# The Role of the Money Supply in Business Cycles

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Most, if not quite all, economists are agreed that the behavior of the quantity of money makes a significant difference in the behavior of the economy—with "money" usually defined to include currency in circulation plus private demand deposits, but sometimes to include commercial bank time deposits as well.[1] Most economists, for example, setting out to forecast next year's gross national product under the assumption that the money supply would grow by 4 per cent, would probably want to revise their figures if they were to change this assumption to a 2 per cent decrease.

In the past five to ten years, however, there has come into increasing prominence a group of economists who would like to go considerably beyond the simple assertion that the behavior of money is a significant factor influencing the behavior of the economy. It is not easy to characterize with any precision the views of this group of economists. As is perhaps to be expected where complex issues are involved, their statements about the importance of monetary behavior in determining the course of business activity encompass a variety of individual positions, positions which may themselves be undergoing change. Moreover these positions are rarely stated in quantitative terms. More frequently, the importance of money as a determinant of business conditions will be characterized as "by far the major factor", "the most important factor", "a primary factor", and by similar qualitative phrases inescapably open to various interpretations. Of course as one moves from the stronger phrases to the weaker, one comes closer and closer to the view that money is simply "a significant factor", at which point it becomes virtually impossible to distinguish their views from those of the great majority of professional opinions. In order to bring a few of the issues into sharper focus, this article will take a look at some evidence for the "money supply" view of business fluctuations in one of its more extreme forms. Without necessarily implying that all the following positions are held precisely as stated by any single economist, an extreme form of the money supply view can perhaps be characterized somewhat as follows: The behavior of the rate of change of the money supply is the overriding determinant of fluctuations in business activity. Government spending, taxing policies, fluctuations in the rate of technological innovation, and similar matters have a relatively small or even negligible influence on the short-run course of business activity. Hence, to the extent that it can control the money supply, a central bank, such as the Federal Reserve System, can control ups and downs in business activity. The influence of money on business operates with a long lag, however, and the timing of the influence is highly variable and unpredictable. Thus attempts to moderate fluctuations in business activity by varying the rate of growth of the money supply are likely to have an uncertain effect after an uncertain lag. They may even backfire, producing the very instability they are designed to cure. Consequently, the best policy for a central bank to follow is to maintain a steady rate of growth in the money supply, year in and year out, at a rate which corresponds roughly to the growth in the economy's productive capacity.

The implications of these views are obviously both highly important and strongly at variance with widely held beliefs. Thus they deny the direct importance of fiscal policy (except perhaps in so far as it may influence monetary policy), while they attribute to monetary policy a virtually determining role as regards business fluctuations. At the same time, they deny the usefulness of discretionary, countercyclical monetary policy. The issues involved are highly complex and cannot possibly be ade-

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[1] More rarely, other types of liquid assets such as mutual savings bank deposits are also included in the definition of money.

quately treated in their entirety in a single article.[2] The present article, therefore, confines itself to examining the historical relationship between monetary cycles and cycles in general business. The article concludes that the relationship between these two kinds of cycles does not, in fact, provide any real support for the view that the behavior of money is the predominant determinant of fluctuations in business activity. Moreover, the historical relationship between cycles in money and in business cannot be used to demonstrate that monetary policy is, in its effects, so long delayed and so uncertain as to be an unsatisfactory countercyclical weapon.

The first section shows how proponents of the money supply view have measured cycles in money and examines the persistent tendency of turning points in monetary cycles, so measured, to lead turning points in general business activity. It argues that these leads do not necessarily point to a predominant causal influence of money on business. A second section suggests that the cyclical relationship of money and business activity may be as much a reflection of a reverse influence of business on money as it is of a direct causal influence running from money to business. A third section indicates why, for some periods at least, the tendency for cycles in money to lead cycles in business may reflect nothing more than the impact on money of a countercyclical monetary policy. Next, the relative amplitudes of monetary contractions and their associated business contractions are examined. Again it is argued that these relative amplitudes fail to provide any clear evidence for a predominant causal influence of money. A fifth section examines the timing of turning points in money and in business for evidence that the influence of money operates with so long and variable a lag as to make countercyclical monetary policy ineffective. A final section suggests that there may well be better ways to evaluate the causal influence of money on business than through the examination of past cyclical patterns.

## CYCLES IN MONEY AND CYCLES IN BUSINESS ACTIVITY

As already implied, proponents of the money supply school have argued that the historical relationship between cycles in money and cycles in general business activity provides major support for their views on the causal importance of money in the business cycle. For the most part, these economists have delineated cycles in the money supply in terms of peaks and troughs in the percentage rate of change of money (usually including time deposits), while cycles in business have been defined in terms of peaks and troughs in the *level* of business activity as marked off, for instance, by the so-called "reference cycles" of the National Bureau of Economic Research (NBER).[3] They have argued that virtually without exception every cycle in the level of business activity over the past century of United States experience can be associated with a cycle in the rate of growth of the money supply. The exceptions that are observed occurred during and just after World War II—although the events of 1966-67 may also be interpreted as an exception, since an apparent cyclical decline in monetary growth was not followed by a recession but only by a very brief slowdown in the rate of business expansion.[4] The money supply school also finds that cycles in business activity have lagged behind the corresponding cycles in the rate of growth of the money supply, with business peaks and troughs thus following peaks and troughs in the rate of monetary change.

While the evidence supporting these generalizations is derived from about a century of United States data, the nature of the measurements and some of the problems

[2] Among the many interesting and relevant issues not discussed are the advantages and disadvantages of the money supply as an immediate target of monetary policy or as an indicator of the effects of policy, the proper definition of the money supply, and the nature and stability of the demand for money.

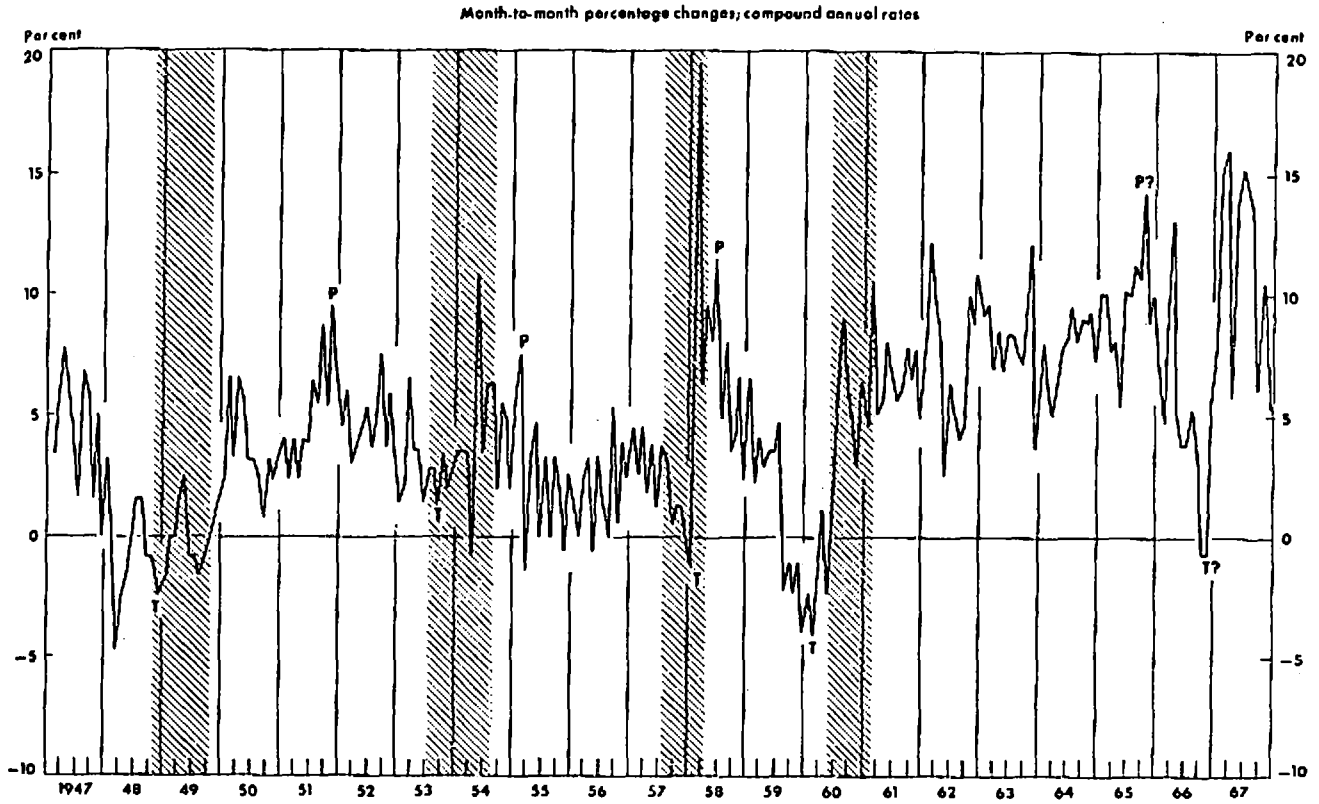
[3] See, for example, Milton Friedman and Anna J. Schwartz, "Money and Business Cycles", *Review of Economics and Statistics* (February 1963, supplement), pages 34-38. While the procedure of these economists in comparing percentage rates of growth of money with levels of business activity can certainly be defended, it is by no means obvious that this is the most appropriate approach, and there are many possible alternatives. Thus, for example, cycles in the rate of growth of money could be compared with cycles in the rate of growth, rather than the level, of business activity. For some purposes the choice among these alternatives makes a considerable difference, as is noted later in connection with measuring the length of the lags of business-cycle turning points relative to turning points in the monetary cycle.

[4] Granting the difficulties of dating specific cycle turning points for series as erratic as the rate of growth of the money supply, a peak (for the definition of money that includes time deposits) seems to have occurred in October 1965, with a trough in October 1966. While there was a slowdown in the rate of growth of business activity in the first half of 1967, there was clearly no business cycle peak corresponding to the peak in the money series. Indeed, the current dollar value of GNP moved ahead in the first two quarters of 1967, although at a reduced rate. The 1965-66 decline in the rate of growth in the money supply was relatively short (twelve months). In amplitude it was clearly among the milder declines, but it was nevertheless still nearly twice as steep as the mildest of past contractions in the rate of monetary growth (November 1951 to September 1953). In any case, the 1965-66 decline does appear to represent a specific cycle contraction for the rate of monetary change under the standard NBER definition. See Arthur F. Burns and Wesley C. Mitchell, *Measuring Business Cycles* (National Bureau of Economic Research, 1946), pages 55-66.

Chart I

**CHANGES IN MONEY SUPPLY PLUS TIME DEPOSITS**

Month-to-month percentage changes; compound annual rates




Note: Percentage changes are based on seasonally adjusted data. Shaded areas represent recession periods, according to National Bureau of Economic Research chronology.

Source: Board of Governors of the Federal Reserve System.

of interpretation can be illustrated from the postwar experience represented in Chart I. The chart shows monthly percentage changes in the money supply, defined here to include currency in the hands of the public plus commercial bank private demand and time deposits, on a seasonally adjusted daily average basis.[5] The shaded areas represent periods of business recession as determined by the NBER. The first point to note is the highly erratic nature of month-to-month movements in the rate of change of the money supply. Indeed, the reader might be excused if he found it difficult to see any clear-cut cyclical pattern in the chart. The erratic nature of the money series, which partly reflects short-run shifts of deposits between Treasury and private accounts, does make the precise dating of peaks and troughs in the money series somewhat arbitrary. This introduces a corresponding degree of arbitrariness in measuring timing relationships relative to turning points in business activity. Waiving this difficulty, however, peaks and troughs in the money series as dated in one well-known study of the problem are marked on the chart for the 1947-60 period.[6] As can be seen, each mone-

[5] While, as noted, many analysts would prefer to define the money supply to exclude commercial bank time deposits, such an exclusion would not materially affect the general picture, at least not for the period illustrated by the chart.

[6] The dates used are essentially those presented in Milton Friedman and Anna J. Schwartz, *op. cit.*, page 37, Table I. Minor modifications of the Friedman-Schwartz dates have been made when these seemed obviously dictated by revisions in the data subsequent to publication of their work.

tary peak occurs during the expansion phase of the business cycle and thus leads the peak in business. Similarly, there is a monetary trough marked during three of the four postwar recessions acknowledged by the NBER. A fourth monetary trough, however, in February 1960 occurs somewhat before the onset of recession three months later.

The leads of the peaks in the money series with respect to the subsequent peaks in business activity are, it should be emphasized, quite variable, ranging from twenty months to twenty-nine months for the period covered in the chart and from six months to twenty-nine months for the entire 1870 to 1961 period. The corresponding range of leads of money troughs relative to subsequent troughs in business cycles varies from three months to twelve months for the charted period and up to twenty-two months for the longer period.

The significance, if any, of these leads in assessing the importance of cycles in money in causing cycles in business is highly problematical. Firstly, chronological leads do not, of course, necessarily imply causation. It is perfectly possible, for example, to construct models of the economy in which money has *no* influence on business but which generate a consistent lead of peaks and troughs in the rate of growth of the money supply relative to peaks and troughs in general business activity.[7] Secondly, the extreme variability of the length of the leads would seem to suggest, if anything, the existence of factors other than money that can also exert an important influence on the timing of business peaks and troughs. Certainly even if a peak or trough in the rate of growth of the money supply could be identified around the time it occurred, this would be of very little, if any, help in predicting the timing of a subsequent peak or trough in business activity. Thirdly, there is a real question as to whether anything at all can be inferred from the historical record about the influence of money on business if, as is argued in the next section, there is an important reverse influence exerted by the business cycle on the monetary cycle itself.

## THE INFLUENCE OF BUSINESS ON MONEY

Although the persistent tendency of cycles in monetary growth rates to lead business activity does not, as noted, necessarily imply a predominant causal influence of money on business, this tendency has nevertheless seemed to the money supply economists to be highly suggestive of such an influence. Certainly the consistency with which these leads show up in cycle after cycle is rather striking and does suggest that cycles in money and cycles in business are related by some mechanism, however loose and unreliable. Nevertheless, it is important to recognize that this mechanism need not consist entirely or even mainly of a causal influence of money on business. It might, instead, reflect principally a causal influence of business on money, or it could reflect a complex relationship of mutual interaction. As noted earlier, virtually all economists believe that there is, in fact, at least *some* causal influence of money on business, and it may be that this influence alone is enough to explain the existence of some degree of consistency, albeit a loose one, in the timing relationships of peaks and troughs in business and money. However, the existence of a powerful reverse influence of the business cycle itself on the monetary cycle would have important implications. By helping to explain the timing relationships of the money and business cycles, the existence of such an influence would certainly tend to question severely any presumption that these timing relationships are themselves evidence for money as the predominant cause of business cycles.

There are, in fact, a number of important ways in which changing business conditions can affect, and apparently have affected, the rate of growth of the money supply over the 100 years or so covered by the available data. First, the state of business influences decisions by the monetary authorities to supply reserves and to take other actions likely to affect the money supply—as is discussed in detail in the next section. Business conditions can also have a direct impact on the money supply, however. For example, they may affect the balance of payments and the size of gold imports or exports. These gold movements, in turn, may affect the size of the monetary base—the sum of currency in the hands of the public and reserves in the banking system. Various official policies have tended to reduce or offset this particular influence of business on money, but at least prior to the creation of the Federal Reserve System it may have been of considerable significance.

Second, business conditions may influence the money stock through an influence on the volume of member bank borrowings at the Federal Reserve. While the size of such borrowings is, of course, importantly conditioned by the terms under which loans to member banks are made, including the level of the discount rate, it may also be significantly affected by the strength of loan demand and by the yields that banks can obtain on earning assets. These matters, in turn, are clearly related in part to the state of business activity.

[7] See James Tobin, "Money and Income: Post Hoc Propter Hoc?", to be published.

A third influence of business on money operates through the effects of business on the ratio of the public's holdings of coin and currency to its holdings of bank deposits. A rise in this ratio, for example, tends to drain reserves from banks as the public withdraws coin and currency. Since one dollar of reserves supports several dollars of deposits, the loss of reserves leads to a multiple contraction of deposits which depresses the total money supply by more than it is increased through the rise in the public's holdings of cash. While no one is very sure as to just what determines the cyclical pattern of the currency ratio, a pattern does seem to exist which in some way reflects shifts in the composition of payments over the business cycle as well as, in the historically important case of banking panics, fluctuations in the public's confidence in the banks themselves.[8]

A final avenue of influence of business on money is through the influence of business conditions on the ratio of bank excess reserves to deposits. When the ratio of excess reserves to deposits is relatively high, other things equal, the money supply will be relatively low since banks will not be fully utilizing the deposit-creating potential of the supply of reserves available to them. Business conditions can affect the reserve ratio in various ways. Thus they can influence bank desires to hold excess reserves through variations in the strength of current and prospective loan demand, through variations in the yields on the earning assets of banks, and through variations in banker expectations. When business is rising, loan demand is apt to be strengthening, yields on earning assets are apt to be rising, and banker confidence in the future is likely to be increasing. Thus excess reserves are apt to decline, with the reserve ratio rising and thereby exerting an upward influence on the money supply.

The influence of business on money—acting through its influence on the growth of the monetary base, the currency ratio, and the excess reserve ratio—is extremely complex and is not necessarily stable over time. The cyclical behavior of the monetary base and the currency and reserve ratios have in fact varied from cycle to cycle. Moreover the relative importance of these three factors in influencing the cyclical behavior of money has varied over the near 100-year period for which data are available. In part, these variations have reflected the effects of the creation and evolution of the Federal Reserve System. A detailed examination of the behavior of the monetary base, the currency and reserve ratios, and the role of business conditions in fixing their cyclical patterns is beyond the scope of this article. Recently, however, a very thorough analysis of the problem has been done for the NBER by Professor Phillip Cagan of Columbia University. He finds that "although the cyclical behavior of the three determinants [of the money stock] is not easy to interpret, it seems safe to conclude that most of their short-run variations are closely related to cyclical fluctuations in economic activity. . . . Such effects provide a plausible explanation of recurring cycles in the money stock whether or not the reverse effect occurred."[9]

The fact that the business cycle itself has an important role in determining the course of the monetary cycle seriously undermines the argument that the timing relationships of monetary cycles and business cycles point to a dominant influence of money on business. By the same token, ample room is left for the possibility that many other factors, such as fiscal policy, fluctuations in business investment demand, including those related to changes in technology, fluctuation in exports, and replacement cycles in consumer durable goods, may also exert important independent influences on the course of business activity.

## MONETARY POLICY AND THE CYCLICAL BEHAVIOR OF MONEY

One important, though perhaps indirect, influence of business on money requires special mention, namely the influence it exerts via monetary policy. The relevance of monetary policy to the behavior of monetary growth during the business cycle was perhaps especially clear during the period beginning around 1952 and extending to the very early 1960's. In this period, policy was more or less able to concentrate on the requirements of stabilizing the business cycle relatively (but not entirely) unimpeded by considerations of war finance, the balance of payments, and possible strains on particular sectors of the capital markets. The ultimate aim of stabilizing the business cycle is, of course, to prevent or moderate recessions and to forestall or limit inflation and structural imbalances during

[8] It might be noted that while the Federal Reserve has for many years routinely offset the reserve effects of short-term movements in coin and currency, such as occur around holidays, for example, the ratio of coin and currency in the hands of the public to deposits has apparently continued to show some mild fluctuations of a cyclical nature.

[9] Phillip Cagan, *Determinants and Effects of Changes in the Stock of Money, 1875-1960* (National Bureau of Economic Research, 1965), page 261.

periods of advance. The tools available to the Federal Reserve, however, such as open market operations and discount rate policy, influence employment and the price level only through complex and indirect routes. Hence, in the short run, policy must be formulated in terms of variables which respond more directly to the influence of the System. Some possibilities include, in addition to the rate of growth of the money supply, the growth of bank credit, conditions in the money market and the behavior of short-term interest rates, and the marginal reserve position of banks as measured, for example, by the level of free reserves or of member bank borrowings from the Federal Reserve. It is clear that the money supply need not always be the immediate objective of monetary policy, and indeed it was not by any means always such during the 1950's. Given this fact, the behavior of the rate of growth of the money supply during the period cannot be assumed to be simply and directly the result of monetary policy decisions alone.

Nevertheless, it is clear that the current and prospective behavior of business strongly influenced monetary policy decisions, given the primary aim of moderating the cycle, and that these decisions, in turn, influenced the behavior of the rate of growth of the money supply. Thus, for example, as recoveries proceeded and threatened to generate inflationary pressures, monetary policy tightened to counteract these pressures. Regardless of what particular variable the System sought to control—whether the money supply itself, conditions in the money market, or bank marginal reserve positions—the movement of any of these variables in the direction of tightening would, taken by itself, tend to exert a slowing influence on the rate of monetary expansion. In this way, the firming of monetary policy in the presence of cumulating expansionary forces would no doubt help to explain the tendency of the rate of monetary growth to peak out well in advance of peaks in the business cycle. Similarly, the easing of policy to counteract a developing recession would help to produce an upturn in the rate of monetary growth in advance of troughs in business activity.

In addition to the feedback from business conditions to policy decisions and thence from policy to the money supply, there are circumstances in which developments in the economy can react on the money supply even with monetary policy unchanged. Consider, for example, a situation in which the focus of policy is on maintaining an unchanged money market "tone"—a phrase that has been interpreted to imply, among other things, some rough stabilization of the average level of certain short-term interest rates such as the rate on Federal funds. Now a speedup in the rate of growth in economic activity would ordinarily accelerate the growth of demand for bank credit and deposits. This, in turn, would normally result in upward pressure on the money market and on money market interest rates. Maintaining the stability in money market tone called for by such a policy would require, however, under the assumed circumstances, supplying more reserves to the banks in order to offset the upward pressures on money market rates. Thus, with unchanged policy, an acceleration in the rate of business expansion could generate an acceleration in the rate of growth of reserves, and thence in the money supply. Similarly, a tapering-off in the rate of business expansion could, in these circumstances, generate a tapering-off in the rate of monetary expansion well before an absolute peak in business activity occurred. It should be emphasized that unchanged monetary policy could be perfectly consistent with countercyclical objectives under these conditions if the slowdown (or speedup) in the rate of business advance either were expected to be temporary or were regarded as a healthy development.

The reaction of monetary policy to changing business conditions and the reaction of the money supply to monetary policy undoubtedly help explain the tendency of peaks and troughs in the rate of growth of the money supply to precede peaks and troughs in the level of economic activity during this period. The resulting monetary leads, however, cannot then be interpreted as demonstrating a dependence of cycles in business on cycles in monetary growth. These leads would very likely have existed even if the influence of money on business were altogether negligible.

## SEVERITY OF CYCLICAL MOVEMENTS

Apart from matters of cyclical timing, some proponents of the money supply school have also regarded the relationship between the severity of cyclical movements in money and the severity of associated cyclical movements in business as suggesting a predominant causal role for money. They argue, perhaps with some plausibility, that, if the behavior of money were the predominant determinant of business fluctuations, the relative sizes of cyclical movements in business and roughly contemporaneous cyclical movements in money should be highly correlated. For example, the severity of a cyclical decline in the rate of growth of the money supply should be closely related to the severity of the associated business recession or depression. The evidence for such a correlation, however, is actually rather mixed.

Cyclical contractions in the monetary growth rate can be measured by computing the decline in the rate of mone-

tary growth from its peak value to its trough value.[10] On the basis of these computations, monetary contractions can be ranked in order of severity. Similarly, the severity of business contractions can be ranked by choosing some index of business activity and computing its decline during each business contraction recognized and dated by the NBER. If the resulting rankings of monetary contractions are compared with the rankings of their associated business declines for eighteen nonwar business contractions from 1882 to 1961, the size of monetary and business contractions proves to be moderately highly correlated.[11] It turns out, however, that this correlation depends entirely on the experience of especially severe cyclical contractions. Among the eighteen business contractions experienced during the period, six are generally recognized as having been particularly deep. They include three pre-World War I episodes and the contractions of 1920-21, 1929-33, and 1937-38. In the latter three declines, the Federal Reserve Board's industrial production index fell by 32 per cent, 52 per cent, and 32 per cent, respectively, compared with a decline of only 18 per cent for the next largest contraction covered by the production index (1923-24).

These six most severe contractions were in fact associated with the six most severe cyclical declines in the rate of growth of the money supply, though the rankings within the six do not correspond exactly. As was argued earlier, business conditions themselves exert a reverse influence on the money supply, and it seems probable that particularly severe business declines may tend to accentuate the accompanying monetary contractions. Thus, for example, the wholesale default of loans and sharp drops in the value of securities that accompanied the 1929-33 depression helped lay the groundwork for the widespread bank failures of that period. These failures were in part caused by, but also further encouraged, large withdrawals of currency from the banking system by a frightened public. By contracting the reserve base of the banking system, in turn, these withdrawals resulted in multiple contractions of the deposit component of the money supply.

Developments of this type help to explain the association of major monetary contractions with major depressions but do not seem to account fully for it.[12] Thus it may be that catastrophic monetary developments are in fact a pre-condition for catastrophic declines in business activity. In any case, for more moderate cyclical movements, the association between the severity of monetary contractions and the severity of business contractions breaks down completely. There is virtually no correlation whatever between the relative rankings of the twelve nonmajor contractions in the 1882-1961 period and the rankings of the associated declines in the rate of monetary growth.[13] Certainly this finding does not support the theory that changes in the rate of monetary growth are of predominant importance in determining business activity.

## MEASURING LAGS IN THE INFLUENCE OF MONEY ON BUSINESS

Despite their belief in the crucial role of the money supply in determining the cyclical course of business activity, some members of the money supply school nevertheless argue, as suggested at the beginning of this article, that discretionary monetary policy is a clumsy and even dangerous countercyclical weapon. The starting point for this view is again the fact that peaks and troughs in the level of business activity tend to lag behind peaks and troughs in the rate of change of the money supply—in particular the fact that these lags have tended to be quite long on average and highly variable from one cycle to another. Thus long average lags of about sixteen months for peaks and twelve months for troughs have suggested to these economists that the impact of monetary policy is correspondingly delayed, with actions taken to moderate a boom, for example, having their primary impact during the subsequent recession when precisely the opposite influence is needed. Moreover, the great variability from cycle to cycle of the lags as measured by the money supply school has suggested that the timing of the impact of monetary policy is similarly variable and unpredictable. For this reason, they argue, it will be impossible for the monetary authorities to gauge when their policy actions

[10] Generally, three-month averages centered on the specific cycle turning point months have been used to reduce the weight given to especially sharp changes in the peak and trough months themselves.

[11] The Spearman rank correlation, for which satisfactory significance tests apparently do not exist when medium-sized samples ($10 < n < 20$) are involved, is .70. The Kendall rank correlation coefficient, adjusted for ties, is .53 and is significant at the 1 per cent level. Rankings of business contractions are based on the Moore index. See Friedman and Schwartz, *op. cit.*, Table 3, page 39.

[12] See Phillip Cagan, *op. cit.*, pages 262-68.

[13] The Kendall coefficient for the twelve nonmajor contractions is a statistically insignificant .03, while the corresponding Spearman coefficient is .01.

will take effect and therefore whether these actions will turn out to have been appropriate.

It is true, of course, that monetary policy affects the economy with a lag. The full effects of open market purchases on bank deposits and credit, for example, require time to work themselves out. More important, additional time must elapse before businessmen and consumers adjust their spending plans to the resulting changes in the financial environment. For this reason, the pattern of spending at any given time will to some degree reflect the influence of financial conditions as they existed several months or quarters earlier. Hence it is certainly possible, for example, that some of the effects of a restrictive monetary policy could continue to be felt during a recession even though the current posture of monetary policy were quite expansionary.

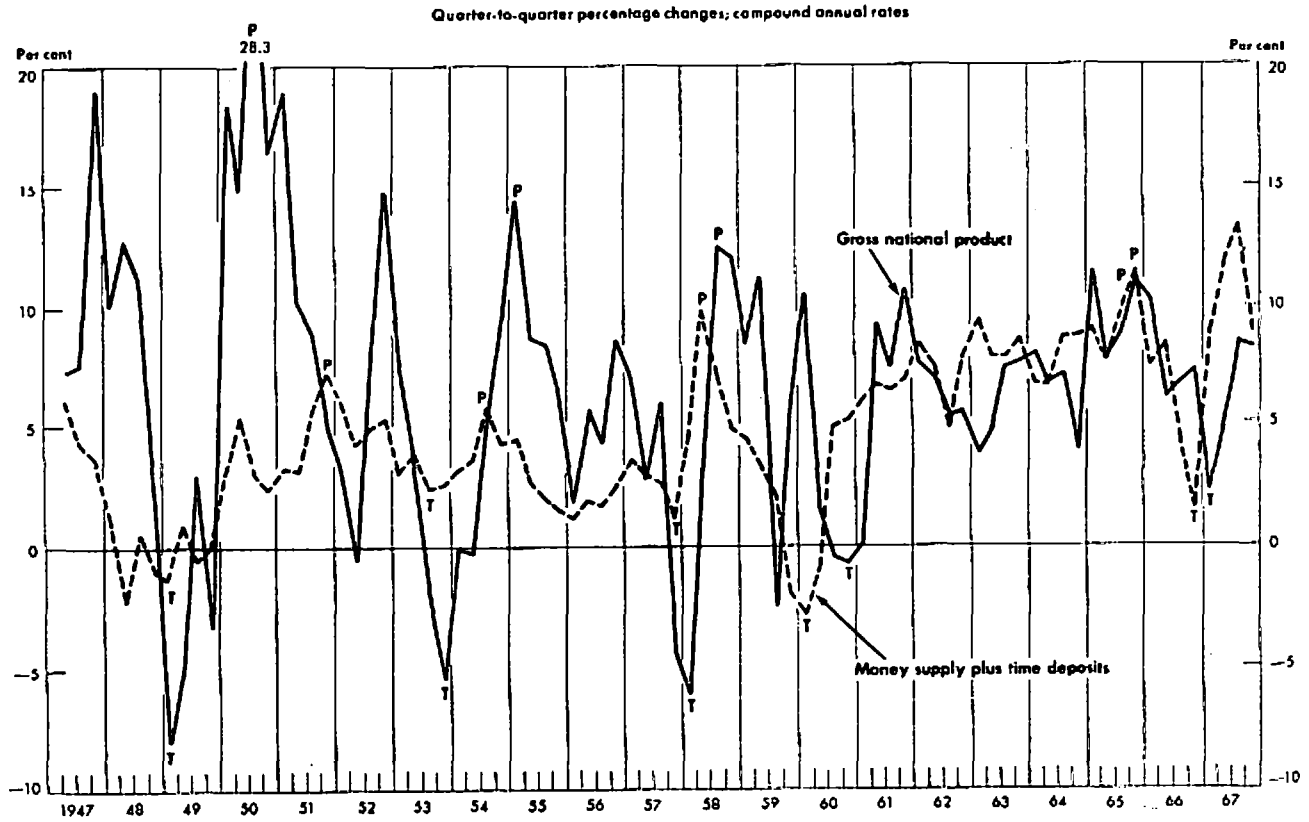
The fact that such lags do exist, however, shows only that monetary policy cannot be expected to produce immediate results. Like fiscal policy, its effectiveness depends in part on the ability to anticipate business trends so that policy actions taken today will be appropriate to tomorrow's conditions. Of course the longer the lags in the effects of policy prove to be, the further out in time must such anticipations be carried and the greater is the risk that policy actions will prove to be inappropriate. Moreover, if the lengths of the lags are highly variable and thus perhaps unpredictable, the risks of inappropriate policy decisions are obviously increased and the need for continuous adjustments in policy is apt to arise.

The timing of cycles in money and cycles in business, however, provides absolutely no basis for believing that the lags in the effects of monetary policy are so long or

Chart II

**CHANGES IN GROSS NATIONAL PRODUCT AND IN MONEY SUPPLY PLUS TIME DEPOSITS**

Quarter-to-quarter percentage changes; compound annual rates




Note: Percentage changes are based on seasonally adjusted data.

Sources: Board of Governors of the Federal Reserve System; United States Department of Commerce.

so variable as to vitiate the effectiveness of a countercyclical policy. First, there are many reasons for doubting that the lag in the effects of monetary policy should be measured by comparing the timing relationships between cyclical turns in money and in business. It has been argued, for example, that other variables more directly under the control of policy makers, such as member bank nonborrowed reserves, or variables more clearly related to business decisions, such as interest rates, must also be taken into account. Yet, even if the behavior of the money supply be accepted as the indicator of policy, there are many alternative ways in which "the lag" between monetary and business behavior can be measured, and it makes a great deal of difference which measure is used. If, for example, the rate of change in the money supply is replaced by deviations in the level of the money supply from its long-run trend, the average lag between monetary peaks so measured and peaks in general business apparently shrinks from the sixteen months previously cited to a mere five months.[14] Alternatively, it can be plausibly argued that the appropriate measure is the lag between the rate of change in the money supply, and the *rate of change*, rather than the level, of some measure of business activity such as gross national product (GNP) or industrial production. When peaks and troughs for money and business are compared on this basis, the lead of money over business appears to be quite short.[15] The near simultaneity, in most cases, of peaks and troughs in the rates of change of the money supply and of GNP during the post-World War II period can be seen in Chart II. To be sure, movements in the two series are quite irregular, so that the decision on whether to treat a particular date as a turning point is sometimes rather arbitrary. Nevertheless, the lead of peaks and troughs in the rate of growth of money over peaks and troughs in the rate of growth of GNP appears to average about one quarter or less.[16]

The point of these various comparisons is not to prove that the lag in monetary policy is necessarily either very long or very short, but rather to illustrate how hard it is to settle the matter through the kind of evidence that has been offered by the money supply school. Similar difficulties, as well as others, beset attempts to measure the *variability* of the lag in the influence of money on business by comparisons of cyclical peaks and troughs in the two. However the turning points are measured, the resulting estimates may seriously overstate the true variability of the lag in the influence of money on business. The reason is that observed differences from cycle to cycle in the timing of turning points in money relative to turning points in business are bound to reflect a number of factors over and beyond any variability in the influence of money on business.[17] These "other" sources of variability include purely statistical matters such as errors in the data and the arbitrariness involved in assigning precise dates to turning points in money and in business. More fundamentally, the fact that there exists a reverse influence of business on money, an influence that is probably uneven from one cycle to the next, imparts a potentially serious source of variability to the observed lags. Moreover, if there are important influences on the general level of business activity other than the behavior of money, these factors would also increase the variability of the observed timing relationships between turning points in money and in business. Taking all these possibilities into account, it seems fair to say that whatever the true variability in the impact of money on business, its size is overstated when it is measured in terms of the variability of the lags in cyclical turning points.

## WAYS IN WHICH MONEY MAY INFLUENCE BUSINESS

If there is a broad conclusion to be drawn from a study of the historical pattern of relationships between cycles in money and cycles in business, it is that there are distinct limits to what can be learned about the influence of money on business from this kind of statistical analysis. Perhaps this should not be surprising. During the business cycle many factors of potential importance to the subsequent behavior of business activity undergo more or less con-

[14] This estimate is presented by Milton Friedman in "The Lag Effect in Monetary Policy", *Journal of Political Economy*, October 1961, page 456.

[15] See John Kareken and Robert Solow, "Lags in Monetary Policy", *Stabilization Policies* (Commission on Money and Credit, 1963), pages 21-24.

[16] When quarterly dollar changes in the money supply are correlated with quarterly dollar changes in GNP experimenting with various lags, the highest correlation is achieved with GNP lagged two quarters behind money. (For the 1947-II to 1967-III period the $R^2$ is .34.) The correlation with a one quarter lag is almost exactly as high, however ($R^2 = .33$). When percentage changes in the two series are used instead, the correlation virtually disappears, no matter what lag is used.

[17] Other sources of variability are discussed in some detail by Thomas Mayer in "The Lag in the Effect of Monetary Policy: Some Criticisms", *Western Economic Journal* (September 1967), pages 335-42.

tinuous change. At the same time the business cycle itself feeds back on the behavior of these factors. Hence it is extremely difficult to isolate the importance of any single factor, such as the behavior of money, and *post hoc, propter hoc* reasoning becomes especially dangerous. In these circumstances there appears to be no substitute for a detailed, and hopefully quantitative, examination of the ways in which changes in the money supply might work through the economy ultimately to affect the various components of aggregate demand. Some brief and tentative sketches aside, the proponents of the monetary school have not attempted such an analysis.

The possible ways in which an increase, for example, in the money supply might stimulate aggregate demand can be separated into what are sometimes called "income effects", "wealth effects", and "substitution effects". Income effects exist when the same developments that produce an increase in the quantity of money also add directly to current income. Examples would be increases in bank reserves and deposits resulting from domestically mined gold or an export surplus. Similarly, a wealth effect occurs when a process increasing the money supply also increases the net worth of the private sector of the economy. A Treasury deficit financed by a rundown of Treasury deposit balances might be regarded as an example of such a process, since the resulting buildup of private deposits would represent an increase in private wealth.

Far more important than the income or wealth effects in the present-day United States economy are substitution effects such as result when the Federal Reserve engages in open market operations and banks expand loans and investments.[18] When the Federal Reserve buys Government securities from the nonbank public, the public of course acquires deposits and gives up the securities. There is no direct change in the public's net worth position,[19] or in its income; rather there is a substitution of money for securities in the public's balance sheet. The same is true when the banks expand the money supply by buying securities from the nonbank public: the public substitutes money for securities, but neither its wealth nor its income is directly changed by the transaction. Similarly, when banks expand deposits by making loans, the monetary assets of the borrowers rise, but their liabilities to the banking system rise by an equal amount and their net worth and income are unchanged.

Since these substitution effects associated with open market operations and with the expansion of bank deposits are by far the most important operations by which the money supply is changed, it seems especially relevant to study the ways in which these effects may influence economic activity. The main avenues appear to be through changes in interest rates on the various types of assets and changes in the availability of credit. When the Federal Reserve or the commercial banks buy securities from the nonbank public in exchange for deposits, funds are made available for the public to purchase, in turn, a wide variety of private securities such as mortgages, corporate bonds, or bankers' acceptances.[20] The increased demand for these securities tends to push rates on them down. And with borrowing costs down, business firms may be induced to expand outlays on plant and equipment or inventory while consumers may increase spending on new homes. In most cases, the effects of lower interest rates on capital spending probably stem from the fact that external financing has become cheaper. In some cases, however, lower market yields on outstanding government and private securities might induce business holders to sell such assets in order to purchase higher yielding capital goods and thus, in effect, to make direct substitution of physical capital for financial assets in their "portfolios". Finally, lower interest rates on securities may reduce consumer incentives to acquire and hold financial assets while tempting them to make more use of consumer credit, thereby reducing saving out of current income and increasing con-

[18] These substitution effects are sometimes also known as "portfolio balance" or "liquidity" effects.

[19] This statement has to be modified to the extent that the Federal Reserve's buying activity bids up the market value of the public's holdings of Government securities. The significance of this wealth effect is probably minimal and is further limited in its consequences by the tendency of many holders to value Governments at original purchase price or at par rather than at current market value.

[20] The newly created deposits may of course in principle be used immediately to buy goods rather than financial assets, thus tending directly to stimulate business activity. Even in this case, however, the effects of the money-creating operations work through and depend upon reactions to interest rates. When the Federal Reserve or the commercial banks enter the market to buy securities, their bids add to total market demand, making market prices for securities higher (and yields lower) than they otherwise would have been. Indeed it is these relatively higher prices (lower yields) that induce the nonbank public to give up securities in exchange for deposits. If the deposits are in fact immediately used to purchase goods, then the process can be regarded as one in which lower market interest rates on securities stemming from bids by the Federal Reserve or the commercial banks have induced the public to give up securities in exchange for goods. The extent to which such switching will occur obviously depends upon the sensitivity to interest rates of business and consumer demands for goods.

sumption purchases.[21]

With regard to bank lending, open market purchases of Government securities increase bank reserves and may ease the terms on which banks are willing to make loans. Changes in lending terms other than interest rates, which include repayment procedures, compensating balance requirements, and the maximum amount a bank is willing to lend to a borrower of given credit standing, are often bracketed as changes in "credit availability". Such changes are regarded by many analysts as being more important influences on many types of spending than are changes in interest rates. Moreover, changes in credit availability related in part to changes in the money supply are not confined to lending by commercial banks, as was dramatically illustrated in 1966 with regard to nonbank mortgage lenders. In any case, an increased availability of funds permits and encourages potential borrowers to increase their loan liabilities, thereby providing funds which can be used to build up financial assets (perhaps mainly money market instruments) or to purchase physical assets in the form of business capital goods, inventories, or consumer durables. Stepped-up purchases of financial assets add to downward pressures on interest rates, stimulating spending through the processes already described, while additional demand for physical assets stimulates business activity directly.

Studies of the influence of changes in interest rates and the availability of credit on spending in the various sectors of the economy have appeared with increasing frequency in the post-World War II period, especially within the past few years. Some of these studies have taken the form of interviews of businessmen and consumers with regard to the influence of credit cost and availability conditions on their spending decisions. Other studies have employed modern statistical and computer technology in an attempt to extract such information from data on past behavior.[22] With regard to spending on housing, there has been general agreement that the cost and availability of credit are highly important. A number of studies have also found varying degrees of influence on business spending for plant and equipment and for inventories as well as on consumer spending for durable goods such as autos and appliances. All these studies, however, have also found factors other than cost and availability of credit to be highly important. Moreover, a large degree of disagreement exists with regard to the exact quantitative importance of the financial factors.

Given the serious technical problems that surround these studies, major areas of disagreement are virtually certain to exist for some time to come. Nevertheless, studies of the type referred to here appear to offer the hope at least that firmly grounded and widely accepted conclusions on the importance of money in the business cycle may ultimately be reached. Of particular interest are large-scale econometric models which attempt to provide quantitative estimates of the timing and magnitude of the effects of central bank actions on the money supply and other financial magnitudes and the subsequent effects, in turn, of these variables on each of the various major components of aggregate demand. One such model is currently under construction by members of the Federal Reserve Board staff in cooperation with members of the Economics Department of the Massachusetts Institute of Technology.[23] Granting the major technical problems still unresolved, projects of this kind appear promising as a means of eventually tracking down the importance of money in explicit, quantitative terms.

[21] While there is little general agreement that such direct effects on consumption are important, a recent study of the problem has in fact found a significant influence of interest rates on consumer demand for automobiles and other durables. (See Michael J. Hamburger, "Interest Rates and the Demand for Consumer Durable Goods", *American Economic Review*, December 1967.) In general, proponents of the monetary school feel that analyses of the role of interest rates in consumer demand undertaken to date have neglected to take into account certain important factors. In particular, they think that the most relevant interest rates may not be the ones usually studied, namely the rates on financial instruments, but rather the interest rates "implicit" in the prices of the durable goods themselves—i.e., where the value of the services yielded by a consumer durable, such as an auto or a washing machine, is treated as analogous to the coupon or dividend yielded by a bond or stock. The obvious difficulties of defining and measuring the value of such services have probably been responsible for the notable dearth of research into this possibility, however, and the issue must be regarded as completely unsettled.

[22] For a summary of some of these studies, see Michael J. Hamburger, "The Impact of Monetary Variables: A Selected Survey of the Recent Empirical Literature" (Federal Reserve Bank of New York, July 1967). Copies of this paper are available on request from Publications Services, Division of Administrative Services, Board of Governors of the Federal Reserve System, Washington, D.C. 20551.

[23] Some preliminary results of this work are discussed in "The Federal Reserve-MIT Econometric Model" by Frank deLeeuw and Edward Gramlich, *Federal Reserve Bulletin* (January 1968), pages 9-40.