Recent Monetary Policy Strategies in the United States

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I. Background

The formulation and implementation of monetary policy in the United States reflects the federal character of its central bank. The Board of Governors of the Federal Reserve System in Washington, D.C. oversees the activities of the System's 12 separate Federal Reserve banks. Each of these 12 reserve banks and their branches provides traditional central banking services to their member commercial banks within the geographical areas served by each.[1]

While nationwide regulatory decisions are generally made by the Board's seven Governors, monetary policy is made by the Federal Open Market Committee (FOMC) which consists of the Board's seven Governors, the President of the Federal Reserve Bank of New York, and the presidents of four additional reserve banks on a rotating basis, though all the reserve bank presidents informally participate in all FOMC meetings. The Federal Reserve's primary instruments for con-

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[1] In the U.S. each bank's deposit-taking activity is confined to the single state in which its head office is chartered. As a result of the Depository Institutions Deregulation and Monetary Control Act of 1980, the reserve banks will have to charge for their services and make them available to nonmembers as well.

trolling the quantity of money and credit are reserve requirements, the terms on which member banks may obtain reserves through the discount window, and the central banks' supply of reserves through open market transactions. By far the most important of these is open market operations.

Open market operations are conducted under the supervision of the Manager of the Federal Reserve System's Open Market Account maintained at the Federal Reserve Bank of New York. Through open market operations the Fed injects or drains reserves from the banking system as a result of purchases or sales of government securities and/or bankers' acceptance (generally in the form of repurchase agreements) by the System's Trading Desk at the Federal Reserve Bank of New York. The transaction of the Trading Desk are guided by instructions transmitted from the FOMC to the Manager of the System's Open Market Account. The Committee's instructions are contained in the minutes of its monthly meetings in Washington. The changing language of these directives through time provides a chronical of the evolving strategies by which U.S. monetary policy has been implemented.

The ultimate objectives of the Fed's monetary policy have changed little through time. A representative statement of these objectives can be found, for example, in the minutes of the September 17, 1979 meeting of the FOMC:

> Taking account of past and prospective developments in employment, unemployment, production, investment, real income, productivity, international trade and payments, and prices, the Federal Open Market Committee seeks to foster monetary and financial conditions that will resist inflationary pressures while encouraging moderate economic expansion and contributing to a sustainable pattern of international transactions.

This general statement of the factors the Committee takes "account of the past and prospective developments in" reflects, word for word, the *Humphrey-Hawkins Act.* However, considerable change has occurred in the Committee's perception of what central bank policies are required in order to meet these objectives and of the strategies to be pursued in implementing them.[2]

The relationship between these ultimate concerns of policy and the day-to-day activities of the Federal Reserve are remote at best. There-

[2] An excellent history of this evolution can be found in *Henry C. Wallich* and *Peter M. Keir,* "The Role of Operating Guides in U.S. Monetary Policy: A Historical Review," Kredit und Kapital, January 1978, pp. 30 - 50.

fore, in setting its primary instruments of control the Federal Reserve focuses attention on so-called intermediate and operating target variables. These variables provide more timely information about the likely behavior of such goal variables as income and prices. Failure to find and refine an adequate operating variable and strategy has been the principal cause of dissatisfaction with the outcome of U.S. monetary policy in recent years.

Students of monetary policy have tended to divide into those who believe that policy should be conducted in terms of and judged by the behavior of interest rates and those who focus on the behavior of the money supply. For a variety of reasons monetary aggregates have been increasingly used as intermediate target variables since the late 1960s. Use of monetary aggregates became increasingly formalized, first as a result of the concurrent resolution of the House and Senate passed in March 1975 which required quarterly reports to Congress on the Federal Reserve's money supply projections for the next four quarters, and most recently because of the Full-Employment and Balanced Growth Act of 1978 (*Humphrey-Hawkins Act*) which requires, beginning in February 1980, semi-annual reports to the banking committees of Congress on the Federal Reserve's growth targets for several monetary aggregates. Monetary targets are selected which are believed most consistent with the ultimate objectives of policy and the Federal Reserve then directs its efforts toward the achievement of these "intermediate" targets.

The increasing use of the money supply (though significantly hedged by the wide ranges adopted in announcing growth rate targets — typically two to three percentage points) has focused attention on the need for day-to-day operating targets stated in terms of economic variables over which the Federal Reserve might hope to exercise greater day-to-day control than is the case for the money supply. In the 1970s the Federal funds rate was used as this operating target variable.

II. Federal Funds Rate Strategy

By the latter 1970s the Federal funds rate strategy for implementing the Reserve Board's objectives for the monetary aggregates had developed into a highly refined procedure. The strategy was based on the assumption of a stable relationship between the Federal funds rate and growth in the monetary aggregates and consisted of a set of

rules for adjusting the funds rate in light of economic developments with the principal feedback coming from the realized growth of money relative to its targeted behavior. The empirically observed relationship between the funds rate and the money supply (a standard money demand function) was used to determine the funds rate consistent with the money supply target. The annual growth rate target ranges for the monetary aggregates were translated into short, two-month (tolerance) ranges used to trigger corrective adjustments in the Federal funds rate when actual money growth rates were sufficiently above or below their targets.

The FOMC set relatively wide short-run tolerance ranges for the aggregates and very narrow trading ranges for the Federal funds rate. The language of the minutes of the September 17, 1979 meeting exemplifies the language of the "money market" directives of the late 1970s:[3]

> In the short run, the Committee seeks to achieve bank reserve and money market conditions that are broadly consistent with the longer-run ranges for monetary aggregates cited above while giving due regard to developing conditions in foreign exchange and domestic financial markets. Early in the period before the next regular meeting, System open market operations are to be directed at attaining a weekly average federal funds rate slightly above the current level. Subsequently, operations shall be directed at maintaining the weekly average federal funds rate within the range of 11-1/4 to 11-3/4 per cent. In deciding on the specific objective for the federal funds rate the Manager for Domestic Operations shall be guided mainly by the relationship between the latest estimates of annual rates of growth in the September-October period of M-1 and M-2 and the following ranges of tolerance: 3 to 8 percent for M-1 and 6-1/2 to 10-1/2 percent for M-2. If rates of growth of M-1 and M-2, given approximately equal weight, appear to be close to or beyond the upper or lower limits of the indicated ranges, the objective for the funds rate is to be raised or lowered in an orderly fashion within its range.
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> If the rates of growth in the aggregates appear to be beyond the upper or lower limits of the indicated ranges at a time when the objective for the funds rate has already been moved to the corresponding limit of its range, the Manager shall promptly notify the Chairman, who will then decide whether the situation calls for suplementary instructions from the Committee.

The Federal funds rate is determined in the interbank market for overnight funds so as to equate the supply and demand for reserves.

[3] An "aggregates" directive called for adjustment of the funds rate if money growth rates deviated significantly from the midpoint of their tolerance ranges.

Reserves consist of banks' deposits with the Federal Reserve (reserve accounts) and their vault cash and are held to satisfy legal reserve requirements, net customer demands for cash, and for the settlement of clearing balances between banks. Ceteris paribus, an imbalance between the supply and demand for reserves will move the funds rate in a corrective direction. Therefore, reserve supply and demand forecasts were prepared and utilized in guiding the Trading Desk Manager's decisions with regard to the day's trading activity. On the basis of such forecasts, reserve shortages or excesses were predicted which presumably the Desk must offset if the Federal funds rate objective was to be met.

While estimates of reserve demand are fairly accurate,[4] estimates of reserve availability are more difficult due to the many factors affecting reserves beyond the Fed's immediate control (so-called "market factors"). Therefore, while estimates of reserve needs facilitated the Desk's attainment of the funds rate objective, little faith was placed in the exact magnitudes estimated. This is revealed in a discussion by *Alan Holmes* and *Peter Sternlight* of policy implementation in 1976.

> When reserves are estimated to be abundant (scarce) and the funds rate threatens to rise (fall) significantly above (below) the desired level, that situation calls into question the accuracy of the estimates of the supply of, and the demand for, reserves. The System's absence from the market in that event could be misleading, and the Manager is likely to enter the market to counteract undesirably firm (easy) conditions.[5]

The cautions reliance on estimates of net reserve needs was further indicated by the manner in which the magnitude of an open market operation was determined. Prior to October 1979, the Desk did not enter the market to purchase a predetermined value of securities (i. e., the forecasted reserve excess or shortfall), but rather adjusted the magnitude of the operation after seeing the quantities bid by the dealers at prevailing rates. However, the process of preparing the reserve needs estimates provided valuable training and experience for implementing the reserve strategy adopted October 6, 1979.

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[4] Lagged reserve accounting makes it possible for the Desk Manager to know exactly the dollar quantity of required reserves before the beginning of each reserve settlement week; otherwise the highly complex structure of differential requirement ratios would make required reserve estimates quite difficult. Excess reserves in the U.S. are negligible.

[5] *Alan R. Holmes* and *Peter D. Sternlight,* "The Implementation of Monetary Policy in 1976," Federal Reserve Bank of New York, Quarterly Review, (Spring 1977), p. 43.

With a funds rate strategy the quantity of reserves is determined by the market, as the Federal Reserve supplies whatever is needed to maintain its funds rate target. The funds rate, unlike reserve needs, is clearly visible and immediately available. It is very responsive to changes in relative reserve supply and demand, and, in particular, to market perceptions of Fed intentions. An additional advantage of targeting the funds rate is that when its movements reflect changes in reserve supplies, as when unforeseen changes in "market factors" would have affected the quantity of reserves, open market operations sufficient to maintain the funds rate will automatically offset the impact of these market factors and leave the total quantity of reserves unchanged.

The careful and tight control of the funds rate achieved in the 1970s did not yield satisfactorily close control of the monetary aggregates. The relationship between the funds rate and the aggregates proved slippery. Errors in predicting reserve demand will alter this relationship as will, among other things, changes in inflationary expectations by altering the relationship between real and nominal interest rates. However, there is an important political consideration as well. The lack of success in hitting money supply targets using the Funds rate strategy resulted not only from the shifting relationship between interest rates and deposits that led to varying deposit levels for a given funds rate, but also from the reluctance of the FOMC to adequately adjust the funds rate target, even when such an adjustment was indicated by the Committee's own professed strategy. By shifting attention from the Federal Reserve's (very limited and short-term) role in interest rate behavior, the shift to a reserve strategy helped ease political pressure on the Federal Reserve to dampen interest rate movements and to keep rates low. *Judd* and *Scadding* convincingly argue that, for a variety of reasons, the FOMC tends to adjust its operating target (whatever it is) cautiously so that the choice of an interest rate operating target is tantamount, practically speaking, to adopting an interest rate intermediate target, while a reserve operating target is inseparable from use of the money supply as an intermediate target.[6]

After "inexplicably" slow money growth in early 1979 and persistently excessive money growth thereafter, despite increases in the funds rate from 10 to 12 per cent, and in the face of accelerating inflation,

[6] *John P. Judd* and *John L. Scadding*, "Conducting Effective Monetary Policy: The Role of Operating Instruments," Federal Reserve Bank of San Francisco, Economic Review (Fall 1979), pp. 23 - 37.

the Federal Reserve dramatically changed strategies. Rather than peg the funds rate within a very narrow range subject to remaining within a fairly wide range of money growth rates, the Fed announced on October 6, 1979 its intention to peg the growth of bank reserves subject to remaining within a greatly widened range (initially 400 basis points) for the funds rate.

III. Reserve Strategy

The key to central bank control of the money supply is its influence over bank credit via its influence on the cost of funds to banks. Ceteris paribus, an increase in the Federal funds rate increases the cost of bank funds which raises loan rates and reduces loan demand, which, in turn, lowers deposits (or the rate of deposit growth). These relationships are subsumed (often right out of sight) in the well-known money (or bank) multiplier formulation of the money supply process.

Reserves are a powerful instrument of monetary control because they exert a decisive influence over the cost of funds to banks. Viewing a reserve strategy in this light it is seen as a set of rules for adjusting the funds rate in ways that tend automatically to correct deviations in money growth from its target path. The reserve strategy feedback rules imply far more frequent and flexible funds rate adjustments than the funds rate strategy it replaced.

As is revealed by the February 5, 1980 domestic policy directive, instructions to the Trading Desk have been significantly simplified by the new strategy.

> In the short run, the Committee seeks expansion of reserve aggregates consistent with growth over the first quarter of 1980 at an annual rate of about 4-1/2 per cent for M-1A and 5 per cent for M-1B, provided that in the period before the next regular meeting the weekly average federal funds rate remains within a range of 11-1/2 to 15-1/2 per cent. The Committee believes that, consistent with this short-run policy, M-2 as newly defined should grow at an annual rate of about 6-1/2 per cent over the first quarter.
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> If it appears during the period before the next meeting that the constraint on the federal funds rate is inconsistent with the objective for the expansion of reserves, the Manager for Domestic Operations is promptly to notify the Chairman who will then decide whether the situation calls for supplementary instructions from the Committee.

Prior to the regular March meeting of the FOMC the provisions of the last paragraph were invoked and the upper limit on the funds rate

was raised to 16-1/2 per cent on February 22 and to 18 per cent on March 7. At its regular March 18th meeting the FOMC established a much widened funds rate range of 13 - 20 per cent clearly revealing its commitment to the new operating strategy.

The funds rate strategy generally assumed that the funds rate was linked to the money supply via the public's demand for money. With a reserve strategy, it is no longer necessary to estimate or know the quantity of deposits the public will hold at various interest rates, as interest rates are allowed to adjust until the public accepts whatever level of deposits are forthcoming as a result of the reserves supplied. Success of the strategy resides, instead, in the ability to accurately predict the multiplier, i.e., reserve demand, and to successfully control reserve supply.

Calculation of reserve demand, and hence the desired total reserve path, starts with the target path of the bank deposit component of M1. The bank deposit target is obtained by subtracting forecasted values of the currency and (in the case of M1B) the nonbank deposit components of the money supply from the FOMC's deseasonalized monetary target.[7] Assumptions are made about the distribution of the resulting bank deposit path between member and nonmember banks. The member bank deposit path is used with other financial data in forecasting the behavior of all other reservable liabilities. From these forecasts a deposit multiplier is constructed by forecasting required and excess reserves. The required reserve forecast is obtained by multiplying the applicable reserve ratios by the projected levels of all reservable bank liabilities (time and savings deposits, CDs, nonbank RPs, Eurodollar borrowings and other managed liabilities, etc.) and the member bank demand deposit target. This requires forecasting their distribution among banks of various sizes and between member and nonmember banks. When converting excess reserves forecasts to weekly values account must be taken of allowable reserve carryovers.[8]

These steps yield a reserve target path. This path provides the staff with estimates of the level of reserves which the combination of market factors and Desk operations should supply if money growth

[7] The seasonally adjusted path is deseasonalized so that the week-to-week and month-to-month movements over the 12-month target period reflect previously experienced seasonal patterns.

[8] *Warren L. Coats*, Jr., "What Do Reserve Carry-Overs Mean for Free Reserves?" Journal of Bank Research (Summer 1976).

targets are to be achieved. It can be adjusted if incoming data suggests unforeseen changes in the multiplier are likely to persist as might result, for example, from unexpectedly slow or rapid growth in CDs or other reservable nonmonetary liabilities. Hitting the reserve target is subject to greater error than is forecasting the target itself. The first reason is that forecasting reserve supply is currently more difficult than forecasting reserve demand, due to the important impact of fairly volatile "market factors" on reserve supply. The second reason is that lagged reserve accounting makes it technically impossible for the Fed to stick to its reserve target when deposits have been (two weeks earlier) above target. This is discussed later.

The *Federal Reserve Bulletin* itemizes 21 factors supplying or absorbing reserves. The major factors outside the direct control of the Federal Reserve affecting the supply of bank reserves are: currency in circulation, Federal Reserve float, U.S. Government deposits with the Federal Reserve, and foreign-related items in the Fed's balance sheet (gold stock, SDRs, foreign official deposits, etc.). Efforts are under way to reduce Federal Reserve float, by far the most volatile market factor, and it could, if desired, be eliminated altogether. With the final enactment of the *Depository Institutions Deregulation and Monetary Control Act* of 1980 resolving the Fed's "membership" problem by authorizing universal reserve requirements on all depository institutions, greater efforts in this direction will doubtless be made.[9] The shift of U.S. Government deposits back to commercial banks has significantly reduced their contribution to the problem (though shifts between government and private deposits affect the multiplier because government deposits are reservable) and foreign-related items have never been too troublesome. Forecasts of the public's currency preferences have been reasonably accurate for the short run and hence not a major source of error in weekly or monthly forecasts.[10] Furthermore, information on the contribution of market factors to reserve availability improves as

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[9] Membership in the Federal Reserve, hence the obligation to satisfy its reserve requirements, has been voluntary.

[10] Reserves are the sum of the current week's member bank deposits at the Fed and their vault cash two weeks earlier. Therefore, a shift in the public's currency-deposit preferences will not, by itself, alter reserves in the current week. However, if a currency drain from vault cash leads banks to replenish the loss by shipping in currency from their Reserve Bank in the same week, reserves will fall immediately. See the author's "Regulation *D* and the Vault Cash Game," Journal of Finance (June 1973).

the reserve settlement week progresses.[11] While estimating market factors is a major difficulty with a reserve strategy, progress has been made and further progress is possible.

Special problems are created by lagged reserve accounting, which bases the current week's required reserves on deposit (and other reservable liability) levels of the two-weeks-earlier accounting period. Required reserves in each reserve settlement week are predetermined by bank behavior of two weeks earlier; hence at least that quantity of reserves (adjusted for carryovers) must be supplied by the Federal Reserve regardless of the reserve levels called for by the reserve strategy. As a result, the new strategy focuses attention on the behavior of nonborrowed reserves (the difference between total reserves and reserves borrowed from the Fed's discount window) and the central role played by the discount window.

The board staff estimates the total reserve path called for in the directive as outlined above. This converted into a nonborrowed reserve path by substracting from total reserves the amount of discount window borrowing that seems to best reflect the FOMC's attitudes about the appropriate stance of policy. A higher-than-usual "borrowing assumption" produces a lower nonborrowed reserve path (given the total reserves implied by the money supply target and money multiplier estimates), i.e., if the System supplies fewer nonborrowed reserves, banks will be forced to increase their borrowing in order to satisfy their reserve requirements. The Fed assumes that due to banks' reluctance to borrow and the using up of their borrowing privilege, this increased borrowing tends (sooner or later) to drive up the funds rate relative to the discount rate.[12] This increase in the cost of funds puts pressure on banks to slow down or contract. The borrowing assumption made by the staff in generating the nonborrowed reserve target is, therefore, an important

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[11] "Over 1979 as a whole, the average revision to all operating factors between the estimate available at the beginning of the statement week and the final number was about $ 840 million (using Federal Reserve Bank of New York forecasts). The average errors decline as the week goes on, but even on the settlement day, the final day on which offsetting adjustments by the Fed are possible, the average miss to the weekly average figure was about $ 150 million (equivalent to a projection miss on the final day's reserve level of about $ 1.0 billion)." Federal Reserve Bank of New York, Quarterly Review, Summer 1980, p. 11.

[12] A fuller discussion of this relationship and the assumption which underlies it follows in Section IV.

factor influencing the intensity of corrective pressure put on the banking system when monetary behavior deviates from its targets.

The total reserve objective is estimated as an average for the (usually four-week) period between FOMC meetings. By substracting the borrowing assumption a period average target for nonborrowed reserves is also produced. As the monetary target does not change during the policy period, the total reserve target does not generally change either (unless there is a change in the multiplier). For a given borrowing assumption the same is true for the nonborrowed reserve target. The reserve targets simply reflect the values that must be hit (given the multiplier) if the monetary target is to be hit. While these targets do not generally change, estimates of actual deposit, hence reserve behavior will change all the time and would only accidentally coincide with their respective targets. If actual deposits are above track, required reserves and total reserves will be above their targets. If the Fed sticks to its nonborrowed reserve target, it will force the banking system to borrow more than implied by the borrowing assumption. In this case the borrowing estimate will be greater than the borrowing assumption. This distinction is vital.

The weekly nonborrowed reserve targets for use by the Trading Desk are constructed by distributing the period average over the period in such a way as to smoothly distribute estimated actual weekly borrowing over the period. The borrowing estimate is the difference between the period average total reserve projection or forecast (as opposed to the total reserve target) and the period average nonborrowed reserve target. The weekly nonborrowed reserve target is the difference between the period average borrowing estimate and each week's total reserve forecast. The process is repeated on Friday of each week through the inter-FOMC meeting policy period so that each week's target is revised on the basis of the most recently available data.[13] While these weekly revisions alter the path of nonborrowed reserves over the policy period, they do not alter the period average.

[13] The bank accounting period in the United States runs from Thursday through Wednesday and on Friday morning the staff has preliminary money stock data for the week just ended (on the Wednesday two days earlier) and revised data for the week which ended nine days earlier. The latter figures are the money stock data that will be released to the public that afternoon. Because of lagged reserve accounting, the staff also has exact data on the current and up-coming week's required reserves. Therefore, the staff effec-

If weekly nonborrowed reserve targets were not revised each week, as outlined above, a move in the money stock off track in week one would not generate an automatic corrective response until week three. For example, an above-path deposit level in week one will not raise required reserves, hence reserve demand above its path, until week three. If the Fed stuck to its nonborrowed reserve path, banks would not be forced to increase their borrowing until week three. However, the procedure of adjusting the weekly nonborrowed reserve target so as to smooth estimated borrowing over the weeks remaining in the policy period means the immediately increased borrowing estimate resulting from the two-weeks-hence increase in required reserves lowers the second weeks's nonborrowed reserve target. This forces an increase in borrowing in week two which should drive up the funds rate in the second rather than the third week and thus putting banks under pressure to reduce lending and return to the target path for deposits. Therefore, despite lagged reserve accounting, pressures (funds rate adjustments) are generated as soon as deposit misses are known. However, this adjustment in the fund rate still comes one week later than it would with concurrent reserve accounting as it requires Fed knowledge that a miss has occurred. With concurrent reserve accounting, changes in required reserves, hence in the funds rate, coincide with deposit misses, i.e., they happen automatically prior to the Fed's knowledge that corrective action is needed.

This procedure would be greatly simplified by a return to concurrent reserve accounting. The Federal Reserve is currently contemplating this step, which would also alleviate the need to operate on the basis of nonborrowed reserves rather than the more relevant total reserve variable, though the Fed might continue to use the discount window as a safety valve softening the impact of errors in reserve estimates.

The amount of corrective pressure generated by the new procedure depends on the funds rate response to the change in borrowing that results. There is little experience on which to judge whether the adjustment pressure that results is adequate or excessive, nor the speed with which deposits will respond or return to their target path. If, for example, the deposit response to an increase in borrowing seems too slow, i.e., if total reserves remain above their target path for too long,

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tively knows the current and approximate up-coming week's reserve demands. This information is used in each week's updating of the total reserve forecast.

adjustment can be speeded up by lowering the nonborrowed reserve path, thus forcing even more borrowing. If the current procedure seems to create excessive adjustment pressures, the miss in total reserves can be partially accomodated by adjusting the nonborrowed reserve path in the same direction. If deposits move further from their target path, corrective pressures automatically intensify. The new procedure is one in which the Fed is always groping toward an unknown and ever-changing "correct" Federal funds rate.

In effect, the nonborrowed reserve strategy undertaken in October 1979 is an automatic feedback rule for adjusting the funds rate to deposit misses where the magnitude of the adjustment reflects bank reluctance to borrow, and where the undesired funds rate responses to incorrectly estimated market factor impacts on nonborrowed reserves are moderated by the discount window. Whether using a funds rate or reserve operating strategy, it remains the Fed's influence on the funds rate that links its actions with deposit behavior. The problem with the funds rate as a target is not knowing where to set it and the political difficulties in adjusting it.

IV. Problem Areas

1. The Discount Window

With a reserve strategy constrained by lagged reserve accounting to supply a more or less predetermined level of total reserves, the Fed influences the cost of funds through its ability to control member bank borrowing. The Fed determines the amount of member bank borrowing as the difference between total required reserves (and desired excess reserves) and the Fed's provision of nonborrowed reserves.

Understanding the relationship between borrowing and the cost of funds requires careful consideration of the actual operations of the discount window. Discount window managers of the 12 Reserve Banks apply a "fairly" constant set of standards for borrowing which make it more and more difficult for the same banks to borrow repeatedly and/or to borrow increasingly larger amounts. Assuming a varying amount of reluctance to borrow from the discount window among member banks due to differing assessments of the non-pecuniary cost of such borrowing, those qualifying banks with the least reluctance will borrow first, etc. As the spread between the funds rate and the

discount rate widens, a larger number of eligible borrowers will turn to the discount window. Each bank borrows where funds are cheapest, where reluctance to borrow through the discount window is treated as a part of the cost of that source of funds. The marginal bank borrowing from the Fed finds the Fed funds discount rate spread just equal to the nonprice cost to it of borrowing from the discount window (i.e., the spread is a measure of its reluctance to borrow from the Fed which includes the actual additional administrative costs of discount window borrowing as well as psychic costs). As the spread widens, more and more borrowing will take place. But equivalently, as more and more banks are forced to borrow in order to obtain the desired quantity of total reserves, more banks are drawn in for whom the costs of discount window borrowing are higher. This pushes the funds rate up relative to the discount rate until the reserve market clears.

The Fed can influence the cost of funds from the discount window (hence generally) with the discount rate or some combination of that rate and administration of the window. With everything on target, nonborrowed reserves would normally be set (i.e. a borrowing assumption chosen) so that total desired reserves can be obtained with only the "normal" amount of borrowing, i.e., that amount for which no spread between the funds rate and discount rate emerges. A deposit overshoot calls (by the feedback rule) for an increase in the funds rate. This can be achieved, as now, by forcing banks to borrow a larger amount (while making it sufficiently unpleasant to do so) so that the funds rate rises, or by raising the discount rate explicitly and allowing banks to borrow all they like at that rate.

The indirect approach of administering the discount window is as good as the explicit approach of adjusting the discount rate if window administration gives rise to a reliably predictable Fed funds-discount rate spread for a given amount of borrowing. In practice that relationship has not been very reliable. Therefore making the cost of borrowing explicit, i.e., by relying on the discount rate rather than "administration of the window," may improve control. This approach may suffer from the same political problems as the old Fed funds rate strategy, but it reestablishes its advantage of automatically neutralizing errors in market factor estimates while still employing the reserve-oriented feedback rule of the new strategy. Something close to this approach without the same political pressures attendant on direct rate-setting activities would result from pegging the discount rate at some

fixed amount above the previous period's cost of funds (perhaps a weighted average of the properly adjusted 30-day CD, commercial paper, and Treasury bill rates, or maybe just the CD rate).

2. The Federal Funds Rate Constraint

Pursuit of the nonborrowed reserve target continues to be constrained by an FOMC-determined range for the Federal funds rate. It is possible to justify the continued use of an interest rate constraint, particularly one with a significantly widened tolerance range, as part of a strategy single-mindedly interested in the money supply. As discussed earlier, the funds rate can move around for many reasons but large weekly changes, say on the order of 2 or 3 percentage points in any one direction, are more likely to reflect changes in reserve supply than in demand. Such large weekly moves can more safely be interpreted as signaling errors in forecasting market factors that would be (partially) offset by an open market operation sufficient to arrest further movement in the rate. Seen in this light, the constraint is a check on the still-troublesome errors in estimating actual reserve supply, not a reflection of a lingering concern for interest rates per se.

However, the same or similar arguments were made (though with somewhat less justification) for the "old" funds rate strategy and the problem remains of making sufficient inter-week adjustments in the range. While the FOMC has clearly adjusted the ranges far more frequently and dramatically since adopting the new strategy, these changes have not been sufficient to achieve its monetary targets. In the Spring of 1980 the money supply (M1B) dropped rapidly for several months, despite a targeted growth rate of 5 per cent and remained well below the levels implied by the announced growth target ranges of 4 to 6 1/2 per cent well into the Summer. Effectively the Fed operated with a funds rate strategy during that period as reserve targets were abandoned in order to stay above the lower funds rate constraint and the FOMC was unwilling to adjust the funds rate range sufficiently to stay within the money supply range.

If the Fed is to stick with their monetary targets — and there is considerable empirical evidence that suggests they should — it would be better to tie the funds rate range to the current Treasury bill rate (perhaps a 3 or 5-day moving average of the most recent rates). Better yet would be a complete break with the Fed's interest rate tradition

by dropping the rate ranges from the directive altogether, leaving it to the banking industry to adapt its ways to volatile one-day rates while the Fed focuses its energies on improving reserve supply and demand estimates.

V. Conclusion

While there are some advantages to stable interest rates, just as there are for stable exchange rates and price levels, such stability is rarely achieved for long by policies designed to fix them directly. Pegging interest rates or exchange rates or administratively fixing or managing prices has ultimately diminished rather than enhanced the desired stability by reducing the pressures to maintain a stable monetary policy. The volatile monetary behavior resulting from efforts to stabilize interest rates in an ever-changing world has led to interest rate volatility inconceivable with steady monetary growth. Whatever its faults, the new operating strategy promises greatly enhanced control of the money supply if the interest rate constraint does not rigidify into the old funds rate strategy.

VI. Analytical Appendix

In principle a general equilibrium model of the economy can be solved for the Federal funds rate (leaving reserves to be endogenously determined) in terms of the desired values of the goal variables (or in a two-stage process, in terms of the money supply target), or it can be solved for reserves (leaving the funds rate to be endogenously determined) in terms of the same variables. Solving such a model for the Federal funds rate in terms of the money supply provides the relationship between these two variables underlying the Fed funds strategy. Inserting the targeted value of the money stock into such a reduced form yields the Federal funds rate target. A similar approach yields the reserve target.

However, there are some important differences between principle and practice. No widely accepted general equilibrium model of the money supply is currently in use. Two less general approaches have characterized modeling of the money supply process. One takes the "supply" of money as given exclusively by the public's demand for it and the other focuses attention on the supply and demand for bank reserves. Of the two, the multiplier approach has the better claim as a

theory of the money supply. Taking currency as given and focusing attention on the banking sector's deposits, the multiplier approach is usually built upon banking sector reserve equilibrium. As such it is a partial equilibrium approach. Deposit supply is taken as the level of deposits which clears the reserve market, i.e., which equates the supply and demand for reserves. Solving this equilibrium relationship for deposits in terms of reserves (or for money in terms of the monetary base) yields the traditional multiplier. The two approaches yield the same result if the deposit market clears instantaneously (i.e. if $D^d = D^s$ at all times). As will be seen, the two approaches are not interchangeable if there are adjustment costs.

The distinction between these approaches is analyzed in terms of a model used by *Richard Davis*[14] as the basis for choosing between a Federal funds rate strategy and a reserve strategy. The approach is the same as *William Poole's* for analyzing the choice between an interest rate and a monetary aggregate as intermediate targets.[15] Equations (1) to (2) reproduce *Davis'* deposit demand (D^d) and supply (D^s) equations with signs adjusted so that all coefficients are positive.[16]

$$D^d = b_1 Y - b_2 i + u \qquad \text{(Demand)} \tag{1}$$

$$D^s = c_1 Ru + c_2 i + e \qquad \text{(Supply)} \tag{2}$$

where Y is nominal income and i is the interest rate. In place of reserves he uses nonborrowed reserves (Ru). By defining Ru as nonborrowed reserves supplied directly by the Fed, e represents changes in borrowed reserves, non-Federal Reserve impacts on total reserves (i.e., market factors) and stochastic shifts in desired excess reserves.[17]

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[14] *Richard G. Davis,* "Implementing Open Market Policy with Monetary Aggregate Objectives," in Monetary Aggregates and Monetary Policy, Federal Reserve Bank of New York (October 1974).

[15] *William Poole,* "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model," Quarterly Journal of Economics (May 1970).

[16] *Davis,* op. cit., p. 14.

[17] *Davis'* deposit supply equation can be obtained by equating the supply and demand for reserves,

$$R^d = (r + a_1)D - a_2 i + \varepsilon_E \tag{a}$$

$$R^s = Ru + Rb + \varepsilon_F \tag{b}$$

where r is the reserve requirement ratio, a_1 is $\partial ER / \partial D$; a_2 is $|\partial ER / \partial i|$; Ru is the quantity of nonborrowed reserves supplied by the Fed, Rb is borrowed reserves and ε_F is the quantity of reserves supplied by "market factors." Equating and solving for deposits gives Davis' equation (2) where $c_1 \equiv 1/(r + a_1)$, $c_2 \equiv a_2 c_1$, and $e \equiv (Rb + \varepsilon_F - \varepsilon_E)\, c_1$.

Davis' assumption that the interest rate adjusts instantaneously so as to continuously clear the deposit market means that with an interest rate target the behavior of deposits is given by the following reduced form equation:

$$D^s = b_1 Y - b_2 i^* + u = D^* + u, \tag{3}$$

"where i^* is the weekly interest rate target used by the Federal Reserve,"[18] and D^* is the deterministic value of D given Y and i^*. This is the basis for treating deposit supply as demand determined as the reduced form equation (3) is identical to the demand equation (1). Davis contrasts the behavior of deposits in (3) with that obtained with a reserve target as seen in his reduced form equation (4):

$$D^s = \frac{b_1 c_2}{c_2 + b_2} Y + \frac{b_2 c_1}{c_2 + b_2} Ru^* + \frac{c_2}{c_2 + b_2} u + \frac{b_2}{c_2 + b_2} e \tag{4}$$

$$= D^* + \frac{c_2 u + b_2 e}{c_2 + b_2}$$

Applying *Poole's* criteria, if nominal income is known with certainty, deposit control is greater with a Fed funds rate target if $\sigma_u < \frac{b_2}{b_2 + 2c_2} \sigma_e$ where σ_u is the variance of u, i. e. $\sigma_u \equiv E[u^2]$ etc.[19]. It should be recalled that e contains the impact on reserve availability of "market factors" which the Fed has always maintained are rather difficult to forecast. The funds rate strategy had the virtue of automatically injecting or draining reserves sufficient to just offset the reserve effect of maket factors.

There are several serious shortcomings with this partial equilibrium framework. The first derives from the assumption of instantaneous and continuous clearing of the deposit market and the second from its partial equilibrium nature. Equations (3) and (4) treat observed deposits as always being equal to their demand. In fact, many economists argue that the quantity of deposits can be altered only by altering the public's demand for them. Hence a change in the Federal funds rate

[18] *Davis*, op. cit., p. 14. The solution is obtained by solving the system for Ru in terms of i etc. (i.e. by equating equations [1] and [2] and solving), then substituting the expression for Ru thereby obtained into equation (2).

[19] It is assumed throughout that all stochastic terms have zero means and variances of σ_x, and that all covariances, σ_{xy}, are zero. The superior strategy is taken by *Poole* to be the one which minimizes a quadratic loss function. In this case the superior strategy is the one which minimizes: $C = E[(D - D^*)^2]$.

operates on deposit supply through demand.[20] While the simplification afforded by the assumption of instantaneously clearing financial markets has yielded high dividends for many purposes, it can be seriously misleading in judging the efficacy of the funds rate strategy for implementing monetary policy. As pointed out by *Niehans*, "the perfect liquidity of cash balances is no compelling reason to expect a high adjustment speed, since the latter refers to a shift from money into other assets or consumption and thus the characteristics of those other assets are also relevant. In fact, it may well be that cash balances, being a typical 'buffer stock' asset, are characterized by quite low adjustment speeds."[21]

This possibility can be modeled by replacing the implicit equation $D^d = D^s = D$ by the partial adjustment equation

$$\Delta D^d = \lambda(D^s - D^d). \tag{0}$$[22]

The use of a discrete time formulation emphasizes the assumption that in the short run the public can be off its "long-run demand curve" because it finds it optimal to adjust gradually to independent changes in deposits. Observed deposits are those given by the banking sector's behavior contained in equation (2), rather than the public's demand in equation (1). Reserve market adjustment which underlies equation (2) is instantaneous (i.e., quicker than money [deposit] market adjustment as depicted in equation [0]).

This formulation and the notion of an independent (from demand) deposit supply is rejected by many economists on the grounds that the deposit rate restrictions in Regulation *Q* prevent banks from operating on their true deposit supply functions. While this might be true (if interest regulations are effective) it does not follow that observed deposits are always on the public's demand schedule. A binding Regulation *Q* will constrain, i.e. modify the banking sector's reserve demand and credit supply, but as long as banks succeed in these (albeit modified) portfolio desires they also succeed in achieving the implied

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[20] Even with the new reserve strategy the New York Federal Reserve Bank continues to forecast the longer-run behavior of the money supply by plugging funds rate and income forecasts into a money demand equation.

[21] *Jürgen Niehans*, The Theory of Money, (Baltimore: Johns Hopkins University Press, 1978), p. 241.

[22] *Dennis R. Starleaf*, "The Specification of Money Demand-Supply Models Which Involve the Use of Distributed Lags," Journal of Finance, September 1970, pp. 743 - 760.

(albeit modified) supply of deposits.[23, 24]. The model developed here also assumes perfect arbitrage between financial assets (other than deposits) making it possible to use a single rate of interest.

Solving the modified equations (0) - (2) for deposits as a function of interest rates gives:

$$(3') \qquad D = -\frac{b_2}{\lambda}\,\Delta i^* - b_2 i_{-1} + \frac{b_1}{\lambda}\,\Delta Y + b_1 Y_{-1} + \frac{\Delta u}{\lambda} + u_{-1}$$

$$= D^* + \frac{u, (1-\lambda)\, u_{-1}}{\lambda} \,,$$

which for $\lambda = 1$ reduces to equation (3). Equation (4) becomes:

$$(4') \qquad D = \frac{c_1 b_2}{z} Ru + \frac{c_2 b_1}{z}\,\Delta Y + \frac{\lambda c_2 b_1}{z}\, Y_{-1} + \frac{(1-\lambda) b_2 c_2}{z}\, i_{-1}$$

$$+ \frac{b_2}{z}\, e + \frac{c_2}{z}\,\Delta u + \frac{\lambda c_2}{z}\, u_{-1} = D^* + \frac{b_2}{z}\, e + \frac{c_2 u - (1-\lambda) c_2 u_{-1}}{z} \,,$$

where $z = \lambda c_2 + b_2$. Assuming as before that Y is constant (or independent and predictable with certainty) and that all lagged values are known, the condition for deposits to be more stable under a funds rate target becomes:

$$\sigma_u < \frac{\lambda b_2}{b_2/\lambda + 2 c_2}\, \sigma_e \,.$$

λ reduces the numerator and increases the denominator, therefore

$$\frac{\lambda b_2}{b_2/\lambda + 2 c_2} < \frac{b_2}{b_2 + 2 c_2}$$

[23] The verbal argument presented here assumes a simple banking sector balance sheet containing two assets (reserves and credit) and one liability (deposits) so that deposit supply is implicitly given by the balance sheet as a reflection of reserve demand and credit supply. The notion of deposit supply is developed more formally subsequently (see equation [5]). For a more extensive discussion of this issue see the author's "Modeling the Short-Run Demand for Money with Exogenous Supply."

[24] The intuitive appeal of treating changes in deposits as a demand side phenomenon is strongest among those who picture deposit creation as resulting from customers walking in off the street to convert currency notes into deposits. Intuition is reversed (i.e. deposit changes are viewed as a supply side phenomenon) among those who picture deposit creation as resulting from banks extending credit by marking up their deposit liabilities. Of course both phenomena interact. Given their reserves, banks' portofolio behavior does impose or create a well-defined quantity of deposits, while the public's currency-deposit behavior (given the monetary base) determines banks' reserves.

as long as $\lambda < 1$. The effect of the adjustment lag λ in the deposit market is to tilt the choice of operating strategies away from the funds rate. It can also easily be shown by solving the system for i in terms of Ru, that the funds rate becomes less volatile with a reserve target as λ falls below 1.[25]

This is by no means the only nor probably the most serious shortcoming of Davis' framework for evaluating the choice of operation strategies. In a general equilibrium setting it is clear that changes in reserves also affect nominal income and hence the demand for deposits. In the medium run, changes in reserves and hence deposit supply may change nominal income by changing real income and/or prices, while in the long run the effect is predominantly through the price level. Thus changes in reserves systematically affect the demand for deposits and hence the relationship between deposits and the rate of interest. As can be seen in equation (3), with a given Federal funds rate, deposits will vary by more than the random term u when changes in nominal income are taken into account. Obviously, any change in Y as a result of a change in money or reserves within the same week are negligible. However, between this very short run and the long run, full adjustment takes place and must be accounted for somewhere. In short, while induced changes in Y will not significantly affect the choice of a Fed funds rate or reserve operating target, they will have a great deal to do with the appropriate rate to peg within each week. That rate will change each week as the lagged adjustment in Y takes place.

Changes in inflationary expectations, and hence the relationship betweeen real and nominal interest rates, are an important additional source of uncertainty in the relationship between deposits and the funds rate. Endogenizing Y and inflationary expectations by combining the monetary with the real sectors further tilts the choice of operating strategies away from interest rates. In fact, as is well known, an interest rate target is unstable (yields an explosive deposit level) when adjustments are instantaneous.

The shortcomings of relying on a partial equilibrium framework are apparent when attempting to analyze the policy implications of lagged reserve accounting. The propensity for deposit multiplier analysis to focus on reserve market equilibrium tends to obscure the actual mechanism and linkages by which the Federal Reserve influences de-

[25] See the author's "Interest Rate Consequences of Targeting Money," IMF.

posit behavior. This is particularly apparent in earlier efforts to model deposit consequences of lagged reserve accounting.[26]. Modifying the reserve market equations (a) and (b) (given earlier in a footnote) to reflect lagged reserve accounting, adding a borrowed reserves equation, and distinguishing three interest rates (i, the loan rate; i_f, the Fed funds rate; and i_d, the discount rate) in anticipation of subsequent discussion of the discount window, yields the following reserve market equilibrium conditions:

(a′) $$R^d = rD_{-2} + a_1 D - a_2 i - a_3 i_f + \varepsilon_E$$

(b) $$R^s = Ru + Rb + \varepsilon_F$$

(c) $$Rb = g_0 + g_1 (i_f - i_d) + \varepsilon_G$$

(d) $$R^d = R^s$$

Therefore,

(2′) $$D^s = \frac{g_0 - rD_{-2}}{a_1} + \frac{a_2}{a_1} i + \frac{a_3 + g_1}{a_1} i_f - \frac{g_1}{a_1} i_d + \frac{Ru}{a_1} + \frac{\varepsilon_F + \varepsilon_G - \varepsilon_E}{a_1} .$$

In equation (2′) the determinancy of deposits seems to hang on the tenuous existence of a deposit-related level of desired excess reserves. However, it is commonly believed that the value of a_1 for the U.S. banking system is approximately zero, in which case deposits in equation (2′) are indeterminate. What reserve market equilibrium yields instead is a relationship between unborrowed reserves and interest rates.

The apparent instability results from incorrectly treating equation (2′) as the deposit supply function. In the real world lagged reserve accounting has not made week-to-week deposit movements unstable as implied by equation (2′), though there have been some very irratic weekly changes. The banking sector's supply of deposits depends not only on reserve market conditions, but on bank willingness to extend loans (and on all other items in bank balance sheets). For the simplest possible balance sheet assumptions, the banking sector's supply of deposits equals its supply of credit plus demand for nonborrowed reserves, i. e.,

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[26] See, for example, *John P. Judd*, "The Quantitative Impact of Lagged Reserve Requirements on Monetary Control," mimeograph, undated, Federal Reserve Bank of San Francisco; and the author's "The September 1968 Changes in 'Regulation *D*' and Their Implications for Money Supply Control," unpublished Ph.D. thesis, University of Chicago, 1972.

$$D^s + Rb \equiv L + Ru' + Rb, \text{ or}$$

(e) $$D^s \equiv L + Ru' \ ,$$

where L is bank loan supply, and $Ru' \equiv Ru + \varepsilon_F \equiv R - Rb$. Specifying loan supply as a reserve-adjusted function of loan rates and the bank's cost of funds (taken here as given by the Fed funds rate),

(f) $$L = l_0 + l_1(1 - r)i - l_2 i_f + \varepsilon_L,$$

and making all of the indicated substitutions and using equation (2′) (solved for the Federal funds rate) to eliminate the endogenous funds rate, yields the deposit supply function:

(5) $$D^s = h_0 - h_1 i_d + h_2 i + h_3 Ru + h, \text{ where}$$

$$h_0 = \frac{l_0 + x\,(g_0 - rD_{-2})}{1 + xa_1}, \ h_1 = \frac{xg_1}{1 + xa_1}, \ h_2 = \frac{l_1\,(1 - r) + xa_2}{1 + xa_1}$$

$$h_3 = \frac{1 + x}{1 + xa_1}, \ h = \frac{\varepsilon_L - \varepsilon_E + x\,(\varepsilon_F + \varepsilon_G)}{1 + xa_1} \text{ and } x = \frac{l_2}{a_3 + g_1} \ .$$

In equation (5) (unlike equation [2′]) deposits are perfectly determinate and stably related to nonborrowed reserves, even when $a_1 = 0$. Combining equations (1) and (5) (with either $D^s = D^d$ or with equation [0]) allows a solution for the loan rate (i) in terms of policy parameters i_d and Ru. Substituting the resulting expression for i into equation (5) gives the (predicted) level of deposits as a function of the same two policy parameters. Federal Reserve modeling of the money supply process tends to focus on equations (1) and (2) rather than equation (5).

The role of the discount window is somewhat submerged in equation (5). Given the loan rate (i), the deposit supply depicted there can be thought of as a function of the cost of funds (i.e. the funds rate) where this is determined by the two policy instruments i_d *and* Ru. The model presented here uses the Fed's interpretation of the operation of the discount window which is seen more clearly by solving equation (c) for the funds rate which gives the rate as an increasing function of the discount rate and the extent to which banks are "forced" to borrow,

(c′) $$i_f = i_d - g_0/g_1 + Rb/g_1 - \varepsilon_G/g_1.$$

Changes in the discount rate affect the Fed funds rate directly while changing nonborrowed reserves does so indirectly (by changing borrowed reserves given reserve demand).

Formally speaking, the model developed here treats borrowed reserves as perfect substitutes for reserves obtained in the Federal funds market, where the cost of borrowed reserves is the discount rate plus the nonpecuniary costs imposed by the Fed's administration of the window. The demand for borrowed reserves is, therefore, implicit in equation (a′) and is obtained by subtracting an exogeneously given level of nonborrowed reserves from each side. Equation (c), or more appropriately equation (c′), is a supply function, not a demand function[27]. It establishes the terms on which the Fed will supply reserves through the discount window. The more banks borrow, the higher the price set by the Fed. This price (the discount rate plus nonpecuniary costs) is always measured by the Federal funds rate.

The following diagrams reflect the above assumptions about the behavior of the discount window and help clarify the workings of the new strategy in the presence of lagged reserve accounting, which makes control of the current week's total reserves impossible.

Figure 1 presents the supply (*S*) and demand (*D*) for total reserves (i.e. equations [a′] through [d]). The supply of reserves schedule is the sum of nonborrowed and borrowed reserves. Beyond the "normal" level of borrowed reserves additional borrowing initiates tighter administration of the discount window, hence an increasing spread between the discount rate and the funds rate, so that the supply of total reserves at a particular funds rate depends on the quantity of nonborrowed reserves. The demand for reserves schedule is the sum of required reserves and desired excess reserves. Because of lagged reserve accounting, required reserves are a predetermined constant within the week, while desired excess reserves will depend on the expected yields on bank loans and investments, the price level, income, etc. as well as the cost of purchased reserves, i.e., the Federal funds rate (see equation [a′]). All factors other than the Federal funds rate, especially other interest rates, are held constant in this discussion so that the vertical axis reflects varying interest differentials between the cost and use of reserves. Any difference between the discount rate and the Federal funds rate is taken as the market's revealed nonprice cost of borrowing from the discount window (i.e., the intensity of window administration) so that at the margin the full cost of these two sources of reserves are always the same.

[27] This clarification was prompted by comments on an ealier draft by *James Beaver*.

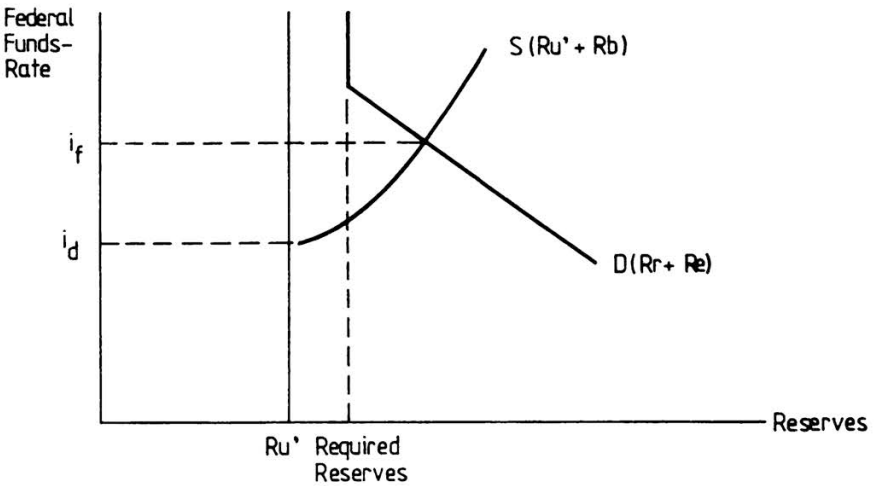

Figure 1: Reserve Market

The intersection of the supply and demand for reserves curves depicted in Figure 1 determines the funds rate and total reserves, given the values of the other variables in equation (2'). Obtaining the supply of deposits (given the loan rate) requires combining this result with the banking sector's balance sheet constraint and loan supply functions as depicted in Figure 2. Starting with the desired (targeted) level of deposits, one can determine the intersection of the reserve supply and demand schedules consistent with that target.[28] This desired intersection is expressed as a target level of reserves (or nonborrowed reserves) in a reserve strategy or as a target funds rate for a money market strategy. Differences between the two strategies emerge when the relationships are not perfectly known. In Figure 2 the reserve demand and loan supply curves shift in response to changes in the loan rate, income, prices, lagged deposits, etc. while the reserve supply curve shifts in response to changes in nonborrowed reserves (including "market factors") and the discount rate.

Figure 3 depicts the differences between interest rate and reserve targeting when the actual reserve demand function is D' while policy targets assumed it to be D. *Holding* nonborrowed reserves constant leads to an increase in the funds rate and some increase in total re-

[28] Bearing in mind the important qualification that the result depends, among other things, on the assumed loan rate.

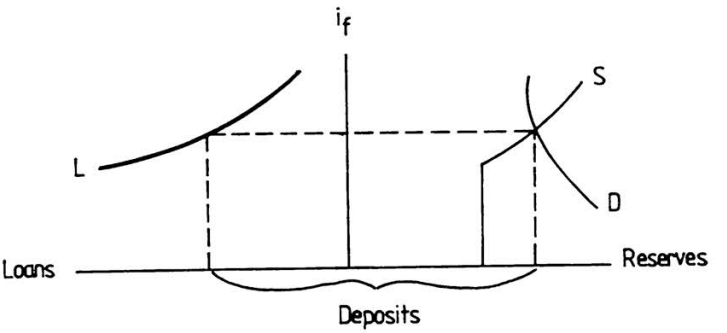

Figure 2

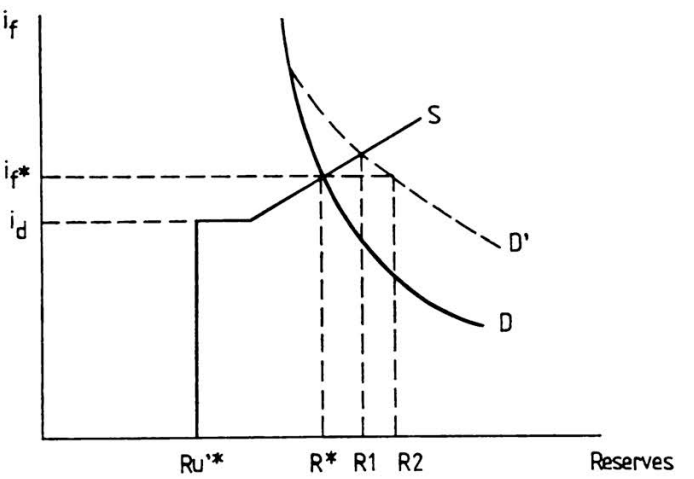

Figure 3

serves (R_1). A money market strategy, on the other hand, holds the funds rate at i_f* while injecting a larger quantity of reserves (R_2). Which of these two approaches is most disruptive to deposits depends on the source of shift in reserve demand and cannot be determined from the partial equilibrium framework depicted here.

On the other hand, disturbances to the supply of nonborrowed reserves (Figure 4), which are totally neutralized by a funds rate target, are partially offset by a nonborrowed reserve target due to the cushioning effect of discount window borrowing.

A proper evaluation of deposit behavior with a funds rate or reserve target requires the more general framework of financial sector behavior outlined earlier, which includes the specification of a proper deposit supply function (such as equation (5) in the case of a nonborrowed reserve target) rather than the incomplete framework of equation (2). Combining equation (5) with equation (1) (i.e., letting $D^s = D^d$) in order to solve out the loan rate gives (equilibrium) deposits as a function of the discount rate, nonborrowed reserves and exogeneous (e.g. income and lagged deposits) and stochastic factors.

$$(4'') \qquad D = wh_0 - wh_1 i_d + [(wb_1h_2)/b_2]Y + wh_3Ru + w[(h_2u)/b_2 + h],$$

where $w = b_2/(b_2 + h_2)$. For a funds rate target the comparable expression is:

$$(3'') \qquad D = \frac{l_0 - g_0 + rD_{-2}}{v} - \frac{a_3 + g_1 + l_2}{v} i_f + \frac{g_1}{v} i_d$$

$$+ \frac{[l_1(1-r) - a_2]\, b_1}{vb_2} Y + \frac{l_1(1-r) - a_2}{vb_2} u + \frac{\varepsilon_E - \varepsilon_L - \varepsilon_F - \varepsilon_G}{v},$$

where $v = 1 - a_1 + \dfrac{l_1(1-r) - a_2}{b_2}$.

The consequences for deposits of various disturbances and policy shifts (such as the disturbances depicted in Figures 3 and 4) can be determin-

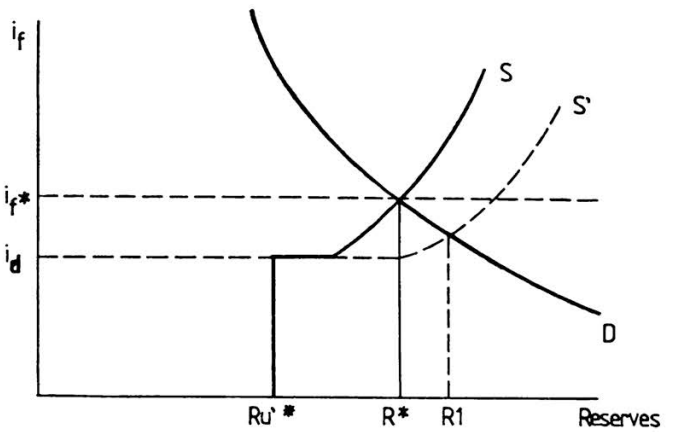

Figure 4

ed by an examination of these two equations, assuming no change in income, prices or inflationary expectations.

Improving monetary control is dependent on improving our models of the process determining bank deposit behavior. The practice of forecasting the money supply from money demand functions has been an impediment to improving short run monetary control and the construction of a more successful operation strategy. In my judgment the further development in the direction suggested here is more promising.

Zusammenfassung

Geldpolitische Strategien der USA in den letzten Jahren

Während der siebziger Jahre begrenzte die US-Notenbank ihre Geldpolitik mehr und mehr auf gewünschte Zuwachsraten von Geldmengenaggregaten. Dieser Vorgang wurde verstärkt durch den intellektuellen Einfluß der monetaristischen Schule und durch das vom Kongreß 1977 verabschiedete „Federal Reserve Reform Act" (zuerst 1975 als House Concurrent Resolution 133 verabschiedet) und dem „Gesetz zur Vollbeschäftigung und zum ausgewogenen Wachstum" 1978 (*Humphrey-Hawkins* Act) gesetzlich verankert. Infolge dieser Gesetze setzt und veröffentlicht die US-Notenbank jetzt die Ziele für den Zuwachs der Geldmenge für das kommende Jahr. Dieser Beitrag gibt einen kurzen Überblick über das Procedere, mit dem die Geldpolitik in den USA in den letzten Jahren formuliert wurde. Begonnen wird hierbei mit der Phase, als man anfing, monetäre Ziele zu setzen, des weiteren wird das Vorgehen (die Strategien) der Notenbank analysiert, um diese Ziele zu erreichen. Die Zinsstrategie (orientiert an den Staatsschuldtiteln) der 70er Jahre wird als Hintergrund für die Beschreibung und Analyse der neuen Notenbank-Strategie nach dem 6. Oktober 1979 behandelt. Abschließend zeigt der Beitrag die Schwierigkeiten für eine Reservestrategie auf, die durch eine verzögerte Reaktion hervorgerufen wird, sowie die neue und verstärkte Rolle des „Diskont-Fensters".

Summary

Recent Monetary Policy Strategies in the United States

During the 1970s the U.S. Federal Reserve quantified its monetary policy increasingly in terms of desired growth rates of monetary aggregates. This process was enhanced by the intellectual ascendancy of monetarism and given legal status by the Congressional adoption of the Federal Reserve Reform Act of 1977 (which made law of House Concurrent Resolution 133, first passed in 1975) and the Full-Employment and Balanced Growth Act of 1978 (*Humphrey-Hawkins* Act). As a result of these laws the Federal Reserve now sets and publicly discloses money growth rate targets for the upcoming year. This

paper briefly reviews the procedures for formulating monetary policy in the United States in recent years, starting when policy was expressed as monetary targets, and describes and analyzes the Federal Reserve's strategies for achieving these targets. The Federal funds rate operating strategy of the 1970s is discussed as background for a description and analysis of the new, post-October 6, 1979 reserve strategy. The paper then considers the difficulties for a reserve strategy posed by lagged reserve accounting, and the new and enhanced role of the discount window.

Résumé

Stratégies de politique monétaire des Etats-Unis durant les dernières années

Pendant les années '70 la Banque centrale des Etats-Unis limita sa politique monétaire de plus en plus à des taux d'accroissement souhaités des agrégats de la masse monétaire. Cette priorité fut encore renforcée par l'influence intellectuelle de l'école monétariste et ancrée dans la législation par le "Federal Reserve Reform Act" voté par le Congrès en 1977 (initialement voté en 1975 en tant que "House concurrent Resolution" 133) et la "Loi sur le plein emploi et la croissance équilibrée" de 1978 (Loi *Humphrey-Hawkins*). Sur base de ces lois la Banque centrale fixe et publie actuellement les objectifs de la croissance de la masse monétaire pour l'année à venir. La présente contribution donne un bref aperçu de la procédure par laquelle la politique monétaire a été formulée ces dernières années aux Etats-Unis. On commerce par les phases au courant desquelles on débuta par fixer des objectifs monétaires, ensuite l'action (les stratégies) de la Banque centrale pour atteindre ces objectifs est analysée.

La statégie des taux d'intérêt (orientée par les bons du trésor) des années '70 est décrite en tant qu'arrière-plan de la description et l'analyse de la nouvelle stratégie de la Banque centrale après le 6 octobre 1979. En conclusion la contribution démontre les difficultés d'une stratégie des réserves monétaires, engendrée par une réaction différée, ainsi que le rôle nouveau et accru de la "fenêtre du taux d'escompte".