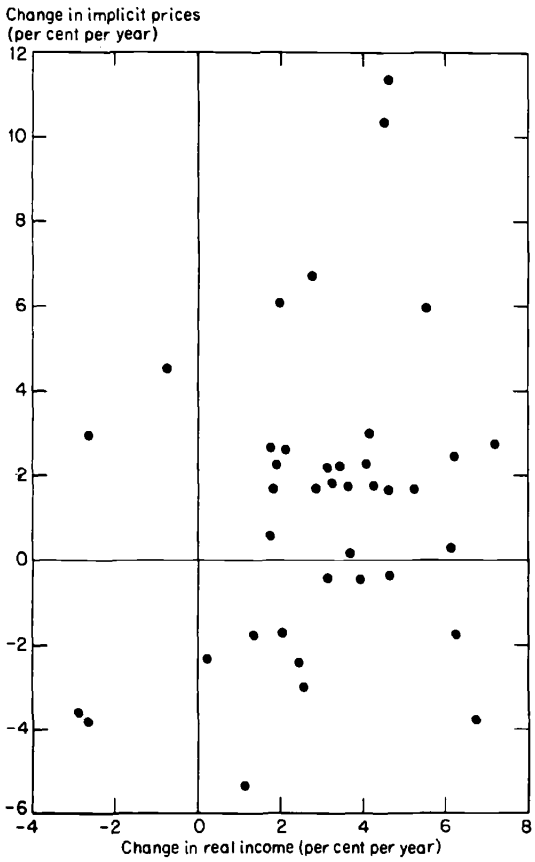
[1] For example, see the assertion of the Council of Economic Advisers in its 1966 "Annual Report" (*Economic Report of the President,* Washington, 1966, pp. 63-64): "As a first approximation, the classical law of supply and demand leads one to expect that the change in the price level will depend mainly on the size of the gap between capacity and actual output."

That this is hardly an obvious implication of "the classical law of supply and demand," or even one that has ancient antecedents, is suggested by the following strictly contradictory quotation (Knut Wicksell, *Interest and Prices,* London, 1936, trans. R. F. Kahn from the original German, *Geldzins und Güterpreise,* 1898): "Money prices, as opposed to relative prices, can never be governed by the conditions of the commodity market itself (or of the production of goods). . . ."

[2] Stanley Lebergott, *Manpower in Economic Growth,* New York, 1964, pp. 43, 512.

CHART IV-2

Rates of Change in Real Income and Implicit Prices: Scatter Diagram of Rates of Change Computed from Triplets of Phase Averages, 1882–1961



productive resources and, in addition, is not very reliable statistically before World War II. However, a few tests suggest that both measures are probably reliable at least in their major movements. (1) For the period common to both, they are highly correlated (the correlation coefficient is .92). (2) Both are fairly highly correlated with phase averages computed for the period since 1946 from the Wharton School series on utilization of industrial capacity.[3] (The correlation coefficient is .64 with the output ratio, .88 with the employment ratio.)

[3] See Joint Economic Committee, Subcommittee on Economic Statistics, *Measures of Productive Capacity*, Hearings, 87th Congress, 2nd Session, 1962, p. 59. Annual averages were computed from the quarterly series in the source.

Table IV-1 presents simple correlation coefficients for the rate of change in prices paired first with the output ratio, next with the employment ratio, and also for the rate of change in output, similarly paired. In addition, partial correlation coefficients are shown in the table for each pair of variables, first when the rate of change in the money stock is held constant, and second when it as well as the rate of change in prices for the preceding overlapping triplet of phases are held constant. Results are shown for three or four different periods: for the full period covered by the data (beginning 1882 for correlations with the output ratio, beginning 1890 for correlations with the employment ratio, and, for comparability, also with the output ratio); for a subperiod ending in 1944, because of our dissatisfaction with the recorded price index while price control was in effect and after its repeal; and for a still briefer subperiod from 1910 to 1944, which displays the widest variability in the rate of price change. We comment first on the correlations with rate of price change, second on the correlations with rate of output change.

1. *Price Change.* The simple correlations in Table IV-1 show a positive but rather weak relation between price change and rate of utilization of capacity. The highest simple correlation, .52, implies that at most 27 per cent of the variability in the rate price change can be statistically accounted for by rate of capacity utilization.

More important, these simple correlations greatly overstate the evidence in favor of this interpretation. For the output ratio, the positive correlation is entirely accounted for by a third common factor, the rate of change in the stock of money, so that the partial correlation between price change and the output ratio, holding rate of monetary change constant, is virtually zero. For employment, the common correlation with monetary change is less important, but the highest of the three simple correlations is only .42, meaning that the employment ratio can account for only 18 per cent of the variability of price change.

TABLE IV-1

CORRELATION BETWEEN RATES OF PRICE AND OUTPUT CHANGE AND MEASURES OF CAPACITY UTILIZATION

Series Correlated	Period	Correlation Coefficients: Simple	Partial, Holding Constant: Change in Money Stock	Partial, Holding Constant: Change in Money Stock and Preceding Price Change
Price change and output ratio	1882–1961	.50	.10	−.48
	1890–1961	.52	.12	−.48
	1890–1944	.35	−.05	−.48
	1910–1944	.36	.03	−.43
Price change and employment ratio	1890–1961	.42	.29	−.40
	1890–1944	.32	.07	−.44
	1910–1944	.33	.25	−.29
Output change and output ratio	1882–1961	.11	−.41	−.17
	1890–1961	.11	−.41	−.15
	1890–1944	.12	−.51	−.09
	1910–1944	.06	−.52	−.15
Output change and employment ratio	1890–1961	−.07	−.42	−.07
	1890–1944	−.04	−.62	−.14
	1910–1944	−.14	−.66	−.19

NOTE: Output ratio is the logarithm of ratio of per capita real income to an exponential trend. Employment ratio is the fraction of labor force employed. Price, output, and money stock changes are per cent per year rates over triplets of phases. The preceding price change is the rate of change over the preceding triplet of phases.

The final column of Table IV-1 pertains to our hypothesis that price anticipations, as reflected by the rate of price change in the preceding period, play an important role in these relationships. The current rate of price change is much more highly correlated with prior price behavior than with the measures of capacity utilization. When the prior rate of price change as well as the rate of monetary change are held constant, the correlations are without exception converted from positive to negative values. What these negative values reflect is that, when monetary change and price anticipations are held constant, a high rate of capacity utilization reflects the absorption of a small fraction of income change by prices and a large fraction by output change. It is a consequence of whatever forces other than monetary change and price anticipations (as measured by prior rate of price change) determine the relative importance of price and quantity changes; it is not itself an independent determinant of the rate of price change.[4]

[4] It is perhaps worth noting explicitly that these results flatly contradict what has come to be known as the "Phillips curve" effect (see A. W. Phillips, "The Relation between Unemployment and the Rate of Change of Money Wages in the United Kingdom, 1861–1957)," *Economica,* November 1958, pp. 283–299). This effect is an alleged inverse rela-

2. *Output Change.* The simple correlations in Table IV-1 show a negligible relation between output change and rate of capacity utilization. However, in this case, introducing the common factor of rate of monetary change converts the negligible correlations into appreciable negative correlations. The rate of output change, the output ratio, and the employment ratio are all positively correlated with the rate of monetary change. However, the output and employment ratios are more highly correlated than the rate of output change. Hence, allowing for the influence of the rate of monetary change produces the theoretically anticipated negative relation between the rate of output change and the rate of capacity utilization. The highest of the correlations, holding monetary change constant, is —.66, so at most the rate of capacity utilization can be regarded as accounting for slightly less than half the variability in rate of output change.

However, this appears to be a serious overestimate of the influence of capacity utilization. When prior rate of price change is added as a variable, the highest of the partial correlations is reduced to .19, so the maximum percentage of the variability in rate of output change that can be accounted for by capacity utilization alone is less than 4 per cent.

On balance, though our data give some support to the view that a high rate of capacity utilization is adverse to a rapid rate of output growth, they give no support to the view that it is favorable to a rapid rate of price rise. The widespread belief that it is may, of course, still be justified; the cycle phase data, or our way of analyzing them, may, for some reason we are unaware of, conceal a close and significant relation.

A manuscript including the results just presented and other aspects of the relations between trends in money, income, and prices is being reviewed by a staff reading committee. After revision, we hope to submit it to the Board in 1967.

MILTON FRIEDMAN
ANNA J. SCHWARTZ

PRODUCTION, EMPLOYMENT, AND PRICE LEVELS IN INDIVIDUAL INDUSTRIES

In efforts to promote prosperity without inflation, recourse is sometimes had to wage and price guidelines. The basic guideline for wage changes in all individual industries is change in real national product per man-hour. It is presumed that changes in the wages of an industry are largely determined by the trend of labor productivity in the economy as a whole rather than by other factors, such as the trend of productivity in the industry itself—or would be so determined, were competition effective and monetary and other general factors making for inflation absent. The basic guideline for selling prices in an individual industry is the change in the industry's labor productivity relative to national productivity. In this case, also, there are presumptions—that selling prices are largely determined by relative productivity trends, or would be so determined were competition effective and general pressures making for inflation absent.

A number of questions arise in considering the practicability of such guidelines. One is how closely wages in different industries do in fact move with national productivity, and how closely prices in different industries move with the corresponding relative productivities.

Chart IV-3 contains an example of information bearing on this question. The chart utilizes recently published census statistics for as many as 192 manufacturing industries

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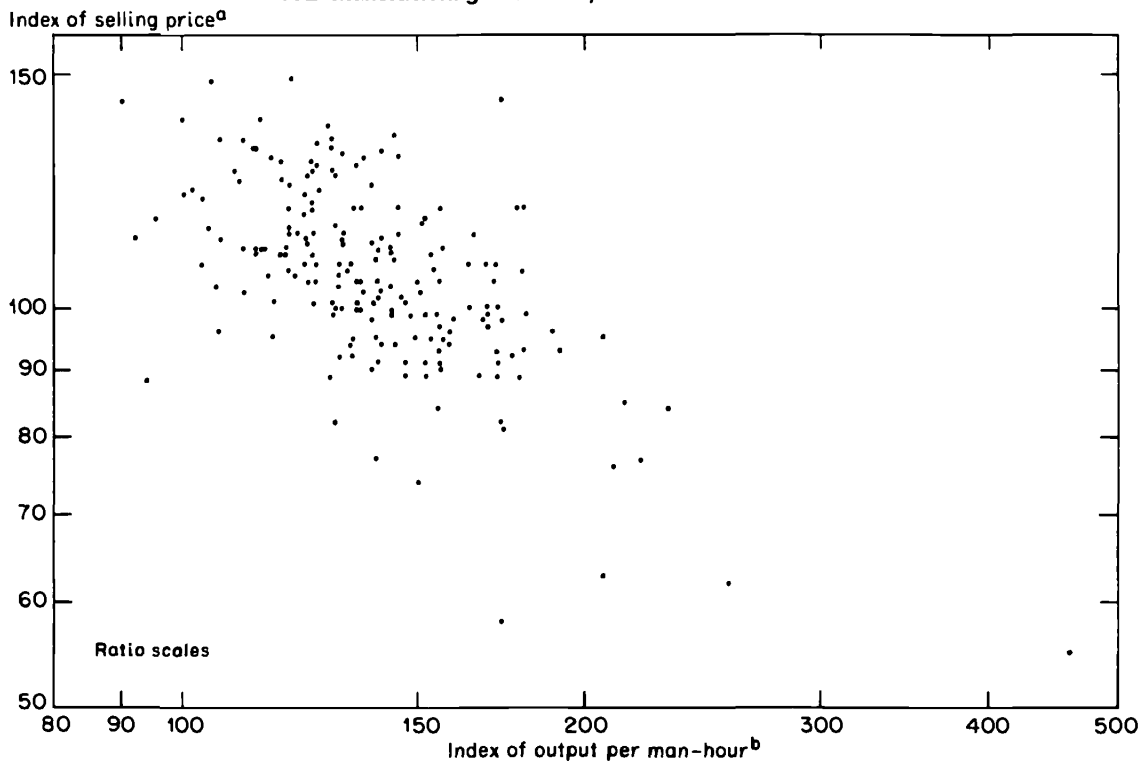
tion between the *level* of unemployment and the rate of change in nominal prices (money wages), which means a positive relation between the *level* of employment and the rate of change in nominal prices.

The basic theoretical defects of the analysis usually relied on to render plausible the existence of a Phillips curve effect are two: (1) a confusion between *nominal* or *absolute* prices and *real* or *relative* prices; (2) failure to take account of price anticipations.

CHART IV-3

Relation Between Indexes of Selling Prices and Indexes of Output per Man-Hour, 192 Manufacturing Industries, 1963 Relative to 1954



SOURCE: U. S. Bureau of the Census and National Bureau of Economic Research.

[a] Unit value of primary products.
[b] Deflated value of shipments per production worker man-hour.

for 1954 and 1963. The data are imperfect, but they have the advantage of providing an unusual amount of the detailed information needed for an answer to the question posed.

The chart compares the indexes of selling prices for the 192 industries with their corresponding indexes of output per man-hour. It is clear that relative labor productivity change is indeed associated (inversely) with relative price change. However, the association is not so strong as to preclude rises (and falls) in many relative prices over the nine-year period that differ substantially from the amounts to be expected on the basis of change in relative productivity alone. No more than 36 per cent of the variation in relative selling price (or less, because of some spurious correlation) is "explained" by relative productivity change. In combination, other factors that affect relative selling price changes were almost twice as important as relative productivity change. It may be noted also that a substantial number of manufacturing industries reduced their prices relative to an index of the general price level (the implicit price deflator for gross national product), despite low rates of productivity increase compared with the increase in output per man-hour in the total private economy.

The chart illustrates another problem in using productivity guidelines for current guidance in determining or assessing price changes. The industries represented in the chart cover all those for which reasonably adequate indexes of productivity are avail-

able. However, even though limited to census years and available only after the long delays inherent in census collection and tabulation, productivity indexes are available for only 192 of the 425 industries in manufacturing. The 192 account for 40 per cent of total factory employment.

A similar story is told by a chart—not shown here—comparing indexes of average hourly earnings of production workers for each of the 192 industries, 1963 relative to 1954, with the corresponding indexes of output per production-worker man-hour. The 192 indexes of average hourly earnings did tend to move together, along with national labor productivity (and the consumer price index), and with little or no relation to the rates of change in productivity of the corresponding individual industries. But the amount of increase in hourly earnings varied considerably. It is well recognized, of course, that factors peculiar to an industry can make its wage rates depart from the general trend even over a period long enough—in this case, nine years—to smooth out year-to-year fluctuations. Changes in skill mix, peculiarities of demand and supply (including lags in response to monetary forces), imperfections of competition—these are all involved.

What the wage and price data show is that "special factors" are important enough to raise serious doubts concerning the applicability of general guidelines. Numerous exceptions create problems. Also, to determine the appropriate degree of deviation from a general guideline, information not often readily available, if available at all, is required.

The census data provide information also on changes in output and employment, and attention is being paid to these changes and their relations to changes in productivity. The new body of data confirms the findings of earlier studies at the National Bureau and elsewhere that unusually large changes in labor productivity have not generally been associated with unduly severe declines in employment in the industries affected. These and other data available for the United States are being supplemented with similar data for other countries.

SOLOMON FABRICANT

THE BEHAVIOR OF INDUSTRIAL PRICES

The primary purpose of the study is to estimate the behavior over time of a number of important industrial and wholesale prices in the United States. Special attention is being given to questions of short-run flexibility of industrial prices (i.e., to the responsiveness of industrial prices to market conditions), and to the accuracy of the individual items and component indices of the Wholesale Price Index as indicators of those price movements. Fragmentary evidence available prior to the commencement of this study had suggested that much of the published price data, both in trade sources and in the WPI, were list prices and that in at least some important markets a substantial volume of trade was taking place below (or occasionally above) list price. The immediate objectives of the study are to estimate (1) the *extent* of such discrepancies, and (2) the *magnitude* of the discrepancies, where they exist. Secondary objectives include investigation of the characteristics of markets which determine price flexibility, investigation of the relation between characteristics of buyers (i.e., of classes of sales) and behavior of price, and investigation of the dynamics of price adjustments over time.

Our efforts thus far have been devoted primarily to data collection. The basic data sought have been records of both buyers and sellers for particular commodities included in our sample. We have interviewed executives of some 160 firms, as well as officials of some 40 governmental agencies and hospitals. In the course of this field work, we have learned a good deal about problems of primary data collection for nonretail price information. Some salient points are given here:

1. In principle, information on prices can be obtained either from buyers or from sell-

ers. In fact, information from buyers is easier to obtain than information from sellers. This is due partly to a greater reluctance of sellers to disclose true prices (a reluctance fostered by the Robinson-Patman Act), and partly to a difference in the way in which records are kept. In a number of firms which did agree to discuss selling prices, it was found, on investigation, that the firms' price records tended to be more like ingredients of unit value indices than of fixed-base, specific commodity indexes. In particular, it was not unusual for the firm to have annual or monthly records of total net receipts and of total volume of shipments, with no finer breakdown. The net receipts were usually net of freight absorption, returns, discounts, and the like; the data typically referred to a number of closely related but not identical sizes, grades, and so on, so that changing product mix was a source of "price" changes; and were typically not segregated by size of shipment, so that volume discounts were confounded. We believe the statements of these firms, that records with more detail than this did not exist except for the records of individual customers, for such pure price indexes would be of little value to a firm. Not surprisingly, the firms were loath to discuss the records of individual customers.

Whereas information from sellers tended to be highly aggregated (and confounded) even where is was available, the information attained from buyers tends to be easily adaptable to price index construction. Records of purchases are typically (though not uniformly) segregated by individual part number or by detailed commodity specification.

Our study, which seeks to reconstruct a decade of price history, is hampered by the record-retention policies of firms, which often require destruction of purchase records after a few years. Nevertheless the information, so far as it goes, is often finely specified enough so that it can be made into a time series which is internally consistent with respect to physical specification, point of delivery, lot size, and the like.

2. For some kinds of commodities, pricing histories are relatively easy to establish via buyers' records; for others, this is very difficult. Commodities frequently purchased, whose specifications do not often change, where the products of all manufacturers are homogeneous, are among the easiest. These include the products forming the bulk of our sample: primary metals and metal mill products, petroleum, industrial chemicals, cement, glass, paper and paper products, and the like. Other kinds of commodities are very difficult to study by means of buyers' records, because technological change or product differentiation may make comparison of product models difficult, or because sporadic purchases of items with varying amounts of optional equipment make comparisons over time difficult. The very important machinery area is a fine example of these problems. Other commodities, such as light trucks and electric motors (which are included in our sample), present these difficulties in less intractable form.

Thus far, our data collection efforts have yielded well over a thousand individual series from some hundred private firms and some thirty-odd public agencies and hospitals. Promises for substantial addition are outstanding, many of which will in fact result in data. Data collection will proceed through the early spring, though on a scale much reduced from the major effort made in 1966.

Our primary efforts are now shifting from data collection to the processing and analysis of the data. Our major drives in that direction are:

1. The task of editing and checking the data and having them punched onto cards has been continuing on a routine basis since the early phases of the study.

2. Several computer programs designed specifically for the peculiarities of our data have been developed. The largest of these computes weighted averages of prices for groups of commodities, and allows comparisons with the corresponding WPI series. This has been a significant undertaking because of several factors making our data less

than ideal from the point of view of computational simplicity.

Although the period of our study is the decade 1957–66, not all of our series cover the entire period. The time span of each series is conditioned both by the periods during which our informants bought (or sold) the commodities in question *and* by their record-retention policy. As a result, for any commodity the series begin at various times and end at various times. In constructing averages or indexes, of course, it is necessary to provide linking for both entry and exit of series.

We have tried to obtain monthly data; we have not always succeeded. Some of our data are on a quarterly basis or on an annual basis. In many instances the data are spaced at irregular intervals, corresponding to the particular months in which the informants happened to buy the product.

For some kinds of analysis, only monthly series can be used; for others, only series available on a regular (monthly, quarterly, or annual) basis are legitimate. For purposes of making our best estimate of the price index at each point, we want to use all our data, not simply part of them; for these purposes, the nonmonthly data are interpolated in the manner recommended by Milton Friedman in *The Interpolation of Time Series by Related Series* (New York, NBER, 1962), using as a related series our best estimates of the price of the same or closely related goods from monthly data.

3. We have worked on problems of criteria for classification of data, and have developed programs for computing various statistics of similarity of time series.

Other steps planned for the immediate future, in addition to a continuing effort to enlarge the sample, include: (a) Empirical investigation of the effect of the number of reporters on such time-honored measures of price flexibility as the mean number of price changes per year. (b) Direct comparisons of NBER data with WPI data; where discrepancies are found, sample reconstructions of WPI sectoral indices using NBER data will be attempted. (c) Investigation of relation of size of buyer, and of status (private firm or public buyer) to the behavior of prices. (d) Analysis of refusals and nonresponses to our requests to see if obvious biases in terms of industry or other characteristics of firms is present in our sample. (Our sample is heavily biased toward larger firms; that bias can be corrected, to some extent, through treating our sample as a stratified one—albeit one with nonoptimal allocation of sample sizes among strata.)

A paper, "The Construction of Industrial Price Indices," was presented by Kindahl at the December 1966 meetings of the American Economic Association. This paper, an outgrowth of the study, discussed some problems confronted in utilizing data on buyers' prices for constructing price indexes.

We hope to complete the data collection by the spring of 1967, and to finish the analysis relating to the primary objectives of the study by late 1967.

GEORGE J. STIGLER
JAMES K. KINDAHL

CYCLICAL MOVEMENTS IN PRICES AND OUTPUT

Recent studies of inflation have drawn attention to the cyclical character of price increases. Since World War II, the general price level has risen during cyclical upswings, as it almost always has, but it has failed to decline during business recessions, by and large remaining constant or even rising slightly. Price declines on a broad scale were not common in earlier recessions (except for severe contractions like 1920–21 and 1929–33), but some tendency to drift downward was evident. Numerous explanations have been offered as to why the price level no longer declines even when unused productive capacity appears excessive.

This apparent change in cyclical behavior deserves closer examination. Part of it may reflect the smaller amplitude of fluctuations in output, on the average, in postwar cycles.

Some studies have related price movements to those in output, but few compare the relationship since World War II with that prevailing in previous periods. If the cyclical amplitudes of output changes are held constant, do the prices of individual products behave differently in recent cycles than formerly; and if so, which products exhibit the greatest change in behavior? Historical comparisons of price behavior provide a needed perspective for analyzing recent developments.

For the present study we are collecting series back to the 1920's or earlier on matched wholesale prices and output for individual products. These will show cyclical movements in prices relative to changes in output for a variety of products over four of five decades. Such a study was pioneered by Frederick C. Mills at the National Bureau in *Price-Quantity Interactions in Business Cycles* (1946), covering the pre-World War II period. In extending his work, we are able to add many new series, but cannot use all of Mills's series because some have been discontinued. There are difficulties in matching price and output data, and in extending comparable series back to the 1920's. Few manufactured products meet these requirements. We have, nevertheless, compiled a list of about eighty-five products, mostly raw materials and basic commodities but also covering about twenty manufacturing series. Although the restricted coverage of the study will circumscribe the applicability of the results, they should still help to clarify to what extent and in what way price behavior has changed.

PHILLIP CAGAN

POPULATION AND LABOR FORCE DURING LONG SWINGS IN ECONOMIC GROWTH

A revised draft of the monograph, taking account of the staff committee's comments, has been completed and is being reproduced for submission to the Board. The Table of Contents is as follows:

RICHARD A. EASTERLIN

PRODUCTIVITY IN THE SERVICE INDUSTRIES

This project, undertaken with the financial assistance of the Ford Foundation, is now entering its final stages. The following studies have been completed:

VICTOR R. FUCHS, *Productivity Trends in the Goods and Service Sectors, 1929–61: A Preliminary Survey, NBER*, O.P. 89, 1964

———, *The Growing Importance of the Service Industries, NBER*, O.P. 96 (also appeared in *Journal of Business*, October 1965)

———, *Differentials in Hourly Earnings by Region and City Size, 1959*, NBER, O.P. 101 (excerpt appeared in *Monthly Labor Review*, January 1967)

———, "The Contribution of Health Services to the U.S. Economy," *Milbank Memorial Fund Quarterly*, October 1966, pp. 65–103

———, "The Growth of the Service Industries in the United States: A Model for Other Countries?" OECD, in press

——— and JEAN ALEXANDER WILBURN, *Productivity Differences Within the Service Sec-*

tor, NBER, O.P. 102 (portion appeared in *The Review of Income and Wealth,* September 1966)

IRVING LEVESON, "Reduction in Hours of Work as a Source of Productivity Growth," *Journal of Political Economy,* April 1967

The following studies are in progress and should be completed this year:

RICHARD AUSTER, "The Substitution of Skilled Labor for Unskilled Labor"

REUBEN GRONAU, "The Demand for Airline Passenger Transportation"

IRVING LEVESON, "Self-Employment in the United States"

DAVID SCHWARTZMAN, "Analysis of Productivity Change in Retail Trade, 1929–63"

In addition, I plan to write a summary volume which will draw on research already completed, will update and complete preliminary materials, and will include the results of two new studies now in progress. One is concerned with cyclical fluctuations in the service industries, particularly as they compare with cyclical fluctuations in manufacturing during the postwar period. The second is concerned with interindustry and intersector differences in hourly earnings.

Henrietta Lichtenbaum, Kay Wilson, and Lorraine Wolch have joined the project as research assistants. Lorraine Lusardi is now secretary for the project.

A forthcoming Conference on Production and Productivity in the Service Industries is described in Part III.

VICTOR R. FUCHS

TAX POLICIES FOR ECONOMIC GROWTH

The National Bureau's study of tax policies for economic growth, supported by grants from the Rockefeller Brothers Fund and the Life Insurance Association of America, has focused on the effects of federal taxation on personal and business activities contributing to economic growth. Included in the research undertakings in this study are the following projects: the effects of various features of the corporate income tax on business policies governing investment, research, and new product development (by Challis A. Hall, Jr.); the extent to which the textile manufacturing industry modernized production facilities in response to the depreciation liberalization in 1961 (by Thomas M. Stanback, Jr.); the adequacy of averaging provisions in the tax law in offsetting the bias in rate graduation against fluctuating business income (by C. Harry Kahn); the effects of the tax treatment of capital gains and losses on individuals' saving and investment patterns (by Roger F. Miller); the effects of the individual income tax on the volume and character of personal effort (by Daniel M. Holland); tax influences on the nature of executive compensation (by Wilbur G. Lewellen); and the use of accelerated depreciation methods by American businesses (by Norman B. Ture). In addition, two conferences have been conducted jointly with the Brookings Institution; the titles of the reports are *The Role of Direct and Indirect Taxes in the Federal Revenue System* and *Foreign Tax Policies and Economic Growth.* These conferences were directed by John F. Due and E. Gordon Keith, respectively. I am preparing a volume summarizing the findings of these investigations and related studies.

The study's completed output, as of the early part of 1967, consists of the two conference volumes, the first of which appeared in July 1964, the second in March 1966, and my volume *Accelerated Depreciation in the United States, 1954–60.* Lewellen's book on executive compensation has been sent to the Board; a summary statement of his principal findings is presented below. Stanback has revised his manuscript after staff review, and a revision of Hall's draft is expected by midyear. Holland's undertaking, particularly the interview study, has proved to be more challenging and time-consuming than originally anticipated. He reports on his progress below. The data problems which beset Kahn's study have been substantially overcome; he expects to complete a draft of

his study by the end of this summer. The Miller project has not yet overcome the formidable data difficulties it faces, but progress is being made.

NORMAN B. TURE

MODERNIZATION IN THE TEXTILE INDUSTRY

This study is primarily an investigation of the effects of changes in depreciation provisions on modernization expenditures in the textile industry. In addition, attention is given to the effects within the industry of the introduction of the investment tax credit in 1962. The investigation relies principally on interviews with executives of twenty-five textile firms conducted during the spring and summer of 1963 along with data provided by most of these firms and supplementary data gleaned from published financial reports.

The textile industry was selected for special study because it was permitted radical shortening of the permissible tax life of basic equipment for tax-deductible depreciation charges prior to the general depreciation reform under IRS Revenue Procedure 62–21 of July 1962. This affords an opportunity to observe the response to shortened depreciation lives over a somewhat longer period than is the case in other industries. In addition, the industry had the reputation of being in need of modernizing, while at the same time it was faced with abundant opportunities for implementing technological advances over recent years.

Liberalized depreciation may contribute to capital modernization in three principal ways. (1) It may stimulate the demand for new capital equipment by its effect on computed rates of return and payback periods, and by reducing risk and the length of the replacement cycle. (2) By reducing corporate income taxes and increasing the internal cash flow of the corporation in the years immediately following any capital expendure, it provides additional internal funds and (if the latter are considered less costly than funds procured in the capital market) may act to increase modernization expenditures. (3) It may change management's willingness to replace equipment or alter capital budget targets by causing the undepreciated book value of an asset to diminish more rapidly, by changing the amount which (according to management rules of thumb) is customarily spent for replacement, or by several other effects. (For the latter influence to be operative, management must employ a single system of accounting records for tax and for general financial bookkeeping purposes.)

Each of these possible routes to increased modernization expenditures is investigated. One of the chief findings is that 36 per cent of the firms interviewed were using investment computation formulas which made explicit the tax savings of liberalized depreciation and thereby made management aware of an increased incentive for modernizing. (There was little indication that firms not using such formulas recognized that liberalized depreciation altered rates of return or reduced payback periods.) Another finding is that roughly half of the firms interviewed regarded the increase in cash flow as being of strategic importance in determining the size of modernization expenditures. Those influenced by the first route (demand effect) tended to be among the medium- and large-sized firms; those influenced by the second route (effect on cash flow) tended to be among the medium or small firms. Roughly three-fourths of the firms interviewed appear to have been significantly influenced by one of these routes or the other. It was, however, impossible to measure the impact of this influence in terms of increased expenditures.

Regarding the third type of influence distinguished above, the findings were less definite, but a number of firms testified that management attitudes had been altered in this fashion. In general, this influence appears to have resulted in a greater willingness to spend for modernization.

Some other findings are that interviewed firms had adopted the depreciation provisions of the Internal Revenue Code of 1954 rather

promptly; that the special tax provisions of October 1961, which made shorter tax lives available to the industry, had resulted in very substantial increases in depreciation; and that the industry has shown a strong preference for incorporating tax-accounting changes into its financial bookkeeping systems. Regarding the investment credit, experience on the part of interviewed firms had been very brief at the time of my investigation. Moreover, the credit was much less liberal than it became under the Revenue Act of 1964. There was a tendency for firms to play down the effect of the credit upon rates of return or payback periods and to regard it as being of marginal importance in affecting their willingness to spend; on the other hand, the strong cash flow influence already observed was no doubt operative here.

THOMAS M. STANBACK, JR.

EFFECT OF TAXATION ON PERSONAL EFFORT

Wilbur G. Lewellen's study, one of three undertaken in this area, is concerned with measuring the total compensation of top business executives. To this end, a method of reducing all forms of payments—pensions, deferred compensation and bonuses, stock option gains, and other rewards—to salary equivalents has been developed and applied to the compensation history of the top five executives in fifty very large industrial companies over the period 1940–63. Lewellen reports below on some highlights of his study. He also mentions some additional work he has started with the same sample of executives relating to their stockholdings, the purpose being to compare the annual change in the value of their proprietary interest with their annual compensation. This comparison should tell us whether their motivations are more like those of owner-managers or, as has been alleged, like those of professional employees or civil servants. Preliminary work suggests that capital gains on company shares they own have been considerably larger than total compensation received annually from the company.

I am conducting the other two studies on the effect of taxation on personal effort. One pursues the question via analysis of the income, deduction, and tax liability experience of taxpayers who report large amounts of salary (over $25,000) and the other through a series of interviews (about 125 in all) with top and middle management.

The first of these two studies directly seeks to discover how heavy are the taxes that persons with high salaries pay, as well as the composition of their total income and the deductions they report on tax returns. For this inquiry we draw on the Treasury's personal income tax file for 1962 (and perhaps 1964 as well), which contains data drawn from over 103,000 unidentified tax returns (heavily oversampled at the higher incomes), to examine in detail some of the characteristics of the returns that reported salaries in excess of $25,000. For these taxpayers, arrayed by salary class, we seek answers to the following kinds of questions:

1. How important are other sources of income relative to salary? This will give an insight into some of the economic activities of high-salaried persons. Are they primarily employees, or do they have characteristics akin to proprietors (as evidenced by large amounts of dividends or capital gains)?

2. Is most of their income taxed at regular rates of income tax, or do they have important amounts of capital gains less heavily taxed? This will tell us how successful they have been in moderating tax liabilities and, of course, furnish an insight into their use of funds.

3. How important are deductions on these tax returns?

4. And then, of course, the most direct query: How heavy, in fact, have the tax liabilities of high-salaried persons been?

The second of my studies approaches the problem of the effect of taxation on effort more directly. To this end I conducted interviews with about 125 business executives,

some in the very top executive posts[5] and others in middle-management posts. The interviews were designed to ascertain what executives, drawing on their own experience, think about the effect of taxation on their effort, i.e., the jobs they take and how hard they work at them.

For these interviews I had in mind a common set of questions, but each of the sessions proceeded perforce at its own pace and in its own particular direction. There is, of course, an underlying similarity in topics covered among the interviews, but each of them is *sui generis*. It is a time-consuming process to review and analyze the interviews, searching for the generalizations they permit. I am still engaged in these reviews and do not yet know the kinds of conclusions that will emerge. It may be helpful, however, to suggest some of the major topics around which the report will be organized.

1. The role of taxation at crucial decision points in an executive's career, such as the decision (a) to choose a business career, (b) to choose which firm to work for, (c) to accept or reject promotions, (d) to accept or reject an offer from another firm, and (e) to retire.

2. The amount of time devoted to personal and business tax affairs.

3. The importance of the capital gains tax opportunity and its effect on effort.

4. The importance of deferred or contingent compensation arrangements, such as pensions and stock options which have been adopted for tax reasons, among others, and the effect of these transformations of compensation on the decisions of executives.

5. The executives' anticipated response to changes in the income tax structure that would mean a lower marginal rate on the return to effort.

DANIEL M. HOLLAND

[5] For the eighteen executives occupying such posts for whom proxy statement information was available:

1. Salary averaged $147,000, ranging from $75,000 to $275,000.
2. Pension expectancy averaged $46,000, ranging from $20,000 to $90,000.
3. Value of own-company stock held averaged $1,138,000, ranging from $49,000 to $4,800,000.

EXECUTIVE COMPENSATION

My study of executive compensation has been completed and is being reviewed by the Board. The work focuses on the rewards, both before and after taxes, of the individuals who occupied the five highest-paid executive positions in fifty of the nation's largest manufacturing corporations during the period 1940 through 1963. In all, the study includes data on the experience of some 550 different individuals and covers nearly 8,000 man-years of compensation history. A historical record of the level and form of compensation is developed, together with various cross-sectional comparisons between the several positions and firms studied. The objective is to determine not only how increases in personal tax rates have affected the size of the compensation package but also how the package has been restructured to take advantage of the favorable tax status of deferred and contingent rewards.

The results suggest that, in terms of the rate of growth of after-tax earnings, top executives have not done as well as other professional occupational groups since 1940. Indeed, when changes in the price level are taken into account, their "real" income turns out to be no higher in 1963 than it was prior to World War II. The composition of the pay package, however, has changed radically. In the early 1940's, cash salary and bonus payments provided approximately 75 per cent of total after-tax compensation of senior corporate executives. During the years 1955–63, the figure was only 38 per cent. Stock options and common-stock-based deferred compensation plans alone generate almost 47 per cent of the total nowadays. Executives' earnings thus seem to be sufficiently tied up with the market price behavior of their firms' stock for the conclusion to be drawn that the stereotyped view of the

professional manager as lacking an ownership orientation is substantially overdrawn. This topic is being pursued further by means of an investigation of executives' stock holdings in their respective firms.

W. G. LEWELLEN

AVERAGING OF INCOME FOR TAX PURPOSES

We now have nine magnetic tapes containing continuous tax records of a sample of 4,130 Wisconsin taxpayers who reported income from unincorporated business at least once during the period 1946–60. Much of the past year was taken up with correction of errors in the construction of the tapes and in the computer program. The tapes are now reasonably free from error, and some preliminary data based on a computer analysis of 1,253 taxpayers in our sample are available. They provide useful information about the structure of the sample and the effect averaging can have on tax liability.

A taxpayer may be in the sample for as little as a single year, or for any number up to fifteen, since selection for the sample was random without regard for the number of years a person filed a return. The distribution by number of years in the sample (based on the aforementioned 1,253 taxpayers) is shown in Table IV-2. The average number of years in the sample per taxpayer in slightly more than nine. Over a third of the taxpayers are in the sample for thirteen years or more. For each of the fifteen frequency groups the sum of tax liabilities computed on an annual basis is compared with the tax liabilities that would have been payable on average taxable income for the period in the sample. The relative difference in the amounts is shown in the second column of the table. The differences range from just under 20 per cent for taxpayers whose income was averaged over ten years to 6 per cent for those with two years.

On the basis of this simple and crude test, it appears that averaging over seven to ten years might suffice to bring about the maximum reduction in tax liability through averaging, but this result is likely to be modified when one applies criteria for averaging different from those used for the table. For instance, a plan which allowed only those to average whose tax liability would be altered by a minimum percentage might produce a different optimum period. The results in the table may also be significantly influenced by developments over the particular period to which the data relate. Those problems will be examined in the further course of the study.

Table IV-3 shows for a single frequency group—those in the sample for fourteen years —what the relative change in tax liability would have been at various levels of adjusted gross income, had taxpayers been able to average taxable income over the fourteen-year period. Relative changes in tax are large

TABLE IV-2

RELATIVE REDUCTION IN TAX LIABILITY FOR 1,253 TAXPAYERS WITH SOLE PROPRIETOR OR PARTNERSHIP INCOME HAD THEY AVERAGED TAXABLE INCOME FOR NUMBER OF YEARS IN SAMPLE

Number of Years in Sample	Distribution of Taxpayers (per cent)	Reduction in Total Tax Through Averaging (per cent)
1	5.3	—
2	6.1	6.0
3	4.2	9.1
4	5.5	18.3
5	5.7	7.3
6	4.8	15.6
7	4.6	17.0
8	5.3	18.8
9	6.9	16.0
10	4.6	19.6
11	5.3	14.1
12	6.5	12.9
13	12.7	11.7
14	17.2	10.9
15	5.1	12.3
Total	100.0	10.3

TABLE IV-3

EFFECT ON TAX LIABILITY OF INCOME-AVERAGING FOR TAXPAYERS WITH UNINCORPORATED BUSINESS INCOME AND PRESENT IN SAMPLE FOR 14 YEARS, BY AGI GROUPS

Average Adjusted Gross Income (AGI) (thousand dollars)	Number of Taxpayers	Average AGI (dollars)	Actual Average Tax Liability (dollars)	Tax on Average Taxable Income (dollars)	Average Tax Saving, Col. (3)–Col. (4) (dollars)	After-Tax AGI, Col. (2)–Col. (3) (dollars)	Tax Saving as Percentage of		Unincorporated Business
							Actual Tax	After-Tax AGI	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0–1	3	593	9	0	9	584	100.0	1.5	55.8
1–3	54	2,177	85	54	31	2,092	36.5	1.5	53.4
3–5	78	4,014	231	199	32	3,783	13.9	0.8	37.4
5–7	43	5,896	527	502	25	5,369	4.7	0.5	31.1
7–10	21	7,944	913	828	85	7,031	9.3	1.2	35.5
10–15	9	12,107	1,698	1,639	59	10,409	3.5	0.6	27.8
15–25	5	20,692	3,224	2,998	226	17,468	7.0	1.3	57.5
25 and over	3	29,159	6,340	5,055	1,285	22,819	20.3	5.6	29.4
Total	216	5,336	532	473	59	4,804	11.1[a]	1.2	37.7

[a] Difference between this percentage and the percentage shown in Table IV-2 is due to rounding.

near the bottom and near the top of the income scale. Near the low end of the scale, tax liability is small to begin with and taxpayers, because of unused exemptions in some years, can easily become nontaxable through averaging. The reason for the sharp rise in relative tax saving for those with average income (AGI) of $25,000 and over is less obvious, and a number of possible explanations await testing. The relative importance of unincorporated business income *per se* is apparently not the explanation. A possible explanation, not yet tested, is that variability of unincorporated business over time is greater at high than at low levels of income. Whereas for the fourteen-year group the tax change from this simple averaging over the period is 11 per cent, the change in after-tax income is only 1.2 per cent and the variation between income groups is very small, below $25,000. Only above that level is the change in after-tax income appreciably higher than for all the other income groups.

C. HARRY KAHN

2. NATIONAL INCOME, CONSUMPTION, AND CAPITAL FORMATION

Current work at the National Bureau in this area encompasses several closely related research objectives. Among these are (1) analysis of the role of households as agents of capital formation; (2) measurement and analysis of investment in human capital, especially in health and education; (3) extension of the scope of the national income accounts through a broader definition of investment and through more systematic use of imputations; (4) restructuring the national income accounts to increase their usefulness as analytical tools, especially in relation to the problem of economic growth.

Nancy and Richard Ruggles are concentrating on the problem of restructuring the accounts and of integrating them with other economic accounts. Much of their current work is conceptual; they will be able to draw on other National Bureau studies in this area for some of the necessary data and will also benefit from the cooperative efforts of the U.S. Office of Business Economics.

John Kendrick has been concentrating on preparing new, more comprehensive estimates of investment. He and his associates are also experimenting with imputations for a wide range of economic activities not currently included in estimates of gross national product. Rosanne Cole has completed a study of the accuracy of gross national product estimates as revealed by subsequent revisions (see section 3).

F. Thomas Juster, in collaboration with the U.S. Bureau of the Census, has begun a new study of household purchases of automobiles and other capital goods and of financial savings.

Gary Becker and his associates are continuing their analysis of investment in education, and a new program of research on the economics of health has been started under the direction of Victor Fuchs. The philanthropy and pension studies are nearing completion.

During the past year the following reports were completed:

Household Capital Formation and Financing, 1897–1962, F. Thomas Juster (General Series 83)

Private Pension Funds: Projected Growth, Daniel M. Holland (Occasional Paper 97)

Consumer Buying Intentions and Purchase Probability: An Experiment in Survey Design, F. Thomas Juster (Occasional Paper 99)

Determinants of Investment Behavior, Robert Ferber, ed. (Universities-National Bureau Conference Series 18)

INTEGRATING AND RESTRUCTURING THE NATIONAL ECONOMIC ACCOUNTS

This project is designed to explore the possibilities of extending the United States national economic accounting system to include additional concepts and data, integrate it with other forms of national economic accounting, and relate it to changes contemplated by the United Nations in its standardized System of National Accounts.

One of the basic changes contemplated initially is the introduction of an enterprise income and outlay account which treats the enterprise sector of the economy in a manner symmetrical to households and general government. In this connection, nonprofit institutions have been removed from the household sector and reclassified in the enterprise sector as nonprofit enterprises. Expenditures for consumption, development, and durable goods have been recognized for enterprises, general government, and households. This means that consumption goods which are provided at business expense are now included for enterprises. For example, estimates are to be made for television, radio, and other mass media consumed by the public but supported by advertising expenditures. Similarly, other business consumption expenditures, such as subsidization of eating facilities, recreation facilities, and travel expense accounts, are to be included.

With respect to economic and social development expenditures, the direct outlays by individuals, governments, and business are taken into account. This permits a better evaluation of the financing of these expenditures and the role they play in the economy. Research and development expenditures by business and government have also been introduced as well as training occurring within the business community.

With respect to durable goods, an attempt is made to segregate consumer and government durable expenditures as well as enterprise durable expenditures. Using perpetual inventory methods, estimates of the stock of capital goods and their wastage over time are to be integrated into the economic accounting framework.

These changes in the form and structure of the national income accounts will serve as the basis for a more general integration with input-output, flow of funds, national wealth, and national balance sheets along the lines indicated in the report of the National Accounts Review Committee published by the National Bureau in 1958. The report of the Income and Wealth Conference held in June 1966 on the proposed revision of the United Nations accounts is being considered in detail, and the suggestions made at that conference have been taken into account insofar as possible. The research is being carried out in conjunction with the Office of Business Economics of the Department of Commerce. It takes into account the increasing availability of microdata in the federal government, i.e., information pertaining to samples of individual enterprises or other economic units. At some future date it may be possible to develop samples of microdata to underlie the sets of accounts within each of the major sectors.

Currently the work on the national income accounting framework has been completed, but a number of specific national income accounting topics are still being studied. For example, the problem of the imputation of allowances for factors of production owned by enterprises, households, and government is being examined. The next step is to start laying out the framework for the other forms of economic accounting which are to be directly integrated into the income accounts. Once the complete framework is laid out, future research will be concerned with implementing the framework with estimates of data for a given period. At this point the work will benefit from the studies John Kendrick already has under way.

NANCY RUGGLES
RICHARD RUGGLES

INVESTMENT EXPENDITURES AND IMPUTED INCOME IN GROSS NATIONAL PRODUCT

Two principal areas of study have been selected with a view to improving the usefulness of the estimates of gross national product for the study of economic growth. The first involves the redefinition of investment to include all current outlays designed to increase future income- and output-producing capacity. Investment then comprises tangible capital outlays by households and governments as well as by business, and such intangible investments as research and development, education and training, medical and health expenditures, and mobility costs.

Revised estimates of gross tangible and intangible investments by sector have been largely completed. They have been integrated with the revised Commerce Department national income and product estimates in the form of current and capital acounts for each major sector, and summary tables for the economy as a whole. In broad terms, the estimates show that gross tangible and intangible investment has grown in relation to gross national product, and the total investment of each major sector has likewise risen as a proportion of its gross disposable income. A description of concepts and general approach, with preliminary estimates for selected years, was published in *Statistisk Tidskrift* (Stockholm, 1966:5) under the title "Restructuring the National Income Accounts for Investment and Growth Analysis."

During 1967, our efforts will be devoted to estimating *net* investment of the several types by sector, and the associated capital stocks in current and constant prices.

Progress in the other main area selected for study was reported in my paper at the November 1966 meetings of the Southern Economic Association, "The Expansion of Imputations in the National Income Accounts." The chief activities for which we have prepared imputed values are indicated by the titles of the companion papers presented at the 1965 and 1966 sessions of the Association: "The Imputation of Rental Values for the Services of Household and Government Stocks of Durable Goods," by Anthony Japha; "The Evaluation of Housewife Services," by Katherine Warden; "The Value of Volunteer Services in the U.S. Economy," by Harold Wolozin; and "Social Accounting Recognition of Academic Study as Productive Activity," by Jennifer Rowley. In addition, Elizabeth Simpson is estimating the value of both investment and consumption goods and services charged to current expenses by business.

As indicated in my summary article, these imputations in total added more than two-thirds to GNP as estimated by the Commerce Department for 1929, and proportionately somewhat less in 1964, due to the relative decline in housewives' services. The official imputations likewise declined—from 8.6 per cent of GNP in 1929 to 7.3 per cent in 1964—due largely to the relative decline of the farm economy and its nonmarket production.

During the coming year, we plan to improve our imputations, particularly for unpaid household services, which is the largest category.

The work on total investment is supported by a grant from the National Science Foundation to the George Washington University; the work on imputations is supported by a grant from the Sloan Foundation to the National Bureau.

JOHN W. KENDRICK

HOUSEHOLD CAPITAL FORMATION AND SAVING

Under a grant from the National Science Foundation, work has been started on a study of short-term movements in household capital formation. A major part of the research effort is concerned with the analysis and development of data on consumer anti-

cipations, both as an aid to prediction and as a way of improving our understanding of consumer behavior.

The point of departure of this project, which is being undertaken in cooperation with the U.S. Bureau of the Census, is the basis provided by previous NBER-Census work on consumer anticipations. We start with the view that survey information on ex-ante purchase probability (for automobiles, houses, and other major consumer durables) may provide useful predictions of household capital outlays and valuable data for analysis of the basic determinants of these outlays. Over the past few months, two separate types of analysis have been pursued.

First, the role of consumer anticipations surveys in forecasting models has been examined, using quarterly data on expenditures for automobiles and major durables during 1953-65. The predictive usefulness of the following surveys has been examined: the Census Bureau survey of consumer buying intentions, the Survey Research Center (SRC) survey of buying intentions, and the SRC survey of consumer attitudes. Variables generated by these surveys have been tested in conjunction with a few simple econometric models that use nonsurvey variables.

A proposed Occasional Paper discussing the findings has been circulated to a staff reading committee and is now being revised. In brief, the findings are that:

1. Forecasting models using the attitude index have consistently underestimated automobile and durable goods purchases between 1962 and 1965.

2. Weighted and seasonally adjusted Census Bureau intentions data, although available for only a relatively short span, appear to provide markedly better predictions than SRC intentions data. The better record is due to three factors: (a) reduced sampling error (the Census sample is larger by a factor of 10), (b) adjustment for seasonal variation, and (c) the use of weights to aggregate the various intender categories, the weights corresponding roughly to the purchase rates observed in reinterview studies. The latter two factors could of course be applied to the basic SRC intentions data, although previous studies have not done so. There may, in addition, be a fourth factor, since there appear to be distinct differences in the way responses are coded despite the almost verbatim similarity of the survey schedules themselves.

3. It is not possible to generalize about either the relative or joint usefulness of attitude surveys and intentions surveys. At the present writing it appears that intentions surveys make a more significant contribution to forecasting models. But during parts of this period (1953-61) attitude surveys were at least as useful and, in certain types of equations, the attitude surveys currently appear to contribute about as much as do intentions.

4. The equation form specified for models designed to predict purchases of consumer durables has important effects on the results. The most accurate predictions (or extrapolations) over the 1962-65 period are obtained from models in which the dependent variable is the ratio of durable goods purchases to income. Equations with the level of purchases as the dependent variable show a persistent tendency to underpredict purchases during this period.

5. Equations involving an intentions variable are apt to be incorrectly specified if intentions are simply included as an additive independent variable. The basic reason is that the factors determining purchase rates for those classified as intenders appear to be different from the factors determining the purchase rates of nonintenders. Preliminary empirical tests indicate that best results are obtained from a two-stage estimation procedure: first, the nonintender purchase rate is predicted by regression methods, then the population purchase rate is predicted as a weighted average (the weights themselves being obtained directly from the survey) of the nonintender and intender purchase rates. The latter is treated as a random variable with a fixed mean value.

Future research plans call for work on the

development of models that do not include survey variables. Development of such models is an essential prerequisite for proper evaluation of the survey variables themselves.

The second phase of recent work has been analysis of experimental surveys designed to improve measures of purchase probability. We now have twelve-month reinterview data from some 2,000 households first interviewed in October 1965. These data show that:

1. "Conditioning" of respondents (achieved by asking a battery of questions regarding assets, income, debts, expectations, and attitudes) does not appear to increase the accuracy of the probability judgments.

2. Use of a response scale containing only quantitative descriptions (30 in 100, etc.) appears to work better than any of the alternative scales tested. Although such a scale yields distributions with a marked peak at the 0.5 probability level, it is consistently more accurate than the others—possibly because it is simpler for respondents to interpret and use.

3. The relation between reported (ex-ante) purchase probability values and the corresponding ex-post values (as measured by reinterview purchase rates) seems to be nonlinear. Transformation of the original scales by either second- or third-degree parabolic functions gives a closer fit to the observed purchase rates than simple linear transformations. In general, the results indicate that purchase rates in the middle part of the scale have a relatively flat slope, and those at the extremes have steeper slopes. Much better data for investigation of this last problem will shortly be available. Starting in July 1966, the Census Bureau has been obtaining purchase probability data on a regular quarterly basis from samples of some 12,000 households. Reinterview data from these surveys will start to become available for analysis in the near future.

A new round of experimental surveys is now in the planning stage. The objectives will be to explore the problems involved in extending the coverage of the survey to include all the major components of household capital formation, to explore the usefulness of data on household savings plans, and to investigate the determinants of ex-ante purchase probability and savings.

F. THOMAS JUSTER

INVESTMENT IN EDUCATION

Work in this area, financed by a grant from the Carnegie Corporation, has been proceeding in several directions. I have prepared an essay entitled "Human Capital and the Personal Distribution of Income: An Analytical Approach" that is to be published about June 1967 by the University of Michigan. It is based on the W. S. Woytinsky lecture that I gave there in March 1966. In this essay I develop a theory of the distribution of earnings and, to a lesser extent, of property income that emphasizes the role of investment in education and other human capital. The theory is used to explain the inequality and skewness in the distribution of earnings, why property income is more unequally distributed and skewed than earnings, and the effects of changes in the degree of equality of opportunity or the segmentation in capital markets on the distribution of earnings.

Barry Chiswick has completed his Ph.D. dissertation for Columbia University on the relation between investment in education and the distribution of income in different states of the United States and in different countries. He finds that states or countries that have relatively high rates of return on education and large inequality in its distribution usually have relatively large inequality and skewness in the distribution of incomes. Indeed, differences in these aspects of the impact of education generally explain a considerable portion of interstate and intercountry differences in the distribution of income.

The plan is to combine during the next year Chiswick's and my own work into a joint monograph on the impact of human capital on the distribution of income.

Victor Fuchs's recent paper, *Differentials in Hourly Earnings by Region and City Size, 1959*, develops new information on the rela-

tion between hourly earnings and years of schooling. Data are shown on this relationship for different age, sex, and color groups, as well as by region and size of city.

Albert Fishlow reports below on his work on economic factors in the historical development of education in the United States, while Dave O'Neill summarizes his investigation of the effects of educational attainment on differences in unemployment rates of Negroes and whites.

GARY S. BECKER

DEMAND AND SUPPLY FACTORS IN THE DEVELOPMENT OF AMERICAN EDUCATION

Analysis of American census data since 1940 has shown a substantial return, as measured by increased income, to investment in education. Extrapolation of the differential incomes by education to an even earlier period has shown the substantial contribution of improved labor skills to past growth. Unfortunately, as one goes farther back in time, the validity of such differentials becomes more difficult to assess.

Accordingly, in my analysis of the historical development of the American educational system, I have focused more upon the factors influencing the demand for and supply of educational facilities than upon its exact contribution to output. In the first instance, this has led to an examination of the transition to public elementary schooling prior to the Civil War. The analysis shows that educational levels in the United States were already quite advanced prior to the common-school revival; this result in turn leads to a reassessment of that movement and to an emphasis upon quality change rather than enrollment increase.[1] A second study already completed calculates the investment in education in the United States—direct and through forgone earnings—for selected benchmarks from 1840 to 1900. It emphasizes the large role played by private investment, as well as the ability of the United States to purchase nearly universal education for a small relative outlay.[2]

Now under way are two additional major research projects. One refers to the comparative responses of the North and South to the educational demands imposed by emancipation and increased European immigration after the Civil War. The cost burden imposed by segregation will be investigated as well as the quality differences in instruction attained by the minority groups in the two regions. A second question relates to the rapid growth of secondary education in the United States after 1890, when it exceeded the rate of increase of college training. It is notable not only because it provides a considerable measure of the increased skill level of the labor force after 1929, as calculated by Denison, but also because it represents a development not matched in Europe. The relative importance of such factors as legally eliminated opportunity costs (through restrictions upon child labor), altered labor demands, and changed curricula will be assessed.

It is anticipated that these new studies will be completed by the end of 1967 and, combined with the others, will afford an analysis of some central questions relating to the evolution of the American educational system.

ALBERT FISHLOW

EDUCATION AND OTHER FACTORS UNDERLYING NEGRO-WHITE UNEMPLOYMENT RATE DIFFERENTIALS

The reported unemployment rate of Negro males in the civilian labor force has been persistently above that of white males ever since data became generally available around 1948. For almost twenty years, through good times and bad, the Negro male rate has been approximately double that of white males.

[1] "The Common School Revival: Fact or Fancy?" in H. Rosovsky, ed., *Industrialization in Two Systems*, New York, 1966.

[2] "Levels of Nineteenth Century American Investment in Education," *Journal of Economic History*, December 1966.

As a first step toward a full understanding of the reasons for this persistent differential, I have brought together various bodies of data in an attempt to answer the question: "To what extent is the observed racial unemployment rate differential due to racial differences in the quality of labor supplied to the same market?" I reasoned that if unemployment incidence was the same between Negroes and whites of equal labor productivity, the same (but as yet not fully understood) factors that account for unemployment differentials between white workers at different skill levels would also account for racial differentials. If, on the other hand, significant racial differentials in unemployment incidence were observable, holding quality of labor supplied constant, then additional factors would have to be explored.

Initial comparisons using 1960 Census of Population data revealed that rather large racial unemployment rate differentials exist between Negro and white males at all levels of educational attainment. Within education classes (standardized for age and urban-rural residence), unemployment rate differentials were about half the size of the aggregate male differential for 1960. To be relevant this comparison must assume that Negro and white males who enter the same labor market at the same age and with the same amount of schooling constitute labor of equal quality. This assumption, however, did not appear reasonable in view of evidence on (1) current performance differentials between Negro and white youngsters at the same grade level on standardized achievement tests; (2) Negro-white differentials, holding educational attainment constant, in scores on the armed forces mental test both currently and during World War II; and (3) racial differentials in the quality of schools attended in the past by adult workers currently in the labor force.

I am now preparing alternative measures of within-education-class racial differentials in the quality of labor supplied and relating these measures to the within-education-class unemployment rate differentials mentioned above. One measure is based on the within-education-class differentials in occupational distribution by race. From these results I estimate that unemployment rate differentials between adult Negro and white male labor of the same quality were at most about one-fourth the size of the aggregate male differential in 1960. This percentage, applied to the Bureau of Labor Statistics' annual averages for 1960, implies that the adult Negro male unemployment rate was at most 1.3 percentage points greater than the rate for adult white males who supplied labor of equal quality. The other two measures will be based directly on Negro-white performance differentials on armed forces mental tests and on standardized achievement tests administered to youngsters while still in school.

Any residual differential that emerges from the labor quality analysis will be analyzed in terms of (1) racial differentials in the amount of job-vacancy information possessed by unemployed workers and (2) discrimination in employment against Negro workers. Also, available data classifying the unemployed by color and reason for job loss suggest that there are no significant differentials by race in voluntary quit rates, and so it appears that any residual differential will reflect differentials in rates of involuntary job-losing or duration of unemployment.

DAVE O'NEILL

ECONOMICS OF HEALTH

The National Bureau has begun a program of research on the economics of health. The initial financing has been provided by a grant from the Commonwealth Fund. The following individuals have agreed to serve on an advisory committee for the project, under the chairmanship of Dr. George James, dean, Mount Sinai Medical School:

Becker, Gary S., professor of economics, Columbia University

Brindle, James, president, Health Insurance Plan of Greater New York

Brown, Norton, M.D., chairman, The New York Academy of Medicine, Special Committee on Social Policy for Health Care

Burns, Eveline, professor of social work, Columbia School of Social Work
Folsom, Marion B., director, Eastman Kodak Company
Ginzberg, Eli, director, Conservation of Human Resources, Columbia University
Gorham, William, assistant secretary for program coordination, Department of Health, Education and Welfare.
Lyall, David, M.D., practicing surgeon
Reder, Melvin, professor of economics, Stanford University
Rogatz, Peter, M.D., executive director, The Long Island Jewish Hospital
Strickler, James, M.D., assistant to the president, Cornell-New York Medical Center
Tyler, Gus, assistant president, International Ladies' Garment Workers' Union

The committee held its first meeting on October 28, 1966.

The following outline indicates some of the research approaches that we are considering:

1. Descriptive Industry Study

The major facts about the present state and recent trends in the health industry are not well established or widely appreciated. There is a need, therefore, to set the factual record straight. The fields to be covered include expenditures, manpower, physical capital, utilization, professional education, geographical distributions, mortality and morbidity data. Attention would have to be given to conceptual problems (What is the health industry? What is its output?), to comparability of data, and to the development of summary measures and index numbers. Much of this work is a necessary prelude to more analytical and policy-oriented studies.

2. Studies of Output and Productivity

Our preliminary work has indicated some of the difficulties involved in attempting to measure output and productivity in the health industry. Nevertheless, we have been able to make some progress, and additional work seems warranted. A related problem is that of appraising existing measures of changes in the price of health services.

3. Decision Making and the Allocation of Resources at Three Levels

Resources for health versus other social goals. It is clear that health is desired, both for its own sake (consumption value) and because it contributes to a more productive economy (production value). It is equally clear that resources allocated to health could be used to produce other consumer goods and services, or to increase our productive capacity through the creation of physical capital, research and development, education, and so on. What is needed is some notion of the value and return to sources devoted to health, compared with alternative uses.

Resources for health services versus other factors affecting health. It is well known that health depends upon numerous environmental factors in addition to health services. Given a certain amount of resources to be used for health, choices must be made between expenditures for health services and expenditures to modify the environment. Information concerning the costs and benefits of various health-related programs is essential if these choices are to be made intelligently.

Allocation of resources among different types of health services. Given a certain level of expenditures for health services, there are still some very important decisions to be made concerning the relative proportions of hospitals, doctors, nurses, nursing homes, and other facilities or personnel. This is particularly relevant as investment decisions are made concerning construction, or the creation of new professional training programs. Granted that we need more doctors and more nurses, which need is more urgent and what are the respective rates of return to society from providing additional supplies of each?

4. Studies of Alternative Institutional Arrangements for Producing and Financing Health Services

Ownership and control of facilities—public, private nonprofit, profit making.

Organization of medical practice—solo, group, hospital-based.

Remuneration of personnel—fee for service, per capita, salary.

Financing—direct consumer payment for service, voluntary insurance, compulsory insurance, general taxation.

There is presently very heated debate over the respective merits of these alternative arrangements, but a dearth of objective research. Examples of each type and combination of types can be found in the United States, and numerous studies could be undertaken. In all such studies the purpose would be to determine the implications for health and for the economy of these alternative arrangements.

5. Studies of Innovation and Diffusion

Important advances in medical technology (diagnostic techniques, surgical procedures, drugs, and so on) can be identified. It would be desirable to discover how these innovations came into being. Also, how, and at what rate, they were diffused throughout the industry. Questions concerning costs and returns to medical research and the lag between best and average practice would play important roles in such studies.

Morris Silver, of City College of New York, has joined the program and has begun to study economic factors affecting Negro mortality. Kong Kyun Ro has joined the program and will work on the economics of hospitals. Michael Grossman will write his Ph.D. thesis at Columbia University in conjunction with this program. He will study the demand for health services. Irving Leveson and I are preparing an article on motor-car accident mortality and vehicle inspection.

Richard Auster, Irving Leveson, and Deborah Sarachek gave a paper, "The Production of Health, an Exploratory Study," at the meeting of the Econometric Society in San Francisco in December 1966.

Ira Silver and Susan Crayne have joined the program as research assistants.

Victor R. Fuchs

PHILANTHROPY

Various sections of Frank Dickinson's manuscript, "The Changing Position of Philanthropy in the American Economy," have been revised following staff review. Solomon Fabricant is preparing an introduction to the manuscript. Ralph Nelson reports below on the status of his work on philanthropic contributions by corporations.

Corporation Giving

The manuscript on economic aspects of corporation giving has been revised and substantially expanded. The main addition has been a chapter which focuses on trends in corporate giving and related developments between the late 1930's and the early 1960's. The growth of corporate income and contributions, in current and constant dollars, is described in greater detail than in the earlier draft. The chapter also examines the proportion of corporations making contributions, and prospects for the increase in total giving that might result were the practice to become more widespread. The trend in the net after-tax cost of one dollar in contributions is described, as well as changes in the share of the various recipients of corporate gifts. Available evidence on the mixture of family and business giving in smaller owner-managed corporations is presented and, though limited, permits some assessment of the amount of corporation giving in its purely institutional sense.

Corporation giving passed the $500 million level for the first time in 1961 and reached $657 million in 1963, the latest year for which data are presently available. Deflated for the increase in the general price level, average annual giving for the four years 1960–63 was nearly eight times its average for the four years 1936–39. In part, the increase reflects the rise in real corporate income and the increasing indirect participation of the general public provided by tax deductibility and the rise in corporation income tax rates over the quarter-century period. How-

ever, a more significant part of the rise reflects an increasing percentage of contributions relative to corporate after-tax income. In 1963, for example, corporations with net income gave 2.7 times as large a percentage of their after-tax income as in 1936–39, even allowing for the decline in the net after-tax cost of one dollar in giving.

RALPH L. NELSON

3. BUSINESS CYCLES

The National Bureau's work on business cycles has for many years embraced two types of investigation. Some studies take a broad view and deal with a wide variety of economic activities. Others have a narrower focus and concentrate upon a single economic process or a closely related group.

Several studies of a monographic nature were completed this year. Cagan's *Changes in the Cyclical Behavior of Interest Rates* was published; Ilse Mintz's *Cyclical Fluctuations in the Exports of the United States since 1879* and Ruth P. Mack's *Information, Expectations, and Inventory Fluctuation: A Study of Materials Stocks on Hand and on Order* are in press. In addition, Juster's *Household Capital Formation and Financing, 1897–1962* and Moore and Klein's *The Quality of Consumer Instalment Credit* (in press) deal partly with cyclical fluctuations, while Lipsey and Preston's *Source Book of Statistics Relating to Construction* provides summary measures of the cyclical behavior of construction activity.

Monographic studies that are under way are reported below, except as noted. They include Mincer's and Boschan's investigations of labor supply and demand; Friedman's, Schwartz's, and Cagan's studies of money, interest rates (section 4), and prices (section 1); Earley's and others' research on credit quality (section 4); Klein's analysis of the cyclical timing of consumer credit; Zarnowitz' work on investment orders; and Juster's project on short-run changes in consumer's plans to buy durable goods or to save (section 2).

Two reports recently published deal with economic fluctuations at large rather than with a specific sector: Zarnowitz' *An Appraisal of Short-Term Economic Forecasts* and Moore and Shiskin's *Indicators of Business Expansions and Contractions*. Other reports anticipated from the study of short-term forecasting are described below.

Ilse Mintz reports below on a new study aimed at determining whether sufficient grounds exist to establish business cycle chronologies for various foreign countries in the postwar period. Also, a new study was begun to explore whether it would be feasible as well as instructive to incorporate in a general econometric model the analytic description of business cycles contained in Arthur Burns's essay on business cycles prepared for the *International Encyclopaedia of the Social Sciences*. Gregory Chow has started to devote attention to this question.

STUDY OF SHORT-TERM ECONOMIC FORECASTING

As indicated above, *Indicators of Business Expansions and Contractions* and *An Appraisal of Short-Term Economic Forecasts* have been published. Other manuscripts that are in an advanced stage are "Forecasting and Recognizing Cyclical Peaks and Troughs" by Rendigs Fels and C. Elton Hinshaw, "The Evaluation of Economic Forecasts" by Jacob Mincer and Victor Zarnowitz, "Adaptive Forecasting: Exponential and Nonexponential Extrapolations" by Jacob Mincer, and "Errors in Estimates of Gross National Product" by Rosanne Cole.

Other studies in preparation include an

analysis of the short-term forecasting ability of econometric models by Jon Cunnyngham and a report on the relation between measurement errors and forecasting accuracy by Rosanne Cole.

An Appraisal of Short-Term Economic Forecasts presents the results of my study of eight sets of forecasts representing the efforts of a large number of individuals, mainly business economists. Additional materials have now been assembled and processed that were not available to me at the time that report was prepared. An analysis of these data is under way. It will permit a re-examination of some of the problems and findings treated in the first report. The new information offers longer and more continuous series of forecasts, starting in the early postwar years. It includes predictions of quarterly as well as annual data, by academic as well as business and financial economists. Since it contains a large number of continuous records of individual forecasters, it will be possible to avoid some potentially serious aggregation problems that pertain to the average forecasts of groups.

The agenda for further study also includes such topics as the distribution of actual predicted changes and forecast errors, determinants and effects of forecast revisions, and the structure and internal consistency of forecasts of economic aggregates and their components.

VICTOR ZARNOWITZ

FORECASTING AND RECOGNIZING CYCLICAL PEAKS AND TROUGHS

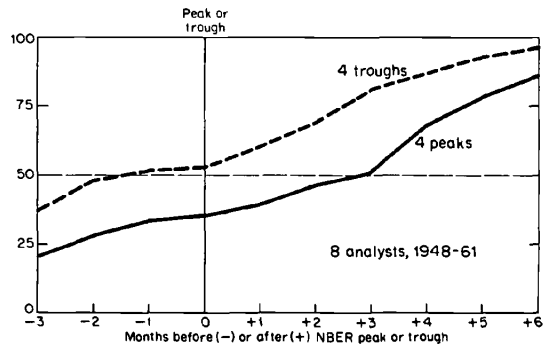
During the past year my manuscript, "Forecasting and Recognizing Cyclical Peaks and Troughs, 1919–29 and 1948–61," has been revised and extended. The principal change has been the addition of two explicit scoring systems, one for accuracy of dating, the other for degree of certainty. The forecasts of eight analysts that have been regularly reported in widely circulated publications were scored for ten-month intervals in the vicinity of the eight peaks and troughs between 1948 and 1961. Two other analysts who relied heavily on business cycle indicators were scored for the four or five peaks and troughs for which published forecasts by them are available.

Degree of certainty refers to the confidence a forecaster has in his prediction of a peak or trough. A published forecast stating that there were even chances of a cyclical peak (or trough) in the vicinity of the actual peak was given a score of 50. If the forecast indicated that a peak (or trough) was more likely than not, it was given a score between 50 and 100 (the maximum score was given for complete certainty). If it implied that a peak or trough in a time interval close to the actual peak or trough was less likely than not, the score assigned was between 0 and 50. Since the publications rarely stated odds explicitly, the scores had to be based on what their words implied.

Chart IV-4 shows the average scores for degree of certainty for eight forecasters at four peaks and at four troughs. As might be

CHART IV-4

Degree of Certainty of Forecasts of Cyclical Peaks and Troughs, 1948–61



expected, the curves slope upward to the right, indicating that the degree of certainty in forecasting or recognizing cyclical peaks and troughs is low three months before the NBER reference date, rises steadily, and is quite high six months afterward. The scores are consistently higher for troughs than for peaks. The same is true for the scores for accuracy of dating, which are not shown here.

Accuracy of dating refers to ability to forecast or recognize the date of a peak or trough. The maximum score of 100 was given a published prediction that missed the NBER reference date by no more than one month, with lower scores for lesser accuracy.

Geoffrey Moore wrote in 1950, "If the user of statistical indicators could do no better than recognize contemporaneously the turns in general economic activity denoted by our reference dates, he would have a better record than most of his fellows." The scores tend to confirm Moore's assertion. A majority of the scores for accuracy of dating for forecasts published in the month of the NBER reference date were zero. On the average, a score of 50 for degree of certainty (even odds on a cyclical turn) is first exceeded one month before cyclical troughs and three months after cyclical peaks. Evidence that users of the NBER indicators actually have done better than their fellows is weak. Two analysts who relied heavily on the indicators scored better than the average of the others at the peaks of 1957 and 1960, but worse at the troughs of 1958 and 1961.

C. Elton Hinshaw has completed a companion study on the recognition record of the Open Market Committee of the Federal Reserve System. He has scored the forecasts appearing in the minutes of the committee for the period 1947–60 for the degree of certainty and compared his results with mine. He is now revising his manuscript. Subject to approval of the studies by the Board, it is planned to publish both of them in a single volume.

RENDIGS FELS

EVALUATION OF FORECASTS

The first draft of "The Evaluation of Economic Forecasts," written jointly with Victor Zarnowitz, was reviewed by a staff committee during the past summer. Subsequently, a revised version of the manuscript was submitted to the Board. The methodology developed in the paper was conceived as an aid in implementing the Bureau's study of short-term economic forecasting. The problems and findings encountered in the empirical work provided a feedback for further methodological development, resulting in the present formulation. Specifically, the paper deals with methods of assessing the degree of accuracy of business forecasts. We formulate and apply measures of absolute and relative accuracy. In the "absolute accuracy analysis" we measure the closeness with which predictions approximate their realizations. In the "relative accuracy analysis" we assess the net contributions, if any, of business forecasts to the information about the future available from alternative, relatively quick and cheap methods, such as extrapolation of the past history of the series that is being predicted. At the same time, we try to assess the degree to which the forecasts themselves rely on extrapolation of the past. To the extent that forecasts do incorporate extrapolations, analysis of extrapolation errors helps in understanding patterns of forecast errors.

A particular extrapolative form of forecasting is treated in a companion paper, "Adaptive Forecasting: Exponential vs. Non-exponential Extrapolations." The first draft of this paper was completed in September, and a final draft will soon be in the hands of the Board. In this paper a distinction is made between the special case of "adaptive forecasting" arising from exponential extrapolation and the more general case arising from linear autoregressive extrapolation. Conditions under which exponential or other forms are optimal are explored. The empirical relevance of distinguishing exponential from non-exponential models of expectations is indicated in applications to such fields as the analysis of business forecasts, the analysis of expectations embedded in the term structure of interest rates, and the analysis of expectations underlying formulations of aggregative consumption functions.

The ideas developed in "Adaptive Forecasting" led to some experimentation with reformulating an expectational model underlying Friedman's permanent income hypothe-

sis (*A Theory of the Consumption Function,* Princeton for NBER, 1957). The purpose of the reformulation is to make possible empirical estimation of (subjective) rates at which consumers discount future income for purposes of current consumption. Population groups and economies differ in their discount rates. This factor creates differences in income consumption relations, as well as in consumer investment and human capital investment behavior. Thus far, the empirical experimentation looks promising, and a paper reporting the results is in preparation.

JACOB MINCER

GNP REVISIONS AND FORECASTING ACCURACY

Most appraisals of current business conditions and forecasts of the future course of the economy rely in part on preliminary estimates of recent levels and movements in GNP. The frequent revisions of these estimates serve as steady reminders that they are subject to error. The revisions are a measure of the price, in terms of accuracy, of up-to-date GNP statistics. It should not be supposed, however, that the existence of these errors destroys the value of these early estimates.

This study explores the nature of the revisions in preliminary GNP data and the extent to which these apparent errors may have impaired the accuracy of GNP forecasts. Two reports have been completed. The first, a proposed Technical Paper, reviews the characteristics of GNP revisions. Its major findings are:

1. Differences between preliminary and revised estimates resemble extrapolation errors. The revisions are largest in those series showing large variability and weak serial correlation, and which are therefore the most difficult to extrapolate accurately.

2. The preliminary estimates have not been much more accurate than forecasters' estimates of current annual levels in GNP and its major components, even though the forecasters' estimates were published three to four months earlier than the official figures.

3. Errors in the preliminary estimates of quarterly changes in GNP and most of its major components were smaller during 1955–61 than earlier in the postwar period. Mechanical extrapolations, however, showed a similar reduction in error. If the reduction in extrapolation errors is used as a yardstick, not quite half of the GNP series show greater gains in accuracy.

4. The early figures tend to overestimate cyclical and underestimate longer-term trend movements in GNP. The cyclical errors are primarily the result of overestimating changes in gross private domestic investment, while underestimating changes in personal consumption expenditures is the main source of the trend errors. During periods of business cycle contraction, the two kinds of error reinforce each other and have caused the initial estimates to exaggerate substantially the severity of peak to trough decline in GNP. The errors have tended to offset each other during periods of expansion.

The second paper, currently being revised, shows how errors in the preliminary statistics are transferred to forecasts of GNP and its major components and, as a consequence, how they impair the accuracy of these forecasts.

ROSANNE COLE

INTEREST RATES AND BUSINESS CYCLE DURATIONS

Business commentators have long pointed to the importance of financial effects upon business cycles. Yet it has proved difficult to measure these effects statistically because of their complex interaction with other cyclical developments. In the course of my work on the cyclical behavior of interest rates (see section 4), I examined one aspect of the effect of financial ease or tightness by comparing turning points in interest rates with the duration of cyclical phases in business activity. This method avoids some of the difficulties of other approaches.

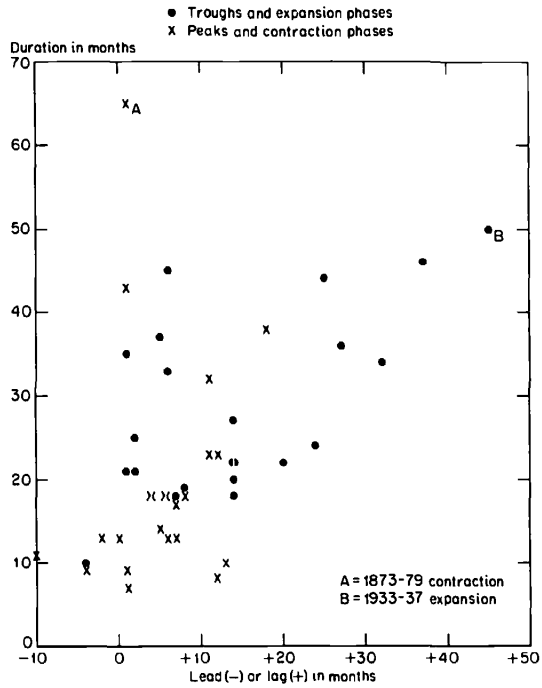
Most interest rates have, as a rule, lagged behind business cycle turns. On the assumption that shifts in the demand for loanable funds conform closely to movements in business activity, the lagged turns reflect nonconforming movements in the supply of funds. Such autonomous shifts in supply, then, may both affect the timing of interest rate cycles and contribute with a lag to the turning points in investment and in business activity. One test of these effects would be to determine whether delayed upturns in rates prolong business expansions and delayed downturns prolong contractions, and conversely for early turns in rates. Such a test does not require a large variety or high quality of data and therefore allows us to cover experience over a long historical period.

Chart IV-5 shows the extent to which the length of the lag in bond yields is related to the length of the corresponding business cycle phase, 1857 to 1960. It suggests a weak but significant association, which regression analysis confirms. When bond yields have continued to decline for a long time after business has turned up, the expansion in business has generally been longer than when the upturn in yields came shortly after the business recovery started. Similarly, when the downturn in yields has lagged behind the downturn in business by an unusually long interval, the contraction in business has generally been longer than usual.

Chart IV-6 reveals a similar, if not closer, correspondence between the lag in bond yields and the length of cyclical swings in construction contracts. This is not a mere repetition of the test in Chart IV-5 because, although the movements in construction do correspond broadly to the business cycle, they often deviate considerably. Moreover, the peaks and troughs in construction-contract activity ordinarily occur *before* those in general business, and it is reasonable to suppose that the effects of financial stringency or ease would be observed first in decisions—such as the placing of a construction contract—where the cost of long-term funds is of great importance. This is one way in which the effect on general business activity could come about.

CHART IV-5

Lead or Lag in Bond Yields at Reference Cycle Turns, and Duration of Reference Phases, 1857–1960

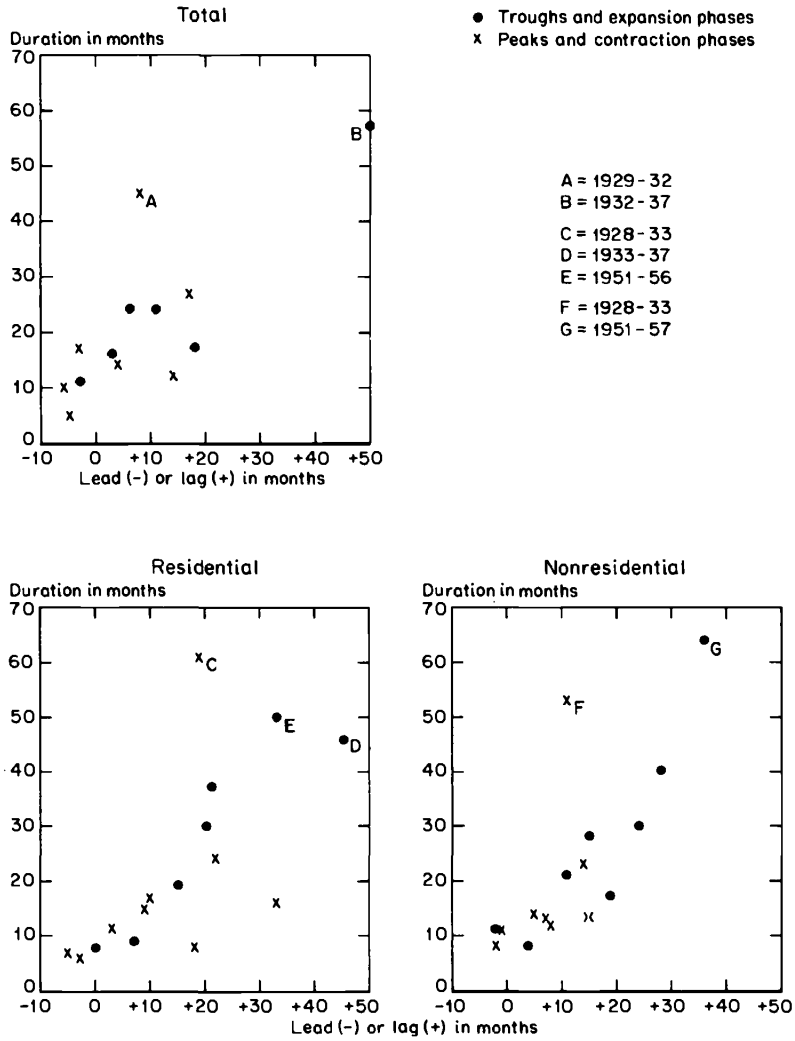


SOURCE: 1857–1937, average of high-grade railroad bonds, from F. R. Macaulay, *Some Theoretical Problems Suggested by the Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856,* New York, NBER, 1938; 1937–65, average of Aaa public utility bonds (1937–45 from S. Homer, *A History of Interest Rates,* New Brunswick, N.J., 1963; 1945–65 from *Moody's Public Utility Manual*).

Various statistical tests performed on the data support the conclusion that the observed association reflects a financial influence on economic activity rather than some mechanical characteristic of cyclical movements. Moreover, the expansion of business activity since 1961 (not included in the charts) is consistent with the earlier experience. The cyclical upturn in bond yields came in early 1963, which is two years after the business cycle trough and uncommonly late, while the business expansion by the end of 1966 had lasted nearly six years, the longest on record except for World War II. According to our

CHART IV-6

Lead or Lag in Bond Yields at Turning Points in Value of Total, Residential and Nonresidential Construction Contracts, and Duration of Phases in Construction



SOURCE: F. W. Dodge Corporation. Periods covered are total construction 1912–60, residential 1916–60, nonresidential 1919–60.

interpretation, the supply of loanable funds in the early 1960's kept pace with the demand and prevented financial restraint from impeding investment decisions until 1963, and even then the restraint did not become strong, judging by the rate of rise in interest rates, until the second half of 1965.

A paper reporting these results has been reviewed by the staff and is being revised.

PHILLIP CAGAN

INVESTMENT COMMITMENTS AND REALIZATIONS

One of the important facts about investment in plant and equipment is that it is a process which unfolds in time through a succession of phases. This has implications which can be helpful for short-run analysis and prediction in the area of capital formation.

The initial stages of technical and economic planning and cost estimation may be long

and important, but so far they have lacked adequate representation in the available data. In time, the decision to invest becomes firm and concrete, with respect to both the details of the project and the time it is to be initiated, and funds to finance it are budgeted, appropriated, and contractually committed. These early stages are measurable in terms of the current aggregative series on capital appropriations (National Industrial Conference Board) and new investment orders and contracts (Department of Commerce, F. W. Dodge Corporation). The physical processes of plant construction and equipment production follow, resulting in finished output of capital goods. As the orders and contracts are filled, payments on their account are made. These late stages are recorded in various series on construction put in place, output, shipments and installations of investment goods, and capital outlays.

Business expenditures on plant and equipment have lagged by about ten months, on the average, behind cyclical turns in new investment orders and contracts during the period since 1949. Comparisons of expenditures with new capital appropriations, which start in 1953, produce a similar over-all figure. At peaks, the average lags were somewhat longer (twelve to fourteen months) than at troughs (eight to nine months). In the early postwar period the lags were very long—from one to two years—on several occasions, but since 1958 they have generally varied from six to nine months. All these measures are based on comparisons between quarterly, seasonally adjusted series.

The highest simple correlations between new investment orders and contracts (OC) and the Commerce-SEC series of business expenditures on plant and equipment (I) are obtained with lags of either two or three quarters. A three-quarter lag also maximizes the correlation between new capital appropriations and I. The quarterly "first anticipations" of investment outlays compiled by Commerce-SEC show much the closest association with I ($r^2 = .96$ for 1949–61; for the relations with OC, r^2 varies between .83 and .88; and for those with appropriations, r^2 is about .80). The effective lead time relative to I, however, is much shorter for the anticipations than for the other series.

The connection between investment commitments and realizations ought in principle to be very close, but the observed correlations are lowered by deficiencies in the data and inadequate measurement methods. In particular, OC leaves much to be desired; e.g., it overestimates the equipment and underestimates the plant component of the commitments aggregate. Also, the relations presumably involve distributed lags rather than discrete lags, because of wide variations in the period of production of various types of equipment and structures.

Consistently with this presumption, investment realizations not only lag behind but are also considerably smoother than investment commitments. The aggregative series are highly autocorrelated: for successive quarterly values, r^2 equals .88 for OC and .95 for I. Earlier values of OC retain significance in a model of the Koyck type which includes the lagged value of the dependent variable, here I_{t-1}, as an explanatory factor (R^2 is .96). Regression results based on this model imply that typically about 46 per cent of the value of orders and contracts are spent in the first year after placement of the orders, 70 per cent during the first six quarters, and over 80 per cent by the end of two years. This pattern is similar to that obtained recently from the NICB data on capital appropriations and outlays of large manufacturing companies.[1]

There is evidence to suggest that the dependence of investment realizations on commitments involves distributed lags with variable rather than fixed coefficients. During a boom, firms receive new orders at high and rising rates at the same time that they approach full-capacity operations; hence they usually require more time to fill orders. In other words, shipments in such periods con-

[1] Shirley Almon, "The Distributed Lag between Capital Appropriations and Expenditures," *Econometrica*, January 1965, pp. 178–196. According to this study, the proportions of total appropriations spent are 45 per cent in a year, 77 per cent in six quarters, and 92 per cent in two years.

tain a larger share of old orders and a smaller share of newly received orders. A recent article showed that regressions with variable coefficients perform better than those with fixed coefficients for a distributed-lag model relating new orders and shipments of machinery and equipment industries.[2] The approach consists in making the lag coefficients depend on the value of backlog-shipment ratios, which serves as an index of pressure of demand upon capacity. I find that the variable-coefficients model works well for other industries in which production to order is important, as would be expected.

Investment decisions are better represented by appropriations or new orders than by output or expenditures. The impact of the factors which influence decisions is presumably strongly reflected in the behavior of the orders-contracts series. A rather different group of factors influences the speed or rate of the implementation of investment orders. The variables in the first group affect capital outlays with rather long lags, those in the second group with shorter lags. Partial overlaps between the two sets are possible, since the variables which influence orders, such as financial constraints, may also have some effect upon the transformation of orders into expenditures.

I have examined regressions of investment commitments (OC) on several factors which have been considered to be important determinants of investment decisions. Equations in both current-dollar and constant-dollar form were used with quarterly series for the period 1949–62. They show positive effects of the "final sales" component of GNP and negative effects of the real capital stock; together, these can be viewed as a flexible version of the accelerator or capacity principle. Levels and changes of profits after taxes also have significant positive effects. On the other hand, corporate cash flow (retained earnings plus depreciation) seems to be merely a proxy for profits: it lacks significance when included together with profits. Interest rates exhibit a significant influence, with the expected negative sign.

These are predictive equations, in which OC is taken with lags relative to the above explanatory variables. The shortest (one-quarter) lags are generally much more effective than longer lags, and simultaneous timing would often yield closer correlations. Investment commitments are early movers in the procession of economic time series; systematic leads relative to OC seem hard to find. However, changes in interest rates (inverted) and in types of profits variables (representing not only aggregates but also diffusion of profits) may help to account for the early cyclical turns in investment commitments. Cagan's work on interest rates (see section 4) supports this contention. Certain other monetary and financial variables, reflecting the possible influences of changes in money stock and evaluations of the future by security markets, may also play a role.

The current-dollar equations "explain" as much as 92 per cent of the variance of OC_t even without the use of the autoregressive term OC_{t-1} as one of the explanatory factors. The constant-dollar equations produce lower correlations, but may be more meaningful. These regressions account for 75 per cent of the variance of investment orders and contracts when lags of one quarter are used, and for 83 per cent upon addition of the autoregressive term. However, the inclusion of OC_{t-1} tends to reduce the significance of other variables, in some cases drastically; moreover, it implies distributed lags that are sometimes implausibly long.

There are clearly great advantages to be gained from improvements of both the data and the explanatory models of investment commitments, and there is also need for more disaggregative data and models. Analytically, the rewards lie in more efficient isolation and better understanding of the determinants of investment decisions; prognostically, in the extension of the effective span of forecasts of investment realizations.

[2] Joel Popkin, "The Relationship between New Orders and Shipments: An Analysis of the Machinery and Equipment Industries," *Survey of Current Business*, March 1965, pp. 24–32.

My work on this subject began in 1963–64 under a Ford Foundation faculty research fellowship. It has been incorporated in two chapters of my manuscript "Orders and Production in Manufacturing Industries." Completion of that study has been delayed by other responsibilities, including the research on forecasting, but I have taken advantage of new information that became available in the meantime. Most of the substantive parts of an extended and updated manuscript are completed.

VICTOR ZARNOWITZ

TURNING POINTS IN FOREIGN BUSINESS CYCLES

In the United States the NBER business cycle turning points have come to be regarded as indispensable. Government, business, and academic economists rely on these bench marks in appraising policy, in forecasting, and in analyzing economic processes during expansion periods and recessions.

When it comes to international matters, however, similar reference points are not available. Those who seek information on the relative severity of fluctuations in different countries, on timing relations among national cycles, on the international transmission of economic fluctuations, and indeed on the continued existence of business cycles must delve into the basic data and make their own decisions as best they can. The NBER's own studies in the international field are hampered by this lack of information. My new project should begin to fill this gap.

The proposed dating of foreign business cycles may encounter the objection that some, or most, foreign economies have not experienced any periods of general decline in recent years. However, it may be replied that fluctuations—although on the whole milder than previously—persist in many aspects of the economy. New orders, investment in inventories, foreign trade, interest rates, profits, and stock prices continue both to rise and to fall. And people continue to be concerned about "recessions," "slack periods," "pauses," "boom years," "overheating of the economy," and so on. Analysis of these various situations will be helped by defining exactly when they begin and end, i.e., by constructing a reference framework for each country. The changed character of the swings will have to be taken into account, however, in selecting the standards and methods of measurement.

For three foreign countries, Great Britain, France, and Germany, Burns and Mitchell present cycle chronologies from the 1800's to 1938 in *Measuring Business Cycles.* Our first task will be to bring these chronologies up to date. Among the three countries, the presence of old-style recessions since World War II seems most doubtful in Germany. We therefore begin with the analysis of the German economy as the one best suited to testing old methods and experimenting with new ones. Later we shall extend the analysis to other countries.

Our first step is to find out whether turning points can be found in German time series, since 1950, by the standards used by the NBER for the United States. Preliminary inspection shows that such series as industrial employment, industrial production of materials, prices of materials, and stock prices have declined for two or more consecutive quarters at one time or another. We are now preparing measures for comparison of these declines with the mildest recessions in the United States in order to ascertain whether one or more comparable German recessions have occurred in the period under review. We shall also wish to consider whether or in what respects the declines resemble those recognized in the German business cycle chronology prior to 1938. These analyses will be aided by the new program for setting turning points by electronic computer developed at the NBER by Gerhard Bry and Charlotte Boschan.

But whether a German recession by traditional standards has or has not occurred in the last fifteen years or so, there is no doubt that nowadays periods are termed "recessions"

when no decline in aggregate economic activity, but merely a slowdown of its growth, occurs. Therefore the next step will be to analyze cycles in growth rates and their relation to cycles in the series proper. In view of the close resemblance in behavior of growth rates and diffusion indexes, this analysis will benefit greatly from the body of knowledge of diffusion indexes developed by Geoffrey H. Moore, Julius Shiskin, and others. The trouble with growth rates from our point of view is their tendency to lead turns in the level of the corresponding series. Hence a chronology based on the highest and lowest points in growth rates would not be comparable with standard NBER chronologies. It would, moreover, give a distorted picture of economic swings, since the maximum rate is likely to be reached early in the recovery after a recession, and the ensuing period of high growth rates and high prosperity would then be classified as a declining phase.

Fortunately, a way to cope with this problem has been devised by Friedman and Schwartz in their study of cycles in the stock of money. This is the concept of the step cycle, an alternation of periods of high and low growth, with the last point in each step defined as the turning point.

The timing of step-cycle peaks in growth rates may be expected to agree more or less with that of peaks in the series proper in instances where declines have occurred. If so, the method would yield chronologies which would be consistent with the traditional ones, yet would permit recognition of movements which could not be classified as cycles by previous standards.

ILSE MINTZ

LABOR FORCE AND UNEMPLOYMENT

Since most of my time during the past year was devoted to analyses of forecasts and of expectations, the study of short-term fluctuations in the labor force proceeded at a slower pace. As previously reported, the major finding of this study is that the labor force responds to short-term pressures and incentives impinging on it. Thus it fluctuates in consonance with the business cycle, though the relation is rather loose and the amplitude generally weak. The response to changing job opportunities is a net result of forces operating in opposite directions. Roughly, these forces correspond to the income and substitution effects of standard economic theory. Because population groups differ in the relative strength of these forces, their net labor force responses differ, rather predictably, from group to group.

Aside from cyclical behavior, the study attempts to ascertain labor force responses to changes in retirement and social security provisions, in minimum wage laws, in costs and attractiveness of schooling, and in demands for military manpower. The scope of the study was recently expanded to include seasonal and regional fluctuations.

Adjustments to changes in demand for military manpower played an important part in labor force developments of the past two years. These developments were analyzed in a paper, "The Short Run Elasticity of Labor Supply," presented at the Annual Meeting of the American Economic Association, December 1966. The paper will appear in the *Proceedings* of the Industrial Relations Research Association. A shorter version appeared in the *Monthly Labor Review,* February 1967.

As a part of the study of the unemployment structure in the United States, Dave O'Neill has been analyzing Negro-white unemployment differentials. As a first step, O'Neill tries to decompose the differentials into those due to differences in labor quality and a remainder. Educational attainment is an important component of labor quality, but differences in nominal schooling understate the differences in effective educational attainment. O'Neill's report on these and other issues in his research is presented in section 2.

JACOB MINCER

JOB VACANCIES

A draft manuscript, "Fluctuations in Job Vacancies—an Analysis of Available Measures," has been completed. It deals with secular, cyclical, and seasonal fluctuations in such series as job openings pending at U.S. Employment Service offices, help-wanted advertising, and unemployment. It contains a theoretical discussion concerned with job vacancies and their relation to unemployment, an empirical analysis of these economic variables in the United States, and a comparison with the behavior of corresponding measures in six European countries. An attempt is made to draw inferences from the analysis of the available data concerning the behavior of job vacancies in general. This proved to be impossible for vacancy levels, involves great uncertainties for trends, but seems to be more feasible for cyclical and seasonal fluctuations.

The study is supported by a grant from the Office of Manpower Policy, Evaluation and Research and by other funds of the National Bureau.

CHARLOTTE BOSCHAN

MONEY AND BANKING

During the past year we prepared a new draft of a lengthy chapter on cyclical changes in money, income, and prices. This and drafts of chapters on short-term changes in the demand for money, on which work is still proceeding, will constitute a separate manuscript, in addition to the one on trends which has been reviewed by a staff reading committee (see section 1). As soon as we finish revising the report on trends, we shall turn our attention to the manuscript on short-term changes.

MILTON FRIEDMAN
ANNA J. SCHWARTZ

ELECTRONIC COMPUTER PROGRAMS FOR BUSINESS CYCLE ANALYSIS

A manuscript on "Electronic Computer Programs for Business Cycle Analysis" has been revised and edited and is ready to go to a staff reading committee. It was decided to add a short chapter on programmed determination of cyclical turning points, which we developed and tested. This chapter is now being written.

Chart IV-7 shows the turning points determined by the present version of the program which we are still trying to improve. The chart is also an example of the output of our new electronic plotter and the programs which we developed for it.

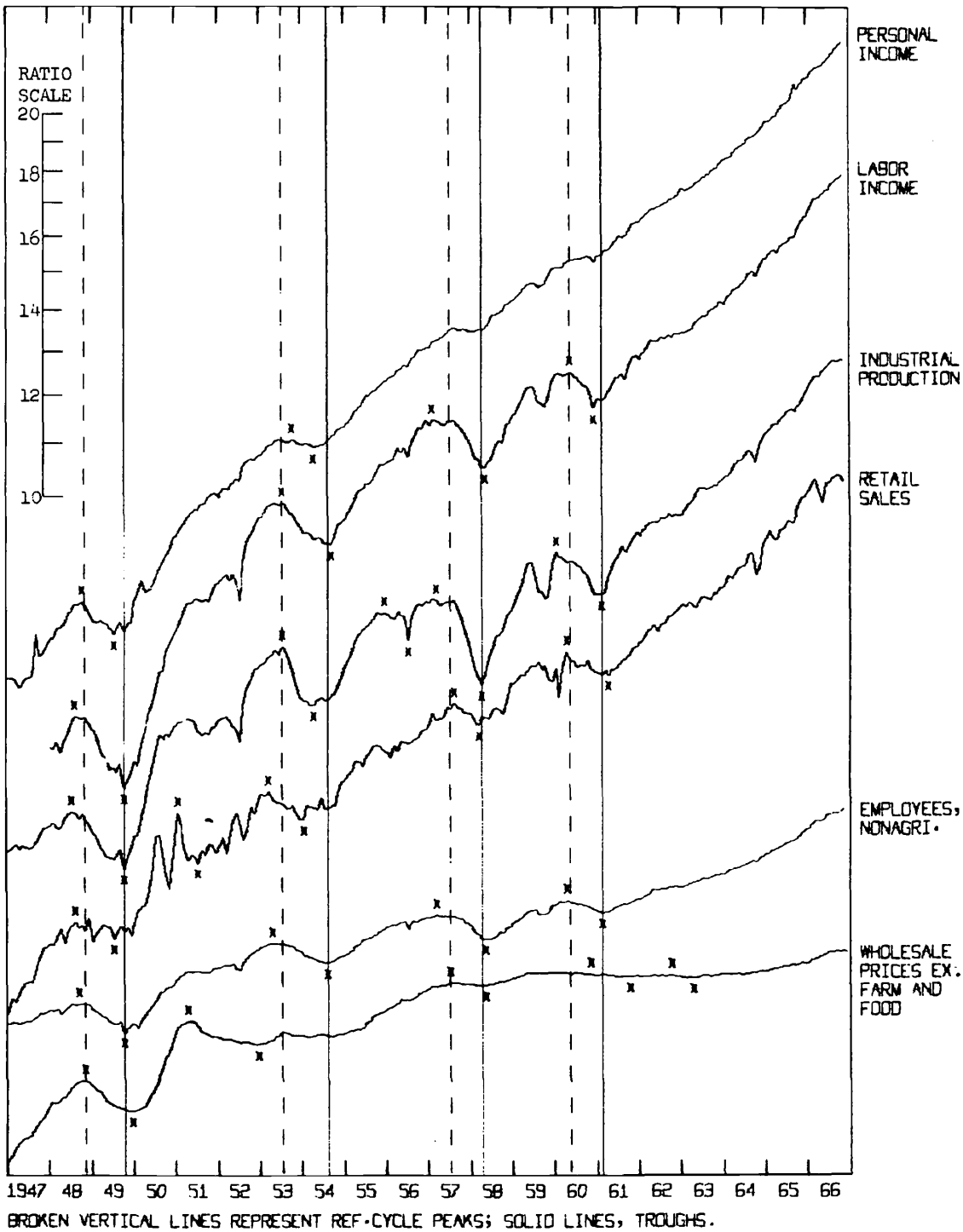
We conducted extensive computerized experiments regarding the effect of changes in the time dimension upon the parameters of econometric expressions. We found that (1) selection of subperiods (forties, fifties, and sixties, expansions and contractions, high and low levels of capacity utilization), (2) degree of aggregation in the time unit (by months, quarters, years, etc.), (3) degree of smoothing (moving averages of various lengths), and (4) length of span over which changes are measured all affect parameters substantially. In several cases they led to differences in sign. Gerhard Bry reported on some results of this experimentation in his paper "Articulating the Time Dimension for Economic Analysis," which appeared in the American Statistical Association, *1966 Proceedings of the Business and Economics Statistics Section.*

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

GERHARD BRY
CHARLOTTE BOSCHAN

CHART IV-7

PROGRAMMED DETERMINATION OF TURNING POINTS



BROKEN VERTICAL LINES REPRESENT REF-CYCLE PEAKS; SOLID LINES, TROUGHS.

4. FINANCIAL INSTITUTIONS AND PROCESSES

A broad view of the workings of the financial system would encompass the trends and fluctuations in the volume of money and credit, in interest rates, and in the quality of credit. It would be concerned with the interrelations among these aspects of the performance of credit markets, as well as with their interaction with the rest of the economy. The National Bureau's current research in finance embraces all these elements.

The following studies dealing with long-term growth in financial sectors were published last year: *Private Pension Funds: Projected Growth,* by Daniel M. Holland, and *Household Capital Formation and Financing: 1897–1962,* by F. Thomas Juster. Interest rate movements and relationships were the subject of Joseph Conard's *The Behavior of Interest Rates: A Progress Report* and Phillip Cagan's *Changes in the Cyclical Behavior of Interest Rates.* Two books are concerned with credit quality: *Trends in Corporate Bond Quality* by Thomas R. Atkinson (recently published) and *The Quality of Consumer Instalment Credit,* by Geoffrey H. Moore and Philip A. Klein (in press).

Most of the current studies in this field are described in the reports that immediately follow. They cover research on interest and finance rates, on bank lending terms and market structure, and on credit quality. The reports by Friedman and Schwartz in sections 1 and 3 describe their work on trends and cycles in money, income, and prices. Cagan's report in section 3 is concerned with interest rates and business cycles. In section 5 Michaely's study of balance-of-payments policies and Furth's study of foreign dollar balances are noted.

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.

Conard's initial report on the project as a whole, *The Behavior of Interest Rates: A Progress Report,* has been published, and his draft manuscript, "Yield Differentials Between Newly Issued and Seasoned Securities," is being revised with a view to publication. Occasional Papers by Reuben A. Kessel, *The Cyclical Behavior of the Term Structure of Interest Rates,* and Phillip Cagan, *Changes in the Cyclical Behavior of Interest Rates,* also have been published. A study by Avery Cohan, "Yields on Corporate Debt Directly Placed," is in press.

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

A draft of "Residential Mortgage Yields Since 1951" by Jack Guttentag and Morris Beck was circulated to a reading committee during the summer, and a revised draft should

be ready shortly. 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.

In the study of nonresidential mortgages, Royal Shipp is analyzing yield determinants and market structure, using data on the characteristics of loans authorized by fifteen life insurance companies during each of four quarters: the third of 1954, fourth of 1959, third of 1963, and first of 1965. The data cover average contract rate, loan size, loan-value ratio, maturity, debt coverage ratio, capitalization rate, as well as other characteristics, with breakdowns by nine regions and eleven types of property. Computer programs have been written that provide frequency distributions, arithmetic means, and standard deviations of the numerical variables. Data tapes are currently being prepared for use in regression analysis. Current data comparable to those being used by Shipp have been collected regularly by the Life Insurance Association of America since July 1965.

Three shorter papers on various aspects of the mortgage market are under preparation. "The Cyclical Behavior of Residential Mortgage Yields" by Jack Guttentag draws on the new time series data collected by Guttentag and Beck to re-examine several common hypotheses regarding mortgage yield behavior (such as the hypothesis that mortgage yields are more sluggish than bond yields). "Inter- and Intraregional Yield Differentials on Conventional, Residential Mortgage Loans" by E. Bruce Fredrikson of Syracuse University uses new data compiled by the Federal Home Loan Bank Board to examine the geographical structure of conventional yields, focusing on regions, states, and metropolitan areas. "The Structure of the Nonresidential Mortgage Market" by Royal Shipp, Board of Governors of the Federal Reserve System, sets forth some basic relationships between nonresidential mortgage loan terms, property characteristics, and borrower characteristics.

JACK M. GUTTENTAG

DIRECT PLACEMENTS—YIELDS AND QUALITY

"Yields on Corporate Debt Directly Placed" is in press. The principal findings of the study are:

1. The most important determinants of yield, for both industrials and utilities, are size of issuer (as measured by total capital), interest coverage, and the average term of the issue. Other less important, although significant, variables are type of lien, industrial class, years nonrefundable, size of issue, maturity, and the debt-equity ratio of the borrower.

2. For finance company issues, the significant variables are size of issue, earnings (before interest and taxes), the coefficient of variation of earnings, the ratio of net worth to senior and equal long-term debt, and type of security.

3. Series have been constructed, holding *all* the above significant variables constant over time, separately for industrial, utility, and finance company issues. These series behave in much the same way as yields on long-term governments—all series show strong upward trend over the period 1951–61 and their turning points conform fairly well to NBER business cycle turning points.

Average yields on industrial direct placements were very close, during the period, to yields on FHA mortgages. Yields on utility direct placements were somewhat lower than yields on FHA mortgages, while yields on finance company placements were somewhat higher.

4. Yields on direct placements are not uniformly higher than yields on comparable public offerings. They are higher only on the large higher-quality issues—and the extent to which they are higher depends on the level of interest rates. On issues of lesser quality, yields on direct placements are either lower than or about the same as yields on comparable public offerings.

In my new study I have defined the quality of a new direct placement as $1+g/1+r$, where r is the yield on the direct placement in question and g is the yield on a government of the same maturity and nonquality characteristics. Both yields relate of course to the same moment of time.

I have called this measure the "probability" that the yield promised on the direct placement will in fact be realized. Strictly speaking, the measure cannot be interpreted as a "probability" unless various assumptions are satisfied: (1) that governments are in fact riskless; (2) that the direct placement market is a fully competitive market from the point of view of the issuer—i.e., that no issuer need pay more for money in the market than the yield on governments of the same maturity plus an appropriate risk premium; (3) that the insurance companies themselves —i.e., the buyers of direct placements—are able to switch freely from mortgages to direct placements to governments, or vice versa, in order to take advantage of whatever yield differentials may appear; (4) that the buyers of direct placements are risk-neutral; and (5) that the direct placement and the government bond are alike with respect to their nonquality characteristics.

The first and second assumptions seem reasonable; the third is dubious, primarily because the secondary markets in mortgages and direct placements are very limited; the fourth is uncertain; and the fifth, although dubious, probably does not matter very much.

Some preliminary analyses have been completed and I am now exploring the question of "risk-neutrality." That is, I am trying to find evidence bearing on the hypothesis that the large life insurance companies, during the period, were in fact risk-neutral. But even if I find that they were not, I will, I believe, be able to interpret changes in the above ratio as indicia of changes in quality—on the assumption that the risk preferences, if any, of the buyers of direct placements did not change during the period.

AVERY B. COHAN

CYCLICAL BEHAVIOR OF INTEREST RATES

The first part of my research on the interest rate project was published in December: *Changes in the Cyclical Behavior of Interest Rates* (Occasional Paper 100). The remaining work is incorporated in the four reports described below. The first three papers are being revised and will be ready for submission to the Board this year. The fourth is being revised and expanded to monograph length; it should be completed early next year.

1. "The Influence of Interest Rates on the Duration of Business Cycles" examines the relation between cyclical turning points in rates and the duration of expansions and contractions in business activity and in investment expenditures. There is a small but statistically significant association for bond yields, which is interpreted as reflecting a financial influence on business activity. When bond yields turn up later than usual after a reference trough, the business expansion tends to last longer than usual, and similarly for bond downturns in contractions. For a summary of this study, see section 3.

2. "Interest Rates and Bank Reserve Ratios—A Reinterpretation of the Association" reviews previous empirical studies and takes a new look at the evidence. It is found that short-term interest rates affect the reserves of banks, which recent studies have contended but which disputes an older view that the association reflected market responses to the reserve position of city banks, particularly in New York City. The main finding,

however, is that the interest rate effect has been considerably overestimated by recent studies and that it is actually quite small and has a negligible influence on the growth rate of the money stock. Most of the observed association is a spurious reflection of variations in the demand for bank loans. Banks, in order to preserve customer loyalty, apparently make every effort to satisfy this demand without commensurate changes in loan rates, regardless of whether it is profitable in the short run for them to do so.

3. "A Study of Liquidity Premiums on Federal and Municipal Government Securities" presents new evidence and a rationale for the finding reported by other studies that such premiums (adjusted to exclude expectational effects) do exist. Kessel's results (*The Cyclical Behavior of the Term Structure of Interest Rates,* Occasional Paper 91), which pertain to the short end of the yield curve for U.S. securities, showed that the premium varies with the general level of the curve. Holding-period yields are used here to test his results for both the short and the long end of the curve. His findings are confirmed for the short end, but only partially for the long end, in part because of certain difficulties of measurement. Possible solutions to these difficulties are explored. The paper discusses the implications of these findings for the interpretation and explanation of liquidity premiums.

4. "The Channels of Monetary Effects on Interest Rates" extends the findings of *Changes in the Cyclical Behavior of Interest Rates,* which demonstrated an inverse dependence of interest rates on the growth rate of the money stock. The new work compares the effects on interest rates of bank credit and other sources of growth in the money stock. Their effects are practically the same, indicating that the way in which changes in the money stock occur makes little difference so far as interest rate effects are concerned. The paper provides a theoretical interpretation of the empirical results.

PHILLIP CAGAN

SEASONAL VARIATION OF INTEREST RATES

This study is concerned with the measurement of seasonal variation in a substantial number of short- and long-term interest rates in the postwar period, and deals briefly with the causes of the changes in seasonal amplitudes during this period. The seasonal in all rates reached a peak in the late 1950's, its amplitude in the case of short-term rates exceeding 10 per cent on either side of the average level of rates. During this period the seasonal amplitude of long-term rates was in the neighborhood of 2 to 3 per cent. After 1963 the seasonal in most of the rates, long- and short-term, is small, and in some cases its existence is doubtful. The study considers the evidence for seasonality in some detail.

An initial draft of a report on the study was completed last fall, and a revised version will be available shortly.

STANLEY DILLER

PERFORMANCE OF BANKING MARKETS

The 1965 NBER Annual Report contained a summary of a suggested research program into the performance of banking markets. During 1966 a grant was received from the American Bankers Association and work commenced on two of the recommended studies. Their progress is reported below.

TERMS ON WHICH BANK SERVICES ARE PERFORMED FOR BUSINESS

The relation between bank market structure and performance has long been an area of considerable controversy. The practical importance of valid estimates of this relationship is heightened by the highly regulated environment in which banks operate and the fact that regulations have a strong influence on market structure.

The major purpose of this research is to

determine the relationship between bank market structure variables and performance in the provision of services to business enterprises. Although banks perform services for a broad customer spectrum, business is the most important category according to almost any method of measurement. Thus this study will cover a substantial portion of the total activity of the commercial banking system.

The usual difficulties encountered by industry studies in measuring the influence of market structure on performance are further complicated in banking by the multiproduct nature of output and the large role played by regulation. For instance, regulation prohibits the payment of interest on demand deposits, which forces banks to enter into barter arrangements with business customers, that is, to charge lower prices on services in exchange for deposits. Thus, for many bank services, market prices understate true prices.

The advantages to the bank and to the business firm of providing a variety of financial services from a single source suggest the use of a package pricing strategy with a profit standard for each customer, rather than an attempt to price each product profitably. The desirability of such a package pricing strategy is enhanced by the great difficulty encountered by banks in developing adequate data on the cost of providing individual services.

These considerations suggest that prices of individual services probably contain a large downward bias and also have substantial random components. To correctly measure market performance, bank charges for equivalent customers must be compared. The most direct method of attacking this problem is to estimate customer profitability, holding constant all relevant differences in services and deposits; however, inadequate cost data as well as conceptual difficulties in estimating cost of capital and optimum capital structure argue against this approach. It was decided, therefore, to focus on loan prices as the dependent variable. In general, the loan is the largest revenue earner in the package of services offered, and most frequently it is the prime consideration in determining the banking connection. Moreover, it always carries an explicit price.

A model has been developed which assumes that the bank attempts to maximize long-run profits. In setting a loan price, the model assumes that (1) the bank has, in government securities, a costless, riskless opportunity to invest its funds, and (2) it must be compensated for risk and cost entailed in committing funds above the costless, riskless rate; it will adjust this price to take account of benefits from the deposits and other profitable business supplied by the customer. Variables will be added to the model to serve as proxies for market structure. This will allow us to estimate the influence of market structure on price.

To test the model and estimate parameters, data on an individual borrower basis will be collected from a selected sample of banks. The sample will be stratified by bank size, whether branch or unit, and degree of concentration in the market served. A sample of banks has been selected and a questionnaire constructed and tested on a few banks. The first sampling of one size class of banks is being made. Additional size classes will be sampled soon after we have analyzed the results of this mailing.

The body of data collected through these surveys promises to be far superior to any yet used in studies of bank performance in the area of business services. Thus, in large measure, the success of this study depends upon the response of banks to our request for data. The cooperation and support of the American Banker's Association in collecting these data greatly enhance the prospect for success.

DONALD P. JACOBS

BANKING STRUCTURE AND PERFORMANCE IN CONSUMER CREDIT MARKETS

The study is intended to develop information on bank performance in consumer credit

markets under various types of banking structures. Its organization falls into two parts: first, the collection of information on bank performance and, second, the search for relationships between performance and structure.

Data will be drawn from three sources. The preliminary work will be based on aggregate banking data available from reports to the supervisory agencies. Since these reports contain relatively little information on consumer credit operations, they will be used primarily to search for over-all evidence of relationships between performance and structure and to design the samples for the collection of data on consumer lending. The principal part will be based on data collected from a sample of banks on the terms, services, and rates of operations in consumer lending. A third part will focus on the nature of competitive adjustments at individual institutions and will be based on a small sample of banks in selected markets.

The study will test the hypothesis that significant variations in price and nonprice features of competition can be observed under different types of banking structures. Analysis of variance and nonparametric tests will be used. Preliminary work on all three phases has been started and tests of the program and questionnaires are currently under way.

PAUL F. SMITH

THE QUALITY OF CREDIT IN BOOMS AND DEPRESSIONS

Trends in Corporate Bond Quality, by Thomas R. Atkinson, has been published, and *The Quality of Consumer Instalment Credit*, by Geoffrey H. Moore and Philip A. Klein, is in press.

A report on some major findings of the study "Residential Mortgage Quality," by John Herzog and me, appears below, together with reports on Edgar Fiedler's "Statistical Compendium on Credit Quality" and George Hempel's "The Postwar Quality of State and Local Debt." "The Quality of Agricultural Credit," a paper by George Brinegar and Lyle Fettig, is being revised following staff review.

My own summary report, "The Quality of Credit in the United States," is being revised and expanded to incorporate the results of the residential mortgage quality study and some new work on business financial ratios. A summary paper that I presented at the August meetings of the American Statistical Association, "Problems in the Measurement of the Quality of Credit," has now appeared in the *Proceedings of the Business and Economic Statistics Section* (1966).

Financial support for the various parts of the quality of credit research program has come from many sources. Initial funds were provided by the Association of Reserve City Bankers in 1956. The Merrill Foundation for the Advancement of Financial Knowledge supplied major financial support from 1957 to 1961. Other financial support, either in grant funds or paid leaves provided to research staff, has come from the Federal Reserve Bank of New York, the Federal Reserve Board, the U.S. Savings and Loan League, the Mortgage Bankers Association, the National Association of Mutual Savings Banks, Bankers Trust Company, Alfred P. Sloan Foundation, and the Research Committee of the University of Wisconsin. General funds of the National Bureau, provided by institutional and individual contributors, have also been used. Organizations supplying invaluable special data for the studies include several of the above and also Dun and Bradstreet, Inc., Robert Morris Associates, the Investment Bankers Association, the Farm Credit Administration, and several other federal government agencies.

JAMES S. EARLEY

QUALITY OF POSTWAR HOUSE MORTGAGE CREDIT

The major purposes of this study, now nearing completion, are (1) to analyze rigorously, by multiple regression methods, loan and

to have much of a vested interest in the property. Occupation did not prove to be a reliable guide to predicting foreclosure. No discernible patterns were evident with respect to number of dependents, marital status, or age of borrower. Loan purpose remained one of the most significant variables, but in this case construction and refinancing were high risk, while repair and purchase were low.

Risk Indexes Over Time. In order to determine whether significant changes in default and foreclosure risk had occurred in the postwar period, the equations which had been derived from the cross-sectional data were applied to time series of certain key variables, namely, loan-to-value ratio, term to maturity, loan purpose, and junior financing. While there are admittedly hazards in such a procedure, we note the following results. First, risk of delinquency was virtually the same for loans made in 1963 as it was for loans made in the late 1940's, whether measured in terms of conventional, FHA, or VA mortgages. Second, the risk of foreclosure, taken as a percentage of loans in default, rose persistently throughout the postwar period. Finally, foreclosure risk, taken as a percentage of all loans made, also rose in the postwar period.

JAMES S. EARLEY
JOHN P. HERZOG

STATISTICAL COMPENDIUM ON CREDIT QUALITY

The current state of the quality of credit is examined only infrequently by business and financial analysts. In part, this is because the role played by credit quality in economic processes is neither very well nor very widely understood, a situation which the several studies in the National Bureau's quality of credit program are designed to help overcome. In large part, too, the lack of current attention to the quality of credit is attributable to the unavailability on a current and continuing basis of statistical time series on this subject.

In many cases, comprehensive and meaningful measures of the quality of credit are simply not collected and published. With surprising frequency, however, the unavailability of current evidence is due only to the fact that the published series are widely scattered and not generally known, and therefore do not regularly come to the attention of students of the economy.

To help remedy this lack of knowledge about the available information, we are preparing a statistical compendium of time series relating to credit quality. This source book, which the Board of Governors of the Federal Reserve System and Bankers Trust Company have aided substantially, will bring together into a single volume most of the known series on the subject—with tables and charts, and showing current sources. These will provide a historical perspective against which future movements of the series can be evaluated. The compendium also should facilitate and perhaps stimulate further research in the field.

In addition to the data, a brief text on credit quality and some of the problems encountered in the interpretation of the data will be included. The scope of this discussion is indicated by the following abbreviated outline of chapters.

1. Introduction and Summary
   (a) background of the project; (b) summary
2. The Meaning and Importance of Credit Quality
   (a) credit quality vs. risk; (b) the two sides of credit quality; (c) the financial and economic impact of credit quality; (d) the role of credit quality in economic fluctuations
3. Empirical Information on Credit Quality
   (a) information desired; (b) time series available; (c) gaps in the statistical arsenal
4. Interpretation of the Data
   (a) nature of the data and their statistical deficiencies; (b) general problems of interpretation
5. Validity of the Quality Measures

A draft of the text has been completed and is undergoing revision before being submitted to a staff reading committee. Almost all of the data have been collected and put

borrower characteristics associated with house mortgage delinquency and foreclosure; and (2) on the basis of the movements of the significant variables during the postwar years, to develop new measures of the changing quality of U. S. house mortgage credit. The data as well as financial support for the study were provided by the U.S. Savings and Loan League, the Mortgage Bankers Association, and the National Association of Mutual Savings Banks. The study was supported also by the University of Wisconsin and by general funds of the National Bureau.

The multiple regression framework was used to determine the relationship between loan, property, and borrower characteristics and (1) the risk of default and (2) the risk of foreclosure, given that a loan was in default. Independent variables used in the regressions were loan-to-value ratios, term to maturity, monthly payment-to-income ratios, borrower occupation, number of dependents, marital status, borrower age, loan purpose, junior financing, loan type, and geographic region. Three samples of loans were analyzed separately. A brief summary of the more important findings follows.

Default Risk. Loan-to-value ratio was directly related to default risk in each of the samples. Term to maturity, on the other hand, bore an inverse relationship to risk. While this may seem surprising at first glance, there are at least two possible explanations. One is that failure to include either a wealth or liquid asset variable in the equations may have prevented us from isolating the effects of financial burden. In other words, the term to maturity may, in part, affect the borrower's ability to pay, in that shorter terms mean higher payments and hence greater default risk. A second explanation might be that lenders require more rapid repayment (shorter terms) from risky borrowers. Payment-to-income ratios did not appear to be at all related to default risk. This may be simple because lenders watch this ratio very carefully and reject loan applications in which some fairly conservative critical limit is exceeded. This is strongly suggested by the fact that in two of the loan samples more than 96 per cent of the loans had payment-to-income ratios under 25 per cent, while in the third 92 per cent of the loans were so classified. Occupation proved to be a fairly important variable. Professionals, executives, and managers were the best risks, and self-employed persons and salesmen the worst. Number of dependents bore a direct relationship to risk in one sample. In the other two it was not significant, though there was some evidence of a direct relationship. Marital status was not significant in any of the equations, even though the risk coefficients were uniformly lower for married borrowers than for single. Borrower age yielded such mixed results that no generalization seems warranted. Loan purpose and junior financing, which were not included in two of the samples, turned out to be the most important variables in the third. In the loan-purpose categories, refinancing clearly stood out as the riskiest, followed by repair, construction, and purchase, in that order. Loans with junior financing present carried much higher risk coefficients than those without, and indeed this variable was the single most important risk determinant. Loan type also was a significant variable, with conventional mortgages showing greater risks than those insured or guaranteed by government agencies. It must be borne in mind, however, that this is true only after the effects of such other variables as loan-to-value ratio and term to maturity had been removed. Significant differences in risk also appeared among regions.

Foreclosure Risk. Since in many cases the relationship between the independent variables and foreclosure risk was similar to the pattern for default risk, only the exceptions are noted below. Term to maturity, which was inversely related to default risk, bore a direct relationship to foreclosure risk. Thus the combined effects of longer terms to maturity and higher loan-to-value ratios caused a significant increase in the foreclosure risk index. Presumably, this is because under such circumstances the borrower is not likely

TABLE IV-4

PRINCIPAL CREDIT QUALITY TIME SERIES AVAILABLE ON A CURRENT AND CONTINUING BASIS[a]

	Loan and Borrower Characteristics						
	Ratios of Debt or Repayments						
	To Income	To Assets	Maturities	Debt Composition	Credit Ratings	Credit Experience[b]	Total
	NUMBER OF SERIES						
Household sector							
Consumer instalment debt	10	11	22	0	0	16	59
Home mortgages	13	15	10	0	0	19	57
All household debt	2	2	0	0	0	3	7
Total, household sector	25	28	32	0	0	38	123
Business sector							
General, including trade credit	2	6	1	5	10	13	37
Bank loans	0	0	1	2	0	5	8
Corporate bonds	0	0	0	0	0	0	0
Mortgages on income properties	1	2	1	0	0	5	9
Total, business sector	3	8	3	7	10	23	54
Agriculture	1	3	7	0	0	15	26
State and local governments	1	0	0	0	3	3	7
Total economy	2	0	0	0	0	3	5
Grand total	32	39	42	7	13	82	215

[a] Excluding the many supplementary series and those not regularly published.
[b] Includes losses, failures, bankruptcies, foreclosures, repossessions, defaults, and delinquencies.

on punched cards for publication. Excluding the many supplementary series and excluding those not published on a current and continuing basis, the compendium will contain over 200 times series. The coverage provided by these principal credit quality indicators, by type of series and by economic sector, is shown in Table IV-4.

EDGAR R. FIEDLER

POSTWAR QUALITY OF STATE AND LOCAL DEBT

Four basic tasks are undertaken in this study: (1) an examination of the historical payment performance of state and local debt, (2) the identification of instrument and borrower characteristics which measure the prospective quality of state and local debt, (3) an examination of the levels of and trends in these characteristics in recent years, and (4) a brief analysis of recent trends in evaluations by rating agencies and by the securities market.

State and local debt payment problems have occurred nearly continuously under both good and bad economic conditions. Only in major depression periods, however, has the extent of state and local debt payment problems risen to a level that materially affected the over-all economy. The incidence

of debt payment problems generally has not appeared to significantly affect or be affected by milder cyclical declines.

In each of the four major depression periods in which there were serious state and local debt payment difficulties, 1837–43, 1873–79, 1893–99, and 1929–37, the extent of the payment difficulties became a serious national economic problem in the later stages of the depression. This timing pattern indicates that state and local debt payment difficulties were at least partially caused by the severe declines in wealth and income in these periods. Furthermore, it supports the hypothesis that state and local debt payment difficulties have been a consequence of and may have added to the severity of major economic declines, but have not been a major element leading to these declines.

Four classes of variables might, on a priori grounds, be expected to measure the prospective quality of state and local debt: (a) the size of the debt service charges which must be paid, (b) the expected over-all cash inflows during the life of the indebtedness, (c) the expected cash outflows which will be paid prior to debt service charges during the life of the indebtedness, and (d) the financial prudence and willingness to pay on the part of the borrower.

Both time series and cross-sectional analyses of historical instrument and borrower characteristics strongly support the a priori model. There was a rapid increase in the amount of debt outstanding, a surrogate for debt service charges, before each of the four major default periods and prior to many individual default situations. At the same time, wealth and income measures indicative of potential cash inflows rose less rapidly than estimated debt service charges. These measures then declined absolutely in the economic decline immediately preceding each of the four major default periods. Cash outlays which were paid prior to debt service charges failed to decline as rapidly as cash inflows before major default periods and in the case of many individual default situations. The use of state and local debt for essentially private purposes and a continuing deficit in the unit's current account also preceded major default periods and many individual default situations.

After identifying the instrument and borrower characteristics which measure the prospective quality of state and local debt, we examine the postwar movements of these characteristics. Assuming the risk of a serious over-all economic decline has remained constant during this period, aggregative instrument and borrower characteristics indicate that the quality of state and local debt has weakened considerably. State and local debt has increased much faster than the relevant wealth and income measures, although the increased contribution of federal financial aid to state governments and of state financial aid to local governments has partially offset this increase in the debt burden. On the other hand, increased reliance by state and local units on cyclically vulnerable revenue sources and decreased flexibility in the application of many state and local revenues call for greater rather than lower coverage of debt service charges. The increased downward inelasticity of state and local expenditures also contributed to the relative decline in the quality of state and local debt. The increased use of state and local debt to build private industrial facilities and the increased amount of indebtedness issued without voter approval add to the reasons for concern about state and local financial practices.

Aggregations of agency ratings and of adjusted market yield differentials are being analyzed to determine the weights assigned to the various instrument borrower characteristics. Preliminary analysis reveals that both agency ratings and yield differentials indicate that the quality of state and local debt was higher in the mid-1960's than in the early postwar years. This result suggests that the rating agencies and the securities market are assigning significantly different weights to the instrument and borrowing characteristics or believe the weakening in these characteristics is more than overcome by a decrease in the

risk of a serious economic decline. Additional study is being focused on this area.

GEORGE H. HEMPEL

CONSUMER CREDIT

The objective of the consumer credit study, sponsored by a grant from several finance companies, is to assess the role of consumer credit in the U.S. economy. The individual studies have centered 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.

During the past year, F. Thomas Juster's book, *Household Capital Formation and Financing, 1897–1962,* was published, making a total of three books and five Occasional Papers to come from the study to date.

Two remaining studies are in progress. Richard Selden's project analyzes flows of funds to finance companies between 1952 and 1961 to ascertain the ways in which these companies responded to changes in monetary conditions over the five cyclical phases during the period. My investigation of the rate structure in automobile financing encountered difficulties which required revison of some primary data affecting analysis of the division of the finance rate between the automobile dealer and the finance company. The revisions have been completed.

ROBERT P. SHAY

5. INTERNATIONAL ECONOMIC RELATIONS

The National Bureau's research in this area is mainly concerned with the international economic and financial position of the United States and closely related issues. Lary's study, *Problems of the United States as World Trader and Banker,* published by the National Bureau in 1963, was in the nature of an exploratory essay and served to identify some of the questions on which work has since been proceeding. One investigation, conducted by Kravis and Lipsey, grows out of the unsuitability of existing price series in the United States and other countries for purposes of international comparison. It is hoped that this study, now nearing completion, will provide more meaningful data on changes in the international price competitiveness of the United States in recent years, and that it will contribute a sound methodology for the regular compilation of statistics on this subject. Another study, which Georgiadis is directing, is also concerned with changes in the international competitive position of the United States, but approaches the subject through an analysis of its performance in international trade.

The general planning and direction of the National Bureau's international studies continue to be financed under the ten-year grant extended by the Rockefeller Foundation in 1960, and both the Kravis-Lipsey project and the Georgiadis project have been financed largely by grants from the National Science Foundation. A grant by the Ford Foundation effective at the beginning of 1966 has permitted a further expansion of this work. This includes both Michaely's comparative analysis of balance-of-payments adjustment policies in the leading trade and financial countries and Lary's study of imports of manufactures by the United States and other developed countries from less-developed countries.

Reports on all of the foregoing projects are given below. Another international project, conducted by Ilse Mintz, is concerned with the identification of turning points in foreign business cycles and is reported on in section 3. This work was begun following the completion of her book, *Cyclical Fluctuations in the Exports of the United States Since 1879,* which is in press.

Three more new projects are getting under

way. One, being carried out in collaboration with the Office of Business Economics of the Department of Commerce, concerns the relation between U.S. manufacturing abroad and U.S. exports. The first objective is to improve the quality and comparability of the basic data; it is envisaged that the report on this part of the study will be issued by the Commerce Department. The National Bureau plans to publish an analytical report drawing on these and other sources. The Bureau's part of the study is under the direction of Robert E. Lipsey.

Another topic on which exploratory work has begun is liquid dollar balances held by foreigners, both public and private, in the United States, as well as such dollar balances held in foreign financial centers, and the forces influencing the composition and growth of these claims. This study is being made by J. Herbert Furth, formerly adviser to the Division of International Finance of the Board of Governors of the Federal Reserve System.

Still another project in the international area on which work is actively proceeding is the organization of a conference on Technology and Competition in International Trade, to be held in 1968 under the auspices of the Universities-National Bureau Committee for Economic Research. A program committee has been appointed consisting of Raymond Vernon (chairman), Harry Johnson, Hal B. Lary, Edwin Mansfield, and Jacob Schmookler.

INTERNATIONAL PRICE COMPARISON STUDY

The study of comparative prices and price trends in the international trade of the United States and its main foreign competitors is now nearing completion. The purpose of the investigation, which has been supported mainly by two grants from the National Science Foundation, has been to develop methods of measuring price competitiveness in international trade and to apply these methods to the trade of the United States, the United Kingdom, the European Common Market, and Japan in machinery, transport equipment, metals, and metal products from 1953 to 1964.

Price collection work, which occupied most of the earlier time of the study, was substantially completed in 1965. The last year has been spent principally in the calculation of indexes and the analysis of results, which now cover about two-thirds of the products to be included in the study. Two publications have appeared so far: *Measuring International Price Competitiveness: A Preliminary Report,* Occasional Paper 94 (1965) and *Comparative Prices of Nonferrous Metals in International Trade, 1953–64,* Occasional Paper 98 (1966). A preliminary summary of the over-all results of the study was given at the 1966 annual meeting of the American Economic Association, and will be published in the Proceedings issue of the *American Economic Review.* A proposed paper on the use of regression methods in international price comparisons has been reviewed by a staff reading committee and is now being revised.

In addition to the published papers, eleven mimeographed reports on other individual product groups have been sent to experts in the industries covered, particularly those who participated in the study, for comment and criticism. Product reports for further groups are now being prepared.

The next six months will be devoted to the calculation of indexes for the remaining groups of commodities and to the drafting of the final report on the study. Two descriptive chapters have been completed and mimeographed.

The participants in the study at the present time, in addition to the authors, are Zenaida Mata, Christine Mortensen, and Doris Preston, who are assisting in the analysis of the data, and Beatrice Grabiner, who is the secretary for the project.

IRVING B. KRAVIS
ROBERT E. LIPSEY

UNITED STATES PERFORMANCE IN INTERNATIONAL COMPETITION

A proposed Occasional Paper dealing with the composition of interindustrial country trade[1] is soon to be submitted for internal review. The main volume of the study will be ready for review during the summer. It includes, in addition to an analysis of trade, an analysis of the relationships of individual commodity groups of imports to domestic variables (such as prices and national income by industry) in each importing country.

The study has been financed by a grant from the National Science Foundation.

H. G. GEORGIADIS

BALANCE-OF-PAYMENTS ADJUSTMENT POLICIES

This study is intended to reveal the policies which the major industrial countries—the members of the "Group of Ten"—have employed in the postwar years for balance-of-payments adjustment. In particular, the study focuses on the degree and consistency of the use of aggregative monetary and fiscal policy instruments for this purpose. This is done, for each country, primarily by the analysis of time series of target and policy variables. The country studies will then serve, in a final synthesis, for cross-country comparisons and for the derivation of conclusions for the international monetary system as a whole.

The study of individual countries is now at an advanced stage. Data for the majority of countries have been compiled, and the analysis has been completed for about half of the group. The results so far seem to confirm that meaningful and significant answers to the questions posed in the study may be expected from the methods pursued.

An interim report has been prepared for publication as an Occasional Paper. It contains a detailed statement of the study's purposes, approach, and methods along with analyses of three countries—Japan, Germany, and the Netherlands. A draft of this report has been discussed at a meeting of the advisory committee on the project and has been reviewed by a staff reading committee. Members of these committees have offered much valuable advice, as a result of which the manuscript is now being revised.

The study continues to benefit from the financial support of the Ford Foundation.

MICHAEL MICHAELY

FACTOR INTENSITIES AND EXPORTS OF LESS-DEVELOPED COUNTRIES

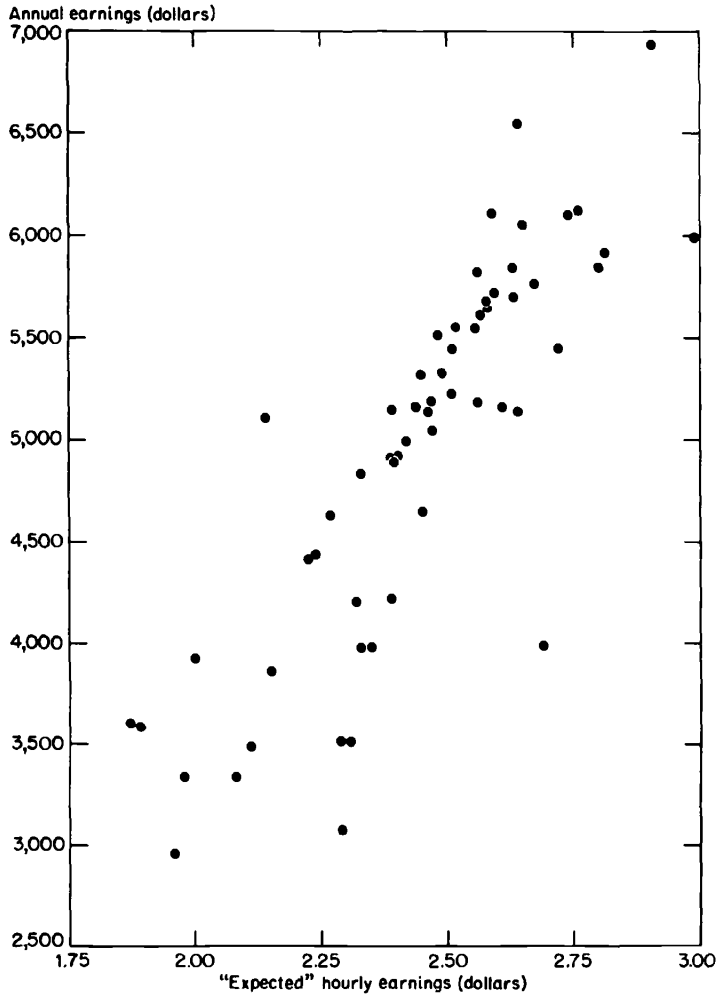
This study, on which a monograph is nearing completion, has entailed an investigation of broader interest into capital/labor ratios in different manufacturing industries as a means of identifying those in which less-developed countries might hold a comparative advantage. The measure used for this purpose is value added by manufacture per employee as computed from censuses of manufactures. One advantage of this measure, compared with conventional computations of physical capital per employee, is that it may be taken to reflect also inputs of human capital. Another advantage, especially for purposes of international comparison, is that value-added data are available for a number of countries, both developed and less developed, frequently in considerable detail by industries and frequently also for a number of years.

Put rather loosely, "value added by manufacture" is what remains after subtracting the value of materials consumed from the gross value of output in any given industry or industry group. Differences from industry to industry in value added per employee are here assumed to measure differences in the aggregate flows of services from the factors of production employed in the manufacturing

[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.

CHART IV-8

Average Annual Earnings and "Expected" Hourly Earnings in 59 Industry Groups in the United States, 1959



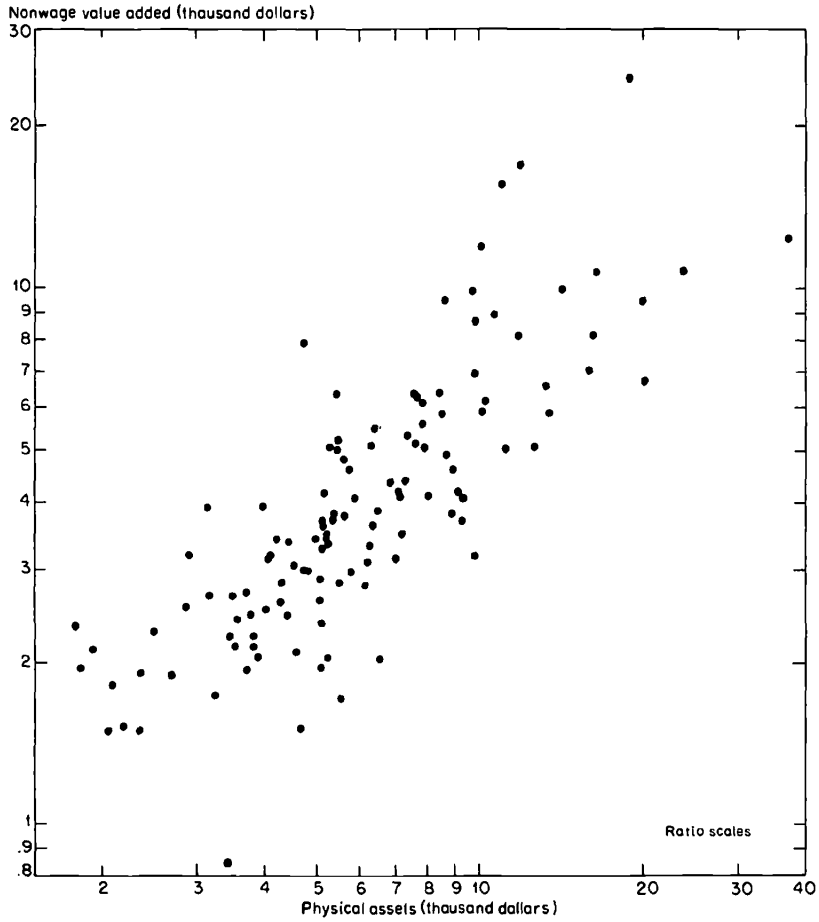
process. It is further assumed that these services may be ascribed either to human capital or to physical capital and that, in interindustry comparisons, the wage (or, more precisely, wage and salary) part of value added is a good proxy for services rendered by the one and the nonwage part a good proxy for services rendered by the other.

We can thus think of the labor force as if it were composed of units of completely unskilled, inert labor to each of which are added, according to the industry, varying amounts of skill or human capital and of machinery and other physical assets. The higher the value added per employee on both accounts combined, the more capital-intensive the industry; the lower the value added per employee, the more labor-intensive the industry.

Taken literally, the assumption that interindustry variations in value added per employee reflect differences in the aggregate value of services rendered by the factors of production would imply fully competitive factor and product markets in which the marginal contribution of these services is

CHART IV-9

Nonwage Value Added and Net Physical Assets per Employee in U.S. Manufacturing by 122 3-Digit Industries, 1957



precisely matched in each case by the rewards paid. In fact, wage differentials may also arise because trade unions are stronger in one industry than in another; or because some industries are growing faster than others and seek to attract labor; or because nonmonetary utilities or disutilities are greater in some industries than in others; or perhaps simply because tradition irrationally bestows higher earnings on some activities than on others. Similarly, rates of return on capital vary because disparities between demand and supply are greater and more enduring in some industries than in others. The essential question is, however, whether or not such influences in the labor and capital markets are so strong and pervasive as to impair the general usefulness of value added per employee as a guide to the capital intensity of different industries. Another question is whether or not the inclusion of purchased services (not subtracted out along with materials) distorts value added per employee as a guide to capital inputs. One reason for thinking that it may not is that some of these services, such as repairs and maintenance, might be expected to vary with the size of assets.

Some evidence for the United States bearing on these questions is presented in the two accompanying charts. Chart IV-8 tests the relation between "expected" hourly earnings,

as a measure of the quality of labor, and actual earnings, as the dependent variable, in the 59 manufacturing industries distinguished by the Census of Population. The first variable is from the National Bureau's study of productivity in the service industries and takes the form of estimates of "expected" hourly earnings in 1959 on the basis of data given by the one-in-a-thousand sample from the Census of Population in 1960. These are the average earnings that would be found for each industry if each worker's earnings were equal to the national average for his particular color, age, sex, and level of education (workers being classified into 168 cells according to these characteristics). Significant differentials in national average earnings associated with each of these variables suggest that they reflect, at least in part, differences in human capital.[2] The chart relates these expected hourly earnings to actual annual earnings derived from the same Census of Population sample. The reason for choosing the annual rather than the hourly series as the dependent variable is that other wage and salary averages used in the present study from the Census of Manufactures are on an annual basis, and it is these figures which need to be tested as a guide to the intensity of different industries in inputs of human capital. The correlation coefficients yielded by the regression analysis for the 59 industries are 0.84 with annual earnings as the dependent variable and 0.79 with hourly earnings as the dependent variable.

Chart IV-9 provides the same sort of test for nonwage value added per employee as a guide to interindustry differences in inputs of physical capital. One of the familiar problems in working with statistics of capital assets is whether they should be taken gross or net of depreciation. Fortunately, the computation can be done both ways, with closely similar results, on the basis of data for the end of 1957 from a special survey made in connection with the 1958 Census of Manufactures.[3] The correlation coefficients yielded by a log regression analysis of 276 4-digit industries are 0.79 with assets on a gross basis and 0.80 with assets on a net basis. For 122 3-digit industries the coefficients are 0.79 on the first basis and 0.81 on the second basis (the latter being plotted in Chart IV-9).

Taken together, these tests indicate that value added per employee in manufacturing should provide a reasonably good measure of the relative intensity of different industries in human and physical capital.

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[2] See Victor R. Fuchs, *Differentials in Hourly Earnings by Region and City Size, 1959*, New York, NBER, 1967. Regarding the color variable, Fuchs notes (page 5) that "The white-nonwhite differences are probably due in part to market discrimination, but color is relevant to quality because of the likelihood that, at given levels of education, nonwhites have received poorer-quality schooling and less on-the-job training than have whites."

[3] The gross-assets series used here consists of the sum of (a) gross book value of fixed assets at the end of 1957; (b) inventories at the end of 1957; (c) rentals paid during 1957 multiplied by seven to approximate the capital value of rental assets. The net series consists of the foregoing minus the sum of (d) accumulated depreciation to the end of 1956 and (e) depreciation charged during 1957.