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Volume Title: Business Cycles: Theory, History, Indicators, and Forecasting

Volume Author/Editor: Victor Zarnowitz

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-97890-7

Volume URL: <http://www.nber.org/books/zarn92-1>

Conference Date: n/a

Publication Date: January 1992

Chapter Title: Research during the First 50 Years of the National Bureau

Chapter Author: Victor Zarnowitz

Chapter URL: <http://www.nber.org/chapters/c10376>

Chapter pages in book: (p. 164 - 180)

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## 5 Research during the First 50 Years of the National Bureau

Research on the nature and causes, and later also on the indicators and forecasting, of business cycles has been a major part of the work of the National Bureau of Economic Research almost from its beginning in 1920. This reflected the need of the times and continued under the administration of each of the six NBER directors of research or presidents: Wesley Mitchell, Arthur Burns, Solomon Fabricant, Geoffrey Moore, John Meyer, and Martin Feldstein. Business cycles, viewed broadly as the major problem of economic instability, constituted a central scientific interest of three of these men—Mitchell, Burns, and Moore. Many research staff members and associates at the National Bureau devoted major parts of their working lives to studies of this subject.

### 5.1 A Wide Range of Interrelated Studies

I think that most students of the subject would accept, though agreeing it is difficult to prove, that the development of modern economic theory contributed importantly to the potential of economic policy by teaching the profession about the probable directional effects of different policy measures. Such lessons are usually applied with lengthy lags, but publicly minded people showed rather more receptiveness to them than many would have expected. Beyond that, great advances in economic statistics and econometrics gave increasingly powerful analytical tools to those concerned with quantitative economic research and its applications to questions of policy. Both the quantity

This chapter is a slightly revised and heavily abbreviated version of an essay written in 1970 to introduce the first in a series of colloquia celebrating the National Bureau's 50th anniversary ("The Business Cycle Today: An Introduction," in *The Business Cycle Today*, edited by V. Zarnowitz [New York: NBER, 1972]). In this form, the chapter is limited to a review of the NBER studies of business cycles in the years 1920–70 as related to some other concurrent work in the same area.

and quality of economic data have increased immensely in what has been termed “the statistical revolution” that in most countries started during the Second World War.

No attempt can be made here to trace all these lines of progress, of course, but this is an appropriate occasion for recalling at least some of the more important contributions of the National Bureau. These are by no means limited to the research classified specifically (and somewhat narrowly) as “studies in business cycles.” At the Bureau, and elsewhere, inquiries in various fields have resulted in new materials and knowledge that proved helpful in dealing with the problem of economic instability.

That this is so can be seen most readily in the case of the massive studies that have led to the development of systematic national income accounting and its worldwide diffusion. Thanks in a large measure to these time-series data, “there now exists in all Western countries a relatively well-organized statistical universe to which our notions of development and stability refer. . . . Economic reality is a product of systematic statistical observations in a more serious sense today than it was during earlier decades (Lundberg 1968, p. 16). The pioneering National Bureau work in this area goes back to the earliest NBER publication, by Mitchell, W. I. King, F. R. Macaulay, and O. W. Knauth, but the main contributions here are those by Simon Kuznets and his associates, which appeared in the years 1937–46 (Mitchell et al. 1921; Mitchell 1922; Kuznets 1937, 1945; Kuznets, Epstein, and Jenks 1941, 1946). The great influence this research had on the development of economics since the 1930s is today generally recognized.<sup>1</sup>

Other basic measures developed in National Bureau studies concern business and household capital formation, consumption, and financing (Kuznets, Fabricant, Goldsmith, Lipsey, Becker, Juster, and Shay); output, employment, labor force, productivity, prices, and wages (Fabricant, Kendrick, Wolman, Long, Easterlin, Mincer, Mills, Stigler, Rees, Kravis, and Lipsey); money flows, interest rates, and the stock of money (Copeland, Macaulay, Durand, Braddock Hickman, Conard, Guttentag, Cagan, Friedman, and Schwartz); government, business, and consumer financing (Seltzer, Holland, Kahn, Saulnier, Haberler, Moore); etc.<sup>2</sup> Without the groundwork laid by these investigations, much of the recent economic research, particularly of a quantitative nature, would have been seriously impaired if not frustrated. This includes studies dealing with business cycle problems, some of them undertaken by the authors who developed the materials just listed (e.g., Friedman and Schwartz 1963a; Cagan 1965, 1966).

1. For example, Johnson (1967, p. 86) observes that Keynes's “original concept of the propensity to consume was very strongly influenced by national income accounting (in fact, the development of the Keynesian theory can be related fairly closely to the development of national income accounting).”

2. This recital, though long, is very incomplete; for references see any catalog of NBER publications.

Of course, in large part the Bureau's efforts in data collection and measurement originated directly in the program of research on business cycles initiated by Wesley Mitchell. Gradually, a uniquely rich library of well over two thousand time series on almost every aspect of economic activity was built up, with full annotations, seasonal adjustments, measures of cyclical timing, amplitude, conformity, etc. These data were assembled and used in the course of many studies, including, in addition to those mentioned above, the massive investigations by Mitchell and Burns of how to define, measure, and analyze business cycles; research on cyclical movements in transportation by Hultgren, in inventories by Abramovitz and Stanback, in personal income by Creamer, in consumption by Mack, in exports by Mintz; and studies of business cycle indicators by Moore, Shiskin, Hultgren, Bry, and Zarnowitz.<sup>3</sup> I believe it is fair to say that the materials assembled and analyzed in all these reports add up to a large proportion of our factual knowledge of how the various economic activities and aggregates behaved during the historically observed sequence of business expansion, downturn, contraction, and upturn—that is, in each phase of the uneven but pervasive fluctuations that marked the process of the economy's growth. To be valid, the theoretical explanations of economic growth and fluctuations must conform to the major facts disclosed by these largely empirical studies; to be useful, they will also have to incorporate the more important and durable of the findings of this research.

Those engaged in the study of economic fluctuations at the National Bureau placed their hope in the cumulation of economic knowledge: that their "quest of the lessons of experience will aid other students, as well as laymen who must wrestle practically with business cycles" (Burns [1946] 1954, p. 24).<sup>4</sup> Their work has been primarily in the nature of basic research—on how business cycles come about, vary, and interact with structural and operational changes in the economy—because this strategy promised to contribute most in the long run to the improvement of the analysis of current business conditions, economic forecasting, and policies. There is evidence in support of this strategy in the wide use made of various tools and results of this research, for example, the reference chronology of business cycle peaks and troughs, the identification of mild and severe contractions, systematic amplitude differences among individual economic processes, and the classification of the lat-

3. Let me add to this sentence an abbreviated list of references (all are volumes in the NBER series of *Studies in Business Cycles*: Mitchell 1927, 1951; Burns and Mitchell 1946; Hultgren 1948; Abramovitz 1950; Stanback 1962; Creamer and Bernstein 1956; Mack 1956; Moore 1961; Mintz 1967.

4. Having illustrated some problems in business cycle research that are of great importance to those concerned with economic policy ("Whether a cyclical downturn can be recognized promptly enough to permit immediate governmental intervention, whether cost-price relations are of slight consequence in the termination of a boom, whether inflationary tendencies become important only as 'full employment' is approached"), Burns continues: "True, the most painstaking studies of experience will not always lead to conclusive answers; but they should at least narrow the margins of uncertainty, and thus furnish a better basis than now exists for dealing with grave issues of business cycle theory and policy" ([1946] 1954, p. 24).

ter by characteristic cyclical timing. Serious criticism also appeared, but it centered on the methodology of the Bureau's cyclical analysis rather than on the substantive findings of this analysis.<sup>5</sup>

Recent literature on the behavior, determinants, and influence of such key economic variables as consumption, types of investment, prices, and money shows continuing concern with a number of economic relationships explored in the National Bureau reports. For example, fixed-investment functions in most of the major aggregate econometric models employ profit variables that have long been stressed in these reports.<sup>6</sup> The accelerator variables appear to be working with rather long distributed lags in these functions, which is consistent with the view that they explain long-run tendencies much better than short-run behavior.<sup>7</sup> In the determination of inventory investment, the accelerator has a role to play, and an important nexus exists involving new and unfilled orders, shipments, production, and price changes; this theme has received much attention in the work of Abramovitz, Stanback, Mack, and Zarnowitz and increasing recognition in more recent econometric studies.<sup>8</sup>

In the theory of consumption, formulations that are consistent with observation of both the short-term instability and the long-term stability and higher values of the proportion of income consumed have in effect superseded Keynes's simpler concept of a stable relationship between consumer expenditures and current income. The failure of early postwar forecasts and Kuznets's data (1946, pp. 52–54) showing a rough constancy of the share of capital formation in U.S. output led to doubts about the validity of Keynes's concept, at least as an explanation of the long-run savings-income relation, and to the emergence of the "relative income," "permanent income," and "lifetime income" hypotheses of Duesenberry (1949), M. Friedman (1957), Modigliani and Brumberg (1954), and Ando and Modigliani (1963). In empirical work, lagged consumption or income terms and measures of assets or wealth are now commonly included in the consumption equations. The National Bureau

5. Koopmans 1947, 1949; Vining 1949a, 1949b. This debate, with an "Additional Comment" by Koopmans 1957, is reprinted in Gordon and Klein 1965, pp. 196–231.

6. Cyclical changes in actual and prospective profits have a strategic part in Mitchell's *Business Cycles* (1913). Mitchell viewed the encroachment of unit costs on prices as one of the main factors limiting the boom and, correspondingly, the improvement in the price-cost ratios and profit margins as one of the main factors limiting the contraction and stimulating the revival.

7. This view is well represented in the literature on the determinants of investment in capital goods. See Burns 1952a, where tests by Kuznets, Tinbergen, and Hultgren are cited in support of this position. (These tests, however, refer to the simple old version of the "accelerator principle," which is now in disuse; recent and current studies employ instead the "flexible," or distributed, lag forms of the accelerator.) The econometric models of Tinbergen, Klein and associates, and Suits primarily use profits in their investment equations; some newer efforts such as the massive Brookings-Social Science Research Council (SSRC) model rely more on the modern stock adjustment (accelerator) formulations. For references, see two survey articles: Nerlove 1966 and Hickman 1969.

8. The Bureau reports include (in addition to the studies by Abramovitz, Stanback, and Mack listed in n. 3), Zarnowitz 1961, 1962; and Mack 1967. Other studies include Darling, Lovell, and Fromm 1961–62; Lovell 1964; Eckstein and Fromm 1968; Courchene 1967, 1969.

was actively involved in these developments (NBER publications include Brady and Friedman 1947; Modigliani 1949; Ferber 1953; M. Friedman 1957; see Burns 1952b for a critical review of the pre-1952 contributions).

Studies of business cycle indicators, diffusion indexes, anticipations data, and short-term economic forecasting all grew out of the Bureau's basic program of cyclical research, but their results are much more directly applicable to the practical problems of decision makers in government and business. The selection of the indicators was based on studies of hundreds of economic time series and successive reviews of the results by Mitchell, Burns, Moore, Shiskin, and associates (see chaps. 10 and 11 for references and detail). Since 1961, up-to-date charts, tabulations, and various analytical measures for these data have been published monthly by the U.S. Department of Commerce. The literature and the data on economic forecasts collected from a variety of sources indicate clearly that the materials and techniques developed in these studies have become important and widely used tools in the analysis and prediction of business conditions.<sup>9</sup> Here the story of the Bureau's efforts has a linkage with the broader subject of the development and present state of economic forecasting, which has recently become something of a "growth industry," reflecting the growth of both the economy and the concern with economic instability.

## 5.2 Direction of the NBER Research in Business Cycles

Theories of business cycles deal with the effects and interaction of two sets of factors, the exogenous disturbances (e.g., variation in weather, inventions, wars, political and perhaps economic policy changes) and the endogenous components of the economic system (quantities demanded and supplied, prices, etc., usually collected in large aggregates by major categories of markets or spending). There are some hypotheses that rely primarily on the first set, attributing the cyclical movements of the economy to cycles in the external disturbances (such as weather-induced harvest cycles). More common are theories that stress the second set, trying to identify endogenous causes of instability in the economic system:

With very few exceptions, all serious explanations are neither purely exogenous nor purely endogenous. . . . Even if one assumes a weather cycle, the peculiar response of the business system, which converts harvest variations into a general alternation of prosperity and depression, has still to be explained. On the other hand, a purely endogenous theory is hardly satisfactory. It is not likely that, without outside shocks, a cyclical movement would go on forever: and, even if it did go on, its course would certainly be

9. Thus, most forecasts of the economy's course in the near future use the framework of the national income accounts, but business cycle indicators are consulted by a large majority of the forecasters in the samples we have reviewed and are listed along with the informal "GNP models" as the principal approaches actually employed (see Zamowitz 1971).

profoundly influenced by outside shocks—that is, by changes in the data (however these may be defined and delimited by economically explained variables).<sup>10</sup>

Most business cycle theories, old and new, are dynamic in the sense of being designed to “explain how one situation grows out of the foregoing” (Frisch 1933). Dynamic models incorporate lags in response, that is, relationships among variables whose magnitudes pertain to different points of time.<sup>11</sup> Such models with lags can generate growth and cycles endogenously, that is, even without changes in the parameters, in the exogenous variables, or in the disturbances. More generally, however, changes in these outside “data,” which may be either random or systematic-autonomous, are included in the analysis, and the models are then used to show how the cyclical response system in the economy converts such changes into recurrent, pervasive fluctuations. In this view, external impulses as well as the internal propagation mechanism are required for the cyclical movements in economic activity to persist; nevertheless, some writers who accept this type of theory still interpret business cycles as “self-generating,” that is, having their essential traits determined primarily by the economy’s organization and modus operandi, not by the nature of any disturbing causes “outside” the economic system.

It is probably this broad conception of self-generating cyclical fluctuations that best describes the core of the theory accepted by Wesley Mitchell, although his comprehensive “analytic description” of business cycles includes some very different elements as well, in subsidiary roles (see M. Friedman 1952). Exogenous forces and accidental events can accelerate or retard an expansion, alleviate or aggravate a contraction. These movements, which are basically endogenous, may also sometimes run into barriers; for example, an expansion may be halted by the upper limit on the supply of money under the gold standard. But there is no evidence that the business cycle peaks (troughs) are typically caused by a concentration of unfavorable (favorable) external disturbances. Also, the expansionary and contractionary processes, while “cumulative,” are usually self-limiting due to the stresses and imbalances that they themselves create; they are rarely terminated by any identifiable barriers. Thus, the economy is definitely not viewed as fundamentally unstable in the sense of generating potentially “explosive” fluctuations which are constrained by some limiting factors.<sup>12</sup>

The National Bureau studies in business cycles show no commitment to any particular cyclical theory but rather deal with aspects of various theories and

10. Haberler 1964, p. 9. It may be added, however, that Haberler suggests that methodologically “[f]or various reasons, it seems desirable, in the explanation of the business cycle, to attach as little importance as possible to the influence of external disturbances” (1964, p. 10).

11. Other dynamic devices closely related to lags include uses of differences or derivatives, expressing rates of change over time, and of cumulated variables (see Christ 1956).

12. The best known theory of such fluctuations, based on a strong accelerator-multiplier interaction, was advanced much later by Hicks (1950). For a critique of this theory, with particular reference to the related evidence from the business cycle studies of the NBER, see Burns 1952a.

their empirical validity. This is probably to a large extent a reflection of the strong influence of Mitchell's work, in which business cycles are treated as a set of complex phenomena with a plurality of causes and which is itself in effect a synthesis of elements of several theories, old and new. There are distinctive concepts here, notably of the differential responses in the price system, the lag of selling prices behind buying prices or costs, and the effects of the consequent changes in profit margins (and the totals and diffusion of profits) on investment and business activity in general. But there are also other important components such as the lags of induced expenditures behind receipts and of investment outlays and deliveries behind investment decisions and orders, the responses of the monetary and banking system, the resulting changes in the cost and availability of credit, in expectations, etc.<sup>13</sup> Evidence collected and evaluated by the National Bureau indicates that these processes, despite their diversity and complexity, displayed a substantial degree of consistency over the successive cycles. This is shown by the diffusion indexes that reveal the pervasiveness and early timing of the fluctuations in the *scope* of expansions and contractions, which are hidden behind the movements of economic aggregates. It is seen, too, in the persistence of timing sequences of different activities: orders, production, shipments, inventory change; investment commitments, expenditures, and realizations; labor market adjustments; interest rates, bond and stock prices; industrial prices, costs, and profit margins.<sup>14</sup>

It seems fair to say that research of this kind and scope directly serves the purpose of analyzing the complex system of processes that are involved in business cycles rather than the purpose of constructing the simplest acceptable theory that could account for the basic features of business cycles. It works toward the latter objective but indirectly, in ways resembling a "roundabout" method of production, which seeks to be more efficient at the cost of being very time-consuming. Substantial contributions to the "tested knowledge of business cycles" have thus been made, but they do not add up to an integrated theory with demonstrated capacity to explain the past and predict the future phenomena in question. To be sure, this ultimate scientific goal may seem rather elusive in the context of dealing with complex processes of economic change which are themselves subject to subtle historical alterations as are,

13. In his essay on Mitchell, M. Friedman writes (1952, p. 271): "The business-cycle theory I have constructed from Part III of Mitchell's 1913 volume contains practically every element that is significant in the business-cycle theories that are currently prominent. Here are the multiplier process, the acceleration principle, the Pigovian cycles of optimism and pessimism, the Marshallian and Hawtreyan drain of cash from the banking system and the resultant tightening of the money market, a decline in the expected yield from new investment at the peak that is the counterpart of the Keynesian 'collapse of the marginal efficiency of capital' except that it is a continuous decline rather than a discontinuous 'collapse,' the Keynesian changes in liquidity preference. Here, too, is an attempt at a reasoned explanation and integration of these phenomena."

14. See Moore 1962 for a report on the early work of the National Bureau on the diffusion indexes, timing sequences, and other aspects of business cycles.



also, the structure and institutions of the economy and the targets and tools of economic policy.

### 5.3 The Concurrent Developments in Theory and Econometrics

More direct attempts to formulate “the” theory of business cycles, mainly by means of speculative thinking, deductive logic, and more or less abstract models, account for a large part of the literature on the economics of cyclical change and growth. There are intellectually attractive problems in economic dynamics, and some ingenious cyclical models have been constructed. It is, however, primarily by being confronted with historical evidence that such models can contribute to our understanding of the business cycles, and not all of the models are testable. When the work of testing and synthesizing is out-distanced by model construction, this tends to result in a proliferation of different (but typically overlapping) theoretical constructs, not in progress toward a unified, validated theory. The latter clearly requires that both empirical and theoretical studies be pursued so as to profit from the quasi-symbiotic interaction of selective fact and disciplined thought (Burns 1969, pp. 12–13).

The decade of the 1930s saw the beginning of three important developments: (1) the formulation and interpretation of explicit and complete mathematical models of business cycles in highly aggregative form (Frisch 1933; Kalecki 1935; Samuelson 1939); (2) the reformulation of macroeconomic theory (Keynes 1936); and (3) the construction of econometric models of business cycles (Tinbergen 1938–39). These were originally rather distinct approaches to the study of the economy and its movements, but their evolution soon came to be shaped by strong cross-influences, both between the theoretical and the econometric models and between either type of models and the post- or neo-Keynesian analysis.

The mathematical models include a system in which a given disturbance sets off fluctuations of an ever smaller amplitude, that is, a *damped* movement toward a new equilibrium. Frisch presents a linear model of this type, where external shocks keep alive the fluctuations in spite of dampening. He notes that the shocks need not be entirely or necessarily random and sees one of their sources in technological innovations, whose role in the economic process of growth and cycles was stressed by Schumpeter (see Frisch 1933; sec. VI; Schumpeter 1934, 1939). Another source of such autonomous impulses, which may be of increasing importance, is the public sector of the economy, whose rapid growth in recent times is a well-known matter of record.

Several early trade cycle theories have a basically Keynesian orientation but different dynamic features. Thus, Harrod (1936) stressed the acceleration principle; Kalecki (1937), the lag between investment decisions and realizations; and Kaldor (1940), investment and saving as nonlinear functions of the levels of output and capital. Samuelson (1939) has shown how combining the multiplier with the accelerator results in a model which can produce cycles

that are either damped or constant or explosive, depending on the numerical values of the two interacting parameters. An endogenous model by Hicks (1950) specifies the values that would produce explosive fluctuations but uses nonlinear constraints to generate cycles around an upward equilibrium trend in national output.

These and other accelerator-multiplier and nonlinear models illustrate a variety of interesting problems in economic dynamics (see Kalecki 1935, 1937; Harrod 1936; Kaldor 1940; Metzler 1941, 1946; Goodwin 1951). They are, however, likely to be more useful for the (somewhat circular) purpose of studying the essential elements and causes of the observed fluctuations of the economy. Their explanatory or predictive power has not been demonstrated. The heavy emphasis on induced investment, with high values for the accelerator, makes these models highly unstable, a feature others found difficult to reconcile with the historical (particularly, recent) course of the economy.

Reactions against the limitations of the endogenous accelerator models can be found, in various explicit or implicit forms, in both theoretical and applied work (see notably Duesenberry 1958). The result is a new emphasis on the plurality of causes and diversity of elements in the individual business cycles, which will remind the reader of Mitchell's analysis and the evidence presented in the National Bureau studies. The similarities extend to several important components of the theory, notably the role of construction costs and profits in the explanation of investment.<sup>15</sup> There is certainly much less affinity between the Bureau's approach and those endogenous models that depend principally and rather rigidly on the acceleration principle.<sup>16</sup>

The construction of aggregate econometric models was originally (as in the pioneering work by Tinbergen 1938–39, 1940) strongly oriented toward business cycle research. In the postwar period, work on such models intensified and broadened, and its results are now being widely used for various purposes, including forecasting, tests of macroeconomic hypotheses, and simulation of the likely effects of alternative policies. The models for the U.S. economy progressed from annual to quarterly units; they vary greatly in size and complexity; but the evolution so far appears to be in the direction of ever larger systems. The models, for the United States as well as for the other countries, generally utilize the structure of national income accounts and are

15. See Duesenberry 1958, chs. 5 and 7. Important antecedent models featuring profits in the investment functions are found in Tinbergen 1938–39; L. R. Klein 1951; L. R. Klein and Goldberger 1955; and Meyer and Kuh 1957.

16. See Burns 1950 for a critique of the Hicks trade cycle theory. It is true that self-generating cycles are the central concepts in the work of Mitchell and others at the National Bureau and that the role of exogenous factors, though by no means disregarded, is treated as secondary. But the argument seems persuasive that the main ideas in the NBER approach (that the nature of the cycle is determined primarily by the structure and institutions of the economy and that both prediction and control of the cycle must be sought in the understanding of the "processes which run regularly within the world of business itself") would not be substantively changed even if the role of the "disturbing causes" were more explicitly involved (see M. Friedman 1952, pp. 253–54).

for the most part of Keynesian persuasion. Many have similar features. This similarity in part reflects the importance and influence in this area of the work by Lawrence R. Klein and his associates.<sup>17</sup>

Since the views about the nature and causes of business cycles are quite diverse, as illustrated by the preceding brief survey of the different theories and models, it is important to ask what light the econometric studies throw upon the relation of the exogenous and endogenous factors that may be involved. The question must be raised in the context of two developments: (1) the increasing emphasis on exogenous factors, among which are included political and economic policy changes, and (2) the challenge to certain tenets and applications of Keynesian theory raised in writings of several monetary economists, particularly Milton Friedman. In what follows, attention will be given to these topics.

#### 5.4 Business-Cycle Simulations

In a study of the Klein-Goldberger econometric model of the U.S. economy, Irma Adelman and Frank Adelman (1959) concluded that nonstochastic simulations based on smooth extrapolations of the exogenous variables do not enable that model to generate cyclical movements resembling the historically observed fluctuations, nor do "type I" stochastic simulations, with random shocks superimposed upon the extrapolated values of the exogenous variables. They found, however, that "type II" stochastic simulations, with random shocks introduced into each of the fitted equations, do result in cycles whose average duration, conformity, and timing characteristics agree broadly with the measures developed by the National Bureau. They interpreted these results as consistent with the Frisch hypothesis that highly developed capitalistic economies react to random impulses so as to convert them into the pervasive and recurrent fluctuations described as the business cycle. Similarly, in his survey of 16 U.S. and foreign aggregate econometric models, Hickman (1969, p. 429) reported that "the weight of their evidence suggests strongly that modern mixed enterprise systems are characterized by stable response mechanisms and small dynamic multipliers. If that be so, then the cycles of experience must be kept alive by exogenous stimuli."

In a comprehensive investigation of econometric model simulations, a team of National Bureau researchers, aided by the active cooperation of the builders of several quarterly U.S. models, found that nonstochastic sample-period simulations produce strongly damped cyclical movements (Zarnowitz, Boschan, and Moore 1972). Only the first one or two recessions covered are, in some attenuated form, reproduced in such simulations; beyond that, the declines in

17. See L. R. Klein 1950, 1964; L. R. Klein and Goldberger 1955; Evans and Klein 1967. See the survey articles by Nerlove (1966) and Hickman (1969) for references to other U.S. and foreign econometric models.

the overall aggregates tend to disappear. In simulations extending for a hundred quarters into the future, the projected series are in general smooth and trend dominated, indicating that these models do not generate cyclical movement endogenously. When shocks are applied to these long *ex ante* simulations, many fluctuations do occur, but they are in large part too short to qualify as cyclical, according to comparisons with the NBER reference cycle measurements. The simulations based on autocorrelated shocks are much smoother and often appear more plausible than those with serially uncorrelated shocks.

The models examined in these simulation studies are in general stable. If it could be assumed that they are correctly specified, these experiments would provide some support for the Wicksell-Slutsky-Frisch theory of a dynamically stable (damped) response mechanism, with fluctuations being renewed and “kept alive” by erratic shocks. The support would appear strong in the case of the Adelmans’ study and some of the models examined by Hickman. It must be viewed as much more limited and qualified, however, as far as the more recent and comprehensive reports of the 1969 NBER conference at Harvard are concerned.<sup>18</sup> Here the evidence suggests that random disturbances alone produce only weak fluctuations, visible in deviations from trends rather than in the stochastically simulated series proper. Smoother and longer (but similarly weak) fluctuations appear when the shocks to the equations are serially correlated. The cyclical aspects of the simulations would probably be strengthened by application of autocorrelated shocks not only to the equations with endogenous variables but also to the exogenous variables.<sup>19</sup> There are reasons to expect that wars, policy actions, technological change (innovations), etc., would indeed frequently result in autocorrelated “autonomous” shocks to the economy.

However, the econometric models in question may not be correctly specified. If so, then the autocorrelations observed in the sample residuals for many equations in these models may in the main reflect these misspecifications. Frequent caveats on this score are expressed in the work on econometric model simulations (Adelman and Adelman 1959; p. 301; Hickman 1969, pp. 428–29; and remarks by de Leeuw, Hickman, and Zarnowitz et al. in Hickman 1969).

It is not easy to document specification errors in the models; economic theory provides broad guidelines, but it does not prevent arguments among economists with different views about what the correct formulations ought to

18. These include, in addition to the NBER study by Zarnowitz, Boschan, and Moore (1972), Evans, Klein, and Saito 1972; Green, Liebenberg, and Hirsch 1972; Howrey 1972. See also the introduction in Hickman 1972.

19. A few such simulations were run for the Office of Business Economics (OBE) model by Green, Liebenberg, and Hirsch (1972), with the result that cycle declines were increased in amplitude and duration. But the effects of shocks in exogenous variables were not given adequate attention in the 1969 NBER conference studies.

be. Large-scale, complex models, in particular, pose many detailed specification problems that theory and empirical research have not yet been able to resolve with the existing information. The best tests available here are indirect, based on the predictive value of the model (see Christ 1968).

### 5.5 The Role of Money

According to many critics, a major source of specification errors in recent econometric models is the neglect or inadequate handling of the monetary and financial factors. This view is stressed particularly by those economists who take a "monetarist" approach to macroeconomics (e.g., M. Friedman 1959, 1968, 1970b; M. Friedman and Meiselman 1964; M. Friedman and Schwartz 1963a, 1963b, 1970; Cagan 1965, 1966). However, some economists basically sympathetic to the so-called neo-Keynesian concepts have also urged that greater attention be given to the monetary and financial sectors in econometric models, and efforts in this direction are apparent in the latest models.<sup>20</sup>

Evidence assembled by Friedman and Schwartz leads them to conclude (1963b, p. 63) that "there is an extremely strong case for the proposition that sizable changes in the rate of change in the money stock are a necessary and sufficient condition for sizable changes in the rate of change in the money income." For the minor U.S. economic fluctuations, "the case for a monetary explanation is not nearly so strong," but "it is plausible to suppose that changes in the stock of money played an important independent role, though certainly the evidence for these minor movements does not rule out other interpretations" (Friedman and Schwartz, 1963b, pp. 55, 63). The mechanism whereby monetary changes are transmitted in ways that can produce cyclical fluctuations in income is viewed as a series of reciprocal adjustments of stocks to flows, which involve variable but often lengthy lags. Absorption of newly injected money, for example, requires alteration of yields and prices of different assets, which creates discrepancies between the actual and desired portfolios and prompts the banks and the public to reshuffle their balance sheets in the effort to reduce such discrepancies. The first impact of an increase in the monetary growth that usually occurs early in contraction is on the financial markets (bonds, then equities), but eventually the stimulus spreads to the markets for goods and services, causing rises in investment and in payments for real resources at large. In the process, interest rates first decline and then rise, the reversal being due to the increase in spending, income, and prices. The process will tend to overshoot and involve cyclical, presumably damped, adjustments to each monetary "shock."

20. See Minsky 1963, pp. 65–66. The increased concern about the role of the monetary-financial factors and their interaction with the "real" factors can also be seen in the reports on the structure and performance of the large-scale Brookings-SSRC model and especially of the more recent FRB-MIT-Penn model (de Leeuw 1965; de Leeuw and Gramlich 1968; and Ando and Modigliani 1969).

This hypothesis envisages disturbances in the growth of money supply that induce cyclical adjustments and recur frequently enough to prevent the fluctuations from dying out. The stock of money is subject to large changes that are autonomous, that is, not directly attributable to contemporary changes in income and prices. Thus, the monetary changes are here treated as a mainly exogenous and “causal” factor in a narrow but important sense.

Formally, the model of the economy that is conveyed by these studies is dynamically stable, converting random or systematic disturbances into cyclical fluctuations in major economic variables. Substantively, it is the monetary factor that is the major source of these disturbances. In particular, this factor is regarded as basically responsible for the major economic fluctuations; the evidence for the minor ones, taken alone, would not be inconsistent with the alternative view “that the close relation between money and business reflected primarily the influence of business on money” (Friedman and Schwartz, 1963b, p. 55). In most applications, however, especially by other monetarists, the distinction between the major and minor fluctuations plays no operational role, and monetary changes are treated generally as the main independent force determining the movements in money income that are associated (sometimes identified) with business cycles. The main rival theory, namely, that “real” rather than monetary factors are critical, with investment being the main motive force in business cycles, is explicitly rejected, but the monetary hypothesis is also sharply distinguished from the earlier “credit” theories of the cycle. This conception of business cycles as essentially a monetary phenomenon (resembling the “dance of the dollar” view of Irving Fisher) is also clearly different from the much broader conception of Mitchell.<sup>21</sup>

## 5.6 Assessing Policies and Understanding Business Cycles

There is a marked tendency in recent discussions of problems of inflation and recession to emphasize the power of economic policy to do both good and evil—to stabilize and disturb. According to a view held by many Keynesians, the economy is rather unstable, in need of being stimulated by fiscal policies at some times and of being restrained by fiscal and perhaps monetary policies at other times. According to the monetarist view, the economy is fundamentally stable, and major business cycle movements are primarily attributable to “inappropriate movements in the money stock”; economic instability can therefore be minimized by controlling the rate of monetary expansion (Andersen and Carlson 1970, p. 8). These are opposite positions, yet they have one important point in common, namely, that economic policy is potent enough to be, if correct, a major force working to promote or restore economic stability; and also to be, if erroneous, a major cause of, or at least contributor to, eco-

21. This statement is, of course, entirely consistent with the fact that Mitchell attached great importance to the role of money in the structure and cyclical movements of contemporary industrial economies in the Western world.

conomic instability. It all depends only on the choice of the right policies at the right time, provided that the choice is defined broadly to include self-imposed institutional rules and automatic stabilizers as well as discretionary policies.

As usual, such positions are often exaggerated and vulgarized in popular debate. Also, extreme views on the powers of stabilization policies are not new.<sup>22</sup> But the increasing emphasis on exogenous and particularly policy factors in the analysis of business fluctuations is so manifest in recent professional writing as to merit serious attention. Is this emphasis based on new evidence or a revival of some old beliefs? Has it increased too much or too little or just about right?

The evidence from econometric models and related simulation studies tends to support the view that exogenous factors play a major role.<sup>23</sup> Policy changes are generally treated as exogenous in these models. But it must again be recognized that all these models represent only different ways of combining fragments of uncertain knowledge and outright hunches; they certainly contain serious errors of commission and omission, are implemented with very imperfect data, and are valuable primarily as vehicles of a continuing search for more and firmer understanding of the economy in motion. The models differ not only with respect to the underlying theories or intuitions, that is, in specification, but also in size and complexity, sample periods, and methods of estimation and application to forecasting. With so many sources of incomparability, which cannot be eliminated, neutralized, or fully allowed for (without removing the distinctive properties of the models), conclusive discrimination among the models is very difficult. However, predictive and dynamic simulation tests, which are probably more convincing than the others, suggest at least a few broad propositions, as follows: (1) Both monetary and fiscal policy variables have significant effects on aggregate spending; neither set should be treated as dominant at all times or as negligible, and improvements in dealing with both sets pay off in better performance of the model.<sup>24</sup> (2) The combined influence of both sets of policy variables is far from sufficient to account for the systematic component of changes in total spending (let alone for other

22. Thus M. Friedman (1968, pp. 1, 5) reminds us that in the 1920s "it came to be widely believed that a new era had arrived in which business cycles had been rendered obsolete by advances in monetary technology. . . . The Great Contraction destroyed this naive attitude. Opinion swung to the other extreme." He expresses the fear that "now as then, the pendulum may have swung too far, that, now as then, we are in danger of assigning to monetary policy a larger role than it can perform."

23. As noted by Hickman (1972, p. 11), "Some classes of shocks may generate cycles when acting upon the models studied in this Conference. It should be emphasized, however, that broadening the class of shocks to include perturbations in exogenous variables—and to allow for serial correlation in the disturbances to equations and exogenous variables—diminishes the role of model structure as a cycle maker."

24. See Andersen and Carlson 1970; Andersen and Jordan 1968, 1969; and de Leeuw and Kalchbrenner 1969. The St. Louis model in its present version (April 1970) indicates that the fiscal effects, though weaker and more temporary than the monetary effects, are significant. See also the references to the analysis of the FRB-MIT-Penn model in n. 20; in this larger and more elaborate model, both monetary and fiscal policy variables have pronounced effects on GNP.

important elements in economic fluctuations).<sup>25</sup> (3) Business cycle analysis and forecasting can benefit from econometric studies of structural models of various degrees of complexity, but inadequate knowledge and data, and perhaps also problems of coordinating the work of a large group of experts, impose definite limits upon the size of potentially useful models at the present time.<sup>26</sup>

There are, of course, good and easily understandable reasons why changes in economic policies attract much greater and more general attention now than in times past, when both the weight of the government and the extent of its intervention in the economy were much smaller. But precisely because this is so, the chances have also increased for overestimation of the potency of governmental policies. Policy changes tend to become a matter of public record, whereas the changes wrought by forces within the economy are more diffuse and subtle, hence often difficult to discern. Moreover, policy changes interact with other "outside disturbances" and endogenous forces so that the task of isolating and evaluating the effects of these factors on the movement of national income and other aggregates is very arduous, even conceptually and a fortiori in empirical applications. The policy variables can be exogenous only in the sense that they do not respond to *current* movements in the endogenous variables. They certainly do respond to earlier developments in the economy as policymakers try to counteract undesirable trends due to either internal causes or external disturbances (including the influence of past policies). These corrective efforts must frequently concur with the more "autonomous" policy initiatives, and both affect aggregate spending, income, etc., only with lags that may be substantial and variable. When these lagged effects are cumulated and attributed fully to policy changes, the influence of these changes may often be significantly overestimated.

This way of looking at economic policies has however, other implications as well, namely, that the governmental actions may at times tend to cancel each other or have net destabilizing effects.<sup>27</sup> One explanation of the latter centers on the difference between the immediate and the delayed conse-

25. For example, the St. Louis equation "explains" nearly two thirds of the variance of changes in GNP with changes in money stock and high-employment federal expenditures alone. This is a rather high  $R^2$  considering the first-difference form of the model, but contemporaneous values of the policy variables as well as short-lag values are included, and there can be little doubt that there is some bias in this single-equation approach: the influence is not entirely from money to GNP but also in the opposite direction. Other formulations designed to reduce this basic and much-debated problem have led to lower correlations (de Leeuw and Kalchbrenner 1969).

26. These limitations are stressed by several reviewers of the Brookings-SSRC model, which contains several hundred equations (see Mosbaek 1968, pp. 194–96; Griliches 1968, pp. 215–34). On the other hand, the single-equation or reduced-form models such as the St. Louis model may be used to study the influence of certain exogenous policy factors, but they are much too "underdeveloped" and structurally undetermined to be helpful in business cycle research.

27. This includes the "policy cycles" as an extreme case of destabilizing action. Maddison (1960) and Gilbert (1962) argue that in Western Europe government intervention in the postwar years succeeded in limiting fluctuations in output to a narrower range at higher levels but also induced setbacks through restrictive anti-inflationary measures.



quences of a policy, as in M. Friedman's (1968) analysis of the monetary authority's attempts to peg either interest rates or the rate of unemployment. Another explanation would have policies alternate between the immediate goals of fighting inflation and of fighting unemployment, with the efforts to contain the rise in prices leading to a business recession or slowdown and efforts to reduce unemployment leading to renewed inflationary pressures, as in some analyses based on the Phillips curve (Bronfenbrenner and Holzman 1963). The two hypotheses are not logically inconsistent and could both be valid. There is evidence to support the view that reactions to discretionary policy shifts involve patterns of lengthy and varying lags, although measurements of the distributed lags in the effect of monetary policy vary considerably and are far from conclusive. There is also evidence to support the relationship between wage changes and unemployment as summarized by the Phillips curve, although it is plausible that in the long run no stable trade-off would exist between unemployment and *anticipated* inflation (M. Friedman 1968; Phelps 1968).

In trying to evaluate any advance in economics, it is proper to take a broad view. We are dealing essentially with gradual processes of increased understanding that cannot avoid occasional setbacks. Thus seen in this brief and very incomplete survey, the work of the National Bureau has resulted in many important and potentially useful contributions.

It is much more difficult to achieve and demonstrate definite progress directly measurable in terms of the resulting improvements in dealing with current economic problems. It is clear that we know much less about the working of economic stabilization policies than we need for both an objective appraisal of the past and as a guide to such conduct of current affairs as would command wide professional agreement. It is certainly difficult, even with the benefit of hindsight, to decide such questions as whether any of the postwar U.S. recessions could have been avoided by better policies and, if so, how and at what alternative costs. But underlying such questions is the central problem of business cycle theory to which frequent reference was made here: What are the relative roles of exogenous factors and endogenous processes in determining the course of the economy? There is great need for well-designed research on this subject, the eventual results of which could contribute greatly to a better understanding of current policy issues.

