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PHILLIP CAGAN

BROWN UNIVERSITY

DETERMINANTS AND EFFECTS OF CHANGES IN THE STOCK OF MONEY 1875-1960

NATIONAL BUREAU OF ECONOMIC RESEARCH

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(Resolution adopted October 25, 1926,
as revised February 6, 1933, and February 24, 1941)

To My Mother and Father

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PREFACE

BY LONG TRADITION prefaces to monetary works note the wide attention given the subject by the public. The remark is still appropriate today. Few subjects have entertained and alarmed the public for so long. A debate continuing for centuries pits the classical writers, who view money as an independent source of economic disturbance, against the critics of this view, who say money is a passive adapter to business conditions with little independent influence. Indeed, recent statements of the passive view sound much like the old real-bills doctrine propounded in the Bullion controversy over a century and a half ago. The active and passive theories of money appear to be antagonists in an unending saga: periodically one or the other side proclaims its adversary dead and laid to rest, but neither one stays buried. Hopefully the rapidly accumulating empirical work will eventually settle the matter, though my interpretation of the evidence—that money is both active and passive—obscures the sharp lines of the old debate and may please neither side.

The present work has become a collection of related but separate studies, each of which merits book-length treatment, so different are the factors affecting the various parts of the money supply in its secular and cyclical movements. Giving due attention to each part has prolonged the work, though there are still many gaps in the analysis. Drawing on the evidence of an eighty-five-year period has enlarged the work as well, but is worthwhile. Important relationships can be misjudged if studied in a few short periods because of special factors which, at short range, give an impression of dramatic impact but in a longer view lose significance. Some studies of the money stock rely too much on the unusual events of the 1930's and 1940's. The financial panic and the fluctuations in bank reserve ratios in those decades obscure the typical behavior of monetary variables and may lead to error. Comparisons with other periods lessen the danger of exaggerating the effects of some factors and missing others.

A statistical work like the present has one author responsible for the conclusions but many contributors. I have used new estimates of the U.S. money stock derived by Milton Friedman and Anna Jacobson Schwartz.[1] Their estimates are based on annual data back to 1896 compiled by the Division of Research and Statistics of the Federal Reserve System, and on nonnational bank data for the period 1875–96 prepared by David I. Fand at the Money and Banking Workshop of the University of Chicago.[2] Part of the present study was done during my association with the Workshop from 1955 to 1958, for which thanks are due to the Rockefeller Foundation for financial support.

I have benefited immeasurably at all stages of the study from the work and suggestions of Milton Friedman and Anna Schwartz. Their two volumes and this one are related, but separate, parts of the National Bureau's study of monetary influences on the economy. Through exchange of ideas and findings there is some overlap in the reports of our studies, though I hope not more than clarity requires. Mine differs from theirs in analyzing specifically and systematically the major factors affecting the determinants of the money stock, which they take up only incidentally. To draw out some implications of the findings I also discuss in Chapter 6 the effects of monetary changes on the economy. Although the conclusions reached are in general the same as those of Friedman and Schwartz, the subject is approached from a different angle. Each of the three volumes, written to stand alone, serves to supplement the others.

I wish to acknowledge also helpful suggestions from many people who commented on earlier drafts of the manuscript: Joseph Conard and Richard Selden, who served with Friedman and Schwartz on a National Bureau staff reading committee for the manuscript, Frank W. Fetter, Ilse Mintz, Geoffrey H. Moore, Jerome L. Stein, and Clark Warburton.

My debt is great to those who helped at various stages with compiling data and computing tables: at the National Bureau, Charlotte Boschan, Sophie Sakowitz, Hanna Stern, Mark Wehle, and

[1] *A Monetary History of the United States, 1867–1960*, Princeton University Press for National Bureau of Economic Research, 1963; and their forthcoming "Trends and Cycles in the Stock of Money in the United States, 1867–1960," also a National Bureau study, in preparation.

[2] "Non-National Banks Estimates: 1867–1896," unpublished Ph.D. dissertation, University of Chicago, 1954.

Tom Yu; at Chicago, Roy Elliot, George Macesich, and Lily Monheit.

Margaret T. Edgar deserves special thanks for a careful job of editing the manuscript; and H. Irving Forman, for expertly drawing the charts.

P. C.

FOREWORD

As Josh Billings wrote many years ago, "The trouble with most folks isn't so much their ignorance, as knowing so many things that ain't so." Pertinent as this remark is to economics in general, it is especially so to monetary economics. Because money is so pervasive and yet hidden, so susceptible to manipulation and yet seemingly beyond the ordinary man's control, it has attracted to itself far more than its share of "crackpots" offering easy panaceas for solving the ills of the world. And among professional economists, it has for centuries been the focus of dispute, both at the rarefied level of abstract theory and at the more mundane level of interpretation of day-to-day experience. In the process, opinion has tended to rigidify into strongly held views—on some dates precisely the opposite of those held at others—which derive their support less from carefully examined and well-organized evidence than from initial statement by great men and subsequent tiresome repetition.

It is not the least of the virtues of Phillip Cagan's monograph that it examines systematically and thoroughly many of these views in light of empirical evidence on factors affecting the quantity of money during nearly a century of United States history, and separates the propositions that "ain't so" from those that might be so from those that are so. A few specimens will document this assertion.

1. Cagan's general topic is the supply of money, so we may begin with a proposition that is almost uniformly taken for granted in current theoretical discussions of that general topic, namely, the proposition that the nominal quantity of money supplied tends to be positively related to interest rates (though, of course, the real quantity demanded tends to be negatively related). The positive effect is assumed to occur primarily through a trimming of reserve ratios by banks when the return they can get on loans and investments rises and, secondarily, through an expansion of the volume of reserves by member-bank borrowing from the Federal Reserve. Cagan examines both

channels, using evidence for both secular movements and cyclical fluctuations. He concludes that the first channel is inoperative: "Cyclical fluctuations in the reserve ratio mainly reflect business conditions, not the cost of holding reserves [interest rates], insofar as the two differ, as they often do." Though he finds some positive relation between rates of interest and member-bank borrowing, he attributes relatively little importance to this effect. Two other channels seem to him somewhat more important: effects on the demand for currency and on the division of deposits between time and demand deposits. "A rise in rates paid on time and savings deposits appears to reduce the demand for currency . . . . A rise in interest rates also induces a shift from demand to time deposits, which reduces the required reserve ratio of banks and hence the total reserve ratio. These effects produce a slight positive relation between interest rates and the money stock (defined to include time deposits)." Yet, all in all, "interest raes . . . appear to have very minor effects on the money stock."

2. A related, though far less basic, issue is the effect of changes in legal reserve requirements on the reserve ratio of the banking system. One view is that such changes will be transmitted in full to the ratio of total reserves to deposits, i.e., that what Cagan calls the "usable reserve ratio" will be unaffected. An alternative view is that changes in legal reserve requirements will affect the total reserve ratio only when usable reserves are small, that otherwise they will leave it unchanged, an increase in requirements being absorbed by a decline in the usable reserve ratio and a decrease in requirements by a rise in the usable reserve ratio. Both views can be found in the literature, and the Federal Reserve System has at times based policy on the one view and at times on the other. After examination of the evidence and consideration of various plausible interpretations, Cagan concludes that the "desired level of usable reserves . . . is usually independent of required reserves, no matter how large the usable reserve ratio may be," although the speed with which banks adjust to a change in required reserves may depend on the size of the usable reserve ratio.

3. Probably the most important issue to which the monograph contributes is the long-standing dispute about the causal relation between money and prices. Do changes in the quantity of money produce changes in the same direction in prices, as the classical economists contended for centuries? Or, as some economists have

argued in recent decades and many noneconomists for much longer, are the price movements the result of a variety of other independent influences, and the observed common movements in the quantity of money a result rather than cause of the price movements? It turns out that Cagan's examination of the source of changes in the quantity of money yields highly relevant evidence for discriminating between these alternatives, or, on a more sophisticated level, for indicating the role of each.

(a) The major source of long-period changes in the quantity of money in the United States has been changes in high-powered money, which, until 1914, reflected mostly changes in the amount of gold. Price rises tend to discovrage gold output and encourage gold exports and thereby tend to reduce the quantity of high-powered money. Conversely, price decreases tend to increase the quantity of high-powered money. These effects show up in the data—but with a very long lag, measured in decades rather than years. The contemporaneous relation is precisely the opposite: price increases accompany a higher than average rate of rise in high-powered money; price decreases, a lower than average rate of rise.

If this variation is not coincidental, or the common result of some unspecified third factor, it must reflect the effect of money on prices. Cagan concludes, "The lagged reaction of the gold stock to changes in commodity prices . . . is what makes the gold standard a poor means of stabilizing the price level, rather than failure of gold-stock changes to affect prices." And "to explain secular movements in prices . . . we should look primarily to the money stock, and then secondarily to nonmonetary factors that may also have important influence."

(b) For short-period fluctuations involving severe business contractions, the evidence is equally decisive and in the same direction. Each such contraction is associated with a sharp decline in the rate of monetary growth. Cagan's examination of the sources of the decline "rules out . . . a sharp fall in business activity as the main reason." The care with which he builds the foundation for this conclusion is most impressive, especially his painstaking, and rather successful, attempt to separate out the effects of banking panics from those of severe business contractions. He concludes, "The evidence is therefore consistent with, and, taken as a whole, impressively favors emphasis on the decline in the rate of monetary growth as the main reason some business contractions, regardless of what may have initiated them, became severe."

(c) For mild cycles, the evidence is no less decisive but yields a different substantive result. For these, Cagan finds clear evidence of the influence of business changes on the quantity of money. Surprisingly, in light of most of the cycle literature which emphasizes the reactions of banks and monetary authorities, cyclical fluctuations in the fraction of its money that the public holds in the form of currency account for roughly half of the cylical fluctuations in the quantity of money. These movements in the currency ratio, and also most of the less important cyclical fluctuations in the banks' reserve ratio, seem to reflect the contemporaneous movements in economic activity. Yet there is also evidence of the reverse influence of money on business. Hence, Cagan concludes that "mutual dependence" is the rule for mild cycles.

4. A by-product of Cagan's analysis of the causal relation between money and prices is his examination of the so-called Gibson paradox, the observed tendency for the long-period movements of prices and interest rates to be in the same direction. Knut Wicksell and John M. Keynes hypothesized that both movements were the common result of independent changes in the demand for loans. An increase in the demand for loans, they argued, would directly raise interest rates; indirectly, because of lagged reactions by the banking system, it would also raise the quantity of money, which, in its turn, would raise prices; and conversely for a decline in the demand for loans. Cagan demonstrates that this explanation, despite its wide acceptance—or at least repetition—is contradicted by the facts—not because there is any flaw in the theoretical reasoning but because the hypothesis requires that the major source of long-period changes in the nominal quantity of money be changes in reserve ratios, whereas in fact it has been changes in the quantity of high-powered money. One relevant fact can deprive the most rigorous chain of reasoning of explanatory value—though, I hasten to add, no assortment of facts, however numerous, have any explanatory value unless they can be organized by a theory.

Cagan considers also an alternative explanation suggested by Irving Fisher, which relies on a delayed effect of actual price changes on expectations about the future course of prices. Cagan finds that the evidence he examines neither clearly contradicts nor strongly supports that explanation. This remains one of those propositions that might be so.

Rather than adding to these examples—which the reader will find it more profitable to do for himself—let me supplement briefly Cagan's comments in his preface on the relation between his study and the two companion volumes by Anna Jacobson Schwartz and myself. All three deal with U.S. experience over the same period. All three attempt to use the factual evidence for that period and that country to illuminate the role of money in economic affairs and to test and enrich our theoretical understanding of the working of a money economy. All three use as a central element our estimates of the quantity of money. All reach compatible and, to some extent, overlapping conclusions—as is natural since the three are products of the same project and each has benefited from the others. Yet each makes its own distinctive contribution to the common objective.

Our *Monetary History of the United States*, already published, is primarily an analytical narrative, organized chronologically, which seeks to extract inferences about the role of money from an examination of successive historical episodes. We were able to do so the better because we had access to Cagan's work and could use it as statistical underpinning for our historical account.

The special task of Cagan's monograph was, as already said, to isolate and measure the factors responsible for changes in the stock of money. In doing so, he has provided basic material that no future student of the subject will be able to do without or need duplicate—in his tables and the careful statistical calculations that underlie them, no less than in his text. There does not exist any other study of conditions determining the supply of money that is remotely comparable to Cagan's in its empirical scope and thoroughness, though, thanks partly to his work, this subject, like the study of money in general, is experiencing something of a boom.

Originally, we did not expect the examination of the supply of money to provide evidence on such general issues as the causal relation between money and prices. We regarded it primarily as a study that, by examining one side of the monetary problem, would provide raw material for the other studies to combine with evidence from the demand side. But research leads a life of its own and has no respect for initial expectations. As the earlier examples illustrate, evidence on the supply of money has turned out to yield unexpectedly powerful evidence on more general monetary relations—perhaps because it has been neglected and hence not already taken into account in the theoretical generalizations enshrined in the literature.

The monograph on *Trends and Cycles in the Stock of Money in the United States*, now in preparation, begins where Cagan leaves off, namely, with the behavior of the stock of money itself. It is a statistical analysis which seeks to find and interpret regularities in the secular and cyclical behavior of the stock of money and of monetary velocity in relation to other economic magnitudes. In addition, it gives a detailed explanation of the derivation of our estimates of the stock of money.

In contrast with our *History*, it is organized by statistical categories rather than by chronological episodes, and takes as its basic data numerical aggregates rather than qualitative events and the actions of individual human beings. In contrast with Cagan's monograph, it deals primarily with the demand for money, rather than the supply. Like the other monographs, it will unfortunately still leave for the future and for other scholars a full development of a monetary theory of the cycle which incorporates both demand and supply in an empirically meaningful way. Cagan's Appendix D is a foretaste of the most general outlines of such a development.

It is now well over a decade since the group of research studies of which this monograph is the second major product was begun at the National Bureau. In that period there has been a flourishing of monetary research in this country and abroad. This monograph, begun at a barren period, comes to fruition to join a rich and growing stream of work, to provide new material and new insights to numerous fellow workers, who will in their turn hopefully render it obsolete. It is an honor to introduce such a book to such a fellowship.

MILTON FRIEDMAN