The Implementation Problem of Monetary Policy

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During the last two decades, there has been considerable controversy regarding the appropriate method of implementing monetary policy. One approach emphasizes market interest rates; the other, monetary aggregates. This article sets forth the basic issues underlying this controversy. It demonstrates the manner in which the market interest rate approach can lead to perverse monetary actions; whereas the monetary aggregate approach reduces the likelihood of such a result.

DECIDING UPON an ultimate objective for monetary policy, such as a more rapid increase in employment or a reduction in inflation, is only one part of monetary policy. The policymakers must also implement such a policy decision. A considerable amount of study has been devoted to this problem, resulting in numerous technical papers, several conferences, and some rather sharp differences of opinion among economists about the best way to implement policy decisions. This article explains this problem in a simplified form and highlights some of the areas of disagreement.

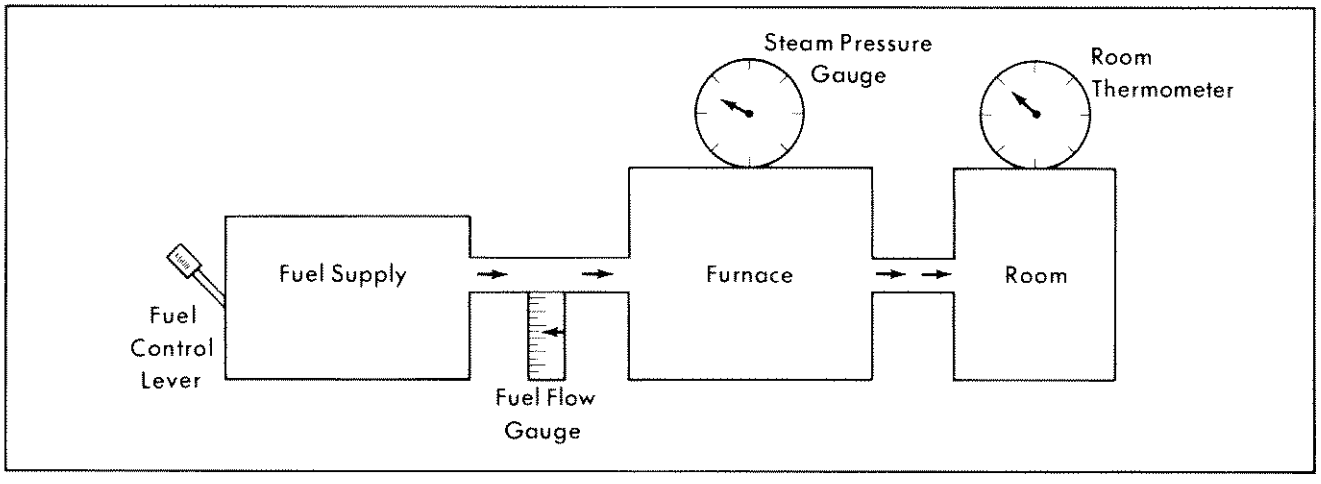
First, the implementation problem is outlined. The use of indicators and operational targets as an aid in implementing policy is then discussed. Next, two hypotheses about the way in which the Federal Reserve's policy actions are transmitted through the economic system are presented. Finally, this framework is used to illustrate how alternative policy prescriptions can develop.

The Implementation Problem

The monetary policy process consists of two broad phases. The policymakers must first decide upon the movements they desire to achieve in their ultimate policy objectives such as prices, output, and employment. Second, they must decide how to manipulate policy instruments such as open market operations, reserve requirements, and the discount rate to achieve these desired effects on their ultimate objectives. This is the implementation phase of policy.

To analyze the implementation problem we shall use the physical analogy of heating a room with a steam furnace. First, let us set up the heating system, as shown in Exhibit 1. Our policymaker is Mr. Homeowner. His policy problem is to maintain the temperature in his house at a comfortable level. He uses his room thermometer to give him a measurement of whether the room temperature is moving in the direction he desires (the room is getting hotter or colder). The means by which he implements a decision to change the room temperature is to adjust the fuel control lever. If, for example, he wants the room temperature to rise, he adjusts the fuel control level to increase the flow of fuel to the furnace. He then judges whether he has correctly adjusted the fuel lever by watching the room thermometer. He knows there is a lag between the time he adjusts the fuel control lever and when the room temperature begins to rise. Taking this lag into account, if the reading on the room thermometer does not rise sufficiently, he would again adjust the fuel control lever.

Exhibit I



It is worth emphasizing that the goal of Mr. Homeowner is a comfortable room temperature, not some reading on the thermometer. The thermometer is only a device that helps him to monitor the heating process.

However, let us assume that Mr. Homeowner has an old furnace, and he is not confident that it works exactly the way the manufacturer claims it should. He installs two intermediate gauges to help him in his control process; a fuel flow gauge to monitor the flow of fuel between the fuel supply and the furnace, and a steam pressure gauge on the furnace to monitor the operation of the furnace. For example, the fuel flow gauge helps the homeowner check for leaks in the fuel line. If this gauge registers a leak, then the homeowner knows that the fuel flow must be increased to maintain the same heat from the furnace.

Monetary Policy

Now let us convert this discussion into an analogy with the implementation problem of monetary policy. The fuel control lever becomes the policy instruments of the Federal Reserve; open market operations, reserve requirements, and the discount rate. The furnace becomes the financial system, and the room becomes the real sector of the economy. Mr. Homeowner becomes the Federal Open Market Committee, and the policy objective becomes something such as employment, prices, and real output, instead of room temperature. The room thermometer becomes a measuring instrument such as the unemployment rate, consumer price index, and GNP in constant prices.

Monetary policy implementation would be much easier if there were complete information about the way in which policy instruments, financial variables, and real variables are interrelated. It would only involve manipulating the policy instruments in a way that would have a known and desired effect on the levels and rates of change of the ultimate objectives of monetary policy. Just as our homeowner, with complete information about how his furnace operates, would know where to set the fuel control lever to get the desired room temperature, the policymakers would know how close, by manipulating the policy instruments, they could come to achieving their desired ultimate policy objectives. There would be no possibility of a "slip twixt cup and lip." The policy instruments could simply be set at definite values, and the desired goals of policy would be achieved subject to any constraints.

Indicators and Operational Targets

The indicator-operational target approach is a pragmatic method of improving the implementation of monetary policy. It starts with the fact that no one has perfect information about the way policy actions filter through the economy, are modified by other factors, and ultimately influence real output, prices, and employment. Economic research, however, has provided some theoretical and empirical information about these linkages. The indicator-operational target approach attempts to employ this information to guide the process by which policy is implemented.

Policymakers are concerned with two major questions when implementing policy. First, what effects are monetary influences exerting on the ultimate policy objectives? Are monetary influences exerting a more, a less, or an unchanged expansionary influence on the future rates of change of prices and employment? An indicator provides information about this question. Second, policymakers want to know how they should manipulate their policy instruments to insure that monetary influences are modified to continue exerting the effect desired by the policymakers. An operational target provides a method for answering this second question.

Indicators

A monetary policy indicator is an economic variable that provides information about the current thrust of the financial sector, including Federal Reserve actions, on future movements in the ultimate policy objectives. Empirical evidence confirms that the effect of monetary policy actions on the ultimate policy objectives is distributed over time. Hence, the Federal Reserve cannot accurately judge the degree of "ease" or "restraint" its current policy actions are exerting on the ultimate objectives of policy by looking directly at measuring instruments such as the consumer price index and the unemployment rate. Current changes in the ultimate objectives primarily reflect the effects of policy actions taken in previous periods.

A further point must be clarified. Policymakers do not need an indicator to tell them their current *intent* of policy. They know what they intend to accomplish with their policy actions.[1] Policymakers

[1]Since the intent of current policy is not made public until about 90 days after the FOMC Meeting in the "Record of Policy Actions of the FOMC" appearing in the Federal Reserve *Bulletin*, a measure of policy intent may be of interest to market participants. However, this is a different problem from the one with which this article is concerned.

want information about the influence their past policy actions are exerting on the future course of the economy.

The choice of an indicator involves choosing some financial variable that consistently provides reliable information about the current influence of the financial sector, including Federal Reserve actions, on future economic activity. In general terms, this requires that the following relationship holds between the indicator and the ultimate policy objectives:

> A change in the magnitude of the indicator is followed by a predictable change in the magnitude of the ultimate objectives of monetary policy.

An economic variable that meets the above criterion can serve as a "scale" that permits policy advisers to make meaningful statements about the relative effects of different policy actions on the ultimate policy objectives. It provides a means of relative comparision of different sets of policy actions; not necessarily an absolute means of comparison.

The usefulness of an indicator hinges on whether or not it consistently supplies reliable information to the policymakers. If at times the ultimate policy objectives move in a direction opposite to the direction predicted using a given indicator, then in such instances the indicator provides false information to the policymakers about the thrust of their policy actions on the ultimate objectives of monetary policy.

Operational Targets

An operational target for monetary policy is an economic variable the Federal Reserve attempts to control directly in its day-to-day money market operations. Following each Federal Open Market Committee (FOMC) meeting, the Committee issues a directive to the New York Federal Reserve Bank. The day-to-day implementation of open market operations is carried out by the Trading Desk at the New York Bank. In general, these directives have traditionally been worded in broad terms such as:

> . . . maintain the prevailing firm conditions in the money and short-term credit markets.

Although the directive may appear to be worded in somewhat ambiguous terms, the Trading Desk does not randomly buy and sell securities. It chooses some financial variable or variables to control and aims its day-to-day operations in the money market at controlling this operational target. The operational target, to be of greatest usefulness, should satisfy three basic criteria as follows:

(1) The Federal Reserve should be able to accurately measure the magnitude of the operational target over very short periods of time.

(2) The Federal Reserve should be able to control the operational target by manipulating policy instruments. In a very short period of time, the Federal Reserve should be able to offset any other factors acting to change the magnitude of the operational target.

(3) Changes in the magnitude of the operational target over an intermediate period of time should dominate changes in the magnitude of the economic variable chosen as an indicator.

The question may arise as to why the concept of an operational target has to be introduced once an indicator is chosen. Why cannot the Federal Reserve aim day-to-day operations directly at the indicator? The necessity for the introduction of operational targets, like indicators, arises basically from the lack of perfect information. At a minimum, the Trading Desk must have some means of evaluating whether its day-to-day operations in the money market are in accord with the intent expressed by the Federal Open Market Committee. To maximize the effectiveness of its daily operations in the money market, the Federal Reserve needs accurate information regarding the influence of these actions. In the short-run many other factors usually influence the movement of intermediate variables such as the money stock and interest rates. If these intermediate variables are used as operational targets, then the short-run influence of other factors frequently causes these variables to transmit misleading information to the policymakers about the effect their day-to-day policy actions are exerting on the intermediate-term movements of the indicator variables.

In our furnace analogy, the operational target becomes the fuel supply. An indicator is a gauge set in the process by which monetary policy actions are transmitted to the real sector of the economy. Usually the indicator is "attached" to the financial sector. It gives the Federal Reserve a reading on how much of the fuel they are supplying (through open market operations, reserve requirements and the discount rate) is being converted into energy to drive the economy.

Two Hypotheses

The lack of complete information about the way policy actions are transmitted to ultimate objectives

requires the formulation of proposed explanations (hypotheses) about the process. A person's choice of an indicator and an operational target usually depends upon his hypothesis about the way policy actions are transmitted through the financial sector into the real sector. Disagreement among economists as to the appropriate choice of an indicator and operational target is basically a disagreement as to the correct representation of the monetary policy transmission mechanism.[2]

Two frequently used hypotheses about the transmission process of monetary policy, the Market Interest Rate Hypothesis and the Money Supply Hypothesis, are compared in Exhibit II. The policy instruments and ultimate objectives available to policymakers are the same regardless of whether they use one of these hypotheses or any other hypothesis about the transmission process. There may be differences between advocates of the two hypotheses, however, concerning the relative importance of different policy instruments and ultimate objectives.[3]

In the Market Interest Rate Hypothesis, the indicator is market interest rates. An economic variable such as free reserves (referred to as net borrowed reserves when borrowings exceed excess reserves) is generally chosen as the operational target. In a broader context, free reserves can be viewed as a substitute for a number of short-term money market factors, such as the Federal funds rate, "tone and feel of the market," and the Treasury bill rate. In the Money Supply Hypothesis, the indicator is the growth rate of the money stock (currency plus demand deposits of the nonbank public). The operational target is the net source base, total source base, or monetary base, as computed by the St. Louis Federal Reserve Bank.[4]

[2]In some cases, individuals may accept an economic variable, such as money, as an indicator based solely on empirical evidence, and still not accept a hypothesis in which money plays a key role in determining economic activity.

[3]For example, many supporters of the Money Supply Hypothesis have traditionally placed more reliance on open market operations and advocated very limited use of the other policy instruments, particularly Regulation Q.

[4]Increases in Federal Reserve credit (holdings of securities, discounts and advances, and float), the gold stock, and Treasury currency outstanding increase the stock of source base. Increases in Treasury deposits at the Federal Reserve, Treasury cash holdings, and other deposits and other Federal Reserve accounts decrease the stock of source base.

The net source base is total source base *net* of member bank borrowings. The monetary base is total source base adjusted for reserve requirement changes. See Leonall C. Andersen and Jerry L. Jordan, "The Monetary Base – Explanations and Analytical Use," this *Review* (August 1968), pp. 7-14.

Exhibit II

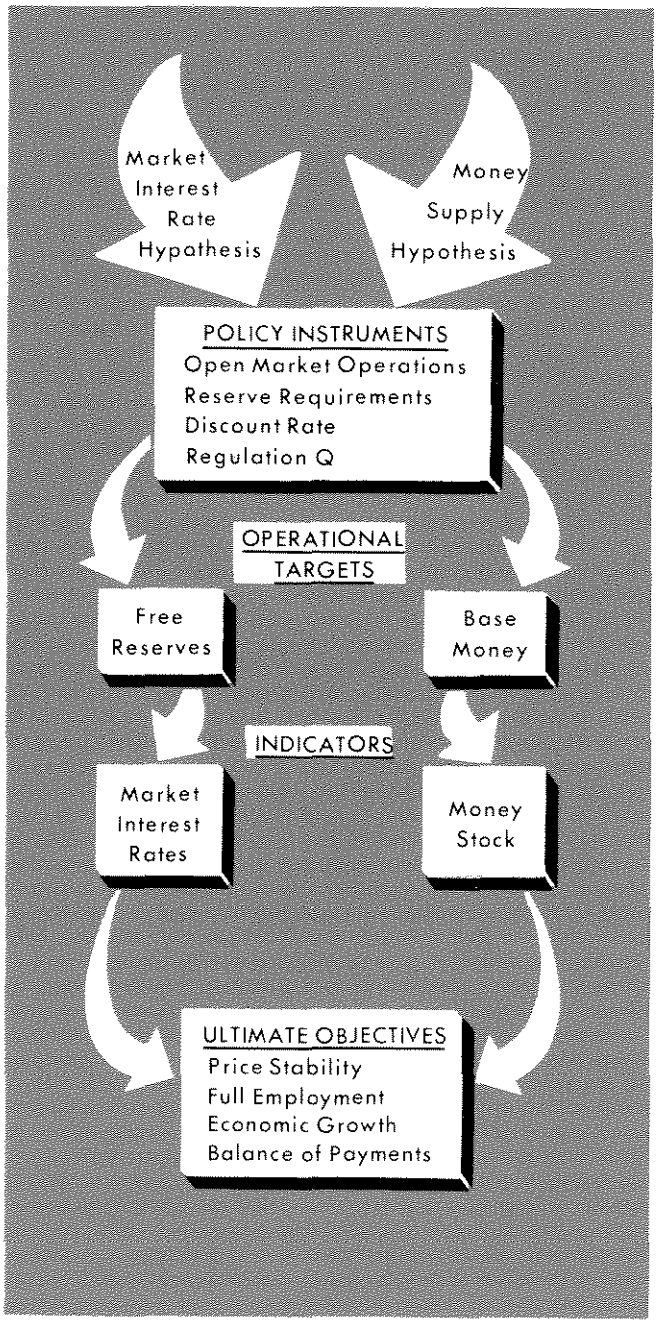
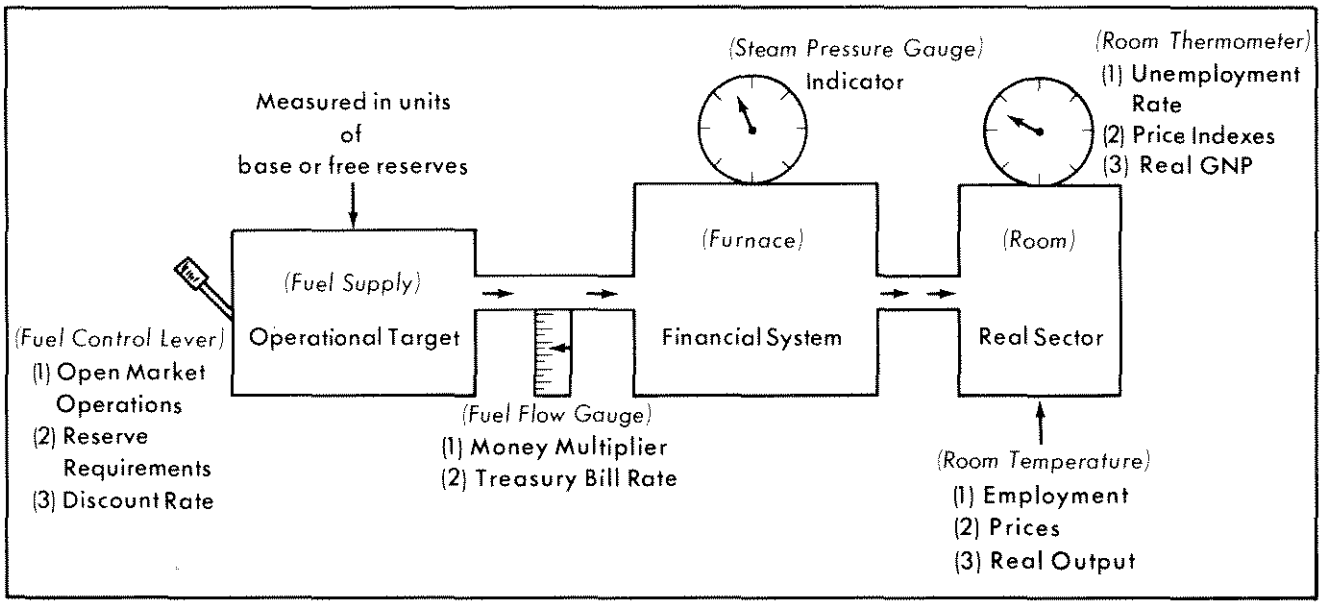


Exhibit III illustrates the analogy between the heating system and the monetary policy mechanism. The Federal Reserve looks at a wide range of data, including the unemployment rate, consumer and wholesale price indexes, and real GNP to evaluate what is happening to employment, prices, and real output. The Federal Reserve then adjusts open market operations, reserve requirements, or the discount rate to achieve its objectives with respect to employment,

Exhibit III



prices, and real output. By altering the policy instruments, the Federal Reserve changes the flow of fuel to the economy. The fuel supply is measured in units of base money or units of free reserves. To analyze the future effect of these actions on the real economy, the Federal Reserve then would look at its gauge on the financial sector, either the growth of the money stock or the level of market interest rates. To further monitor the process, the Federal Reserve may use another gauge, equivalent to the fuel flow gauge, such as the Treasury bill rate for the Market Interest Rate Hypothesis or the money multiplier for the Money Supply Hypothesis.[5] This type of gauge signals leakages in the flow of fuel to the financial system.

Examining Exhibit II and Exhibit III, we can see where some differences of opinion might arise about the influence of Federal Reserve actions. For one thing, the two hypotheses in Exhibit II measure the fuel supply by different means. One viewpoint measures the flow of fuel in terms of base, the other in terms of free reserves. Under the Money Supply Hypothesis, the Federal Reserve is supplying more fuel if the growth rate of the base increases. The Market Interest Rate Hypothesis takes an increase in the level of free reserves as a measure of an acceleration in the flow of fuel.

A second area of disagreement can develop about the manner in which the flow of fuel from the Federal Reserve is converted into a flow of total spending. Supporters of the Money Supply Hypothesis contend that an increased flow of base money into the financial sector is converted into an increased growth of the money stock, which results in an increased flow of total spending, influencing employment, prices, and real output. The alternative view is that an increased level of free reserves is converted in the financial sector into lower market interest rates, which result in an increased flow of total spending and hence real variables are influenced. In our analogy, this question may be phrased, "how is fuel converted into energy that drives the economy?"

Supporters of the two hypotheses are monitoring the progress of policy by different gauges, where the gauges are attached to the same part of the process. Since the growth of the money stock and market interest rates frequently move in the same directions, substantial divergences of opinion often arise regarding the correct policy action to take to achieve the same ultimate objective.

For example, suppose that the supporters of the Market Interest Rate Hypothesis look at their indicator (the gauge on the financial system) and

[5]The money multiplier summarizes the influence on the money supply process of all those factors other than changes in the base. By monitoring the movements of the components of the multiplier, the Federal Reserve could determine the effects of any given growth of base on the growth of the money stock. For example, an increase in the public's desired holdings of currency relative to demand deposits would decrease the growth of money associated with any given growth of base. This would be a "leakage" between the fuel supply and the furnace. By increasing the flow of base, the Federal Reserve could offset this influence on the money supply process.

observe that market rates are rising. If they desire no change in the influence of policy, they may conclude that the flow of fuel to the financial sector will not be converted into enough energy (low market rates) to maintain the rate of growth of real output and employment they desire. Hence, they would advise that policy instruments be used to raise the level of free reserves (pump in more fuel).

However, let us assume that the supporters of the Money Supply Hypothesis look at their indicator and observe that the growth rate of money is accelerating. They conclude that the fuel being supplied by Federal Reserve actions would be converted into a progressively more rapid flow of total spending, and they advise that the policy instruments should be used to slow the growth of the base (pump in fuel at a slower rate).

At this point a substantial divergence of opinion about the reason for the change in market interest rates arises between the supporters of the two hypotheses. This difference of analysis has important implications for the conduct of monetary policy. The supporters of the Market Interest Rate Hypothesis contend that Federal Reserve policy actions are dominating the movements in interest rates and that the rise in market rates will result in a slowdown in the real economic activity. The supporters of the Money Supply Hypothesis, however, contend that changes in the public's demand for credit are dominating movements in market interest rates and that Federal Reserve actions through their influence on total spending are influencing the public's demand for credit. In terms of our analogy, the Money Supply Hypothesis asserts that the market interest rate indicator is not insulated from developments in the real sector. As the real sector heats up (employment, real output, and prices rise), this influences the readings on the market interest rate indicator.

To analyze the importance of this difference of analysis, we shall first discuss the interdependence of free reserves and the base. Then the implications for monetary policy of this interdependence are examined. *In the following presentation, the net source base is used, and hereafter when the terms "base money" or "base" are used, they will refer to net source base.* The same results may be derived by using the monetary base or source base.

Interdependence

Free reserves are calculated by subtracting member bank borrowings from member bank excess reserves. One of the components of the source base on the *uses* side of the balance sheet is member bank excess reserves. The net source base is obtained by subtracting member bank borrowings from the source base. Therefore, the components of the net source base may be combined so that free reserves is one of the uses of the net source base.[6] If the Federal Reserve alters the level of free reserves, and if currency held by the public and vault cash in nonmember banks are held constant, the net source base is changed in the same direction. Free reserves and the net source base are not independent of each other. Actions taken by the Federal Reserve to alter or maintain the existing value of one of these operational targets exert an influence on the other.

To analyze the importance of this interdependence, the bank credit market is introduced. Supply and demand conditions in this market are specified as follows:

$aB = S =$ commercial banks' supply schedule for bank credit
$D =$ public's demand schedule for bank credit

The equilibrium condition for the bank credit market is given as:

$$S = D$$

(Amount of credit banks are willing to supply = amount of bank credit demanded by the public).

In the above expression, (a) denotes the bank credit multiplier, which is the connecting link between the amount of net source base (B) and the amount of credit banks are willing to extend.[7]

[6]In this article, the net source base is denoted by B. Generally this concept is denoted as B^a. The superscript has been removed to avoid any confusion that might arise when the bank's credit supply curve is specified later.

The net source base is defined in the following manner:

$$B = R^m - A + V + C^p$$

where: R^m = member bank reserves = $R^r + R^e$
V = vault cash holdings of nonmember banks
A = member bank borrowings from the Federal Reserve Banks
C^p = currency held by the nonbank public
R^e = excess reserves of member banks
R^r = required reserves of member banks

Free reserves (R^f) are defined as follows:

$$R^f = R^e - A$$

The relationship between the net source base and free reserves can be expressed as follows:

$$B = (R^e - A) + R^r + C^p + V = R^f + R^r + C^p + V$$

[7]The money multiplier and bank credit multiplier summarize all those factors, other than changes in the net source base, that affect the money supply process. When the monetary base is used, the influence of reserve requirement changes and member bank borrowings are included in movements in

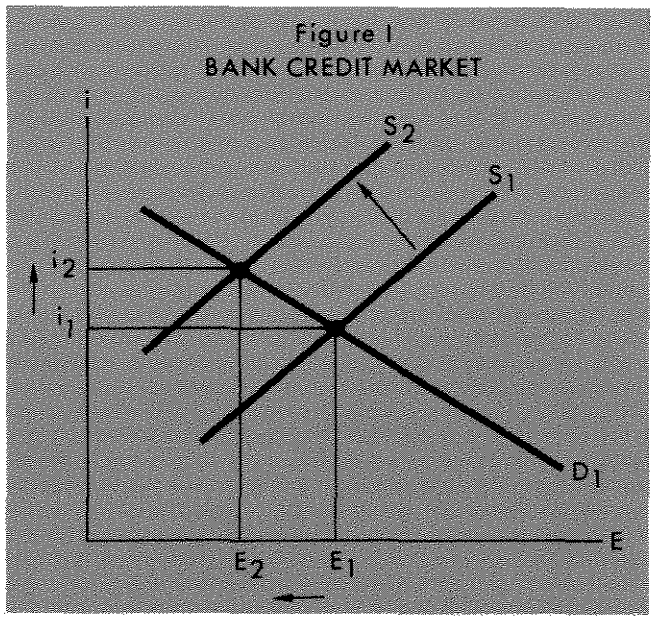
Both the bank credit multiplier, and hence the amount of credit banks are willing to extend, and the public's demand for bank credit are dependent upon the bank credit market interest rate.

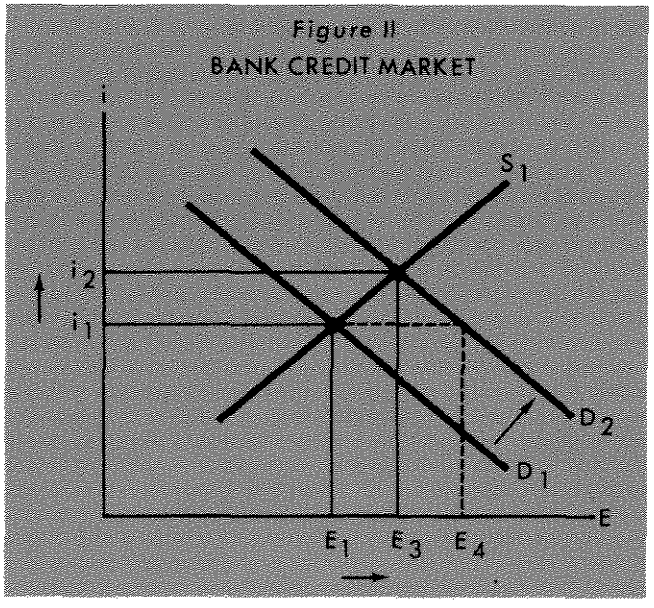
The public's demand for bank credit and the bank's credit supply also depend upon a number of other factors. For example, the public's demand for credit depends upon the expected rate of return on real capital and upon price expectations. The banks' supply of credit depends upon the amount and rate of growth of the net source base. In our following illustrations, these factors would appear as shifts in the supply and demand schedules.

A rise in market interest rates could result from either a shift in the credit supply curve, or a shift in the credit demand curve, or some combination of the two. The effect of a shift in the credit supply curve is shown in Figure I. The credit supply curve shifts from S_1 to S_2 and, in the resulting adjustment process, the interest rate rises to i_2 and bank credit outstanding falls to E_2.

Now let us look at an alternative explanation for the rise in market rates. Suppose that the rise in rates was due to a shift in the public's demand for credit. This appears as a shift to the right of the public's demand curve from D_1 to D_2, as shown in Figure II.

At the market interest rate (i_1), the quantity of bank credit demanded by the public (E_4) exceeds the amount of credit the banks are willing to supply (E_1), given the stock of base and the value of the bank credit multiplier. If the Federal Reserve System does not increase the growth rate of the net source base in response to the rise in interest rates, but permits market interest rates to adjust to clear the credit market, the interest rate rises toward i_2. As the yields on loans and securities rise, the amount of credit banks are willing to supply rises; banks reduce their excess reserves, increase borrowings from Federal Reserve Banks, and raise the yields they offer to attract time deposits.[8] The new equilibrium quantity of bank credit demanded and supplied is E_3.





The policymakers do not observe these supply and demand curves shifting up and down: all they observe is the increase in the reading on the market interest rate indicator. If the policymakers believe

the base, instead of in the multiplier. The money multiplier associated with the net source base is:

$$m^1 = \frac{1 + k}{(r - b)\ (1 + t + d) + k}$$

k and d, respectively, are the ratios of currency held by the public and U.S. Government deposits at commercial banks to the demand deposit component of the money stock.

r, b, and t, respectively, are the ratios of bank reserves, member bank borrowings, and time deposits to commercial bank deposit liabilities (excluding interbank deposits).

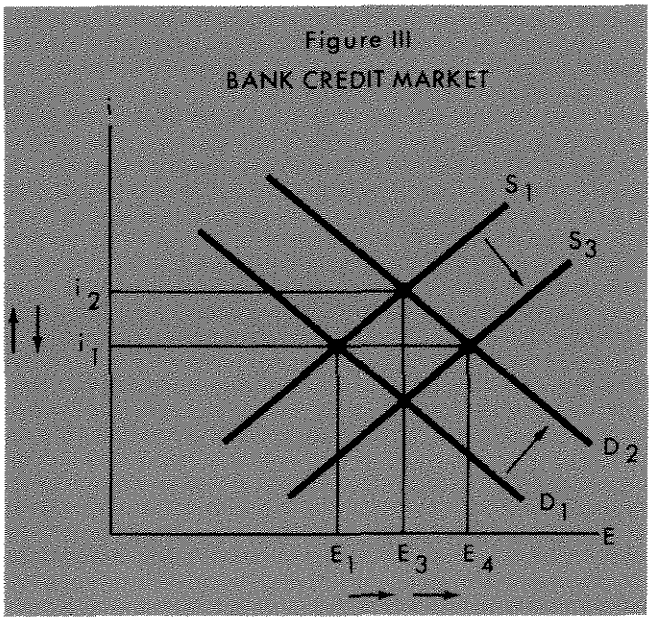
The reserve ratio, (through the dependence of banks' derived excess reserves), the borrowing ratio and the time deposit ratio are all dependent upon credit market interest rates.

For an illustration of the derivation of a money multiplier, see Jerry L. Jordan, "Elements of Money Stock Determination," this *Review* (October 1969) pp. 10-19.

[8]Whether bank credit increases or decreases depends upon the relationship between Regulation Q ceiling rates and the yields banks offer on time deposits. If banks are already at Regulation Q ceilings, then an increase in the public's demand for credit resulting in a rise in market interest rates may lead to disintermediation and a decrease in bank credit.

the rise in market rates to i_2 represents a leftward shift (decrease) in the credit supply curve, as in Figure I, and they desire no change in the influence of policy, they may now increase their purchases of securities to raise the level of free reserves. This policy action, according to the Market Interest Rate Hypothesis, would shift the credit supply curve to the right, from S_2 back toward S_1, and market yields would decline from i_2 back toward i_1.

If, however, the rise in rates resulted from a rightward shift of the public's demand for credit (as shown in Figure II), then to prevent market interest rates rising to i_2, the Federal Reserve must expand the net source base enough to shift the banks' credit supply curve to S_3, as shown in Figure III. At a market interest rate of i_1, banks are now willing to supply a larger amount (E_4) of credit. Under these conditions, the operational policy of raising free reserves, which accelerates the growth of the base, results in a more rapid expansion of bank credit and money than would result in the situations illustrated by Figures I and II.



Supporters of the Money Supply Hypothesis assert that Federal Reserve actions shifting the credit supply curve would be self-defeating, if the rise in market rates reflected a shift in the public's demand curve. In a situation such as that illustrated by Figure III, the money stock expands very rapidly. The Money Supply Hypothesis predicts that market rates would only temporarily remain at i_1. As the feedback effect of the rise in the money stock on total spending is reflected in the public's demand for credit (shifting the demand curve further to the right), the Federal Reserve would again have to increase the net source base to maintain the market yield at i_1. Under these conditions, changes in the base are determined by shifts in the public's demand for bank credit via the reaction of the monetary authorities. This implies that the Federal Reserve would give up its control over the money supply process. Total spending would rise at a progressively more rapid rate and interest rates would increase.

Implementing Policy Under Different Economic Conditions

This section illustrates how alternative policy prescriptions can arise in response to changing economic conditions. Two different sets of conditions are specified, and the monetary policymakers are assumed to make a policy decision based upon this information.

Condition 1

State of the economy: The economy is operating at full employment. An increasing proportion of total spending is reflected in rising prices. Commercial banks have raised their offering rates on time deposits to Regulation Q ceiling rates.

Policy decision: Policymakers shift the focus of their attention from real output and employment to achieving stable prices.[9]

Using the Market Interest Rate Hypothesis, policymakers reason that interest rates must be pushed higher to slow total spending and bring aggregate demand in line with the productive capacity of the economy. Consequently, they adopt an operating strategy designed to raise market rates. This involves using policy instruments to reduce the level of free reserves. The Trading Desk is instructed to "pursue open market operations with a view to obtaining tighter money market conditions." The result of these open market actions is to decrease the growth rate of the base, which results in a slowing in the rate of expansion of the money stock.

As market interest rates continue to rise, banks can no longer compete for time deposits and disintermediation begins. Consequently, the amount of earning assets banks can hold declines. In restructuring their portfolios, banks attempt first to reduce their holdings of lowest-yielding assets. The time sequence of this process would probably be declines in their holdings of short-term Government securities first,

[9]This shift in focus of attention does not mean the policymakers now ignore the growth rate of real output and employment. The ability of the policymakers to achieve a price objective is conditioned by the influence of their policy actions on real output and employment.

followed by declines in holdings of municipal securities. As long as possible, banks try to reduce holdings of securities in order to continue to acquire business loans.[10]

The impact in the credit market is a sharp decline in the prices of municipal bonds and Government securities. Cries of a liquidity crisis, or "credit crunch" may arise in the financial community. Other financial intermediaries such as savings and loan associations are also affected by the rapidly rising interest rates. Added to the outcry from the securities markets may be the asserted danger of some possible failures of savings and loan associations. The economists who use market interest rates and other financial market conditions as their indicators might warn, in terms of our furnace analogy, that "there is too much pressure and the furnace is going to blow up!"

The scenario outlined in this stage corresponds, in rough form, to monetary policy in 1966. In late 1965 and early 1966, monetary policymakers moved to a more restrictive monetary policy aimed at reducing the "emergence of inflationary pressures." During the summer of 1966 the Federal Reserve pursued a progressively more restrictive policy. As market interest rates rose above Regulation Q ceiling rates, the Board of Governors did not raise Regulation Q ceiling rates. As funds flowed out of banks and nonbank savings institutions, these institutions faced a new and costly period of portfolio adjustment. The result of these policies culminated in August 1966 in a relatively short-lived liquidity crisis, called the "Credit Crunch of 1966."[11]

Under such conditions, the Federal Reserve policymakers face a very difficult decision. Using interest rates as indicators, the information transmitted to them is that they are following very restrictive policies. Slower growth of bank credit, and other information transmitted to them directly from financial markets and the financial intermediaries, reinforce this view. The correct operating strategy now appears to be to reverse quickly open market operations, and "ease the pressures in the financial markets."[12]

[10]The rise in the share of loans in bank assets during periods when banks must reduce the total volume or growth rate of bank credit also reflects the long-run profitability of bank-customer relations. See Edward J. Kane and Burton G. Malkiel, "Bank Portfolio Allocation, Deposit Variability, and the Availability Doctrine," *Quarterly Journal of Economics* (February 1965), pp. 113-34.

[11]See Albert E. Burger, "A Historical Analysis of the Credit Crunch of 1966," this *Review* (September 1969), pp. 13-30.

[12]It should also be noted that the Federal Reserve does not make policy decisions in a vacuum. At such times the Federal Reserve may be under considerable public or government pressure to ease its policy.

If the money stock is being used as an indicator, the reduced growth rate of money resulting from the slowing in the rate of increase of the base also signals that the policymakers have begun to exert a less expansionary influence on the ultimate policy objectives. However, the supporters of the Money Supply Hypothesis would argue that the sharp rise in credit market interest rates and the "above average liquidity pressures in the financial market" do not necessarily signal the desirability of a significant reversal of operating strategy. The key elements of a less expansionary monetary policy are a reduced expansion of demand deposits and bank credit. This is the necessary preliminary to the desired policy objectives of reduced aggregate demand and hence a reduced rate of increase of prices.

An analysis based on the Money Supply Hypothesis agrees that a continued operational policy of restricting the growth rate of the base would, in the short-run, lead to higher levels of market interest rates. Over the intermediate-term, however, the resulting slower growth of the money stock would exert a dampening influence on total spending. The slowdown in total spending would exercise a dampening influence on the upward pressures on prices and also lead to a reduction in the demand for credit. Hence, pursuing such an operational target would, according to this hypothesis, lead to lower market interest rates and the desired ultimate policy objective of lower prices.

Condition 2

Let us now assume that the policymakers have engaged in a set of policy actions that resulted in a slowing of economic activity. This permits an analysis of the implications of different methods of implementing policy in a cyclical downturn.

State of the economy: The growth rate of real output has been reduced well below its long-run potential. The level of unemployment has risen above 5 per cent.

Policy decision: Pursue a monetary policy that results in an increased growth rate of real output and hence a decreased level of unemployment.

In an economic downturn, if the Federal Reserve uses market interest rates as its indicator, it might conclude that the falling market rates signal monetary policy has become "easier" than previously. This interpretation depends upon the condition that the decrease in interest rates is resulting from a shift in the credit supply curve. If the decrease in interest rates reflects a decrease in the *demand* for credit,

then Federal Reserve policy may be "tighter" than previously. The fall in interest rates raises the banks' desired excess reserve ratio which operates to reduce the money multiplier. Also, if the downturn has been preceded by a "crunch" in the financial markets, this may also operate to raise banks' desired excess reserve ratio. If during the "crunch" the Federal Reserve exercised relatively strict administration of the discount window, this factor would lower the banks' desired ratio of borrowings to deposits. Therefore, the decline in the growth rate of money, resulting from a slower growth of the base, is reinforced by the fall in market interest rates.[13] Hence, the monetary aggregates transmit the opposite information, that policy actions are having more of a restrictive effect on the future movements of real output, employment and prices.

A rise in the member banks' desired holdings of excess reserves, and a decrease in their borrowings from Federal Reserve banks, result in a rise in the level of free reserves. Under these conditions, to reduce the operational target of free reserves below its previous level, the Federal Reserve must engage in an even more aggressive policy of open market sales. The result is an even more rapid decrease in the net source base, and hence a further downward impetus on the money supply process.

This stage might be labeled the "Let us turn it around" stage. As our previous discussion implies, the choice of an indicator and an operational target have important implications for the ability of the Federal Reserve to turn the economy around to a renewed period of expansion in the time period desired by the policymakers. To briefly outline the problems that might arise, let us assume that the policymakers decide that to achieve their ultimate objectives the money stock should increase at a more rapid rate.

However, although policymakers accept the growth rate of the money stock as their indicator, let us assume that policy is still implemented using the operational target of the Market Interest Rate Hypothesis. When judging the impact of day-to-day open market operations on the growth rate of money, the Trading Desk uses free reserves or, with equivalent results, the Federal funds rate. The growth rate of money is used to gauge the extent to which Federal Reserve actions are being converted into energy that will drive the economy upward. However, the flow of fuel is measured in free reserve units instead of in units of base.

[13]The reader may refer to footnote 7, page 25, to see how these factors would lower the money multiplier.

Under the economic conditions set forth for this stage, the equilibrium level of free reserves would be expected to rise and the Federal funds rate would fall. If the monetary authorities are guided in their open market operations by either of these operational targets, they may be reluctant to pursue an aggressive policy of open market purchases. Therefore, the growth of the base may be slower than what is required to achieve the desired growth rate of the money stock.

The policymaker's failure to achieve some publicly announced growth rate of money *does not mean* that the Federal Reserve cannot control money. The failure to reach the desired monetary growth path may result from using an inappropriate operational target. As shown earlier, if the Federal Reserve tries to resist market-determined movements of interest rates, without taking adequate account of the influence of of these actions on the growth rate of the base, policymakers may not be able to achieve the growth of money they desire. The Federal Reserve can continue to use open market operations to smooth short-run pressures in the financial markets arising from situations such as Treasury financings or a Cambodian Crisis. However, to control the growth rate of the money stock, it must consider the effect of these actions on the growth of the base, which dominates the intermediate-term growth rate of the money stock.[14] Empirical evidence has been presented that, by combining information about the past movements of money multiplier with a base operational target, the Federal Reserve can exercise reasonably close control over the intermediate-term growth rate of the money stock.[15]

Summary

This paper has presented a simplified explanation of the implementation problem of monetary policy. The actual implementation process is somewhat more complicated. For example, we assumed that the Federal Reserve had only one ultimate objective. In an actual situation its ability to achieve stable prices will be constrained by the effect that its policy actions have on employment. In our furnace analogy, this would be a case where the homeowner is concerned not only with the room temperature, but also with the relative humidity in the room. The speed with which the homeowner can increase the room

[14]For a further discussion of this point, see Allan Meltzer, "Controlling Money," this *Review* (May 1969) pp. 16-24.

[15]Lionel Kalish, "A Study of Money Stock Control," *Journal of Finance* (September 1970), pp. 761-776.

temperature to a comfortable level and still maintain a tolerable level of humidity is dependent upon a number of conditions under which the process is carried out (initial conditions), such as the outside temperature. Likewise, the ability of the Federal Reserve to influence prices while maintaining a "tolerable" level of employment will depend upon initial conditions, such as price expectations, the price and employment response of producers to a decrease in total spending, and the structure of the labor market.

Monetary policy at present and in the foreseeable future must be implemented under conditions of less than perfect information about the structural relationships linking the economy together. The indicator-operational target method uses existing knowledge to achieve efficient implementation of policy. This article has shown that the correct choice of an indicator, and an operating strategy for controlling that indicator, are important problems. If the Federal Reserve follows an indicator that is providing false information, then this can have severe consequences for prices and employment.

Movements of market interest rates and the growth rate of the money stock frequently give conflicting information about the thrust of monetary policy. The possibility of conflict between proponents of these two indicators is greatest at times when it is most important that the Federal Reserve accurately assess the thrust of monetary policy actions. The operational strategy used to influence the level of market interest rates affects the relative expansionary or contractionary influences the Federal Reserve is exerting on the money supply process. If the Federal Reserve attempts to offset changes in levels of market interest rates that result from shifts in the public's demand for credit, then the growth rate of the base becomes endogenously determined. Under these conditions, the growth of the money stock reinforces expansions or contractions in total spending and hence movements in prices and employment.

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