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Regulation, Bank Competitiveness, and Episodes of Missing Money

In setting monetary policy, most central banks look at a number of economic indicators, including data on monetary aggregates. The motivation for monitoring monetary aggregates comes from the equation of exchange:

$$(1) \qquad M \times V = P \times Y,$$

where M = money, V = velocity [nominal gross domestic product (GDP) / M)], P = the price level, and Y = transactions (usually measured by inflation-adjusted GDP). Typically, people reduce their holdings of money as the spread between a riskless short-term market interest rate (such as the three-month U.S. Treasury bill rate) and the average yield earned on monetary assets rises. As a result, the velocity of money rises as this spread or "opportunity cost" of money increases. If velocity is predictable, then money and its predicted velocity can be used to infer nominal GDP ($P \times Y$). Under these circumstances, a monetary aggregate is useful for policymakers as an indicator of nominal GDP. This is especially true because data on GDP are available after a long lag, whereas information on money and interest rates is more readily available.

However, in three of the past four recessions (1973–74, 1979–80, and 1990–91), the monetary aggregate most closely monitored by the Federal Reserve has been much weaker relative to income and opportunity cost measures than previous experience predicted. This unusual weakness, or "missing money,"[1] poses a serious problem for policymakers because it means that the monetary aggregate in question is less useful as an indicator of nominal activity at a critical point in the business cycle. Furthermore, analysts often need at least several quarters of data to discern whether such a money demand shock has occurred and whether any particular shock is permanent or temporary.

Consider a permanent downward shift in the level of demand for a monetary aggregate; such a shift would result in a fall of that aggregate's growth rate relative to GDP growth over a period of time at each level of opportunity cost. There are two choices that a responsible central bank would consider. If the central bank stabilized the growth rate of that aggregate at the previous average, nominal GDP growth would temporarily accelerate and then return to its previous growth rate. Eventually, the spurt in nominal GDP growth would result in a temporary acceleration in inflation. As a result, the price level would be permanently raised relative to its path had the money demand shock not occurred. While the price level would post only a once-and-for-all rise, such an episode would create uncertainty about whether the central bank was committed to controlling inflation. Such uncertainty would likely depress real economic activity for awhile because inflation uncertainty discourages firms and households from committing to long-run projects.

I would like to thank, without implicating, Anne King and Steven Prue for providing excellent research assistance, and Michael Cox, Ken Emery, Evan Koenig, Ken Robinson, and Harvey Rosenblum for their suggestions during the progress of this research. Any remaining errors are my own.

[1] *Throughout this study, the term "missing money" describes episodes in which the level of a monetary aggregate has been smaller than predicted based on past relationships, income, and the opportunity cost of money.*

As an alternative, the central bank may accept temporary weakness in the growth of its primary monetary aggregate. However, it is difficult in real time to know precisely how much of a slowdown is appropriate. If the central bank permitted money growth to slow too much, nominal GDP growth would temporarily be below trend. If the monetary authority underestimated the impact of a money demand shock, then nominal GDP growth would temporarily be above trend until the money demand shock passed.[2]

Given that cases of missing money are problematic for central banks, it is natural to ask why there have been money demand shifts. To help answer this question, this study reviews research on the three most recent episodes of missing money. Common to each of these cases is a decline in banks' ability to compete with nonbanks that stemmed from the changing impact of banking regulations. As a result of declines in the competitiveness of banks, households and firms have shifted toward using nonbank types of "money" and credit, and researchers have found it helpful to redefine money or measures of its opportunity cost to obtain a more reliable indicator of nominal GDP.[3]

In establishing these findings, this study begins with a simple macroeconomic model of how rising bank regulatory taxes can contribute to weakness in overall economic activity and a decline in the share of credit provided by banks. The second section of this article reviews the mechanics of how a shift away from credit and deposits at banks to substitutes at nonbanks can also result in a missing-money phenomenon. Within this framework, the second section then analyzes evidence on the three most recent episodes of missing money. Each case of missing money is found to have coincided with declines in the ability of banks to compete with nonbanks. The concluding section discusses the policy implications of these findings.

A simple macroeconomic model

This section lays out a simple model of aggregate demand that can be used to analyze the impact of regulatory burden on economic activity and on the share of credit provided by banks. These effects, coupled with insights provided in the next section, are later shown to be useful in helping policymakers detect whether a monetary aggregate is accurately reflecting nominal GDP growth. The model used here is presented in two parts. First, the conditions for equilibrium in the goods market are described in a world where firms can borrow either from banks or directly from open credit markets. Second, conditions for equilibrium in the credit market are derived. Using these conditions, the equilibrium levels of output and interest rates are derived.

A simple IS specification. A portion of firms (Θ^m) obtains credit only from the financial markets, while the remaining portion ($\Theta^b \equiv 1 - \Theta^m$) relies completely on bank loans. Demand by each firm for open market (L^m) or bank credit (L^b) is

$$(2) \qquad L_t^m = \alpha_0 + \alpha_1 Y_t - \alpha_2 R_t^m \text{ and}$$

$$(3) \qquad L_t^b = \alpha_0 + \alpha_1 Y_t - \alpha_2 R_t^b,$$

where Greek letters denote positive coefficients, Y is output, R^m is the average rate on open market credit, and R^b is the average bank loan rate.

The average cost of credit (R) and total private credit demand (L^p) across all firms are thus

$$(4) \qquad R_t = \Theta^m R_t^m + \Theta^b R_t^b \text{ and}$$

$$(5) \qquad L_t^p = \Theta^m L_t^m + \Theta^b L_t^b = \alpha_0 + \alpha_1 Y_t - \alpha_2 (\Theta^m R^m + \Theta^b R^b).$$

[2] *The cases in the text analyze permanent shocks to money demand. If the shocks were temporary, then by not altering its long-run monetary targets, a central bank could keep the economy growing in line with the central bank's previous long-run nominal GDP target. In this case, there would be some temporary acceleration or deceleration in nominal GDP growth that would later be reversed.*

[3] *As argued later in this article, money demand shifts in the mid- and late-1970s led the Federal Reserve to change the primary monetary aggregate it monitored from M1 to M2. Indeed, when M2 was officially created in 1980, it was defined to include new financial instruments such as money market mutual funds (MMMFs) and repurchase agreements.*

On grounds that firms and households spend less when the cost of finance rises, nominal income is assumed to depend negatively on average credit costs:

$$(6) \qquad Y_t = \phi_0 - \phi_1 R_t = \phi_0 - \phi_1 \Theta^m R_t^m - \phi_1 (1 - \Theta^m) R_t^b.$$

Decisions about modeling how the costs of bank and open market credit are determined have been made to be consistent with several key stylistic facts. First, firms that rely on open market credit generally are perceived as posing little default risk. Second, bank credit has an advantage over open market paper in that the deposit insurance system bears some of the default risk of bank loans. Third, open market credit has an advantage over bank credit in avoiding certain regulatory costs imposed on the banking system.

Interest rates on bank and open market credit are, respectively:

$$(7) \qquad R_t^b = c^b + r_t + (1-d)D_t^b + t^{bf} \text{ and}$$

$$(8) \qquad R_t^m = c^m + r_t + D_t^m,$$

where r is the riskless market interest rate, d is the implicit default risk subsidy on bank loans from deposit insurance, D^b is the average fair market risk premium on bank loans, D^m is the average fair market risk premium on open market paper, t^{bf} reflects any regulatory burdens on banks that effectively can be treated as a constant, c^b is a constant reflecting the per-dollar costs of providing bank loans not associated with interest costs or default risk (primarily information and transactions costs), and c^m is a constant reflecting the per-dollar information and transactions costs associated with issuing open market paper.

To capture differences in default risk across firms in a tractable way, the assumption has been made that the fair market default risk premium (D^i) across firm types (i) has a uniform distribution over the interval:[4]

$$(9) \qquad D^i \sim U[0,1].$$

Setting equations 7 and 8 equal yields the critical level of default risk (D^c) at which firms are indifferent between bank and open market credit:

$$(10) \qquad D_t^c = \left[t^{bf} + \left(\frac{c^b - c^m}{d} \right) \right] = \Theta^m,$$

which is increasing in regulatory taxes imposed on all bank loans (t^{bf}), decreasing in the extent to which bank loans have lower information and transactions costs than open market paper ($c^b - c^m$), and decreasing in the implicit risk-taking subsidy (d) provided by deposit insurance. Since D^i has a uniform distribution over [0,1], $\Theta^m = D^c$ and $\Theta^b = 1 - D^c$. In this model, banks lend to higher risk firms, while lower risk firms issue open market paper. The reason is that the cost disadvantage of bank regulatory taxes is roughly fixed across borrowers, while the implicit benefit of deposit insurance is increasing in default risk because indirectly taxpayers bear some of the risk.[5] For example, the implicit benefit of deposit insurance is low on a bank loan to a firm that has low default risk, while the regulatory burden of such a loan may be very high. In this case, bank loans are a more costly source of credit than open market paper. Thus, the model is consistent with the stylized fact that only very low default risk firms issue commercial paper. This qualitative result can be obtained in this model if one assumes that the information costs of issuing open market debt are lower for firms having low default risk because their creditworthiness is generally more transparent to investors.[6]

Since default risk is distributed uniformly, the average default risk premium on open market paper is ($D^c/2$) and that on bank loans is ($[1 + D^c]/2$). Using these average risk premia along with

[4] For ease of exposition, any rationing of credit is suppressed.

[5] As stressed by Keeley (1990), the value of this implicit subsidy depends on how well-capitalized a bank is. This implicit subsidy declines as a bank's capital increases because when a bank fails, the capital invested by bank equity and subordinated debt holders are the first funds used to cover any losses from liquidating the bank. For ease of exposition, all banks are treated as being equally capitalized in the model.

[6] Diamond (1991) develops a theoretical model that more rigorously and formally demonstrates this result.

equations 7, 8, and 10 yields the following expression for the average cost of credit:

$$(11)\quad R_t = \Theta^m R_t^m + \Theta^b R_t^b$$
$$= r_t + c^b\left[1-\left(\frac{c^b}{2d}\right)\right] + t^{bf}\left[1-\left(\frac{t^{bf}}{2d}\right)\right]$$
$$+\frac{(1-d)}{2} - \frac{(c^m)^2}{2d} - \frac{t^{bf}c^b}{d}$$
$$+\frac{t^{bf}c^m}{d} + \frac{c^b c^m}{d}.$$

Differentiating equation 11 and substitution from equation 10 implies

$$(12)\quad \frac{\partial R}{\partial c^b} = 1-\Theta^m > 0,$$
$$\frac{\partial R}{\partial t^{bf}} = 1-\Theta^m > 0,$$
$$\frac{\partial R}{\partial c^m} = \Theta^m > 0,$$
$$\frac{\partial R}{\partial d} = \left(-\frac{1}{2}\right) + \Theta^m\left[1-\left(\frac{\Theta^m}{2}\right)\right] < 0, \text{ and}$$
$$\frac{\partial R}{\partial r} = 1.$$

Equation 12 implies that the average cost of credit rises when either bank regulatory taxes (t^{bf}) or information and transactions costs (c^b) increase. This result is obtained because the rise in credit costs to those firms that remain bank borrowers will outweigh the effect of some firms' switching toward less expensive open market paper. Thus, a rise in regulatory taxes might help induce a recession, cause a decline in the importance of banks in credit markets, and—as will be discussed in the next section—trigger an episode of missing money.

As equation 12 also indicates, a rise in the information and transactions costs of commercial paper (c^b) will cause the average cost of credit to increase. This increase occurs even though some firms shift away from open market paper when the information and transactions costs of open market paper rise because the effects of this shift on average credit costs are outweighed by the impact of higher costs on those that remain nonbank borrowers. Thus, a rise in c^m will, by raising the cost of open market paper, cause banks to gain credit market share and reduce the demand for nominal output.

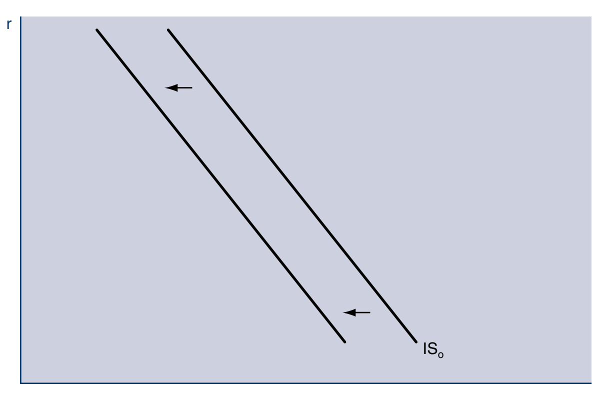
A rise in the deposit insurance subsidy decreases the average cost of credit by lowering the cost of bank loans. While the sign of the effect is theoretically ambiguous, a higher subsidy will lower the cost of finance as long as there are some firms that rely on bank loans (that is, $\Theta^m < 1$).

Substituting equation 11 into equation 6 yields the following IS curve:

$$(13)\quad Y_t = \phi_0 - \phi_1 r_t - \phi_1\left\{\begin{array}{l} c^b\left[1-\left(\frac{c^b}{2d}\right)\right] + t^{bf}\left[1-\left(\frac{t^{bf}}{2d}\right)\right] \\ +\left[\frac{(1-d)}{2}\right] - \left[\frac{(c^m)^2}{2d}\right] - \frac{t^{bf}c^b}{d} \\ +\frac{t^{bf}c^m}{d} + \frac{c^b c^m}{d} \end{array}\right\},$$

which implies a negative relationship between combinations of output and the short-term interest rate that clear the goods market. Thus, the IS curve has the normal downward-sloping shape (*Figure 1*). As will be shown later, equation 13 implies that a rise in regulatory taxes on banks reduces output at each combination of the riskless market interest rate (r) and goods demand (Y).

Figure 1
Effect of a Rise in Bank Regulatory Burden on Goods Market Equilibrium



Thus, such an increase in bank regulatory burden can be depicted as an inward shift of the IS curve from IS_0 to IS_1. Of course, a rise in regulatory taxes may indirectly affect r_t when the conditions for goods market equilibrium (IS curve) and credit market equilibrium are solved together.

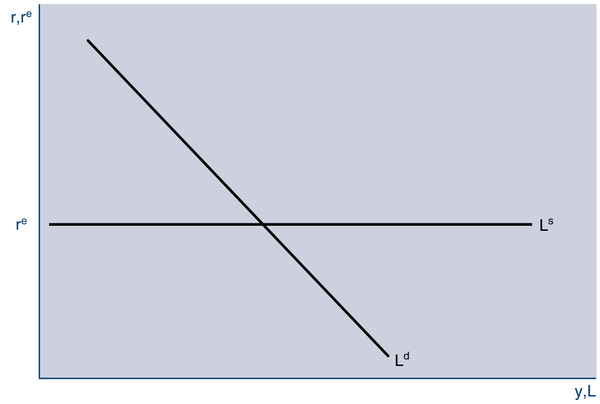
Credit market equilibrium conditions. Traditional Keynesian models depict interest rates as determined by the supply and demand for money. This approach may have been plausible for the 1930s and 1940s because few firms could issue open market paper following the collapse of the bond and commercial paper markets during the Great Depression. Today, it is more accurate to model short-term interest rates as determined by the total supply and demand for short-term credit, since commercial paper and Treasury bills have each grown to roughly the size of commercial and industrial (C&I) loans at banks.[7]

The demand for short-term credit is mainly comprised of the demand for bank loans, commercial paper, and Treasury bills. Although it is likely that the demand for bank loans and commercial paper is interest-sensitive, it can be argued that the demand by the U.S. government for Treasury bills has generally been highly insensitive to short-term rates. By implication, government demand for short-term credit can be approximated by a constant (L^g), and total credit demand (L_t) equals private plus government demands:

$$
\begin{aligned}
(14) \qquad L_t &= L_t^p + L_t^g \\
&= \alpha_0 + \alpha_1 Y_t - \alpha_2 R_t + L^g \\
&= \alpha_0 + \alpha_1 Y_t + L^g - \alpha_2 r_t \\
&\quad -\alpha_2 \left\{ \begin{aligned} & c^b\left[1-\left(\frac{c^b}{2d}\right)\right] + t^{bf}\left[1-\left(\frac{t^{bf}}{2d}\right)\right] \\ & + \left[\frac{(1-d)}{2}\right] - \left[\frac{(c^m)^2}{2d}\right] - \frac{t^{bf}c^b}{d} \\ & + \frac{t^{bf}c^m}{d} + \frac{c^b c^m}{d} \end{aligned} \right\}.
\end{aligned}
$$

In principle, the supply of short-term credit can be depicted as the sum of credit supplies from different sources. However, the supply of short-term credit in the United States can be depicted in a simple fashion because the Federal Reserve has typically implemented monetary policy by altering a targeted level of the federal funds rate to stabilize nominal aggregate activity. Federal funds are reserves that banks trade with one another to meet reserve requirements on bank deposits. By purchasing or selling reserves in exchange for Treasury bills, the Federal Reserve tries to target a chosen level for the federal funds rate. Under these conditions, banks would borrow from the Federal Reserve to purchase T-bills if T-bill rates were above the average *expected* level of the federal funds rate over the remaining maturity of the Treasury bills. Banks will continue to buy Treasury bills until T-bill rates fall in line with expectations of the federal funds rate, consistent with the empirical findings of Cook and Hahn (1989). This arbitrage implies that the T-bill rate equals the average federal funds rate target (r^e) that the market expects the Federal Reserve to use over the life of a particular maturity T-bill. By implication, the Federal Reserve can generally target *short-term* interest rates, and the supply curve of total short-term credit (L^s) is horizontal (*Figure 2*) and

Figure 2
The Supply of and Demand for Short-Term Credit



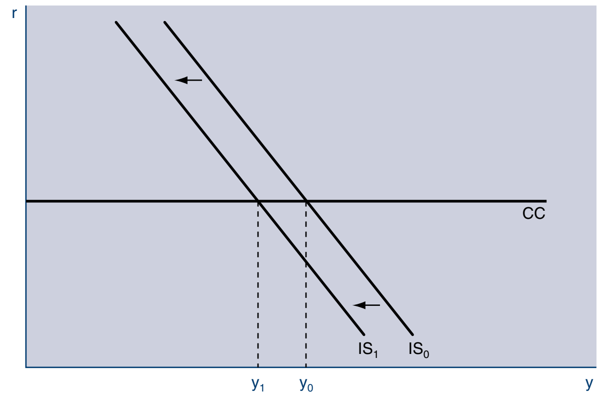
[7] *For example, the outstanding commercial paper of nonfinancial and financial firms is roughly four-fifths the size of C&I loans at banks (*Federal Reserve Bulletin *1993), while the stock of U.S. Treasury bills is roughly as large as C&I loans at banks.*

depends on the expected path of the federal funds rate target.[8]

As output rises at a given level of interest rates, the credit demand curve shifts to the right. However, if the Federal Reserve maintains its funds rate target, the credit supply curve remains horizontal and the riskless short-term interest rate does not change. As a result, the equilibrium combinations of interest rates and output at which short-term credit demand equals short-term credit supply can be depicted as the horizontal CC curve in Figure 3. This curve shifts in line with expectations about the federal funds rate target. The result that the CC curve is horizontal under an interest rate target parallels the flat LM curve obtained in Poole's (1970) model.[9]

The effects of altering the relative cost of bank loans and open market paper. According to equation 10, three types of factors affect the relative use of bank loans and open market paper: bank regulatory taxes (t^{bf}), the implicit deposit insurance subsidy (d), and the differential between the information costs for bank loans and for open market paper ($c^b - c^m$). In light of these three factors and the forthcoming analysis of three cases of missing money, this section presents analysis of the effects of a rise in bank regulatory taxes, a decline in the implicit deposit insurance subsidy, and a decline in information costs associated with open market paper.

Figure 3
Credit and Goods Market Equilibrium



The effects of raising bank regulatory taxes. By increasing the cost of loans relative to market interest rates, a rise in bank regulatory taxes shifts the IS curve inward to IS_1. This can be demonstrated by differentiating equation 13 and substituting a result from equation 12:

$$\text{(15)} \qquad \frac{\partial Y}{\partial t^{bf}} = \left(\frac{\partial Y}{\partial R}\right)\left(\frac{\partial R}{\partial t^{bf}}\right) = -\phi_1(1-\Theta^m) < 0.$$

If the central bank does not perceive the IS shift and cuts interest rates, then smoothing short-term market interest rates (r^e) results in a decline in the demand for nominal output (Y) from Y_0 to Y_1. As a consequence, increases in bank regulatory taxes can contribute to the onset of a recession.[10]

Changes in bank regulatory taxes thus create disturbances to the IS curve, which create problems in using a federal funds rate target. This result accords with the insights in Poole (1970). Poole's

[8] *By contrast, the Federal Reserve has much less effect on long-term interest rates, which it indirectly affects by influencing expectations about future inflation and the size of the inflation risk premium in long-term interest rates. This premium reimburses investors for the risk that inflation may be higher than they expect. If inflation were higher than expected, expectations of future inflation would likely rise, then interest rates would rise so that inflation-adjusted yields are maintained. These conditions imply that bond prices would likely fall.*

[9] *A flat CC curve is a reasonable approximation in the very short run. However, any changes in the central bank's target rate that are made partly on the basis of money or credit growth imply that this curve is upward-sloping in the medium run. Thus, past changes in the federal funds rate target that have been partly or largely based on M2 growth suggest that the CC (or LM) curve has an upward slope in the short to medium run.*

[10] *In the short run, a rise in bank regulatory taxes causes a rise in the average cost of credit. If, however, enough innovation is induced by regulations, the average cost of credit could fall in the long run, provided the long-run cost of issuing open market paper declines enough. For example, while the regulatory burden of reserve requirements likely increased the cost of providing bank loans in the high interest rate environment of the late 1970s and early 1980s, it helped spur the development of the commercial paper market. As pointed out by Post (1992), the cost of commercial paper has generally fallen over the past decade.*

model showed that a central bank policy of targeting a monetary aggregate will be superior to that of targeting a short-term interest rate if IS shocks are large relative to money demand shocks. It is thus tempting to conclude that targeting a monetary aggregate would yield superior results under these circumstances.

However, as shown in the next section, the change in banks' regulatory burden also causes a fall in the demand for money. In the Poole framework, as the importance of money demand disturbances rises, targeting a monetary aggregate becomes less attractive relative to targeting a short-term interest rate. Thus, changes in banks' regulatory burden create problems for both types of operating procedures.

The effects of reducing the implicit deposit insurance subsidy. The effects of reducing the implicit deposit insurance subsidy are qualitatively similar to those of increasing the regulatory tax on banks. Such a decline increases the cost to banks of providing loans (equation 7), which makes bank loans relatively more expensive than open market paper for more firms. One result of this change in relative costs is that some firms shift away from bank loans and switch to issuing open market paper (Θ^m increases in equation 10). In addition, much like a rise in bank regulatory taxes, a reduction in this subsidy (d) leads to an increase in the average cost of finance (R in equation 12). This increase in cost, in turn, shifts the IS curve inward, thereby reducing the nominal demand for goods (Y). This result can be seen by differentiation:

$$(16) \qquad \frac{\partial Y}{\partial d} = \left(\frac{\partial Y}{\partial R}\right)\left(\frac{\partial R}{\partial d}\right) = -\phi_1\left(\frac{\partial R}{\partial d}\right) > 0.$$

This expression is positive because (R/ d) < 0 and implies that reducing d will shift the IS curve inward.

For two reasons, one should avoid inferring from this example that reductions in the implicit deposit insurance subsidy are not necessarily beneficial. First, any effect on aggregate demand can be offset by a monetary easing action, which would push down short-term market interest rates. Second, because deposit insurance implicitly shifts much of the default risk on high-risk loans from stockholders in banks and thrifts to taxpayers, deposit insurance results in excessively risky lending and thus creates inefficiencies. The high cost of the savings and loan association bailout provides a justification for implementing risk-based capital standards. The point of this example is to illustrate that monetary policy should take into account any macroeconomic impact of curtailing the risk-taking incentives of deposit insurance.

The effects of a decline in the information costs of open market paper. A decline in the information costs of open market paper can stem from reductions in costs associated with investors' learning about firms, improved computer technology that reduces the transactions costs of buying and selling open market paper (such as bonds and commercial paper), and the deepening or increased liquidity of open paper markets. Like a decline in the deposit insurance subsidy to banks and a rise in bank regulatory taxes, a fall in the costs of providing open market paper (c^m) will reduce the cost of open market paper (R^m) relative to that of bank loans (R^b) and thereby induce a rise in the share of open market paper (Θ^m in equation 10).

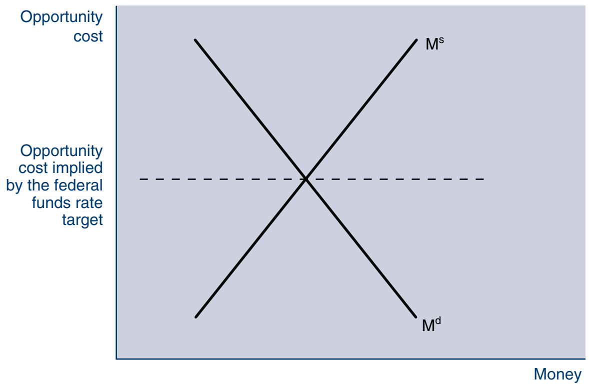
The effects on aggregate demand, however, differ greatly because a decline in the cost of open market paper lowers the average cost of finance (equation 11). As a result, the gap between the average cost of finance to firms and the riskless open market rate paid by the U.S. Treasury narrows at each level of income. Thus, a decline in c^m causes the IS schedule to shift to the right, thereby driving up aggregate nominal demand. This effect can be demonstrated by differentiating equation 13 and substituting a result from equation 12:

$$(17) \qquad \frac{\partial Y}{\partial c^m} = \left(\frac{\partial Y}{\partial R}\right)\left(\frac{\partial R}{\partial c^m}\right) = -\phi_1\Theta^m < 0.$$

The stabilization of aggregate demand thus calls for increasing the federal funds rate, in contrast to the prescription of cutting the federal funds rate if bank regulatory taxes rise or if the deposit insurance subsidy is lowered.

Thus, the monetary policy implications of these examples are not the same. The analysis above implies that to discern among these types of

Figure 4
The Supply of and Demand for Money



shocks, policymakers should check for not only a decline in bank credit market share, but also for whether such a decline is accompanied by a rising regulatory burden on banks, a reduction in the implicit deposit insurance subsidy to banks, and a weakening in income growth or, alternatively, a reduction in the information and transactions costs of using open market paper and a strengthening of nominal income growth. The next section discusses how an unpredictable decline in the measured money supply may also accompany such shocks.

Episodes of money demand instability

This section begins by describing how, in a simple framework, reduced bank competitiveness can lead to a missing-money phenomenon. Then, in terms of this framework, three episodes of missing money are discussed: the missing M1A in the mid-1970s, the missing M1A and surge in money market mutual funds (MMMFs) during the late 1970s and early 1980s, and the current case of the missing M2. Finally, the implications of these shocks for M2 targeting are discussed.

How reduced bank competitiveness can create a missing-money phenomenon. This section outlines a simple supply and demand model of money that can be used to analyze cases of missing money. In Figure 4, the money demand (M^d) curve is drawn with a downward slope that reflects that households and firms reduce their holdings of money as the opportunity cost of money (*OC*) rises (if all else remains the same). The opportunity cost of money is the extra yield that investors forgo by holding money, which provides convenience and transactions services over other assets that have higher pecuniary yields. In practice, opportunity costs are typically measured as the difference between a riskless short-term market interest rate and the average yield earned on monetary assets. The money demand curve is drawn for a given level of income. This curve shifts to the right as income rises because the transactions demand for money will rise at each level of the opportunity cost of money.

The money supply curve (M^s) has an upward slope to reflect that banks would be willing to supply more deposits as the spread between market interest rates and deposit rates increases because banks can earn more profit by supplying deposits when the yields on securities (or loans) rise relative to deposit rates. Here it is assumed that the Federal Reserve does not rigidly target money balances (otherwise, the money supply schedule would be vertical).[11] The money supply schedule is partly a derived demand for funding loans because banks will bid up deposit rates if loan demand rises and loan interest rates rise as a result. Thus, a monetary easing action that boosts loan demand through interest rate or wealth effects will shift this curve to the right, while an exogenous decline in demand for bank loans will shift the curve to the left.

[11] *This assumption is consistent with the Federal Reserve's use of a target range for M2. This policy allows M2 balances to move within a range for three reasons. First, it implicitly recognizes that moderate M2 growth will, barring money demand shocks, need to accompany moderate growth in nominal income. Second, this policy recognizes that changes in interest rates will affect the velocity of M2 and thereby alter the pace of M2 growth needed for moderate growth in nominal income. Third, the policy also recognizes that shifts in money demand may occur and that the money supply curve may shift owing to bank behavior. In the latter case, the opportunity cost of money associated with a particular federal funds rate could vary, depending on how actively banks bid for M2 deposits. This practice, in turn, alters the velocity of M2 and the growth rate of M2 that is needed to stabilize aggregate demand.*

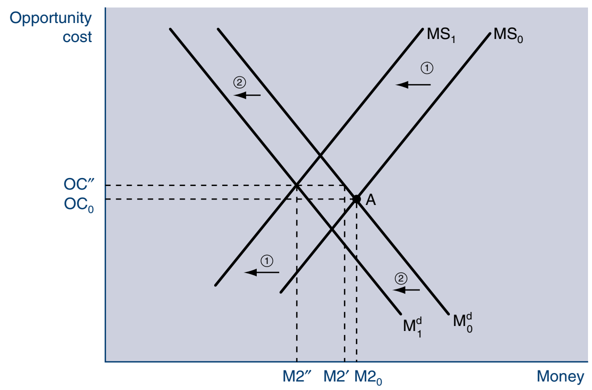
The case of a nonrange money target is discussed later in this article.

Money demand models, such as the Federal Reserve Board's M2 model (henceforth, the *FRB model*),[12] tend to estimate M2 growth well as long as changes in the level of income are the only source of shifts in the money demand schedule. The following examples illustrate this point. First, consider what happens if the Federal Reserve eases monetary policy. The easing shifts the money supply schedule to the right in the short run, causing a decline in M2's equilibrium opportunity cost. This movement along the money demand curve is picked up by the opportunity cost measures in the FRB model. Then, as the decline in short-term interest rates causes aggregate demand to pick up, nominal income will rise, causing the money demand schedule to shift to the right, which induces a measured rise in M2's opportunity costs. This shift of the money demand curve is picked up by the income and consumption spending variables in the FRB model. In the past, M2's growth rate primarily reflected movements of the money supply curve along the money demand curve and shifts of the money demand curve owing to income changes. As a result, the coefficient estimates of the FRB model reflect a positive effect of income on M2 growth and a negative correlation of M2's opportunity costs with M2 growth. By implication, the coefficient estimates of the FRB model will yield good predictions of M2 growth as long as income and money supply shocks are the only sources of change affecting M2.

An example of a money demand shock. Now consider an example in which some changes in the economic environment not reflected in M2's measured opportunity cost simultaneously cause firms to shift from C&I loans to bonds and induce households to shift out of M2 deposits into bond mutual funds. Income is held constant in this example to reduce the number of curve shifts for ease of exposition.

This case is shown in Figure 5. One result is that the demand for bank credit falls, and with it, bank demand for issuing M2 deposits. By implication, the M2 supply curve shifts inward (shift 1), and the FRB model should pick up this decline through its opportunity cost measures. However, because the demand for M2 deposits also falls at every combination of *OC* and *Y*, the money demand curve shifts inward (shift 2). Since coefficient estimates for most M2 models are based on a past

Figure 5
A Bypassing of the Banking System



negative correlation between M2 and its opportunity cost, the money demand model implicitly assumes that a shift in the money supply rather than demand curve has occurred. In terms of Figure 5, money demand models assume that the demand curve is unchanged and that the supply curve intersects the demand curve at point A. As a result, money demand models would estimate, once interest rate and income data are available, that M2 moved to a level like M2′ rather than having declined all the way to M2″.[13] In this instance, a case of missing money would occur.

Alternatively, if the demand curve shift is large enough relative to the supply curve shift, then *OC* could be lower in equilibrium and the money demand model would predict a rise in M2 even though M2 would actually fall (since both the M^d and M^s curves shift to the left). In either case, the money demand model overpredicts the equilibrium level of M2 because it fails to pick up the money demand curve shift by assuming that only

12 *For a discussion of this model, see Moore, Porter, and Small (1990) and Small and Porter (1989).*

13 *Note that income is being held constant in this example. While changes in income will shift the* M^d *curve, the inclusion of income variables in money demand curves controls for* M^d *shifts stemming from changes in income.*

Figure 6
Transfers of Funds

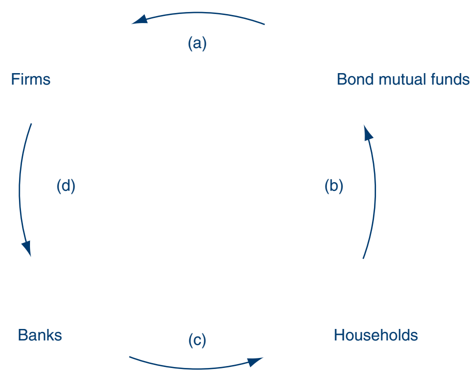


Figure 7
Balance Sheet Changes

Firm

A	L
	–100 C&I loans
	+100 bonds

Bond Mutual Fund

A	L
+100 bonds	+100 mutual fund shares

Bank

A	L
–100 C&I loans	–100 small time deposits

Household

A	L
–100 small time deposits	
+100 bond mutual fund shares	

changes in nominal income shift the money demand curve.[14]

Fundamentally, the money demand shift occurs because both borrowers and depositors substitute away from banks for credit and deposit services. To illustrate this point, Figure 6 depicts the transfers of funds in the movement to a lower equilibrium level of M2. Suppose a firm issues a $100 bond purchased with $100 by a bond mutual fund, which in turn gives $100 in mutual fund shares to a household in exchange for a $100 check drawn on a bank account. Suppose also that the household moved the $100 from a nonreservable small time deposit to a checking account to make the transaction.[15] The firm takes the $100 raised by issuing bonds (exchange a) to pay off $100 in C&I loans to the bank (exchange d). The bond mutual fund pays the firm with the $100 it raised from selling mutual fund shares to households (exchange b). The household, in turn, obtains the $100 used to purchase bond fund shares by withdrawing $100 from its bank checking account (exchange c). In essence, the $100 that the household shifts into bond funds eventually goes back to the bank when the firm issuing bonds pays off its C&I loan.

Another way of showing this equilibrium is to review each party's balance sheet, as depicted in Figure 7. On the firm's balance sheet, total liabilities are unchanged as the $100 increase in bonds issued matches the $100 decline in C&I loans. For the household, the $100 increase in bond fund holdings matches the $100 decline in M2 balances. Notice that total assets and total liabilities are unchanged for the firm and household. The bond fund, however, experiences a $100 increase in both assets (the $100 rise in bonds) and liabilities (the $100 increase in mutual fund shares). By contrast, the banking industry is hit with a $100 decline in C&I loans on the asset side that is matched by a $100 decline in M2 deposits on the liability side. If the only source of inflows into bond funds came from M2 balances, then one way to solve this case of missing money would be to add bond funds to M2, much like adding MMMFs to M2, provided that one or more variables could be found to consistently measure the desire to hold bond funds.

This example illustrates how a case of missing money can arise when M2's demand curve shifts, and the shift is not the result of a change in income.

[14] *From a Marshallian point of view, money demand changes predicted by typical econometric models can be interpreted as movements along short-run money demand curves that may shift with income levels, whereas money demand shocks can instead be interpreted as movements along a long-term money demand curve in so far as these "shocks" represent the endogenous response of firms and households to changes in the opportunity cost of using money.*

[15] *This assumption enables us to avoid changing bank reserves and is sensible, given that bond funds seem to be more substitutable for small time accounts than for other M2 balances that are less useful as savings vehicles.*

Thus, missing money likely can be accounted for by unusual events that cause either possible changes in the elasticity of money demand with respect to income or opportunity costs, or permanent declines in money demand for given levels of income and opportunity cost measures.

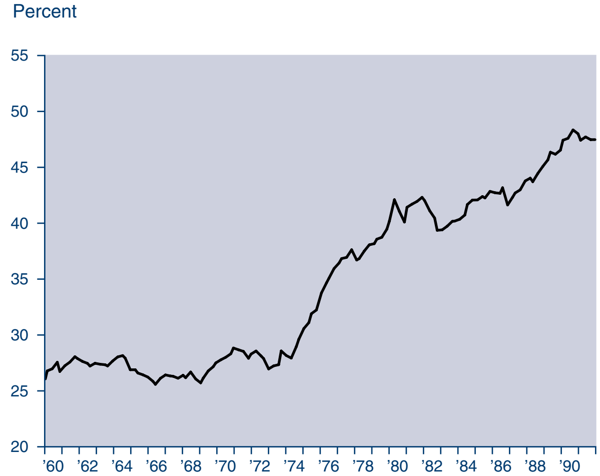
The mid-1970s case of missing money. Until the early 1980s, the monetary aggregate most closely monitored by the Federal Reserve was M1A, which was defined as currency plus demand deposits.[16] Based on its prior relationship to income and interest rates, M1A was unusually weak in the mid-1970s, leading one monetary economist to call this episode "The Case of the Missing Money" (Goldfeld 1976).

The mid-1970s were characterized by shocks to both sides of bank balance sheets and by a severe recession. On the asset side, there was unusual weakness in C&I loans. Many large firms shifted from C&I loans to commercial paper and finance company loans for three reasons. First, because market interest rates rose above deposit rate ceilings set under Regulation Q, depositors shifted funds away from banks and thrifts toward investments bearing market interest rates (see the box entitled "Regulation Q and the Competitiveness of Banks and Thrifts"). Owing to a shortage of loanable funds, banks and thrifts rationed credit with nonprice terms, which drove larger firms to credit sources that were unaffected by Regulation Q (*Figure 8*).[17] (Mortgage borrowers had fewer alternatives and as a result, there was a sharp decline in housing construction [Jaffee and Rosen 1979 and Hendershott 1980]). Second, partly to free up funds for other borrowers, some banks provided lines of credit to back up commercial paper issuance to encourage their largest borrowers to make this shift.[18] Third, the rise in short-term rates increased the reserve requirement tax on banks, and banks passed this extra cost onto borrowers by raising the prime rate relative to market interest rates. This increase in the cost of C&I loans relative to commercial paper encouraged many large firms to shift to paper as a source of finance.[19] This shift was permanent for many firms because once they incurred the fixed costs of becoming a paper issuer, it was cheaper to bypass bank loans whose cost was inflated by reserve requirements.

On the liability side of bank balance sheets, there was unusual weakness in business holdings of demand deposits at a time when the interest prohibition on demand deposits was at a then-record binding level. These conditions were accompanied by firms' entering repurchase agreements (RPs) and purchasing overnight Eurodollars (Tinsley, Garrett, and Friar 1981), likely reductions in compensating balances owing to firms' borrowing less from banks and shifting to commercial paper (Duca 1992b), and firms' incurring fixed costs to initiate cash management techniques that reduced their need for demand deposits (Porter, Simpson, and Mauskopf 1979).

Thus, this missing-money episode occurred at a time when both bank assets and bank liabilities were unusually weak. Moreover, the missing money

Figure 8
The Nonbank Share of Short-Term Credit
(Seasonally Adjusted)



[16] *Demand deposits* are noninterest-bearing deposits that are checkable.

[17] Finance companies raise funds mainly by issuing commercial paper.

[18] By providing liquidity to firms in a pinch, such backup lines reduce the risk to investors holding commercial paper.

[19] Most commercial paper is not subject to reserve requirements because it mostly is held directly by firms and households or is held by money funds.

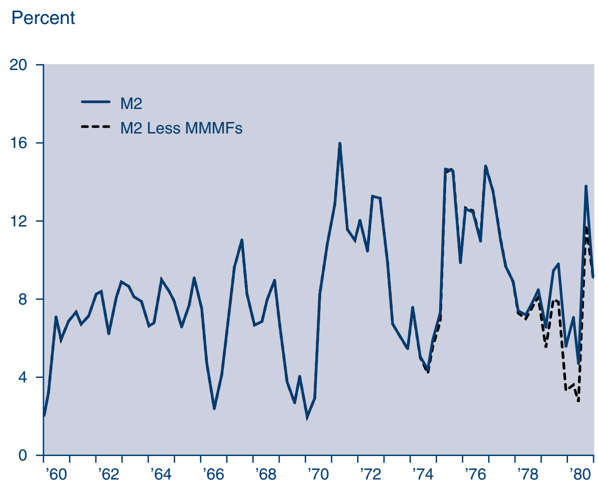
of the mid-1970s can be interpreted as having stemmed from a decline in the competitiveness of the banking system that resulted from an interaction between high interest rates and bank regulations (such as Regulation Q and reserve requirements). In terms of the model in the first section, replace M2 with M1A, whose opportunity cost is some short-term T-bill rate. In reference to Figure 5, the C&I loan shock to bank balance sheets reduced the need of banks to issue deposits, thereby shifting the supply of deposits curve leftward (shift 1), and the shift away from compensating balances and demand deposits toward RPs, Eurodollars, and cash management can be represented by an inward shift in the demand curve for M1A (shift 2). As a result, the level of M1A is lower than suggested by its opportunity cost and by nominal income.

The missing M1A and growth of money funds in the late 1970s. In the late 1970s and early 1980s, another case of missing M1A coincided with large inflows into nonbank types of deposits, namely MMMFs, overnight repurchase agreements, and overnight Eurodollars. During the late 1970s, these new instruments grew rapidly, while demand deposits were unusually weak (Wenninger, Radecki, and Hammond 1981 and Dotsey, Englander, and Partlan 1981). Owing to high nominal rates, a high reserve requirement penalty was in effect, and Regulation Q ceilings were binding on many smaller banks and thrifts that were not well established enough to issue large time deposits that were not subject to interest rate ceilings.

On the asset side of depository balance sheets, many firms shifted toward commercial paper. In addition, the advent of market-rate-based money market and small-saver certificates reduced the funding cost advantage of banks over nonbanks. As a result, bank auto loan rates rose toward finance company rates, and banks lost market share to finance companies. Once again, unusual weakness in demand deposits coincided with declines in depository assets and liabilities that can be traced to regulatory effects. The decline in the competitiveness of depositories was also accompanied by a surge in MMMFs so large that removing MMMFs from M2 before 1980 would have reduced M2 growth in the late 1970s by 1 to 3 percentage points (*Figure 9*).

In terms of Figure 5, the reduced demand for C&I loans (shift 1) and for demand deposits by

Figure 9
The Growth Rates of M2 and M2 Minus MMMFs



firms (shift 2) during this episode is similar to the mid-1970s case of the missing money, as is the combination of reduced demand for loans (shift 1) and M2 deposits (shift 2) by households.

In response to this episode of missing money, the Federal Reserve redefined the monetary aggregates and expanded the definition of M2 to include the new innovations. Before 1980, there was no published monetary aggregate that resembled the current definition of M2. Instead, the Federal Reserve published several aggregates that reflected separations of banks from thrifts and some aggregations of small and large time deposits. In no case were MMMFs, RPs, and Eurodollars included in aggregates published by the Federal Reserve until the official redefinition of M2 in early 1980 (Simpson 1980).

The current case of missing money. The current episode of missing M2 has been accompanied by

1. rapid inflows into bond and equity funds that are not consistently linked to spreads between short- and long-term interest rates,
2. heavy corporate bond and equity issuance,
3. edit-check reports to the Federal Reserve Board staff of large paydowns of C&I loans by corporations issuing bonds,

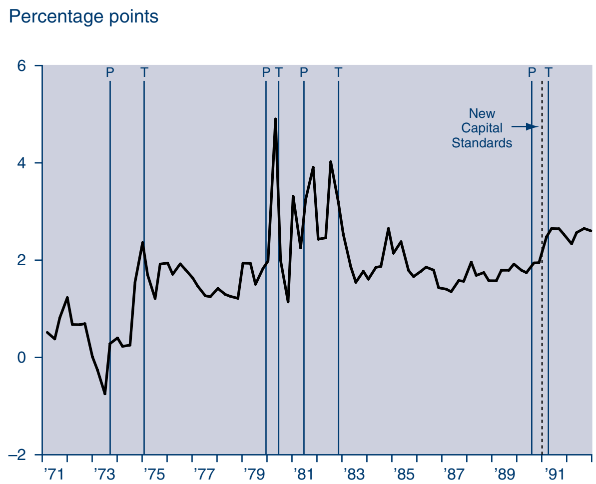
4. Resolution Trust Corporation (RTC) activity, which has reduced the demand for M2 in unusual ways and which has reduced both the asset and liability sides of depository balance sheets, and
5. the institution of new risk-based capital standards that may have widened the spread between the prime and short-term interest rates.

These phenomena have arguably reduced or been a reflection of a decline in the competitiveness of depositories as financial intermediaries.

On the asset side of depositories, the wide spread of prime over short-term market rates has encouraged many firms to shift away from C&I loans. Bond issuance has surged the past two years, and although commercial paper has grown less robustly, it has grown faster than bank loans. The discrepancy between bond and paper issuance partly reflects that corporations are refinancing long-term debt. In addition, a reduction in the competitiveness of prime rate financing could affect more firms that could issue bonds than firms that could issue commercial paper. The reason is that only a subset of firms that can issue bonds are well-known enough to issue commercial paper, especially since the Securities and Exchange Commission (SEC) restricted the extent to which money market mutual funds could purchase commercial paper with ratings below A1/P1 (Crabbe and Post 1992).

Nevertheless, there has been some shift away from bank loans to commercial paper that may reflect the wider spread between the prime rate and high grade commercial paper that has persisted since year-end 1990 (*Figure 10*). That widening coincided with the implementation of new and tougher risk-based capital standards on banks that increased the cost of C&I loans (see the box titled "The Impact of Risk-Based Capital Standards and the FDIC Insurance Premium Hike"). Aside from commercial borrowing, a wide spread between consumer loan rates and M2 deposit rates is encouraging households to withdraw M2 funds to pay off consumer loans (Feinman and Porter 1992). Nevertheless, for firms without access to the bond markets and for households that cannot self-finance purchases, the increased regulatory burden on banks has likely lowered investment and consumption spending by increasing the cost of bank financing.

Figure 10
The Spread Between the Prime and
One- and Two-Month Commercial Paper Rates



On the liability side of depository balance sheets, several unusual factors are affecting the demand for M2. First, RTC activity has created a prepayment risk on M2 deposits that is not measured by spreads between market and deposit interest rates. As a result, these measures of M2's opportunity cost are understating M2's true opportunity cost, thereby leading money demand models to overpredict M2 growth (Duca, forthcoming). Second, RTC resolution activity also has accelerated the adjustment of deposits to a lower interest rate environment by prematurely ending small time deposit contracts. Third, RTC effects and the recent large spread between short-term and long-term interest rates may have induced the public to gather information about long-term, non-M2 assets such as bond and equity funds (Feinman and Porter 1992). Fourth, the same factors apparently led mutual funds to increase their advertising of their products and induced several large banks to begin marketing bond and equity funds to their depositors (Cope 1992). These actions may have led to a discontinuous portfolio reallocation by households from M2 toward bond and equity mutual funds, thereby causing unusual weakness in M2 as it is currently defined.

Figure 11a
Money Market Equilibrium

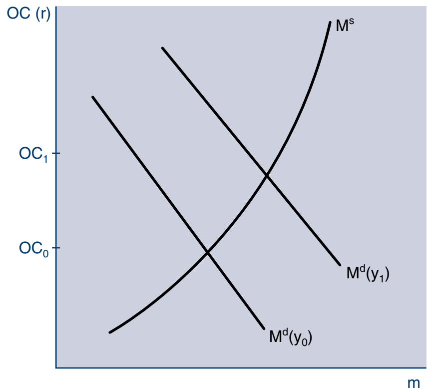
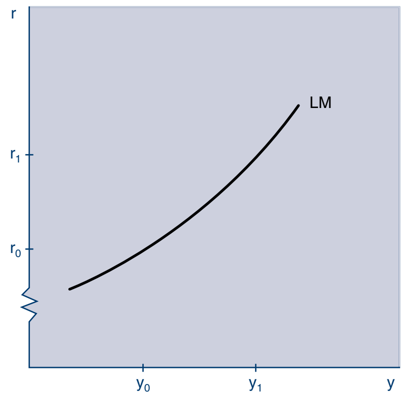


Figure 11b



In terms of Figure 5, the shift by corporations from C&I loans to bonds and equity finance is similar to the shift toward commercial paper in the mid-1970s, and substitution by households from M2 into bond and equity mutual funds is similar to the shift toward MMMFs in the mid-1970s. Incentives for households to reduce their assets and liabilities also can induce similar supply and demand curve shifts. As discussed in Feinman and Porter (1992), wide spreads between loan and deposit rates offered to households encourage them to reduce their demand for M2 at given levels of income and opportunity cost measures (shift 2), and to reduce their demand for consumer loans, which causes an inward shift of the bank supply of deposits curve (shift 1).

Similar shifts can also plausibly arise from RTC resolution activity. RTC resolutions effectively swap Treasury debt and thrift assets for thrift deposits, thereby shifting inward the deposit supply curve (shift 1).

What missing money implies for monetary policy. As stressed by Poole (1970), unusual changes in the demand for money reduce the ability of a monetary aggregate target to stabilize aggregate demand. This can be shown by deriving

Figure 12a
A Money Target Reduces
the Impact of IS Shocks

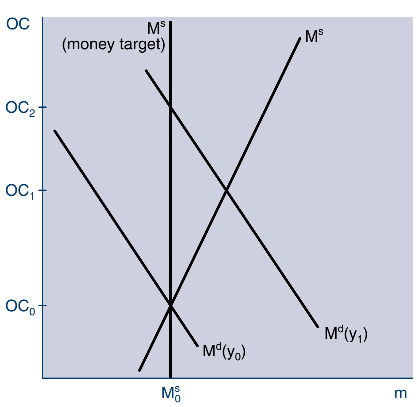


Figure 12b

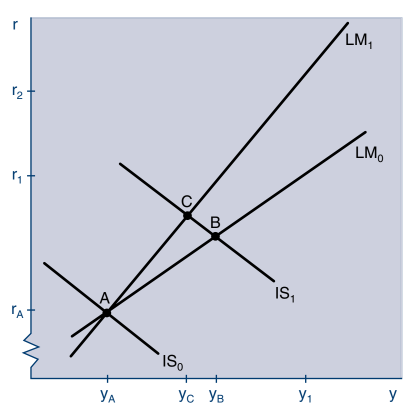


Figure 13a
A Money Target Increases the Impact of Money Demand Shocks

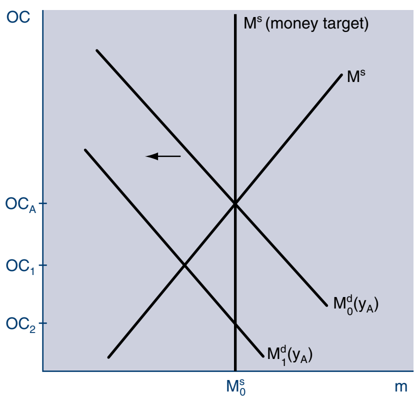
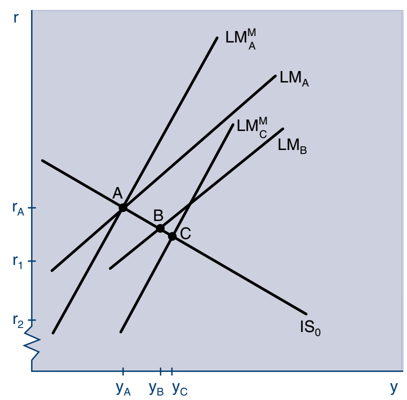


Figure 13b



the conditions under which the supply and demand for money are in equilibrium (the LM curve) and then solving for nominal output by combining the LM curve with the IS curve from the first section of this article.

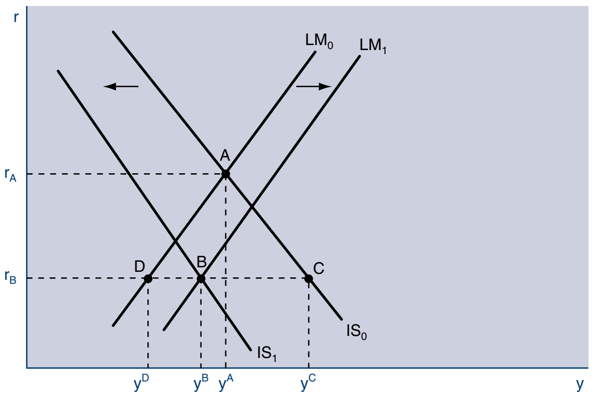
In terms of the money demand and money supply curves in Figure 5, a rise in income will shift the money demand curve (M^d) out and to the right (*Figure 11a*). This change implies that the combination of opportunity cost terms and income levels at which the demand for money equals its supply can be depicted by the upward sloping line in Figure 11b. Figure 11a assumes that the opportunity cost of money increases with the short-term market interest rate. An assumption implicit in the upward sloping money supply curve in Figure 11a is that the central bank will allow a rise in income to boost money balances.

If, however, the central bank prevents the money balances from changing, then the money supply schedule is essentially made vertical. This effect can be shown to make the LM curve steeper. Figure 12a indicates that an increase in income from Y_0 to Y_1 will shift the money demand curve to the right. If the money supply curve is vertical, the opportunity cost of money would rise to OC_2, whereas if the money supply curve had a non-vertical upward slope, the opportunity cost of money would rise to only OC_1. Since the opportunity cost of money increases when the market interest rate is higher, when income is Y_1, the equilibrium market interest rate that clears the money market under a fixed-money policy is higher (r_2) than when the money supply curve slopes upward (r_1). Thus, fixing money balances makes the LM curve steeper.

A steeper LM curve has important policy implications. If we combine this steeper LM curve with the IS curve from the first section of this article, we can see that the impact of a given IS shock on nominal output is smaller. In Figure 12b, the economy is initially at point A with nominal output at Y_A. The initial equilibrium is at point A because point A is the only combination of nominal output (Y) and the market interest rate (r) at which both goods market (IS) equilibrium and money market (LM) equilibrium occur. If the IS curve shifts rightward from IS_0 to IS_1, then the new equilibrium under a fixed money rule is at point C, whereas the new equilibrium is at point B when under the flexible money supply policy. Notice how output is less affected by an IS shock when the LM curve is steeper (Y_C is closer than Y_B to Y_A).

But if some change in the economic environment also affects the money demand curve, then stabilizing the level of the money supply may further destabilize nominal output. Consider the increased popularity of bond funds, which causes the public to demand less money at each combination of income and opportunity cost of money. Then, as shown in Figure 13a, the money demand curve shifts inward. As a result, the level of nominal income must be higher for the same initial level of money to be held in equilibrium for a given level

Figure 14
How a Bypassing of the Banking System Is Problematic for Interest Rate and Money Targeting



of opportunity cost. This implies that both LM curves in Figure 13b shift to the right by the same horizontal distance and that the level of income rises. However, if money balances are stabilized, the money demand shock pushes the economy to point C rather than point B. As a result, nominal output is more affected by a money demand shock when the LM curve is steeper (Y_C is further away from Y_A than is Y_B). Because a steeper LM curve implies that money demand shocks have a greater destabilizing effect on output, money targeting becomes less useful when the demand for money is unstable.

Now consider the impact of a rise in bank regulatory burden on *both* the IS and LM curves, assuming that the Federal Reserve does stabilize money held (in other words, that the LM curve is steep). As demonstrated in the first section of this article, the resulting increased cost of credit to borrowers causes the IS curve to shift inward to the left. In addition, as discussed earlier in this section, the reduced competitiveness of the banking system will likely be accompanied by an unusual decline in the demand for money (that is, a leftward shift of the money demand curve) that causes a rightward shift in the LM curve. In Figure 14, the economy is initially at point A. If the IS shift is large enough to outweigh the LM shift, then increased regulatory burden on banks will result in weakness in nominal income and a decline in short-term interest rates (point B) that accompanies both a case of missing money and a decline in the share of credit supplied by banks. These results, which are broadly consistent with recent events, are also obtained if the LM curve is less steep.

Unusual shifts in either the IS or LM curves complicate policy-making aimed at stabilizing aggregate demand because policymakers readily observe interest rates, whereas estimates of nominal GDP are available after a lag and are subject to substantial revision. In the context of Figure 14, notice how the new level of the short-term market interest rate *under*states economic weakness if it is assumed that the IS curve did not shift. In this case, consider what would happen if an analyst mistakenly assumed that a money demand shock (an unusual decline in money demand) caused the LM curve to shift rightward so that the new LM curve intersected the IS curve at point C. Based on this assumption, one would mistakenly infer from the new interest rate level (r_C) that the economy was at point C rather than point B and that nominal output was Y_C rather than Y_B.

At the same time, the unusual weakness in money balances held *over*states economic weakness if one assumes that a money demand shock did not occur but that the IS curve shifted. In this case, one would infer from the original LM curve and a market interest rate of r_C that the IS curve shifted left to put nominal output at point D and that income has fallen to Y_D, which is less than Y_C.[20] Thus, because changes in bank regulations can, in principle, shift both the IS and LM curves, they can create problems for the use of either an interest rate or money target.

Furthermore, the dichotomy of overestimating GDP growth from an interest rate targeting perspective and underestimating GDP growth from a money targeting perspective from this example may have relevance for recent events. In particular, this dichotomy parallels the tendency of most major economic forecasters to have overpredicted GDP

[20] *This qualitative result is also obtained if the central bank does not rigidly target money balances, thereby making the LM curve less steep. Quantitatively, however, the problem of inference using a monetary targeting perspective is smaller when the LM curve is less steep.*

growth during 1991–92 (in other words, they assumed that the economy was at a point like C in Figure 14), while M2 growth suggested that GDP growth should have been weaker than it actually was (point D).

Conclusion

Evidence from three cases of missing money indicates that factors reducing the competitiveness of banks accompanied each episode. In the two earlier cases (1974–75, 1979–80), the interaction between controls on deposit rates and high market interest rates spawned innovations and reactions that reduced M1 growth. The subsequent policy responses of deregulating deposit rates and of preventing inflation from accelerating have prevented these types of factors from spawning further innovations that destabilize money demand.

The most recent case of missing money also reflects how regulatory and nonregulatory factors have encouraged firms and households to bypass banks and thrifts. On the asset side of bank balance sheets, risk-based capital standards have raised the cost of bank loans, which in turn has encouraged firms to shift away from bank finance and some households to pay down consumer debt by drawing down their bank deposits. On the liability side of bank balance sheets, the steepening of the yield curve, the depressing effects of higher FDIC insurance premiums on deposit rates, and RTC resolution activity have encouraged households to shift away from bank deposits to bond (and perhaps equity) mutual funds (Duca 1993). As a result of these factors, both sides of bank and thrift balance sheets have declined in unusual ways. This combination of influences is suggestive of leftward shifts in the supply and demand for money, and thus may account for why money demand models are overpredicting M2 growth.

The appropriate regulatory response to the recent case of missing money is less clear-cut than in earlier episodes. While capital standards and increases in risk-based deposit insurance premiums have ostensibly induced banks to widen spreads between loan and deposit rates, they also have the desirable effect of shifting the downside risk of lending away from taxpayers to bank equity holders. Determining whether risk-based capital standards and deposit insurance premiums are appropriate is beyond the scope of this article.

Nevertheless, this study has several implications for monetary policy. First, changes in the competitiveness of the banking system can alter the information content of monetary aggregates. Second, the demand for money can be altered by factors affecting long-term market interest rates. As argued by Feinman and Porter (1992), both considerations suggest that the Federal Reserve does not have as much direct control over M2 as previously thought, implying that the monetary aggregates need to be interpreted in more complicated ways than previously thought.

Third, by causing IS (goods market) and LM (money market) disturbances, changes in the regulatory burden on banks have created problems for both interest rate and monetary aggregate targeting in three recent recessions. By implication, conducting a sound monetary policy is not as easy as either hindsight or ex post monetary indicators suggest. As a result, achieving broad economic goals requires that a central bank exercise a good deal of judgment and discretion in conducting its operating procedures.

Finally, the previous and current episodes of missing money imply that the Federal Reserve should take an active role in policy actions that affect the competitiveness of the banking system and ensure that the consequences of such actions for the implementation of monetary policy are taken into account when formulating these policies. For this reason, the Federal Reserve must have significant input into the regulation of banks if it is to fulfill its mission as a central bank.

Regulation Q and the Competitiveness of Banks and Thrifts

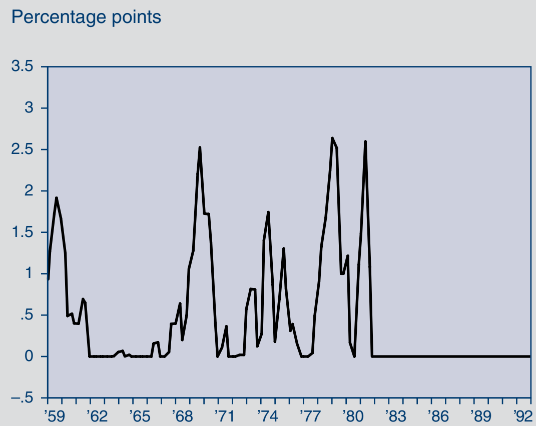
The degree to which Regulation Q put banks and thrifts at a competitive disadvantage in raising loanable funds can be gauged by measuring the extent to which market interest rates rose above deposit rate ceilings. The measurement of Regulation Q effects raises three issues:

1. which retail deposit rate to use,
2. whether rate ceilings for thrifts or banks should be used, and
3. how to handle the introduction of market-rate-based deposit instruments prior to the lifting of all rate ceilings on nontransactions deposits in 1983.

With respect to issue 1, for two reasons the Regulation Q variable presented here reflects regulations affecting small time deposits. First, because small time deposits serve more as savings rather than transactions instruments, the small time deposits are more sensitive to their opportunity cost than are other types of household M2 deposits. Second, most market-based deposit instruments that were introduced in the late 1970s were, by design, substitutes for small time deposits.

In handling issue 2, rate ceilings on thrifts were used because regulations tended to favor thrifts since rate ceilings on thrift accounts were as high as, if not higher than, those on bank deposits. In addressing issue 3, there were two basic types of partially regulated, deposit-type instruments that were introduced before 1983 by law: small-saver certificates and money market certificates. Small-saver certificate regulations were used in constructing a Regulation Q variable because minimum balance requirements on small-saver certificates ($500 to $1,000) were much more similar to those on retail deposits than were the requirements on money market certificates ($10,000) over most of the late 1970s and early 1980s.

Figure A
The Bindingness of Regulation Q Ceilings on Deposit Rates



Given these considerations in dealing with issues 1, 2, and 3, the Regulation Q measure here is defined using spreads between market interest rates and rate ceilings on small time deposits and/or small-saver certificates. Between 1960 and the second quarter of 1978, this measure (*REGQ*) equals the quarterly average spread between the three-year Treasury rate and the rate ceiling on three-year small time deposits when the ceiling was binding, and zero otherwise. Starting in the third quarter of 1979 when small-

(Continued on the next page)

Regulation Q and the Competitiveness of Banks and Thrifts—*Continued*

saver certificates were created, *REGQ* equals one of the following based on quarterly averages of monthly data:

a. any ceiling spread set by legislation between market interest rates and rates on small-saver certificates,[1]
b. the maximum of zero and the difference between the $2^1/_2$-year Treasury yield (constant maturity) and any legislated cap on small-saver rates,[2] or
c. zero since August 1981 when rate ceilings on small-saver certificates were removed.

For details on deposit regulations, see Mahoney, White, O'Brien, and McLaughlin (1987).

As can be seen in Figure A, Regulation Q was very binding in the 1974–75 and 1979–80 periods when missing-money problems were arising for M1. These disintermediation effects were largely ended when rate ceilings were dropped on small-saver certificates in August 1981 and were completely eliminated with the lifting of all ceilings on nonbusiness deposit rates in 1983. The earlier episodes of binding Regulation Q ceilings (the early 1960s and again in 1967) were not accompanied by missing-money episodes, mainly because they were not accompanied by innovations (such as the creation of money substitutes) that affected the demand for money.

[1] These set spreads ranged from zero to 50 basis points.

[2] Between January 1980 and August 1981, ceilings on small-saver yields were based on the $2^1/_2$-year constant maturity Treasury yield.

The Impact of Risk-Based Capital Standards and the FDIC Insurance Premium Hike on Banks' Costs

While U.S. commercial banks were not subject to a minimum capital rule before year-end 1990, they attempted to meet an unofficial goal of maintaining a minimum ratio of 6 percent total capital (equity plus subordinated debt) to assets. Using that ratio as a base, the capital standards that were fully implemented at year-end 1992 raised the effective minimum ratio of total capital to loans from 6 percent to 8 percent. In light of emerging loan quality problems in 1990, many large banks acted as though capital standards were fully implemented at year-end 1990 to reassure market investors that the banks could meet the final phase-in of capital standards at year-end 1992.

The effect of new capital standards on the marginal cost of lending roughly equals the additional capital banks need (0.08–0.06 percent) multiplied by the extent to which the yield on capital (*ROE*) exceeds that on insured deposits (r^d). Because most banks cannot issue subordinated debt, assume that capital costs roughly equal a targeted yield on the return on equity (*ROE*) capital. Based on anecdotal evidence, let's use a target *ROE* goal of 15 percent. For the yield on deposits, let's use 4 percent, which roughly approximates the average rate on six-month time deposits over most of 1992. Based on these figures, the new capital standards raised the cost of funding C&I loans by 0.22 percent (0.02 x 0.11). In addition, in the second half of 1990 the Federal Deposit Insurance Corporation (FDIC) announced that it would increase the insurance premium levied on insured deposits by 0.075 percent, from 12 to 19½ cents per $100 of deposits. To remain profitable, banks eventually would need to pass on the extra costs of tougher capital standards and higher insurance premiums (0.295 percent) to their customers in the form of a wider spread between loan and deposit rates.

How does 0.295 percent compare with the pricing of the prime lending rate? Banks typically set the prime rate equal to the cost of borrowing overnight funds in the federal funds market plus some spread to compensate themselves for administrative costs, default risk, and some target return to equity holders. Because default risk varies with the business cycle, the spread between interest rates on bank loans and a competing source of credit can be used as an indicator of how competitive banks are in providing C&I loans, provided that the spread moves with default risk.

One increasingly popular interest rate spread is that between the prime rate and commercial paper (Friedman and Kuttner 1992). Compared with the calculated impact of both capital standards and deposit insurance changes (0.295 percent), the spread between the prime rate and the one- to two-month prime commercial paper rate rose by a

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The Impact of Risk-Based Capital Standards and the FDIC Insurance Premium Hike on Banks' Costs—*Continued*

somewhat higher 0.50 percent near year-end 1990, as indicated earlier in Figure 10. The somewhat greater rise in this spread partly reflects the requirement that many banks have risk-based capital ratios greater than 8 percent, based on regulator assessments of the bank's soundness. For this reason, the calculated effect of the new bank capital standards presented here likely *understates* their average effect on banks' cost of funding loans.

The remainder of the increase in the spread may also reflect a slight increase in the default risk on bank loans compared with commercial paper. While both rates rise with a pervasive increase in default risk, this spread tends to widen temporarily during recessions, perhaps because the issuers of commercial paper generally are more established firms and, during tough times, are less prone to default on loans. Nevertheless, this spread has not narrowed to prerecessionary levels. This evidence and the fact that the spread widened during the phasing-in of the new bank capital standards strongly suggest that the new bank capital standards have raised the cost of prime-based bank loans.

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