PART I

Tested Knowledge of Business Cycles

A dozen years have passed since Arthur Burns wrote the National Bureau's Thirtieth Annual Report, *New Facts on Business Cycles* [1] Three business cycles have come and gone. In the interim more new facts have been uncovered and many earlier findings have been tested, modified, and clarified. Such a process of discovery, testing, modification, and explanation is the essence of the National Bureau's research program, as of any scientific effort. In this way knowledge cumulates. It may be well to take stock once again of our work on business cycles. I shall concentrate on the contributions that have been made since Burns' report was written, note their practical use, and discuss some directions that future work might take. Such a review will demonstrate, I think, the unique value of continuity in our research program.

1. THE POSTWAR SETTING

The postwar period has testified to the continued potency of the forces that cause business cycles. At the outset it was uncertain whether the business cycle, as it had been known in the past, would continue to exist. The Great Depression and World War II had stimulated an enormous growth in governmental activity relative to private enterprise; new governmental functions, such as insuring of bank deposits and mortgages, provision of social insurance, and regulation of stock market trading, had been developed to prevent some of the serious consequences of depressions; and there was a new determination, epitomized in the Employment Act of 1946, to use governmental power when necessary to curb cyclical fluctuations. In the sequel, it is clear that these developments and some others have indeed

NOTE: I am indebted to Arthur F. Burns, Solomon Fabricant, and other colleagues for their suggestions on Part I of this report, and to Hal B. Lary, who took charge of Part III. Sophie Sakowitz and Alexander Pitts were responsible for the statistical work in this section.

[1] Reprinted in *Business Cycle Indicators,* Princeton University Press for National Bureau of Economic Research, 1961, Vol. I, Chap. 2.

helped to reduce the severity of cyclical declines.[2] On the other hand, it is equally clear that the business cycle has not been eliminated.

Indeed, it is fair to say that the recessions since 1945 have stimulated much greater public interest in the problem of business cycles. Each of these recessions has also led to a variety of governmental actions for dealing with the problem. All this has made it easier for the student of business cycles to justify his work, and has whetted his appetite to pursue it. Besides, the business cycle policies of government have given rise to new questions for study. For example, what were the effects of these policies? How timely were they? How could they have been made more effective? What opportunities were missed and why?

Partly as a result of this interest and activity, the postwar student of business cycles has had at his command a greater wealth of current economic statistics than before. The figures are more frequent and timely—witness the replacement of annual by quarterly estimates of gross national product and its components; they are more appropriately designed—witness the publication nowadays of numerous economic indicators in seasonally adjusted form; and they cover some new dimensions of economic activity—witness the proliferation of data on businessmen's intentions to invest and consumers' intentions to spend.

In this setting, the National Bureau's research on business cycles has come to be used widely, not only in this country but also abroad. One evidence of this was the publication last autumn, following a protracted period of experimentation and testing in which Julius Shiskin played a primary role, of *Business Cycle Developments*, a monthly report of the United States Department of Commerce. This report, to which I shall refer frequently, contains a broad collection of economic indicators selected and classified by the National Bureau, relies upon the business cycle peak and trough dates established in the course of our researches, and includes a number of analytical measures largely developed in our studies.[3] Basically it owes its existence to the postwar developments I have mentioned—the continued occurrence of recessions, the great public interest in dealing with them, and the new emphasis on economic statistics. All this has stimulated both our own work and its application and testing by others, and has fostered the accumulation of knowledge of business cycles during the period since Burns wrote his *New Facts*.

Burns formulated four chief propositions in his report. I shall consider each of them in turn, describing some of the applications and tests that have since been made, and the additional knowledge we now have concerning them.

2. BURNS' "UNSEEN CYCLE"

A business cycle, according to the definition adopted by Burns and Mitchell,[4] not only is "a fluctuation in aggregate economic activity" but also consists of "expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle." Mitchell later elaborated one aspect of this definition: "Business cycles consist not only of roughly synchronous expansions in many activities, followed by roughly synchronous contractions in a slightly smaller number; they consist also of numerous contractions while expansion is dominant, and numerous expansions while contraction is dominant."[5] That is to say, it is characteristic of business cycles that they are

[2]See Arthur F. Burns, "Progress Towards Economic Stability," *American Economic Review*, March 1960, pp. 1-19.

[3]Shiskin described the background and rationale of the new monthly report in *Signals of Recession and Recovery: An Experiment with Monthly Reporting*, Occasional Paper 77, New York, NBER, 1961.

[4]*Measuring Business Cycles*, New York, NBER, 1946, p. 3.

[5]*What Happens during Business Cycles*, New York, NBER, 1950, p. 79.

widely diffused, but it is also characteristic that they are imperfectly diffused.

In his 1950 annual report Burns observed that this phenomenon of diffusion constitutes an "unseen cycle" that lies hidden within the movements of economic aggregates. During each expansion in total activity there is first a rise and then a fall in the scope of the expansion, and during each contraction in total activity there is first a rise and then a fall in the scope of contraction. Expansionary movements, which begin during a contraction in aggregate activity, spread from firm to firm, industry to industry, region to region, and from one aspect of economic activity to another, and this cumulative process takes time. Contractions in their turn spread in a similar way, beginning while aggregate activity is still rising, but engulfing more and more enterprises and processes until the tide turns and activity as a whole begins to decline. In this sense, recession begins while expansion is still dominant, and recovery begins while recession is still dominant.

This process is evident in every business cycle of which we have a record. Though it may have been "unseen" before Burns wrote, it has been "seen" ever since, both historically and currently. Before 1950 the only statistical evidence on this point—in the form of what has come to be known as a "diffusion index"—was historical in nature. These indexes showed what percentage of a group of activities had undergone expansion at different stages of past business cycles, but not what percentage was currently expanding. Since then many current diffusion indexes have been constructed, and a number are regularly published in *Business Cycle Developments*. From these one can determine quickly, for example, what proportion of companies in a large sample have recently experienced rising profits, or what proportion have recently increased their appropriations for new investment projects.

Although the date when a business cycle expansion reaches its widest scope depends on how it is measured, diffusion indexes of a broadly representative sort have invariably reached their highest values some months before the peak in aggregate economic activity. Burns observed that this was true of all the prewar cycles, and it has continued to be true. The expansion of 1945-48 reached its widest scope in the fourth quarter of 1947, about a year before the business cycle peak. The next expansion (1949-53) reached its widest scope in the third quarter of 1950, narrowed, and then became fairly widespread again in the third quarter of 1952, about nine months before the business cycle peak. The 1954-57 expansion reached its maximum diffusion in the second quarter of 1955; aggregate activity continued to expand for two years more. The scope of the 1958-60 expansion was greatest in the second quarter of 1959, about a year before the cyclical peak.[6]

If there is not much uniformity in these intervals, this was also true of the prewar record. The "unseen cycle" casts a shadow of varying length before it. This limits, but does not destroy, its value. No one landmark on the road of business cycles seems to hold an absolutely fixed position; yet all together they can help us chart a sounder course.

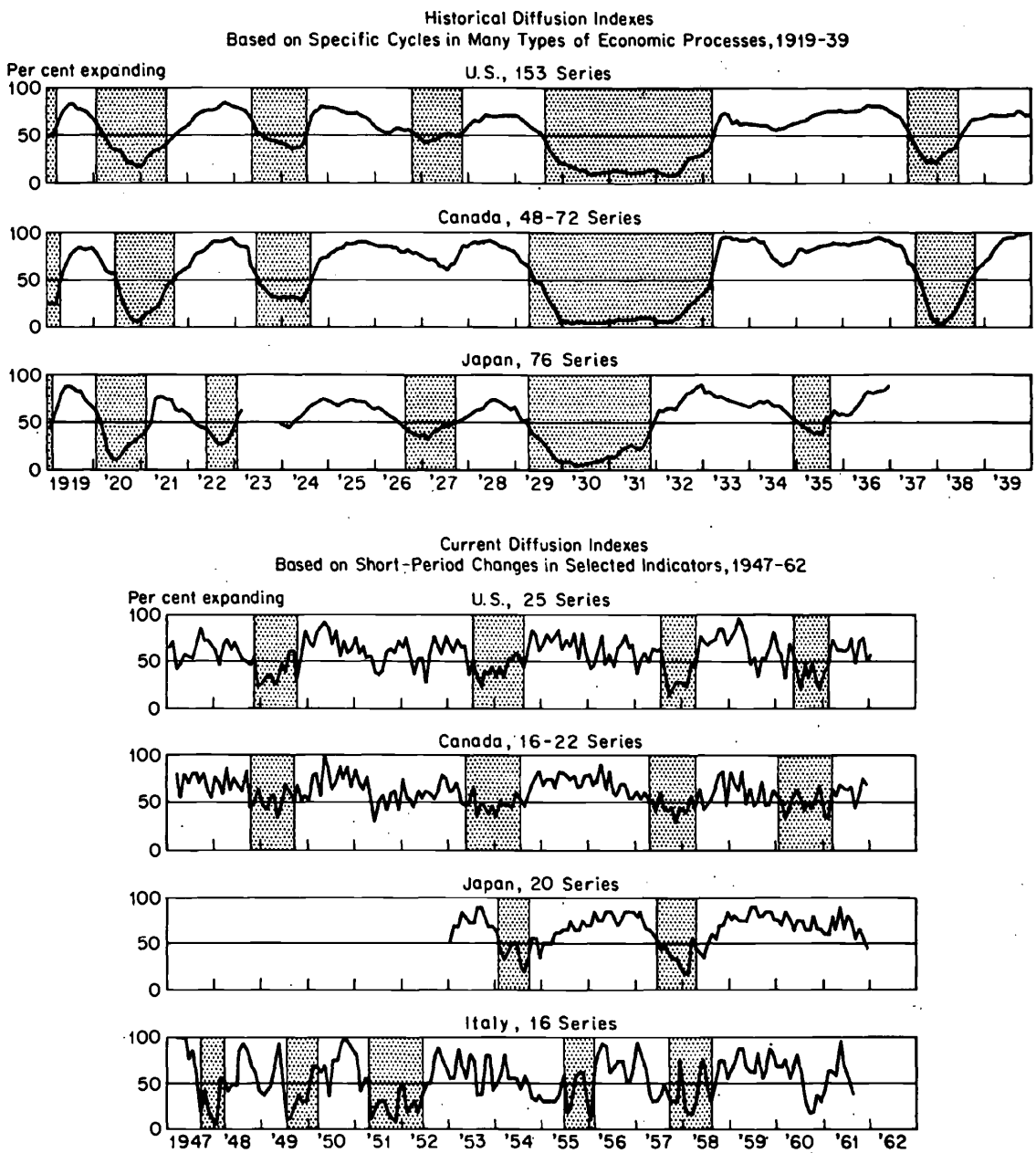
The diffusion indexes that Burns examined in 1950 were not only historical in nature; they were limited in their coverage to the United States. Later research carried out in Canada, Japan, and Italy demonstrates that the diffusion phenomenon is characteristic of those economies as well, and resembles that of the United States (Chart 1). In these countries, too, business cycles are widely but imperfectly diffused, and the degree of diffusion has the property of waxing and waning in a cycle that precedes the cycle in aggregate activity.

Ilse Mintz has extended diffusion analysis to world trade. Since cyclical movements in the imports of different countries are neither perfectly synchronized nor scattered at ran-

[6]The dates of maximum diffusion are based on a monthly index covering employment in thirty-two and production in twenty-five nonfarm industries (see Shiskin, *Signals of Recession and Recovery*, p. 183). Other broadly based diffusion indexes reached peaks at about the same dates.

CHART 1

Diffusion Indexes for Several Countries, 1919-61



NOTE: Shaded areas represent business cycle contractions in each country; unshaded areas, expansions.
SOURCE: Appendix.

dom, they form both a cycle in aggregate world trade and a diffusion cycle that precedes it (Chart 2). Her diffusion index shows that in most of the postwar period most countries have expanded their imports, but it also brings out the less well-known fact that at times very widespread reductions have occurred. At these times, or shortly afterward, our own exports have declined, and they have not begun to rise again until rising imports have become rather general in the rest of the world. The diffusion index is an indicator of demand for our exports, and they have been highly responsive to it. In these days, when the balance of payments is a matter of national concern, it is well to keep an eye on such clues as this index may give to the prospects for exports.[7]

Discerning the process of cyclical diffusion long after the fact is easy; recognizing what is going on currently is far more difficult, as the indexes in Chart 1 demonstrate. Numerous devices to accomplish this have been tested, both at the National Bureau and elsewhere, and more no doubt will be. Eventually it may become no more difficult to date a "reference peak" in diffusion indexes—representing the point at which the business cycle expansion reached its widest scope—than to date a business cycle peak, and likewise for troughs. If this could be done not too long after the event, it would improve our capacity to identify the current stage of the business cycle and to envisage the next stage.

The matter is important, for one of the findings to which the study of diffusion indexes has led is that the change in scope of an expansion or contraction during a business cycle has a great deal to do with the rate at which aggregate activity expands or contracts. Expansions do not proceed at a constant pace. Some expansions are vigorous, others lethargic. There is much evidence to show that the variations both within and between expansions are attributable in large part to differences in the number of firms or industries that are expanding. Hence it would seem to be desirable, if we are concerned with preserving and extending the rate of growth of the economy, that we also be concerned with making expansion as general as is practicable. By this criterion, policies that have widespread stimulative effects are better, other things being equal, than those with narrow effects. Choices cannot, of course, always be made along these lines, but our studies of diffusion suggest that it may be an important consideration.

To illustrate the relation between diffusion and rate of expansion, consider the dates mentioned earlier, when the postwar expansions reached their widest scope. On the first occasion, the fourth quarter of 1947, gross national product in constant prices was currently rising at an annual rate of 6 per cent. On the succeeding dates of maximum diffusion, the annual percentage rates of expansion in GNP were 19, 4, 8, and 12. So far the current expansion was most widespread in the second quarter of 1961, at which time the rate of expansion in GNP again was 12 per cent per year. These rates are, of course, exceedingly high, far greater than those sustained over each expansion as a whole.[8] Except perhaps for the last, they occurred when each expansion was as widespread as it ever got to be.

3. LEADS AND LAGS

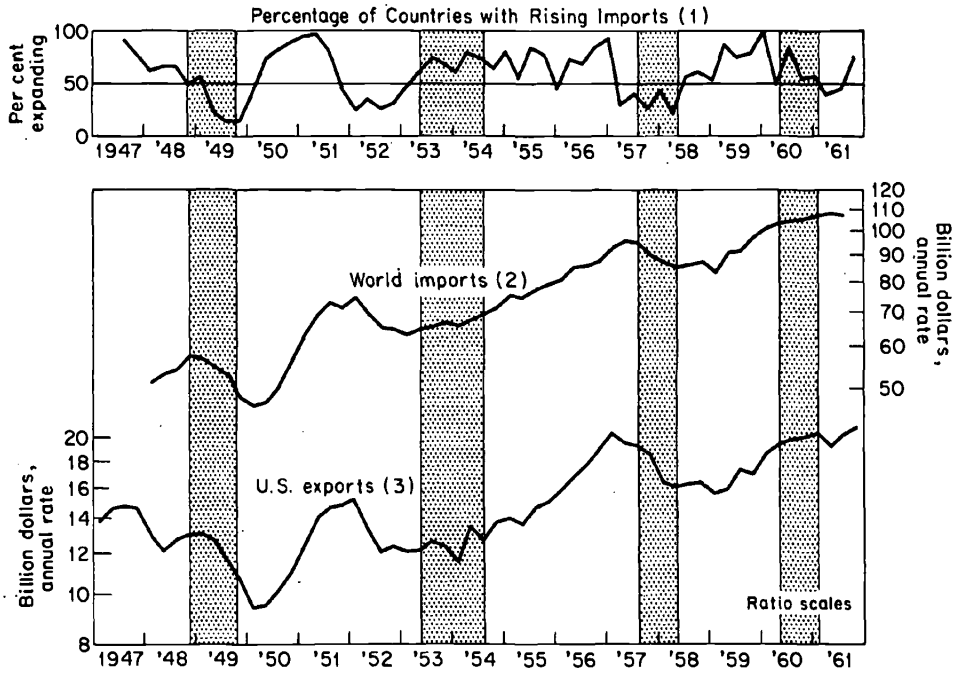
After commenting on the reasonableness of the proposition that cyclical movements spread gradually through the economy in the manner described by diffusion indexes, Burns lifted "the veil of anonymity" clothing these indexes

[7]For another type of clue, see the report by Lary in Part III.

[8]The rates cited are based on changes from the preceding quarter, converted to annual equivalents. The annual rates for the entire expansion from business cycle trough to business cycle peak are: IV 1945–IV 1948, 1.1 per cent; IV 1949–II 1953, 7.2 per cent; III 1945–III 1957, 4.3 per cent; II 1958–II 1960, 5.9 per cent. The rate for the first expansion is low, partly because GNP had, by the fourth quarter of 1945, not yet reached its lowest point. If the period I 1947–IV 1948 is used instead, the rate is 3.8 per cent.

CHART 2

United States Exports, World Imports, and Percentage of Countries with Rising Imports, 1947-61



NOTE: Shaded areas represent U.S. business cycle contractions; unshaded areas, expansions.

SOURCE: See Appendix.

and developed the proposition that this cumulative movement contains sequences that persist in some degree from one cycle to the next. A diffusion index based on a range of economic activities may tell us that the proportion undergoing expansion first rises and then falls during a business cycle upswing, but it does not tell which activities came first in the procession, or whether any of them came first in every cycle or most cycles.

Since these sequences may contain clues to the causal process of business cycles, it is important to look for them. One of the strongest conclusions that emerged from our studies of business cycles before World War II, Burns observed, was that "the check to the dominant movement of business activity, whether it be expansion or contraction, is typically felt especially early in financial processes and activities preparatory to investment expenditure." By this he meant that such indices as new orders for investment goods, construction contracts and building permits, stock prices and market activity, new security issues, and starts of business enterprises typically turn down before aggregate production, employment, income, or sales, and that they typically turn up earlier also. Note that these activities are *preparatory* to investment expenditure, representing an early, decision-making stage of the process of investment, not the actual expenditure or final, installation stage.

This finding has been confirmed in the postwar period. Moreover, we now have some valuable new statistical series with which to observe the process. For example, one of the products of Zarnowitz' study of the cyclical behavior of new orders was a series that combined orders for machinery and equipment with contracts for construction of commercial and industrial buildings and utility plants. This monthly series, a direct descendant of Burns' compilation for 1919-39, is currently published in *Business Cycle Developments*. Burns' index reached cyclical highs and lows in advance of every business cycle peak and trough but one in the interwar period, with an average (median) lead of four months. The new series has led at every business cycle peak and trough of the postwar period, with an average (median) lead of five months. There can be no question that decisions to invest, in the aggregate, typically take an unfavorable turn well before there is any decline in aggregate output, sales, or income, and that they usually begin to improve before there is any improvement in these basic factors.

We shall return to this matter later. Meantime, note that there are other persistent sequences in business cycles. Some pertain to the labor market. For example, Bry has shown that in virtually all industries cyclical adjustments in the workweek take place prior to adjustments in employment, on the average about four months earlier. This comes about as enterprises seek to achieve a prompt and efficient balance of labor and other resources devoted to production. Other repetitive sequences are found among different types of inventories, as shown by Abramovitz' and Stanback's studies; in the markets for stocks and bonds, as Macaulay's and Hickman's work demonstrated; and in the behavior of prices, costs, and profits, as Hultgren has shown. Sequences in the cyclical movements of these diverse elements have different though related causes, and the authors of the studies mentioned have taken great care in working out the explanations and testing their hypotheses and findings. All of these types of sequence, and others, were mentioned in Burns' report, although additional work has been done since then.

One way in which we have sought to make the results available for practical use is to compile lists of indicators, classified according to their typical timing in business cycles. Three such lists have been constructed, one in 1938 by Mitchell and Burns, the other two by me in 1950 and 1960. Each of these lists has drawn on the studies that had previously been made, and each has been tested against subsequent data. One of them (the 1950 list) has also been tested on data for another country, Canada. The results reveal a substantial degree of persistence in the characteristic timing of the selected series.[9] The successive revisions in the lists reflect largely the expanding scope of our studies and the improvements in available data; changes in cyclical behavior account for only a small fraction of the revisions. For practical reasons the lists have been restricted to a modest number of indicators—twenty-one in the first two and twenty-six in the third. However, the publication of *Business Cycle Developments* has made it feasible to use a much larger list, which we therefore supplied for the purpose. It also will make it convenient to revise the list more frequently and therefore to incorporate more promptly the results of new research and new statistical compilations.

Studies of leads and lags can, as I have said, contribute to understanding of the causal processes involved in business cycles. By helping us to recognize the interconnections among current developments, and to distinguish the more significant and meaningful from the less, they enhance our ability to forecast. As a result, although many uncertainties remain, a turn in the business cycle can now be recognized more promptly and with greater confidence than was the case twenty or even ten years ago.

4. THE ROLE OF PROFITS

The subject of price-cost-profit relations in business cycles has had a long history. Wesley

[9]See *Business Cycle Indicators*, Vol. I, Chaps. 1-4, 7, 10. For a test of the 1960 list, see pp. 65-66, below.

Mitchell gave it much attention in his *Business Cycles* (1913). He viewed the encroachment of unit costs on prices as one of the critical factors that brought a boom to an end, just as he viewed the reduction of costs relative to prices as a significant factor in the revival in business that followed depression. There the matter was virtually left, as far as empirical research was concerned, until Hultgren took it up in his *American Transportation in Prosperity and Depression* (1948). The result left Mitchell doubtful about the validity of his original formulation,[10] but Hultgren's later work on other industries than railroads put a different face on the matter, as Burns observed in *New Facts*. In support of Mitchell's propositions, Burns cited the evidence contained in Hultgren's analysis of the diffusion of profits.[11]

Since then, Hultgren's further work on costs, prices, and profits, part of which was published in 1960, and Kendrick's study of productivity, published last year, have provided much new evidence.[12] Now, with the publication of *Business Cycle Developments*, one can trace currently, for the first time, many of the important links among the processes that center around the cyclical behavior of profits.

Let me state the salient findings on this subject as they now appear to stand, particularly for manufacturing industries. A collection of relevant series is shown in Charts 3 and 4. Table 1 summarizes the timing of these series at business cycle peaks and troughs since 1919.

1. Price-cost ratios and profit margins (profits per dollar of sales) undergo sharp fluctuations in general conformity with business cycles but with significant leads at both peaks and troughs.[13] The movements are so sharp that they often dominate those in aggregate profits, even though the latter are sustained by rising sales while margins are declining toward the end of expansions, and are depressed by falling sales while margins are improving near the end of contractions. As a result of the sharp movements in the ratio of prices to costs, the average (median) lead of aggregate profits at business cycle turns since 1919 has been only slightly shorter than the average lead of the price-cost ratio: two months in the one case, four months in the other (Table 1, cols. 5 and 6). Turns in both the price-cost ratio and in total profits have usually preceded the corresponding turns in production, although the tendency is clearer in the ratio than in total profits, and the evidence of a lead in profits is stronger for the postwar than for the prewar period.

2. The cyclical leads of profit margins cannot be attributed to early downturns or upturns in the prices of manufactured goods. This price level has usually risen throughout business cycle expansions and stabilized or fallen throughout contractions. The price-cost ratio and the profit margin have usually turned before prices, and in recent cycles have undergone sharp cyclical contractions even while the price level was rising.

3. The timing of profit margins is primarily determined by the movements of unit costs, particularly unit-labor costs. These costs have usually declined during the initial stages of business cycle expansions, but have begun to

[10]See Arthur F. Burns (ed.), *Wesley Clair Mitchell: The Economic Scientist*, New York, NBER, 1952, p. 53.

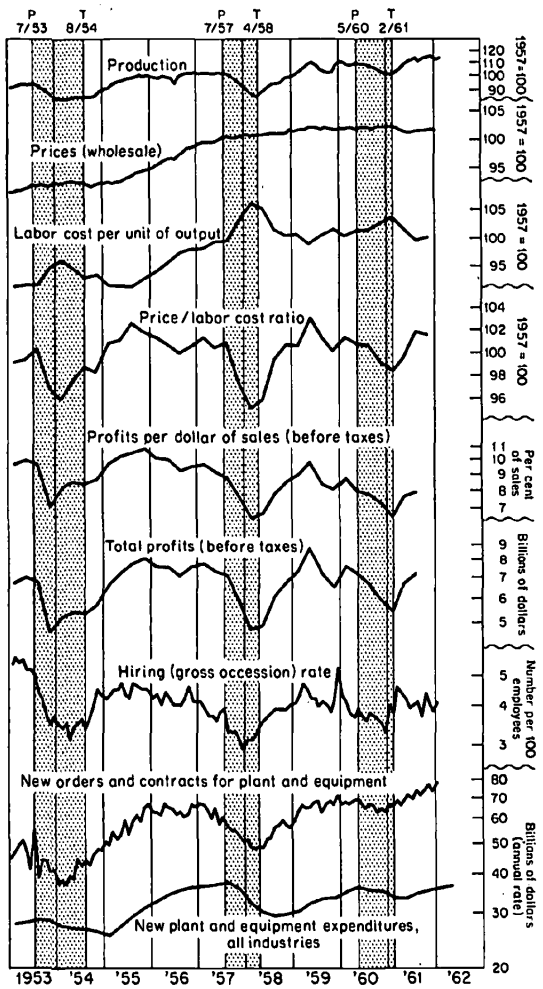
[11]*Cyclical Diversities in the Fortunes of Industrial Corporations*, Occasional Paper 32, New York, NBER, 1950; reprinted in *Business Cycle Indicators*, Vol. I, Chap. 11.

[12]Thor Hultgren, *Changes in Labor Cost During Cycles in Production and Business*, Occasional Paper 74, New York, NBER, 1960; John W. Kendrick, *Productivity Trends in the United States*, Princeton for NBER, 1961. See also Edwin Kuh, "Profits, Profit Markups, and Productivity," Study Paper 15, *Employment, Growth, and Price Levels*, Joint Economic Committee, 86th Congress, 1st Session, 1960. Canadian economists have cultivated this area, too, and their analysis of an independent body of information provides a valuable check on our own.

[13]If the data on costs, prices, profits, and sales were comprehensive and comparable, the profit margin would be equal to one minus the reciprocal of the price-cost ratio. Hence the movements in the margin and the ratio would always be in the same direction and their turning points would coincide. The series used in Chart 1 and Table 1 do not possess this elegant relationship, but since 1947 (when the margin data begin) their movements have been closely correlated.

CHART 3

Manufacturing Prices, Costs, and Related Variables



NOTE: All series are adjusted for seasonal variations. Shaded areas are business cycle contractions; unshaded areas, expansions. Prices, labor cost, and price/labor cost ratio are on arithmetic scales, all others on ratio scales.

SOURCE: See Appendix.

rise before the end of expansion (that is, while output was still rising), and the upturn has been accompanied or soon followed by a downturn in profit margins. Unit costs have continued to rise during the early months of business contractions, but have turned down usually a few months before the end, reversing the decline in margins. Of course, like the two blades of the proverbial scissors, both prices and costs determine margins, but costs have generally been the widely moving element accounting for the leads in margins.[14]

4. Unit-labor costs tend to move inversely with output because of the overhead nature of certain types of jobs, contractual commitments, and so on, but at the same time other factors cause them to move in a significantly different way from output.[15] Were it not for these differences, profit margins and price-cost ratios might be expected to duplicate the movements of production rather than to lead them.

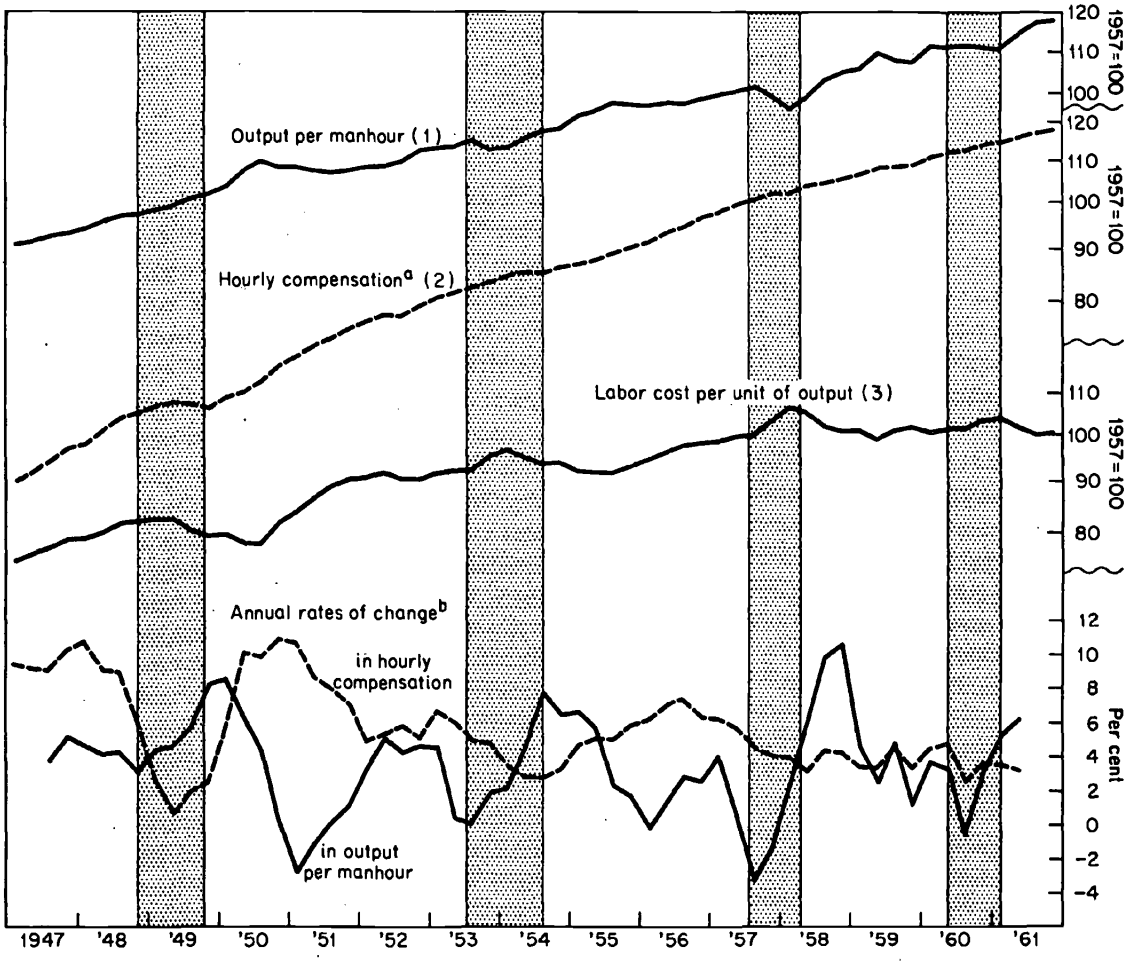
5. Some of the factors that bring about the distinctive behavior of unit-labor costs can be seen when cost is subdivided into its two components, average hourly compensation and output per man-hour. The early stages of a business cycle expansion usually witness a rapid rise in output per man-hour and a slower rise in hourly compensation; hence unit costs decline. In the later stages, output per man-hour rises less rapidly than before, and hourly compensation more rapidly. When the advance in compensation exceeds that in output per man-hour, unit costs rise. This happened, for

[14]This result for manufacturing is confirmed by economy-wide data for all corporations developed by Kuh in the study cited in footnote 12. He defines the profit markup as the ratio of the value of net output to wages, with the value of net output being equal to profits plus wages. Hence the markup is equal to the ratio of prices to labor cost per unit of output; in terms of the profit margin, it is the reciprocal of one minus the margin (see footnote 13). Kuh divides the quarterly percentage change in markup into a price component and three other components: net output, man-hours, and hourly wage rate (see his Table 8, p. 107), which we have combined to form a unit labor cost component. We find that in 34 out of 49 quarters, 1947-59, the cost effect on the profit markup exceeded the price effect. On the average, it was twice as large. In addition, the cost effect was highly correlated over time with the change in the markup, whereas the price effect was not.

[15]Compare the inverted timing comparisons for labor costs with the (positive) comparisons for production in Table 1, cols. 4 and 1.

CHART 4

Output per Man-hour, Hourly Compensation, and Labor Cost per Unit of Output, Manufacturing (All Employees), 1947-61



NOTE: All series are adjusted for seasonal variations. Shaded areas are business cycle contractions; unshaded areas, expansions (monthly chronology). The top three series are on ratio scales.

SOURCE: See Appendix.

[a]Including wages, salaries, and supplements.

[b]Percentage changes between quarterly averages, one year apart, centered at midyear.

TABLE 1

COSTS, PROFITS, AND RELATED VARIABLES: NUMBER OF LEADS AND LAGS AND THEIR MEDIAN AT BUSINESS CYCLE PEAKS AND TROUGHS, 1919-61

	Manufacturing Production (1)	Wholesale Prices, Mfd. Goods (2)	Labor Cost per Unit of Output, Mfg. *Positive* (3)	Labor Cost per Unit of Output, Mfg. *Inverted* (4)	Ratio, Price to Unit Labor Cost, Mfg. (5)	Corp. Profits After Taxes, Mfg. (6)	Gross Access. Rate, Mfg. (7)	Orders and Contracts for Investment Goods (8)	Plant and Equipment Expenditures (9)
Leads exceeding 12 mos.	...	...	...	3	2	...	4	1	...
Leads of 7-12 mos.	1	2	...	5	4	4	4	2	...
Leads of 1-6 mos.	6	4	...	3	10	7	9	14	2
Coincidences	7	2	...	1	1	4	2	1	4
Lags of 1-6 mos.	3	4	6	1	2	2	...	...	13
Lags of 7-12 mos.	...	...	6	...	...	...	...	...	...
Lags exceeding 12 mos.	...	1	3	...	...	...	...	...	...
Total Comparisons	17	13	15	13	19	17	19	18	19
Bus. Cycle Turns Skipped									
Number	2	6	4	5	...	...	...	...	...
Years when they occurred	'26-7	'53-61	'24-9	'26-33, '48	...	...	...	...	...
Bus. Cycle Turns Not Covered									
Number	...	...	...	1	...	2	...	1	...
Years when they occurred	...	...	...	'19	...	'19-20	...	'48	...
Extra Specific Cycle Turns									
Number	...	2	2	2	2	4	4	...	...
Years when they occurred	...	'51-2	'34-6	'33-4	'33-4	'33-4, '50-1	'33-6, '51	...	...
Median lead (−) or lag (+), in mos.	0	0	+9	−8	−4	−2	−4	−5	+1

NOTE: Leads or lags at the wartime peak, February 1945, and postwar trough, October 1945, are omitted. When unit labor cost is treated invertedly (col. 4), peaks are matched with business cycle troughs and troughs with business cycle peaks.

SOURCE: See Appendix.

example, in 1950, 1955, and again in 1959, as Chart 4 shows. When business contracts, a brief decline usually occurs in man-hour output while compensation rates continue to rise, lifting unit costs. Later in the contraction the rate of increase in output per man-hour picks up while the advance in hourly compensation weakens; and when the former exceeds the latter, unit costs begin to decline. As the chart shows, this occurred in manufacturing industry as a whole in 1949, 1954, 1958, and 1961. Thus the wide swings in the rate of change in output per man-hour and in hourly compensation have pursued very different courses during business cycles, and their systematic failure to synchronize has been responsible for the cyclical swings in unit-labor costs and, ultimately, for those in profit margins.[16]

In this account, I have traced only the proximate factors determining the cyclical behavior of costs and profits. A full account would, of course, deal with the effect on prices and sales of changes in demand by business enterprises, consumers, and government; with the effect on output per man-hour of changes in the level of output, in the efficiency of workers and management, and in the utilization of capacity; with the effect on hourly compensation of changes in overtime earnings, in the relative number of employees at various wage levels, and in wage and salary rates as affected by escalation clauses and the negotiation of new contracts; and with the effect on costs of such factors as materials prices, interest payments, and maintenance. A full account would also tell what diffusion indexes of prices, profits, costs, and output contribute to our knowledge of the way these developments spread from industry to industry and from firm to firm. Finally, it would consider whether my sketch applies to industries outside of manufacturing, as well as to what extent it is representative of individual manufacturing industries.[17] Many of these matters are covered in Hultgren's investigation.

If costs do have a dominant influence on the cyclical behavior of profit margins, which in turn dominate the swings in total profits, they must play an important role in the generation of business cycles, as Mitchell long ago suspected. For along with other developments they affect the prospect of profit, which remains one of the strongest incentives in a private enterprise economy. How far does the upturn in costs and the ensuing downturn in margins that takes place while sales and output are still expanding explain the downturn in orders for equipment and contracts for plant construction, which also occurs while business is

[16]Kendrick's recent study of productivity provides some interesting information on cyclical patterns of change in output per man-hour in manufacturing, although his data are annual. In the first year of each of the nineteen business cycle expansions from 1888 to 1960, output per man-hour rose, and the average change was +7.2 per cent. Sixteen of these expansions lasted at least two years; the average change in the first year was +7.7 per cent; in the second, +2.6 per cent. For the eight expansions that lasted at least three years, the average change in the first year was +7.1 per cent; in the second, +3.3 per cent; and in the final year of expansion, -0.6 per cent. Output per man-hour declined in the final year of six of these eight expansions. In the first year of the eighteen business cycle contractions, the average change in output per man-hour was +0.3 per cent. In eight instances it fell; in ten it rose. Since only three contractions lasted more than a year, on an annual basis, the data provide virtually no information on the characteristic pattern of change during contractions.

[17]In addition, there are important technical questions having to do with the measurement of output per man-hour, prices, costs, and profits. For example, the series on output per man-hour used in Chart 4 is based on an index of output constructed, in part, with the aid of interpolated and extrapolated measures of output per man-hour; hence it reflects, in part, these interpolations and extrapolations rather than actually recorded levels. It is also based on an estimate of man-hours that assumes, for lack of information, that so-called nonproduction workers were employed for a forty-hour week throughout the period. These assumptions can be, and to some extent have been, tested and the results compared with alternative methods of estimation. One of the critical tests is the comparison of the price-labor cost ratio with the independently derived profit per dollar of sales (see Chart 3). The broad conclusions are supported by these tests, but the figures cannot be regarded as precise.

expanding? Does the price-cost squeeze, and its reversal, help to explain the leads in the hiring rate and in the layoff rate? Is it a factor in the early turns in the number of new enterprises established and in the bankruptcies of larger-size businesses, which have been a regular feature of business cycles for nearly a hundred years, as Zarnowitz and Lerner have shown? These apparent links between costs, prices, profits, and decisions by business enterprises to expand or contract operations need to be carefully checked and worked out. With the data now available we are in a good position to carry out such a study.

5. MILD AND SEVERE DEPRESSIONS

Burns concluded his report on *New Facts* with the proposition that there are systematic differences between mild and severe depressions, and that the elucidation of these differences is a crucially important line of research, because severe depressions must be prevented. As an indication of the way in which developments during a boom may increase the severity of a subsequent depression, he cited the work of Mintz and of Saulnier, which disclosed that the quality of new issues of foreign government bonds and of urban mortgages deteriorated as the boom of the 1920's progressed. This deterioration contributed, through its impact on default rates, to the severity of the depression of the thirties. He thought that further research would be fruitful on this and on other clues to the problem why some business contractions remain mild while others become extremely serious.

Although each of the five contractions since World War II has, by comparison with the more severe prewar contractions, been mild or moderate, the problem is still an important one. Closely related to it, and no less important, is the problem of ensuring the vigor of expansions. Of the advances in our understanding of these matters that have been made in recent years, I shall discuss two in some detail and briefly mention others.

The method of cyclical analysis described by Burns and Mitchell in *Measuring Business Cycles* (1946) involved the computation of patterns showing in skeleton form the behavior of a given statistical series during each business cycle that it covered. From these patterns the characteristic behavior of production, prices, and other activities could be discerned, and the patterns could be used to reveal the cyclical interrelationships among different economic variables. In recent years we have given attention to the adaptation of these patterns to current business cycle analysis, and in particular to the problem of distinguishing, as promptly as possible, severe contractions and vigorous expansions from their milder counterparts.

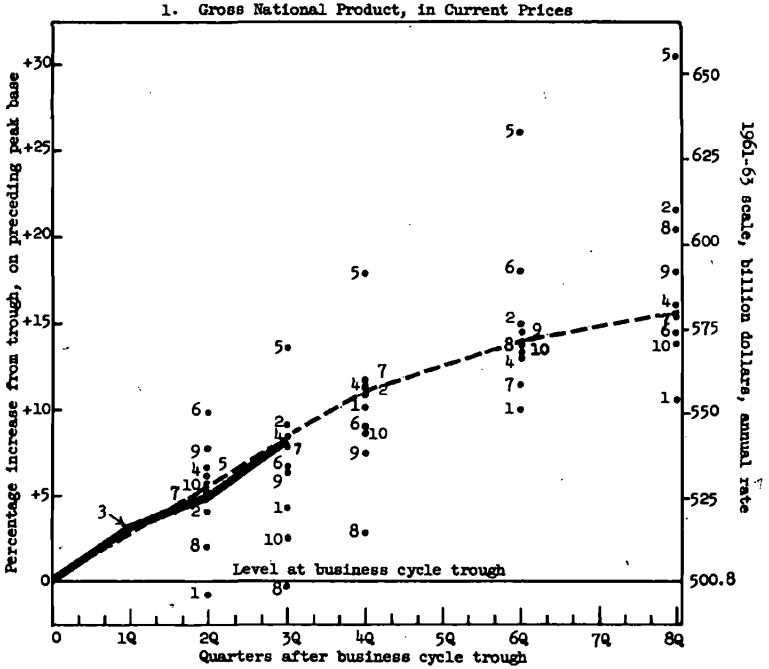
Some examples of the results are shown in Chart 5. Consider the second panel, industrial production. The numbered points represent the course of production during each business cycle recovery since 1920. Points numbered (1) refer to the recovery that began in November 1927, following the mildest contraction of the entire period. Points numbered (10) refer to the recovery beginning March 1933, following the severe contraction of 1929-33. The other recoveries are arrayed similarly, the current recovery (solid line) being (3) since the 1960-61 contraction is the third mildest in the list. Except for the current recovery the levels are shown only every six months in order to simplify the chart. The dashed line is an average (median) pattern based on the six recoveries that followed mild or moderate contractions, this range of experience being most nearly pertinent to the current situation.

Historical analysis of the type described by Burns and Mitchell led to certain findings concerning the behavior of industrial production during business cycles. One was that rates of increase during the initial stages of recovery were generally larger following severe contractions than following mild ones. Another was that initial rates of increase (during, say, the first six to twelve months) usually exceeded those at any subsequent time during the business expansion, although the retardation that occurred after the initial spurt was often suc-

CHART 5

A Sample of Business Recovery Patterns

1. Gross National Product, in Current Prices



Standing at II Q 1960 business cycle peak: 506.4; at I Q 1961 trough: 500.8.

Recovery beginning Feb. (IQ) 1961.

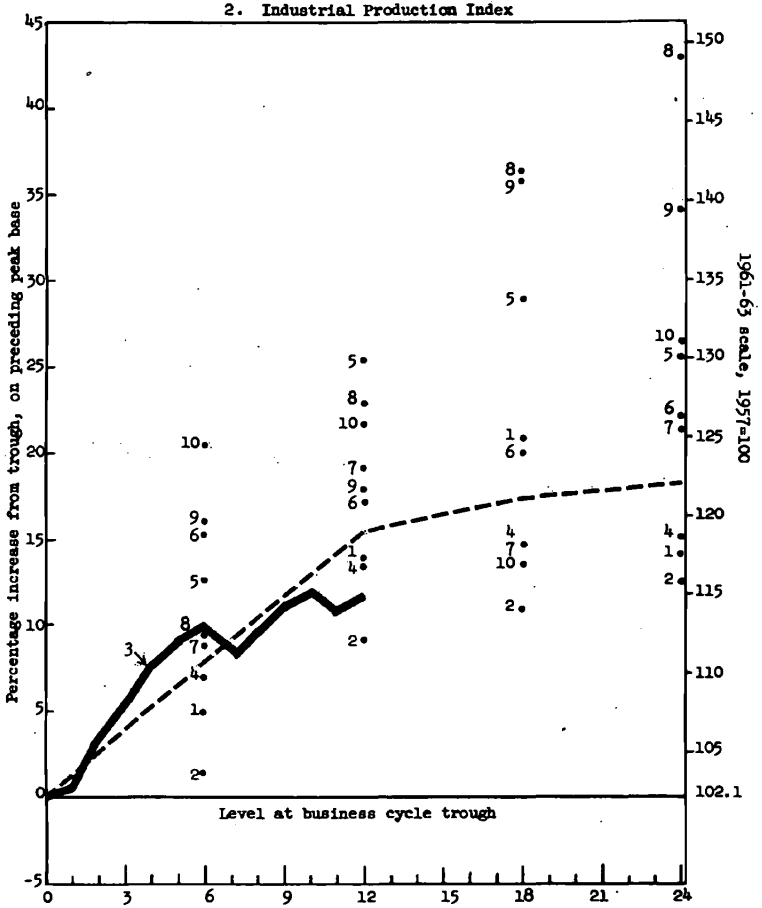
Median of previous recoveries that followed mild or moderate recessions (nos. 1,2,4,5,6,7).

Arabic numerals identify recovery periods arrayed according to severity of the preceding recession, beginning with the mildest. The periods start with the business cycle trough, as follows:

1. Nov.(IVQ) 1927
2. Oct.(IVQ) 1945
3. Feb.(IQ) 1961
4. Aug.(IIIQ) 1954
5. Oct.(IVQ) 1949
6. July(IIIQ) 1924
7. Apr.(IIQ) 1958
8. July(IIIQ) 1921
9. June(IIQ) 1938
10. Mar.(IQ) 1933

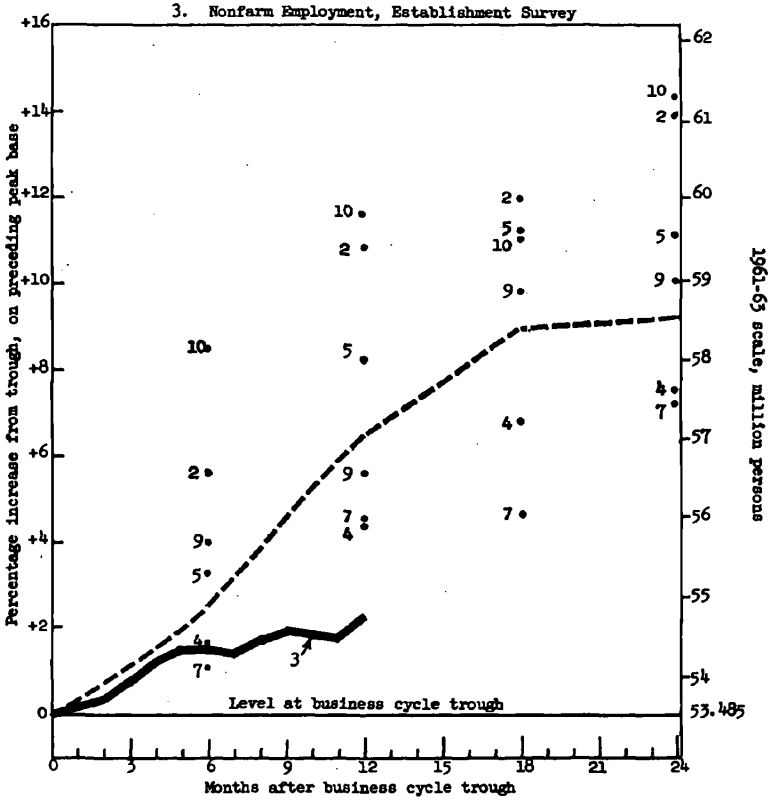
Source: See Appendix.

2. Industrial Production Index



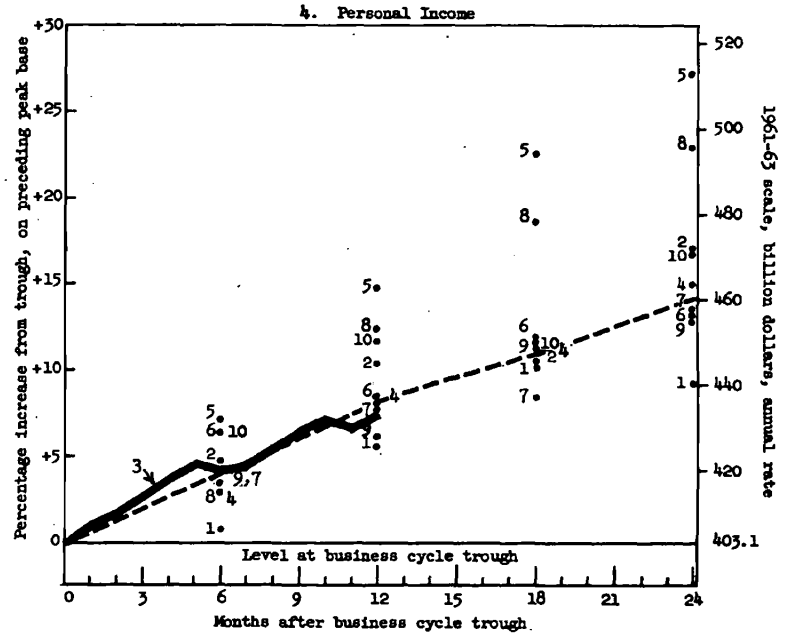
Standing at May 1960 business cycle peak: 190.3 (3 mo. av.); at February 1961 trough: 102.1.

CHART 5 (continued)



Feb.61 May61 Aug.61 Nov.61 Feb.62 May62 Aug.62 Nov.62 Feb.63

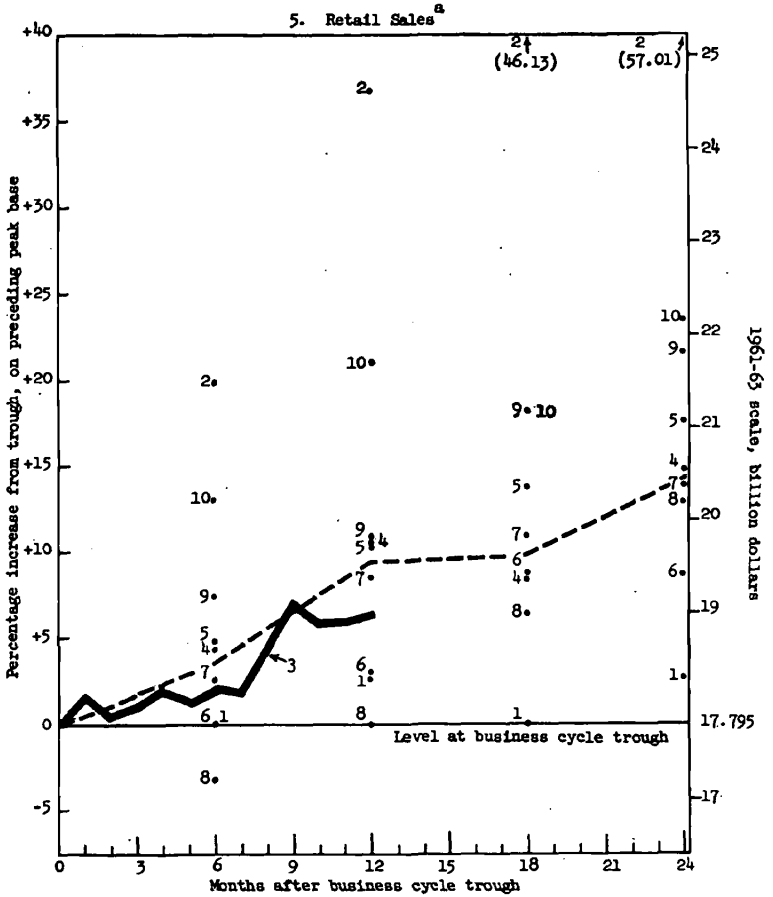
Standing at May 1960 business cycle peak: 54.608 (3 mo. av.); at February 1961 trough: 53.485.



Feb.61 May61 Aug.61 Nov.61 Feb.62 May62 Aug.62 Nov.62 Feb.63

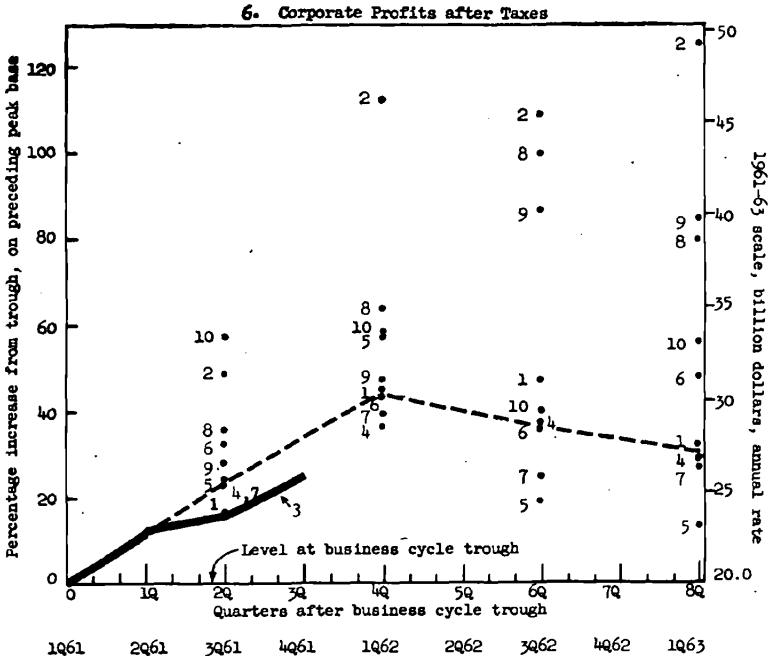
Standing at May 1960 business cycle peak: 403.1 (3 mo. av.); at February 1961 trough: 403.1.

CHART 5 (concluded)



Standing at May 1960 business cycle peak: 18.585 (3 mo. av.); at February 1961 trough: 17.795.

[a]Department store sales for 1, 6, 8, 10.



Standing at II Q 1960 business cycle peak: 23.3; at I Q 1961 trough: 20.0.

ceeded by some reacceleration toward the end of expansion.[18]

The production patterns serve both to demonstrate these findings and to relate them to recent experience. The fact that in each column of dots the higher numerals are generally at the top demonstrates the first finding, since the high numerals identify recoveries following severe contractions. The greater rate of increase in production during the first six months of recovery than later is apparent, too. Although many factors affect the pace of a recovery and cause the variations that are evident in the chart, it also reveals some—although not a high—degree of stability in the relative positions of the several recoveries after the first six months.

A broad collection of such patterns, covering various aspects of economic activity, such as employment, income, sales, prices, costs, profits, and investment, can, I think, bring into useful focus a large portion of the historical experience garnered in our business cycle studies, demonstrating the variations that have occurred from cycle to cycle as well as the consensus, revealing relationships between unusual developments in one sector and those in another, and helping distinguish the economy's larger swings from its more ephemeral twists and turns. Some charts of this sort are provided each month in *Business Cycle Developments*. By such means any current expansion can be compared with its predecessors as it proceeds, its vigor can be assessed, forecasts of its future course appraised, and unusual aspects noted. Similar charts can be constructed for recessions, and appear to be helpful in distinguishing the more severe of these episodes from the less.

During the 1957-58 recession we conducted an experiment designed to facilitate a series of judgments on its ultimate severity. Historical evidence had suggested that, about four months after a downturn began, features that would distinguish a severe contraction from a mild one could begin to be discerned in early-moving indicators. As the contraction proceeded, more evidence would accumulate month by month, providing a basis for revising or retaining the initial judgment and reducing the uncertainty surrounding it, although no more than a rough ranking of the current contraction relative to earlier ones was envisaged. The method also provided an approximate estimate of how long economic activity would remain depressed, based essentially on an estimate of how long it would take, after recovery started, to regain the prerecession level. The latter intervals are generally shorter, the milder the contraction.

The preliminary results for 1957-58 were published in *Measuring Recessions* (Occasional Paper 61, 1958), and a supplement showing how the experiment ultimately turned out was included in *Business Cycle Indicators*. The 1957-58 contraction ranked fifth in ultimate severity among the eight that had occurred since 1920,[19] and the period of "depressed activity" lasted nineteen months according to the industrial production index. This ranking was initially indicated by data covering the first four months of the contraction, i.e., July-November 1957, and was substantially confirmed in each succeeding month thereafter. The period of "depressed activity" was considered likely, on the basis of historical experience, to fall within a range of eighteen to thirty months, and the actual interval turned out to be at the lower end of this range.

A similar experiment was carried out during the 1960-61 recession. In this case, data covering the first four months (May-September 1960) suggested that the contraction would rank close to the mildest of the eight since 1920, and this ranking was substantially sup-

[18]A deficiency of Chart 5 is that it does not clearly depict events at the end of expansion, since expansions have lasted various lengths of time, often more than the twenty-four months covered by the chart. Hence the protracted slowing down in the growth of industrial production shown by the median (dashed) line on the chart does not properly characterize what happens toward the end of a business cycle expansion, although the rate of growth in, say, the last twelve months of expansion has, as a rule, been smaller than in the first twelve.

[19]Omitting the contraction of February-October 1945 because of its anomalous character.

ported in each succeeding month.[20] The total decline from the business cycle peak, May 1960, to the trough, February 1961, turned out to be, by most measures, somewhat larger than the 1926-27 contraction, but smaller than any of the other seven. The period of "depressed activity," thirteen months as measured by the industrial production index, was correspondingly brief.

These experiments are an example of efforts to take account of the fact that the amplitude of each business cycle varies from its fellows, to understand the variations that have occurred, and to utilize that understanding in appraising the current cycle. Let me now turn to another illustration, prompted by the recent publication by the Joint Economic Committee of Thomas Stanback's *Postwar Cycles in Manufacturers' Inventories*.[21] This monograph has also been published by the National Bureau as No. 11 in Studies in Business Cycles.

In his basic study, *Inventories and Business Cycles* (1950), Abramovitz observed that changes in the rate of accumulation of inventories are related to the cyclical swings in business activity in a highly important and systematic way: their contribution to an upswing or downswing is likely to be large initially, but to dwindle as the expansion or contraction lengthens. Consequently, in short business cycle phases the change in inventory investment is apt to have a dominating influence, whereas in longer swings other factors take on the chief role.

Stanback shows that this pattern has continued to be true of the postwar period. Reductions in inventory investment have been a prime factor in each of the postwar business contractions, which have been relatively short. On the other hand, increases in inventory investment have been of primary significance only in the early stages of the expansions, which have been relatively long. For example, in the four expansions between 1946 and 1960, gross national product (in 1954 prices) rose by $20 billion in the first year and by $14 billion in the second, on the average. The rise in inventory investment contributed $4 billion to the advance in the first year, less than half a billion in the second. Not only did the contribution of inventory investment to the rate of expansion in GNP become smaller as the expansions proceeded, but it accounted for a large part of the reduction in the rate of expansion itself.

Hence there is a systematic shift in the effect of inventory investment on economic activity during a business cycle. There is also a shift in its composition. The initial impact during an expansion, Stanback shows, is largely attributable to a rise in investment in purchased materials and goods-in-process inventories. Later on the rise in investment in finished-goods inventories typically becomes the dominant factor. Similar statements apply to contractions.

Stanback probes further into the behavior of purchased materials by examining the level of unfilled orders, which provides a motive for accumulating materials for future use, and the availability of materials, which also can stimulate or inhibit accumulation. Ruth Mack has been investigating a new concept in this connection, one that combines stocks of materials on hand with those that are on order. Since purchasing decisions are made with an eye on both quantities, and unforeseen changes in the one can be offset quickly by deliberate changes in the other, this idea is surely worth pursuing. A preliminary draft of her analysis appeared in the Joint Committee print referred to above; a final version will, we expect, be completed shortly.

These investigations have an important bearing on the brief and relatively mild business cycle contractions that have characterized the postwar economy. Substantial progress has been made, also, on other research on the severity of depressions and the vigor of expansions. Earley and his associates have fol-

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[20]See my testimony at the hearings on the *Current Economic Situation and Short-Run Outlook* before the Joint Economic Committee, 86th Congress, 2nd Session, December 7 and 8, 1960, pp. 92-107.

[21]Printed in *Inventory Fluctuations and Economic Stabilization*, 87th Congress, 1st Session, 1961.

lowed up the findings of Mintz and Saulnier on the quality of credit with an extensive investigation designed to produce means of detecting signs of deterioration at an early stage. The studies of Friedman and Schwartz have revealed that sharp contractions in the money supply have occurred only in severe depressions. Abramovitz' study of long waves suggests that during the long upswings in construction, business cycle expansions have usually been long and vigorous and contractions brief and mild; while during the long downswings, the reverse has generally been the case. All these studies are nearing completion.

6. NEW RESEARCH

The program of research that has yielded the results I have described is a continuing one. The reports in Part III tell what is presently under way. But we should look beyond them.

A portion of our resources should be devoted to testing and extending previously established results. Business cycles are ever-changing. Mitchell recognized this when he wrote in 1913: "It is probable that the economists of each generation will see reason to recast the theory of business cycles which they learned in their youth." Continuous testing of old hypotheses against new data will permit us to discard what seems wrong and retain what seems right. In one field or another, therefore, we should always be seeking to test and verify. Even though each of the individual pieces of research be of small dimension, the cumulative result of such a program can be great.

Our research should also have the focus and stimulus provided by basic studies which either cover a wide range or break new paths. The work I have just reviewed suggests two such studies. One would deal systematically with the relations between costs, prices, and profits on the one hand, and business decisions to expand or to contract on the other. A thorough analysis of this basic process, as I have already indicated, is both needed and feasible. A second study of great importance would explore historically, statistically, and analytically the factors that differentiate mild from severe depressions, as well as those that promote vigorous, prolonged expansions that produce real growth without inflation. It would weigh not only the lessons of history but also how those lessons can be applied to the present and what information and policies may be needed to apply them.

Although both these studies should provide new guides for business cycle policy, it also seems desirable, as we plan future research on business cycles, to consider a study that would deal directly and comprehensively with business cycle policy.

Business cycle policy has come to embrace a wide range of interrelated actions and institutions—tax policy, debt management, monetary policy, public works, housing, unemployment compensation, deposit insurance, stock market regulation, mortgage guarantee and insurance, to mention a few. Many of these activities have been treated in earlier National Bureau studies. *Housing Issues in Economic Stabilization Policy* (1960) by Grebler; *Federal Lending and Loan Insurance* (1958) by Saulnier, Halcrow, and Jacoby; *Federal Grants and the Business Cycle* (1952) by Maxwell; *Planning and Control of Public Works* (1930) by Wolman; and the conference reports on *Consumer Instalment Credit* (1957), *Policies to Combat Depression* (1956), and *Regularization of Business Investment* (1954) are examples from a long list. Many of our current investigations—of interest rates, consumer credit, money supply, tax policies for economic growth, international economic relations, as well as this spring's conference on monetary economics—touch various aspects of business cycle policy.

The monographic studies we have issued demonstrate, I believe, that this difficult subject can be treated on an objective basis. A larger effort in this direction therefore seems feasible. As I remarked at the outset, the postwar period has provided a wealth of policy actions to study, and new actions and experiments are constantly being undertaken or

proposed. Do we not have a public responsibility to try, sooner or later, to undertake a comprehensive study of the vital subject of business cycle policy?

7. CONTINUITY

In May 1938 the National Bureau published its first report on business cycle indicators; in October 1961, some twenty-three years later, a federal agency began publishing a monthly statistical report based on our most recent selection and classification of indicators. This experience is not unique. Many of the results of National Bureau studies have eventually been incorporated in the regular statistical work of government agencies—the estimates of national income, of productivity, of consumer credit, of the flow of funds, for example. This outcome, fostered by the cooperation and initiative of many government economists and other officials, has made our research more broadly useful. But it would not have come about unless the research itself commanded confidence, and confidence is not attained overnight.

The scientific integrity of the individual who is responsible for the research—the author—is one basic ingredient upon which this confidence depends. There are also other vital ingredients, not the least of which is the careful review of each of our studies by the research staff, by the Board, and often by outside experts. This reviewing process virtually always brings out points that require revision or clarification before final publication. Another factor, and one that I wish to stress, is the continuity in our research program itself. Continuity and responsibility go together. If mistakes have, despite all precautions, been made, it is our duty to correct them; if new data suggest that earlier results are no longer valid, it is our duty to set them straight. In this way confidence in the dependability of research is built up and preserved.

Continuity in a research program also helps to ensure that the results of research will cumulate, producing a growing body of tested knowledge. *Ad hoc* projects are much less likely to have this effect. All research generates questions as well as answers. In a continuing program the questions can be picked up and new studies planned to deal with them. New ideas generated in the course of research become the focus of new work, and the interest and experience of those engaged is enlisted to the full.

Finally, continuity in a research program fosters thoroughness. Investigations of this type take a great deal of time—time to collect the evidence, time to think through its implications, time to recover from false starts, time to consider the views of one's colleagues, time to write and rewrite the results and to document them so that others can verify the work and extend it. The problems we select must be worth the time—and the money that it costs. If we choose our research wisely, we shall anticipate many of the problems of the day and make it easier to reach sound conclusions.

The history of the National Bureau's research has demonstrated this truth over and over again. When Mitchell and Burns were requested by the Secretary of the Treasury, in the fall of 1937 as the economy was undergoing a sharp contraction, to tell him what statistical series would give the earliest reliable indication that the contraction was coming to an end, they were able to give him a prompt answer. The answer was not only essentially valid for that contraction but for every one since. This accomplishment was made possible by the basic studies of business cycles that they could draw upon, which had been under way for many years before 1937. Last summer, when the Joint Economic Committee requested the National Bureau for a report that would contribute to their investigation of inventory fluctuations and economic stabilization, we were able within a short time to provide them with the results of Stanback's work, the culmination of several years of methodical research. His work in turn depended heavily upon Abramovitz' study, which was begun in 1938, just as Abramovitz had depended upon other studies of the National Bureau. The confidence that Stanback's report justifies is a

product of the continuing program of basic research of which it was a part.

"The ultimate goal of science in any field," Milton Friedman[22] once wrote, "is a theory—an integrated 'explanation' of observed phenomena that can be used to make valid predictions about phenomena not yet observed. Many kinds of work can contribute to this ultimate goal and are essential for its attainment: the collection of observations about the phenomena in question; the organization and arrangement of observations and the extraction of empirical generalizations from them; the development of improved methods of measuring or analyzing observations; the formulation of partial or complete theories to integrate existing evidence."

We have not reached this ultimate goal, but we are striving toward it—in our business cycle studies as in our other major investigations.

GEOFFREY H. MOORE
Associate Director of Research

[22] *Wesley Clair Mitchell, The Economic Scientist,* p. 237.

APPENDIX

SOURCE NOTES FOR CHARTS AND TABLE 1

CHART 1

United States: 1919-39: Based on specific cycles in the components of index D57.0, *Business Cycle Indicators*, Princeton for NBER, 1961, Vol. II, pp. 68-70.

1947-61: Based on changes over one-month span in 1960 list of indicators, excluding GNP in constant prices; cf. *Signals of Recession and Recovery*, Occasional Paper 77, New York, NBER, 1961, p. 74.

Canada: 1919-39: Edward J. Chambers, "Canadian Business Cycles since 1919: A Progress Report," *The Canadian Journal of Economics and Political Science*, May 1958, p. 176 (data supplied by author).

1947-61: Economics Branch, Department of Trade and Commerce, Ottawa.

Japan: 1919-36: M. Baba and I. Sugiura, *Keikihendo no Bunseki to Yosoku* ("Measuring Business Cycles and Forecasting"), 1961, p. 120.

1953-61: Division of Statistics, Bureau of Economic Research, Economic Planning Agency, Tokyo.

Italy: G. Miconi, *La méthode du National Bureau of Economic Research à New York et son application au diagnostic sur l'économie italienne*, Rome, Istituto Nazionale per lo Studio della Congiuntura, October 1961, p. 39 (data supplied by author).

CHART 2

(1) Compiled by NBER. 1947-53: Based on change over four-quarter span in original data, 35-41 countries excluding U.S., centered.

1954-61: Based on change over one-quarter span in seasonally adjusted data, centered, 20 countries excluding U.S. The countries are Algeria, Australia, Austria, Belgium-Luxembourg, Brazil, Canada, Denmark, France, India, Italy, Japan, Malaya, Mexico, Netherlands, Norway, Sweden, Switzerland, Union of South Africa, United Kingdom, and West Germany.

(2) Excluding U.S. imports. United Nations. Seasonal adjustment by NBER.

(3) Excluding military shipments. Department of Commerce.

CHART 3

See notes to Table 1, below.

CHART 4

(1) Manufacturing output divided by estimated man-hours for all employees; compiled by NBER from Federal Reserve Board and Bureau of Labor Statistics data. For nonproduction workers a 40-hour workweek was assumed.

(2) Wages, salaries, and supplements divided by total man-hours for all employees; compiled by NBER from Office of Business Economics and Bureau of Labor Statistics data.

(3) Wages, salaries, and supplements divided by output (see above). Equivalent to hourly compensation divided by output per man-hour.

CHART 5

Compiled by NBER from Office of Business Economics, Federal Reserve Board, and Bureau of Labor Statistics data. The percentage changes during each recovery are computed on the base of the standing of the series at the preceding business cycle peak (three-month average centered on the peak month, or, in quarterly series, the figure for the peak quarter). For convenience, on each chart the equivalent scales for the current recovery are given on the right-hand side and at the bottom, together with the peak and trough figures. Each

recovery pattern begins at the business cycle trough and with the level of the series at that date, regardless of when the series itself reached its low. The charts are carried forward a uniform 24 months from the trough, although in two cases the business expansion ended a few months earlier (Nos. 1, 8), in two a month or so later (6, 7), while in the rest it continued for another year or more. The median pattern (dashed line) is the average of the middle two or three figures at each six-month interval for the six recoveries after 1920 and prior to 1961 that followed mild or moderate recessions (Nos. 1, 2, 4, 5, 6, 7) or as many of these as the series covers. For further analysis and examples of recovery patterns, see *Business Cycle Indicators,* Vol. I, pp. 86-100, 687-735; and *Signals of Recession and Recovery,* pp. 72-87.

TABLE 1

(1) Board of Governors of the Federal Reserve System.

(2) 1919-27, 1947-61: Bureau of Labor Statistics. For 1919-27 the index used covers all finished products, which includes some nonmanufactured goods and excludes some manufactured goods. 1927-39: Compiled by NBER from Bureau of Labor Statistics data.

(3) and (4) Compiled by NBER from Bureau of Labor Statistics, Office of Business Economics, and Federal Reserve Board data. 1919-38: Covers wages of production workers only. 1947-61: Includes wages and salaries of all employees. See series 23.1 and 23.0, *Business Cycle Indicators,* Vol. II, pp. 148-149. The quarterly series in Charts 3 and 4 includes wage supplements; the monthly series used in Table 1 does not.

(5) Same as (2) and (3).

(6) 1920-38: Harold Barger, *Outlay and Income in the United States, 1921-1938,* New York, NBER, 1942. 1947-61: Federal Trade Commission and Securities and Exchange Commission. The series used in Chart 3 is before taxes.

(7) 1919-May 1929: Metropolitan Life Insurance Company. June 1929-61: Bureau of Labor Statistics.

(8) 1919-38: Cumulated net diffusion index compiled by NBER, based on specific cycles in 14 series on new orders for producer durable materials and equipment and 56 series on construction contracts and building permits, including some on residential building (based on series D6.2, *Business Cycle Indicators,* Vol. II, p. 158). 1949-61: Aggregate of new orders for producers' durable equipment and contracts for commercial and industrial building and privately owned public works and utilities, compiled by Bureau of the Census from data supplied by Office of Business Economics and F. W. Dodge Corporation. See series 6.2, *Business Cycle Indicators,* Vol. II, p. 90.

(9) 1919-38: Manufacturing industries only, Office of Business Economics. 1948-61: All industries, Office of Business Economics and Securities and Exchange Commission. See series 22.1 and 22.0, *Business Cycle Indicators,* Vol. II, p. 147.

Current data for series 3, 5, 7, 8, and 9 are published in *Business Cycle Developments,* U.S. Department of Commerce, Bureau of the Census.