

# Effects of Financial Deregulation on Monetary Policy

*By Howard Roth*

Deregulation of deposit ceiling rates has complicated monetary policy in recent years. Introduction of new, higher yielding accounts and the gradual phaseout of ceiling rates on existing accounts led to large shifts of funds that temporarily distorted monetary growth rates. To cope with the effects of these distortions on monetary policy implementation, the Federal Reserve redefined the monetary aggregates and changed the emphasis placed on various aggregates as policy guides. The worst of the policy problems resulting from the initial transition to deregulated deposit rates are now over, since deposit ceilings have already been phased out on all but a few accounts.

However, there may be more lasting effects of deposit rate deregulation that might affect the future conduct of monetary policy. For example, deregulation may have altered the short-run response of monetary growth to changes in market interest rates. If so, the

degree of interest rate volatility associated with close, short-run monetary control may also have changed.

There is reason to suspect that the interest sensitivities of both M1 and M2 have been affected by deposit rate deregulation. In the last three years the patterns of monetary growth following changes in interest rates have differed from the pattern that was typical before deregulation. For example, the increase in interest rates that began in the spring of 1984 was followed by several months of very sluggish M1 growth. Growth of M2, on the other hand, seemed to be less affected. This would have been an unusual development before deposit rate deregulation. Then, interest rate increases reduced M2 growth much more than M1 growth. These experiences suggest that deregulation may have reversed the relative interest sensitivities of M1 and M2.

This article examines the implications for monetary policy of changes in the interest sensitivities of the monetary aggregates resulting from financial deregulation. The first section documents the changes in the composition of

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M1 and M2 in recent years and explains how these changes could have increased the interest sensitivity of M1 and reduced the interest sensitivity of M2. The second section provides empirical estimates confirming that M1 has become more sensitive to interest rate changes and that M2 has become less sensitive. These changes have improved the prospects for achieving close, short-run control of M1, while reducing the prospects for close, short-run control of M2. To shed light on the implications of these results for monetary control, the third section assesses the degree of interest rate volatility that would accompany monthly control of either M1 or M2. The conclusion from this assessment is that monthly control of either M1 or M2 is inadvisable because it would lead to considerable interest rate volatility.

### **Effects on the interest sensitivities of M1 and M2**

Deregulation has changed the composition of the monetary aggregates.<sup>1</sup> In contrast to the situation a few years ago, most nontransactions accounts now pay a market-related rate of interest, and a substantial fraction of transactions deposits pay interest. The rates paid on transactions deposits do not closely follow market rates, however. As a result, M2 has likely become less sensitive to changes in market interest rates while M1 has likely become more sensitive.

#### *Effects on M1*

Two developments have accounted for most of the transformation of M1 to date. One was

<sup>1</sup> Deregulation is defined broadly in this article to encompass deregulation of deposit rate ceilings, the authorization of new deposit accounts by Congress, and the development of new accounts, like money market mutual funds, by nondepository institutions.

the authorization of nationwide NOW accounts in 1981, and the other was the introduction of ceiling-free Super NOW accounts in 1983. Both new accounts have grown rapidly. As a result, the proportion of M1 in interest-earning checking accounts has climbed from less than 7 percent in 1980 to more than 25 percent today.

The increasing importance of NOW's and Super NOW's may have affected the interest sensitivity of demand for M1. The interest sensitivity of demand for a monetary aggregate is an average of the interest sensitivities of demand for the various assets in that aggregate. The interest sensitivities of these assets depend, in turn, on how their own rates respond to changes in market interest rates. If an asset's own rate does not move closely with market interest rates, a change in market rates will affect the opportunity cost of holding the asset, which can be measured by the difference between market rates and the asset's own rate. This change in opportunity cost affects demand for the asset. The size of the effect depends on how much the opportunity cost of holding the asset changes when market interest rates change, as well as how responsive demand for the asset is to changes in its opportunity cost. Thus, if the opportunity costs of NOW's and Super NOW's respond proportionally more or less to changes in market interest rates than does the opportunity cost of currency and demand deposits, and the sensitivities of these assets to changes in opportunity cost are comparable, then the rapid growth of NOW's and Super NOW's has likely changed the interest sensitivity of demand for M1.<sup>2</sup>

<sup>2</sup> For one commonly used model, a change in the opportunity cost of holding an asset affects demand for the asset such that the percentage change in demand is proportional to the percentage change in the opportunity cost. Two assets with this behavior that are equally sensitive to changes in their opportunity cost will respond differently to changes in market rates if the opportunity

Demand for NOW accounts should be more sensitive to market interest rates than is demand for currency and demand deposits. Whereas currency and demand deposits do not earn explicit interest, most NOW accounts earn 5 1/4 percent, the ceiling rate. Therefore, a change in market rates has a greater proportional impact on the opportunity cost of holding NOW's than on the opportunity cost of holding demand deposits or currency. For example, assume market rates increase from 10 1/4 percent to 11 1/4 percent. Before the increase, the opportunity cost of holding demand deposits and currency is 10 1/4 percentage points and the opportunity cost of holding NOW accounts is 5 percentage points. The increase in market rates would raise the opportunity cost of demand deposits and currency by about 10 percent to 11 1/4 percentage points, and would raise the opportunity cost of NOW accounts by 20 percent to 6 percentage points. Because the opportunity cost is lower for NOW accounts than for currency and demand deposits, a given change in market rates has a larger proportional impact on the opportunity cost of NOW accounts.<sup>3</sup> As a

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cost of one asset is proportionally more affected by changes in market rates than is the opportunity cost of the other asset.

For another model of asset demand, the percentage change in demand for the asset in response to a given percentage change in its opportunity cost is not constant. Rather it is a function of the level of the opportunity cost. See Flint Brayton, Helen T. Farr, and Richard Porter, "Alternative Money Demand Specifications and Recent Growth in M1," Board of Governors of the Federal Reserve System, May 23, 1983.

<sup>3</sup> Moreover, the extent to which the change in the opportunity cost of NOW's exceeds that of currency and demand deposits is even higher at lower market rates and can become very large as market rates fall toward 5 1/4 percent. For example, when market rates equal 6 percent, a one percentage point increase in market rates—almost a 17 percent increase—increases the opportunity cost of NOW's 133 percent. That is, the elasticity of NOW's to changes in market rates is 6. An explanation given for the extraordinary fall in M1 velocity in 1982 was a rapid buildup in regular NOW account balances as market rates fell toward the 5 1/4 percent fixed rate of regular NOW's. See Howard Roth,

result, demand for NOW accounts is probably more sensitive to changes in market rates than is demand for currency and demand deposits.

The relative sensitivity of Super NOW accounts is less clear. Because there is no regulatory ceiling on Super NOW rates, they can follow market interest rates. Indeed, it had been assumed before their introduction that Super NOW's would pay a rate proportional to market rates. Instead, rates on Super NOW's have displayed considerable inertia, responding only partially and with a considerable lag to changes in market rates. For example, the national average rate on Super NOW's varied only between 7 1/4 percent and 8 3/4 percent in 1984 despite considerable variability in market interest rates.<sup>4</sup> As a result of the relative constancy of rates on Super NOW's, changes in market rates have a similar impact on the opportunity cost of holding Super NOW's as on the opportunity cost of holding NOW's. Thus, demand for Super NOW's may also be more responsive to changes in market rates than is demand for currency and demand deposits.

Because the opportunity costs of NOW's and Super NOW's are relatively sensitive to changes in market interest rates, the growing importance of these accounts may have increased the sensitivity of M1 to changes in market rates.<sup>5</sup> Moreover, the actual behavior of Super NOW rates so far suggests that removal of ceiling rates on NOW accounts in March of next year is unlikely to affect the

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"Recent Experiences with M1 as a Policy Guide," *Economic Review*, Federal Reserve Bank of Kansas City, March 1984, pp. 17-29.

<sup>4</sup> *Bank Rate Monitor*, Advertising News Service, Inc., Miami Beach, Florida.

<sup>5</sup> Empirical estimates in a later section confirm this expectation. A more comprehensive empirical study arriving at the same conclusion is the Brayton, Farr, and Porter study referenced in footnote 2.

interest sensitivity of M1 appreciably. As a result, a lasting effect of deposit rate deregulation may be higher interest sensitivity of M1.

### *Effects on M2*

Since M1 assets are also included in M2, introduction of NOW's and Super NOW's has affected M2. More important, though, have been the changes in the nontransactions portion of M2.

The nontransactions portion of M2 includes one of the most significant financial innovations in recent years, money market mutual funds ( MMMF's). Although introduced in 1974, MMMF's did not grow rapidly until much later. They increased from less than \$7 billion in December 1978 to \$185 billion by December 1982. MMMF's offered investors

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### *A lasting effect of deposit rate deregulation may be higher interest sensitivity of M1.*

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market-related rates, high liquidity, and lower minimum balance requirements—a combination not available at depository institutions. Perhaps more than anything else, the inability of banks and thrifts to compete with MMMF's spurred the deposit rate deregulation of the early 1980s.

The Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA) and the Garn-St Germain bill of 1982 provided the means for banks and thrifts to compete with MMMF's. The DIDMCA called for the complete deregulation of rates paid by banks and thrifts within six years. The Garn-St Germain bill accelerated this deregulation by authorizing banks and thrifts to begin offering money market deposit accounts (MMDA's) in December 1982. MMDA's were enthusiastically received because they

are liquid, pay a ceiling-free rate, and offer transactions capabilities. Within four months, funds in MMDA's surpassed those in MMMF's. Meanwhile, under DIDMCA, ceiling rates on small time deposits were being removed. Currently, only passbook savings deposits, regular NOW accounts, and time deposits of less than \$1,000 with maturities of seven to 31 days still have interest rate ceilings. Even these ceilings will be removed by March 1986.

Because of deregulation, the proportion of the nontransactions part of M2 paying a market rate is much higher now than it was only a few years ago. Accounts not subject to interest rate ceilings accounted for only about 10 percent of the nontransactions portion of M2 in December 1978. By December 1984, 84 percent of the nontransactions portion of M2 was in accounts with no regulatory ceiling rates.

Despite the phaseout of ceiling rates and the introduction of unregulated accounts, not all the assets in the nontransactions portion of M2 pay a rate that mirrors market rates. Whereas the yields on money market certificates (MMC's) and other deregulated time deposits closely track market interest rates, the yields on nontransactions accounts without a specific maturity vary less than market rates. The average yields on MMMF's and MMDA's, for example, lag behind market rates and are less volatile. Nevertheless, yields on most nontransactions accounts are closer to market rates than are yields on transactions accounts. For ease of exposition, therefore, analysis of the effects of financial deregulation is based on the assumption that ceiling-free nontransactions accounts in M2 pay a market rate.

Deposit rate deregulation has likely reduced the interest sensitivity of demand for the nontransactions component of M2. Since as much can be earned on accounts that pay a market rate as on market instruments themselves,

there is no opportunity cost of holding these accounts. Therefore, changes in market interest rates should not affect demand for the ceiling-free accounts in the nontransactions portion of M2. Only the few deposits still subject to regulatory ceiling interest rates are sensitive to changes in market interest rates. And since these ceilings will be removed next year, the entire nontransactions component of M2 will have rates that move to some extent with market rates. As a result, M2 will likely become even less sensitive to market interest rates, another lasting effect of deposit rate deregulation.

The overall effect of financial innovation and deregulation on the interest sensitivity of M2 is not clear. While demand for the M1 portion of M2 has likely become more interest sensitive, demand for the nontransactions portion has likely become less interest sensitive. Since the nontransactions component is much larger than the M1 component, the probable overall effect is a reduction in the interest sensitivity of M2. These effects can be determined precisely, however, only through empirical estimation of the interest sensitivities of the demands for M1 and for the nontransactions component of M2.

### **Empirical estimates of the effects**

To estimate the interest sensitivities of M1 and M2, demand functions for M1 and the nontransactions portion of M2 were specified and estimated. The effects of deposit rate deregulation on the interest sensitivities of M1 and M2 were determined by estimating these

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<sup>6</sup> See Helen T. Farr, "Derivation of the Fitzgerald Time Deposit Rate Used in the Monthly Money Market Model," Board of Governors of the Federal Reserve System, December 1982 (Revised).

The motivation for the M1 equation used in this article was a similar equation used by the staff at the Board of Governors. See the reference in footnote 2.

demand functions over two periods—one ending before financial change had a major influence and the other including more recent data.

### ***Specification of equations***

Specification of the M1 equation reflects the assumption that the demand for M1 depends mainly on real income, the price level, and market interest rates. Assets in M1 are held primarily to make transactions. The amount of transactions depends on the level of real income. Therefore, real personal income was included in the M1 equation as a proxy for the real volume of transactions financed by payments from transactions deposits. To the extent that there are economies of scale in managing transactions balances, a change in real income may lead to a less than proportional change in demand for M1.

Demand for transactions assets also depends on the level of prices. Because transactions assets are held as a store of real purchasing power, a change in the overall price level should result in a proportional change in demand for M1 in the long run. However, because transactions balances may not be adjusted immediately to price level changes, the current and lagged inflation rates were included in the M1 equation to allow for lagged adjustment to price level changes.

As argued above, the opportunity cost of holding funds in M1 assets is related to the interest rate on alternative assets. Commercial paper and other money market instruments are one alternative to transactions balances; time deposits are another. Therefore, the rate on 3-month commercial paper and a rate representing the return on small denomination time deposits, the Fitzgerald rate, were included in the M1 demand equation.<sup>6</sup>

The demand for M1 has also been affected in recent years by shifts resulting from finan-

**Demand Functions for M1  
and Nontransactions Portion of M2**

$$(1) \ln(M1) = a_0 + b_0(L)\ln(Y/P) + \ln(P) + c_0(L)\ln(RCP) + d_0(L)\ln(RFITZ) + f_0P + g_0P_{-1} + h_0TIME + j_0D + u_0$$

$$(2) M2-M1 = a_1 + b_1(L)\ln(Y) + c_1(L)(\ln RCP - \ln RFITZ) + g_1DMMDA + u_1$$

Definitions:

M1 = M1, seasonally adjusted

M2-M1 = Nontransactions portion of M2, seasonally adjusted

Y = Personal income, seasonally adjusted

P = Personal consumption expenditure deflator, seasonally adjusted

RCP = Yield on 3-month commercial paper

RFITZ = Yield on time deposits as measured by the Fitzgerald rate (see footnote 6)

$\dot{P}$  = Percentage change in personal consumption expenditure deflator, seasonally adjusted

TIME = Linear time trend

D = Vector of dummy variables measuring effects of:

1974-76 shift in money demand (= DSHIFT)

1980 credit controls (= DCRED)

1981 introduction of nationwide NOW accounts (= DNOW)

and 1982-83 introduction of money market deposit accounts (= DMMDA)

(L) = Polynomial lag operator L

$j_0$  = Vector of coefficients on dummy variables

$u_0, u_1$  = Zero mean, finite variance error terms

cial innovation and deregulation and by other special circumstances. Dummy variables were included in the M1 demand equation to account for the downward shift in M1 demand in the mid-1970s, the imposition of credit controls in 1980, the authorization of nationwide NOW accounts in 1981, and the introduction of MMDA's and Super NOW's in late 1982 and early 1983. A time trend was also included to allow for gradual improvement of technology in cash management. A more

detailed explanation of the specification of the M1 equation is given in the accompanying box.

Specification of the equation for the non-transactions component of M2 was similar in most respects to the specification of the M1 equation. Demand for nontransactions assets, as for M1 assets, depends on real income and on the price level. But, whereas some theories predict that real income and prices may affect demand for transactions balances differently,

**TABLE 1**  
**Estimated demand functions**

Variable	Coefficient Estimates*			
	M1		Nontransactions	
	1972-77	1972-83	1972-77	1972-83
Y/P	1.11†	1.02†	—	—
P	1.00‡	1.00‡	—	—
Y	—	—	0.81†	0.98†
RCP	-0.06†	-0.04†	-0.14†	-0.18†
RFITZ	-0.02	-0.07†	0.14†	0.18†
P <sub>1</sub>	-0.57†	-0.31†	—	—
P <sub>2</sub>	-0.26	-0.09	—	—
DSHIFT	-0.03†	-0.00	—	—
DCRED	—	0.01	—	—
DNOW	—	0.05	—	—
DMDA	—	0.07	—	0.12†
TIME	-0.02	-0.02†	—	—

\* Sums of lag coefficients for all variables for which a polynomial lag was estimated.  
† Statistically significant at the .05 level.  
‡ Constrained to equal unity.

there is little reason to expect that the same would be the case for nontransactions balances. For this reason, nominal income, rather than real income and prices individually, was included in the demand equation for the nontransactions portion of M2.

A large proportion of nontransactions assets earn explicit interest. As a consequence, the opportunity cost of holding nontransactions assets depends not only on market interest rates but also on the own rates of the nontransactions accounts. For this reason, the difference between market rates and the Fitzgerald rate was included as a proxy for the opportunity cost of holding nontransactions accounts.

Finally, deregulation has caused fewer shifts of funds for nontransactions accounts than for M1 assets. Only the introduction of MMDA's appreciably affected the demand for nontransactions accounts in M2. Therefore, a dummy variable representing the transition to MMDA's in 1983 was included in the nontransactions equation.<sup>7</sup>

#### *Empirical estimates*

The M1 and nontransactions deposits equations were estimated over two periods to determine the effects of financial deregulation. The first set of equations was estimated from 1972 through 1977. Because deregulation had not yet had appreciable effects, these equations serve as standards for comparison in evaluating the effects of financial change. An additional set of equations was estimated from 1972 through 1983 to determine the effects of deregulation in recent years on demands for M1 and nontransactions accounts.<sup>8</sup>

<sup>7</sup> This nontransactions equation was motivated by an equation developed by the staff of the Federal Reserve Bank of San Francisco. See John P. Judd, "A Monthly Model of the Money and Bank Loan Markets," Federal Reserve Bank of San Francisco, Working Paper No. 83-01, May 1983.

<sup>8</sup> These equations were estimated only through 1983 so that simulations of money behavior in 1984 would not be affected by inclusion of 1984 data in the estimation period. Extending the estimation period to include 1984 does not change the estimation results appreciably.

**TABLE 2**  
**Changes in interest rate sensitivities**

	Consolidated Measure of Interest Rate Sensitivity*	
	1972-77	1972-83
M1	-0.06	-0.09
M2-M1	-0.15	-0.03
M2	-0.12	-0.04

\* This measure takes into account how the rate on small denomination time deposits respond to changes in the 3-month commercial paper rate. The relationship between the Fitzgerald rate, which was used in the estimated money demand functions, and the 3-month commercial paper rate was estimated through a regression of the form:

$$RFITZ = a2 + b2(L)RCP$$

where b2(L) is a fifth degree polynomial. This estimated relationship was then used for computing the composite interest sensitivities in this table and for the simulations in the following section.

The estimated coefficients are shown in Table 1. Most of the empirical estimates are in line with values implied by economic theory, suggesting that the specifications are accurate enough to provide reliable estimates of the interest sensitivities. The primary difference between the equations estimated through 1977 and those estimated through 1983 is in the interest rate coefficients. Interpretation of the change in coefficient values on interest rate variables is not straightforward, though, because more than one variable is included in each equation to represent opportunity costs. The opportunity cost terms had to be consolidated into a single measure to determine the total effect of deregulation on the interest rate sensitivities of M1 and the nontransactions portion of M2. These consolidated measures are given in Table 2.

The consolidated measures of interest rate sensitivities confirm that deposit rate deregulation has increased the interest sensitivity of M1 demand. As shown in Table 2, the interest sensitivity of M1 demand increased from -0.06 before deregulation to -0.09 after deregulation. This increase in the interest sensitivity of M1 is consistent with the theory that introduction of NOW's and Super NOW's

increased the responsiveness of demand for transactions deposits to changes in market interest rates. The empirical estimates may even understate the magnitude of the change because the estimates for the period ending in 1983 include data from the period before financial deregulation began having an appreciable effect. With allowance for this bias, the current interest sensitivity of M1 may be even larger than implied by the estimates in Table 2.

The empirical estimates also confirm that financial deregulation has substantially reduced the interest sensitivity of M2. The consolidated measure of the interest sensitivity of the nontransactions component of M2, also shown in Table 2, is estimated to have declined from -0.15 for the period ending in 1977 to only -0.03 for the period ending in 1983. Despite the increased sensitivity of M1 demand, this decline in the interest sensitivity of the nontransactions component of M2 has led to a fall in the interest sensitivity of M2 from -0.12 to -0.04.<sup>9</sup> As for M1, the empirical

<sup>9</sup> This is a more extreme decline than that found by M. A. Akhtar in "Financial Innovations and Their Implications for Monetary Policy: An International Perspective," *BIS Economic Papers*, No. 9, December 1983.



estimates probably understate the change in the interest sensitivity of M2 because data from the period before deregulation are included in the sample period.

In summary, deposit rate deregulation appears to have reversed the relative interest sensitivities of the monetary aggregates. Whereas M2 was more sensitive to interest rate changes than M1 before the recent financial changes, M1 now appears to be more interest sensitive than M2. Further deregulation may alter somewhat the interest responsiveness of the two aggregates. However, the interest responsiveness of M2 will likely remain below that of M1.

### **Implications for monetary control**

The reversal in the relative interest sensitivities of M1 and M2 calls for a reevaluation of these aggregates' roles in monetary policy implementation. Efforts to achieve precise, short-run target growth rates for a monetary aggregate that is insensitive to interest rate movements could result in extreme interest rate volatility, which could adversely affect the economy. As a consequence, adhering closely to monthly targets for M2, for example, is inadvisable. Adhering closely to monthly targets for M1 is also inadvisable. Although deregulation has reduced the interest rate volatility that would be associated with close, short-run control of M1, this volatility would still be considerable.

### *Relation between monetary control and interest rate volatility*

The Federal Reserve relies on a long-run relationship between money and income to achieve its monetary policy objectives. Since income is a major determinant of the public's demand for money, income growth and money

growth are closely related in the long run. As a consequence, the Federal Reserve uses annual growth targets for monetary aggregates to achieve income growth consistent with monetary policy goals.

Some contend that achieving long-run money growth objectives is not enough. They argue that the Federal Reserve should also prevent short-run variability of money growth because such variability causes uncertainty that impairs economic efficiency.

The interest rate volatility that might result from close, short-run control of monetary growth could be costly, too. Despite the long-run relationship between money and income, interest rate changes are the primary means by which monetary policy actions affect money growth in the short run. Changes in the discount rate and open market operations affect interest rates quickly, but affect inflation and real income growth with a long lag. As a result, keeping money growing at a constant rate would require interest rate changes large enough to keep the public's demand for money growing at the target rate. If these interest rate changes are large and frequent, they could increase the risk involved in saving and investment. A higher risk might retard capital spending, thus reducing economic growth and impairing economic welfare.<sup>10</sup>

The degree of interest rate volatility necessary to achieve close, short-run monetary control depends on several factors. One important factor is the underlying variability in money growth. Variability in inflation or real income growth, for example, would cause variability in money demand that must be offset by interest rate changes to keep money growth constant. Since income and inflation affect M1

<sup>10</sup> See Paul Evans, "The Effects on Output of Money Growth and Interest Rate Volatility in the United States," *Journal of Political Economy*, April 1984, pp. 204-222.

and M2 similarly, however, underlying variability from this source probably has little effect in comparing the relative degree of interest rate volatility for M1 control and M2 control.

Nevertheless, the underlying variability of M1 is greater than that of M2. There are a number of possible explanations for the higher variability in M1. One involves imperfect adjustment of money data for seasonal elements. Demand for transactions balances is more influenced by seasonal elements than is demand for nontransactions balances. For example, demand for transactions balances is very high during the Christmas shopping season because individuals must hold more in currency and checking accounts to finance higher spending. Although the Federal Reserve uses a variety of statistical procedures to seasonally adjust M1 growth, these procedures are imperfect. As a result, month-to-month growth in M1 may vary substantially because of seasonal influences. Because nontransactions accounts are not so closely related to spending, M2 is less affected by inadequate seasonal adjustment procedures. With the underlying variability of M1 growth larger than that of M2 growth, the interest rate volatility necessary to smooth M1 growth would likely exceed the volatility to smooth M2 growth even though demand for M1 is more sensitive to interest rate changes than is demand for M2.

The interest sensitivity of money demand is nonetheless an important factor affecting the interest rate volatility accompanying short-run monetary control. Interest sensitivity is particularly important to the extent that achieving short-run money growth targets requires discretionary policy actions to change the average rate of monetary growth. For example, suppose that money is predicted to grow more rapidly than desired and the Federal Reserve

deems it necessary to raise the discount rate or lower nonborrowed reserve growth to slow money growth. If money demand is highly interest sensitive, a modest increase in market interest rates would be sufficient to slow money growth. Accordingly, the Federal Reserve could achieve its short-run money growth objectives by a small increase in the discount rate or a small reduction in the growth rate of nonborrowed reserves. In contrast, a large increase in the discount rate or a substantial reduction in the growth rate of nonborrowed reserves would be required to boost market rates enough to accomplish the desired slowdown if money demand is very unresponsive to interest rates. For discretionary policy changes, therefore, the reduced

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***Close monthly control of either M1 or M2 would result in much more interest rate volatility.***

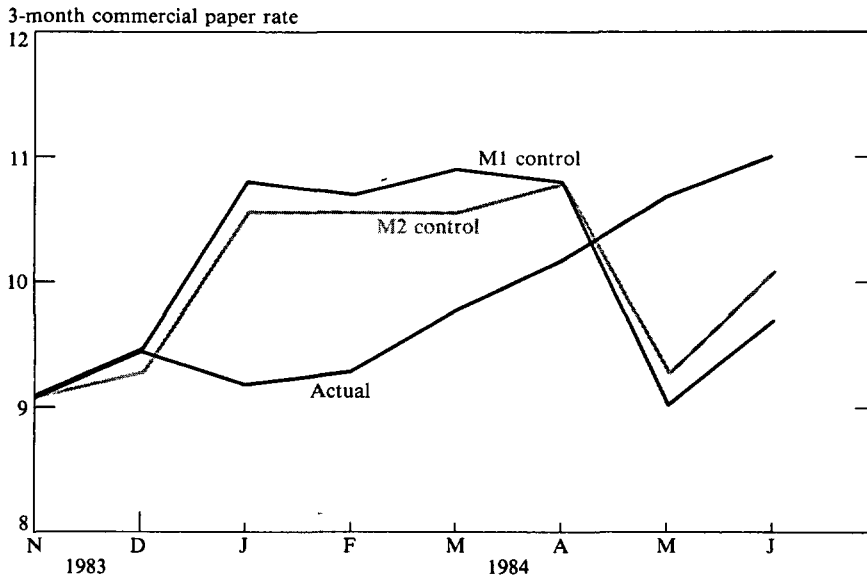
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interest sensitivity of M2 demand has increased the interest rate changes necessary for short-run monetary control.

#### ***Short-run monetary control***

The estimated money demand equations for the period ending in 1983 were simulated to determine the interest rate volatility that might result from close, short-run monetary control. Two sets of simulation were conducted. In the first, the underlying variabilities of M1 and M2 growth were smoothed by setting their monthly growth rates equal to the average growth rates actually experienced over the simulation period. In the second, the average M1 and M2 growth rates were lowered by one percentage point in addition to smoothing the underlying variability. Both sets of simula-

**CHART 1**  
**Interest rate behavior required**  
**to smooth monetary growth**



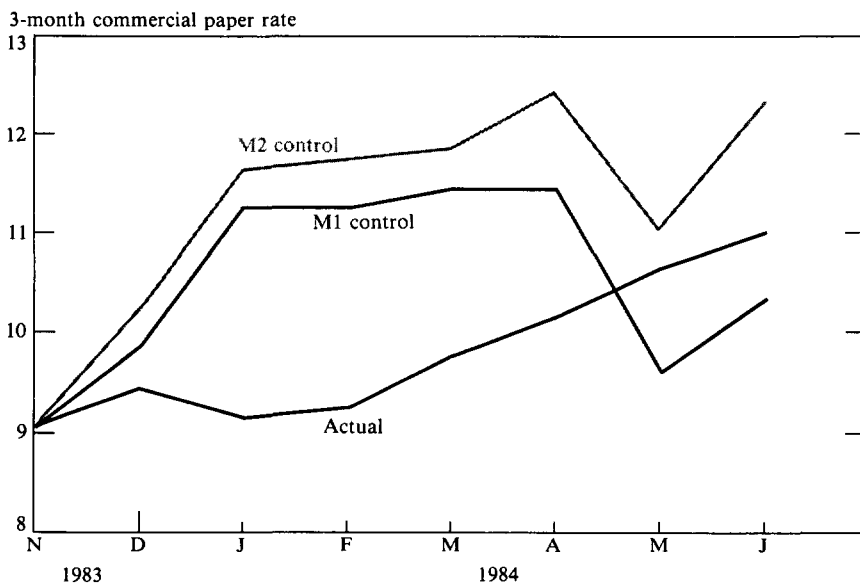
tions were for the period from December 1983 to June 1984. Because monetary policy affects real income and inflation with a long lag, actual historical values of these variables were used in the simulations. Only interest rates were allowed to vary to keep money growth at a constant rate each month of the simulation period.

The results of the first set of simulations are shown in Chart 1. The results confirm that underlying interest rate variability would be greater for M1 than for M2. Despite the lower interest rate sensitivity of M2, smoothing M2 growth would require less interest rate volatility than smoothing M1 growth. However, close monthly control of either M1 or M2 would result in much more interest rate volatility than actually occurred over the simulation period even though the average growth rates for the period as a whole were unchanged.<sup>11</sup>

The results of changing the average growth rates of M1 and M2 are shown in Chart 2. As expected, lowering money growth by one percentage point would have led to considerably higher interest rates than were actually experienced. Moreover, the increase in interest rates necessary to reduce M2 growth is much larger than the increase to reduce M1 growth the same amount. According to the estimated equations, the interest sensitivity of M2 has been lowered so much by financial deregulation that policy actions to reduce M2 growth one percentage point would have boosted market interest rates two to three percentage points throughout most of the first half of 1984.

<sup>11</sup> Of course, control over a longer run period, say, on a quarterly basis, could likely be accomplished with less interest rate volatility and, in this sense, would be more feasible. Only monthly control is considered in the current study, however.

**CHART 2**  
**Interest rate behavior required**  
**to lower monetary growth**



In summary, the simulations show that close monthly monetary control would likely result in larger interest rate volatility. Despite the increased interest sensitivity of M1 demand, smoothing the underlying variability of M1 growth would require much greater changes in interest rates. While the underlying variability in M2 demand is less and could be smoothed more easily, the reduced interest sensitivity of M2 caused by deposit rate deregulation has made it difficult to change the short-run M2 growth rate through monetary policy actions. Lowering M2 growth by as little as one percentage point would now require a prolonged period of much higher interest rates. To the extent that large changes in market interest rates have adverse effects on the economy, close, short-run control of either M1 or M2 may be inadvisable.

## Conclusions

Although the portfolio shifts during the transition phase of deposit rate deregulation are nearly complete, deregulation will have a lasting impact on monetary policy implementation. The empirical findings in this article suggest that the patterns of monetary growth in 1984 were not an aberration: Deregulation has resulted in M1 growth being more responsive to interest rate changes than is M2 growth. This lasting effect of deregulation on the interest sensitivities of monetary aggregates may have far-reaching implications for the conduct of monetary policy.

The implication explored in this article is whether close, short-run control of M1 or M2 is possible without inducing excessive interest rate volatility. At what point interest rate vola-

tility becomes "excessive" is to some extent subjective. However, simulation results suggest that close monthly control of either M1 or M2 would require considerably larger fluctuation in market interest rates than was actually experienced in 1984. To the extent that the

Federal Reserve can achieve its longer run policy objectives without forcing one of the monetary aggregates to grow at a constant rate each month, the costs of interest rate volatility imply that short-run monetary control is neither necessary nor desirable.