Conference Series No. 1

Controlling MONETARY AGGREGATES

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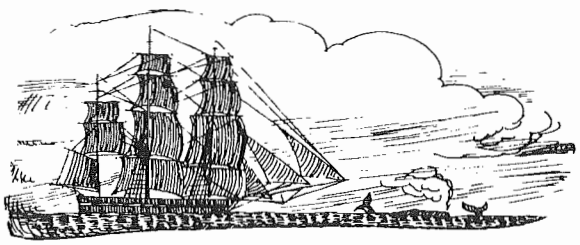
PROCEEDINGS OF A CONFERENCE HELD IN JUNE, 1969

FEDERAL RESERVE BANK OF BOSTON

Controlling MONETARY AGGREGATES

Proceedings of the
MONETARY CONFERENCE
Held on Nantucket Island
JUNE 8 - 10, 1969



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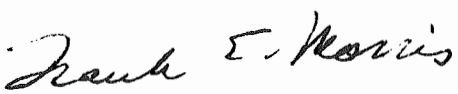
FOREWORD

Controlling Monetary Aggregates is the proceedings of a conference on that topic, sponsored by the Federal Reserve Bank of Boston in June of this year.

The conference—the first of a proposed series, covering a wide range of financial and monetary problems—brought together a distinguished group of men from the universities, government, and finance to exchange ideas on one of the most pressing of current policy issues—the role of money in economic activity.

We hope that the distribution of these proceedings will make a useful contribution toward increased public understanding of these issues—and to evolving policy decisions.



Frank E. Morris
President

Boston, Massachusetts

September, 1969

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Controlling MONETARY AGGREGATES

PANEL

The Role of Money in National Economic Policy

PAUL SAMUELSON

The central issue that is debated these days in connection with macro-economics is the doctrine of monetarism.

Let me define monetarism. It's not my particular title. Monetarism is the belief that the primary determinant of the state of macro-economic aggregate demand—whether there will be unemployment, whether there will be inflation—is money, M_1 or M_2, and more specifically, perhaps, its various rates of change.

I'm going to borrow a method of exposition that I understand Jim Tobin used at an ABA meeting some years ago, when *A Monetary History of the United States* of Mrs. Schwartz and Mr. Friedman was being discussed. I wasn't present, but I was told that Jim wrote three sentences on the blackboard: "Money doesn't matter," "Money matters," and "Money alone matters." And he then said that Professor Friedman, having established to everybody's satisfaction the untruth of the first statement, went on as if it were a *sequitur* to think that he had established the third statement.

Well now, I wasn't provided with a blackboard, and I can't lapse into my academic mannerisms, but I have written down a spectrum of remarks from "Money doesn't matter," to "Money matters," to "Money matters much," to "Money matters most," and to "Money alone matters." Now, monetarism is certainly at the right of this spectrum. There is nobody, I think, worth our notice on the American scene who is at the left end of that spectrum, although there still do exist in England men whose minds were formed in 1939, and who haven't changed a thought since that time, and who do belong at the left of that spectrum and say money doesn't matter. They've embalmed their views in the Radcliffe Committee, one of the most sterile operations of all time. And so, monetarism, which is a correction to that extreme view—and, I think, an excess on the

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other side—is very much an item for export to the British Isles. For so many years they exported wisdom and knowledge to us, it's only proper that we requite that past with export. I would argue that the right view, the extreme view, is not the most persuasive view, but monetarism is that.

Now, you may think that's a straw man that I'm setting up—that there is nobody who believes in monetarism as I've defined it. But I believe that I'm correct in saying that there is at least one person in this country who does believe in it, and he is a person of no small stature. I'm not referring to John Kenneth Galbraith, in saying this, but to one who has not graced our assembly with his presence here today, and that is Dr. Friedman.

I've an advantage probably not vouchsafed to all of you. Once a week I am privileged for 28 1/2 minutes to listen to the voice of Dr. Friedman—and his view, as expressed repeatedly in those tapes, is this: that as far as macro-economic aggregate state of demand is concerned, money alone matters. Now, this doesn't mean that money alone determines everything. It will not cure flat feet, or dandruff, or marital fidelity. It is not true, for example, that fiscal policy has no role: For example, how big the Galbraithian public sector is is very much determined by fiscal policy; and what the composition of any state of aggregate demand is, in terms of consumption goods and capital formation, does depend upon a fiscal policy. But as for the general issues—of whether you are going to have more inflation or deflation, or whether you are going to have unemployment—we know a very little bit about it. About something like half of the squared variation in the state of aggregate demand can be explained by the money factor; the rest is noise. There are no systematic predictable elements.

Now, I think that that is an extreme view, and it is not a persuasive view if you look at all of the evidence. There was a great debate at NYU between Professor Friedman and Walter Heller. I wasn't privileged to be there. I talked to various people in New York who were there and, generally speaking, those who were in favor of one view when they came in, went out thinking that their man had won the debate. I talked to one Wall Street character who alleged to be neutral, and he said, "Well, Heller had the better wisecracks, but Friedman had mountains of evidence. He didn't have time to give those mountains of evidence there at that time, but, you can't laugh off the evidence."

I have reviewed these mountains of evidence, and I think that there is a great amount of evidence—much of it is due to the efforts of Professor Friedman at the National Bureau, much of it is due to workshop students working with him, and much of it to colleagues—but most of that evidence is not, in the sense of the statistician, a powerful test of monetarism as I've defined it. Most of that evidence is conclusive with respect to a Radcliffe Committee stupid view that money doesn't matter, but as to the view that money matters and that fiscal policy, just to take an example, does not have a systematic influence, there is very little of the mountain of evidence that is germane to that.

Types of Evidence

Now, since other speakers have to speak, I can't review all these mountains of evidence, but let me just mention what some of the types of evidence are. First—and I've heard several tapes dealing with this—take particular incidents in American history. In 1919, for example, we came out of World War I; there was a much-underbalanced budget; the Federal Reserve was under the thumb of the Treasury; and then, on a certain day, it can be established, just as a diplomatic historian can establish facts, that the Federal Reserve was given its freedom from the Treasury. On that certain day, it took certain acts, so you have almost a controlled experiment in which something happened to the money supply and then—within six months or seven months or nine months, whatever the lag period is—something happened to the business conditions. Now, I think that is good evidence that money matters. That does not tell you what its role is with respect to the importance of fiscal policy or other matters. But we have a lot of evidence like that.

There is another kind of evidence. Namely, that people who use monetarism deliver the goods. Don't ask me why money matters; it's as if it matters, but we don't know what the exact connections are.

There's somebody in a Chicago bank who gets better forecasts using this method than anybody else in that part of the country; there's somebody in a New York bank which shall be nameless, who gets better estimates; and, in the academic community, there are a few people who are armed with this knowledge of monetarism and—why, we don't know—they deliver the goods.

We had a crucial experiment in 1966 in which the monetarists said certain things with which the other people—I'll call them neo-

Keynesians or post-Keynesians, since nobody can quite stand to be called a Keynesian in this country—differed. There was a joust between these different forecasters, and who do you think won on that occasion? It was the monetarists.

The same thing happened again after the middle of last year.

Now, this is a very complicated story, but let me say that, if you are going to use that kind of evidence, you have to use all of it, and you have to be quantitative.

I keep a little black book, and I find there is a great overlap in estimates between different users, different methods, and at one time one of the groups seems, in its meaning, to differ from that of the other groups. Much of the time they, in fact, coincide. . . as, for example, I think right now the kind of forecasts I hear myself making on those tapes are not very different from that a monetarist makes. But occasionally you find a difference and, occasionally, the monetarist's view is the more accurate one. Occasionally the opposite happens.

Suffice it to say that since the middle of last year I have a collection of estimates from people of both schools that cross each other.

I have more pessimistic estimates for the first quarter of the year from monetarists, in some cases, than from the other method. In the middle of 1966, the monetarists tended to be right with respect to a slowing down ahead. By year's end they tended to be wrong in prophesying that recession of 1967—whose existence, by the way, is not a semantic problem. Anyone in this game who speaks of recession knows exactly what the National Bureau's definition of recession is.

Magic and Forecasting

And so I say, based upon this and much other evidence, that the people who call themselves monetarists do not have a magic way of making a better forecast. I simply assert that I have hills of evidence bearing upon that point. And I add something—namely, a man who believes he's a monetarist, who makes forecasts, does not himself know *what* his forecasts are based upon. Some of those whom I have observed most closely, who do make good forecasts, I find combine witchcraft and arsenic in killing their neighbors' sheep. If their flair for forecasting tells them *not* to follow monetarism to its logical conclusion, they don't; and they are amply rewarded.

In fact, the biggest jackasses are those who follow *only* the monetarism, and some of the biggest mean-squared errors—and when you square an error of $10-15-20 billion, it's in the hundreds of billions—came, in 1967, from monetarists' forecasts.

I'm going to pass over the evidence of timing and turning points, which is a very mixed kind of evidence, is consistent with many different theories, and also is not a powerful test of where you are on this spectrum that I spoke of. . . at the extreme right or something less than the extreme right.

It's important to decide whether monetarism is true, because whether, for example, the tax bill goes through and the surcharge is extended—which is now something that is in doubt—to a monetarist doesn't matter. It really doesn't matter; the Fed just does its business and keeps that money supply growing in the proper range at the proper rate. It couldn't matter less as far as aggregate demand is concerned. And that's point number one.

Another example. We had a big surprise. The SEC survey showed 14 percent intentions of increase in plant and equipment. What's the effect of that to a monetarist? Nothing. It's of absolutely no importance and—you might think I'm making this up, but I heard it right from the tape, itself—it's of absolutely no importance that investment is stronger than people had thought, because there is no systematic relationship. If there is no systematic relationship between government expenditures in the income accounts, and taxes in the income accounts, when you bracket this with autonomous changes in private investment, there is also no systematic thing.

Now, you might say it takes a stern man to follow his logic down to that extreme. Well, we've got a hero in this country who follows his logic all the way, and this is his assertion.

I think that's very unpersuasive in terms of all we know about economic history, and I think it's wrong.

Now, I want to conclude on a more academic note. What is it that makes one who doesn't even follow the year-to-year and month-to-month business cycle situation skeptical about monetarism in the extreme—and I think hard to defend—form that I have defined?

If you actually examine the logic of economics—and I now am going into the neo-classical economics on which I was brought up in the pre-Keynesian period—there is no reason in the world why, in an equation like $MV = PQ$, the V should be thought to be independent

of the rate of interest. There is every plausible reason in terms of experience, in terms of rarified neo-classical theory, for the velocity of circulation to be a systematic and increasing function of the rate of interest; and the minute you believe that, you have moved from the right of the spectrum—that of monetarism—to that noble eclectic position which I hold, the post-Keynesian position.

Now, if you will, examine, for example, the new Encyclopedia of Social Sciences article by Professor Friedman on money—as I read that article which goes on for, I suppose, 100 paragraphs.

The first 98 paragraphs of that, I could agree with completely. The demand for money is a complicated thing. It depends upon many things, including the rate of interest and all the plausible things, etc.

The last two paragraphs assert, quite strongly, the literary equivalent of the following equation: that the change in the level of money income with respect to government expenditures, or with respect to taxation, or with respect to the difference between them ($M = \overline{M}$, holding the supply of money constant) is zero. On the tapes, I hear the exact equivalent of that. That is a *non sequitur*. It does not follow from the previous analysis.

Finally—and this, again, is the important thing that interests me as an academic—if you actually analyze different wealth assets in the differing degrees of liquidity, there is no reason in the world, that I can see, why an ordinary open market operation, in which you swap one kind of used asset for another kind of used asset, should be expected, when it gives rise to the increase in what the Federal Reserve Bank of St. Louis reports to me every-hour-on-the-hour as a change in the supply of money, to have the same effect and be in the same invariant relationship to a different kind of increase in money, let's say an increase in money due to gold mining, where income is created along the way, or an increase in money due to deficit financing.

So I've tried to make a thought experiment—to redo the period from February 1961, to, let's say early 1965, leaving out the war, and taking that wonderful Camelot period when the GNP grew mightily. Let us redo the experiment in which the money supply grows exactly as it did in that period but the budget is kept at a balance—at a low balance level—such as the outgoing Eisenhower Administration had promised and had looked to.

According to, let's say, a reduced form estimate of the November Federal Reserve Bank of St. Louis, you can even plug the variables

into that problem, and you would get about the same development in this hypothetical history as you got in actual history.

I think all reason is against that.

I think that what would have happened was that if you had to create the same amount of money by that method with an entirely different kind of fiscal policy, you would have had, in the short run, to have depressed interest rates.

I forget, for example, about the international exchange problem, because of course the exchange rate can float; there is no restraint on domestic policy in a rational world. I don't, by the way, want to cast any scorn on that view. The biggest problem that we face in the world today is how to get from here to there. The "here" is rigid exchange rates and the "there" is exchange rates with some kind of flexibility.

But I think there is every theoretical reason for expecting there to have been a different effect and so, as I look over the evidence, I say, "Money, yes; but monetarism, no."

PANEL

DAVID MEISELMAN

Paul Samuelson believes that he was invited to this conference because he is a proper Bostonian. Perhaps I should point out that I believe the only two people on the program who were born in Boston proper—west of Dedham, at least—are Allan Meltzer and myself. This means the two of us are proper Bostonians by birth.

I am very pleased and honored to be on the first panel of the Nantucket Monetary Conference sponsored by the Federal Reserve Bank of Boston. As this conference begins, it seems to me that the Federal Reserve Bank and its President should be commended for initiating the conference and for bringing to it a wide range of participants who represent much of the best of serious and responsible concern for effective monetary policy. At the outset of the conference, I wish to make a plea that we bury old, and largely inappropriate hatchets, and remember that Barry Goldwater was really never a true believer in the Quantity Theory; that Milton Friedman may not have been a true believer in Barry Goldwater; and that Keynes, himself, remained essentially the Manchester Liberal student of Alfred Marshall, even after *The General Theory.*

In that spirit, I would like to start by mentioning several characteristics of monetary behavior we should keep in mind as the Conference proceeds. The characteristics in the colloquy are generally so well known that if our cataloging services were more efficient I could save everybody's time by merely stating arguments numbered 32 and 11 and hold in reserve reply number 6 to Jim Tobin's exception 17, while Allan Meltzer handled arguments 38 and 33, and saved number 15 as the clincher to reply to Paul Samuelson's old 77.

Association Between Changes in the Stock of Money and in the Price Level

To return to some of the characteristics, perhaps the first is that there is an impressive body of evidence of long standing, perhaps the most firmly established empirical association in all of economics, that there is an association between large-scale and rapid changes in

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the stock of money and changes in the price level. Indeed, every substantial and sustained inflation ever studied that has come to my attention has been associated with correspondingly substantial and sustained large-scale increases in the stock of money. Similarly, every important deflation ever studied has been associated with a fall in the stock of money, or, as in the case of the United States from 1869-1896, very little or no monetary growth to match the growth in output. Of course, this is to be expected when the demand for money is relatively stable and is specified in real terms. The real value of each unit of money, given the demand for money, is related to the total nominal quantity of money. In some respects, this is an extension of the very simplest economics. Because the stock of money generally tends to be under the control of the monetary authorities, it follows that the monetary authorities can control the nominal stock of money, but the real stock of money depends on the behavior of the public.

For shorter periods, it seems that the general configuration of business cycles is similar to the general configuration of monetary change. Periods of large-scale expansion in nominal GNP are related to a corresponding large-scale expansion in the stock of money which had taken place earlier, and similarly for a contraction in nominal GNP, especially when related to the rate of change of the stock of money. Second, the stock of money, especially when evaluated as changes in the rate of change of the stock of money, tends to lead business cycle turns. But the lead of money over income does not seem to be a dependable one in the sense that there is a simple or constant lead of money over business conditions. Different investigators report different leads of money over income ranging from three to six months to three to five years. The Federal Reserve Board-MIT model seems to yield one of the longest leads of money over income. Some work at the Federal Reserve Bank of St. Louis has reported close to the shortest lead. Milton Friedman's position on this matter would seem to make him a moderate in the lag controversy.

The Need for Control of the Stock of Money

In my view, monetary policy is, or should be, concerned with control of the stock of money—even though the stock of money, itself, may not be an explicit policy instrument, policy target, or policy indicator. Other things, such as interest rates, may be uppermost in the minds of the monetary authorities as targets or indicators of policy; but, as I see it, looking at interest rates, alone, is

both an inefficient and self-defeating way to operate a stabilizing monetary policy. One of the reasons that it is inefficient is that interest rates are a very confusing indicator of monetary policy. Interest rates may also be a confusing target as well. Of course, traditional Keynesian analysis, which is very close to the traditional banker view, regards the rate of interest as responding inversely to changes in the quantity of money. In this general context, recall that prices in the Keynesian analysis are given; the marginal productivity of capital also tends to be given and fixed; and that, in effect, security prices or interest rates may change, but commodity prices and perhaps the price of labor as well are also given and fixed.

The rate of interest in the traditional Keynesian analysis is the real rate of interest because price level considerations, including expectations of changing prices, are essentially ruled out. Either prices are assumed constant or the role of price expectations in affecting the nominal rate of interest is held aside. As we have all come to realize, especially in the past few years, the nominal rate of interest seen in the market is composed of the real rate of interest plus some adjustment for the expected rate of change of prices. A large increase in the stock of money ultimately affects prices, which in turn have some feedback effects on nominal rates of interest. This seems to be true not only in recent years but, as I have examined the evidence, it holds for at least the last 100 years of United States financial history, and perhaps longer in England as well.[1]

In addition to the feedback between money and interest rates through the price level effect, a change in the stock of money can also affect the real rate of interest. If, by affecting aggregate demand, the change in the stock of money alters employment, then again, depending on well established elements of traditional economic analysis, the change in employment will tend to change the ratio of labor to capital in the short run, and thereby the marginal productivity of both labor and capital. Thus, for example, if there is a restrictive monetary policy which leads to unemployment, output becomes more capital-intensive, so that the marginal product of capital falls, as does the real rate of return. This is an element in the argument that Hicks' IS curve has a positive slope.[2]

[1] See David Meiselman, "Bond Yields and the Price Level: The Gibson Paradox Regained," in *Banking and Monetary Studies,* (1963)

[2] D. Meiselman, "Money, Factor Proportions, and the Real Cycle," presented at the Zurich meetings of the Econometric Society, 1964.

Because of these kinds of complex interactions and lags, we cannot take the marginal product of capital, or prices, or interest rates as datum. They all respond to changes in the stock of money with a very complex set of interactions and lags we know very little about. This is one of the reasons that many of us are led to focus on the stock of money as the best available indicator of monetary policy and to point to interest rates or credit market conditions as poor indicators of monetary policy. In addition, it seems to me that the stock of money can be controlled within rather narrow limits, and that this is a very important factor to consider in discussing public policy. Clearly, investment outlays cannot be controlled, and, in many respects, cannot be predicted very well. In principle, government expenditures and taxes could be controlled, but the experience of the past few years should remind us that Congress need not be sufficiently cooperative—or is the word passive?—to permit White House dictation of Federal Government expenditures and taxes, holding aside important questions about state and local government spending and taxing.

Need to Relinquish Interest Rate Regulation

It is important to realize that, if we do emphasize monetary policy, and, with it, controlling the stock of money as the principal instrument or indicator of monetary policy, there are certain things that we will have to give up. For example, it means that various attempts to peg or to moderate either one or a wide range of interest rates will have to go by the board. In that respect, much of the discussion about controlling the stock of money implies a need for collateral discussions regarding necessary changes in our financial structure and financial regulations. The problems posed by the savings and loans and a vast array of housing subsidies inherent in their regulation are but two of many items under this broad heading.

There is another parallel implication of focusing on the stock of money relating to balance of payments and exchange rate policy.

At breakfast this morning, Henry Wallich said that he would discuss the balance of payments, which means our discussions shall extend at least to three digit arguments 107, 104, and 102, and I look forward to those discussions as the conference proceeds.

I was very interested in some of the points that Paul Samuelson has just made regarding his definition of monetarism. I suppose that, if Milton Friedman didn't exist, we would have to invent somebody

like him to give some anthropomorphic qualities to the caricature Paul has presented. Milton does assert that money is very important. As I understand it, in trying to explain short period economic change, he would tend to omit many other kinds of variables, especially the ones most traditional Keynesians emphasize.

However, I don't think we can thereby conclude that, because there is much doubt cast on the dependability of other factors in determining GNP, that nothing else ever matters. I would like to ask Paul, "If other things matter, first, what are the other things; second, how much do they matter; and third, how dependable are they?" With respect to the dependable effects of fiscal policy—and I emphasize the word dependable—at the very least I believe that the matter is very much up in the air. It seems to me that it is clear what the direction of effect on GNP would be if we have a substantial change, especially a permanent change, in income tax rates, but I think it is quite another matter to assign some specific numbers to those effects.

I have been doing some research in the past year and a half on this matter, some of which parallels the work Leonall Andersen has done at the Federal Reserve Bank of St. Louis, in which I have been trying to find some dependable statistical links between various commonly used expenditure and tax measures and measures of change in macro-aggregates. Thus far, I cannot find any of the associations traditional fiscal policy would lead us to expect. This is true whether I use the actual budget figures or whether I shift them to full employment values, whether I try different leads or lags, and so forth. My investigation isn't yet at the point where I would like to publish the results, but I can report that thus far the only results are negative ones.

May I add that I have been using quarterly data for as far back as the figures are available, something like a span of 20 years, and I have been examining the period as a whole as well as dividing the period into separate business cycles.

These and other negative results lead me to ask Paul what specific evidence he had in mind in his presentation. Please, Paul, can't I at least peek at one of those hills?

PANEL

JAMES TOBIN

Believe it or not, New Haven is in the First Federal Reserve District, the Boston-Harvard region. I had to come to Nantucket in 1969 to find out that my concerns about debt management policy in 1961 and 1962 were of any concern to the Treasury. I was worried a little bit in those days, when we at the Council with the help of Bob Roosa and others at the Treasury had persuaded the Federal Reserve to *buy* long-term bonds, why it should also be good policy for the Treasury to *sell* them at the same time. Bob Roosa explained to me at some length—I couldn't learn it very well—that it made a lot of difference who was buying and who was selling and how it was being done. Maybe if I were a more practical man, I would understand these things.

I don't know if it's worse to follow Samuelson, who uses all your arguments, or Meiselman, who refers to them by number.

I will concentrate on the question of evidence, which is crucial to the great debate. One kind of evidence, which has been presented at some length, is timing evidence: namely, the leads of changes in stock of money, or of changes in the rate of change of the stock of money, or of other monetary aggregates over income, or over the rate of change of income or over other measures of economic activity. A large amount of the work of Friedman and Schwartz in their *Monetary History of the U.S. 1867-1960*[1] and in their article, "Money and Business Cycles,"[2] is concerned precisely with pinning down these timing patterns. Dave Meiselman mentioned timing evidence this morning also. Now I think it is clear that timing evidence—leads, lags and so on—is no evidence about causation whatsoever. This is argued very eloquently, and I think correctly, by Solow, Kareken, and Brown in their CMC paper.[3]

I have engaged in a little irreverent exercise which constructs two models: on the one hand, one of these British models that Paul Samuelson was referring to, an ultra-Keynesian model where money has no causal relationship to anything, and on the other hand, a Friedman-like model in which money is the driving force of the business cycle. I have then compared the timing patterns of money

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and the change in money relative to money income and the change in income implied by these two different worlds. As it turns out, the Radcliffe world, the ultra-Keynesian world, produces a pattern of leads and lags in business cycles that superficially looks much more like money causing income than the Friedman world in which money actually is causing income. Moreover, the ultra-Keynesian model produces patterns of leads and lags in business cycles which coincide precisely with the summary of empirical results about such timing that appears in the Friedman-Schwartz article, whereas the implications of Friedman's and Schwartz's own theory diverge considerably from their own empirical findings.

Milton Friedman has responded that he knows better than to think that timing evidence has anything to do with causation. If this is stipulated, we can regard as descriptive but irrelevant detail all those pages about timing that an unwary reader might think were there for the purpose of making some point about causation.

There is a related point about evidence, which has to do with the effects on the data of the sins of the Federal Reserve and other monetary authorities in the past. Now let me give you a ridiculous example to make the point. Don't take it too seriously. Suppose that some statistician observes that over a long period of time there is a high association, a very good fit, between gross national product and the sales of, let us say, shoes. And then suppose someone comes along and says, "That's a very good relationship. Therefore, if we want to control GNP, we ought to control production of shoes. So, henceforth, we'll make shoes grow in production precisely at 4 percent per year, and that will make GNP do the same." I don't think you would have much confidence in drawing this second conclusion and policy recommendations from the observed empirical association.

Over the years, according to the monetarists, the Federal Reserve has been acting like the producers and sellers of shoes. That is, the Fed has been supplying money on demand from the economy instead of using the money supply to control the economy. The Fed has looked at the wrong targets and the wrong indicators. As a result, the Fed has allowed the supply of money to creep up when the demand for money rose as a result of expansion in business activity, and to fall when business activity has slacked off. This criticism implies that the supply of money has, in fact, not been an exogenously controlled variable over the period of observation. It has been an endogenous variable, responding to changes in economic

conditions and credit market indicators via whatever response mechanism was built into the men in this room and their predecessors.

The evidence of association between money and income reflects, to a very large degree, this response mechanism of the Federal Reserve and the monetary authorities. It cannot be used simultaneously to support the reverse conclusion: namely that what they have done is the *cause* of the changes in income and GNP. Perhaps the monetarists will be sufficiently persuasive of the Federal Reserve and of Congressional committees to bring about, in the future, a controlled experiment in which the stock of money is actually an exogenous variable.

Much evidence has been presented purporting to show the superior power of monetary variables over fiscal variables and private investment measures in explaining changes in GNP. This evidence comes in what I call pseudo-reduced-forms.

The meaning of the term *reduced-form* is this: If you think of the economy as really a complex set of equations—basic structural relationships describing business investment, demands for loans, demands for money, the consumption function and so on—conceivably you could solve such a system and relate the variables in which you are ultimately interested, such as GNP, to the truly exogenous variables including the instruments of the monetary and fiscal authorities. Such a solution of a big complicated model you would call a *reduced-form.* And then one possible way of estimating a model of the system would be not to estimate the structural equations, the building blocks of the system, but to estimate the condensed equations which relate the ultimate outputs like GNP to the ultimate causal factors. That would be reduced-form estimation.

There are a lot of difficulties in that procedure. Therefore, most builders of big and small models of the economy do not proceed in that way; but, instead, try to estimate the individual structural equations one by one. What I mean by a pseudo-reduced-form is an equation relating an ultimate variable of interest, like GNP, to the supposedly causal variables, but one which doesn't come out of any structure at all. Instead, the investigator just says, "Here are the effects and here are the causes, let's just throw them into an equation." The form and content of the equation—the list of variables and the lag structure—are not derived from any structural model. That is what we have had presented to us as the main evidence for the supposed superiority of monetary variables in explaining GNP.

When, in contrast, we try to take a *theory* of how money affects the economy, and test it in the form it is presented, we have to look at one of two things: either a demand for money equation, or some complicated set of linkage equations through which changes in the money stock affect investment demand, consumption demand, etc. As far as the demand for money equation is concerned, as Paul Samuelson mentioned, the crucial assumption of some monetarists is that interest rate variables are of no importance, so that there is a tight linkage between the stock of money and GNP. If real GNP and prices, current and lagged, are the only important factors in the demand for money balances, then we know that control of money stock is uniquely decisive, and we don't have to look elsewhere in the system. However, all the tests that I know in which interest rates are allowed to enter demand for money equations, indicate that interest rates have important explanatory power.

If we do not really know that the demand for money is exclusively determined by income, then things other than income may absorb changes in money supply. There is no short cut. We have to look for the effects of changes in the stock of money, and it is hard work. We have to look through the system of structural equations to see how money enters directly and indirectly into investment demand and consumption demand and so on. We have to examine long chains of causation. In those chains there could be many slips, and there could be many structural changes, innovations in markets and institutions. That is the purpose, I suppose, of the hard work involved in large econometric models, work which these other attempts to find evidence try to short-circuit completely.

[1] Friedman, Milton and Schwartz, Anna Jacobson, *A Monetary History of the United States, 1867-1960* (Princeton, N.J.: Princeton University Press, 1963).

[2] Friedman, Milton and Schwartz, Anna Jacobson, "Money and Business Cycles," *Review of Economics and Statistics,* XLV (Supplement: February, 1963), 32-78.

[3] Ando, Albert, Brown, E. Cary, Solow, Robert M., and Kareken, John, "Lags in Fiscal and Monetary Policy," Report of the Commission of Money and Credit, *Stabilization Policies* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963), 1-163.

PANEL

ALLAN H. MELTZER

As I listen to this debate, and it seems to have gone on for a long time, I notice that people take various positions. One is that Milton Friedman is completely wrong; another is that Friedman is almost completely wrong. A third is that there is a grain of truth to what Friedman says, but it is not very important; and, therefore, fiscal policy matters far more than the so-called monetarists say. Always, there is a subtle suggestion that some of us know a great deal more about the way in which the economic system operates than we have time to tell. If the argument and evidence could be presented, everyone could see that there is a considerable amount of evidence available showing the sizable effect of fiscal policy operations and supporting some very detailed econometric model of the economy.

Now, I haven't seen that evidence, and I would like to see it. I do know that last November, at the University of Michigan forecasting conference, the forecast of the Michigan econometric model for the first quarter of 1969 was that GNP would increase by $4.4 billion. At about the same time, the Wharton econometric forecasting unit predicted a $5.2 billion rise in first quarter GNP and a $7.4 billion rise in second quarter GNP. We now know that these predicted changes, made only six weeks before the start of the quarter, missed from 2/3 to 3/4 of the actual change. We will soon know that the second quarter GNP changes predicted by those models are considerably less than 50 percent of the actual second quarter change. Moreover, the econometric models forecast larger changes in the second and third quarters than in the first quarter, contrary to the pattern that we can now expect.

You may also recall that a year ago Arthur Okun, then Chairman of Council of Economic Advisers, warned us of the dangers of "fiscal overkill"; talked about the threat of a downturn in the third and fourth quarter of last year as if it were almost a certainty; and argued that the surtax and the prospective reduction in expenditures were likely to push the economy into a recession. These predictions, like the predictions of the Wharton and Michigan models, proved incorrect. The last few years have shown that it is very difficult to forecast GNP a year in advance until we know what the Federal Reserve is

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going to do about the quantity of money. In periods like 1961 to 1965 or 1964, when the quantity of money grows at a relatively steady rate, it is easier to make accurate GNP forecasts. In periods when there are large gyrations in the stock of money, it is difficult to forecast by using models that ignore changes in the stock of money or minimize their effects. And, I believe, that piece of evidence is buttressed by the demonstrated superior predictive performance of the Andersen-Jordan model. Small and unimportant as these two facts may seem in isolation, they are two of the more important facts we have obtained from recent experiences.

If these facts were isolated, we might dismiss them or leave to the model builders to search for the source of their errors. The determinants of GNP and its components are not so well known that large forecasting errors are remarkable; and GNP predictions are not so precise that occasional large errors are either unexpected, or noteworthy. Recent errors, however, are part of a continuing sequence and follow closely the sizable errors in forecasting made in recent years by econometric models that minimize the effect of changes in money.

Reason for Forecasting Errors

There is at least one important common element in the models that make for large forecasting errors. The Wharton and Michigan model builders share a common disdain for any possible influence that might be exercised by changes in the quantity of money. Professor Suits, a principal contributor to the Michigan model, has expressed his view that the neglect of changes in money has no important consequences for his model. Mr. Okun takes a similar position. He writes that the effect of monetary policy is given by the change in market interest rates. A rise in market interest rates is judged to be contractive, and a fall in interest rates is called expansive. The 1969 report of the Council of Economic Advisors, written when Okun was chairman, repeatedly takes that position and states it in terms that are too clear to be misinterpreted.

I believe that the position is incorrect, and that the cause of the error is that market interest rates are an unreliable indicator of monetary policy. That statement doesn't mean that changes in interest rates are independent of fiscal policy or real variables, and it doesn't deny that the demand for money depends on interest rates. Samuelson and Tobin raise the latter point repeatedly and force me

to confess my ignorance publicly. How do you get from the fact on which we all agree—that the demand for money depends on interest rates—to the conclusion that interest rates are a reliable indicator of monetary policy?

In fact, we know very little about the determinants of short-term changes in market rates. By using interest rate changes to judge the content of current monetary policy, we are very likely to be misled. The closer the economy is to full employment, the more we are likely to be misled.

Of several different errors underlying the incorrect notion that levels or changes in the market interest rates are solely, or mainly, the result of monetary policy, two errors seem to me to be most important. One is the failure to distinguish between credit and money. Most of the changes in market interest rates that we observe are the result of activities taking place on the credit market, not on the theoretical "money market" of economic analysis. The second is the failure to distinguish between changes in interest rates that result from changes in productivity and thrift, and changes that result from inflation. The latter distinction, the distinction between nominal and real magnitudes, is one of the oldest in economics, but it has been neglected in policy discussions and in many econometric models. To understand the effect of change in money on economic activity, both distinctions have to be kept in mind: the distinction between credit and money, and the distinction between real and nominal values.

Two Opposing Views

An understanding of monetary policy, of the role of money as an indicator, and of the difference between the effects of changes in credit and money can be obtained by contrasting two frameworks. In one view, monetary and fiscal policies are seen as the means by which the public sector offsets instability in the economy resulting from changes that occur in the private sector. Fluctuations in prices and output are seen as the result primarily of real forces and changes mainly in attitude or outlook that raise or lower investment, thereby raising or lowering the nominal value of income, market interest rates, and the demand for money. The task of monetary policy, in this framework, is to offset undesired changes in interest rates caused by the unforeseen changes in investment. The task of fiscal policy is to offset the unforeseen changes in the private expenditure and maintain expenditures at the full employment level.

Monetary policy is called "restrictive" if market rates are permitted to rise; "permissive" if market rates are prevented from rising; and "coordinated" if the balance of payments is in deficit, and market rates are permitted to rise so as to attract an inflow of short-term capital from abroad. With this framework, it appears reasonable to accept interest rates as the main indicator of monetary policy. If the framework were correct, the decision might be more tenable—although still not correct.

The alternative view—at least my view—does not deny that changes in market interest rates are partly the result of changes in attitude or changes in technology that shift private expenditures. The difference—and it is an important difference—is a difference of emphasis and interpretation. Not only are changes in private expenditure assigned a smaller role, but many of these so-called autonomous changes are viewed as a delayed response to past monetary and fiscal policies.

The effect of a monetary or fiscal policy is not limited to the initial change in interest rates. An expansive monetary policy raises the monetary base, stocks of money and bank credit, and initially lowers market interest rates. The expansion of money increases expenditure, increases the amount of borrowing, and reduces the amount of existing securities that individuals and bankers wish to hold at prevailing market interest rates. These changes in borrowing and in desired holdings of securities reverse the initial decline in interest rates; market rates rise until the stock of existing securities is reabsorbed into portfolios, and the banks offer the volume of loans that the public desires. If expansive operations continue, expenditures, borrowing, and interest rates rise to levels above those in the starting equilibrium. Later, prices rise under the impact of increases in the quantity of money, further reducing the desired holdings of bonds and other fixed coupon securities, and increasing desired borrowing. A rise in holdings of currency relative to demand deposits adds to the forces raising interest rates on the credit market.

In this interpretation, the effect of monetary (or fiscal policy) is not limited to the initial effect. The response to a maintained change in policy includes the effects on the credit market, the acceleration and deceleration of prices, and ultimately, if policy makers persist, the changes in attitudes and particularly in anticipations of inflation or deflation. These changes, however, are regarded as reliable consequences of maintaining an expansive or contractive monetary policy, just as much to be expected as the initial effect.

It is the temporary changes in the level of interest rates observed on the credit market that frequently mislead monetary policy makers into believing their policy is restrictive when it is expansive. Large changes in the growth rate of money become a main source of instability precisely because the credit market and price effects dominate the initial effect of monetary policy in an economy close to full employment. Misled by the change in market interest rates—or their interpretation of the change—the Federal Reserve permits or forces the stock of money to grow at too high or too low a rate for too long a time. Excessive expansion and contraction of money becomes the main cause of the fluctuations in output and of inflation or deflation. Inappropriate public policies, not changes in private expenditures, become the main cause of instability.

A portion of the second interpretation has now been accepted by the principal spokesman of the Federal Reserve System. In his March 25th statement to the Senate Banking Committee, Chairman Martin said:

> I do not mean to argue that the interest rate developments in recent years have had no relation to monetary policy. We know that, in the short run, expansive monetary policies tend to reduce interest rates and restrictive monetary policy to raise them. But in the long run, in a full employment economy, expansive monetary policies foster greater inflation and encourage borrowers to make even larger demands on the credit markets. Over the long run, therefore, expansive monetary policies may not lower interest rates; in fact, they may raise them appreciably. This is the clear lesson of history that has been reconfirmed by the experience of the past several years.

With that statement, Chairman Martin abandoned the framework that has guided Federal Reserve policy through most of its history and has been responsible for major errors in policy. Recognition that interest rates generally rise fastest under the impact of monetary expansion—that the credit market effects dominate short-term changes in interest rates—is probably the single most important step toward an understanding of the role of money that has been taken in the entire history of the Federal Reserve System.

If we develop our analysis and concentrate on improving our understanding of money and of the differences between money and credit, rather than on the issue of whether Milton Friedman is wholly right or wholly wrong, we will have more progress to report next time we meet. Thank you.

PANEL

HENRY C. WALLICH

People who have ended up believing or who have believed all along, that money plays a decisive role, have been increasingly justified, up till now. Paul Samuelson spoke of a bank in New York that gets better forecasts looking at money six months ago than one can get by a computer model. That bank employs a student of mine from whom I have learned how they do this. It is quite remarkable how close the relationship between money and income has been over the last six years. Money has, undoubtedly, led the economy very closely. There is, however, one small qualifying detail that, I think, is worth examining. The student I mentioned finds that there was a change in the structure of the relationship between money and income which showed a break roughly at the time when the economy came to full employment. I repeat, the structure changed, but the quality of the prediction did not much change, before 1964 and after. Nevertheless, one feels intuitively that, at full employment, there would likely be a different relationship of money and income than there would be below full employment. Perhaps it is worth looking at some of the factors that make for the extraordinarily good predictive value of the money supply in the last few years.

Factors That Make the Money Supply Important

In the kind of economy we had in the last three or four years, it is fair to say that we probably had at most times a strong unsatisfied demand for loans. At such a time, it is relatively easy for the banking system, if it has excess reserves, to expand the money supply by meeting loan demand rather than by buying and monetizing existing assets such as short-term governments. That kind of process, where money is created by loans, is more likely to be expansive than the other, where existing liquid assets are monetized. This has been the kind of a process I think we have had in the last few years. This may explain why, at the time when the surcharge went in while the Fed simultaneously began to expand the money supply, the expansion of money became a pretty good substitute for the expenditures that

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were eliminated by the surcharge. Hence, we got no visible effect from the surcharge. In conditions of unemployment, that might not have worked.

By the same token, with the banking system in the position it is, there is very little difference between money, broadly defined, and credit. That is, the volume of bank loans is very roughly the same as that of deposits because investments are small. As long as the banking system had a substantial volume of assets that they could liquidate, it was possible to increase loans without increasing the money supply. One would expect, at such a time, a less-close link between money and income. This situation has largely, if not completely, disappeared. Hence, money and credit being almost identical, the linkage between either one of them and income is likely to be closer than it would be if bank credit, in the narrow sense, could vary independently of the money supply.

One last reason why I think it is increasingly obvious today—and I stress today—that we must look at money and not at interest rates is that inflation has made interest rates almost meaningless. Allan Meltzer has pretty much covered this point, but perhaps it bears repetition. The real interest rate is unknown—it is unknowable—because it depends on peoples' price expectations and has little to do with past inflation. Under those conditions, it is very difficult for the central bank to be guided by interest rates. Using money as a guide creates problems of that sort too, because what is happening to the real money supply isn't what is happening to the nominal supply. Nevertheless, my first impression is that these difficulties are less serious. So, in times of inflation, I would say, we should definitely look more to money and less to interest rates. But that says nothing of what is appropriate in times of stable prices.

Definitions

This gets me to the subject of definitions. It is a lowly occupation; but, since nobody has touched on it, perhaps I should. At the historic breakfast this morning I was able to double the number of definitions of the money supply. My count prior to breakfast stood at 10, it now stands at 20. Just to give them to you briefly: M_1, including or excluding government deposits—as you know, in April, government deposits made rather a blip and confused the picture of money growth; M_2, which you can define not only as including or excluding government deposits, but also including or excluding CD's—and I have the Master's verdict that CD's ought to be excluded;

then M_3, as some people call it, adds to M_2 things like savings and loan and credit union shares. M_3 can be defined with any of the four M_2's. That makes ten definitions. You can multiply these ten by two by taking in banks' cash items for collection on foreign branches—which I understand amount to $3 billion at the present time and which by decision of the Board, are hereafter to be included in the money supply—so that they become subject to reserve requirements. The best you can do really with the money supply, I think, is to run a diffusion index and see which way it goes.

I would like to add one other point on money supply. We speak of the demand for money and its relation to income, and that is how I have always seen it. That isn't at all, I am sorry to say, how corporate treasurers regard it. Should you ask a corporate treasurer, "Why do you keep such and such balance?" He would not say, "Because our transactions are such and such." He would say, "Because we have got to compensate the bank for its promise to make a loan to us," or, "To compensate our bank for the expense of running our account"—all of which relates to transactions, but rather indirectly. So some large part of the total money supply is only very tenuously related to income. Perhaps we had better do some research, maybe of an institutional kind, to see what really determines the holdings of these balances.

Changes in the Budget

For people who believe in fiscal policy, I also have some good news. We talk about the budget surplus and the full employment surplus as though their magnitudes were clearly definable. We had hoped that after we went through the exercise of consolidating the three budgets into one, we would know what the surplus was. The Treasury recently went through a little exercise of throwing back into the budget various types of expenditures and quasi-expenditures that had been de-budgeted since fiscal 1968 or otherwise left out. These are mainly government loans, guarantees and insurance of private loans, and similar federal credit programs that have burgeoned very rapidly in recent years. Some of these loans have been altogether privatized, for instance Fanny Mae was privatized. Some of them have been stepped up in their original form. Some of them certainly do not deserve to be thrown into the budget in their entirety because they do not clearly lead to incremental expenditures. FHA guarantees are of that type. Nevertheless, when you take them all for what they are worth, there is $21 billion that has been

de-budgeted in this broad sense. Instead of having a $6 billion surplus in a unified budget for fiscal 1970, we have a $15 billion deficit. What is more, instead of swinging from a small surplus in fiscal 1969 to a sizable surplus in fiscal 1970, we are moving to a larger deficit. The deficit increases, by this count, by $3 billion. So take your choice. Is fiscal policy moving toward restraint, or is it moving toward expansion? Until we have examined these aspects of fiscal policy, we are in a weak position to say whether fiscal or monetary policy is the chief operative force.

International Aspects

One area that has not been discussed by anybody is the international. When we look at what we are doing to the international community by our present monetary policies, some very interesting observations arise. For instance, with respect to renewal of the surcharge, Frank Morris said at our breakfast session, "Good God, they may not renew the surcharge." And David Meiselman said, "So what." This is obviously the difference between the fiscal and monetarist positions. Well now, how about the kind of monetary policy that the "so what" positions implies for other countries? If we want to keep Euro-dollars at 10 percent, we may be able to offset any consequences of not renewing the surcharge—there is some monetary policy that will have the same domestic implications as a softer policy plus surcharge. But it will mean, of course, that we drain foreign countries of their official dollar reserves. Our official settlements balance becomes very good when a central bank loses dollars. Our liquidity balance is not affected. Meanwhile, countries losing dollars find themselves compelled to tighten interest rates, to take direct action in their markets, and restrict mobility of capital. Not only their balances of payments, but their domestic conditions may be interfered with. In other words, all the adverse consequences of the wrong kind of policy-mix in the United States become evident. It has long been commonly thought that the proper mix of policy direction is to use monetary policy against the balance of payments and fiscal policy against domestic inflation. We have no domestic conflict at the moment. In other words, the Mundell assignment problem does not affect us domestically because both fiscal and monetary policy are oriented toward restraining inflation. But internationally, heavy reliance on monetary policy is the wrong thing, in terms of the kind of cooperation that we should have in the use of policies. Three or four years ago, we used to tell the

Europeans they ought to use fiscal, not monetary policy, to restrain their inflation. They did not pay attention to us. Now we are reciprocating.

Need for Rules in the International Area

At this point, it becomes germane to say a word about rules. I am very skeptical of rules for reasons that have been so well expressed in the good paper by Warren Smith, which I am supposed to discuss later. In the international area, however, rules are very much needed for lack of a better, available alternative. There is no discipline from above. If there are no rules, such as the gold standard rules of the game, or rules as to assignment of monetary and fiscal policy, or rules, if you will, as to nonintervention in flexible rates—it takes much longer to reach equilibrium. Quicker adjustment becomes possible if countries cooperate in setting their policies; and cooperation, essentially, I think, means rules. It is doubtful to me that policymakers can always get together and decide things ad hoc. But rules as to international conduct have existed in the past, and I think they would be useful for the future.

In concluding, let me say a couple of words about the problem that troubles me about the whole debate of Monetarists versus Keynesians. Everybody, of course, is entitled to his hypothesis. And, until the hypothesis is refuted, he is entitled to believe in it. Is one also entitled to give advice on that basis? After all, bad advice can be very costly. All the professor does is go back to his drawing board and to his computer if his advice proves wrong. The Federal Reserve cannot go back to the old drawing board. This leads me to think that in the face of these unresolved questions, one ought to be very careful as to what one advocates. Obviously, policy must be made. No policy is a policy too; and, therefore, some advice must be given. It is the firmness, the conviction with which advice tends to be given, that bothers me. By the same token, I am a little troubled by what seems to be a partisanship evolving in these matters. I am sure we are all inspired by a passion for truth, but there is increasing emphasis on passion—I wouldn't say less emphasis on truth—and I think the effort to run regressions to prove the other guy wrong is something that could lead us into serious trouble.

The Federal Reserve itself must appraise all this conflicting advice. Since they can't avoid responsibility, they must find the best possible compromise. I always thought that the time would come when, as a result of certain changes in Washington, the Fed would become the

most liberal agency in town. And I thought that, at that time, those of us who had previously argued for independence would now come out for coordination, and those who had been against independence would see its virtues. The time for the Fed to be the most liberal agency in town, that is the most Keynesian, has probably arrived. But I would like to say that I have not yet switched to demanding coordination. Thank you.

Monetary Velocity in Empirical Analysis

PAUL S. ANDERSON

The primary purpose of this paper is to focus attention on the substantial changes which have occurred in monetary velocity in the past. Velocity changes have tended to be overlooked in most current discussion concerning the relative importance of quantity. A secondary purpose here is to investigate some analytical approaches to understanding past velocity trends so that further movements might be anticipated to some extent.

According to Harry Johnson's review of "Monetary Theory and Policy" in the *American Economic Review* in 1962 [V], the reason why the Quantity Theory was totally rejected after the 1920's was that velocity declined so drastically and unexpectedly. Quantity and velocity are like the two sides of a coin; and, if velocity is erratic or undependable, quantity is given up as hopeless.

The St. Louis Equation

We can use the St. Louis GNP predicting equation of Andersen and Jordan as a current illustration of the dependence of the Quantity Theory on stable or cooperative velocity [I]. Admittedly this is somewhat unfair since the aim of that equation was to compare the relative impacts of monetary and fiscal actions on GNP. But it apparently has turned out to be a rather good predicting equation, and this has tended to give it both popularity and validity.

The prediction results of the equations are presented in Chart 1, and they are impressive: The visual association between the predicted and actual changes in GNP is more striking than the R^2 of .63. Even when the prediction is in error, it appears to be pointing out quite accurately the short-term trend. One would not have thought that changes in the quantity of money would forecast so well the future

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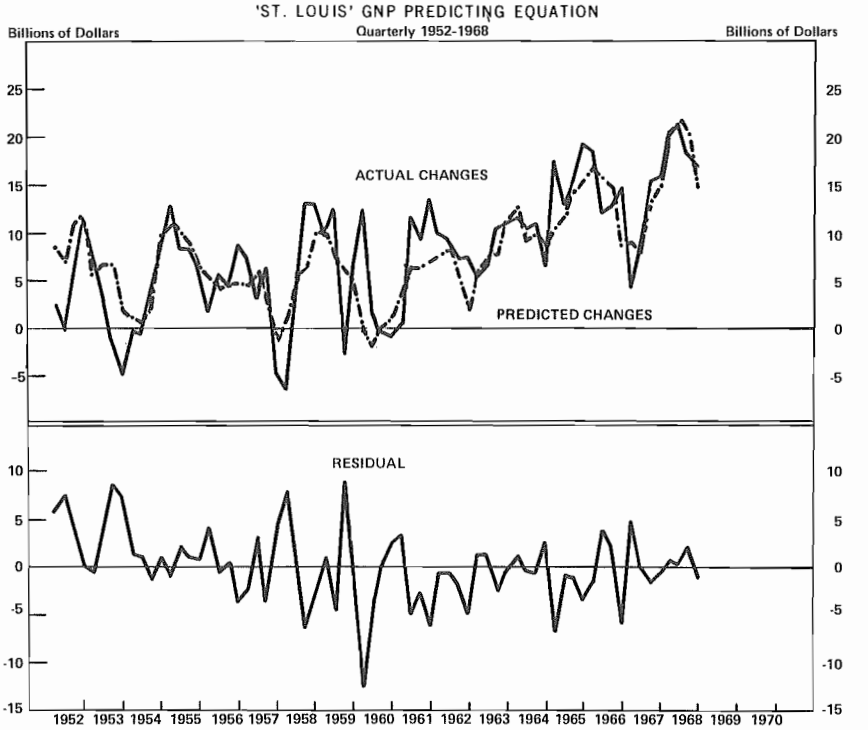
CHART I

'ST. LOUIS' GNP PREDICTING EQUATION



NOTES TO CHART I

Predicted values are based on the coefficients of equation 1.3^{r} in the Federal Reserve Bank of St. Louis November 1968 Review, revised to include data through the fourth quarter 1968 as shown below:

Quarter	t	t-1	t-2	t-3	Sum	Constant	R^2	S.E.	D.W.
ΔM	1.49	1.56	1.45	1.26	5.77	2.35			
	(2.49)	(3.54)	(3.33)	(1.97)	(7.58)	(2.94)	.63	3.95	1.78
ΔE^*	.41	.51	-.05	-.71	.16				
	(1.60)	(2.60)	(-.26)	(-2.81)	(.51)				

r: Quarterly data from I/1952-IV1968.

E*: Gramlich weighted high-employment series.

NOTE: Change in GNP/Change in E*, Change in M, First Differences, 4th degree current and 3 lags.

course of GNP. These results could easily lead to over-reliance on the ability of money to determine future changes in business activity.

So, as we admire or envy these results, we are well-warned to exercise extreme caution. On its face, the St. Louis equation implies a stable velocity for the increments of the money stock. As the history of the Quantity Theory shows, this is a dangerous assumption to make. Specifically, the equation presumes a velocity of the increments to the money stock of 5.77 times a year (this is the sum of the coefficients). Meanwhile, overall or average velocity almost doubled during this 1952 to 1968 period, going from 2.8 to 4.6. (Conceptually, the high but stable 5.77 level of incremental velocity can be reconciled with the lower but rising average velocity by assuming that 5.77 is the velocity ceiling and that actual average velocity will asymptotically approach this velocity ceiling.)

But the actual relation between the incremental and average velocities in this equation seems more complex and can be brought out by a simplified illustration. Following are hypothetical money stock and GNP data for two successive years; the values are roughly the magnitudes that prevailed in the early 1950's:

	MONEY STOCK	VELOCITY	GNP
Year 1	$100	3.00	$300
Year 2	102	3.06	312

Components and Increments

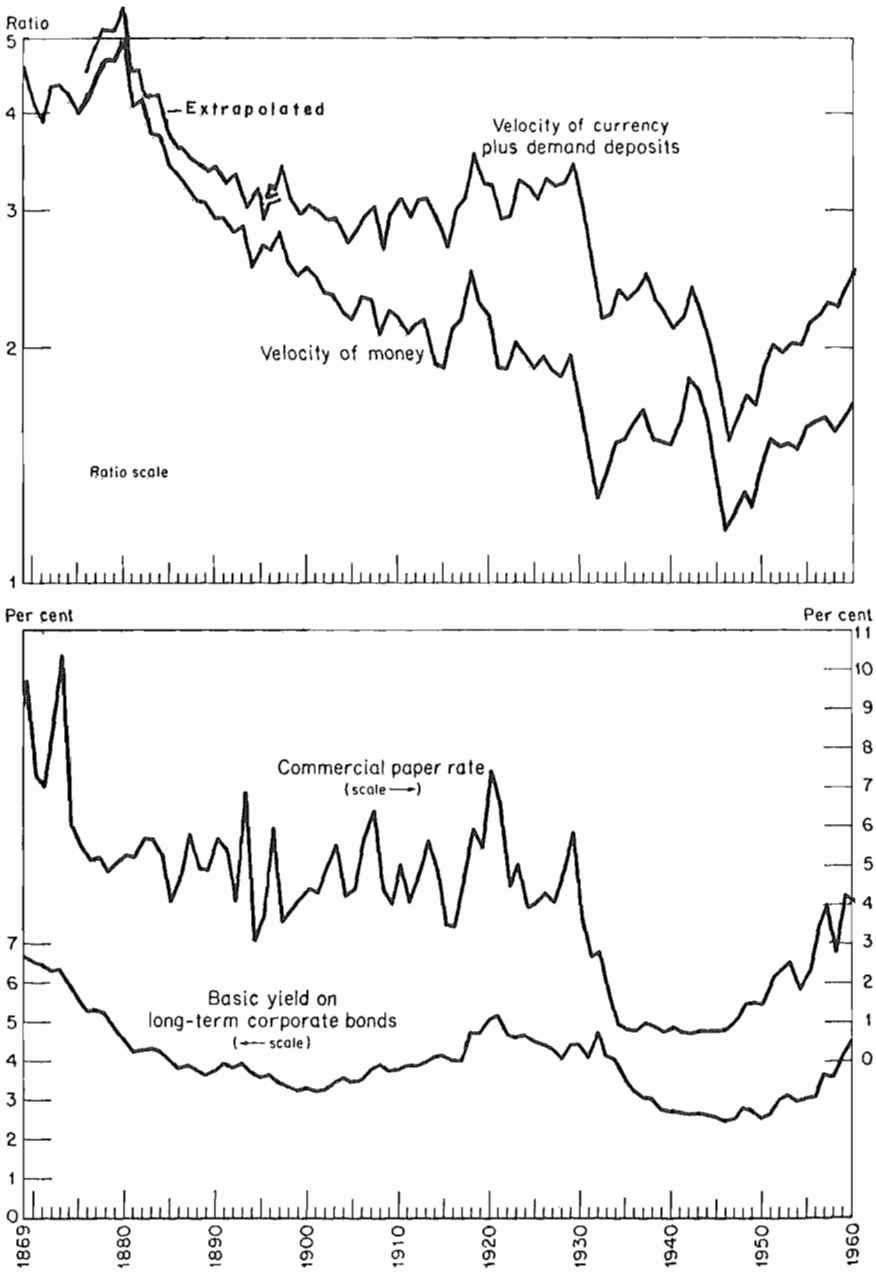
The GNP growth of $12 billion can be accounted for by two analytical procedures—by components and by increments as follows:

	MONEY STOCK	VELOCITY	GNP
Components	100 (old)	+.06	+6
	+2	3.06	+6
			12
Increments	+2	6.00	12

The St. Louis equation uses the increments explanation, according to which the entire increase in GNP is accounted for by the $2 billion increase in the money stock turning over 6 times a year. This implies that the old money stock continues to turn over only 3 times a year. It might be understandable that newly-created money is used more actively than old money. But then the implication is that, in the following Year 3, the $2 billion increment of Year 2 has a reduction in its turnover rate to 3.06 times a year, which seems implausible.

CHART 2

Interest Rates and Two Measures of Velocity, Annually, 1869–1960



SOURCE: III, P. 640

The components method of accounting for the GNP increase appears straightforward and simple, with part accounted for by an increase in the turnover rate of the pre-existing money stock and part by the increase in the money stock which turns over at the same new, slightly higher, rate of use. This method allows for an increase in GNP even if there is no increase in the money stock. It might be notable that the biggest prediction error made by the St. Louis equation was in the first quarter of 1960 when the money stock had actually declined for several quarters.

The St. Louis equation ignores the substantial post-war change in average velocity, but that has not hurt its overall results. In times past, such neglect would have been disastrous, predictionally speaking. For example, in the 1930's, average velocity was falling, meaning that incremental velocity was below the average. On the basis of average velocity during the 1920's, the increase in the money stock from 1929 to 1939 would forecast a $30 billion growth in GNP; instead, actual current dollar GNP was $15 billion lower. Since extreme velocity changes have occurred in the past, is there any assurance they will not occur in the future?

Determinants of Velocity

Quantity theorists have, of course, been concerned with velocity shifts, and they have tried to obtain some velocity determinant which would help explain the seemingly erratic shifts. We can briefly mention the two explanations which Harry Johnson noted as being rather promising. The first was Friedman's luxury-good theory, according to which the economy chooses to hold relatively more money as it grows richer [III, p. 639]. Increases in relative holdings of money leads to reduced velocity, of course. As shown in Chart 2, this explanation worked rather well up to World War I, but since then it has fared rather badly. It is generally refuted by cross-section data of individuals and businesses. It may be that the pre-World War I velocity decline actually reflected an increasing relative need for money as the market economy represented an increasing share of total production in the country.

The second school of velocity explanations that Johnson noted used the interest rate—usually a long-term corporate bond rate—as the chief determinant. What is troublesome here is that interest rates are a price, and it seems awkward to consider price as a determinant; it is usually considered a resultant. It seems to me that Meltzer, for

example, took this resultant view in denying the existence of the liquidity trap during the 1930's when he attempted to demonstrate that the interest rate is driven down as velocity declines [VI].

Even though interest rates might be more suitably considered a resultant rather than any causal factor, they do serve in their resultant status as a ready indicator of changes in the general monetary environment, which changes, in turn, are associated with, or cause, velocity changes. For example, currently, eager borrowers are seeking money. By contrast, in the 1930's, we might say that redundant money was searching for users, but there were very few users. Naturally, velocity is going to behave very much differently in these two environments. The level and trend of interest rates do indicate, in at least a rough sort of way, which type prevails at any given time.

We will suggest here an alternative indicator of whether the economy is actively seeking more spendable funds or whether funds are overabundant. In addition to being an indicator, this alternative framework does have a direct operational connection to rates of spending. This approach entails an analysis of differing methods or processes of money creation.

Different Processes of Money Creation

To introduce the concept of differing modes of money creation, we can go back to the situation in the early days of the Federal Reserve. The first bank reserves consisted of gold and Government money deposited at the Federal Reserve banks; but, after that, additional reserves were created by member bank discounts. In fact, from 1918 to 1920, these discounts actually exceeded total reserve balances by as much as 50 percent. After 1920, however, open market purchases of acceptances and, increasingly, Government securities became the main channel of reserve creation.

It has frequently been pointed out that in discounting the initiative is with the commercial banks, while in open market operations the initiative is with the Federal Reserve. This is an important difference; for, when commercial banks must borrow their reserves, we can be quite sure these reserves are really necessary. Conversely, when borrowed reserves become unnecessary, we can be quite sure they will be extinguished by repayment of borrowings. Thus, when all reserves are discounted reserves, their total will quite likely fluctuate pretty closely with the need for them. We can call discounted reserves internally- or endogenously-generated reserves.

Reserves supplied through open market operations are in some respects similar to, and in other respects different from, discounted reserves. Open market reserves are simply substitutes for discounted reserves during the boom phase of the cycle when commercial banks are supplementing open-market reserves with discounted reserves. But during the recession phase of the cycle, open-market reserves are unlikely to decline as rapidly as discounted reserves would have; they are inelastic on the downside with perhaps an "unneeded" amount being imposed on banks. Thus, their total level is less sensitive to fluctuations in the demand for reserves than discounted reserves. Open-market reserves might be termed externally- or exogenously-imposed reserves.

There are conceptually two types of money supplies which are analogous to endogenously-generated reserves and exogenously-imposed reserves. The first is endogenously-generated money which arises from the demands of the private sector and which leads to a demand for reserves. The second is exogenously-induced money which arises because reserves are imposed on banks, leading them to acquire assets, usually Treasury bills, and creating demand deposits in the hands of sellers. There is a formal similarity between endogenously-generated and exogenously-induced money and the Gurley-Shaw "inside and outside money" [IV]; but, as we shall see, the relative impacts or influences are almost the reverse. The first money supply category is typified by deposits arising from loans which represent an immediate need for funds. Loan deposits are "purchased" by an interest rate which normally is not an insignificant cost. They are also obtained generally through shorter-term loans which come up for reconsideration fairly often. For these reasons, there is a virtual guarantee that this type of deposit will either be used or liquidated. It lives under constant tension.

A loan deposit, generally, directly represents one step in the processes of production and distribution. Thus, it tends to be self-liquidating as the transaction it finances is completed. This is, of course, the concept encompassed in the "real bills" doctrine. Not only does a loan deposit exert a push to start a productive phase, but also it exerts a pull to complete that phase since the borrower desires to get the proceeds for repaying his loan.

The life of an induced "bill" deposit presents quite a contrast. When a Treasury bill is initially issued by the Government, the proceeds are likely to represent the ending of a cycle of production and distribution rather than the beginning. (This fact apparently has

implications for equations such as the St. Louis one where Government expenditures are set as a determinant of GNP. This point is discussed later.) While the recipient of the payment financed by the bill issue could extinguish the deposit by acquiring the bill, a bank will probably bid it away if it has excess reserves. When they have excess reserves, banks have a more inelastic demand for earning assets than do other holders, such as corporations. Banks are highly leveraged, so even the low return on Treasury bills during an "easy money" period is important to them. Furthermore, they have lower acquisition costs than do other prospective holders. Therefore, when the central bank begins supplying "unneeded" reserves to the banking system, banks are almost certain to respond by acquiring short-term securities from other holders, thereby creating "bill deposits."

Once a bill deposit is created, it is almost a mathematical certainty that this deposit will gravitate to less and less active holders. The more active holders will get rid of such deposits by using them in productive or financial payments, the latter including purchases of securities from non-bank holders, prepayment of current liabilities, retirement of stock or bonds, etc. These financial transactions will eventually shift the bill deposit to a relatively inactive holder who may keep it dormant for long periods.

Regression analysis can be used to quantify the velocities of each of the two types of deposits. In the last 60 years there has been quite a bit of variation in the relative levels of each, so positive results can be expected. The general form of the resultant regression equation will have GNP as the dependent variable and the two money supplies as independent variables.

Difficulties in Defining the Components

There are a number of difficulties, however, in defining each of the money components. The asset side of the aggregate balance sheet of commercial banks must be used in the differentiation; and, unfortunately, there is no direct connection between the asset side, i.e., cash assets, loans, and investments, and the liability side, i.e., demand deposits, time deposits, and capital. There is also the question of how to handle the currency component. As a first approximation, loan deposits can be represented by loans. But not all types of loans are "real bills" in character. Real estate mortgage loans, for example, are mainly long-term. Furthermore, they are

usually associated with time, rather than demand, deposits. Interbank loans should not be used as measures of loan deposit money since interbank deposits are not part of the money supply. Other types of loans probably should also be excluded. But, before 1939, the only loan breakdowns available are for real estate, collateral, and all other. Therefore, up to 1960, only real estate loans were excluded in arriving at loans which represent "real bills" deposits. Since 1961, business loans, expanded to the level of non-real estate loans, were used as the loan proxy. Such loans can be taken as a proxy for the series that is desired.

Another problem is the fact that, in certain years before 1931, total loans less real estate loans exceeded the money supply. This meant that some of these included loans were offset by time deposits or capital accounts (in addition to the currency component). The maximum discrepancy occurred in 1930 when the money supply equalled 88 percent of included loans. To take account of this discrepancy, included loans were reduced by 12 percent to give "loan-money" loans.

The currency component of the money supply was handled the same way as demand deposits because currency usually gets into the hands of the public through a debit to some demand deposit. Conceptually, it seems preferable to have ignored currency in this framework, but the statistical results would then not have been as good.

Statistical Results of Quantitative Velocity

The regression results are presented in Table I. The first section uses the conventional money supply as the money stock, while the second uses the "Boston Supply," i.e., published money supply plus Treasury deposits at commercial and Federal Reserve banks. As noted elsewhere [II], when total GNP is associated with a money stock, the proper money stock should include Government working balances. The statistical results of the two versions are practically the same in most cases. Income velocity of loan money generally averages in the 3.5-4.5 times a year range, while that of bill money averages around 1.0-1.5. Most coefficients are highly significant.

One interesting by-product of the statistical investigations of the period since 1911 was a finding with regard to deficit financing. Gross Federal debt was inserted as an independent variable, and its coefficient turned out negative and almost significantly so when it

TABLE I

COEFFICIENTS OF GNP REGRESSION EQUATION 1911-1968

Data form	Constant	Loan money	Bill money	Federal debt (inT+1)	Time	R^2 (corrected)	S.E.	D.W.
Money Stock = Conventional Definition								
Level	23.1 (1.9)	5.8 (22.2)				.8956	61.8	.08
Level	-15.7 (5.0)	5.0 (74.3)	1.9 (30.1)			.9940	14.8	.51
Level	-9.6 (2.5)	4.5 (21.4)	1.1 (3.8)	0.3 (2.5)		.9946	14.1	.50
Level	-18.0 (3.3	4.3 (18.8)	0.9 (2.8)	0.3 (2.7)	0.7 (2.1)	.9949	13.7	.52
Annual Change	5.4 (3.2)	2.9 (9.1)				.5884	11.2	1.39
Annual Change	2.2 (1.3)	4.0 (10.3)	1.4 (4.1)			.6799	9.8	1.49
Annual Change	1.9 (1.2)	3.5 (8.8)	0.7 (1.7)	0.3 (2.9)		.7182	9.2	1.69
Annual Change	-2.1 (0.8)	3.1 (6.6)	0.6 (1.5)	0.3 (2.7)	0.2 (1.7)	.7280	9.1	1.82
Money Stock = Conventional Definition Plus Treasury Operating Balances								
Level	23.1 (1.9)	5.8 (22.2)				.8956	61.8	.08
Level	-15.1 (5.1)	5.0 (73.5)	1.7 (29.9)			.9939	14.9	.56
Level	-11.6 (2.2)	4.7 (14.0)	1.2 (2.7)	0.2 (1.1)		.9940	14.9	.53
Level	-19.4 (3.2)	4.3 (11.8)	0.8 (1.6)	0.3 (1.6)	0.8 (2.3)	.9944	14.3	.53
Annual Change	5.4 (3.2)	2.9 (9.1)				.5884	11.2	1.39
Annual Change	2.9 (1.8)	3.7 (10.7)	1.0 (4.0)			.6756	9.9	1.58
Annual Change	2.6 (1.7)	3.1 (7.7)	0.2 (0.5)	0.4 (2.4)		.7039	9.5	1.80
Annual Change	-2.0 (0.7)	2.7 (6.0)	0.2 (0.4)	0.3 (2.3)	0.2 (1.9)	.7180	9.2	1.93

NOTE: Money and debt data as of June 30. Loan money equals .88 X total loans other

was concurrent with or leading GNP. But it had a significant, positive coefficient when it followed GNP by one, or even two, years. As shown in the table, insertion of the debt variable reduced the coefficients of the two money stocks significantly. In fact, in the annual change equations, it reduced the coefficient of bill money to below the 5 percent level of significance. These results seem to indicate that the money stock does pick up the impact of the deficit on a concurrent basis because actual governmental expenditure seems to occur after the activity it generated has been completed. This, incidentally, is consistent with the finding that bill money has a low income velocity since, once the Treasury bill is issued to pay for the obligation incurred, the activity represented by the obligation has been completed. The time coefficient is positive in both equations, supporting the Fisherian expectation of a slowly rising velocity trend—although it may also reflect structural changes in the economy such as the decline of agriculture.

Higher Use Rate for Loan Money

Thus, experience over the period 1911 to 1968 does support quite strongly the notion that loan money has a substantially higher use-rate than bill money. Two bits of evidence are especially noteworthy. The first is that the velocity estimates secured by the level and the incremental equations are quite similar—which, I think, is a rather strong indication of basic stability of the estimates. The second, as may be seen from Chart 3, is the fact that the estimate based on the proportions of the two types of money traced the velocity decline after 1929 rather well. The use of bond rates as a velocity indicator would lead to an estimate of 1932 velocity, for example, which would be higher than the level for 1928 and 1929. The two-money estimate does tend to lag actual velocity, however. This lag will be discussed later.

A crucial test of the coefficients or velocities of the two types of money is provided by computing regressions for the post-war period. Both the monetary and general economic environments since World War II have been markedly different from the preceding four decades, and it would not be surprising if the velocity coefficients were also quite different. As shown in Table II, the quarterly *level* equations for the 1952-1968 period are quite erratic with their large negative constants, but the coefficients in the quarterly change equations have about the same comparative values as in the long-term

equations. Use of the conventional money supply yields somewhat higher correlations and t-values than use of the Boston Supply. This apparently reflects the fact that Treasury balances are rather erratic over the shorter term.

Since the two-type money equation performs reasonably well in the post-war period, it is interesting to see how well it compares with the St. Louis equation as a predictor of GNP. Preliminary results (final Almon lag computations have not been made) indicate that the two-type money equation with the same lag structure predicts about as well, perhaps a little better, than the St. Louis equation.

Comparison with the St. Louis equation brings out some of the characteristics of the two types of money. Most important—and unfortunately from the point of view of prediction—loan money is not much of a leading indicator. In a four-quarter lag equation, the current and T-1 quarters carry 60 percent of the sum of the coefficients. By contrast, in the case of bill money, the current and T-1 quarters carry only 40 percent of the sum. Loan money correlates substantially better with GNP when it follows GNP, which

CHART 3

ACTUAL AND ESTIMATED INCOME VELOCITY, 1911 - 1968

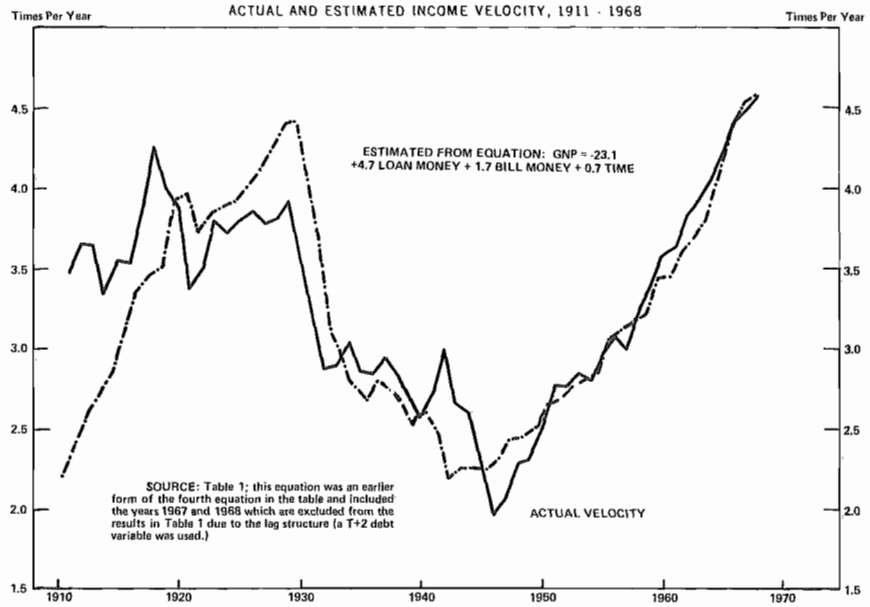


TABLE II

COEFFICIENTS FOR GNP REGRESSION EQUATION QUARTERLY DATA, 1952-1968

Data Form	Constant	Loan Money	Bill Money	R^2	S.E.	D.W.
Money Stock = Conventional Definition Plus Treasury Cash Balances						
Level	-549.7 (6.5)	8.5 (61.1)	6.5 (8.5)	.9883	16.4	.23
Quarterly Change	3.2 (3.4)	4.8 (7.1)	1.3 (2.5)	.4612	4.9	1.34
Money Stock = Conventional Definition						
Level	-428.3 (3.6)	8.4 (40.7)	5.7 (5.1)	.9829	20.0	.07
Quarterly Change	2.5 (3.0)	5.6 (8.8)	2.6 (4.6)	.5617	4.4	1.29

NOTE: Loan money in these equations is taken as total business loans at commercial banks.

means that GNP has a stronger influence on loan money than vice versa. Again by contrast, the correlation between bill money following GNP and GNP is negative.

Before turning to some of the policy implications of the two-type money theory, a warning is in order. Loan money may simply be a rather sensitive business cycle indicator, and thus its movements may only be *associated* with changes in spending and GNP rather than being a central part of the mechanism by which these spending changes are accomplished. Of course, while loan changes *are* a rather good cycle indicator, they also do seem to be a handy vehicle through which the economy can economize on the amount of money by facilitating rapid shifts of funds from one user to another and thus insuring that spending capacity is fully utilized.

Policy Implications of the Two-Type Money Theory

The two-type money theory has different implications for recessions and booms. During recessions, the Federal Reserve can induce an increase in bill money, but the problem is that such an increase might simply replace loan money at a three-to-one ratio, leaving total expenditures unchanged. It hardly seems likely that a bill holder, like

a corporation holding bills for tax payments, will be persuaded to spend just because commercial banks bid bill yields so low that the corporate treasurer did not find it worthwhile to enter the bill auction. It appears quite extreme to assume that a corporation will decide to build a new plant or enlarge inventories just because bill yields fall from, say, two to one percent, and it surrenders its bill holdings for cash.

As to boom implications, the two-type money theory traces out how inflation can be fed even if the money stock rises more slowly than real output—which has been precisely the case since 1964. But since 1964, the proportion of loan money has risen from 63 to 90 percent of the total. With a 2.5-to-1.0 velocity ratio, predicted overall average velocity rises a little over half as much as the percentage point rise in the loan money proportion, so over the 1964-68 period, the prediction was for a 17 percent rise. Actual average velocity rose over 13 percent, or about 3 percent per year. This has also been the inflation rate over that time. Thus, the inflation since 1964 can be accounted for entirely by velocity rises.

Since the loan money proportion is now around 90 percent, there may be some hope that not much potential exists for further rises in velocity. Specifically, since the loan money proportion can only rise 10 more percentage points, only a 5 percent further rise in velocity is indicated. Of course, there may be a basic upward time trend in velocity, but this appears to be a rather small influence. It is encouraging to note that average velocity has risen less than 3 percent over the past four quarters even though interest rates have risen to unbelievable levels.

To conclude, the primary purpose of this paper has been to focus attention on velocity. When actual and potential velocity changes are ignored, the importance of the quantity of the money stock also tends to be downgraded, if not ignored. With regard to monetary policy implications, velocity changes have tended to be quite perverse and have served to blunt the effectiveness of policy. During recessions, induced increases in the money stock have been largely dissipated in decreased velocity. But during the boom when restraint is desired, the potential that was built up by velocity declines during the recession begins to surface, and even drastic limitation of monetary growth does not halt inflation.

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DISCUSSION

LEONALL C. ANDERSEN

Paul Anderson concludes that, "Velocity changes have tended to be quite perverse and have served to blunt the effectiveness of monetary policy." He argues that the influence of a change in the money stock on GNP is largely dissipated by offsetting changes in velocity. This contention is used to question the usefulness of the reduced-form equation developed by Jordan and myself relating changes in GNP to current and lagged changes in money and Federal Government expenditures.

Anderson bases his argument on the point of view that the response of GNP to changes in the money stock depends on whether this change is accompanied by a similar change in bank loans or by a change in bank investments. An increase in what he calls "loan money" increases velocity more than an increase in "bill money." The first is used to purchase goods and services while the latter is not. During a recession, an increase in money is more likely to be reflected in a rise in bill money, thereby lowering velocity; and in a boom it is more likely to be reflected in a rise in loan money, resulting in a rise in velocity.

I find his study interesting and suggestive of an important consideration for monetary policy decisions based on controlling movements in the money stock. However, I do have reservations about some of the underlying assumptions and the conclusions. He assumes a distinction in terms of the influence on velocity between changes in bank deposits which are accompanied by changes in loans and those accompanied by changes in investments; and he further assumes that this distinction is maintained as the deposits are used for transactions. Such a distinction may be true at the time of the first transaction between the bank and the borrower, but I believe that the distinction becomes quickly blurred beyond this first transaction. I am not convinced by the statement, "Once a bill deposit is created, it is almost a mathematical certainty that this deposit will gravitate to less and less active holders."

Assertions of such distinctions show up frequently in monetary

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literature. For example, many postulate that an increase in nonborrowed reserves will have a greater influence on bank credit expansion than a similar increase in borrowings from Reserve Banks. This may be true for the first bank; but, when deposits move to another bank, it is impossible for that bank to distinguish the accompanying increase in its reserve account from nonborrowed or borrowed sources. This latter bank responds to an increase in its total reserves.

Anderson relies on the "accommodation principle" of bank behavior to support his argument that an increase in loan money will have a greater influence on spending than an increase in bill money. This principle postulates that banks will always accommodate a rise in loan demand by reducing excess reserves and holdings of investments and by increased borrowing from Reserve Banks. A decrease in loan demand has an opposite response.

This view of bank behavior is different from that of the portfolio approach, which is based on the "profit-maximization principle." According to this principle, bank behavior regarding the composition of their earning assets between loans and investments, their holdings of excess reserves, and their borrowings from Reserve Banks is based on alternative yields and costs.

Albert Burger and I tested these two hypothesized principles of bank behavior in a paper presented at last winter's meeting of the American Finance Association. We were led to reject the accommodation principle. Bank response to interest rates was consistent with the profit-maximization principle and not with the accommodation principle. Moreover, GNP was found not to influence behavior regarding borrowings from Reserve Banks and loan behavior, and it was related to excess reserves in a negative manner, contrary to accommodating behavior. This evidence leads me to doubt the validity of the key point of Anderson's analysis.

It is still possible that changes in money will result in offsetting movements in velocity. One frequently made argument is that an increase in money will lower interest rates, thereby decreasing velocity because of an increase in the demand for money. I argue that this would be temporary. As Cagan reported at last winter's meeting of the American Finance Association, interest rates decrease for about two quarters after an increase in money, but then begin to rise. If the demand for money responds to interest rates, then velocity would begin to rise after the initial decrease in interest rates following an increase in money.

A change in money could also result in a brief offsetting movement in velocity, even if the demand for money did not respond to interest rates. If money influences GNP with a lag distributed over time, then a decrease in the rate of monetary expansion would necessarily result in a rise in velocity, but only for a short period, because GNP would temporarily continue to rise in response to the previous, more rapid rate of monetary expansion. The shorter the lagged response of GNP to changes in money, the briefer will be the period, and the smaller would be the amount of the rise in velocity.

The hypothesis that changes in money are associated with offsetting changes in velocity may be tested by regressing changes in velocity on current and lagged changes in money (narrowly defined). Anderson's hypothesis that changes in loan money relative to bill money is associated with offsetting movements in velocity may be tested by regressing changes in velocity on current and lagged changes in the ratio of loans to bank credit. The accompanying table reports the results of regressing changes in velocity on both of these variables included in the same regression.

Regression Coefficients of Changes in Velocity on Current and Lagged

	Change in Money Stock		Change in Loan/Bank Credit Ratio
t	-0.01455* (2.70)		2.65773 (2.98)
t-1	0.00639 (0.91)		-2.33197* (1.96)
t-2	0.00089 (0.11)		-0.48525 (0.49)
t-3	0.01014 (1.54)		0.37452 (0.47)
Sum	+0.00298		+0.21503
Constant		0.02543	
R^2		.37	
S.E.		0.02856	
D.W.		1.52	

1953-I - 1969-I Ordinary Least Squares

This regression supports both views as well as supporting my argument that the induced changes in velocity will be brief. With the loan-to-bank credit ratio constant, velocity is negatively related to the current quarter change in money, but positively in succeeding quarters. The over-all response of velocity to a change in money is small, as measured by the sum of the coefficients. With money held constant, the response of velocity to a change in the loan-to-bank credit ratio is positive, as postulated by Anderson, in the contemporaneous quarter, but it is virtually offset in the following quarter.

In conclusion, these induced changes in velocity do not support the view that they are of such a nature as to negate the usefulness of money in economic stabilization. The offsetting movements in velocity are short-lived, with velocity moving back to its trend growth after the first quarter. If the rate of monetary expansion is changed infrequently, these velocity problems are of little importance for basing monetary policy on growth of the money stock.

My analysis has been limited to the past 15 years; I have not considered the broad sweep of history as did Anderson. Consequently, I have no evidence regarding abnormal situations such as those of the 1930's. However, I believe that the more recent experience has greater relevance for testing hypotheses which can be used for contemporary monetary management.

The Federal Reserve's Modus Operandi

JOHN H. KAREKEN

Some economists may be quite sure that the Federal Reserve should operate by fixing the stock of money. I am not; and to begin, what I thought I would do is explain why. Nor am I sure, by the way, that the Federal Reserve ought to operate by pegging rates on Treasury obligations. I once was, and not all that long ago. But, regrettably, I have become less so.

The question, as I would put it, is whether the Federal Reserve should fix the stock of money, however defined, or alternatively peg the rate on three-month Treasury bills and as well, perhaps, the rates on, say, five- and ten-year Treasury bonds. This is not quite the same as asking whether the Federal Reserve should fix the stock of money or, in contrast, operate as it has been. If there is an interest rate among the variables used in defining money market conditions, it is the Federal funds rate. And the record is quite clear; the spread between the funds rate and the three-month bill rate, or any of the rates on longer-term Treasury obligations, has not been constant.

If pressed to defend how it operates, the Federal Reserve might put forward a political rather than an economic argument. Reaching back in history, it might cite the fuss caused by the none-too-gentle slide in Treasury bond prices after World War I. Market participants may, however, be a good deal more sophisticated than they were—so may Congressmen and Senators.

But, even if not, an economist can perhaps be permitted to assume that the Federal Reserve operating by pegging Treasury rates is not wildly absurd. The only question is whether, in the national interest, the Federal Reserve ought to fix the stock of money or peg Treasury rates (and, thereby, I assume, all other rates).

It could also be too easy, simply assuming that the Federal Reserve can make the stock of money as large or as small as it wants; and over some reasonably brief interval of time, not three months but rather a week or at the outside a month. If it cannot, then

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approximating any desired three-month average could involve changing the weekly or monthly average, possibly even sharply; and sharp changes would presumably not be good. Having the same reserve ratio for all kinds of member bank deposits ought to help. But even if different ratios will likely persist (for no very good reason, near as I can tell), I shall nevertheless assume here that the Federal Reserve can indeed make the stock of money whatever it wants, maybe not on the day, but on the week or month.

Were the Federal Reserve entirely certain about the economic structure which constrains it, and entirely accurate in its forecasts, then how it operated would make no difference. It could decide to fix the stock of money or peg interest rates with any old coin, fair or unfair, that happened to be handy. We are all well aware, however, having lived through 1965 and 1968, that uncertainties are the essence of the policymakers' reality. And what would seem to be true is that how the Federal Reserve ought to operate depends on what its uncertainties are and, to speak loosely, how great each is.

I can illustrate this proposition, taking nominal GNP as the Federal Reserve's target variable. I could just as well take some measure of the imbalance on international account; but if I did, some might object that with a floating dollar, or flexible exchange rates all around, the Federal Reserve would not have to bother.

Choosing the Random Variables

It might be assumed—quite unrealistically, to be sure, but as a beginning—that total demand for current output has an exogenous component (government spending, say), which is the only random variable. On this assumption, fixing the stock of money would seem to make more sense than pegging interest rates. As between the two ways of operating, the fixing of the stock of money yields a smaller variance for GNP. Why it does, may be obvious. It is just that with the stock of money fixed, there is a kind of automatic stabilization. Without the Federal Reserve doing anything, any discrepancy between the expected and actual values of exogenous demand produces a stabilizing change in interest rates, and thereby a stabilizing change in the induced component of total demand. With interest rates pegged, however, there is no stabilizing change in the induced component of demand, whatever the discrepancy between the expected and actual values of the exogenous component. The actual stock of money may differ from the expected stock, but this is of no consequence.

It might also be assumed—again, quite unrealistically—that one or another of the coefficients of the money-demand equation is the only random variable. On this assumption, fixing the stock of money would evidently make less sense than pegging interest rates. As between the two ways of operating, the fixing of the stock of money yields the larger variance for GNP. By pegging rates, the Federal Reserve gets itself back, as it were, to a certain world; there can be no discrepancy between desired GNP and actual GNP. With the money stock fixed, however, any discrepancy between the expected and actual demands for money forces a discrepancy between desired GNP and actual GNP.

And if the exogenous component of demand and one or another of the money-demand coefficients are both random variables? Whether the Federal Reserve should fix the stock of money or peg interest rates depends then (if independence is assumed) on the ratio of the two variances: that of the exogenous component of demand and that of the money-demand coefficient. With a sufficiently large variance for exogenous demand, fixing the stock of money makes more sense than pegging interest rates; and for a sufficiently small variance, fixing the stock of money makes less sense.

To approximate reality even reasonably well, it likely should be assumed that the Federal Reserve is not only uncertain about whatever exogenous variables there are, but also about the private sector's responses to a change in interest rates. Assuming this, one can still get a condition, though, which determines how the Federal Reserve ought to operate. For the pegging of interest rates, there is one reduced-form equation, what I refer to as the r-equation. For the fixing of the stock of money, there is another reduced-form equation, the m-equation. Now, for variances of the random variables appearing in the r-equation which are large enough—in comparison, that is, with the variances of those variables appearing in the m-equation—fixing the stock of money makes more sense than pegging interest rates; and for variances which are small enough, fixing the stock of money makes less sense than pegging interest rates.

But my point is this: we do not know how the various variances compare; so far as I am aware, no one has checked. I grant, however, that I might be better acquainted with the economics literature than I am.

*Note: This proposition, and those of the immediately preceding paragraphs, are proved in my paper, "The Optimum Monetary Instrument Variable" (Xeroxed), a copy of which may be obtained by writing to the author.

It could be, of course, that there are better assumptions than those I have used, most of which I have conveniently not set out, and that there is, therefore, a better condition than mine. Then, by all means, let this better condition be derived, and the appropriate calculations made. Until they have been, we must all, it seems to me, be unsure about how the Federal Reserve ought to operate.

It would help considerably if we could agree on which is more variable, the demand for current output or the demand for money. There may be those who know, possibly even for sure; but among those who know, there is, I think, less than universal agreement.

I might put my point differently: It seems to me not good enough to simply exhibit an historical association between the stock of money, however defined, and some measure of current output. Though the association might be strong indeed, fixing the stock of money could still make lsss sense than pegging interest rates.

Use of a Proviso Variable

There is another way in which the Federal Reserve might operate. It might use a proviso clause, with either the stock of money or some index of interest rates as the proviso variable. It could, for example, hold interest rates at pre-determined values through some portion of the policy period, until an initial reading on the stock of money had been obtained. Then it could change rates, possibly in proportion to the discrepancy between the actual stock of money and the expected stock. Or it could fix the money stock at some pre-determined value, and then at some point, depending on what interest rates had averaged, possibly change its target value. Actually, the Federal Reserve has been using a proviso clause for some time now, but the proviso variable has been the bank credit proxy. The Manager of the Open Market Account has been automatically adjusting as the values of those variables—among them the Federal funds rate and free reserves—which together define money market conditions. What I have to say about the use of a money stock proviso clause (the stock of money being the proviso variable) may therefore be of some relevance.

The rationale for using a money stock proviso clause is simple enough. For the stock of money, there is a relatively short information lag. What matters ultimately is actual GNP; but it becomes known only with a considerable lag—a longer lag than that with which the actual stock of money becomes known.

Again, it might be assumed that total demand for current output has an exogenous component, and, further, that this exogenous component (which for the Federal Reserve could be government spending) is the only random variable. On this assumption, pegging interest rates subject to a money stock proviso clause makes more sense than simply pegging interest rates. Knowing no more than what the stock of money actually was in, say, the first half of the policy period, it is still possible to infer with perfect certainty what actual GNP was and to adjust interest rate target values properly. Simply pegging interest rates implies a certain variance for GNP; but pegging interest rates subject to a money stock proviso clause implies a smaller variance.

But if pegging interest rates subject to a money stock proviso clause makes more sense than simply pegging them, then fixing the money stock, subject to an interest rate proviso clause, makes still more sense. This will not be surprising; as I said before, with exogenous demand as the only random variable, simply fixing the stock of money makes more sense than simply pegging interest rates.

Policy with Two Random Variables

What if there are two random variables, though, exogenous demand and one or another of the money-demand equation coefficients? Then it is not generally possible, knowing only what the actual stock of money was, to infer with certainty what actual GNP was, or what interest rates should be over the remaining portion of the policy period. Consider this: the stock of money is observed to have been less than expected. It could be that exogenous demand was less than expected, and that, therefore, actual GNP was less than desired GNP. But it could also be that the actual desired stock of money was less than expected, and that exogenous demand was greater than expected. The trouble is that, depending on which inference is correct, interest rates should be either increased or decreased.

Even with two (or, indeed, several) random variables, using a proviso clause may, however, still be possible—perhaps advantageous as well. But again, it cannot be said at this point whether the Federal Reserve ought to use a proviso clause or, if so, which sort. Whether it ought to peg interest rates and use the stock of money as its proviso variable, or alternatively fix the stock of money and use some index of interest rates as its proviso variable, depends in part on how certain variances compare. To repeat, this we do not know.

Fixing the Stock of Money

In talking about how the Federal Reserve should operate, I have, so far, assumed GNP to be the target variable. Perhaps I ought now to assume that the target variable is some measure of the imbalance on international account, or that there are two target variables—GNP and some measure of international account imbalance—and go right on. I am going to stick, though, with GNP as the target variable, and inquire briefly into whether there would be any unfortunate side effects if the Federal Reserve were to operate by fixing the stock of money.

This is how the Federal Reserve ought to operate, provided that the demand for current output is sufficiently more variable than the demand for money. I shall therefore assume that it is. But in fixing the stock of money, the Federal Reserve does not ensure what interest rates will be; it determines expected values, not actual values. And it is the possibility of random, short-run fluctuations in rates, resulting from random changes in the demand for money, which has caused concern.

The Treasury, responsible for raising the Federal government's money, comes immediately to mind. So does the Federal Reserve's operating rule: that there be no change in policy (in discount rates, say, or reserve requirements or the target value for the funds rate) from shortly before the Treasury announces its financing terms until the newly issued securities have been pretty much distributed. Although I could be quite wrong on this, it is my impression that when the Treasury is, so to speak, in the market, the Federal Reserve contrives to keep rates within rather narrow limits—which is precisely what it could not do if it were fixing the stock of money.

I have heard it argued that without Federal Reserve assurances about interest rates, largely implicit perhaps, the Treasury would not be able to sell coupon securities. Allegedly, there would be no underwriters. The risks would be too great. Underwriters might, though, simply demand and get a larger underwriting premium. It is difficult to judge, but they might. The Treasury's average borrowing cost would increase. But this could be a reasonable price to pay. Also, if the Federal Reserve were operating by fixing the stock of money, there would be no need for it to hold Treasury obligations of differing maturities, so the Treasury might limit itself to such maturities as it could sell by auction.

Possibly, I am too optimistic. Still, it seems to me that with modest institutional changes the Treasury could get by without help from the Federal Reserve. This is likely something the new Treasury staff has been thinking about.

Through the years, central bankers have insisted on the desirability of week-to-week and day-to-day stability of interest rates—undoubtedly with good reasons, which, however, have largely remained their secret. Until all these reasons are made public—and the present would be a very good time—we must, I think, accept that the Federal Reserve could operate by fixing the stock of money. Random, short-term fluctuations in rates there would be, but not great upsets.

This is not to say, though, that the Federal Reserve should operate by fixing the stock of money or, if so, that it should increase the stock of money at a constant rate.

Operational Contraints on the Stabilization of Money Supply Growth

ALAN R. HOLMES

The debate over whether the Federal Reserve should rely exclusively on the money stock—somehow defined—as an indicator or a target of monetary policy, or both, continues unabated. While the debate has shed some light on the role of money in monetary policy and the role of monetary policy in the overall mix of policies that affect the real economy, there has been perhaps as much heat as light. And the light that is being generated from the many research studies that have stemmed from the debate is very often dim indeed.

This paper does not attempt to contribute to the controversy. Instead it tries to sketch out briefly current practices of the FOMC in establishing guidelines for the conduct of open market operations—guidelines that involve a blend of interest rates and monetary aggregates. It then turns to the operational constraints and problems that would be involved if the Federal Reserve were to rely exclusively on the money supply as the guideline for day-to-day operations.

The approach taken in the paper is essentially practical rather than theoretical. The views expressed should be taken as those of the author, and not as representative of the Federal Reserve System. It will probably not come as much of a surprise, however, that the conclusions find much in favor of current FOMC practices and procedures.

Current FOMC Practices

The Federal Reserve has frequently been accused of money market myopia. This is a false charge usually made by economists affected in some degree by a peculiar myopia of their own. The charge stems, or so it seems to me, in the first instance from a confusion between monetary policy decisions *per se* and the oper-

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ational instructions given by the FOMC for the day-to-day conduct of open market operations.

The Federal Reserve has always maintained that money matters just as it believes that interest rates matter too, particularly given the institutional framework of our financial system. In reaching policy decisions, the Committee not only pays attention to the real economy—to current and prospective developments in employment, prices, GNP and the balance of payments—but it also considers a broad range of interest rates and monetary measures. Among the monetary measures, there are the various reserve measures—total reserves, nonborrowed reserves, excess reserves, and free or net borrowed reserves. Next are the measures of money ranging from M_1 on out. Finally, there are the credit measures, bank credit, the credit proxy—ranging on out to total credit in the economy and the flow of funds.

Is the Federal Reserve wrong in its eclectic approach? Is it wrong to consider a broad range of interest rates and aggregates and to reach a judgment as to the combination of rates and aggregates (and the resultant impact of that mix on market psychology and the expectations of consumers, savers, and investors) that is compatible with desirable movements in the real economy and the balance of payments? Should it instead adopt a single aggregate variable—the money supply—and devote its entire attention to stabilizing that variable no matter what happens to other aggregates or to interest rates?

Despite the empirical claims of the monetary school, there appears to be little conclusive evidence to support their case that such a course of action would give the desired overall economic results. Both the St. Louis equations and correlation analysis at the Federal Reserve Bank of New York, for example, give slightly better marks to bank credit than to money supply. Moreover, the analyses suggest that significantly different results can be attained by relatively small changes in the time period covered.

While I do not believe that research results to date justify adopting an operating policy designed solely to stabilize the monetary growth rate, I nevertheless believe that the research efforts stimulated by the monetary school have a real value. Out of it all, there is bound to develop a better understanding of the relationships between monetary aggregates, interest rates, and the real economy. I suspect, however, that the underlying relationships are so complex that no simple formula can be found as an unerring guide to monetary

policy. The psychology and expectations involved in private decision making are probably too complicated to compress into any such simple formula.

Thus, I think, the FOMC is right in paying attention to a broad range of reserve, money, and credit aggregates; in trying to understand why they are behaving as they are; and in assessing the implications of their past and prospective behavior for employment, prices, and GNP. Further, I think the Federal Reserve is right in not restricting itself to a single theory of money, and in choosing the best from a number of theories.

In reaching a policy decision, the Committee pays close attention to a wide spectrum of interest rates, ranging from the Federal funds rate, through the short and intermediate term rates, out to rates in the long-term capital markets. One obvious problem with interest rates as either an indicator or target of monetary policy is that they may be measuring not only the available supply of money and credit but also the demand for money and credit. Obviously, a policy aimed at stabilizing interest rates in the face of rising demand will give rise to greater increases in the monetary aggregates than would be the case if demand were stable. Interest rates can also be misleading indicators of underlying conditions at times of special short-lived supply and demand relationships—of some fiscal policy development or of prospects for war or peace in Vietnam, to take some recent examples. But interest rates have the decided advantage of being instantaneously available, and they can often be excellent indicators that estimates of monetary aggregates, particularly reserve estimates, are wrong. The judicious use of interest rates as correctors of poor aggregative forecasting should not be underestimated.

Thus, when the FOMC reaches a policy decision, it is not thinking exclusively in terms of rates or of monetary aggregates, but of a combination of the two. A move towards a tighter policy would normally involve a decline in the rate of growth of the aggregates and an increase in rates. And a move towards an easier policy would normally involve an increase in aggregate growth rates and a decline in interest rates.

But, unfortunately, given the nature of our commercial banking system, money and credit flows cannot be turned off and on instantaneously. At any given point in time, banks have on their

books a large volume of firm commitments to lend money. Also, potential borrowers may, if they surmise that the Federal Reserve is tightening policy, decide *en masse* to take down loans in anticipation of future needs. Hence there may be, for a time, an undeterred growth in bank credit and the money supply. But this, in turn, should involve a more rapid and larger rise in interest rates than would otherwise have been the case. The point is that the Federal Reserve is always making a trade-off between aggregates and rates. It has, and takes, the opportunity at its FOMC meetings every three or four weeks to assess what has developed, what the impact has been on the real economy and on private expectations of the future, and to determine whether another turn of the screw—towards tightness or ease—is called for.

The moral of the story, if there is one, is that Federal Reserve policy should not be judged exclusively in terms of interest rates or in terms of monetary aggregates but by the combination of the two—and by the resultant impact of this combination on market psychology and expectations about the future and, ultimately, on the real economy. The weights placed on aggregates and rates, including those placed on individual components of either group, can and do vary from time to time. It is important to recognize that there is nothing in the present framework of Federal Reserve policymaking, or policy implementation, that would prevent placing still greater weight on aggregates if that should be considered desirable. I think it is obvious that aggregate measures of money and credit are getting their full share of attention at the present time.

Rates and aggregates, along with real economic developments and prospects, are the basic ingredients of any FOMC policy decision. They are also involved in the instructions that the FOMC gives to the Federal Reserve Bank of New York for the day-to-day conduct of operations in the interval between Committee meetings. Obviously, it would make little sense for the Committee to issue directives to the Desk in terms of the real economy with which it is basically concerned. Not only are open market operations in the very short run unlikely to have a major impact on the real economy, but adequate measures of economic change are unavailable in the short time span involved.

Thus the Committee, in its instructions to the Manager, focuses on a set of money market conditions—a blend of interest rates and rates of growth of various reserve and credit measures—the Committee believes is compatible with its longer run goals. At each FOMC

meeting, the Committee has before it staff estimates of ranges for the Federal funds rate, the Treasury bill rate, bank borrowings from the Federal Reserve, and net borrowed reserves that the Staff believes compatible with an overall policy of no change, or of greater tightness or ease, as the case may be. Additionally, the Staff prepares estimates of the money supply and the bank credit proxy that it believes likely to correspond to a given set of money market conditions. Needless to say, these forecasting techniques fall short of being an exact science, but their existence tends to focus attention on the vital interrelationships between interest rates and aggregates that will ensue from any policy decision.

As is well known, since the spring of 1966 the Open Market Committee has usually included in the directive a proviso clause with an explicit reference to one aggregate measure—the bank credit proxy—with specific instructions to modify open market operations if the proxy is tending to move outside a predicted or desired range. Thus the Committee expects to see money market conditions moving to the tighter end of the scale if the proxy is expanding too rapidly, or towards the easier end of the scale if the proxy is falling short.

How does this all work out in practice? First of all, the money and capital markets send out a constant stream of signals of interest rate developments that we can and do measure from day-to-day and hour-to-hour. If there are deviations from past patterns or levels (or from anticipated patterns or levels) of interest rates, we can usually find out a good deal about the source and meaning of the deviations.

Second, we have forecasts of the factors affecting bank reserves apart from open market operations—estimates of float, currency in circulation, gold and foreign exchange operations, and the level of Treasury balances at the Federal Reserve. These factors can and do supply or absorb hundreds of millions in bank reserves from day-to-day or week-to-week. The estimates are made at the Board and at the New York bank for the current statement week and for three weeks ahead, and they are revised daily on the basis of the inflow of reserve information available within the System each day.

Third, we have available an estimate once a week (on Friday) of the bank credit proxy and of the money supply for the current month; and, as we get towards the middle of the month, for the next month as well. And this estimate can be revised—at least informally—by the middle of a calendar week, after there has been time to analyze weekend deposit performance at Reserve City banks and a weekly sample of deposit data at country banks. We can then use these aggregate data—available less frequently and with a greater time

lag than interest rate or reserve data—to modify subsequent open market operations with an impact on interest rates and the reserve supply.

I should add that we are fairly cautious about over-interpreting any short-run wriggle in the credit proxy. While forecasts of the proxy have generally proved to be more stable than money supply forecasts—perhaps mainly because the proxy avoids the large and erratic shifts between Treasury deposits in commercial banks and private demand deposits—they, too, have proved to be somewhat undependable on a week-to-week basis. Thus we have felt it desirable—particularly early in the month when firm data are scant—to wait for some confirmation of any suggested movement of the proxy before beginning to shade operations towards somewhat greater firmness or ease.

Nevertheless, the proxy has been a useful adjunct to the directive, modifying reserve and rate objectives on a number of occasions and tending to flag aggregate problems for the Committee's attention at subsequent FOMC meetings.

It should, of course, be noted that, at times like the present, when Regulation Q ceilings are pressing hard on bank CD positions, the credit proxy loses much of its value as a continuous series. It does not, however, necessarily lose its value as a short-run guide—provided that it is understood that much lower growth rates may be required to allow for the shift of intermediate credit away from the commercial banking system. Despite all the talk about disintermediation and intermediation, we need to know much more about the process and its implications for monetary policy. The problem is that commercial banks are at the same time creators of money and credit and intermediaries between savers and borrowers in competition with other nonbank financial institutions. Worthwhile research remains to be done in this area, particularly in light of the dramatic changes that are occurring in our financial institutions.

In summary, there are four main points that I would like to draw from this abbreviated review of monetary policy formulation and implementation. First, monetary policymakers have always paid close attention to monetary aggregates—along with interest rates—in the formulation of policy decisions. It has been the interaction of the two on the real economy—on employment, prices, the GNP, and the balance of payments—that has been the focus of concern. Reluctance to adopt money supply as the sole guide to policy decisions has not stemmed from lack of concern about money but from the lack of

evidence that the adoption of such a guide would give the desired results. Empirical research to date does not supply that evidence.

Second, it is incorrect to characterize monetary policy in terms of money supply alone. A rise in money supply—outside some specified range—does not necessarily mean easy money nor a decline of tight money. Policy has to be judged by a combined pattern of interest rates and monetary aggregates—and money supply is only one of those aggregates.

Third, since the spring of 1966 the FOMC has included an aggregate measure—the bank credit proxy—in its directive covering day-to-day open market operations. While use of the aggregates to shape interest rates and reserve measures has probably not been as aggressive as the monetarists would like to see (and, besides, it is the wrong aggregate according to some of them), it has been a useful adjunct to the directive.

Fourth, information on the performance of monetary aggregates (e.g., credit proxy and money supply) is available only with a time lag, and week-to-week forecasts of monthly data have tended to be erratic. This suggests that, in the short run, interest rate movements may provide a very useful indication of forecasting errors. It further suggests that aggregates can contribute more to the process of policy formulation—when there are opportunities to take a long-range view—than to the process of policy implementation as exemplified by the second paragraph of the directive. But current procedures for both policy formulation and policy implementation provide room for as much attention to monetary aggregates as may be required, and it is apparent that the aggregates are receiving a full measure of attention at the present time.

Operational Problems in Stabilizing Money Supply

In the absence of a concrete proposal, there are major difficulties in attempting to isolate the operational problems that would be involved in stabilizing the monetary growth rate to some targeted level. Much would depend on the definition of the money supply used, the time span over which the growth rate was to be stabilized, and whether the money supply was to be the sole indicator and/or target of monetary policy or mainly a primary indicator or target.

It obviously makes a great deal of difference whether the proposal is for a rigid monetary rule or whether there is room—and how much—for discretion. Some of the proposals for moving to the

money supply as a target and indicator have been coupled with the complete abandonment of so-called "defensive" open market operations—a suggestion that raises a host of other problems that are not relevant to the main point at issue.

There is, of course, a strong temptation to pick and choose among the various suggestions, and to erect a money supply target as a "straw man" that can be readily demolished. I shall try to resist that temptation and consider in more general terms the operational problems that would be involved if the FOMC were to move to money supply as the principal indicator of policy or target for open market operations.

But before setting straw men aside, it might be worthwhile to consider the proposition that open market operations should be limited to the injection of a fixed amount of reserves at regular intervals—say $20 million a week. So-called defensive operations—the offsetting of net reserve supply or absorption through movements in float, currency in circulation, gold or foreign exchange operations, etc.—would be abandoned, leaving the banking system to make its own adjustments to these outside movements. While such a system would certainly reduce the level of operations at the Trading Desk, it has never been quite clear how the banking system would make the adjustments to the huge ebb and flow of reserves stemming from movements in the so-called market factors. Either banks would have to operate with excess reserves amounting to many billion dollars at periods of maximum reserve supply by market factors, or they would have to have practically unlimited access to the discount window. Neither possibility seems very desirable, if one is really interested in maintaining a steady growth rate in some monetary aggregate.

There is no reason to suppose that banks would, in fact, hold idle excess reserves in the amounts required. At times of reserve supply by market factors, attempts to dispose of excesses through the Federal funds market would drive the Federal funds rate down and generally lower dealer borrowing costs and the interest rate level. At other times, the reverse would happen. As a result, there would be either feast or famine in the money market, inducing changes in bank loan and investment behavior that would make it impossible to achieve the steady growth of financial aggregates that was presumably desired to begin with. The resultant uncertainty would undermine the ability of the money and capital markets to underwrite and to provide a means of cash and liquidity adjustment among individuals and firms.

The opening of the discount window, on the other hand, runs the risk that reserves acquired at the initiative of the commercial banks would be used to expand the total supply of money and credit and not solely to meet the ebb and flow of reserves through movement of market factors. As a result, the Federal Reserve would have to institute the same controls—in a decentralized fashion—at the various discount windows to limit the supply of reserves that are now provided in a more impersonal way through open market operations.

Consequently, it would appear wise to disassociate the debate over money supply from the problem of so-called defensive open market operations. There seems to be no reason why a seasonal movement of currency, a random movement of float, or a temporary bulge in Federal Reserve foreign currency holdings should automatically be allowed to affect the money market or bank reserve positions. There would seem to be no point in consciously reducing our efficient and integrated money and capital markets to the status of a primitive market where the central bank lacks the means and/or the ability to prevent sharp fluctuations in the availability of reserves—in the misguided attempt to hold "steady" the central bank's provision of reserves.

But the point remains that the ebb and flow of reserves through market factors is very large. While defensive operations are generally successful in smoothing out the impact of these movements on reserves, even a 3 percent margin of error in judging these movements would exceed a $20 million reserve injection in many weeks. Hence the small, regular injection of reserves, week by week, is not really a very practical approach.

The idea of a regular injection of reserves—in some approaches at least—also suffers from a naive assumption that the banking system only expands loans after the System (or market factors) have put reserves in the banking system. In the real world, banks extend credit, creating deposits in the process, and look for the reserves later. The question then becomes one of whether and how the Federal Reserve will accommodate the demand for reserves. In the very short run, the Federal Reserve has little or no choice about accommodating that demand; over time, its influence can obviously be felt.

In any given statement week, the reserves required to be maintained by the banking system are predetermined by the level of deposits existing two weeks earlier. Since excess reserves in the banking system normally run at frictional levels—exceptions relate

mainly to carryover excess or deficit positions reached in the previous week or errors by banks in managing their reserve positions—the level of total reserves in any given statement week is also pretty well determined in advance. Since banks have to meet their reserve requirements each week (after allowance for carryover privileges), and since they can do nothing within that week to affect required reserves, that total amount of reserves has to be available to the banking system.

The Federal Reserve does have discretion as to how the banks can acquire this predetermined level of needed reserves. The reserves can be supplied from the combination of open market operations and the movement of other reserve factors, or they can come from member bank borrowing at the discount window. In this context, it might be noted that the suggestion that open market operations should be used in the short run to prevent a rise in total reserves through member bank borrowing is completely illogical. Within a statement week, the reserves have to be there; and, in one way or another, the Federal Reserve will have to accommodate the need for them.

This does not mean that the way that reserves are supplied makes no difference, nor that aggregate indicators cannot be used to influence the decision as to whether reserves will be supplied through open market operations or whether banks will be required to use the discount window. A decision to provide less reserves through open market operations in any given week, thereby forcing banks to borrow more at the window, could be triggered by a prior FOMC decision (based partly on a review of aggregate money and credit measures) to move to tighter money market conditions, or it might be occasioned by the implementation of the proviso clause if the bank credit proxy was exhibiting a tendency to expand more rapidly than the Committee deemed to be warranted.

No individual bank, of course, has unlimited access to the discount window. Borrowing from the Federal Reserve involves the use of adjustment credit that is limited in both amount and in frequency of use. Eventually, as the aggregate level of borrowing is built up, the discount officers' disciplinary counseling of individual banks that have made excessive use of the window will force the banks to make the necessary asset adjustments. Other banks, desirous of maintaining their access to the discount window intact for use in their own emergency situations, will try to avoid use of the window by bidding up for Federal funds or by making other adjustments in their reserve positions. In the process, interest rates, spreading out from the

Federal funds rate, will have been on the rise. As pressure on the banks is maintained or intensified, the banking system as a whole is forced to adjust its lending and investment policies with corresponding effects on money and credit—and eventually on the real economy.

A switch to money supply as the target of monetary policy would, of course, make no difference in the process through which open market operations work on the banking system to affect monetary aggregates. But, depending on the time span over which it was desired to stabilize the rate of monetary growth and on whether money were to become the exclusive indicator and/or target, there would be a significant difference in the rate of interest rate variations. How great that variation might be would be a matter of concern for the Federal Reserve in the conduct of open market operations. I would like to return to that subject in just a few minutes.

First, however, it may be worthwhile to touch on the extensively debated subject whether the Federal Reserve, if it wanted to, could control the rate of money supply growth. In my view, this lies well within the power of the Federal Reserve to accomplish provided one does not require hair-splitting precision and is thinking in terms of a time span long enough to avoid the erratic, and largely meaningless, movements of money supply over short periods.

This does not mean that the money supply could be used efficiently as a target for day-to-day operations. Given the facts that adequate money supply data are not available without a time lag and that there may be more statistical noise in daily or weekly figures than evidence of trend, we would be forced to rely on our monthly estimates for guidance in conducting day-to-day operations. Projections of money supply—and other monetary aggregates—are, of course, an important ingredient of monetary policymaking. While I believe we have made considerable progress in perfecting techniques, forecasting is far from an exact science. Money supply forecasting is especially hazardous because of the noise in the daily data and because of the massive movements in and out of Treasury Tax and Loan accounts at commercial banks.

Let me illustrate the sort of problem that might be faced by citing some numbers representing successive weekly forecasts of annual rates of money supply growth for a recent month—admittedly not a good month for our projectors. The projections cited begin with the one made in the last week of the preceding month and end with the

projection made in the last week of the then current month. The numbers are: -0.5 percent, +4 percent, +9 percent, +14 percent, +7 percent and +4.5 percent. I might also note that, in the middle of that then-current month, the projections for the following month were for a 14 percent rate of growth. By the end of the month, the projection was -2.5 percent.

Assuming that the Desk had been assigned a target of a 5 percent growth rate for money supply, it seems quite obvious that, at mid-month, when the forecast was for a 14 percent growth rate for both the current and the following month, we would have been required to act vigorously to absorb reserves. Two weeks later, on the other hand, if the estimates had held up, we would have been required to reverse direction rather violently.

The foregoing should suggest that short-run measures of monetary growth do not provide a good target for the day-to-day conduct of open market operations. Use of such a target runs the serious risk that open market operations would be trying to offset random movements in money supply, faulty short-run seasonal adjustments, or errors of forecasting. In the process, offensive open market operations might have been increased substantially—and I have the uneasy feeling that financial markets might find such operations offensive in more than one sense.

While short-term measures of money supply growth appear to be too erratic to use as a primary target of open market operations, there are times when cumulative short-term evidence begins to build up—even between meetings of the FOMC—that strongly suggests that a deviation from past trends has gotten under way. Such evidence could of course be used, if interpreted cautiously, to modify operations in much the same way that the bank credit proxy is now used.

To return to the question of interest rate variation, there appears to be general agreement that variations would be greater with money supply as a guideline than they have been while the System was using multiple guidelines involving both monetary aggregates and interest rates. How great interest rate variations would be, would depend very much on how rigid the guideline was and how short the time horizon in which it was supposed to operate might be. The question of how great variations might be can probably never be resolved in the absence of any concrete experience.

Some exponents of the monetary school, however, seem to imply that interest rate variations make no difference at all—somehow the

market is supposed to work everything out. It seems to me that there are serious risks in the assumption that the financial markets of the real world—in contrast to the markets of a theoretical model—can readily handle any range of interest rate variation. Pushing too hard on money supply control in the face of rapid interest rate adjustment could wind up by destroying the very financial mechanism which the monetary authority must use if it expects to have any impact on the real economy. Psychology and expectations play too great a role in the operations of these markets to permit the monetary authority to ignore the interpretations that the market may place on current central bank operations.

Thus, in the real world of day-to-day open market operations—theoretical considerations aside—the use of money supply as a target would appear to be too mechanistic and, in the short run, too erratic to be of much use. The use of money market conditions—a blend of interest rates and reserve and credit measures—is a more realistic short-run guide, providing opportunities for trade-offs between interest rates and aggregates in the light of market psychology and expectations. Aggregate measures, including the money supply, are, of course, indispensable indicators for the monetary authorities as they reach policy decisions. But exclusive reliance on—or blind faith in—any single indicator does not appear justified by the current state of the arts.

DISCUSSION

JAMES TOBIN

A graduate student of mine, taking advantage of the publicity now given to Open Market Committee minutes, set himself the following problem: to relate the Committee's vote to the movement over the next three weeks of some monetary and financial variables. He tried everything he could find relating to bank reserves, interest rates, and credit conditions.

There was no perceptible relationship between the votes of the committee and the behavior of these statistical magnitudes over the three weeks between meetings. He also observed that nobody worried at the next meeting about whether the previous vote had been carried out. That was before Alan Holmes was at the desk, and I don't know if it is still true. Anyway, my student found that, in spite of the low short-run correspondence of votes to measurable quantities, the Committee's will was gradually executed over longer periods of policy stance.

This is by way of introducing a simple but surprisingly neglected point about the discussion of *indicators.* There is too much emphasis on what happens in a three-week period. It doesn't really matter much whether, let's say, the desk has a procedure which keeps some interest rate constant for three weeks, or does something specific to reserves for three weeks. It doesn't really matter if at the end of the three weeks, at the new meeting, the whole question is going to be reviewed, and the whole policy can be reformulated, and a new target or a new order given to the desk.

Sometimes these discussions seem to me to pretend that the chosen indicator is to be a target fixed for a year, or two years or—God help us—for a whole period of infamous pegging. If that were true, there would indeed be a point in arguing about which indicator should be chosen: if you must choose between a quantity of money and an interest rate and stick to one or the other for five years, which should it be? But we're not in that position; and we don't have to make that kind of long-run decision. Whether Alan Holmes is keeping some interest rate constant for the next three weeks, or whether he's doing something specific to reserves the next three weeks, he doesn't have to do either one forever. The Open Market Committee will meet again and will make another decision.

This observation may limit somewhat the applicability of John Kareken's ingenious results. In his model, he fixes either the quantity of money or "the" interest rate, and he fixes them, it would seem, for a long enough period for the important economic behavioral reactions that follow from any such fixing to have their effect on the economy.

Nevertheless, I think John is going about the problem the right way, namely, to try to find some rules of policymaking that will minimize the variance of the objective of Federal Reserve policy around its target. He contrasted two policies—one was to fix M and the other was to fix interest rates—and he asked under what circumstances can you say one of them is preferable to the other.

Of course, there is a range of intermediate policies, and Kareken's question might be reformulated to say: what is the optimal supply function, relating money stock to interest rates, for the Federal Reserve to follow? The Open Market Committee might respond—or order Alan Holmes to respond—to a certain rise in interest rates with a certain expansion of quantity of money. If they built into their operations some supply response of this kind, our task would be to figure out what the optimal degree of response would be. Maybe it's zero, maybe it's infinite. Zero response would correspond to keeping the quantity of money constant at some desired target, and infinite response would mean supplying whatever money is needed to keep interest rates constant. In between, there is a lot of room.

Generally, Kareken's results could be said to be as follows: The degree to which the Federal Reserve supplies money in response to an observed rise in interest rates above its interest rate target should be higher, the higher is its estimate of the variability of the demand for money relative to the variability of spending on GNP. I can add that the response of the Federal Reserve should be higher, the higher the Federal Reserve's view is of the sensitivity of spending to interest rate changes. If interest rates can go up and down without affecting spending, then the Federal Reserve shouldn't care about whether the interest rates are going up or down or not. There is no reason to worry about interest rate fluctuations if they are not causing any variance in GNP around the target that the Fed is seeking to meet. (Of course, there may be other reasons, perhaps connected with money market myopia—that's Alan Holmes's phrase, not mine—that would lead the Federal Reserve to wish to reduce fluctuations of interest rates.)

The size of the multiplier is also relevant. A high multiplier would tend to move you toward wanting to hold the quantity of money constant rather than interest rates constant.

One problem with Kareken's model is that it assumes that the Federal Reserve can know the structure well enough to know, on the average, what combination of quantity of money and reserves will produce what interest rate and will be geared to the target for GNP. Assuming that they've got the averages right, the only problem is how they respond to deviations around the averages due to random causes in the monetary and financial sector or in real spending. The actual problem the Federal Reserve faces is more complicated. When they observe a deviation—the interest rate is exceptionally high or spending is exceptionally high, relative to their targets—they don't know whether they are just observing a random drawing from the same old hat, something which they ought to expect to happen, or whether they are seeing a change in structure such that the whole average position of policy should be shifted.

Let me also point out that there are lots of interest rates and that stabilizing the ones that the Federal Reserve has readily at hand doesn't mean stabilizing the whole structure. It certainly doesn't mean that stabilizing or controlling those interest rates that are closest to spending decisions—longer-term interest rates, or interest rates on riskier assets, or implicit interest rates, or costs of capital in equity markets, and so on. So that it's not so clear that the Federal Reserve faces more difficulties in controlling the quantity of money than in controlling interest rates. It's not easy to control the rates that are really important for ultimate spending decisions.

I return to the question with which I began. Should the policy made at each Open Market Committee meeting be expressed in terms of stabilizing some indicator, an interest rate or a monetary aggregate, for the next three weeks? For many reasons which have been expressed today, neither type of indicator seems adequate to express the thrust of monetary policy on the real economy. Actually, if we must look for a single indicator short of the ultimate target variables themselves—GNP, prices, unemployment, and so on—I would be tempted to look not at the ones suggested but rather at the state of the markets where used capital goods and used durable goods are valued—stock markets and bond markets. . .markets where the plant and equipment owned by American corporations is valued daily. . . and markets in existing houses, cars, etc. These markets in general seem to me the important locus of linkage between monetary events

and policies and the real economy. One step in that linkage is changing the valuation that the market places on durable goods and capital goods compared with their reproduction costs. Changes in this relationship between the market valuation of real assets and the costs of producing them may be an important indicator of future desirability of producing those things.

Perhaps the real dispute is between using any single indicator at all and using a procedure of adaptive forecasting, as follows: Every time the FOMC meets, they are provided with a set of forecasts of the development of the economy for the next few quarters. Those forecasts not only take into account their past actions but are conditional on future settings of the policy instruments at their disposal—open market purchases, discount rate, etc. The FOMC can estimate the difference that alternative instrument settings will make to the future course of the things they are really interested in. They are not really interested in interest rates or money supply, for example, while they are really interested in GNP, unemployment, and price levels. They can estimate, for example, what difference it makes to the course of those target variables whether or not at this meeting they order the desk to make open market purchases of $100 million, having in mind a particular plan for future actions. I think this is the procedure the Committee should follow, and the economics profession should be trying to make this procedure feasible. I am not willing, myself, to give up on this objective and to settle for some simple indicator on the ground that our knowledge is so poor about the way the economy operates that we can't make policy the way it ought to be made.

Another and related dispute concerns the sources of variation in aggregate economic activity. On the one hand, we have those who emphasize that aggregate economic activity would be stable along a nice growth path if only government policy were stable, so that the reason that we have instability is government policy itself. (Monetarists generally take this position, although there is no logical connection between one's view on the issue of stability and his view of the monetary-fiscal debate.) On the other hand, there are those who see many exogenous sources of economic fluctuation other than government policy—from the private economy, from abroad, from technology, and from tastes. In this view, the economy would be quite unstable in the absence of discretionary policy. Maybe there is some reconciliation of these two views in the proposition that all those supposed non-governmental exogenous shocks are merely lagged

consequences of long-ago instability in government behavior. Here the debate becomes pretty abstract and fruitless. We can't erase the fact that the government behaved in some shaky irregular manner in the past and may, by its actions from 1776 on, have built up lots of waves that look to some of us like exogenous shocks. In any case, we have to deal with the fact that those waves exist now. It may take 50 to 100 years of stable government policy with X percent per year growth in M before everything settles down. I doubt that we want to wait that long.

In this age, we are hoping to stay within a rather narrow band around a full employment growth track, with very little deviation on the unemployment side or the excess inflation side. To stay there, given the sources of shock from the private economy still in the system, there will have to be sizable fluctuation of interest rates. You need more fluctuation of interest rates than you might have if you were willing to have larger fluctuations in economic activity. We have to make people willing to change the timing of their expenditures in order to chop off peaks and fill in valleys. I am not sure that monetary policy and fiscal policy, in the forms we have them now, are sufficiently flexible to do the trick. Rather appealing to me is the idea of the Swedish investment tax and investment fund, a flexible device that we also may need in our arsenal.

Tactics and Targets of Monetary Policy

JAMES S. DUESENBERRY

Fashions in economic policy can change as rapidly as fashions in dress. Only five years ago, economists—with the enthusiastic assistance of the press—were hailing the successes of fiscal policy, while monetary policy took a back seat. Most accounts of the economic expansion from 1961 through 1965 gave monetary policy credit for accommodating—i.e., not getting in the way of the expansion generated by fiscal policy—but did not give monetary policy a very active role. Today, a large number of economists are prepared to agree that monetary policy plays the dominant role in determining the movements of aggregate demand.

It is true, no doubt, that many economists were overly optimistic about our ability to predict the effects of fiscal policy and even more optimistic about the predictability of the Congress. The political failures of fiscal policy in 1966-67 and the weak impact of the surtax in 1968-69 are sufficient to account for the current skepticism in regard to fiscal policy. [It is worth noting that all the statistical evidence underlying the income expenditure approach would lead us to expect the occurrence of substantial forecast errors from time to time.]

The swing toward monetary policy reflects the fact that swings in the growth in GNP have followed the swings in the growth of money supply to a marked degree. But we should be wary of supposing that we have found a new key to stabilization policy. The fact is that we still have a very inadequate knowledge of how monetary policy works. Indeed, we are still disputing about how to measure monetary policy.

Policy Measurement

This morning I want to discuss two related topics. First, I shall attempt to discuss the question of policy measurement in language which will, I hope, be understandable both to those who emphasize the monetary aggregates and to those who analyze monetary policy in terms of credit conditions. Second, I shall make some observations

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on the conduct of monetary policy in a world of uncertainty and incomplete information on the quantitative effects of policy actions.

In the last few years, there has been a good deal of discussion of the measurement of monetary policy or as some put it, of the proper indicator of monetary policy. The problem arises because there is a difference between measuring what the Central Bank does—in terms of open market operations, discount rates, and Regulation Q—and measuring the consequences of its actions in terms of (a) monetary aggregates, currency, bank reserves, demand deposits, and time deposits, (b) credit conditions—bank liquidity, interest rates, and so on, or (c) GNP components.

Money market practitioners and many Federal Reserve officials are inclined to describe monetary policy in terms of what I have called credit conditions. They say that the Fed is pursuing a tight money policy when interest rates are rising and bank liquidity is declining. A good many economists find that terminology unsatisfactory because credit market conditions are determined by many factors of the system besides the actions of the Central Bank. As they often point out, the Fed can take actions which *ceteris paribus* would be expected to ease credit conditions while other factors actually cause tighter conditions. Indeed, that is not only possible; it is the most common pattern of events. The economists who have concerned themselves with this matter have sought a measure of monetary policy actions which would be essentially independent of the endogenous reactions which create the problem I have just mentioned.

Measuring the Impact of Changes in the Federal Budget

It seems to me that the problem to which they address themselves has a close analogy to the problem of measuring the impact of changes in the federal budget. In fact, that analogy seems to me to be an obvious one, and I would be afraid of boring you were it not for the fact that that analogy has seldom been used.

In the case of fiscal policy, we all recognize that (quite aside from budget gimmicks) the observed surplus in the federal budget is not a very satisfactory measure of the impact of the budget on the economy. Actual revenues with a given tax structure are an endoge-

nous variable influenced by everything that affects GNP, including federal expenditures. When there is no change in either expenditures or tax rates, the budget surplus reflects changes in the strength of private demand acting as an automatic stabilizer. Moreover, a sharp rise in expenditures can set off a dynamic expansionary process which generates a large increase in revenue. *Ex post,* the surplus in the budget may change very little and will be a very poor measure of the expansionary impact of the rise in expenditures.

Very similar things can be said about monetary policy action or inaction. Suppose, for example, that the Fed keeps Regulation Q, discount rate, and reserve requirements constant and conducts only defensive open-market operations so that unborrowed reserves remain constant. Suppose that at the same time, other factors in the economy tend to produce a strong expansion of demand. Then interest rates will tend to rise, and so will monetary aggregates as currency responds to increased activity and banks borrow at the Fed in response to rising rates and increased loan demand. Time deposits will expand more rapidly if the Regulation Q ceilings were not initially effective; but their growth may slow down if ceilings were initially effective. Depending in part on the time deposit response, bank liquidity is likely to decline and loan rationing to intensify. Higher interest rates and tighter credit-rationing at banks and elsewhere will tend to check the expansionary tendencies in the economy. If the policy I have described can be regarded as a "no action" policy analogous to a fiscal policy of maintaining fixed expenditures and tax rates, then monetary policy has acted as an automatic stabilizer; and the whole sequence would operate in the reverse direction in the case of a contraction of demand.

For those who wish to describe monetary policy in terms of policy action, the case I have described would be a case of no action; but clearly those who describe policy in terms of credit conditions would consider the policy to be a restrictive one, just as those who describe fiscal policy in terms of *ex post* surplus would describe the rising surplus accompanying a private demand expansion (with fixed expenditures and taxes) as a restrictive fiscal policy.

Let me turn to a second aspect of the analogy. I noted earlier that the budget surplus is not only responsive to non-fiscal factors influencing GNP, but also that fiscal actions can feed back on themselves, so that an expenditure increase—which, *ceteris paribus,* reduces the surplus—can in fact generate a rise in revenue which largely affects the original rise in expenditures.

Something similar can happen in the case of monetary policy. A sharp rise in unborrowed reserves tends, through familiar processes, to reduce interest rates and expand total expenditures. The induced rise in expenditures will, at a later date, increase demand for money which, in turn, tends to raise interest rates. It is theoretically possible that the induced rise in interest rates will exceed the initial fall in rates so that an increase in money supply ultimately produces a net increase in interest rates. In practice, I know of no case when it can be said that an easy money policy, by itself, set off an expansion process which raised interest rates.

The more interesting practical case is one in which other forces interact with monetary policy to produce a strong expansion. Later on, the monetary authorities find it necessary to hold down the growth of bank reserves, and interest rates rise. There are plenty of cases of that sort.

In the case of fiscal policy, there is general agreement, among economists, at least, that the actual surplus or deficit tells nothing about the direction of fiscal action—i.e., whether fiscal action has been expansionary or restrictive—let alone about its appropriateness. One can measure fiscal action in terms of (a) the sum of expenditure increases and the revenue reductions produced by tax rate changes at a given income level or (b) in terms of changes in full employment surplus or deficit. With zero fiscal action in the first case, automatic stabilization (fiscal drag) sets in when income rises or falls absolutely. On the second basis, with zero action, automatic stabilization sets in when income deviates from the full employment path. Most economists prefer the second measure because it enables one to associate positive fiscal action with the correction of undesirable GNP movements and because it enables economists to explain budget policy in terms which sound a little like the traditional views of budget balancing.

Credit Conditions as a Target Variable

In the case of monetary policy, the movements of credit conditions, like the interest rate, are like observed surpluses and deficits—the product of an interaction between monetary actions and the other factors influencing demand. Clearly, credit conditions do not measure what the Central Bank has done. But, as I shall indicate below, they can be used as a target variable when the target is chosen in terms of a target GNP growth and forecasts of future GNP growth at different levels of current interest rates.

Central Bank action can be measured against a zero action base by summing up in some way the net effects of open market operations, reserve ratio changes, and so on, to produce a measure analogous to the first of the two fiscal measures mentioned above. And one could, of course, create another measure with a moving base line which takes account of the normal growth in the economy. If I read them correctly, Meltzer and Brunner have been trying to produce measurements along those lines.

There are some technical difficulties in making those measurements, but I think that Meltzer and Brunner are quite correct in saying that a measure of monetary policy actions must be based on the instruments of policy, not on the market phenomena which they influence but do not control. Perhaps I can sum it up this way. When the monetary base is expanding at a somewhat higher than average rate during a period of rapid expansion, interest rates are likely to rise and bank liquidity to decline. In those circumstances, it is commonly said that "the Fed is pursuing a tight money policy." Perhaps it would be more correct to say that "unusually expansive monetary policy interacting with strong demand is producing tighter credit conditions."

However, I don't suppose that the so-called monetarists are concerned with pedantic niceties of statement on the nature of Federal Reserve action. Few people concern themselves with measurement unless they think that the measurements in question will be used in some way. The choice of measurements is connected with substantive views about the conduct of policy. Those who tend to describe monetary policy in terms of credit conditions do so, not because they fail to understand what's going on, but because credit conditions fit into a logical approach to policy formation.

That approach might be called the "income expenditure and credit conditions" version of how to plan monetary policy. One starts at the turn of the year with the usual array of materials for a GNP forecast—budget estimates, plant and equipment surveys, and so on—and works through a four-quarter forecast on the assumption that interest rates and other credit conditions remain constant. By incorporating money demand functions one can project the monetary aggregate increase required for consistency with the constant credit conditions assumption. The forecasted rise in GNP is then compared with a target path, and one estimates what increase or decrease in GNP change from the original forecast is required. Because of lag considerations, most of the adjustment must take

place in the second half of the year in response to monetary changes in the first half year. As a second step, one experiments to find a path for credit conditions which will bring the GNP path in the second half year more nearly in line with a target path.

The most satisfactory path for changes in credit conditions in the first half year also implies a path for the movement of money supply. One could then envisage the Open Market Committee and the Board attempting to adjust open market operations and other policy instruments to keep credit conditions on the chosen path. This would also be the predicted path for money supply, provided the original projections were correct. However, the credit conditions logic suggests that, if the target and credit conditions path were achieved while monetary aggregates did not follow the projected path, the FOMC would tend to maintain the credit conditions path and let the aggregates deviate from the projection. Of course, both paths would be adjusted in the light of a new economic forecast.

I do not maintain that the scenario I have just outlined is a realistic description of policy, but it is the outline of policy implied by the logic of the credit conditions approach.

Manipulating Rates on Time Deposits

Let me develop that logic a little further. The major instrument of the policy I have suggested is, of course, open market operations with occasional adjustments in reserve requirements. But in order to manipulate the availability of bank credit, flows to thrift institutions, and market interest rates separately, ceiling rates on time and savings deposits can be manipulated. I regard the discount rate as mainly a signalling instrument, though it may have some effect on the willingness of banks to borrow. But I regard member bank borrowing as mainly a source of short-term reserve adjustments in periods when loan demand from priority customers exceeds the inflow of funds to a bank. And I envisage each bank as subject to a somewhat fuzzy limit on its borrowings. Seasonal and erratic situations aside, large banks are using up a special type of credit line when they go to the window; and they must either find additional funds or sell securities to get out.

Member bank borrowing is therefore a measure of the pressure on banks to liquidate securities. If their short-term securities portfolios are small and they have losses on long-term securities, sales are costly and lead to intensified loan rationing. Whenever borrowings are large,

those banks are under pressure to liquidate and intensify loan rationing. In the longer run, pressure for loan rationing can be measured by the size and character of the securities portfolio and the rate of decline in liquid security holdings. But over very short periods, changes in borrowing are a proxy for changes in the ability of banks to meet loan demand. That, to my mind, is the reason for watching members' bank borrowing or free reserves in day-to-day operations.

Interest Rates as a Target

The target path for interest rates must, of course, reflect the policymakers' views about all the factors influencing investment decisions, including the effect of price expectations on investment decisions. It is fashionable nowadays to emphasize the distinction between real and nominal interest rates. I doubt whether the concept of real interest rates has any real usefulness in short-run policymaking. The difference between real and nominal interest depends in theory on the expected rate of price change. In a theoretical world in which all prices move together and price expectations respond only to past price movements, the real interest rate concept has a clear meaning. But when prices do not all move together and price expectations reflect interpretations of economic policy as well as price history, there is no well-defined empirical meaning to a real rate of interest. For short-run policymaking purposes, interest rates should reflect price expectations insofar as they are believed to affect investment. Moreover, investment surveys already reflect price expectations and interest rates at the time of the survey. The calculations suggested above require knowledge of the change in investment plans produced by a change in nominal interest rates with given price expectations (allowing for any expected changes in price expectations after the date of survey).

Difficulties of Measurement

The approach I have just outlined makes sense as a logical construction, but it cannot be made operational in quantitative terms. Unfortunately, few people have any great faith in their knowledge of the short-run interest elasticity of investment demand. The impact of changes in bank liquidity or credit rationing at banks is even more difficult to calculate. Also, recent experience indicates that our knowledge of the effects of relative interest rates on flows

of funds to thrift institutions and the mortgage market leaves something to be desired.

The result is that income expenditure analysis may give guidance—within the limitations of ordinary GNP forecasting—as to the direction in which credit conditions should change, but it gives very poor guidance on the required amount of change. That leads to a tendency to formulate policy in such phrases as "leaning against the breeze." An indication of acceleration in the movement of demand leads to policy actions which produce some rise in interest rates and loss of bank liquidity but which also permit an accelerated rise in money supply. If one adheres to that kind of policy long enough, interest rates and credit rationing will eventually offset the original stimulus unless it reverses itself. In a stable, dynamic system, a "lean-against-the-wind" policy will moderate fluctuations, provided one reverses policy when the growth of GNP decelerates. Nevertheless, one cannot be satisfied with a policy whose quantitative aspects are so vague.

That fact may not be as disastrous as it at first appears. It may often happen that some constraint on monetary policy imposes a drastic simplification on the practical problem. For example, during a strong expansion, it may appear that from a stabilization point-of-view, one would like to have a very rapid rise in interest rates and a sharp decline in bank liquidity to induce severe credit rationing. The ambiguities of "very rapid," "sharp," and "severe" are apparent. But it may also be the case that policymakers believe that short-term interest rates should not rise more than a certain amount because they do not wish to risk imposing too great a burden on the housing industry. That consideration may impose a sufficient limitation on their action so that they need only take the actions which just avoid violating the constraint. (Of course, there is in that argument an implicit judgment that the cost in stabilization policy terms is worth the gain in housing terms, but that judgment requires much less knowledge than the one required for the calculation discussed above.)

Constraints on Monetary Policy

At other times, balance-of-payments considerations have imposed effective constraints on monetary policy. At still others, policy makers limit their action because they are afraid of generating unstable speculative movements in the securities markets. On the

expansionary side, it has sometimes been argued that banks should not be allowed to become too liquid during a recession because it would then be too difficult to impose restraint on them at a later date.

Constraints of this sort are of real significance, and they may make it possible to make monetary policy decisions at times without the knowledge that would be required if only stabilization considerations were relevant. But the constraints are not always relevant and then it seems to me to be very difficult to make a rational quantitative formulation of monetary policy in credit conditions terms. When no constraints are relevant, we tend to fall back on a rather vague credit conditions gradualism, at least until the need for more vigorous restraint becomes apparent, and then shift to drastic restraint which leads to credit crunch problems. Moreover, I suspect that at times the constraint of concern for orderly security markets is invoked in order to solve the problem of ignorance as to the required amount of change in credit conditions.

The limitations on our ability to quantify the effects of any sequence of monetary policy actions have become apparent under the severe pressures which have been at work during the past four years. It seems to me, at any rate, that no one has any clear idea of the quantitative effect of the changes in credit terms which have taken place in the past few months.

One result of that state of affairs is a stronger demand for a statement of monetary policy which runs in more readily quantifiable terms. And that brings me back to measurement. A policy defined in terms of changes in money supply or reserve variables is, by definition, a policy stated in quantifiable terms. But, of course, it does not follow that, because the policy inputs are quantifiable, we can readily measure the effects of those inputs.

One can certainly define a policy in terms of one or more monetary aggregates. But if one believes, as most of us do, that (a) demand for money is responsive to the interest rate and (b) the interest rate required to produce any target GNP is constantly changing, it is not easy to see how to choose the change in monetary aggregates required for any given economic objective. Indeed, if we could, we would have no trouble in operating and measuring a policy stated in terms of credit conditions.

Taking Advantage of the System's Automatic Stabilization Properties

But it may be that certain types of policy can reduce errors by taking advantage of the automatic stabilization properties of the system. Without pausing to argue whether it is best to operate in terms of M_1, M_2, or some reserve base magnitude, consider the use of a policy always stated in terms of changes in M_1. Suppose that policymakers lack faith in forecasting and want to exploit the automatic stabilization properties of the system. They could choose a target change in GNP for, say, the next 12 months—choosing the target on the basis of unemployment and price stability considerations. Finally, they could choose a target for money supply growth by dividing the current—or recent past—value of velocity of M_1 into the target GNP.

Provided the money demand functions were stable, they would then achieve an automatic stabilization effect about the target growth path. If demand factors on the basis of given credit conditions tended to produce a GNP in excess of the target, credit conditions would automatically tighten up. Of course, velocity would also rise. The actual growth in GNP would therefore be somewhere between the target and the GNP, which growth would have emerged with no change in credit conditions. Similar results with opposite signs would occur if demand were weak.

This kind of policy would have the advantage of producing an automatic stabilizing response to unanticipated changes in the rate of growth of demand, e.g., in periods like 1955. It would be another form of "leaning against the breeze" with a more or less built-in calibration system. Also, because it would sometimes, in effect, shorten decision lags, it would have certain advantages.

Disadvantages

This policy approach would also have four disadvantages. First, there do appear to be significant shifts in velocity produced by factors other than income, wealth, and interest rates. Those shifts would produce unintended shifts in credit conditions—sometimes, quite large ones. Those shifts would then produce destabilizing shifts in income.

Second, while I can see how one might formulate a policy in terms of one of the monetary aggregates by following some variant of the

approach which I have outlined (for which I hold no particular brief), I find it difficult to see how one could make use of more than one such aggregate or how one could deal with such matters as Regulation Q ceilings. It is not enough to say that M_1 and M_2 move together. They do so only in a very general way.

Third, as I have already noted, considerations, such as the balance of payments, mortgage markets, and security market speculations, make it necessary to give a certain amount of attention to credit market conditions in any case.

Finally, the policy I have outlined would not provide for any discretionary response to forecasted variation in the strength of demand. (It would permit variation in the target rate of growth of GNP to allow for already existing differences between actual and potential GNP.) It would, for example, call for about the same growth in GNP whether budgetary and investment forecasts indicated a boom or a recession. GNP forecasting is certainly subject to substantial errors, but it does produce useful information for policymakers, which ought not to be thrown away.

One could go one step further and adjust a policy, stated in money terms, to take account of the anticipated strength of public and private demand. But to calculate the required adjustment, one would have to know everything required for the credit conditions policy outlined above.

In short, a simplistic money supply policy would provide an additional degree of automatic stabilization, but only at the expense of accepting destabilization from shifts in the money demand function, forgoing the active use of monetary policy to offset forecasted changes in fiscal policy and private investment, and forgoing any manipulation of rate ceilings to affect the distribution of the impact of credit restraint among different sectors of the economy. To achieve a money supply policy which meets those objectives requires either the introduction of considerations very similar to those used in the credit conditions approach or reliance on theories of income determination which are—to put it mildly—still very controversial.

Those objections are not necessarily fatal; they only indicate that the problem of making policy in quantitative terms is not a simple one.

But none of those negative remarks should be taken as a defense of the present vague state of the central banker's art. We have been

making and describing policy in ways which conceal rather than reveal the logical quantitative basis for policy decisions. Our lack of firmly established knowledge about the quantitative effects of policy actions justifies a certain amount of eclecticism, but that does not justify a failure to make a reasonably clear statement of the quantitative basis for our actions. We should try to estimate the effects of a proposed course of action in quantitative terms (i.e., numerical terms, not necessarily quantity of money terms). We should be eclectic in the sense that we make those estimates in a variety of different ways—looking at our estimation procedures as alternative ways of processing the information which describes past experience.

Earlier, I outlined what I called the "income expenditure—credit conditions" approach to monetary policy. If we systematically formulated policy in those terms, we would be forced to make a clear quantitative judgment of the results to be expected from alternative policies. We would also get a clear statement of the uncertainties and the risks which follow from the pursuit of one program compared with another.

Given the uncertainties surrounding our basic forecasts and our estimates of the effects of monetary actions, we cannot expect to control the economy with any precision. We can only try to pursue policy which gives a desirable balance between the risks of excessive growth of demand and the risks of deficient growth. There are many ways to pursue that objective. One is, as I have suggested, to base one's policy on numerical estimates of the effects of policy, on explicit GNP forecasts, and on numerical estimates on the range of probable outcomes.

Finally, since money demand and supply functions would be an integral part of the process of calculating the expected impact of monetary policy actions, we would be able to provide a basis for deciding how to correct an initial program in the light of experience. We would obviously have to make adjustments in response to errors in the forecast of GNP and its components (not only in the light of quarterly GNP figures, but earlier, in response to some monthly indicators). But there is also a need to make adjustments when the credit conditions and money supply forecasts go awry. If, for example, the open market desk holds to credit conditions targets for a time and then finds that monetary aggregates exceed the projections, what should be done? Is the error due to error in the money demand functions or is there a stronger demand for credit, which

presages a stronger GNP than originally anticipated? Or was our original estimate of elasticity of investment demand to interest rate change in error? The conclusion we will reach will depend on judgments about the reliability of the elements going into the original calculations.

All that may sound very elaborate; but, in fact, one can take the approach I have suggested in some very simple ways. If one wishes, one can start by making relatively simple adjustments for the impact of credit policy to a standard GNP forecast.

Moreover, although money supply and demand functions and other implications would be built into the more elaborate prediction models, monetary aggregates can be introduced in very simple *ad hoc* ways. For example, the question "why should M_1 increase by more or less than the target change in GNP, divided by current or recent past velocity?" seems like a good one to me. There may be, in particular cases, perfectly good answers running in terms of velocity trends, constraints, and what not. The important thing is that we should ask quantitative questions about policy actions and their effects and make explicit answers to them.

DISCUSSION

ALLAN H. MELTZER

There is a large gap between monetary theory and the practice of monetary policy, as I've said a number of times. There is a larger gap between discussions of the theory of economic policy and the actual conduct of policy. When economists discuss economic policy, conclusions are very clear. Policy operations should set the market rate equal to the natural rate, provide something called the "optimum stock of money," or in the more esoteric models, move the economy to a so-called bliss point.

There may be some tenuous connection between these ideas and the activities that take place at the trading desk or at the meetings of the Open Market Committee; but, like Jim Duesenberry, I've read a lot of minutes and sat in when economists were invited to discuss policy, and I haven't seen any close connection between the activities that take place and the framework used to discuss economic policy.

One main reason for the gap is that in the theory of economic policy we always assume that we know not only what has happened, but what is going to happen as a result of any change we make. In the actual conduct of policy, we are usually a good deal more uncertain about the short-term impact of policy actions, even if we have confidence in our ability to predict the long-term effects.

To bridge the gap between theory and practice, Karl and I developed the analysis that Jim Duesenberry used today. Since Jim and I agree on main points, I want to discuss areas of agreement, rather than differences, and talk about implementation.

Need for a Quantitative Target

Let me begin by agreeing that policy decisions should be made in a way that permits the Committee to give the manager a quantitative target. I know enough about the history of the Federal Reserve to know that this proposal has been discussed many times both within and outside the System. But nothing has been done, so I plan to make some suggestions about the ways in which the conduct of policy can be changed to permit the Committee to give clearer instructions.

One of the first problems that has to be solved is the problem of definition. We are all familiar with the complaint about different

definitions of money and monetary aggregates. As Henry Wallich said yesterday, there are at least 20 different definitions. No doubt Henry is guilty of understatement. There are probably more than 20. But many of the disputes about definitions are not matters of great moment. The most important difference is of recent origin and is a consequence of the substantial rates of growth and decline in commercial bank certificates of deposit resulting from the failure to change Regulation Q. Milton Friedman, the main proponent of a definition that includes time deposits, now agrees that the amount of CD's should not be included in the definition of money. With this change, M_1 and M_2 (minus CDs) move together.

I don't know of any period in which there would be a substantial difference in policy as a result of using one rather than the other definition of money as an indicator of monetary policy. There are differences between M_1 and M_2. For example, the long-term rates of growth are very different. However, there is no sustained period in which people who looked at M_2 minus CDs would have suggested that policy was expansive while people who looked at M_1 thought policy was contractive. Disagreement about the extent to which policy was expansive or contractive might be larger at times, but again the difference would not be substantial.

Several years ago, while reviewing Cagan's work on money, I could not find any period up to 1955 in which an important error or judgment difference would have resulted from using M_1 rather than M_2 to judge the thrust of monetary policy. Although I prefer M_1, as you know, I fail to understand why economists harp on differences in definition that are of limited importance for policy.

Need for a Narrow Range in the Growth Rate of Money

Let me turn to a second area on which we may reach agreement, the choice between rules and authorities. This choice is more an apparent than a real choice. One reason is that we have to make decisions to implement a monetary rule. Another is the existence of fixed change rates. I believe that the main substantive issue in the rule vs. authority debate is the desirable amount of variability in the growth rate of the stock of money permitted during a given period. Recent experience has probably taught many people that there are limits to the acceptable or desirable amount of variability.

Senator Proxmire's proposal gives wide latitude to discretionary policy but restricts the growth rate of money, narrowly defined, to a

range of 2 to 6 percent. The Proxmire proposal avoids the pitfall of forcing sizable deflation on the economy in a peculiar attempt to compensate for inflation, although the lower end of Proxmire's range would permit slight deflation to restore equilibrium. My own preference is for a narrower range. One reason is that I believe it is undesirable to shift from the current positive expected rate of price change to a position in which the prevailing expectation is deflationary.

If we could get through the transition from expected inflation to expected deflation, it might be very desirable to have the return to cash balances from deflation that economic theorists have discussed. But our past experience gives overwhelming evidence that the transition to deflation is very difficult, and I do not want the Federal Reserve to retain the power to choose a policy that forces the price level to fall.

Again, we are faced with the gap between theory and practice. The choice of an optimal growth rate of money is of limited value if we cannot implement the choice. Until we learn a good deal more about designing policies that permit smooth transitions from where we are to where we want to be, the transition will remain an obstacle.

Another obstacle is the constraint imposed on the day-to-day conduct of policy as a result of historical developments and particularly the background and preferences of men chosen as members of Board or as managers of the open market account. One example is the concern for money market events as measured by free reserves and short-term interest rates. This concern restricts the choice of a target to measures that are available daily and that have a reasonably close connection to the actions that the manager takes in the money market. The reason is that the manager wants to observe what he has done and does not know how to operate without a target he can observe – however inaccurately – on a daily basis.

Controlling the Monetary Base

As Brunner and I have indicated elsewhere, the monetary base can be controlled effectively with the information now collected at the trading desk in New York. In fact, the manager can control the base more accurately than he can control movements of free reserves or the other money market indicators he now uses. By controlling the base, the manager controls the rate of monetary expansion suffi-

ciently well to maintain the rate within a narrow range. If we can get the Federal Reserve to give up a part of its concern for the money market, we can bridge part of the gap between theory and practice and can improve the conduct of monetary policy.

I propose, as a first step, that we reverse the present system, moving away from the use of free reserves, interest rates, or money market targets, all subject to a proviso clause, as in the announced policy of the Open Market Committee for the last several years. Instead, let the former proviso clause become the target. State the target as a growth rate of the quantity of money, or of the monetary base, or as an absolute change in the base (we can translate from one to the other). Set a range of fluctuations in interest rates as the new proviso clause. In this way, we move away from an approach based on money market or credit market conditions toward an approach based on control of money as a means of affecting economic activity and prices. By gradually widening the range of acceptable fluctuations in interest rates, we take additional steps away from the money market conception toward a system that is far more consistent with monetary theory. In this way, we start to bridge the gap between theory and policy operations.

An additional step, that Jim suggests several times in his paper, is to describe policy in quantitative terms. Anyone who has read the history of Federal Reserve policy knows that the manager is generally given vague, qualitative directions so that there is no clear way for the committee to decide whether he carried out the policy that the majority of the committee favored. One committee member may think he had; another may be sure he had not. Even those who agree on descriptive phraseology don't always have the same results in mind.

Until recently, there has been little concern about measuring what the manager has done or auditing his performance. Matters have improved slightly in recent years, and there is now a clearer idea about what the manager is directed to do. My suggestion that the Federal Reserve accept the monetary base as a target of policy and relegate fluctuations in interest rates to the proviso clause permits the Committee to describe desired policy in quantitative terms. Once that is done, the Committee can audit the manager's performance. Furthermore, the committee can move toward a more stabilizing policy by reducing the range of acceptable deviations between desired and actual policy.

By specifying a range within which interest rates are permitted to fluctuate, we pay attention to the historical concern of central bankers for day-to-day or week-to-week changes in interest rates. However, we do not allow concern for fluctuations in interest rates to interfere with the longer-range goals of monetary policy such as employment and price stability. In making this suggestion I want to distinguish two types of fluctuations in interest rates. One is the daily or weekly change that will be a subject of the proviso clause. The other is the change in interest rates that occurs during cycles. There is no reason, that I know, for expecting the use of money as a policy target to increase the size of cyclical fluctuations in interest rates.

Some Proposed Changes in Federal Reserve Arrangements

Although there is considerable evidence that exchanging the positions of money and interest rates in the proviso clause and as target of monetary policy would increase the contribution of monetary policy to economic stability, there are a number of changes in arrangements that would further improve the operating characteristics of the revised system. Some of the changes I am about to propose can be made by the Federal Reserve without seeking new legislative authority. Others require an act of Congress and are therefore difficult to accomplish. Since I have neither the time nor the knowledge to provide a complete list of desired changes, I am content to mention a few that come to mind.

First, one restriction that has little present economic justification is the maintenance of different reserve requirements for banks of different classes. Differences in requirement ratios are based on historical, not current, conditions. By eliminating differences in requirements, the Federal Reserve moves toward a less complex set of institutional arrangements and thus improves its own ability to predict the effect of its actions.

A second proposed step is the elimination of changes in reserve requirement ratios. The most recent change in reserve requirements illustrates the defects of reserve requirement ratios as policy instruments. At a time when there were about $130 million worth of excess reserves in the banking system, there is no rationale for a policy that requires banks to shift $650 million from excess to required reserves. There was no way in which the banks could affect their excess reserve during the two weeks in which they were

expected to meet the requirement other than by borrowing from a Federal Reserve or inducing the public to give up currency. The banks were forced to borrow, and there is now about $1 billion of additional borrowing. As in past periods, the borrowing remained in the System so that the banking system was able to expand the stocks of money and credit. The main effect of the reserve requirement change, as so often in the past, is on the profits of the banks. This is a rather indirect way to reduce bank expansion and hard to justify when there are more direct methods available.

A third step, a similar step, is suggested for very similar reasons. The System ought to remove reserve requirements for Treasury deposits so that the movement of Treasury balances between banks and the Federal Reserve would not cause swings in the money supply. There is nothing that the banks can do to attract Treasury deposits; removing the reserve requirement cannot lead banks to bid for Treasury deposits in any effective way. With taxes and expenditures given, or set by congressional policy, the Treasury alone decides where it wishes to keep its balances and when the balances are going to be withdrawn. Removing the reserve requirement ratio is a step in the direction of institutional simplification and has the desirable side effect of removing the need for defensive operations by the Federal Reserve.

A fourth step, one that is being discussed at the moment, is to put borrowing arrangements on a more rational basis. A very cumbersome proposal has been produced by the System. The proposal requires judgments about the purpose that brings the borrowing bank to the Federal Reserve bank, the size of the seasonal swing in deposits at the borrowing bank, etc. These are matters that are of no concern to the Federal Reserve when acting as a lender of last resort. A much simpler borrowing arrangement has been proposed many times in the past. The banks should be allowed to borrow at a penalty rate.

Fifth, and currently the most important change of all, is to remove the ceiling rate on time deposits. Regulation Q is a mischievous device that confuses the Open Market Committee. The confusion arises because of the neglect of differences between nominal and real interest rates. Regulation Q rates are nominal rates. Banks find numerous ways to circumvent the regulations. They offer additional services to depositors; they sell participations in loans; they change the required size of compensating balances. These and other

adjustments permit the banks to offset part of the effect of Regulation Q. More importantly, the change in market rates relative to Regulation Q ceiling rates causes a change in the stock of money, narrowly defined, relative to the stock of money defined to include time deposits, and changes the relationship between money and credit. Regulation Q is a main cause of diverging growth rates of monetary aggregates during cycles. The divergence in growth rates misleads the Federal Reserve and others, and contributes to the uncertainty about the direction of monetary policy.

A Second Group of Proposed Changes

My second group of proposed changes includes those that are more difficult to obtain. Though no less important, I discuss these proposals more briefly. The first is important for the development of a rational world monetary system. We need a mechanism for adjusting to payment imbalances that reduces the domestic instability caused by the imbalances.

A second source of instability that should be removed is the practice of the home finance industry of holding short-term liabilities and long-term assets. One of the lessons of monetary history that has been repeated most frequently is that this practice leads to insolvency. Fear of forcing insolvency on an important segment of the financial industry inhibits the central bank from taking action.

My solution to the problem is relatively simple. Both the banking system and the home finance industry should be open to entry. Banks should be permitted to acquire savings and loan associations, and savings and loans should be permitted to acquire banks. Recent legislative proposals that threaten to stop this process are undesirable.

Finally, let me close with an economist's favorite recommendation. The payment of interest on demand deposits should be permitted. Permitting interest payments would reduce the size of shifts between time and demand accounts when rates change, and would improve economic welfare. Once again, we take a step toward reducing the gap between theory and practice.

Each of you may not accept my list of priorities or my solutions. I hope you will agree, however, that by removing some of the restrictions we have imposed on the operation of the monetary system, we can develop a system that adjusts more flexibly. Recent

changes have made institutional arrangement increasingly complex, have made monetary policies more difficult to design and interpret, and have increased the gap between theory and practice.

A Neo-Keynesian View of Monetary Policy

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Those of us who take an essentially Keynesian view in macroeconomics are often accused, somewhat unjustly, I believe, of minimizing the importance of monetary forces. That contention was probably true 20 years ago for a variety of historical and institutional reasons. But much water has passed over the dam since that time, and I believe it would now be difficult to find an example of the popular stereotype of the Keynesian economist who thinks fiscal policy is all-important and monetary policy is of no consequence. After all, in Keynesian analysis the power of monetary policy depends on the values of certain parameters, and if one is open-minded, he must be prepared to alter his views as empirical evidence accumulates. In some respects, this process has already proceeded quite far—some of the simulations performed with the FRB-MIT model, which is decidedly Keynesian in spirit, show monetary policy having very powerful effects indeed, albeit operating with somewhat disconcerting lags.

Thus, there is nothing inherent in the Keynesian view of the world that commits its adherents to the belief that monetary policy is weak. What is, it seems to me, distinctive about Keynesianism is the view that fiscal policy is capable of exerting very significant independent effects—that there are, broadly speaking, two instruments of stabilization policy, fiscal policy and monetary policy, and that the mix of the two is important. Indeed, I suppose most Keynesians would assign primacy to fiscal policy, although even this need not inevitably be the case. But in a certain fundamental sense, I believe the issue separating the Keynesians and the so-called Monetarist School relates more to fiscal than to monetary policy, since some Monetarists seem to deny that fiscal policy is capable of exerting any significant independent effects. In addition, the neo-Keynesian view seems to differ significantly from that of the Monetarists with respect to the role played by the stock of money in the process by which monetary policy affects the economy.

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In this paper, I shall attempt to sketch what I would describe as a neo-Keynesian view of the process by which monetary and fiscal policy produce their effects on the economy and to evaluate some aspects of the recent controversy regarding stabilization policy in the context of this view. I shall then advance some suggestions concerning the conduct of monetary policy.

I. *The Transmission Mechanism of Monetary Policy*

There appear to be several elements involved in the mechanism by which the effects of changes in monetary policy are transmitted to income, employment, and prices.

Portfolio Adjustments

The major advance in monetary theory in recent years has been the development of a systematic theory of portfolio adjustments involving financial and physical assets. This theory of portfolio adjustments fits very comfortably within a Keynesian framework and indeed greatly enriches Keynesian analysis and increases its explanatory power. The *General Theory,* itself, embodied a rudimentary theory of portfolio adjustments: the way in which the public divided its financial wealth between bonds and speculative cash balances depended on "the" rate of interest. The interest rate then affected investment expenditure, but Keynes failed to incorporate the stock of real capital into his analysis and relate it to the flow of investment spending. Indeed, many of the undoubted shortcomings of the *General Theory* stem from the failure to take account of capital accumulation.

The way in which monetary policy induces portfolio adjustments which will, in due course, affect income and employment may be described briefly as follows: A purchase of, say, Treasury bills by the Federal Reserve will directly lower the yield on bills and, by a process of arbitrage involving a chain of portfolio substitutions, will exert downward pressure on interest rates on financial assets generally. Moreover—and more important—the expansion of bank reserves will enable the banking system to expand its assets. If the discount rate is unchanged, the banks can be expected to use some portion of the addition to their reserves to strengthen their free reserve position by repaying borrowings at the Federal Reserve and perhaps by adding to their excess reserves. But the bulk of the addition to reserves will ordinarily be used to make loan accommodation available on more

favorable terms, and to buy securities, thereby exerting a further downward effect on security yields.

With the expected yield on a unit of real capital initially unchanged, the decline in the yields on financial assets, and the more favorable terms on which new debt can be issued, the balance sheets of households and businesses will be thrown out of equilibrium. The adjustment toward a new equilibrium will take the form of a sale of existing financial assets and the issuance of new debt to acquire real capital and claims thereto. This will raise the price of existing units of real capital—or equity claims against these units—relative to the (initially unchanged) cost of producing new units, thereby opening up a gap between desired and actual stocks of capital, a gap that will gradually be closed by the production of new capital goods. This stock adjustment approach is readily applicable, with some variations to suit the circumstances, to the demands for a wide variety of both business and consumer capital—including plant and equipment, inventories, residential construction, and consumer durable goods.

Wealth Effects

Since monetary policy operates entirely through voluntary transactions involving swaps of one financial asset for another, it does not add to wealth by creating assets to which there are no corresponding liabilities. Nevertheless, monetary policy does have wealth effects, which may be of considerable importance. An expansionary monetary policy lowers the capitalization rates employed in valuing expected income streams, thereby raising the market value of outstanding bonds as well as real wealth and equity claims thereto. In part, this strengthens the impact on economic activity of the portfolio adjustments, already referred to, by increasing the size of the net portfolios available for allocation. In addition, the increase in household wealth may significantly stimulate consumption. Indeed, in a recent version of the FRB-MIT model, the effect on consumption resulting from the induced change in the value of common stock equities held by households accounts for 35 to 45 percent of the initial impact of monetary policy in some simulations.

Credit Availability Effects

The portfolio and wealth effects appear to constitute the basic channels through which monetary policy has its initial impact on economic activity. In addition, however, the institutional arrange-

ments for providing financing to certain sectors of the economy may be such as to give monetary policy a special leverage over the availability of credit to these sectors, thereby affecting their ability to spend. It is perhaps most illuminating to discuss changes in credit availability in the context of a restrictive monetary policy.

No doubt changes in credit availability affect many categories of expenditures to some degree. But the sector in which they are most clearly of major importance is homebuilding. Even in the absence of the rather unique institutional arrangements for its financing, housing demand might be significantly affected by monetary policy as changes in mortgage interest rates altered the desired housing stock. But as postwar experience has repeatedly shown, most dramatically in the "credit crunch" of 1966, changes in mortgage credit availability may greatly strengthen the impact of restrictive monetary policy on homebuilding and cause the effects to occur much more rapidly than the stock-adjustment mechanism would imply. There are three different ways in which mortgage credit availability may be affected by a restrictive monetary policy.

First, commercial banks may raise interest rates on consumer-type time deposits to attract funds to meet the demands of their customers. If savings and loan associations do not raise the rates paid to their depositors or raise them less than the banks raise their rates, households may rechannel their saving flows away from the savings and loan associations and toward the banks—or may even withdraw existing savings from savings and loan associations and shift them to banks. Even if, as has recently been the case, the Regulation Q ceilings are used to prevent the banks from attracting household saving away from savings and loan associations, a rise in short- and intermediate-term open-market interest rates may set in motion a process of "disintermediation," with savers channelling their funds away from fixed-value redeemable claims generally and directly into the securities markets. Either of these processes which cut down the flows of funds to savings and loan associations can have, of course, a powerful effect on housing activity. With frozen portfolios of older mortgages made at lower interest rates than currently prevail, these institutions may find it difficult to pay substantially higher interest rates to attract or hold funds even if the Home Loan Bank Board will allow them to.

Second, when commercial banks feel the effects of credit restraint, they normally reduce their mortgage lending in order to be able to accommodate the needs of their business borrowers.

Third, as interest rates rise, yields on corporate bonds typically rise relative to mortgage interest rates, and some institutional investors, such as life insurance companies, shift the composition of their investment flows away from mortgages and toward corporate bonds, which, in any case, have investment properties which make them more attractive than mortgages at equivalent yields. This tendency may be exacerbated by unrealistically low interest rate ceilings on FHA and VA mortgages and by State usury laws applicable to conventional mortgages.

The way in which mortgage credit availability impinges on homebuilding has changed with the passage of time. In the 1950's, when FHA and VA financing was more important than it has been recently and when the FHA and VA interest rate ceilings were more rigid than they are now, restrictive monetary policy affected housing mainly by diverting the flows of funds coming from investors having diversified portfolios away from mortgages and toward corporate securities. That is, the third effect listed above was the most important. In 1966, when homebuilding was drastically curtailed by monetary restraint, all of the effects were operating, but the first—the drain of funds away from savings and loan associations—was by far the most important. In 1968 and 1969, interest rates have risen sufficiently to arouse concern about a repetition of the 1966 experience. But while housing seems currently to be feeling the effects of tight money, it has proved to be much less vulnerable than was generally expected. There are several reasons for this, but the one most worthy of mention is the adoption by the Federal Reserve and the various Federal housing agencies of a number of measures designed to cushion or offset the effects of high interest rates on housing activity.

Secondary Effects

Working through portfolio effects, wealth effects, and credit availability effects, the initial impacts of monetary policy will generate additional income, and this will further increase the demand for consumer nondurable goods and services. It will also expand the demand for the services of durable goods, thereby giving a further boost to the desired stocks of these goods. Thus, the familiar magnification of demand through multiplier and accelerator effects comes into play. It is often overlooked that the sharp reduction in the multiplier since the 1930's as a result of the greatly increased income-sensitivity of the tax-transfer system has presumably had

important effects on the working of monetary as well as fiscal policy. Indeed, I would judge this increase in "built-in stability" through the fiscal system to be a major factor making monetary policy less potent today than in earlier times.

A further chain of secondary effects is set in motion as the rise in income increases demands for demand deposits and currency for transactions purposes, thereby reversing the initial decline in interest rates. This induced rise in interest rates will exert a dampening effect on the expansion by a partial reversal of the forces that initially triggered the rise in income. Whether or not this secondary effect will carry interest rates all the way back to their initial level (or higher) is an open question, concerning which I shall have some comments later on in this paper.

Effects on Real Output vs. Prices

I think almost all economists of a Keynesian persuasion would accept the proposition that the way in which the effect of an increase in demand is divided between output response and price-level response depends on the way it impinges on productive capacity. Thus, expansion caused by monetary policy is generally no more or no less inflationary than expansion caused by fiscal policy (or, for that matter, by an autonomous increase in private demand). This statement needs to be qualified in a couple of minor respects. First, monetary expansion might be less inflationary than an equivalent amount of fiscal expansion over the longer run if it resulted in more investment, thereby causing labor productivity to increase more rapidly. Second, the impacts of monetary policy are distributed among sectors in a different way from those of fiscal policy; and, with less than perfect mobility of resources, the inflationary effect might depend to some degree on this distribution.

II. *Some Controversial Issues*

I would now like to discuss several of the issues that seem to be at the heart of the recent controversy regarding monetary and fiscal policy.

The Effectiveness of Fiscal Policy

For the purpose of isolating the effects of fiscal policy from those of monetary policy, I believe a "pure" fiscal policy action should be defined as a change in government expenditures or a change in tax rates without any accompanying change in the instruments of monetary policy. Under our present institutional set-up, the instruments of monetary policy are open-market operations, changes in reserve requirements, and changes in the Federal Reserve discount rate. Open-market operations may be viewed as governing unborrowed reserves plus currency, with defensive operations offsetting undesired changes in this total that would result from erratic variations in float, gold stock, etc.

An increase in government purchases of goods and services, with tax rates constant, would affect the economy by three different routes. First, there would be a direct expansionary *income effect* resulting from the purchase of output by the government. Second, there would be an expansionary *wealth effect* as the private sector, experiencing an increment to its wealth entirely in the form of net claims against the government, increased its demand for real capital in an effort to diversify its portfolios.[1] These income and wealth effects would set off a multiplier-accelerator process of economic expansion. This expansion, in turn, would activate a partially offsetting monetary effect as the rise in income increased the demand for money. If the dial settings of the monetary instruments remained unchanged, this would drive up interest rates. The rise in interest rates would cause some reductions in those types of expenditures that were sensitive to interest rates through portfolio, wealth, and availability effects.

The wealth effect of fiscal policy may be quite powerful, particularly because it is cumulative—that is, it continues to operate until the budget has been brought back into balance, thereby shutting off the increase in net claims against the government. But, unfortunately, no effort that I know of has been made to incorporate it in an empirical model; consequently there is no way to formulate even a crude estimate of its importance.

If we neglect the wealth effect simply because we do not know how much weight to give it, we are left with the income effect and

[1] For an extensive theoretical treatment of the wealth effect, see James Tobin, "An Essay on the Principles of Debt Management," in *Fiscal and Debt Management Policies* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963), pp. 142-218.

the offsetting monetary effect. The monetary effect will be greater (a) the greater the proportion of expenditures in GNP that are affected by interest rates, (b) the greater (in absolute value) is the average interest elasticity of these expenditures, (c) the greater is the income elasticity of demand for money, (d) the smaller (in absolute value) is the interest elasticity of demand for money and (e) the smaller is the interest elasticity of the supply of money.[2]

Only if the interest elasticities of both the demand for and supply of money are zero will the monetary effect completely cancel out the income effect.[3] That is, there will be some leeway for fiscal policy to increase income if a rise in interest rates either induces economization in the use of demand deposits and currency or causes the supply of such monetary assets to expand (for example, by inducing banks to increase their borrowings at the Federal Reserve). Since the empirical evidence is overwhelming that both money demand and money supply possess some degree of interest elasticity, it seems clear that fiscal policy is capable of exerting an independent effect on income. This conclusion is heavily supported by evidence derived from large structural models of the U.S. economy. For example, while there is no unique multiplier for fiscal policy in the FRB-MIT model, a number of simulations with that model show fiscal policy to have very substantial independent effects on economic activity.

[2]It is possible to derive a more elaborate version of the static Keynesian multiplier incorporating the monetary effect. The following is such a multiplier equation.

$$\frac{dY}{dG} = \frac{1}{1 - e + \dfrac{\dfrac{I}{Y}\eta_{Ir}\eta_{LY}}{\eta_{Lr} - \eta_{Mr}}}$$

Here Y is GNP; G is government purchases; e is the marginal propensity to spend out of GNP; I/Y is the proportion of GNP that is sensitive to interest rates; η_{Ir} (<0) is the average interest elasticity of interest-sensitive expenditures; η_{Lr} (<0) is the interest elasticity of demand for money; η_{Mr} (>0) is the interest elasticity of supply of money; and η_{LY} (>0) is the income elasticity of demand for money. The usual simple Keynesian multiplier without allowance for monetary effect is $1/(1 - e)$. The monetary effect is incorporated in the third term (taking the form of a fraction) in the denominator of the equation above. Since this term is positive, its presence reduces the size of the multiplier. The statement in the text above regarding the factors determining the size of the monetary effect is based on this expression.

[3]In this case, the supply of money may be regarded as exogenously determined. If the demand for money depends only on income, income will have to change sufficiently to eliminate any discrepancies that arise between the demand for and supply of money. Thus, money controls income, and fiscal policy is incapable of affecting it. The reader will note that if both η_{Mr} and η_{Lr} are zero, the multiplier for fiscal policy given in footnote 2 above becomes zero.

It is often pointed out, especially by those who emphasize the role of money in the economy, that the effect produced by a stimulative fiscal action is dependent on the way in which the resulting deficit is financed. This is in a sense true, but this way of putting it is somewhat misleading. For example, it is sometimes stated that, in order to achieve the full Keynesian multiplier effect, the entire deficit must be financed by creating money—some statements even say high-powered money. What is necessary to achieve this result is to create enough money to satisfy the demand for money at the new higher level of income and the initial level of interest rates.

Ordinarily, the required increase in the supply of money will be only a fraction of the deficit, and the required increase in high-powered money will be an even smaller fraction. Moreover, there is a serious stock-flow problem. When income reaches its new equilibrium in a stable economy, the increased deficit (a flow) will be financed out of the excess of saving over investment generated by the rise in income. Additional demand deposits and currency are needed to meet the increased transaction demand at the higher income level, but this requires only a single increase in the money stock. In reality, there may be further complexities that require a modification of this principle—for example, if the demand for money depends on wealth as well as income or if the price level is determined by a Phillips Curve mechanism so that prices are not merely higher but are increasing more rapidly at higher levels of income.

Nevertheless, the principle is, I believe, basically correct. Rather than saying that the multiplier depends on how the deficit is financed, I think it is more accurate to say that it depends on the kind of monetary policy that accompanies the fiscal action. If monetary policy is such as to hold interest rates approximately constant, something analogous to the full Keynesian multiplier (with no monetary feedback) will be realized; if it allows interest rates to rise, the multiplier will be somewhat smaller; if it causes interest rates to fall, the multiplier will be somewhat greater.[4]

[4]If fiscal policy has a wealth effect working through changes in the public's holdings of net claims against the government, it seems quite likely that the magnitude of this effect will depend on the form taken by the change in net claims. For example, a change in public holdings of short-term debt may have a larger effect on aggregate demand than an equal change in holdings of long-term debt. To the extent that this is the case, debt management policies which change the maturity composition of the public's holdings of government debt may have important economic effects. But there is no reason to focus special attention on the composition of increments to the debt resulting from deficits, since the increment to the debt in any year is only a tiny fraction of the total debt to be managed. In any case, as indicated earlier, we are entirely neglecting the wealth effect because in the present state of knowledge there is no way of forming a judgment concerning its importance.

The Role of Money

Although I have used the term "money" in my discussion above, I am not sure the term is a very useful or meaningful one. Money (in the sense of means of payment) has two components, demand deposits and currency. Those two components are not, however, perfect substitutes—they are held, by and large, by different kinds of spending units; demand for them responds in different ways to different stimuli; and, because they are subject to markedly different reserve requirements, shifts between them alter the total amount of credit that can be supplied by the financial system. They are best regarded as two different financial assets and treated as such.

Moreover, there is no apparent reason why "money"—whether in the form of currency or demand deposits—is more or less important than any of the myriad other financial assets that exist. It is now generally agreed that the demands for demand deposits and currency depend on the yields available on alternative assets and on income or related measures (and possibly, but by no means certainly, on wealth). Thus, the quantities of currency and demand deposits held by the public are generally agreed to be endogenous variables determined in a general equilibrium setting along with the prices and quantities of other financial and real assets.

Nor is there any appreciable evidence that money—whether in the form of demand deposits or currency—affects peoples' spending on goods and services directly. Such empirical evidence as there is suggests that people change their expenditures on goods and services because (a) their income changes; (b) their wealth changes; (c) their portfolios are thrown out of equilibrium by changes in relative yields on real and financial assets by actions taken by the monetary or fiscal authorities; (d) credit availability changes for institutional reasons altering in one direction or the other their ability to finance expenditures they want to make; or (e) their propensities to spend or their preferences for different kinds of assets change for essentially exogenous reasons, such as changes in tastes, changes in technology, and so on. That changes in the stock of money *per se* would affect spending seems to me highly improbable.

Of course, if changes in stocks of demand deposits and currency—or the combination of the two—were tightly linked to those changes in yields, in wealth, and in credit availability through which monetary policy operates, changes in the stocks of these monetary

assets might be highly useful measures of the thrust of policy even though they played no part in the causal nexus. But this, too, I think is unlikely. In a highly sophisticated financial system such as ours, in which new financial instruments and practices are constantly being introduced, it seems highly improbable that the demands for monetary assets are simple and stable functions of a few unchanging variables.

The many empirical studies of the demand for money that have been made in recent years have generally proved incapable of differentiating among alternative hypotheses. Consequently, one is free to choose among a variety of possible theories of the demand for money. The one that appeals to me is the hypothesis that money (i.e., demand deposits and currency) is dominated by time deposits and very short-dated securities, with the result that it is not a significant portion of permanent portfolios. This leaves the demand for monetary assets as an interest-elastic transactions demand along the lines postulated by Baumol and by Tobin.[5]

Such an explanation, however, makes sense only for relatively large business firms and wealthy individuals. It does not seem applicable to smaller units. Among such units, I suspect that the general rise in interest rates that has been going on for the past two decades has pushed these rates successively above the thresholds of awareness of different groups of people, causing them to abandon their careless habit of foregoing income by holding excessive cash balances. If I am right, this behavior is probably not readily reversible if interest rates should fall. It seems to me that there is still a substantial element of mystery about the demand for monetary assets—mystery that will probably be resolved, if at all, only on the basis of extensive study of the behavior of the cash-holdings of micro-units.

Relationship Between Changes in Money and Changes in Income

None of the above should be taken to mean that there is no relation between changes in demand deposits and currency and changes in income. Indeed, I believe there are three such relationships, which are very difficult to disentangle.

First, an expansionary monetary policy that stimulated increased spending and income through portfolio effects, wealth effects, and

[5] See W. J. Baumol, "The Transactions Demand for Cash: An Inventory Theoretic Approach," *Quarterly Journal of Economics*, LXVI, November 1952, pp. 545-56; James Tobin, "The Interest Elasticity of the Transactions Demand for Cash," *Review of Economics and Statistics*, XXXVIII, August 1956, pp. 241-47.

credit availability effects would bring in its wake an increase in supplies of demand deposits and currency. This would be a sideshow rather than the main event, but it would nevertheless occur. But the size of the increase associated with a given stimulus might vary considerably from one situation to another.

Second, a rise in income caused by fiscal policy or by an autonomous shift of private demand, with the monetary dials unchanged, would react back on the money supply in three different ways.[6] (1) The rise in interest rates caused by the rise in income would cause the banks to increase their borrowings from the Federal Reserve and perhaps to economize on excess reserves. (2) The rise in market interest rates would cause investors to shift funds from time deposits and similar claims into securities if, as is likely, the interest rates on these claims did not rise fully in pace with market rates. This would cause the quantity of demand deposits to increase as investors withdrew funds from time accounts and paid them over to sellers of securities for deposit in demand accounts. (3) If banks and related institutions raised rates on time-deposit type claims, some holders of noninterest-bearing demand deposits would be induced to shift funds to time accounts. To the extent that issuers of these claims held cash reserves against them, the amount of reserves available to support demand deposits would be reduced, requiring a contraction in these deposits. Effects (1) and (2) would cause the money supply to increase, while effect (3) would cause it to fall. It seems likely that (1) and (2) would outweigh (3), leading to an increase in the supply of monetary assets. The probability of this outcome would be increased if the Federal Reserve was laggard in adjusting Regulation Q ceilings. Indeed, a rigid Regulation Q ceiling would completely immobilize effect (3) while maximizing the size of effect (2).

Third, under the rubric of "meeting the needs of trade" or "leaning against the wind," the Federal Reserve has, at times, adjusted the supply of reserves to accommodate, or partially accommodate, changes in the demand for money brought about by changes in income, thereby creating a third chain of causation running from income to money supply.

With perhaps three relations between money and income present at the same time—one running from money to income and two

[6]This discussion is based on an analysis developed in W. L. Smith, "Time Deposits, Free Reserves, and Monetary Policy," in Giulio Pontecoroo, R. P. Shay, and A. G. Hart (eds.), *Issues in Banking and Monetary Analysis* (New York: Holt, Rinehart and Winston, Inc., 1967), pp. 79-113.

running from income to money—it is likely to be almost impossible to tell what is going on by direct observation. And, as Tobin has shown, in such a complex dynamic situation, it is almost impossible to infer anything conclusive about causation by studying the lags.[7]

Does Easy Money Cause Interest Rates to Rise?

One of the supposedly startling propositions that has been advanced recently is the notion that an easing of monetary policy—commonly measured in terms of the rate of increase in the money stock—will cause interest rates to rise and, conversely, that a tightening of monetary policy will cause interest rates to fall. To be sure, if the rate of growth of the money stock is accelerated, interest rates will decline at first. But before long, money income will begin to grow so rapidly that the resulting increase in the demand for money will, it is contended, pull interest rates back up above the level from which they originally started.

In the first place, this possibility has long been recognized in Keynesian economics. In a static Keynesian model it is possible for the IS curve to have a positive slope, with stability conditions requiring only that this slope be less than that of the LM curve. This could happen, for example, if income had a strong effect on investment.[8] In such a situation, a shift to the right of the LM curve, which might be caused by an increase in the money stock, would cause the equilibrium interest rate to rise. A more realistic possibility is that the economy contains endogenous cycle-generators of the accelerator or stock-adjustment type, which cause income to respond so vigorously to a stimulative monetary policy that interest rates rise above their original level at an ensuing cyclical peak.

There is another chain of causation, working through the effects of inflation on nominal interest rates, which might cause a decline in real interest rates to be associated with a rise in nominal interest

[7]James Tobin, "Money and Income: Post Hoc Propter Hoc?" (mimeographed); also W. C. Brainard and James Tobin, "Pitfalls in Financial Model Building," *American Economic Review,* LVIII, May 1968, pp. 99-122.

[8]The actual condition required is that the sum of the marginal propensities to consume and invest must exceed one, but (as a condition for stability) be less than one plus a term measuring the size of the monetary feedback. (Even if the two propensities totaled less than unity, the IS curve could slope upward if a rise in interest rates caused total spending to rise. But this could occur only on the remote chance that the income effect dominated the substitution effect in saving behavior so powerfully that a rise in interest rates caused consumption to increase by more than it caused investment to decline.)

rates. This possibility has generally been neglected by Keynesians, but it is in no way inconsistent with Keynesian analysis. An expansionary monetary policy, which lowers nominal interest rates (and real interest rates) initially, will push the economy up the Phillips Curve, thus causing prices to rise more rapidly. As the increase in the actual rate of inflation generates a rise in the anticipated future rate of inflation, an inflation premium may get built into interest rates, causing nominal interest rates to rise. It seems possible that nominal interest rates could be pushed above their original level even though real interest rates remain below this level. This outcome would be more likely (a) the greater the expansionary effect of a given fall in the real rate of interest on real income, (b) the greater the decline in unemployment caused by a given increase in real income, (c) the greater the increase in the rate of inflation caused by a given decline in unemployment, and (d) the more sensitive the response of the anticipated rate of inflation to a change in the actual rate of inflation.[9] The probability that nominal interest rates would be pushed above their initial level by this mechanism is very difficult to evaluate, however, primarily because we know very little about the extent to which, and the speed with which, an increase in the actual rate of inflation gets translated into an increase in the anticipated rate of inflation.

Thus, the notion that an expansionary monetary policy would ultimately cause nominal interest rates to rise above their initial level is in no way inconsistent with Keynesian views. Whether such a phenomenon actually occurs is a different matter. With fiscal policy changing and with the strength of private demand changing, it is not safe to conclude that, because an easing of monetary policy was

[9] Beginning with the equation $r = r' + p_e$, which expresses the relation between the nominal interest rate (r), the real interest rate (r') and the anticipated rate of inflation (p_e), the following expression can be rather easily derived.

$$\frac{dr}{dr'} = 1 + m\frac{dI}{dr'}\frac{du}{dY}\frac{dp}{du}\frac{dp_e}{dp}$$

Here m is the multiplier; dI/dr' is the response of interest-sensitive expenditures to a change in the real rate of interest; du/dY is the response of the unemployment rate to a change in real GNP; dp/du is the response of the rate of inflation to a change in the unemployment rate (i.e., the slope of the Phillips Curve); and dp_e/dp is the response of the anticipated rate of inflation to a change in the actual rate of inflation. Since three of the components of the second term on the right-hand side of the equation (dI/dr', du/dY, and dp/du) take on negative values, the second term as a whole is negative. Whether a fall in the real rate of interest will cause the nominal rate of interest to rise or fall depends on whether the second term on the right is larger or smaller than unity.

followed at some later time by a rise of interest rates above their initial level, the easing of monetary policy *caused* the rise in interest rates. The best evidence I have seen is from simulations with the FRB-MIT model which show that an injection of bank reserves causes interest rates to fall sharply at first and then rise gradually but only part of the way back to their original level. But, of course, simulations starting from a different initial position might show different results. In all probability, the phenomenon in question occurs under some conditions but not under others.

III. *Suggestions Regarding Policy*

At the very beginning of this discussion of the conduct of monetary policy, let me make clear that I am not talking about the issue of rules versus discretion. That is a different subject, which I will discuss briefly at the conclusion of my paper. Assuming that the Federal Reserve will continue to conduct a discretionary policy, let us consider what is the best way to proceed with that task.

It seems to me that much of the recent literature on monetary policy has been obsessed with a search for a magic touchstone—some measure of the impact of monetary forces that can be used as the sole guide in the conduct of policy. Unfortunately, I don't believe there is such a touchstone—the world is too complicated and we know too little about it for that. There is a second related obsession with the problem of characterizing monetary policy. Is it "tight" or "easy"? Is it "tighter" or "easier" today than it was, say, six months

The first of these questions is clearly a matter of judgment and opinion. The second, comparative form of the question sounds more capable of a scientific answer, but in fact I think it is equally unanswerable. Does it mean, "Is monetary policy contributing more to aggregate demand today than it was six months ago?" If it does mean that—and I can think of no other interpretation—I wouldn't have the faintest idea how to go about answering it. The problem facing the Federal Reserve, however, is not how to characterize monetary policy but how to carry it out, and this puts things in a somewhat different light.

Since monetary policy affects economic activity with substantial lags, policy must clearly be based on forecasts of future economic

conditions. While our knowledge has improved considerably, we still cannot be very sure about the lags, which undoubtedly depend upon underlying conditions. Moreover, the lags vary from sector to sector. It seems quite clear that monetary policy can affect homebuilding quite rapidly, at least under some conditions, if the dials of policy are adjusted in the right way. The lags in the effects on the other sectors appear to be considerably longer. Forecasting is also a difficult task, but there is no way to escape the need for it. Not the least of the difficulties of monetary policy, as has been demonstrated several times in the last three years or so, is the forecasting of fiscal policy.

While the ultimate goals of policy are high employment, price stability, the rate of growth of output, and so on, these cannot be used as immediate guides to policy, because it takes so long for policy measures to affect them. The authorities must choose as guides to policy some more immediate and more specifically monetary variables that appear to be related to the goals they are trying to achieve.

There are a number of monetary aggregates that the Federal Reserve can control with varying degrees of precision if it chooses to do so. It can obviously control its portfolio of securities exactly, and it can control unborrowed reserves plus currency outside member banks quite closely by employing defensive open-market operations to offset changes in uncontrollable factors affecting reserves, such as float, gold stock, Treasury deposits at Federal Reserve banks, etc. It can probably control total reserves plus currency (the monetary base) fairly accurately either by using open-market operations to offset changes in member bank borrowing or by changing the administration of discount policy to reduce the fluctuations in borrowing. The stock of demand deposits and currency would be more difficult to control, but I suspect that its average value over a quarter's time could be controlled fairly satisfactorily.

Alternatively, policy could be directed at regulating interest rates, although some interest rates would be easier to control than others. The Treasury bill rate could be controlled with any desired degree of accuracy under present operating procedures, because the Federal Reserve deals directly in the Treasury bill market. By a shift in its operating procedures, the Federal Reserve could control the yield on some other maturity of Federal debt. I believe it could, instead, maintain fairly close control of a variety of alternative interest rates on private debt—such as the Aaa corporate bond yield—although it

would have to influence such rates indirectly unless it were to deal in private debt.

The basic issue of monetary policy is: Should the Federal Reserve focus primarily on controlling some monetary aggregate or should it focus on controlling interest rates? I believe there is a very strong *prima facie* case for a policy that is oriented toward interest rates. The reason is that the portfolio effects, wealth effects, and credit availability effects through which the impacts of monetary policy are transmitted to the economy are better measured by changes in interest rates than by changes in monetary aggregates. The vast bulk of the empirical evidence supports this view, indicating that it is through interest rates that monetary policy affects expenditures on goods and services. Indeed, I know of no evidence that any monetary aggregate that the Federal Reserve could control has an effect on expenditures.

Of course, if there were tight and well understood linkages between some monetary aggregate--say, the stock of demand deposits and currency--and interest rates, it would matter little which the Federal Reserve attempted to control, because a money target would imply an interest rate target. There are indeed linkages between monetary aggregates and interest rates—these linkages are, in my judgment, sufficient to prevent the Federal Reserve from controlling both monetary aggregates and interest rates except to a very limited extent. But the linkages are not well understood and are subject to change as a result of financial innovations and changes in patterns of financial behavior. Consequently, it does make a difference whether the Federal Reserve selects a monetary aggregate or an interest rate as a guide to policy.

Advantages of Treasury Bill Rate as a Guide to Policy

My specific suggestion is that the Federal Reserve focus on the Treasury bill rate as its basic guide for monetary policy. There are several advantages in this approach. First, the Federal Reserve can, without any basic change in its operating procedures, control the Treasury bill rate with virtually any degree of accuracy it desires. Second, there are many occasions on which the bill rate must be a focus of attention anyway, because it is the key short-term rate affecting international capital flows. Third, the bill rate is closely related to market interest rates on those forms of short- and intermediate-term debt that compete with fixed-value redeemable

claims and are therefore of critical importance for the availability of mortgage funds. Fourth, there is considerable evidence that the bill rate works through an expectational mechanism to affect those long-term rates that are important in determining the cost of capital to business firms, State and local governments, and home buyers. Moreover, the wealth effect of monetary policy works through capitalization rates that would be indirectly affected by a policy aimed in the first instance at the Treasury bill rate.

Of course, the bill rate target would have to be selected on the basis of a forecast of economic activity several quarters ahead, including a forecast of fiscal policy. One could, for example, use a model such as the FRB-MIT model to estimate a pattern of behavior of the bill rate that could be expected to achieve the desired performance of the economy over the next three or four quarters, given the anticipated fiscal policy. This target could then be adjusted on the basis of special factors or judgmental considerations. I would not propose to peg the bill rate exactly but to establish a range of, say, 20 basis points within which it would be permitted to fluctuate. The bill rate target would, of course, be reexamined at each meeting of the FOMC on the basis of the latest forecast of the economic outlook.

I would not, however, adhere dogmatically to such a "bills-only" policy. If long-term interest rates should fail to respond in the anticipated way to a change in the bill rate target, I would not hesitate to nudge them along by open-market operations in long-term Treasury securities. Nor would I entirely neglect monetary aggregates. I would want to supplement the bill rate target with some kind of quantitative guideline to prevent gross mistakes in policy. In the case of a non-growing economy, using the stock of demand deposits and currency as the quantitative guideline, the matter is relatively simple—one should be sure that this stock increases when the economy is below full employment and declines when it is above full employment. The problem here is one of distinguishing between automatic and discretionary elements of policy—similar to the problem in fiscal policy that gave rise to the full-employment surplus concept. When the economy is weak, for example, interest rates decline automatically even if the monetary authorities do nothing, and it is desirable to be sure that the authorities are reinforcing this tendency by discretionary measures rather than offsetting it as they sometimes appear to have done in the past.

The problem of developing a suitable monetary guideline is considerably more complicated in the case of a growing economy. My procedure would be to begin by estimating a "normal" rate of monetary growth. For example, if the target point on the Phillips Curve is 4 percent unemployment which is judged to be associated with 2 percent inflation, if the rate of growth of productive capacity under full employment conditions is estimated to be 4 percent per year, and if the income elasticity of demand for monetary assets is judged to be unity, the "normal" rate of monetary growth would be estimated at 6 percent per year. At any particular time, if the objective of policy was to restrain the economy, growth should be less than 6 percent; if the objective was to stimulate the economy, growth should be more than 6 percent.

There is a problem of deciding what aggregate to use as an index of monetary growth. Should it be the monetary base as calculated by the Federal Reserve Bank of St. Louis, the money supply, total bank credit, or some other aggregate? Unfortunately, the significance of a change in the rate of growth of any of the commonly used aggregates depends upon the public's preferences for different categories of financial assets, including currency, demand deposits, time deposits, and securities. Since these preferences appear to change for reasons that we do not yet fully understand, problems of interpretation are bound to arise. My quite tentative suggestion would be to use the monetary base as the index of monetary growth. But I would also monitor the behavior of the other aggregates closely. If the selected bill rate target resulted in growth of the base inconsistent with the guideline for several weeks and if the behavior of the other aggregates seemed to support the conclusion that monetary growth was too slow or too fast, the whole situation, including the bill rate target, should be carefully reexamined.

Other Dimensions to be Considered

I think an approach along the lines developed above would make sense in providing an overall rationale for monetary policy. But there are important dimensions that are omitted in the above discussion. It has long been my contention that those responsible for the conduct of monetary policy must pay close attention to its impacts on particular sectors of the economy, especially when a restrictive policy is being followed. An example of this dimension of monetary policy is the variety of measures that have been taken by

the Federal Reserve and a number of other Federal Government agencies during the past year to cushion the impact of high interest rates on homebuilding.

The Federal Reserve has attempted to shield the savings and loan associations from bank competition by maintaining low ceiling rates on savings deposits and those forms of time deposits that compete most directly with savings and loan shares. The Federal Home Loan Bank Board has acted to encourage continued mortgage lending by savings and loan associations by reducing the liquidity requirement applicable to the associations and by making advances available to them. In addition, the Home Loan Banks have attempted to manage their own borrowings in the capital market in such a way as to minimize the possible impact on deposit flows. The Federal National Mortgage Association increased its mortgage holdings by $1.6 billion in 1968, and increased the scope and flexibility of its stabilizing activities in the mortgage market by introducing a new program of weekly auctions of mortgage commitments, beginning in May 1968. The ceiling rate applicable to FHA and VA mortgages was raised from 6 percent to 6¾ percent in May and was raised further to 7½ percent in January 1969. Finally, in its general conduct of monetary policy, the Federal Reserve has kept its eye on the flows of funds to savings and loan associations with a view to avoiding, if possible, a rise in short- and intermediate-term interest rates sufficient to set off a "disintermediation crises" of the type that occurred in 1966.

The impact of monetary policy on the economy would, I believe, have been substantially different in 1968, and thus far in 1969, in the absence of these precautionary actions by the Federal Reserve and by the various agencies with responsibilities in the housing field. In all probability, we would long since have experienced a sharp decline in housing starts and residential construction expenditures similar to that which occurred in 1966. There are a number of reforms which might be adopted to increase the efficiency and flexibility of the mortgage market and to reduce the excessive impact that monetary policy now tends to have on homebuilding. Unless and until such reforms are implemented, however, I believe it is appropriate for the monetary authorities to concern themselves specifically with the effects of their policies on the housing sector. Indeed, I believe structural measures of the kind employed in 1968-69 should be thought of as part of monetary policy and should be applied as the situation seems to warrant on the basis of close cooperation between the Federal Reserve and the other agencies involved.

No matter how skillfully monetary policy is conducted, things are bound to go wrong from time to time. The underlying strength of private demand will sometimes prove to be stronger or weaker than was anticipated; fiscal policy will depart from its expected path; and the timing and magnitude of the economy's response to monetary actions will seldom be exactly as anticipated. I do not count myself among the group of economists who believe the business cycle is dead. If we seriously attempt to keep the economy moving along a selected high-employment growth path, resisting departures from that path in either direction, I believe we can still expect some economic fluctuations. The hope is that we can keep these fluctuations mild. But our success in that respect is much more critically dependent on improving the performance of fiscal policy than it is on changing the techniques of monetary management. Improved fiscal policy would relieve the Federal Reserve of its recent impossible task of offsetting the effects of profoundly destabilizing movements of the Federal budget. Even operating within the framework established by a reasonably well-designed fiscal policy, the Federal Reserve is bound to make occasional mistakes, but it should be able to make an effective contribution to economic stabilization and do so without the sharp gyrations in monetary variables that we have witnessed recently.

IV. *Rules versus Authorities*

There is no reason, in principle, why one holding Keynesian views must necessarily favor discretion over a monetary rule. One could believe that our knowledge of the responses and the lags in the system is so poor that efforts to conduct a discretionary policy add to instability rather than subtract from it. I think discretion conducted on the basis of the best information available can do a better job than a rule, but I find the question a very complex one, and I do not see how anyone can be sure of the answer.

Before a rule involving steady growth of some aggregate such as the monetary base could be seriously considered, however, it seems to me there would have to be procedural or institutional changes in three areas.

First, there would have to be some assurance of better fiscal policy than we have had recently. Our problems of the last three years are

primarily the result of inaction and inordinate delay in fiscal policy, and discretionary monetary policy has helped by either taking the place of needed fiscal restraint or supplementing it when it was too-long delayed.

Second, if monetary policy is to disregard interest rates entirely, I believe we need an overhaul of the arrangement for financing housing.

And, third, interest rates cannot be disregarded until the international monetary system has been reformed in some way to remove the balance-of-payments constraint on domestic interest rates.

Having said all of this, let me add that I believe the discussion of monetary rules is largely academic anyway. Even assuming that a rule were adopted, I feel certain that there would be overwhelming pressure to abandon it the first time it appeared that discretion would enable us to achieve a better performance—and that, I believe, would occur quite soon after the rule was adopted.

DISCUSSION

HENRY C. WALLICH

I am struck by the state of the debate between the Monetarists and the Keynesians as it comes out, explicitly and implicitly, in Warren Smith's paper. Here we are five years since the first acid test of the new economics—the tax cut of 1964—and Warren Smith says such things as, "It can be shown that there is an independent fiscal policy effect." It is not what he says that is striking, but that he thinks it is necessary to say that at this time. His assessment of the climate of opinion is what strikes me. Here is fiscal policy apparently with its back to the wall, fighting for its analytical life. You see a similar development in England. The Radcliffe Report, which was regarded as merely odd when it first came out, is now regarded as definitely wrong.

What is the cause of all this? Clearly, we are moving more deeply into a quantity theory world—some like to call this a classical world. Whatever it is, the slack has gone out of the banking system, out of cash balances of firms and households, and we are on a very tight monetary rein. This was not, I think, inconceivable at the time the Keynesian doctrines were formulated, but we have to recognize they were formulated in a totally different environment. Analytically, the problem that we now encounter was taken care of, in a sense, very adequately. We had L_1 and L_2, if you remember, L_1 being active balances; L_2, idle balances. You did not need new money creation by the central bank because the government stimulated the economy by deficit spending. All that needed to happen was a transfer of balances from L_2 to L_1. This would raise the interest rate slightly, but not enough to affect investment significantly. That was the framework in which fiscal policy clearly was very powerful. You do not have to assume a liquidity trap in order to make that framework effective.

"No Change in Policy" Policy

Now, L_2 is exhausted, we have run through the slack and a situation that was not foreseen is upon us. Warren Smith discusses the effectiveness of fiscal policy in a framework of no change in monetary policy. This is intriguing because it bears on how the Federal Reserve and central banks generally view their activity. What is a "no change in policy" policy? Warren says it is essentially no

change in the dial setting of discount rate, open market operations, and reserve requirements. There is room in his framework, however, for defensive operations, so that essentially "no change in policy" comes out as "hold the base constant." That still allows for some flexibility, then, with respect to money because excess reserves may be used more aggressively by banks as interest rates rise. It is even conceivable that consumers will deposit currency in banks as interest rates rise, and those would supply additional reserves. So, if we say that no monetary policy change means constant base, we still allow some monetary flexibility that can be used by fiscal policy.

Warren Smith gives an alternative definition, and that is "keep interest rates constant." If one uses that as a criterion of "no change in monetary policy," one opens the doors wide to unlimited money creation that could, and, in fact, may have to take place as the economy is expanded by fiscal policy. We have here two quite different criteria of what "no change in policy" means.

Federal Reserve Targets and Responsibilities

This gets me to Warren Smith's comments on Federal Reserve targets and responsibilities. One's judgment of the achievements of the Federal Reserve depends very heavily on what one thinks the Fed is responsible for. If you assume, as I think Warren does, that it is responsible for improving conditions a little beyond what they would be in an automatic system, then most of the time one will find that it does pretty well. This involves one in specifying what an automatic system would be. Would it be a rather flexible one with gold imports from abroad, as under the old gold standard, or would it be a closed system with little flexibility for raising the money supply? But whatever standard one takes, one could say, "Does monetary policy improve on what would happen under that system?"

The alternative way of looking at it is to say: monetary policy could get the economy to full employment. That is what the quantity theory says. Monetary policy really has the economy on the leash and can control it. In that case, any falling short of perfection becomes the fault of the central bank. The central bank then will deserve to be criticized almost incessantly. My own inclination is to go the first route. I would guess the Federal Reserve's inclination has been the same, that is, to argue they are responsible for improving things beyond what would happen automatically. For instance, many years ago, the Fed explicitly rejected responsibility for the price level. I think they would now reject responsibility for maintaining

full employment in the face of inadequate fiscal policy, and I think that would be sensible. If we cast the Fed in the role of a policymaker of last resort, who is responsible for making up for all the defects of all other policies, we are likely, first, to get very disturbing action from time to time and, second, to hand out a great deal of unfair criticism.

The Correct Target

Turning to Warren Smith's targets, I note his ringing declaration that he prefers interest rates to money supply. I find myself of two minds, although I think I can sort out these two minds. The argument that interest rates are the right target to look at because that is how the transmission mechanism works is not compelling. If interest rates are highly endogenous, if money is less endogenous, then money may be the better target. At first sight, one would think that interest rates are extremely endogenous, money less so. This is not quite certain, however. If the Federal Reserve can be expected to respond as a policymaker to conditions in the economy, then everything the Fed does becomes endogenous. Neither money, nor the base, nor any version of reserves can then be treated as truly exogenous. Hence, I do not think that the choice between money and interest rates can be made on grounds of how endogenous the instrument is. I would argue, as Alan Holmes did, that we have to take a practical operating view. If we were to take a money target and try to hit it every hour on the hour, interest rates would become extremely disturbed. Speculation or wise management of cash positions by banks and others would scarcely even things out. Probably the strain on the monetary mechanism, the institutions, would become very great, as Alan says.

I would argue that, in the short run, an interest rate target makes a lot of sense, simply in terms of keeping the market going on an even keel. There are also international repercussions to be taken into account that would follow from extreme interest rate instability. In the longer run, however, there is a good deal to be said for a money supply target, on the grounds that to make a mistake about interest rates is much worse than to make a mistake about money. If you peg the wrong rate or stick to the wrong rate too long, the results could be explosive. Although I have seen work that seems to show that this depends on the parameters of the system, by and large, it seems pretty plausible that pegging interest rates is likely to be explosive. Pegging the money supply at the wrong growth rate simply leads to mild inflation or mild deflation. The damage from error is less.

I would argue, therefore, that one should have a short-run interest rate target, for a few weeks or months perhaps, and a money supply target over a longer period. Over time one should allow interest rates to vary sufficiently to achieve that money supply target. Of what that period of time is, I do not feel very certain. I hear by word of mouth that, in the money supply series, the cyclical trend begins to dominate the random elements only after 7 months. That would seem to say that for 7 months you cannot really tell what the "true" money supply is, or what a given goal means. All one can do is to take a seven-months' moving average, then one knows what the money supply was 3-1/2 months ago. It would seem then that one has to have a money supply target pretty far in the future.

Wealth Effects

I would like to make two concluding points. Warren Smith discusses the transmission mechanism. He talks about wealth effects. He discusses the effect of an increase, say in bond prices, and even more so, an increase in stock prices. I have great doubts about these wealth effects operating very strongly on consumption—and I realize there is conflicting evidence on it. First of all, those bonds for the most part are not owned by households to begin with, nor by non-financial firms. To the extent that bonds are owned, however, a rise in bond prices says to the holder that, while he has a capital gain now, when the bond matures, he will have to refund at a less favorable interest rate if interest rates do not change. So while he has a gain now, at some time in the future he will have a reduction in income. It depends on his time horizon to which fact he gives the greater weight.

Something very similar happens with stocks. It is true that a rise in stock prices, reflecting simply a change in capitalization rates, gives the holder a capital gain which he may want to spread over his life and spend. At the same time, if this holder is still a saver and accumulator, he knows that he must buy stocks hereafter at a higher cost per dollar of return. That ought to make him save more rather than less. To which of the two factors he gives greater weight seems to me indeterminate.

Finally, Warren Smith addresses himself to the problem of the direct effect of cash balances. Here we come to the core of the quantity theory discussion. Is there a direct effect running from money holdings to consumption? Do people who have more money just go out and spend it? Are things really that simple?

I would argue that the household makes two sequential decisions. The first decision is the savings-expenditures decision. At that point he decides on nondurable consumption and I think, realistically, also on durable consumption. Thereafter, he has the savings left which temporarily increase his cash balance. He now has to make a second decision, a portfolio decision. It seems to me unlikely that in making that second decision he should go back on the first and decide to consume part of the money he has just decided to save. All he can do, therefore, is allocate it to assets, and having excluded durable consumer goods from his choice, as I think one probably ought to do, he can choose financial assets or housing, essentially.

The area for the direct effect is very small in the case of the household. In the case of a firm, it is different because a firm saves and allocates its savings to all sorts of assets, principally capital goods. There I could visualize such a direct effect. Now, if one concludes that the direct effect is small on the side of the consumer, there is only one way out, and Jim Meigs pointed to it. One has to discover a way by which larger holdings of money influence all consumption directly. If one can show that that happens, then proof has been produced of a direct effect on a sufficiently broad front to make a difference. I have always heard that there is no demonstrable effect of interest rates on savings, but that is surely implied here. This is the missing link that otherwise remains in the quantity theory approach.

Some Rules for the Conduct of Monetary Policy

JAMES L. PIERCE

Resolution of the debate over rules versus authority in the conduct of monetary policy appears to hinge on the solution to two separate but related problems. First, there is the problem of determining the most appropriate model to apply to describe the relationship between monetary instruments and economic aggregates. Second, there is the problem of determining the appropriate decision rules to be followed by policymakers when setting their instruments, given their goals and given their model. This paper is primarily concerned with the decision rule problem and not with the question of whose model is best.

For convenience of exposition, the only decisions considered for the conduct of monetary policy will be the determination of desired values of either the interest rate or the stock of money; blends of the two instruments will also be considered. It is assumed that on a quarterly average basis, it is technically possible to set the average desired money stock or the average desired short-term interest rate.

In Section 1, an attempt is made to summarize what is currently known about optimal decision rules for monetary policy. Section 2 describes some experiments in which some simple rules of thumb for the conduct of monetary policy are applied to the structure of the FRB–MIT econometric model.

1. *Decision Rules for Monetary Policy*

a. *Optimal Decisions*

In order to discuss optimal decision rules for monetary policy, it is necessary to use a model which relates policy instruments to the

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*The views expressed in this paper do not necessarily reflect those of the Board of Governors or its staff. I wish to thank H. T. Farr for invaluable help in the preparation of this paper.

relevant goals. For this purpose, it is convenient to use initially the static Hicksian IS-LM curve framework. It is obvious that, for this simple model, in a nonstochastic world, optimal policy decisions can be stated in terms of either the interest rate or the money stock. If the target of policy is, say, full employment nominal income, this target can be achieved either by setting an interest rate which is consistent with the target, given the parameters and other exogenous variables in the system, or by setting a money stock which is consistent with the target. In this model, the choice between the optimal interest rate and the optimal money stock is not an interesting one because one variable implies the other.

The problem becomes interesting when we drop the assumption that values of the endogenous variables are known with certainty. When the demand relations in the economy are subject to stochastic disturbances, there is no hope for always hitting the target. If it is assumed, however, that policymakers seek to minimize the expected loss from failing to hit the full employment target and that they possess a quadratic loss function, some simple results can be obtained.[1] In particular, if the money stock is the policy instrument, the stock which formerly assured full employment now gives the minimum expected loss available for all possible values of the instrument.

Further, if the interest rate is the instrument, the value which previously provided full employment now gives the minimum expected loss possible for use of that instrument.

It has been demonstrated by Poole (1967), however, that in such a stochastic world, the interest rate and the money stock are no longer perfect substitutes as policy instruments. The minimum expected loss under an interest rate policy is not, in general, equal to the minimum expected loss when money stock is the instrument. Which of the two instruments provides a lower expected loss depends upon the particular values of the structural parameters and upon the variances and covariances of the disturbances. In general terms, if most of the source of instability lies in unpredictable shifts in the saving and investment functions, it is better to pursue a money stock than an interest rate policy. In this case variations in the interest rate with a fixed money stock will reduce the impact of these shifts on income relative to what they would be if the interest rate were set at its optimal fixed value. If the primary source of instability is

[1] See Theil (1964) and Holt (1962)

unpredictable shifts in the demand for money, it is preferable to set the interest rate at its optimal value and simply accommodate the shifts in money demand.

Poole goes on to demonstrate the interesting result that it is possible to define a policy which blends interest rates and money stock to provide an expected loss which is as low or lower than that attainable by utilizing interest rates or money stock alone.

There are great difficulties in obtaining analytic solutions for more complex situations. In particular, most policy models assume that the parameters of the model are known with certainty. Brainard (1967) has obtained the optimal policy solution to a simple model in which the structure is not known with certainty. The generalization of Poole's results to include uncertain parameter values raises problems which make it impossible to derive solutions for optimal policy.

Poole has also demonstrated that, for a simple (second order) dynamic system with additive error terms and known parameters, an active counter-cyclical policy, using either the interest rate or the money stock as an instrument, dominates a policy of a constant money stock or a constant interest rate.[2] A similar result has been reported by Lovell and Prescott (1968), comparing fixed and variable money rules using a somewhat different second-order model.

Very little is known about optimal policy decisions for more complex situations than those considered above. What is appropriate monetary policy for a growing economy with an imperfectly known, probably nonlinear structure which is subject to stochastic shocks, and which probably has long lags? There is no very good answer to this question right now. Further research is clearly in order. Substantial effort is being expended by the Board of Governors' research staff and by academic economists to provide an eventual solution to the problem. Along with efforts to estimate the structures of more detailed models, sensitivity analyses dealing with changing economic structures are currently being conducted. Projects are also underway to obtain dynamic simulations of nonlinear, stochastic systems. The optimal policy choices implied by various utility function specifications will be obtained for these structures.

b. *Rules of Thumb*

A practical short-run approach to policy problems is to propose

[2]The dynamic models are trendless so a constant money stock is analogous to Friedman's money growth rule in a growing economy.

rules of thumb for the conduct of monetary policy which might lead to results which are superior to those obtained from the current conduct of policy. Friedman's proposal of a constant growth rate of the money stock can be interpreted as such a rule of thumb. The rule is not claimed to be optimal in the linear decision rule sense. It is only argued that the lags in response of the economy to variations in monetary policy are so long[3] and so uncertain in length[4], and the ability to forecast future events is so limited, that pursuit of an active counter-cyclical monetary policy may give results which are inferior to the rule.

Friedman's rule may be "nth" best among rules of thumb, however. Ignorance of how to conduct optimal monetary policy does not imply that resort should be made to the simplest rule available. Such ignorance might suggest, however, that the application of relatively simple rules of thumb may give results which dominate those obtained from attempts at more sophisticated policy manipulation.

Because it is often difficult—if not impossible—to identify the sources of unexpected interest rate or money stock variations, setting the value of one instrument subject to maximum variations in the other may give results superior to those obtained when only one instrument is used. Two rules of thumb in the spirit of Poole's analytic results are suggested by this statement.

First, a constant money growth rule could be pursued subject to maximum allowable changes in the interest rate. For example, if the interest rate constraint is violated during any period, the money stock could be changed sufficiently to bring the interest rate back to its allowable range. By varying the severity of the interest rate change constraint, the rule could range all the way from a Friedman rule, where any change in interest rates is tolerated, to a pure interest rate rule, where no interest rate change is tolerated at all. Narrow constraints would be appropriate when it is likely that short-run shifts in the money demand function are an important source of instability.

[3]The issue of lags provides an interesting example of how policy prescriptions need not hinge on a specific model. Friedman bases his prescription on his reading of direct money-income relations. The FRB-MIT econometric model, which is far removed from the quantity theory, gives evidence of a lag for monetary policy which is even longer than that claimed by Friedman.

[4]Friedman's observation that monetary policy lags are variable in length is not necessarily devastating to policy activists. Variable lags are not necessarily unpredictable lags, see Tinsley (1967).

The relationship between money growth and interest rates should be made negative if the source of large interest rate changes is shifts in the saving and investment functions. In this case, the use of a positive relationship between interest rate changes and money growth would be inferior to the Friedman rule. The choice between a negative or positive relation between money and interest rates should rest on empirical evaluation of the circumstances. The choice cannot be changed frequently, however, if the rule is to remain a rule.

Second, an interest rate rule, such as a constant rate of increase in the interest rate, could be pursued subject to a money growth constraint. Thus, the interest rate rule would be pursued single-mindedly provided the growth in the money stock did not fall outside some predetermined range, say, 2-6 percent per annum. By varying the width of the allowable range of growth rates, the rule can range all the way from a pure interest rate policy, in which any money growth rate is allowed to a Friedman rule, in which only one growth rate is allowed, and the interest rate is free to vary. Narrow growth rate ranges would be appropriate when it is likely that shifts in the saving and investment functions are the source of instability.

Before proceeding to apply these rules of thumb to an actual model, it should be stressed that the policy rules studied here are only intended to be suggestive. There are certainly other candidates, and no attempt has been made to exhaust all reasonable alternatives. The purpose of the exercises is to illustrate how rules of thumb might be used—not to suggest the best rule. It should also be stressed that rules of thumb are just that; they are not great principles to which policy makers should slavishly adhere. If economic events clearly indicate the modification or abandonment of a rule, that course clearly should be taken. What the rules do say is that policy-makers should be made aware of economists' ignorance of optimal policy and be given a task which they can conceivably perform.

2. *Some Simulation Experiments*

This section describes several simulation experiments in which the rules of thumb described in the previous section are imposed on a recent version of the FRB-MIT model.[5] For the sake of brevity, simulated values only for nominal GNP are reported.

For purposes of comparison, a control simulation was run to predict values of GNP in which all exogenous variables were fed into

[5] For a description of the model see de Leeuw and Gramlich (1968), and Rasche and Shapiro (1968).

the model at their actual historical values over the 1963-I–1968-I period. Comparisons are made in terms of such control solutions.

The first policy simulation is one which adheres to a strict Friedman rule. The simulation shows what the model predicts would have happened to GNP over the control period if the money stock (demand deposits plus currency) had grown at a constant percentage rate from quarter to quarter. The growth rate chosen was the constant annual rate at which the initial money stock in 1962-IV had to grow to achieve its actual value in 1968-IV. The rate was 4.25 percent per year. The simulation results are presented in Table I. Figure I shows the additional GNP (positive or negative) which would have been forthcoming with a constant actual growth rate of the money stock.

The results suggest that, if the simple rule of thumb of a constant growth rate of the money stock had been adopted during the period,

TABLE 1

CONTROL SIMULATION VS CONSTANT MONEY GROWTH

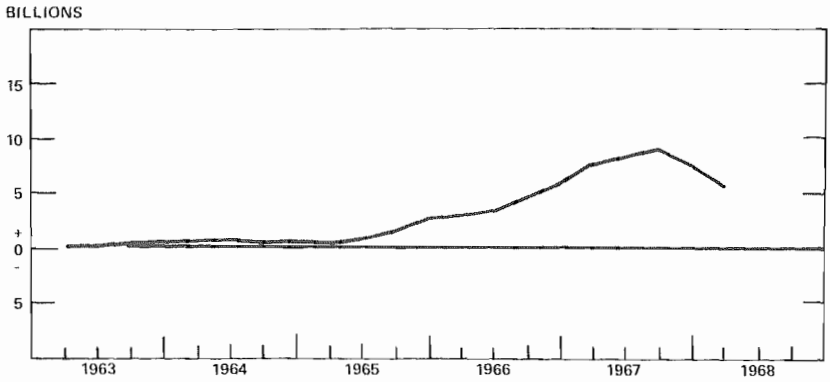
(Billions of dollars)

		Control	4.25% Money Growth	Difference
1963	I	578.421	578.443	.022
	II	587.189	587.228	.039
	III	597.990	598.237	.247
	IV	611.374	611.849	.475
1964	I	624.925	625.534	.609
	II	638.628	639.284	.656
	III	651.630	652.070	.440
	IV	663.689	664.067	.378
1965	I	672.911	673.320	.409
	II	688.092	688.883	.791
	III	703.955	705.466	1.511
	IV	720.770	723.212	2.442
1966	I	735.479	738.468	2.989
	II	750.230	753.512	3.282
	III	761.916	766.253	4.337
	IV	771.731	777.580	5.849
1967	I	786.810	794.473	7.663
	II	801.814	810.035	8.221
	III	820.492	829.448	8.956
	IV	841.208	848.603	7.395
1968	I	859.861	865.367	5.506

FIGURE I

EFFECTS ON GNP OF 4.25% GROWTH IN MONEY

DEVIATIONS FROM CONTROL SIMULATION



the performance of GNP would have been only slightly worse than the actual control simulation. The 1966 boom would have been more aggravated using a money growth rate than was the case using more sophisticated policy decision procedures. It is interesting to note that use of the constant money growth rate would not have appreciably increased the variability of GNP over the period studied. Further, the imposition of the 4.25 percent rule actually produced smaller quarterly changes in the bill rate than those obtained for the control simulation, where bank reserves experienced large quarterly fluctuations. The mean absolute change in the bill rate for the control simulation was 45 basis points; for the money growth rule, it was only 16 basis points.

Figure II shows the differences between the control simulation and two simulations in which the money stock is made to grow at constant annual rates of 4 percent and 3.5 percent, respectively. The results are not surprising: A lower growth rate of the money stock over the period would have produced an improved performance of the economy. Again, use of constant quarterly growth rates in the money stock does not introduce great quarterly variability into the GNP generated by the model.

The next set of experiments concern a money rule which is constrained by a maximum allowable interest rate change. The same 4.25 percent money rule was applied to the model, provided that the Treasury bill rate did not change during the quarter by more than a

specified absolute amount. If the rate change fell outside the range, the money rule was abandoned for the quarter, and bank reserves were changed sufficiently to bring the bill rate change back to its allowable range. Several absolute change values were attempted; results for absolute changes of 30 basis points and of 10 basis points are reported.

The results indicate that placing sufficiently narrow bounds on the allowable change in the bill rate can have a large impact on simulated GNP. Figure III shows the differences between the simulated GNP values for the straight (4.25 percent) money rule and those subject to maximum absolute changes of 30 and 10 basis points, respectively. In both cases, because interest rates could not rise rapidly in the later periods, there was a definite tendency to add to the excess demand conditions. The results suggest that, for the period of simulation, a simple money rule dominates one which seeks to limit quarter-to-

FIGURE II

EFFECTS ON GNP OF 4.00% and 3.50% GROWTH RATES IN MONEY:
DEVIATIONS FROM CONTROL SIMULATION

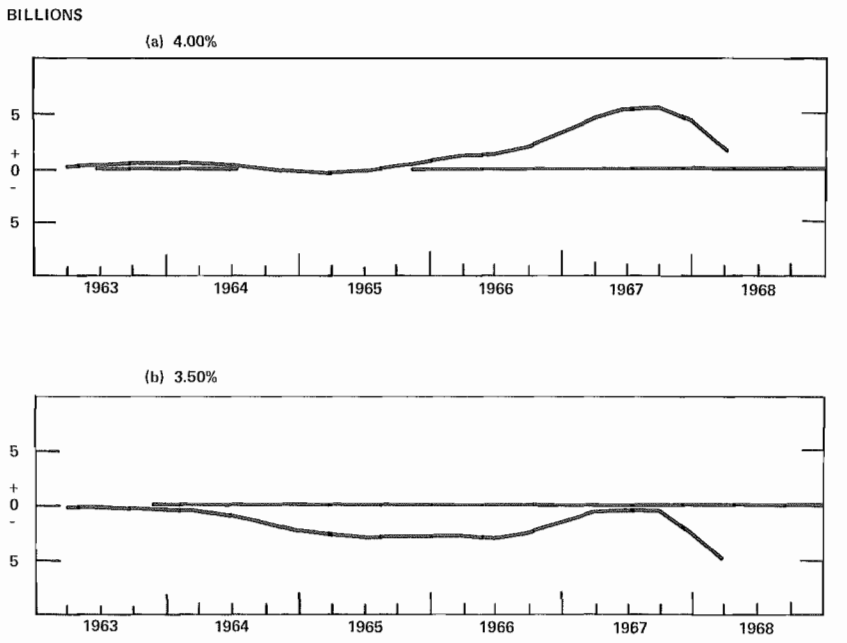
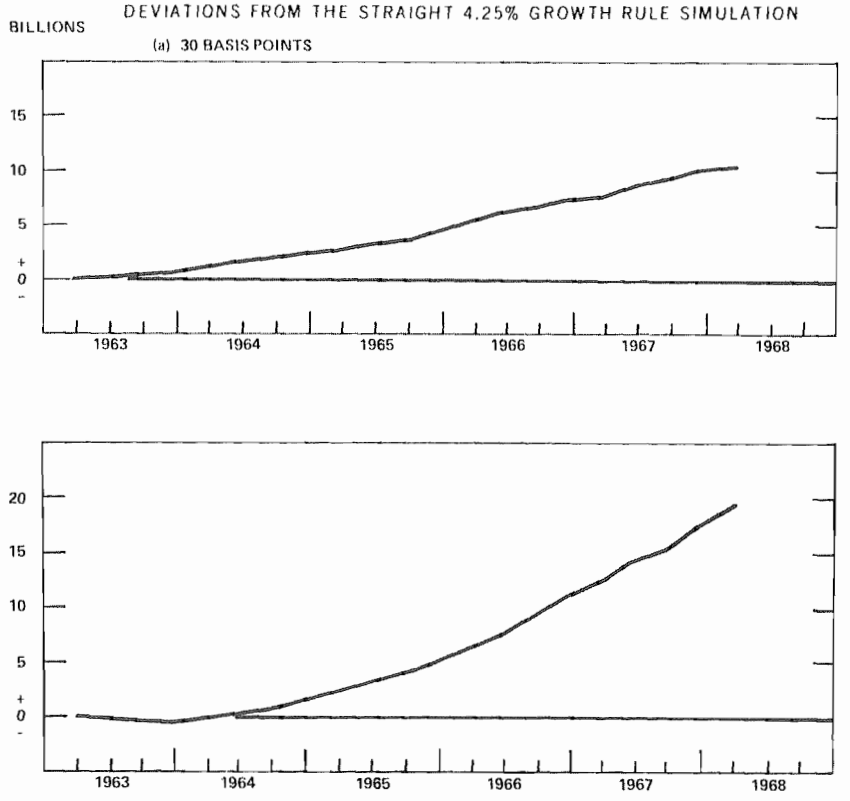


FIGURE III

EFFECTS ON GNP OF 4.25% GROWTH IN MONEY SUBJECT TO A MAXIMUM ABSOLUTE CHANGE IN THE BILL RATE: DEVIATIONS FROM THE STRAIGHT 4.25% GROWTH RULE SIMULATION



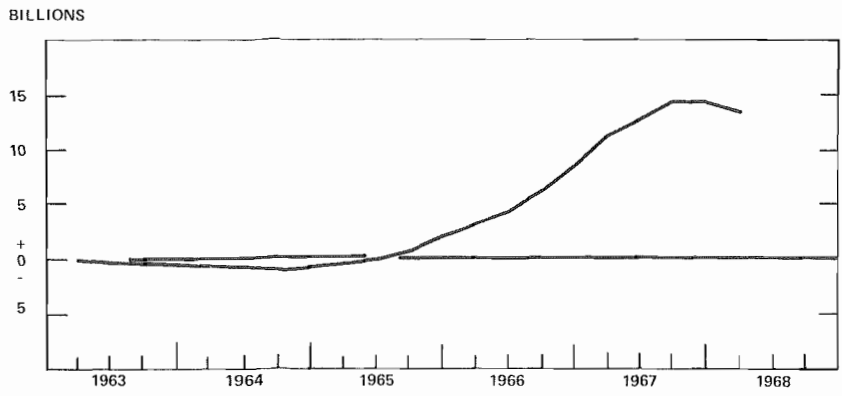
quarter changes in the bill rate. During the period, an inverse rule between money and interest rates was apparently called for.

Another set of simulations deals with imposing an interest rate rule on the economy. Here the initial simulation was one in which the interest rate was made to rise at a constant annual rate (11.7 percent) from a base period of 1963-I to achieve its actual value in 1968-I. In this simulation the money stock is endogenous.

The simulation results from applying the interest rate rule, taken as deviations from the control simulation, are reported in Figure IV. The results are quite similar, but somewhat larger in magnitude, than those obtained for the money growth rate rule. Preventing interest

FIGURE IV

EFFECT ON GNP OF CONSTANT BILL RATE GROWTH:
DEVIATIONS FROM CONTROL SIMULATIONS



rates from rising rapidly in 1966 and 1967 would have added to the excess demand in the economy.

The remaining simulation experiments examine the influence on the simulated performance of the economy of an interest rate rule which is constrained by a maximum range of money growth rates. Several ranges of money growth were attempted; a 2-6 percent range had virtually no impact on simulated GNP. Figure V shows the difference between the simulated GNP values for the straight interest rate rule and those for maximum ranges of 3-5 percent and 3.5-4.5 percent in the annual growth rate of money. The constraints were effective in 5 and 7 quarters, respectively.

The results suggest that this combination rule would have been beneficial over the period of simulation. Not only is the expansion of GNP retarded during the later quarters of simulation but also the economy pursues a more steady path of expansion.

3. *Conclusions*

The results of the simulation experiments suggest that rules of thumb may be a useful guide to policy. While rules are not infallible—as the money growth with maximum interest rate change rule indicates—they appear to be capable of providing stability to the economy. In particular, a combination interest rate-money stock rule

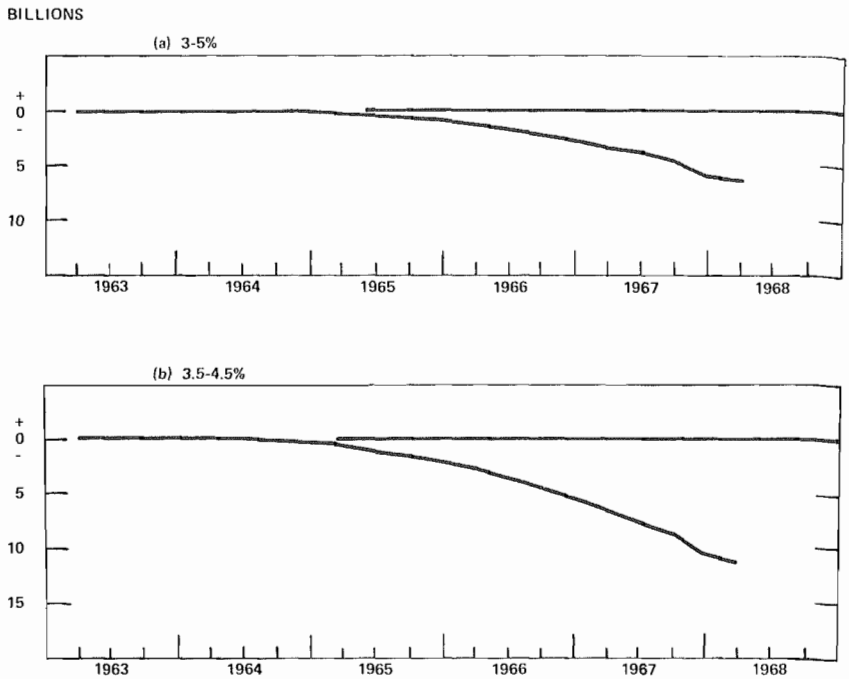
which limits the range of growth of the money stock appears to be a particularly promising rule of thumb.

Some words of caution about the results are clearly in order. First, the appeal of rules may be dependent on the model used for simulation. Second, experimentation indicates that the short-run response of the economy to a particular rule is dependent on the initial conditions from which the simulation is begun. This suggests that, if rules are to be applied, they should be established gradually. To be successful, the application of a rule has to get off on the right foot. Attempts to override unfavorable initial conditions with a rule may seriously disrupt the economy for several quarters, if not permanently.

The experiments reported in this paper have only scratched the surface of the rules versus authority issue. They do indicate that the

FIGURE V

EFFECT ON GNP OF CONSTANT BILL RATE GROWTH
SUBJECT TO MAXIMUM MONEY GROWTH RATES:
DEVIATIONS FROM THE STRAIGHT BILL RATE GROWTH SIMULATION



subject is worth pursuing in more detail. The results indicate that simulations with complex models may support the use of simple rules of thumb for monetary policy. The application of the rules to competing models may provide further useful information. Equally important is the need of analyses to determine the sensitivity of the results to the particular parameter estimates used. Stochastic simulations might also provide important insights into the problem.

While the derivation of optimal policy decision rules for known structures is an important undertaking, it appears, however, that there may be a substantial immediate payoff to designing suboptimal operating rules for policy.

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DISCUSSION

DAVID MEISELMAN

I regret that I have had little time to examine the simulation results reported in Jim Pierce's excellent paper. I suspect that, even if I had had much more time, I still would have had difficulty going through the model's complex interactions and lags because of the model's immense detail. I shall therefore take the liberty of devoting most of my comments to related questions of the interpretation of these results and to some of their theoretical foundations. In that sense, some of my comments are also relevant to some of the other analyses used at this conference, as well as to several of the central issues raised in the interesting paper Kareken presented yesterday afternoon.

In addition, I wish to note that I attended another famous lunch today at which Jim Duesenberry made a very apt comment that I shall quote later. Also, I have some additional details about that famous breakfast yesterday morning which Henry Wallich discussed in his comments at the opening session of the conference.

Pierce wisely distinguishes between the two separate but related problems of, one, the most appropriate model to apply to best describe or analyze the relationship between monetary instruments and indicators on the one hand, and economic aggregates on the other hand; and, two, the determination of the appropriate decision rules to be followed by policymakers in setting their instruments, given their goals and given their models. Jim then goes on to discuss the decision rule problem, not the question of which model is best. I have little quarrel with this exercise, provided we keep in mind that it is an exercise whose results depend crucially on the model used.

Jim Pierce discusses two models. The first is the Hicks IS-LM apparatus as used by Bill Poole, my former colleague at Johns Hopkins. Poole's analysis is derived from the comparative status of the Hicks model, and analyzes the consequences of each schedule being subject to stochastic disturbances in a world in which the source of change in aggregate income can be readily identified—which in this context is whether it is the IS or the LM curve which shifts to initiate a change in income and interest rates.

I agree with many of Poole's formal conclusions that, in principle, in a world of perfect knowledge, using two instruments—(1)changing the stock of money and (2) fixing interest rates—results in a lower expected loss; and that, if most of the instability lies in the IS curve because of unpredictable shifts in either saving or investment, it is best to pursue a money stock rather than an interest rate target; and that, if instability lies in the LM curve because of unpredictable shifts in the demand for money, then an interest rate target is best. For, with a fixed stock of money and given the demand for money, if there is an unanticipated shift in either investment or saving, (or government expenditures and/or tax rates), interest rates will change to moderate the change in income stemming from these disturbances.

For a given stock of money, how much of the initial disturbance will be offset depends on the interest elasticity of the demand for money. At one extreme, if the demand for money is zero interest elastic, making income velocity a constant in this context, nominal aggregate income remains the same. At the other extreme, if the demand for money is infinitely elastic with respect to interest rates, we are confronted with the specter of the liquidity trap. Interest rates remain the same, and there are no offsetting forces at work. Regarding evidence for the liquidity trap, I note that study after study shows that the demand for money has a very low, but not zero interest elasticity—not the very high interest elasticity required to approach the liquidity trap situation. In addition, the substantial variability in interest rates, as well as their rising trend in recent years, hardly squares with the constant and very low rates required for the liquidity trap.

Note one simple rule for central bank action. Change the stock of money to accommodate changes in the quantity of money demanded. Another way of putting it is that M be changed to offset any shift in V. In the absence of growth, if the IS curve is given, this is accomplished by a fixed interest rate target achieved by appropriate monetary change, holding aside all of the problems of lags as well as considerations regarding how to identify the source of any disturbance to interest rates or to income, or how the change in the money stock takes place.

Objections to the Poole Analysis

There are many things that bother me about the Poole analysis. I shall take up three of them. The first is the presumption that the IS

curve and the LM curve are independent. This is a very crucial assumption that tends to be made repeatedly when the Hicks apparatus is used in technical discussions, as well as in related discussions which implicitly depend on the apparatus.

Second, Poole assumes a negatively sloped IS curve. My own judgment is that, under a wide range of circumstances, the IS curve is best taken to have a positive slope. This is one of the reasons it becomes very difficult indeed to identify the source of the disturbance that leads to a change in either interest rates or aggregate nominal income. With a positively sloped IS curve as well as a positively sloped LM curve, income and interest rates will tend to move in the same direction whether the initial disturbance is "real", in the sense that it is initiated by a shift in the IS curve, or "monetary", in the sense that it is initiated by a shift of the LM curve.

Third, the price level is essentially excluded from the analysis. Among other things, we have no way of knowing whether interest rates are nominal or real—although in one sense, because no price level effects are taken into account, especially regarding expected prices, real and nominal rates are the same. On the other hand, it is clear that the LM curve depends on the nominal rate of interest—the cost of holding money—but the IS curve incorporates the real rate of interest because saving and investment depend on real magnitudes.

If the IS curve and the LM curve are independent, which is the usual textbook case as well as the case implicit in most discussions of macro phenomena, this essentially comes down to a presentation of much of the old Keynesian presumption of fact regarding the sequence of events following a change in either the supply of or demand for cash balances. As you know, the sequence is from money to bonds (or interest rates), to goods. Money buys only bonds, a convenient short-hand expression for all debt instruments; money never buys goods or equities. Money affects the aggregate demand for goods only insofar as the change in bond prices and nominal interest rates caused by shifts in the stock of money (or the demand for money) alter desired saving or desired investment.

In other words, money is to lend, never to spend. Thus, if there is a shift of the LM curve and the LM curve is understood to move along the given and fixed IS curve, this is another way of asserting that the disturbance initially affects only the bond market. People with more or less money in their portfolios than they prefer to hold under existing alternatives attempt to adjust to their preferred cash

position only in the bond market, selling bonds to acquire more cash, or buying bonds with the redundant money, thereby affecting bond prices and interest rates. As interest rates change there is the related question of the response of either saving or investment to the new interest rates. In effect, any direct shift between money and goods is ruled out.

Note that, if people attempt to move between money and goods in order to eliminate a disequilibrium on money account, we essentially have a shift of the LM curve which causes a corresponding shift in the IS curve without, in the first instance, any intervening change in the interest rates! If we follow Poole's rule with respect to offsetting changes in the demand for money which happen to adjust, as above, at the money-goods margin rather than at the money-bonds margin, we will tend to cause the economy to explode.

To illustrate the point, let us spell out what would happen if, in fact, disequilibrium on money account directly affected the demand for goods. Consider a reduction in the demand for cash as people wish to shift out of cash and into goods. It makes little difference whether the goods are consumer goods or capital goods. In the first instance, aggregate expenditures rise but interest rates remain the same. Later, interest rates will tend to rise in response to the higher level of aggregate demand because of (1) the resulting change in the quantity of money demanded to match the new higher level of spending—an increase in the transactions demand for money if you wish, (2) an increase in the productivity of capital, or (3) an increase in prices leading to an upward revision of the expected rate of change of prices.

In the face of these adjustments, if we tried to pursue a policy of fixing nominal interest rates, income would rise faster as interest rates were prevented from rising by an increase in the stock of money, and the equilibrium rate of interest would rise still more. If the policy of supplying still more money to moderate or stop the rise in equilibrium interest rates stemming from this disturbance continued long enough, the system would explode. Alternatively, if we consider an increase in the demand for cash, where people wish to shift out of goods into cash, we get just the opposite result. In the first instance, nominal income would fall, but interest rates would remain the same, later to be pulled down as a consequence of the fall in aggregate demand. A policy of maintaining the level of interest rates in the face of downward pressure on interest rates would cause the economy to implode.

Of course, the speed of adjustment toward full chaos would increase if, as income rose or fell, there was a corresponding change in prices leading to a change in price expectations and, thereby, to a change in nominal interest rates. These considerations present a serious problem, perhaps an insuperable one, when alternative policies are available—the use of each depending on which of the two schedules is understood to have shifted.

The traditional IS-LM analysis is deficient in dealing with concurrent or expected prices. In that respect, the analysis shares some of the problems we all have in coping with price level phenomena and in separating changes in nominal aggregate demand into changes in prices and changes in real output. (The Federal Reserve Board-MIT model has its own special difficulties here; its price equations leave much to be desired.)

In view of these considerations, it seems to me that there is much danger in following any interest rate target to offset changes in the demand for money—the only formal case which has been made for an interest rate target at this conference. These dangers can largely, but not completely, be avoided by following a money supply target or a money supply indicator in the context of a monetary rule for stable monetary growth, especially since there is much accumulated evidence that the demand for money is highly stable.

At the famous lunch I attended this noon I happened to mention this point to Jim Duesenberry, who commented that a money supply target has automatic stabilization properties but an interest rate target has open-door properties. I quite agree.

The third point I wish to make regarding use of the Hicksian apparatus is that, if, in fact, the IS curve has a positive slope, then we cannot, by examining interest rate and income data, identify the source of the change in either interest rates or income as being either "monetary", that is, a shift of the LM curve resulting from a change in either the supply or demand for money, or "real", that is, a shift of the IS curve resulting from a change in saving or investment. Income and interest rates will tend to move in the same direction whichever class of phenomena initiate the macro disturbance; we can readily increase the instability of both aggregate demand and interest rates by trying to fix the rate of interest at the wrong time, as indeed has been the sad case so frequently in the past. This holds even under the most generous interpretation of assumptions questioned above that adjustments to a change in the demand for money or to a change in the stock of money take place exclusively at the money-bonds

margin. Identifying the sources of change are still more difficult once we acknowledge that we do not start with the world in static equilibrium and that we must consider lags and rigidities, expectational and speculative factors, and practical questions regarding which interest rates to consider for policy purposes.

Regarding the Federal Reserve Board-MIT model, of course, the specific results of this experiment flow from the structure of the model itself and the model may leave much to be desired as an accurate representation of the real world. In that connection, it is important to note that changes in the stock of money work with very long lags in the Federal Reserve Board-MIT model. The lags of the model seem to be among the longest recent investigators have reported. For example, I believe the Federal Reserve Board-MIT lag is almost double the one Milton Friedman has reported. I merely wish to point out that the long lags Friedman found in his research have been a crucial factor in his case against discretionary monetary policy and for a monetary rule, and that the Federal Reserve Board-MIT findings of still longer lags may be strengthening Friedman's case excessively!

Extension of the Surtax

I shall close my comments with some additional details about the famous breakfast that Henry Wallich mentioned in his remarks at the opening session of the conference. In discussing the current problem of the extension of the surtax Henry summarized my position on the surtax as "So what?" Henry was correct in stating that I did not believe the temporary extension of the temporary tax would be a very effective or crucial element in the anti-inflation program, but I think it would be useful if I briefly elaborated several of the points in the breakfast discussion because I believe there were some interesting elements in it. What I did say was that I thought that, in terms of the *direction* of effect, extending the surtax would be helpful in stemming inflation and perhaps in moderating some of the pressure on interest rates, but that I believed these effects would be quite small, which would be consistent with the effects the surtax had when it was enacted a year ago. The case for its limited effectiveness would seem to be especially strengthened because the current proposal is that the surtax be extended temporarily, cut in half after six months, and that it be fully eliminated in a year. On the basis of virtually everybody's sophisticated theory of either consumer outlays or outlays for capital goods, the temporary nature of the tax plus its

relatively low rates means that its total effect on private demand is likely to be very small indeed, holding aside the independent effects of monetary policy. With private spending little effected, the measure can have only trivial effects on interest rates. The tax would largely fall on private saving, which will tend to offset the tendency that a smaller Federal Government deficit would lower interest rates.

Before we had an opportunity to discuss some of these details, Frank Morris had cited an article in the *New York Times* of the day before which had raised doubts that Congress would approve any extension of the surtax. Frank said, "I shudder to think what would happen if the surtax were not extended." I hope Frank found some calm in my analysis.

Controlling Monetary Aggregates

SHERMAN J. MAISEL

It sometimes appears that many people have a basic misunderstanding of the manner in which the Federal Reserve attempts to implement monetary policy. Much discussion attributes the exact amount of a week's or month's movements in the monetary aggregates—whether the narrowly defined money supply, bank reserves, or bank credit—to a specific plan or action of the Federal Reserve. Many statements which describe how the Fed increases or decreases reserves to fix the amount of money seem derived from an incorrect interpretation of what the Federal Reserve does, based upon the highly oversimplified elementary textbook explanations of the procedure by which banking systems create money and credit.

Too few statements recognize that, in any period, the amount of money or bank credit created is the joint result of a complex interaction among households, commercial and industrial corporations, financial institutions, the Treasury, and the Federal Reserve. In addition, there appears to be a failure to recognize that the changes in money or credit as reported in the weekly or monthly statistics can differ greatly from the true situation. There are large random forces and estimating errors present in most short-period adjusted data. There are very few weeks—frequently even months—in which much of the reported movement in monetary aggregates is not primarily the result of statistical "noise."

What I propose to do first in this paper is to explain my understanding of how the Federal Reserve attempts to implement monetary policy. Then I shall discuss the large amount of noise which exists in the weekly or monthly published data. Finally, I will give some idea of the orders of magnitude of the reserve movements which would have to be forecast or offset in any attempt to control the narrowly defined money supply in a short period if operations

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attempted to control the amount of demand deposits or money by fixing the reserves available as a base for deposit creation.

The Federal Reserve Money Market Strategy

It is clear that, as a matter of fact, the Federal Reserve does not attempt to increase the money supply by a given amount in any period by furnishing a fixed amount of reserves on the assumption that they would be multiplied to result in a given increase in money. (The multiplier, it is recognized, would not be a constant but would vary from period to period, depending on relative interest rates and the actions of groups other than the monetary authorities. Sophisticated advocates of a policy based on highly controlled reserve generation recognize that monetary action must also be taken either to anticipate changes in the multiplier or to determine it.)

Instead, the Federal Reserve follows what has been termed a money market strategy:[1]

1. The operational directives of the Open Market Committee specify values (within a range) of money market variables that the manager of the Account is to attempt to maintain. It is expected that he can do so by altering the margin between required reserves and the amount of reserves furnished by the System, and by the form his market operations take. These margins are considered significant in their direct impact on bank operations; but, what is probably more important, they influence the interest rates on money market instruments.
2. The amount of marginal reserves to be furnished and the money market rates sought are picked so as to influence the direction and rate of change of a more remote intermediate monetary variable.
3. The desired rate of change in the intermediate monetary variable is that judged to be the most effective in aiding the economy to move toward its ultimate optimum goals.

[1] For those interested in more detailed statements of some of the concepts and problems, cf., J. M. Guttentag, "The Strategy of Open Market Operations," *Quarterly Journal of Economics,* Vol. LXXX, No. 1 (February 1966), pp. 1-38; and P. H. Hendershott, *The Neutralized Money Stock* (Homewood, Illinois: Richard D. Irwin, Inc., 1968), 159 pp.

The present discussion is my personal construct. As indicated in the text, many and even most members of the FOMC might disagree with my construct. They would build an entirely different one of their own to express their view of what are obviously identical operations.

A possible side advantage of this strategy is that it can be followed even though it might be impossible to get agreement among the members of the FOMC either as to ultimate goals, or to the form or level of an intermediate monetary variable, or as to how to define what strategy is being followed.

Each decision maker may believe one or the other of the following types of variables is most significant at a given time:

Intermediate Monetary Variables

(1) Monetary or credit aggregates such as: the money supply narrowly or broadly defined; deposits of financial institutions; member bank liabilities or credit; broader concepts of credit flows, liquid assets, wealth, and lending.
(2) Relative and absolute real or nominal interest rates.
(3) The general atmosphere of the credit markets and banking as reflected in expectations; demand for credit; the amount of credit being supplied; rates of change.

Because significant relationships exist among all these variables, influencing one will move others in the same direction although not necessarily to the same degree. As a result, if there is an agreement as to the operational variables the manager is directed to follow, there need be no meeting of minds with respect to which intermediate monetary variables should be controlled or as to the proper degree of control.

The movements of these intermediate variables can be influenced by a change in the level of any of the policy instrument variables within the power of the Fed. These are primarily:

Policy Instrument Variables

(1) The purchase or sale of open market securities.
(2) Repurchase agreements on securities.
(3) The discount rate.
(4) Regulation Q ceilings.
(5) Required reserve ratios.

A change in an instrument variable reacts with other forces in the credit markets and the economy to shift the demand and supply for

funds. At each Open Market Committee meeting, estimates are made as to the effect changes in particular instrument variables will have on those money market variables which respond most clearly to Federal Reserve policy, namely:

Money Market Variables

(1) Borrowings of member banks from the Federal Reserve.
(2) Net free reserves.
(3) The Federal funds rate.
(4) Call money rates to government bond dealers.
(5) The three-month bill rate.

The expected movements in the money market variables are accompanied by estimates of growth in the intermediate monetary variables. Given the projected state of the economy, the banking system, Treasury operations, etc., each possible setting of the money market variables is expected to lead to a unique growth rate for an intermediate monetary variable. We must realize, however, that variables will fluctuate around their trends in the short-run period.

Debates may occur with respect to desired goals; desired movements of the intermediate financial variables; the importance of specific instrument variables; or as to the correctness or errors in the judgment models--which are used to estimate changes in the economy, as well as the changes in the intermediate variables, and the effects on the money market of shifting the instrument variables.

All these considerations are summed up when the manager of the Open Market Account is instructed to buy or sell securities in order to achieve specific (within a range) values for the money market variables. The manager of the Account operates in the securities markets accordingly. At times, because of outside influences, the specified relationships for all variables cannot be achieved simultaneously. When this occurs, the manager uses his discretion in an attempt to achieve those settings which he believes are most consistent with the goals of the Committee.

This intent to control intermediate monetary variables through the money market variables is shown by the inclusion in most directives of a proviso clause. The manager is provided the growth rate for the bank credit proxy (within a range) expected to result from the

directed settings of the money market variables. If the proxy moves outside the projected limits, he is instructed to operate in the open market so as to alter the money market variables in order to influence the credit proxy toward its projected path. The proviso clause is an attempt to correct for errors which may arise if the relationships among the money market variables and the intermediate monetary variables have not been projected correctly, or if errors were made in projecting the other financial and economic variables which also influence the proxy's growth.

This picture of operations can be expressed symbolically:

Where:	IMV	=	Intermediate monetary variable	
	R_b	=	Borrowed reserves	
	R_f	=	Free reserves	
	Q	=	Q ceiling	
	r_b	=	Treasury bill rate	
	r_f	=	Federal funds rate	
	r_c	=	Call money rate to dealers	
	GNP	=	Economic activity	
	L	=	Liquidity preference of corporations, banks, financial institutions, etc.	
	T	=	Treasury cash management	
	r_d	=	Discount rate	
	RR	=	Required reserves	
	S	=	Open market operations	
Then:	Δ IMV	=	$M (R_b, R_F, Q, r_b, r_f, r_c, GNP, L, T)$	(1.0)
	$r_b; r_f; r_c$	=	$r (r_d, R_b, R_F, GNP, L, T)$	(2.0)

The change in the intermediate monetary variable, however defined, is determined by the interaction of the Federal Reserve controlled variables; certain money market rates strongly influenced by the Federal Reserve; changes in output and prices; movements in the financial sector and liquidity functions; and the Treasury as in (1.0).

The Federal Reserve action may influence directly the IMV. It also will influence money market rates as in (2.0).

$$\Delta \, RR_{T+2} \cong \Delta \, IMV \qquad (3.0)$$

$$R_b; R_f = R \, (\Delta \, RR, S) \qquad (4.0)$$

The change in the intermediate monetary variable approximately determines the change in required reserves two weeks later (3.0). Given the change in required reserves, the manager of the Open Market Account can (within the limits of his operating misses) determine exactly the level of net free reserves (4.0). The banking system, given a level of net free reserves, determines its own level of borrowings and excess reserves simultaneously.

When the manager is directed to influence the money market variables and, through them, intermediate monetary variables, he cannot at the same time control the changes in total reserves. Most reserve additions will follow directly from the previous changes in the IMV (credit proxy). The manager will operate to furnish slightly more or less than the change in required reserves (4.0) to interact with the market (2.0) and obtain the settings he is attempting to achieve. This means, in most cases, he will furnish most (say, 90 per cent or more) of the changes in required reserves which have been previously determined by the various market interactions.

Technical Operations

Let us express this in terms of actual weekly operations. At the start of a week, the manager has a report of borrowings and an estimate of excess reserves, and, therefore, of net borrowed reserves for the previous week.

The manager also knows the amount by which required reserves will change for the week, since they depend upon changes in deposits two weeks previously. He has projections of movements expected in certain so-called technical factors, which will increase or decrease the amount of reserves available to member banks in the current week. These include float, currency in circulation, Treasury deposits at Federal Reserve Banks, gold and foreign accounts, Federal Reserve foreign currency holdings, and all other items.

He sums these projections. By comparing them to the changes in required reserves, he can estimate the amount that banks would have

to add or subtract from the free reserves of the week before if he takes no action to increase or decrease reserves by Federal Reserve security operations. For example, assume during week No. 1, banks borrowed $600 million and had net borrowed reserves of $500 million. If the total change in required reserves and the technical factors indicate an increased requirement of $500 million, he knows—if his projections are correct—that if he does not change his security accounts, banks will have $1 billion of net borrowed reserves in week No. 2. They will have to borrow somewhere in the vicinity of $1.1 billion, but borrowings will vary somewhat because individual banks can alter the amount of excess reserves that they carry during the week.

At this point, the manager can determine a tentative program of open market operations in order to meet his instructions from the FOMC with respect to the desired range of money market variables he is to attempt to achieve. During the course of the week, he receives five types of information:

1. The changes in interest rates reported in the market.
2. Borrowings at Federal Reserve Banks.
3. New estimates of changes occurring from technical factors as the week progresses.
4. Background information on supply and demand in the money markets.
5. Changed projections of movements in the monetary aggregates including the credit proxy, M_1, and M_2. These changes arise from revisions of prior weeks' information, and from data on current deposit movements in a sample of banks.

As the week progresses, the manager performs open market operations in an attempt to achieve the constellation of borrowings and rates shown in his instructions from the FOMC. If one or another of the variables differs from the expected relationship, the manager must use his background information and his judgment in determining the operations which will best meet the Committee's objectives. If the projections for the intermediate monetary variables move outside the range projected for the Committee, the manager will alter his operations so as to change the money market variables in the direction deemed likely to influence the IMV's in the desired direction.

The manager will not be able to meet his exact objectives in any week. The projections of technical operations may be in error. Banks

may or may not borrow reserves after it is too late for him to operate. Because of sudden changes, he may not be able to accomplish his desired operations. Finally, the estimates of the monetary aggregates may be in error.

"Noise" in the Monetary Aggregates

Reported changes in the monetary aggregates can vary from the basic underlying trend of monetary policy. As one would expect, the longer the period under consideration the smaller the impact of the non-policy-determined movements. Still, even over a quarter, these other movements are large.

The movements are actually of two very different types. The first, which I have labeled "noise," consists of: operating misses; errors in estimating the actual data at the time that operations end for a period; shifting seasonals; and irregular movements which are temporary and the product of special factors. The second type arise from two facts already noted: a) under the current money market strategy, Federal reserves are a dependent variable only partly controlled by the Fed, b) furthermore, even if the Fed did fix the exact rate of reserve increments, large variations in money and credit could still occur because the banks and the market determine how total reserves are divided among the bases supporting different types of deposits.

Operating misses arise because of errors in reporting, errors in sampling, or information not available when operations must be ended. For some time, the size of misses has been decreasing steadily. The misses are small compared to the totals, but large compared to weekly or monthly changes.

The seasonal factors are large. In addition, they are dominated by irregular forces, particularly over short periods. In many cases, it is hard to determine, by analysis of historical data, what corrections should be made in the figures if the objective is to arrive at a true measure of the changes in the monetary aggregates required to measure either the underlying trend of monetary policy or those movements expected to influence spending or prices and quantities.

The demand for money will vary greatly depending on the day of the week in which a month, quarter, or year ends. The same is true of the day on which traditional dividend and tax dates fall. The changes in tax rates and collection dates and percentages have been important in most recent years. The day on which the Treasury borrows and the form of its borrowings are critical. While estimates

are made currently as to the impacts of these factors, they still confuse the judgment of seasonal variation, particularly as observed at the time operations take place.

Irregular Elements Bias Analysis

The irregular elements include seemingly minor factors, such as the financing of a corporate take-over bid, a breakdown of a bank computer, or a snow storm. Each of these may cause even weekly average changes to vary by over 100 percent or more. As an example of such movements, examine pages A17 and A18 of the January 1969 *Federal Reserve Bulletin.* Each carries an estimate for the December 1968 change in the narrowly defined money supply. In one case, the increase is reported as $1.2 billion, or at an annual rate of growth of 7.5 percent. In the second case, the increase is estimated at $8.4 billion, or at an annual rate of 53 percent. Neither figure is in error. The first weights the extremely unusual end-of-year changes in one way; the second in a different way. Neither gives a very good sense of the underlying trend, because of the dominant influence of very special factors that were rapidly reversed. These irregular forces were large enough, however, to bias strongly the analysis of the two adjacent quarters in which they occurred – and, for many purposes, even the annual data for the two years.

Data calculated at the time operations end are the significant data for operational purposes, but theoretically not for any policy impact. These estimates are subject to revisions as more information becomes available, as full universe data replace samples, and as seasonal forces are re-estimated. Revisions between the money supply as first reported and as currently reported averaged $152 million per week over the past three years. They had a range of from -$1.4 billion to $1.0 billion. Their mean deviation was over $490 million. Clearly, they make a significant amount of noise which must be taken into consideration when one looks at the reported weekly changes. In a somewhat similar manner, we might note that one part of the money supply, namely, non-member bank demand deposits, is not subject to reserve requirements of the Federal Reserve, nor is information on these movements readily available. Their variance is rather great. Their share of total demand deposits has been growing. The weekly and monthly data for this component are estimates from other types of data. Specific information on how this component has changed is available only semi-annually with a lag of four to eight months.

Total Reserves and the Narrowly Defined Money Supply

Finally, let me comment briefly on some of the problems of attempting to control, in any short period, the narrowly defined money supply. Many unsophisticated comments and theories speak as if the Federal Reserve purchases a given quantity of securities, thereby creating a fixed amount of reserves, which through a multiplier determines a particular expansion in the money supply.

Much of modern monetary literature is actually spent trying to dispel this naive elementary textbook view which leads people to talk as if (and perhaps to believe) the central bank determines the money supply exactly or even closely—in the short run—through its open market operations or reserve ratio. This incorrect view, however, seems hard to dislodge. Almost daily, I read that last week or last month the Fed increased the money supply by 5 percent.

Such statements are simply inaccurate. The growth of the money supply in any period is the result of actions taken by the Federal Reserve, the Treasury, the commercial banks, and the public. Over a long period, the Fed may play a paramount role, but this is definitely not the case in the short run. As I have indicated—to the best of my knowledge—the Fed has not attempted to control, within rather wide limits, the growth of the narrowly defined money supply in any week or month.

It should be clear from previous statements that the Federal Reserve does attempt to influence—but not to control exactly—the expansion of bank credit and, therefore, of total reserves. However, we must recognize wide differences between movements in total reserves and the money supply.

Over the past 10 years, the rate of growth of the money supply has averaged about 80 percent of the rate of growth in total reserves. On the other hand, the coefficient of determination (r^2) between the money supply and total reserves for quarterly changes (in the seasonally adjusted data) in this period is only .27; or, on the average, nearly three-fourths of the quarter-to-quarter movements in the two totals are not statistically related. For year-to-year changes, the r^2 is .73. These are measures of the way in which the market redistributes its use of total reserves in any period.

If it were determined that the Fed ought to change its operating targets, what type of system might be devised to control the money

supply? Let me deal briefly with a few possibilities while examining some of the related orders of magnitude so as to give some indication of the types of factors involved. I obviously have not attempted to analyze each of these methods in detail. I have outlined primarily one extremely simplified procedure to show the type of movements and problems involved. While this procedure, clearly, is not that assumed in sophisticated models, it seems to me to follow the type of naive model many people do appear to have in mind.

One method would be to consider changes in M_1 as the dependent variable in the type of model now used to predict and somewhat to control the bank credit proxy. Included among the independent variables in such a model would be the existing instrumental variables controlled by the Fed. These variables could then be altered in such a manner as hopefully to result in the desired levels for M_1, the dependent variable. A model could be developed and used for any period such as a week, month, quarter, or year, depending on what was believed to be theoretically relevant and operationally feasible.

If it were found that a high correlation existed between M_1 and any one or a group of instrumental variables and this correlation was maintained in actual operations, such a model might be rather simple. A problem would still remain as to whether or not the effects of operating the monetary variables to achieve this particular goal would be as efficient as aiming them at a variety of other goals, but that would be a question in basic decision-making rather than an operating problem.

A second procedure would be one similar to that now used to estimate the operations needed to offset technical and seasonal movements in reserves and reserve requirements. Rather than operating so as to obtain certain money market conditions, the manager could use an estimating system similar to his current one and could conduct open market operations in an attempt to control the amount of reserves available to support those demand deposits counted as part of the money supply, by exactly offsetting all other forces furnishing or utilizing reserves.

Finally (and, surprisingly to me, the most difficult to conceptualize, since it seems to be what most imagine to occur), would be some system in which open market operations attempted to furnish by a formula a given volume of reserves for expansion of the money supply. This type of system, I imagine, would note deviations of past movements from a desired level and would attempt to close the gap

between actual and desired reserve levels by some form of distributed lag of the type developed in many inventory theories.

Controlling Reserves Available for Expansion of the Money Supply

The difficulty with attempting to change the reserve base in order to control directly the money supply arises from the fact that there is no exact relationship between them. The money supply can be altered by non-reserve movements while reserves can be used to support non-money supply expansions.

Changes in the money supply are equal to:

$$MS = D + ND + FD + C - F$$

Where:

MS	=	Narrowly defined money supply.
D	=	Demand deposits (private) at member banks (less interbank deposits).
ND	=	Demand deposits (private) at nonmember banks (less interbank deposits).
FD	=	Foreign demand deposits at Federal Reserve Banks.
C	=	Currency outside member banks.
F	=	Float.

The naive assumption seems to be that the growth in the money supply can be controlled by the Federal Reserve altering the amount of reserves available as a base for member bank demand deposits.

When we look at Federal open market operations, we find that the amount of reserves furnished are divided among many uses, namely:

$$\Delta (S+B) = \Delta TF + \Delta \frac{D}{rd} + \Delta \frac{GD}{rd} + \Delta \frac{NIBD}{rd} + \Delta \frac{TD}{rt} + \Delta ER + \text{seasonal reserves.}$$

Where:

S	=	Securities.
B	=	Borrowings.
TF	=	Technical factors (see page 8).
rd	=	Required reserve ratios for demand deposits.

rt	=	Required reserve ratios for time deposits.
D	=	Demand deposits at member banks.
GD	=	Government deposits at member banks.
NIBD	=	Net interbank deposits among member banks.
TD	=	Time deposits at member banks.
ER	=	Excess reserves.

We can now see what forces must be estimated if we were to furnish an amount of reserves in any period so as to offset exactly all other uses and to allow the amount needed as a base for a specific growth in the money supply. Namely:

$$\Delta\ (S+B) = \frac{MS^*}{rd} + AOR\ (\text{All other reserves})$$

Where: MS^* = the desired change in the money supply.

$$AOR = \frac{(ND + F + C + FD)}{rd} + ER + \frac{GD}{rd} + \frac{NIBD}{rd} + \frac{TD}{rt}$$

$$+ \text{seasonal reserves} + TF$$

We see that, in addition to operations to offset the technical factors and seasonal forces which are both now part of operations, estimates and offsetting operations would be required for changes in the money supply not dependent on reserves at the Federal Reserve, on changes in excess reserves, and on movements in government, interbank, and time deposits. Insofar as these operations changed total deposits in a period, they would have to be matched by equivalent alterations in bank assets or credit.

What are the orders of magnitude and some of the problems which appear to be raised by this concept? Tables I and II give some of the background information needed for this analysis.

Column 1 of the table shows the current estimate of the actual growth in the money supply for the past six months, distributed equally over the entire period. This growth was at a 3.3 per cent annual rate for the half-year period (which I imagine was a rate satisfactory to many). The second column shows the changes in the money supply due to forces not under the control of the Federal Reserve, namely, currency, non-member bank demand deposits, float, and foreign deposits. We note that for this period, these other components grew at a 6.2 percent annual rate, so that the increase in the member bank demand deposit component was at a 1.3 percent annual rate. We also note that the growth of these other components

was irregular. As a result, we see in column 7 that, if it were desired that the expansion of the money supply be constant, the amount of reserves furnished for the theoretically Fed-controllable component could not be constant, but rather they would have to fluctuate to offset the irregular movements in the remainder.

The size and irregularity of the necessary movements are shown in columns 4 and 7. From these columns, we can calculate that the average increase in member bank deposits was almost $30 million per week, or $120 million per four-week period, and $383 million per quarter. The desired weekly increments varied from $938 million to minus $1,058 million. Monthly variations ranged from $992 million to minus $588 million. During this period, the average reserve requirements behind these deposits averaged about 15.2 per cent. Therefore, expressing the desired change in demand deposits in terms of reserves, we find the amount to be furnished in an average week would have been $4.4 million, with a four-week average of $18 million, and the amount needed for a quarter, $58 million. The weekly range, however, would have been from $141 million to minus $159 million, with a monthly range from $151 million to minus $89 million.

These requirements to meet a steady growth in the money supply can be compared to the actual fluctuations which occurred. Such actual movements are a measure of irregular and transitory forces, and errors in the seasonal correction mechanism. When we examine column 5, we find that the actual changes in member bank demand deposits, seasonally adjusted, on a weekly basis averaged $30 million with a range of $2,310 million to minus $1,950 million. For a month they averaged $128 million with a range of $2,139 million to minus $145 million.

Column 8 shows the reserves behind these movements. This column is a rough estimate of the average weekly movement in required reserves needed to support irregular forces in the demand deposit component. The reserves required for irregular movements averaged $130 million, or 29 times the desired weekly increment, while the range around the desired $4.4 million was from $359 million to minus $303 million. The changes in a month or a quarter were, of course, relatively far less. But they, too, were considerable at $213 million—or 11 times the desired monthly increase.

The final two columns of Table I give an indication of how large the weekly technical open market operations would have had to have been to offset the other factors furnishing or absorbing reserves, in an attempt to furnish the desired amount of reserves for an orderly

TABLE I

MOVEMENTS IN THE MONEY SUPPLY AND ITS RESERVE COMPONENTS

November 27, 1968 - May 28, 1969

DEPOSITS, SEASONALLY ADJUSTED
(In Million Dollars)

	(1) Desired Money Supply	(2) Component of Money Supply Not Based on Member Bank Reserves	(3) (4) Desired Member Bank Private Demand Deposits		(5) (6) Actual Member Bank Private Demand Deposits	
			Level	Change	Level	Change
Nov. 27, 1968	193,221	77,003	116,218		116,218	
Dec. 4	193,342	77,253	116,089	-129	115,682	-536
11	193,463	77,117	116,346	+257	115,977	295
18	193,585	76,733	116,852	+506	115,952	- 25
25	193,706	76,496	117,210	+358	116,174	222
Jan. 1, 1969	193,827	76,284	117,543	+333	117,417	1243
8	193,948	77,463	116,485	-1058	117,981	564
15	194,070	77,521	116,549	+ 64	116,237	-1744
22	194,191	77,278	116,913	+364	116,283	46
29	194,312	76,895	117,417	+504	114,718	-1565
Feb. 5	194,433	76,888	117,545	+128	115,904	1186
12	194,555	77,446	117,109	-436	115,483	-421
19	194,676	78,145	116,531	-578	116,681	1198
26	194,797	77,328	117,469	+938	117,011	330
Mar. 5	194,918	77,787	117,131	-338	115,967	-1044
12	195,039	78,036	117,003	-128	115,557	-410
19	195,161	78,129	117,032	+ 29	115,881	324
26	195,282	78,401	116,881	-151	116,169	288
Apr. 2	195,403	78,323	117,080	+199	116,833	664
9	195,524	78,773	116,751	-329	119,143	2310
16	195,646	79,167	116,479	-272	117,193	-1950
23	195,767	78,541	117,226	+747	116,094	-1099
30	195,888	78,574	117,314	+ 88	114,845	-1249
May 7	196,009	78,647	117,362	+ 48	115,357	512
14	196,131	79,300	116,831	-531	115,814	457
21	196,252	79,184	117,068	+237	117,709	1895
28	196,373	79,389	116,984	-84	116,984	-725

TABLE I

MOVEMENTS IN THE MONEY SUPPLY AND ITS RESERVE COMPONENTS

November 27, 1968 - May 28, 1969

(In Million Dollars)

	Reserves Required For:			
	(7) Change in Desired Member Bank Deposits S.A.	(8) Change in Actual Member Bank Deposits S.A.	(9) Seasonal Movements in Member Bank Private Demand Deposits	(10) All Other Reserve Movements AOR*
Nov. 27, 1968				
Dec. 4	-19	-81	+241	105
11	+39	44	+ 90	-532
18	+76	- 4	+346	285
25	+54	-33	- 30	141
Jan. 1, 1969	+50	187	+406	515
8	-159	85	-211	-259
15	+10	-262	- 15	889
22	+65	7	-241	15
29	+76	-236	-196	-345
Feb. 5	+19	178	- 90	-223
12	-66	-63	-271	157
19	-87	180	-211	362
26	+141	50	-196	-346
Mar. 5	-51	-157	+301	-258
12	-19	-62	+15	-170
19	+4	49	+75	-182
26	-23	43	-226	-95
Apr. 2	+30	100	+120	-199
9	-51	359	+140	-643
16	-42	-303	+358	-38
23	+116	-171	-124	1259
30	+14	-194	-202	473
May 7	+7	80	-264	737
14	-83	71	-140	-353
21	+37	295	-233	-124
28	-13	-113	+47	8

*This is the sum of all other reserves (AOR) less those required to offset the component of the money supply not based on member bank reserves (column 2).

expansion of the money supply. Column 9 shows that the seasonal changes in member bank reserves behind demand deposits averaged $19.7 million per week, with a range of $406 million to minus $271 million. Its monthly average was $85 million, with a range of $647 million to minus $768 million. The final column shows the week-to-week movements in reserves that would have been necessary to offset all other factors (AOR) adding or subtracting reserves.

Table I shows data on a week-by-week basis for the past six months. Table II shows average values for roughly the same reserve data for the past three years. The first column shows actual variations in the reserve equivalent of movements in the money supply. We note that over the three-year period, the average change in the reserve equivalent (money supply multiplied by .152) was $23 million per week, $97 million per month, and $330 million per quarter. The remaining data in the column show the range, and deviations for this series. These are the summary average equivalents of column 1 in Table I.

The last column shows that, to furnish reserves for seasonal variations in demand deposits, about $248 million in reserves (the mean deviation) would have to be added or subtracted per week, $299 million per month, etc. The range and standard deviations of the seasonal component are also shown. The second-last column shows the extent of operations needed if all other reserve sources and uses except the movements in the money supply were to be accommodated. Again, the most significant figures are the $405 million weekly average, and the $366 million monthly average operations required.

The columns between the first and last two measure the sometimes-offsetting factors that are covered by these reserve changes. Column 2 contains the other components of the money supply; column 3 shows the reserve operations now engaged in to offset technical factors, etc.

The two tables can be summarized in two statements: The irregular movements in the money supply compared to its underlying trend are large. When we compare the reserves which would have to be furnished in a period to the average irregular changes for the similar periods over the past three years, the ratios for a week are 243/4.4, or 55; and 304/18, or 17, for a month; and 350/58, or 6 times the desired increase, for the quarter.

The movements in other forces supplying or absorbing reserves, in addition to those required to expand or contract the money supply,

TABLE II

AVERAGE MOVEMENTS IN THE RESERVE EQUIVALENTS OF VARIOUS SOURCES AND USES OF MEMBER BANK RESERVES AND MONEY SUPPLY COMPONENTS
1966 - 1968

(In billions of dollars; not seasonally adjusted)

Period and type of average	MS[1] Money supply	All Other Reserves							Reserves required for seasonal movements in demand deposits
		(F-C-FD-ND)[1] MS component not based on MB reserves	TF Technical factors	ER Excess reserves	GD[1] Government demand deposits	NIBD[1] Net interbank deposits among MB's	TD[2] Time deposits at MB's	AOR All other reserves	
1 Week:									
Av. Δ per period	.023	-.012	.048	.001	.001	.002	.012	.052	------
Range	-.669	-.182	-1.043	-.553	-.505	-.193	-.034	-1.733	-.576
	to .790	to .144	to .871	to .374	to .648	to .227	to .047	to 1.554	to .591
Mean deviation	.243	.090	.304	.162	.171	.051	.012	.405	.248
Std. "	.289	.077	.384	.206	.212	.067	.014	.506	.210
4 Weeks:									
Av. Δ per period	.097	-.051	.207	-.002	.002	.010	.048	.212	------
Range	-.958	-.193	-.975	-.141	-.395	-.152	-.043	-1.008	-.890
	to .699	to .191	to .998	to .105	to .382	to .143	to .130	to 1.051	to .526
Mean deviation	.304	.063	.358	.045	.147	.048	.032	.366	.299
Std. "	.380	.085	.442	..058	.184	.062	.040	.442	.364
13 Weeks:									
Av. Δ per period	.330	-.170	.739	-.006	.009	.037	.154	.762	------
Range	-.122	-.350	.030	-.052	-.255	-.034	-.044	-.232	-.415
	to .988	to-.016	to 1.857	to .046	to .136	to .138	to .249	to 1.612	to .596
Mean deviation	.350	.115	.397	.028	.088	.041	.070	.426	.316
Std. "	.380	.123	.502	.032	.117	.051	.087	.555	.374

1/ Each of these components has been multiplied by .152 to get its reserve equivalent.

2/ Time deposits have been multiplied by .042 to get their reserve equivalent.

are also large compared to any desired changes in the money supply. For this three-year period, the ratios are 506/4.4, or 115 per week; 442/18, or 25 per month; and 555/58, or 10 per quarter.

Problems

The tables give an indication of some of the problems that would be faced by a system which attempted to control the money supply directly by furnishing a fixed amount of reserves on a week-to-week basis to increase the base behind the money supply—while, at the same time, operating to offset the reserves supplied or used for other purposes.

The first problem concerns the irregular movements. We have noted that over a month the average change in reserves required to allow for irregular movements is 17 times as large as the amount required to expand the money supply, while, for the quarter, the ratio is 6 times. The procedure set out would not allow any reserves for irregular movements; yet it appears desirable, for many purposes, to increase reserves to allow the money supply to expand and contract as a result of transitory forces in the economy.

The forces which we have called irregular are real and serve an economic purpose. They arise from errors in estimating the seasonal forces and in estimating special transitory needs of the economy. Insofar as they are offsetting over a longer period, they do not affect the total money supply. If reserves were not provided for these needs, banks would be forced to vary their assets in an amount equivalent to a multiplier of the reserves now furnished. There could be alternating periods of extreme ease or tightness both in lending and in interest rates for reasons entirely unrelated to the underlying credit situation or policy goal.

The second problem is a technical one. The system outlined above would require the Desk to estimate six series in addition to the group which is now estimated and, hopefully, offset by technical operations. The amount of these operations would be large. Any errors in these estimates or forecasts carried forward to actual operations would either absorb or furnish reserves which could be used to expand the money supply—a result contrary to that for which the system is proposed. While this problem would be not nearly as great as for the irregular components, it would still be considerable.

We have no exact estimates of how large errors in the forecasts would be, but we can arrive at some values by extrapolating from

current data and practices. I have measured the actual weekly forecast errors in current technical operations. The actual forecast error (mean deviation—partially arising from the various problems in data revisions and the inability to operate noted earlier) was $44 billion in reserves in an average week. This compares to a weekly mean deviation of $304 million for these total operations—or the forecast error was about 14 per cent of the total. The variance of the forecast error was 2.4 per cent of the variance of all technical operations.

I have assumed, for the want of better data, that this same percentage error of variance would apply to the seven items shown in Table II that would have to be forecast. Assuming that the variances would be uncorrelated (probably not a good assumption), we can derive the variance and standard deviation of the forecast of AOR (all other reserves) as the sum of the variances of its components—a set of independent random variables. In this case, we find that the standard deviation of AOR for one week is $77 million. In other words, we would expect that, about half the time, the error in forecasting the amount of operations required would be more than $52 million. Although some errors are likely to be cumulative, if we assume that the weekly forecast can correct for all previous errors in the month or quarter, we would have approximately the same error for the longer periods.

Under such an assumption about forecast errors, we would find that, in at least half the months, the amount of reserves furnished in error would enable the money supply to expand or contract in a month by more than 50 per cent above or below the desired amount.

The final complication is far more difficult, and is one about which we have little information. It arises from the manner in which a bank—and banks as a whole—can meet their reserve requirements, and from the fact that depositors can shift the type of their deposits. When the Fed alters the reserves it furnishes through open market operations, banks, individually, can borrow from the discount window, borrow reserves from other banks, or sell assets. Member banks as a whole can either borrow from the discount window or sell assets.

If the Fed is attempting to control total reserves, it can sell securities to offset, with a slight lag, any additional reserves it furnishes through the discount window. The changes in the actions of banks which result from their increased dependence on borrowed, in place of non-borrowed, reserves will influence all types of rates—as well as the banks' ability and willingness to hold securities or make

loans. How great such reactions would be in response to large-scale weekly shifts in discounting is, of course, not clear.

A similar unknown is how large shifts in bank assets would have to be in response to System action to control the rate of expansion in one type of deposit, such as the demand deposit component of the money supply. The procedure outlined in the previous section would mean that the System would furnish or absorb all reserves required so long as they were not changing the desired level of private demand deposits. If banks found they had insufficient reserves because the System wanted to curtail the expansion of demand deposits, they would sell assets. If these were paid for from time, inter-bank, or government deposits, the System would show a miss in its forecast of reserves for these purposes. Operations the following week would be planned to absorb additional reserves freed by the sale of these assets. The sale of assets and absorption of reserves could continue until the money supply finally converged on its desired track. It is not easy to forecast—particularly over a short term—how much credit would have to contract or, in the opposite case, expand, to bring about such a convergence.

The resulting situation would appear to be similar to the present. Banks and the public would reach an equilibrium among assets and deposits, based on liquidity functions and interest rates. The procedure aimed at controlling M_1 would bring about an equilibrium at some point. It appears difficult to me, however, to predict with existing information, derived from an entirely different institutional system, where that equilibrium would be or how stable it would be compared to current procedures.

An Elastic Currency

It is now possible to restate one logical reason for following the money market strategy. We saw how great are the misses, the random movements, and the influence of other forces on reserves when compared to the changes required for growth in the narrowly defined money supply. If one attempted to increase reserves according to an exact schedule, the market would have to shift rapidly in order to accommodate seasonal forces, errors in operation, Treasury cash operations, and the type of irregular movements which the Federal Reserve now accommodates.

An attempt to control growth in the money supply directly, through controlling the amount of reserves created, runs into the

difficulty that in any quantity-price relationship, if one controls the quantity tightly, the price must be allowed to move freely and through an extremely wide range. In addition to many other considerations, the problems would have to be faced of what costs and what structural changes the economy would experience if interest rates fluctuated widely as the result of an attempt to control a single use of monetary reserves directly.

Our financial structure and capital markets are extremely well developed and efficient. The amount of funds bought and sold in our money markets averages well over $10 to $12 billion per day. On a gross basis, the amount of money raised by the economy totals over $600 billion, for maturities of under one year, and over $220 billion with longer maturities, each year. In such a system, major advantages result if the monetary aggregates react flexibly to absorb the daily, weekly, monthly, and seasonal shocks, and other irregular forces.

This need for flexible reactions in the monetary aggregates was a major factor in the formation of the Federal Reserve. It has always been a central interest in its operations. The need for such flexibility may be greater today than in the past. Our capital markets operate with an extremely low ratio of equity capital. We have developed highly specialized financing institutions and techniques. The underwriting of our public debt is done at extremely low margins. These are possible because the market does not have to shoulder the risks of widely fluctuating interest rates from irregular short-term movements. The additional reserves created to satisfy the purely seasonal or irregular demands for short-term funds disappear quite rapidly. They influence only slightly total demand, or the supply and demand equilibrium for financial funds. It is not evident why one should want rates in the money markets to fluctuate in response to their movements.

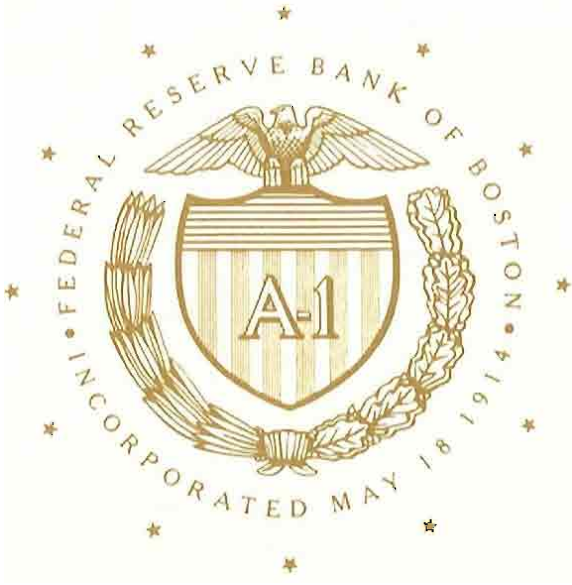
Most decision models and loss functions would, I believe, show that, beyond certain limits, it is highly advantageous for the Government to assume the risks from irregular movements. The position of these limits will depend, at any time, on the ability of the private sector to assume such risks, on the shape of loss functions, on the variance of movements, and similar matters.

Of course, I recognize that, if such risk assumption is possible only at the expense of other goals, it might not be worthwhile. The gains from one program must be weighed against the loss from another. Still, I believe that allowing flexible reactions to temporary reserve

requirements is logical. I would also agree that we need a better understanding of how the present system works, as well as of how to improve it.

I must conclude, however, that—recognizing the degree of noise and irregularity in the existing data—somewhat less attention should be paid to very short-run movements in either the monetary aggregates or in money market conditions than presently seems to be the case. More attention needs to be given to the logic of different control systems and particularly to the logic of different monetary goals.

Given the intensity of the beliefs of the Fed's critics that these problems are vital to formulation of a sensible monetary policy and that the operational problems are fairly simple to solve, I personally feel that more effort should have been, and should be henceforth, spent on analysis of these problems. I recognize, of course, that there are major theoretical problems—as well as others, concerned with formulating the best decision-making process—which are also vital in the determination of optimum operating procedures. It does appear, though, that a wider understanding of how operations are determined and of possible alternatives should be useful to all.


FEDERAL RESERVE BANK OF BOSTON
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