

Money Market Strategy or Monetary Aggregates: An Analysis of Recent Federal Reserve Policy

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IN recent years the critics of monetary policy have placed increasing emphasis on the need to control monetary aggregates. This emphasis has resulted from what appears to be a bias on the part of the Federal Reserve in favour of reducing strains in the money-market which in turn causes the Central Bank to lose control over an important aggregate such as the money supply. If the Federal Reserve attempts, say, to meet an expanded demand for bank credit by increasing bank reserves, it reduces pressure on interest rates (and hence the money-market) but may lead to loss of control over money.

The focus of this paper is to attempt to determine if there has been any significant change in monetary policy, over the later years of the 1960s and early 1970s, in reaction to the criticism of the money-market strategy of the Federal Reserve. In recent years Federal Reserve officials have, in policy statements, appeared to profess allegiance to greater reliance on the control over aggregates and a movement away from a money-market strategy. This paper will attempt to determine if such a shift has indeed occurred. After constructing a model of Federal Reserve policy, several different tests will be applied to ascertain the extent of changes (if any) in the nature of monetary policy.

A Model of Central Bank Policy

In economic theory the consumer is assumed to maximise utility subject to the constraints imposed by a limited amount of income. He allocates expenditures

in such a way that marginal utility per dollar of expenditure (among different goods) are equal. In equilibrium then, the consumer maximises utility when:

$$\frac{MU_a}{P_a} = \frac{MU_b}{P_b} = \frac{MU_n}{P_n}$$

where MU is marginal utility, P is price, and a , b , and n different goods.

On the basis of policy statements, it is possible to imagine the Federal Reserve System as having a disutility function which relates the objectives of policy to one another. This function (ϕ) can be expressed thus: the Central Bank attempts to minimise its disutility by minimising the difference between certain desired levels of target variables and actual levels. We shall imagine a disutility function which contains as variables, income, prices, unemployment and interest rates. Thus:

$$(1)\phi = W_1(Y_t - Y_t^*)^2 + W_2(P_t - P_t^*)^2 + W_3(U_t - U_t^*)^2 + W_4 I_t^2$$

where W_1 , W_2 , W_3 , and W_4 are the weights attached to these objectives; Y_t , P_t and U_t are actual levels of income, prices, and unemployment; Y_t^* , P_t^* and U_t^* the desired values of these variables. I_t , the interest rate, is included in the disutility function since it is assumed that the Central Bank reacts to disorderly conditions in financial markets.

The disutility function contains certain assumptions which should be spelled out. It is assumed that the Federal Reserve would be equally unhappy if the rate of growth of income exceeded the desired rate as it would be if it were to fall short of that desired. Also it is assumed that the Central Bank would be equally unhappy with deflation as with inflation, with over full-employment as with excessive unemployment. Though unrealistic to a certain extent, these assumptions will be retained for purposes of simplicity. It is certainly clear, however, that a rate of growth in income above that desired creates fewer problems for the Central Bank than one reflecting stagnation in economic activity. As to price behaviour it does not appear plausible to say that the Central Bank would be equally unhappy with declines in the price levels as with increases. It would seem that the Federal Reserve would be more reluctant to allow price inflation as contrasted to declines in the price level. Price stability as an objective of policy appears to have elements of asymmetry with greater disutility attached to price inflation. To the extent that price deflation is associated with unemployment and stagnation in economic activity then perhaps some of this asymmetry would be reduced.

The Federal Reserve is assumed to minimise disutility subject to their view of the economy which we can depict in terms of a series of equations. Before setting these equations, however, it is necessary to decide on the appropriate monetary variable through which the Central Bank hopes to influence the target

variables. Also the instrument of policy, through which the Federal Reserve influences the appropriate monetary variable, must be specified. As to the first aspect we shall assume that the Federal Reserve views their influence on the economy as deriving from their impact on total reserves. There is enough in the way of policy statements by Federal Reserve officials to support this emphasis on total reserves as the important intermediate variable.¹ Also total bank reserves as the intermediate variable is preferable to such other monetary indicators as the money supply or bank credit. It is easier to see the influence of the Central Bank on total reserves as compared to the money supply (or bank credit) since other factors on the side of demand may influence these other variables. Recognising, then, the imperfections implicit in any monetary indicator, the use of total bank reserves may be defended as logical and consistent with the workings of monetary policy in the United States.

Taking total bank reserves (R_t) as the important monetary variable, we have the definitional equation:

$$(2) R_t = G_t + Z_t$$

with G_t being all those reserves supplied to the banking system (or absorbed from it) by open market operations and Z_t being a composite of all other factors affecting reserves. Included in the latter are float, treasury currency, movements of treasury deposits and gold movements. Open-market operations are, realistically, the instrument and bank reserves the intermediate variable in our model; the Federal Reserve is conceived of as using open market operations so as to affect bank reserves and through bank reserves ultimately prices, income and employment.

Assuming that the Federal Reserve attempts to minimise its own disutility function, it does so subject to the constraints imposed by its view of the economy's workings. We may express this view by a series of equations whereby income (Y_t), prices (P_t) and the unemployment rate (U_t) are all expressed as functions of total reserves (R_t), the government's budget surplus (S_t) and recent movements in income (L_y), prices (L_p) and unemployment (U_t). Thus:²

$$(3.1) \quad Y_t = a_1 R_t - b_{11} S_t + b_{12} L_y - B_{13} L_u + b_{14} L_p + V_1$$

$$(3.2) \quad P_t = a_2 R_t - b_{21} S_t + b_{22} L_y - b_{23} L_u + b_{24} L_p + V_2$$

$$(3.3) \quad U_t = a_3 R_t + b_{31} S_t - B_{32} L_y + b_{33} L_u - b_{34} L_p + V_3$$

$$(3.4) \quad I_t = -a_4 R_t + c T_t + V_4$$

1. The Maisel subcommittee studying monetary policy is said to have leaned in the direction of total bank reserves as the desirable indicator of monetary policy. Andrew Brimmer, "The Political Economy of Money: Evolution and Impact of Monetarism in the Federal Reserve System", *Papers and Proceedings, American Economic Review*, May 1972, p. 350.

2. This model was suggested by John Wood, "A Model of Federal Reserve Behavior", in *Monetary Process and Policy: A Symposium*, G. Horwich, ed. (Homewood, Illinois: R. D. Irwin, Inc. 1967).

These equations which are viewed as depicting the Central Bank's understanding of the economy may be defended in this way; total bank reserves and the government's budget surplus (or deficit) are both obviously related to the behaviour of important macroeconomic variables. Also the present level of, say, income is viewed as being influenced by recent changes in income (L_y) mainly on the assumption that if income has been rising it will be presumed to continue rising. Thus the Fed's view of the economy today is strongly influenced by recent changes in income (L_y), prices (L_p) and unemployment (U_t). The same reasoning applies to the Central Bank's view of prices and unemployment.

The interest rate relation (eq. 3.4) may be seen as the Federal Reserve attempting to minimise fluctuations in interest rates so as to perform its function of contributing to financial stability. The interest rate in turn is viewed as a function of changes in bank reserves (R_t) and in the amount of outstanding Treasury securities (T_t). The negative coefficient of the bank reserve variable emphasises the liquidity effects of an increase in bank reserves which is assumed to lower interest rates; an increase in Treasury securities outstanding is assumed to lower security prices and raise interest rates.³

The coefficients of the other structural equations may be defended in this way: both income and prices may be assumed to increase directly with increases in reserves with unemployment decreasing as the Central Bank expands reserves. An increase in the budget surplus is conceived of as having a deflationary impact on income and prices, with unemployment rising. Recent increases in income are seen as being positively related to present income and prices, with unemployment declining; recent increases in unemployment are related in a negative manner to income and prices. Recent increases in prices are associated with increases in current income and prices and with reductions in unemployment.

The variables included in our model are defined in the following manner:

Y_t^* is the desired level of income; in place of GNP, industrial production figures are used. It is assumed that, being as industrial production grew at an average annual rate of 8 per cent during the 1960s, the desired growth of income is 8 per cent.⁴ P_t^* , desired price behaviour, is zero and U_t^* , desired unemployment is assumed to be 4 per cent.⁵ L_y , is a three month average of industrial production, L_p , a three month average of consumer prices and L_u , a three month average of the unemployment rate, all of which are seasonally adjusted. S_t and T_t are also three month averages of the Budget Surplus and Treasury securities outstanding (outside of the Federal Reserve and the trust funds). I_t is a three month average of treasury bill rates.

The intermediate variable through which monetary policy is assumed to

3. Data on bank reserves are taken from the Monthly Review of the Federal Reserve Bank of New York. All other Data from the Federal Reserve Bulletin.

4. Since we are using monthly data, the actual figure would be 8 per cent divided by 12. Industrial Production is used in the place of GNP since it appears that the Federal Reserve would react in its open-market operations more to data that are quickly and readily available.

5. V_1, V_2 , etc. may be defined as the stochastic disturbance term in the equation.

influence the economy, namely total bank reserves (R_t) is stated in monthly figures. G_t is defined as the Federal Reserve's holdings of government securities and Z_t , the other factors affecting bank reserves, both on a monthly basis. All of the other variables are in terms of three month averages and all data are in first differences. Thus the variable $L_{v,t}$, for the month of June, let us say, would be the difference between the three month average of March, April and May and that of April, May and June. This is consistent with the logic that the Federal Reserve's view of the present economy is influenced by recent developments.

Substituting the structural equations into the disutility function, we may attempt to minimise the disutility function by differentiating with respect to G_t , equating the result to zero and solving for G_t . We obtain:

$$\begin{aligned}
 (4) \quad G_t = & \frac{-(a_1^2 W_1 + a_2^2 W_2 + a_3^2 W_3 + a_4^2 W_4)}{D} & Z_t \\
 & \frac{-(W_1 a_1 b_{11} + W_2 a_2 b_{21} - W_3 a_3 b_{31})}{D} & S_t \\
 & \frac{+(W_1 a_1 b_{12} + W_2 a_2 b_{22} + W_3 a_3 b_{32})}{D} & L_v \\
 & \frac{-(W_1 a_1 b_{13} + W_2 a_2 b_{23} + W_3 a_3 b_{33})}{D} & L_u \\
 & \frac{+(W_1 a_1 b_{14} + W_2 a_2 b_{24} + W_3 a_3 b_{34})}{D} & L_p \\
 & \frac{+a_1 W_1 Y^*}{D} & + a_4 W_4 T_t
 \end{aligned}$$

where $D = a_1^2 W_1 + a_2^2 W_2 + a_3^2 W_3 + a_4^2 W_4$

Estimation of and implications resulting from the model

By differentiating with respect to G_t we have in effect isolated the Federal Reserve's holdings of government securities as the important policy variable which can be related to the ultimate target variables. Regressing changes in security holdings by the Central Bank on the other variables yielded the following results. The single most important variable explaining Central Bank open-market operations was the Z_t variable which, as indicated previously, includes all the other factors affecting bank reserves. In all of the regressions the Z_t variable was statistically significant and had a logical negative sign indicating that the Federal Reserve system's open-market operations were defensive in nature. That is, the

Federal Reserve would buy, for example, government securities as technical factors such as float, movements of treasury balances, etc. absorbed reserves, and sell them as these same factors supplied reserves. In order, however, to determine if any significant change had occurred in the nature of Central Bank policy as revealed in open-market operations we have broken the period down into these sub-periods namely 1963-66, 1967-71 and 1969-71. The following equations were obtained with the "t" values below the coefficients:

$$(5.1) \quad G_t = 135.07 - 0.55Z_t + 423.32L_v$$

$$\quad \quad \quad (2.09) \quad (5.28) \quad (2.03)$$

$$1963-66 \quad + 459.85L_p + 504.85L_u + 1348.78S_t + 0.07T_t$$

$$\quad \quad \quad (.835) \quad (1.76) \quad (1.51) \quad (1.90)$$

$$R^2 = .389$$

$$D.W. = 2.628.$$

$$(5.2) \quad G_t = 41.42 - 9.96Z_t - 394.87L_v + 15.21L_p$$

$$\quad \quad \quad (.430) \quad (7.49) \quad (2.06) \quad (2.03)$$

$$1967-71 \quad - 502.3L_u - 0.03S_t - 0.32T_t$$

$$\quad \quad \quad (.604) \quad (.445) \quad (.004)$$

$$R^2 = .516$$

$$D.W. = 2.794$$

$$(5.3) \quad G_t = 545.40 - 1.01Z_t - 654.85L_v$$

$$\quad \quad \quad (.235) \quad (5.505) \quad (2.04)$$

$$1969-71 \quad + 16.92L_p - 288.59L_u - 0.07S_t - 70.65T_t$$

$$\quad \quad \quad (.184) \quad (.243) \quad (.679) \quad (.506)$$

$$R^2 = .528$$

$$D.W. = 2.827$$

It may be seen, then, that between the beginning and the end of the period, the R^2 definitely increased indicating that whereas 39 per cent of the variation in open-market operations could be explained by the independent variables in 1963-66, by 1969-71 almost 53 per cent of the variation was explained.⁶ Just as significant was the change in the coefficient of the Z_t variable. In the 1963-66 period, for every reduction, say, of \$100 million in bank reserves due to technical factors, the Federal Reserve would offset 55 million. By the end of the period the same reduction in reserves would have elicited purchases of 101 million dollars of government securities by the Central Bank. As to the other variables the only

6. The variable Y_t^* was omitted since, in all of the regression, the "t" values were very small.

one with a statistically significant coefficient was the income variable; though significant in all these periods the negative coefficient of the later 1960s (and early 1970s) is more meaningful since it indicates that the Federal Reserve increased its holding of governments as industrial production declined. Thus, it appears that in the latter part of the 1960s the defensive nature of monetary policy increased as the Central Bank offset a higher proportion of the other factors affecting bank reserves, while being more cyclically oriented in terms of its reaction to changes in industrial production.

The higher coefficient of the Z_t variable and the importance of this variable for the fit of the equation (deleting it reduces the R^2 to approximately .10) appears to confirm the position that the Federal Reserve's dealing in securities was still very much money-market oriented in the early 1970s. The fact that the coefficient changed may be thought of as indicating different degrees of pressure exerted on the money market by the Central Bank as it pursued different interest rate targets.⁷ If over the period studied, the Central Bank had offset smaller proportions of the factors affecting reserves then we might properly conclude that it had become less money-market oriented and perhaps more conscious of monetary aggregates.

To support the premise that Federal Reserve policy was as defensive and indeed accommodative in its open-market operations we have modified the meaning of Z_t to include with the changes deriving from technical factors (float, gold, etc.) changes in required reserves. If, for example, technical factors were absorbing \$100 million and required reserves were increasing by \$100 million (as loans increased), then total excess reserves would fall by \$200 million. Regressing changes in security holdings by the Federal Reserve on Z_t (defined in this way) we find that the Central Bank was even more accommodative in the later 1960s, with the R^2 of the equation higher and the coefficient again negative and greater than one. Thus,

$$1963-66 \quad G_t = 130.83 - .974Z_t \\ \quad \quad \quad (2.539) \quad (6.93)$$

$$R^2 = .510 \\ D.W = 2.07$$

$$1967-71 \quad G_t = 251.92 - 1.21Z_t \\ \quad \quad \quad (2.739) \quad (12.74)$$

$$R^2 = .740 \\ D.W = 1.93$$

$$1969-71 \quad G_t = 309.76 - 1.27Z_t \\ \quad \quad \quad (2.975) \quad (9.00)$$

$$R^2 = .710 \\ D.W = 1.97$$

7. Among the components of Z_t , currency in circulation yielded the highest R^2 when open-market operations were regressed on it.

In the late 1960s and early 1970s the Federal Reserve was more than generous in the provision of reserves.⁸ As market factors absorbed reserves, either through such technical aspects or float, or through the impact of loan expansion on required reserves, the Central Bank supplied a more than proportionate share of reserves.

This behaviour in the latter part of the period studied suggests several explanations. One, the Federal Reserve may have over-reacted trying to offset market factors as a response to what they may have considered the mistakes of the credit-crunch year of 1966. Secondly, their projections of market factors affecting reserves could have been in error by more than the normal margin.⁹ A third possible explanation might be the reaction of the Federal Reserve to the Potential crisis associated with the Penn-Central failure in the summer of 1970. Whatever the reason, however, the Central Bank was indeed more aggressive with offsetting actions in the second half of the period.

The higher coefficient of the Z_t variable is looked on as indicating a greater degree of offset to market factors to the point of offsetting all of the reserves absorbed by (or supplied by) market factors. This may also be interpreted, of course, as dynamic that is, open-market operations aimed at changing the level of reserves in the banking system. No contradiction need be involved, however, since greater sensitivity to market forces is consistent with changing bank reserves, bank credit and the money supply. The important point is that the Central Bank increased its reliance on offsetting action in the implementation of monetary policy; this must be interpreted as being more rather than less money-market oriented.

The fact that open-market operations are more closely related to market factors influencing reserves than to the real variables cannot be interpreted as insensitivity to income and price movements. A more proper interpretation would appear to be that the degree of offset provided to market factors, via open-market operations, varied from year to year depending on the state of the money-market, interest rates, and real movements in the economy. In Table 1 the coefficients obtained on a yearly basis, are presented, illustrating that the degree of offset does vary from a minus .40 to minus 1.00 for purely technical factors and from a minus .50 to a minus 1.89 for total market factors. In terms of specific impact on bank reserves and the money supply, a policy of offsetting market factors was able to bring about drastic declines in the rates of increase of money in both 1966 and 1969, consistent with anti-inflationary policies.

The defensive nature of open-market operations, so apparent here as in other

8. Lombra and Torto in a study encompassing the period 1952-68 support the "accommodative" nature of monetary policy. Raymond Lombra and Raymond Torto, *Federal Reserve Defensive Behavior and the Reverse Causation Argument*, Board of Governors of the Federal Reserve System.

9. An interesting statistic quoted by the New York Federal Reserve Bank was that the deviation of actual weekly market factors from the projected figures was approximately \$250 million. "Monetary Aggregates and Federal Reserve Open-Market Operations", *Monthly Review*, Federal Reserve Bank of New York, April 1971, p. 82.

TABLE I: Regression Coefficients, Yearly, for Technical and Market Factors, 1963-71

	Technical Factors	(R ²)	Market Factors	(R ²)
1963	-0.424 (1.92)	.27	-0.654 (3.65)	.57
1964	-0.406 (.626)	.03	-0.505 (1.62)	.21
1965	-0.514 (1.54)	.19	-0.963 (24.30)	.98
1966	-0.412 (2.16)	.32	-1.00 (11.99)	.93
1967	-0.505 (2.16)	.32	-1.00 (10.97)	.92
1968	-1.00 (5.26)	.73	-1.06 (14.40)	.95
1969	-1.47 (3.96)	.61	-1.89 (13.35)	.94
1970	-0.77 (3.43)	.54	-0.968 (5.17)	.72
1971	-0.42 (1.15)	.13	-0.629 (1.95)	.30

studies, offers the best explanation of changes in the Federal Reserve's holdings of governments. Attempting to relate changes in the Fed's portfolio to such concepts as required, free or excess reserves failed to explain much of the variation. Only where G_t was related to excess reserves of the banking system, was a significant relationship obtained. Thus, with

$$G_t = f(\text{Excess Reserves})$$

the following equations were obtained (with "t" values under the coefficients):

$$1963-66 \quad (6.1) \quad G_t = 0.719 - 0.001ER_t, \quad R^2 = .07 \\ (3.34) \quad (2.327) \quad D.W. = 2.19$$

$$1967-71 \quad (6.2) \quad G_t = 0.889 - 0.0016ER_t, \quad R^2 = .10 \\ (4.44) \quad (2.45) \quad D.W. = 1.79$$

$$1969-71 \quad (6.3) \quad G_t = 0.973 - 0.0022ER_t, \quad R^2 = .15 \\ (4.23) \quad (2.37) \quad D.W. = 1.90$$

Though the R^2 increased, at most only 15 per cent of the variation in the Central Bank's holdings of governments could be explained by excess reserves. The "t" values indicated a statistically significant relationship between open-market operations and excess reserves; the negative coefficient indicates that as excess reserves increased, say, the Federal Reserve would sell securities so as to absorb

reserves. This is perfectly consistent with the defensive nature of open-market operations.

Alternative Models

Equation (5) may be stated in a form so as to make total bank reserves (R_t) the dependent variable. Whereas we have assumed that open-market operations were a function of specific independent variables, we will now assume that the Central Bank varies bank reserves in response to change in income, prices, unemployment, etc. It may be expressed thus:

$$(7.0) \quad R_t = f(L_{y_t}, L_{p_t}, I_t, L_{u_t}, S_t, T_t)$$

The only new variable included is I_t , a three month average of Treasury bill rates, so as to ascertain the response of the Central Bank via changes in reserves to movements in interest rates. All of the data are again in first differences.

This variation is consistent with the model developed in the previous section since it appears perfectly logical to assume that the Central Bank attempts to vary total bank reserves in response to movements in such real variables as income, prices and unemployment. Because of its position in the market for money and capital the same logic applies to variation in bank reserves in response to movements in financial variables and to the Treasury's position. Using the same sub-periods we have:

$$(7.1) \quad R_t = 102.10 + 313.08L_{y_t} + 16.82L_{p_t} \\ (1.94) \quad (1.62) \quad (.03) \\ + 211.66I_t + 930.21L_{u_t} - 0.11S_t - 0.61T_t \\ (0.52) \quad (1.39) \quad (2.21) \quad (.007) \\ R^2 = .249 \\ D.W. = 3.06$$

$$(7.2) \quad R_t = 152.28 - 58.55L_{y_t} - 3.02L_{p_t} - 629.42I_t - 42.83L_{u_t} \\ (3.49) \quad (0.52) \quad (0.08) \quad (2.47) \quad (0.11) \\ - 0.07S_t - 24.74T_t \\ (2.08) \quad (.608) \\ R^2 = .281 \\ D.W. = 2.41$$

$$(7.3) \quad R_t = 150.74 + 84.73L_{y_t} + 4.71L_{p_t} - 695.33I_t \\ (2.26) \quad (0.53) \quad (0.11) \quad (2.42) \\ - 241.92L_{u_t} - 0.090S_t + 28.88T_t \\ (.445) \quad (2.61) \quad (.45) \\ R^2 = .316 \\ D.W. = 2.296$$

Regressing changes in bank reserves on the six independent variables indicates a closer relationship by the end of the period, with the higher R^2 of .316 as compared to .249 earlier. Also, a statistically significant relationship was seen to exist between the budget surplus and bank reserves. The negative coefficient of this variable is logical indicating that the Central Bank influenced bank reserves to accommodate the liquidity needs of the Treasury; a budget deficit would be associated with an increase in reserves, a surplus with a decrease. As to the statistically significant I_t variable, its negative coefficient may also be thought of as meaningful. As current average interest rates increase, bank reserves would decrease indicating a contracyclical change in reserves. This pattern reversed that seen in the 1963-66 period when reserves increased with rises in interest rates.¹⁰

The negative coefficient of the budget surplus (S_t) variable, indicating that bank reserves were related inversely to changes in the budget, is consistent with the negative coefficient of the Z_t variable of our first model. The consistency may be explained in this manner; by offsetting market factors affecting bank reserves, the Federal Reserve was providing the reserves to help finance the Treasury's deficit. As the Z_t coefficient was greater than one (the offset greater than unity) in the later years of the decade, bank reserves were allowed to increase even more as the Treasury's needs increased due to large deficits. Failure to offset market factors would have made it more difficult for the banking system to absorb government debt. This view would see defensive open-market operations as encompassing the provision of reserves needed to meet expanding credit demands, whether from the public or private sector.

The regressions resulting from our formal model and the reduced form equations do not give any clear evidence that there have been changes in monetary policy indicating less stress on the money-market strategy. For one, our model indicates that a greater percentage of open-market operations could be explained by market factors in the later 1960s; also that a given change in bank reserves originating in market factors was more than offset by changes in the Fed's holdings of securities. If, then, the Central Bank bought, let us say, \$120 million in securities as market factors absorbed \$100 million this policy can be interpreted as being even more money-market oriented than that of the earlier period when approximately 74 per cent was offset. The statistically significant (negative) relationship between changes in bank reserves, and the Treasury's surplus is indicative of the Central Bank's need to support, and indeed its support of, the Government's financing. Supplying reserves to the banking system as the Treasury incurs a deficit is consistent with the Central Bank's responsibility to the market and a desire to minimise upward pressure on interest rates.¹¹ It is not

10. When changes in the monetary base (defined as bank reserves and currency in circulation) are regressed on the same variables pretty much the same results are obtained. The R^2 increased from .27 to .302 with again the budget having a negative and statistically significant coefficient.

11. During 1970 six directions were issued to the account manager to consider forthcoming Treasury financing in open-market operations. *Review*, Federal Reserve Bank of St. Louis, May 1971, p. 19.

indicative of a greater awareness of a need to restrict the growth of monetary aggregates either in the form of bank reserves or the money supply.

On the basis of the relationship between changes in bank reserves and interest rates, with a negative and statistically significant coefficient, it would seem that the Federal Reserve's policy from 1967 through 1971 was one of reducing reserves as interest rates rose and increasing them as rates fell. This type of policy would be inconsistent with the much criticised money-market strategy where the objective is to minimise fluctuations in interest rates. Before accepting this conclusion, however, it should be pointed out that a reduction in the reserve base of the banking system may be brought about by the Central Bank as the economy is in the prosperity phase of the business cycle. Though interest rates typically rise in this phase of the cycle, the reduction in bank reserves could well be thought of as contracyclical rather than as being influenced by a desire to increase pressure on interest rates. Though the regressions yielded a positive coefficient (between R_t and I_t) from 1963-66, the negative coefficient in the later 1960s need not imply a change in policy from one of moderating to one of increasing pressure on interest rates. Interest rates may well have been a proxy for changes in economic activity with the Federal Reserve attempting to moderate inflationary pressures.

Together with the models which have been developed we may look at the behaviour of monetary aggregates to see if they have displayed either less or more instability as compared to previous years. The figures on monetary aggregates raise as many questions, however, as they answer. For one, the basic premise that the Federal Reserve has, in the past, lost control over the money supply because of their concern for interest rates is not supported by the data. In the prosperity phase of the business cycle as credit demands accelerate the Federal Reserve has been said to meet these demands by increasing bank reserves, hence the money supply, so as to moderate upward pressure on interest rates. If we take the two periods August 1954 to July 1957 and August 1958 to May 1960, both of which represent the upward phase of the business cycle (trough to peak), the average annual rate of increase in the money supply (narrowly defined) was but 1.75 per cent and 1.83 per cent respectively. Secondly, over a longer period, from 1961-65, it is not apparent that the Central Bank's money-market strategy led to a loss of control over the money supply since M_1 increased by a moderate average annual rate of 3.41 per cent.¹² Third, if there has been emphasis on monetary aggregates it does not appear to have brought about a moderate increase in the money supply in the prosperity phase of the most recent business cycle beginning with the trough reached in November 1970. Though M_1 increased by but 3.75 per cent in the last quarter of 1970, the (average) growth rates were 9.06, 10.47, 3.72 and 1.05 per cent respectively (on an annual basis) for the four quarters of 1971. In the first two quarters of 1972, the average annual rates were 9.23 and 5.29 per cent¹³ respectively. This record reflects more, rather than less instability in the money supply.

12. *Business Conditions Digest*, US Dept. of Commerce, December 1971.

13. *Ibid.*, October 1972.

Granted that such mitigating factors as the Penn-Central crisis of 1970 and the balance of payments crisis in 1971 must be considered it does not appear that the Federal Reserve system has moved in the direction of abandoning its money-market strategy nor that the recent much publicised focus on aggregates has actually resulted in more stability in the behaviour of the money supply.¹⁴

To summarise, when looking at data over the period of the 1960s and early 1970s, it is difficult to find much to support the view that there has been a significant change in monetary policy which has placed more emphasis on the behaviour of monetary aggregates and less on money-market conditions. Changes in the Fed's holdings of government securities continue to display in this, as in other studies, the distinguishing characteristic of being related mainly to market factors affecting bank reserves. If the change had been in the other direction, mainly, where less of open-market operations could be related to market factors, then, perhaps the argument as to aggregates could be sustained. Changes in bank reserves which tend to increase when budgetary deficits appear also support the view that monetary policy continues to be money-market oriented. Finally, changes in the growth of the money supply in the prosperity phase of the most recent business cycle do not reflect the moderation that would be associated with greater concern with aggregates and less with money-market conditions.

Some further considerations

The data presented in this paper support the view that the Federal Reserve has not abandoned its traditional concern with the stability of the money market and that open-market operations are still money-market oriented. It does not mean that the Federal Reserve is now, or has been, oblivious to the monetary aggregates. This is the main contention of the monetarist school when it attacks the money-market orientation of the Federal Reserve, that it has a certain myopia whereby it focuses on interest rates and the money market disregarding bank reserves and the money supply.

When studying statements of policy made by the Federal Reserve over the years it is by no means apparent that the Central Bank's thought processes ran in the direction envisaged by its critics. Just to cite a few instances, the Federal Reserve has stated explicitly the importance of both financial quantities and financial prices (interest rates):

In seeking guidance for the conduct of monetary policy, therefore, incoming information on both financial quantities and financial prices must be assimilated and interpreted.¹⁵

14. The cumulative increase of commercial bank credit seven quarters after the trough of the business cycle was 22.5 per cent for the recent cycle, 16.7 per cent for the 1961 and only 5.5 per cent for the 1958 cycle. *Comments on Credit*, Solomon Brothers.

15. *Compendium on Monetary Policy Guidelines and Federal Reserve Structure*, Subcommittee on Domestic Finance of the Committee on Banking and Currency, Dec. 1968, p. 36.

Also,

Above all it would be ill advised to generate the danger of inflation either long-run or short by creating redundant dollars in order to make easier the financing of a deficit.¹⁶

The necessity of helping the Treasury in its financing and the dangers associated with this financing are cited time and again.

The Treasury obviously would not expect the Federal Reserve to inflate the money supply thereby putting the entire economy in jeopardy merely so that the Treasury could get money at an artificially low rate.¹⁷

The concern of the Federal Reserve with the use of bank reserves and the need to provide for the needs of a growing economy have been expressed thus:

We have no control over what uses the banks make of these reserves. What we have to do is to supply the needed reserves.¹⁸

Also, the conflict between providing and not providing enough reserves, associated with rising interest rates:

Throughout 1965, the Federal Reserve System has followed a policy that permitted member bank reserves to grow in response to the credit needs of a growing economy. It became increasingly apparent, however, that the rate at which we were supplying reserves to the banking system, even though it supported a strong rise in the money supply and in bank credit, was not enough to meet the intense demand for credit at prevailing interest rates.¹⁹

The expression of these views by Federal Reserve officials indicates that the significance of control over bank reserves, the problem of financing Treasury deficits and the conflict between controlling reserves and interest rates has long been recognised by the Central Bank. It is difficult to see much difference between these statements of policy and more recent statements by Arthur Burns, Chairman of the Board of Governors of the Federal Reserve:

During this period more careful attention has been given to the monetary aggregates because we recognise that excessive amounts of money and credit might inadvertently be supplied in a period of rising credit demands if attention were to focus primarily on interest rates. We recognise, however, that changes in the cost and availability of credit affect the nation's economic activity, and we, therefore, cannot neglect the condition of financial market.²⁰

16. *Economic Report of the President, Hearings Before the Joint Economic Committee*, Jan. 1963, p. 341.

17. *Ibid.*, p. 342.

18. *Economic Report of the President, Hearings Before the Joint Economic Committee*, Jan. 1962, p. 203.

19. *Recent Federal Reserve Action and Economic Policy Co-ordination, Hearings Before the Joint Economic Committee*, Dec. 1965, p. 11.

20. Arthur F. Burns, *Address Before the Joint Luncheon Meeting of the American Economic Association and the American Finance Association*, Toronto, Canada, Dec. 29, 1972, pp. 17-18.

In spite of the increased emphasis on the aggregates, Dr. Burns has stated quite explicitly that:

Monetary policy cannot ignore conditions in the money market.²¹

And,

Open-Market operations are still used to avoid undue fluctuations in short-term interest rates, which could create destabilising effects on credit markets and the economy generally.²²

A second consideration involves the historical relationship between changes in monetary aggregates and interest rates. Assuming that the Federal Reserve was concerned with interest rates in the period 1961-65, it is apparent from this experience that no conflict need exist between maintaining stable growth in, say, the money supply and preventing disruptive changes in the level of interest rates. The money supply did not grow excessively in this period nor did interest rates fluctuate greatly. In the first half of the 1960s the money supply grew at an average annual rate of about 3.41 per cent, a rate which certainly cannot be considered inflationary, nor far removed from the growth rate of the economy. Thus, a money market strategy can be followed so long as unusual demands are not made on the market especially demands emanating from the Treasury's deficits. This is the lesson to be learned from the experience of the 1960s.

Because of the absence of convincing evidence that monetary policy has indeed shifted away from a money market orientation, it may be asked if the Federal Reserve is paying lip service to the emphasis on monetary aggregates while continuing to adhere to previously accepted norms of monetary policy. This view was expressed quite well by Arthur Okun:

Federal Reserve official directives focus on money supply targets while their actions have been more eclectic and pragmatic.²³

Indeed, the Economic Report of the President for 1972 does admit:

Despite the stated policy to place emphasis on the monetary growth rate in 1971, actual operations were designed to influence interest rates and conditions in short-term money-markets with the intention of thereby achieving the desired growth rate.²⁴

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21. 1972 *Economic Report of the President, Hearings Before the Joint Economic Committee*, Feb. 1972, p. 177.

22. 1972 *Economic Report of the President, Hearings Before the Joint Economic Committee*, Feb. 1972, p. 177.

23. Arthur M. Okun, "Rules and Roles for Fiscal and Monetary Policy" in *Issues in Fiscal and Monetary Policy: The Eclectic Economist Views the Controversy*, James Diamond (ed.), Chicago: DePaul University Press, 1971.

24. *Economic Report of the President, 1972*, p. 57.