

Is deposit rate deregulation an Rx for M1?

Paul L. Kasriel

Since the Banking Act of 1933, U.S. commercial banks have been prohibited from paying explicit interest on demand deposits. Over time, however, there has been a gradual erosion of the spirit, if not the word, of this legislation. For example, in the 1970s, the rapid growth in money market mutual fund assets and overnight repurchase agreements could be attributed to the fact that these financial instruments possess transactions characteristics as well as market rates of return. In December 1980, depository institutions nationwide were authorized to offer NOW accounts—essentially interest-bearing checking accounts subject to a legal deposit rate ceiling (currently 5-1/4 percent). Depository institutions were authorized to offer money market deposit accounts and Super NOW accounts beginning in December 1982 and January 1983, respectively. Super NOW accounts are fully checkable deposits, earn market-related rates of interest free from any legal ceiling, but are subject to the restriction that, if the account balance falls below a minimum of \$1,000, the interest rate on the deposit becomes subject to the regular NOW account deposit rate ceiling. Money market deposit accounts are similar to Super NOWs except that they have limited transactions characteristics. Recently, congressional legislation has been proposed that would remove any rate restrictions on demand deposits.

Questions have arisen as to what effects complete deposit rate deregulation would have on the public's demand for and the monetary authority's ability to control the supply of transactions balances—that is, money. Answers to these questions have important implications for the school of economic thought known as monetarism. Monetarism has been defined as "... the proposition that changes in the quantity of money have important influences in the short run on output and interest rates, and in the long run on prices."¹

Two fundamental assumptions underlying monetarism are:

1) that the public's demand for real (in the sense of purchasing power) money balances is relatively stable and predictable in relation

to a few explanatory variables, such as real GNP and interest rates; and

2) that the monetary authority can control the nominal quantity of money.

The monetarist policy prescription derived from these assumptions is that the monetary authority should operate so as to produce a steady rate of growth in the nominal supply of money. This steady rate would be expected to produce a relatively steady rate of inflation (which could take on a value of zero) in the long run.

Some analysts have suggested that the deregulation of deposit rates on transactions accounts would diminish any legitimacy that the monetarist policy prescription might have by undermining the validity of its two key assumptions. What follows is an analysis of the implications of complete deposit rate deregulation on transactions accounts for the stability of the public's demand for real transactions balances and the monetary authority's ability to control the nominal quantity of such balances.² The principal conclusions are that deposit rate deregulation would reduce an important source of instability in the public's demand for real transactions balances and would leave unaffected the monetary authority's ability to control the nominal quantity of these balances.

Implicit versus explicit interest

The legal prohibition of the payment of explicit market rates of interest on transactions deposits implies that below-market rates of return will be earned on these deposits even if implicit payments are made. In turn, the implication of this is that there will be an incentive to create money substitutes.

The reason implicit payment of interest on transactions deposits could be expected to be below the market rate in a money economy is that implicit payments are equivalent to barter. Barter is economically inefficient in the

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sense that the marginal cost to a bank of providing free or below-market price services to its customers is greater than the marginal value that depositors place on these services. If an explicit money payment equal to the cost of subsidizing these services were made instead, then customers could purchase these same services in the same amounts provided with implicit payments but, given a choice, probably would not do so. Therefore, *explicit* payments at market rates on transactions deposits would not make banks worse off, but would make depositors better off, abstracting from income tax considerations.

Compounding this dead weight loss of implicit interest payments is the potential problem that banks may not be able to quickly alter the levels and composition of their compensating services. As a result, the implicit return on deposits would be adjusted with a lag to changes in market interest rates, driving an additional wedge between the implicit return on transactions deposits and market rates when interest rates are rising.

The fact that close substitutes for transactions deposits, such as overnight repurchase agreements and money market mutual fund shares, evolved and flourished prior to the inception of Super NOW accounts is persuasive evidence that the return on transactions deposits, largely in the form of implicit payments, was below market rates.

Money demand instability

Because deposit rate regulation implies below-market rates of return on transactions balances when interest rate ceilings are a binding constraint, there will be an incentive to create and use money substitutes earning higher rates of return. The creation of these substitutes could be expected to lead to a fall in the demand for conventionally defined money. Indeed, it has been argued that "... the most likely cause of the observed instability in the demand for money after 1973 is innovation in financial arrangements ... induced by the combination of higher inflation rates (and therefore interest rates) and legal impediments to the payment of a market rate of return on transactions balances."³ In addition to producing instability in the demand for money in the sense of changing the quantity of money demanded at given levels of GNP and interest

rates, the prohibition of the payment of explicit market rates of interest on transactions deposits could be expected to increase the responsiveness of the quantity of money demanded to changes in market interest rates.

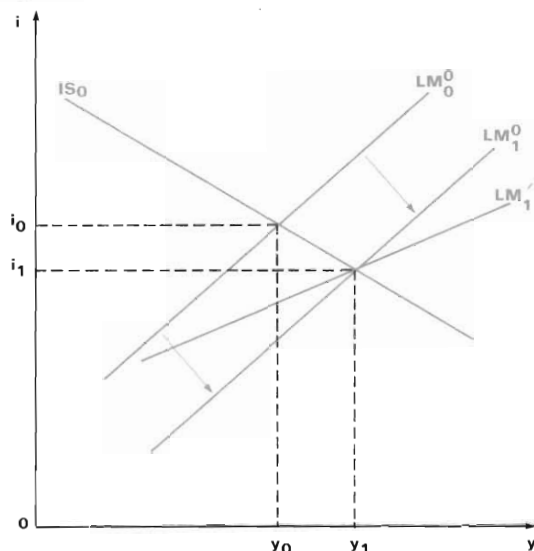
As relatively unregulated close substitutes for regulated transactions deposits evolve, the public's demand for the latter would fall. That is, at given levels of income and interest rates, the public would prefer to hold a lower quantity of money balances than it would in the absence of close substitutes for transactions deposits. In terms of a traditional IS-LM diagram⁴ as shown in Figure 1, the LM curve shifts out from LM_0^0 to LM_1^0 .

Equivalently, this effect can be described as an increase in the income velocity of money. Thus, a given quantity of money will support or be associated with a higher level of nominal GNP. This result is shown in Figure 1 by an increase in the equilibrium level of real GNP from y_0 to y_1 .

In addition to the LM curve shifting as a result of the development of substitutes for transactions deposits subject to interest rate ceilings, the slope of the LM curve also could be expected to decrease (as represented by LM_1^1 in Figure 1). That is, the elasticity of the demand for money with respect to interest rates on alternative assets could increase. This means that the quantity of money demanded at a given level of real GNP and own rate of return on money, would show an increased response to a change in the yields on money substitutes.

This *a priori* expectation of an increased cross-elasticity of demand with respect to alternative yields follows from economic theory. It is well established that both the own price elasticity of demand for a product and the cross-elasticity of demand with respect to the prices of substitute products are greater, the closer those substitutes are for the product in question. The development of close substitutes for money implies that the elasticity of demand for money with respect to yields on these substitutes will increase. Thus, as money substitutes yielding market rates of return are developed, a given proportional change in these market rates will elicit an increasing proportional change in the quantity of money demanded. (Hereafter, discussions of the interest elasticity of the demand for money refer to the cross-elasticity rather than the own elasticity.)

Figure 1



The greater this interest elasticity of the demand for money, all else the same, the greater the potential “slippage” in the relationship between the money stock and nominal GNP or, what is the same thing, the greater the potential variability in the income velocity of money.

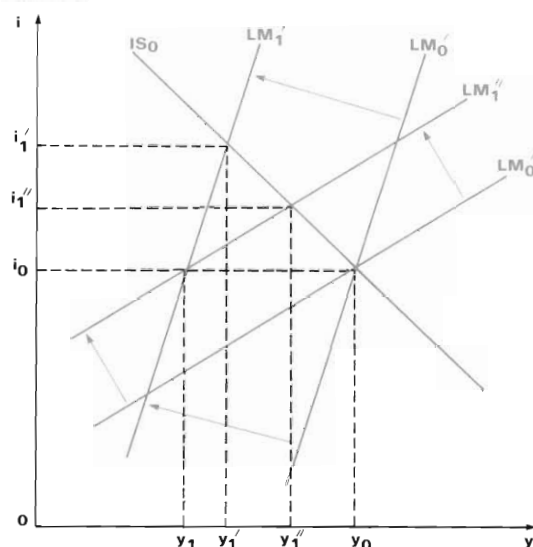
Two examples will illustrate the implications of this increased interest elasticity. First, suppose that the monetary authority takes actions to reduce the quantity of money and, in so doing, causes interest rates to rise. The greater the interest elasticity of the demand for money, all else the same, the less contractionary (in a GNP sense) will be a given reduction in the stock of money because the public will choose to economize more on the quantity of money it demands due to the interest rate increase. The interest-rate induced economization of money balances allows a lower quantity of money to support a higher level of nominal GNP than otherwise would have been the case. This is exactly equivalent to saying that the income velocity of money has increased.

In terms of an IS-LM diagram, this point is shown in Figure 2. Intersecting the IS curve IS_0 at interest rate i_0 and real GNP y_0 are two LM curves reflecting money demand curves of different interest rate elasticities. The LM curve embodying the higher interest rate elasticity of money demand is represented by

LM_0'' and the lower interest elasticity by LM_0' . An arbitrary decrease in the money supply is represented by the leftward parallel shift in both LM curves such that they intersect at the coordinates i_0, y_1 . Assuming no change in the general price level, the new equilibrium implied by the less interest elastic LM curve, LM_1' , would be established at interest rate level i_1' and real GNP level y_1' . In contrast, the new equilibrium implied by the more interest-elastic LM curve, LM_1'' , would be established at interest rate level i_1'' and real GNP level y_1'' . Because y_1'' is greater than y_1' for the same decrease in the money supply, the implication of Figure 2 is that the income velocity of money is higher when the interest elasticity of the demand for money is higher.

As a second example, suppose that the government finances an increase in its expenditures by borrowing from the public. All else the same, this increased demand for credit would increase market interest rates. The greater the interest elasticity of the demand for money, the more expansionary (in a GNP sense) will be the increase in federal government expenditures. Again, the rise in interest rates induces the public to economize on its demand for money balances and, thus, allows a given quantity of money to support a higher level of nominal GNP.

Figure 2



The interest rate–real GNP implications of an increase in government expenditures are shown in Figure 3. An increase in government expenditures is represented by a rightward shift in the IS curve from IS_0 to IS_1 . The new equilibrium level of real GNP is higher (assuming that the economy was not already at full employment), the greater the interest elasticity of the demand for money, that is, the flatter the slope of the LM curve.

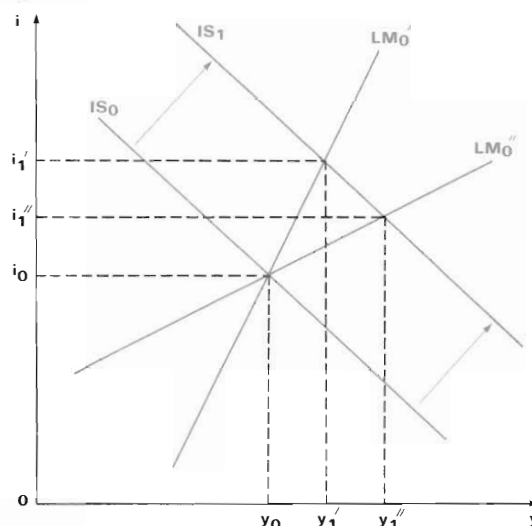
The evolution of money substitutes could present a problem for a monetary authority whose intermediate policy target is the level of the money stock. If there are difficulties in predicting the timing of innovation-induced shifts in money demand and related changes in the interest elasticity of the demand for money, there is increased uncertainty as to what level the money stock is consistent *ex ante* with the monetary authority's implicit nominal GNP goals. Indeed, from the standpoint of stabilizing nominal GNP, money targeting may be less desirable than interest rate targeting if these unpredictable elements of money demand are large relative to unpredictable changes in the aggregate demand for goods and nonmoney services.⁵

Deposit rate deregulation and money demand

The payment of market interest rates on all transactions deposits would be expected to diminish greatly money demand instability caused by the evolution of money substitutes. Transactions deposits that pay explicit market interest rates and are guaranteed to be redeemable at par (by virtue of federal deposit insurance) would reduce the incentives in the marketplace for the creation of money substitutes.⁶ As a result, changes in the demand for money as represented by parallel shifts in the LM curve would be reduced, all else the same.

Moreover, the payment of market interest rates on transactions deposits could reduce the size and variability of the opportunity cost of holding money, i.e., the yield on alternative assets compared with the yield on money. This would make the demand for money less sensitive to movements in interest rates, i.e., less interest-elastic. If, for example, interest rates in general were rising, the rate paid on transactions deposits would be expected to move sympathetically. Unless the yield spread be-

Figure 3



tween transactions deposits and substitute assets were to change, the rise in interest rates would not be expected to induce a fall in the quantity of money balances demanded.⁷ That is, the rise in interest rates would not be expected to increase the income velocity of money.⁸

Contrast this result with the case of a rise in interest rates when transactions deposits are subject to a binding legal ceiling on the explicit deposit rate and a lagging implicit return. In this case, the rise in market rates itself would represent a widening in the yield differential between transactions deposits and substitute assets. Therefore, the quantity of money balances demanded would decrease. Thus, if the payment of explicit market interest rates on transaction deposits were allowed, income velocity or the relationship between money and GNP would be expected to be more stable.

Deposit rate deregulation and savings

Some analysts have suggested that the explicit payment of market rates of interest on transactions deposits might introduce a new source of instability to the demand for money. It is argued that M1-type balances, i.e., transactions balances, could take on the characteristics of "savings" vehicles in addition to their transactions characteristics. In such an event,

"... M1 would become more like the various assets held for investment purposes, and changes in M1 could be dominated at various times by shifts in the composition of the public's portfolio rather than by changes in income and prices."⁹

If explicit rates of interest were paid on transactions deposits, then these deposits would yield joint products—transactions services and savings services. But the explicit rate paid on transactions deposits would be expected to be dominated by the rate paid on assets that provided mainly savings services, that is, nontransactions assets, because of intermediation costs. There is a cost to a bank of managing its portfolio in such a way as to be able to honor uncertain deposit withdrawals on demand. This cost will be reflected in a lower rate paid on deposits subject to withdrawal on demand than rates paid on *nontransactions* assets. Although an increase in the public's propensity to save would be expected to increase the demand for transactions deposits bearing market rates of interest compared with deposits bearing below-market rates, it is difficult, *a priori*, to say how significant this differential effect would be given the yield domination of nontransactions assets.¹⁰

The critical question with regard to the explicit payment of market interest rates on transactions deposits is not whether it will lead to a greater sensitivity in the demand for money with respect to the public's saving decisions, but whether the demand for money, on net, will be more or less stable. We would expect that the more varied the services that an asset produces, the more stable would be the demand for that asset in the presence of shifts in the relative demands for different services. Comparing extreme cases of an asset that produced only one service with an asset that produced all of the different services consumed in an economy, shifts in the relative demands for different services would have less of an effect on the demand for the all-services producing asset. Therefore, if the explicit payment of market rates of interest on transactions deposits expands the number of different services provided by money, then the demand for money, on net, should be more stable. Moreover, if, as it has been argued, the most probable cause of money demand instability since 1973 was financial innovation resulting from the legal prohibition of explicit market interest payments

on transactions deposits, then it would be a curious world indeed if the removal of this prohibition caused a *net increase* in money demand instability.¹¹

Greater penalty for imprecise money supply control

The payment of explicit market interest rates on transactions deposits is a double-edged sword for the monetary authority. That the demand for money could be more stable and the quantity of money demanded could be less affected by movements in interest rates implies a more predictable relationship between the quantity of money supplied and nominal GNP. Thus, the ability of the monetary authority to stabilize GNP could be enhanced. However, the penalty for imprecise control of the money stock by the monetary authority is increased. A given variation in the money stock will, all else the same, produce a larger variation in nominal GNP and interest rates in a regime of completely deregulated rates on transactions deposits than in one of binding rate regulation.

This result obtains because the opportunity cost of holding money does not change as much for a given change in the general level of interest rates in a deregulated regime. This means that the interest elasticity of money demand will be reduced. Consequently, as the money stock decreases, the usual accompanying interest rate increase will not cause the quantity of money demanded to decrease as much as it might in a regulated deposit rate regime.^{12,13} In a deregulated world, then, it would be incumbent upon a monetary authority that was attempting to hit a money stock target to devise and implement a reserve accounting framework and operating procedure that would minimize its errors in controlling the money stock.¹⁴

Monetary control

Although, for reasons given above, the demand for money could be expected to be more stable, some analysts have alleged that deposit rate deregulation could impair the monetary authority's ability to control the stock of money. The fundamental premise of this view is that the monetary authority changes the *supply* of money by affecting the quantity of money *demanded* by the public via

changes in the opportunity cost of holding money. For example, if the monetary authority raises market interest rates by selling bonds from its portfolio, with deposit rates subject to a binding legal ceiling, this will increase the opportunity cost of holding money. Thus, the quantity of money demanded by the public will decrease. According to this view of money supply determination, because the quantity of money demanded has fallen, the quantity of money supplied also must have fallen.¹⁵ If deposit rates are market determined, however, the increase in rates of return on nondeposit assets induced by the monetary authority would lead to a simultaneous increase in deposit rates, thereby eliminating or muting any change in the opportunity cost of holding money. Thus, this avenue for monetary control would be closed or restricted. The alternative route to monetary control, according to this view, would be through the effects of interest rates on GNP, and then, of GNP on the demand for money. A policy-induced rise in interest rates would lower nominal GNP which, in turn, would reduce the demand for money.

According to this view, then, an implication of paying market rates of interest on transactions deposits is that a given policy-induced change in interest rates will have a much smaller opposite impact on the level of the money stock or a given change in the money stock will require a larger policy-induced change in market interest rates. It is argued, then, that close control of the money stock could imply interest rate movements that are destabilizing to the economy. Another alleged implication of deposit rate deregulation is that the direct GNP-money demand route to money stock control would detract from the money stock's role as an intermediate target of monetary policy because, it is argued, money would cease to be a leading indicator of nominal GNP but would be relegated to being a contemporaneous indicator.¹⁶

Supply view of money stock determination

There are a number of conceptual problems with this view of money stock determination and its implications. First, it fails to make a distinction between the demand for money and the supply of money. The impression gained from the above-described view

of money stock determination is that the demand for money is an important element in determining the level of the money stock. To see that this is not necessarily so, consider a world in which there are 100 percent reserve requirements on bank deposits and both the monetary authority and banks pay market rates of interest on reserves and deposits, respectively. Changes in bank reserves plus currency (sometimes referred to as high-powered money or the monetary base), which can be strictly controlled by the monetary authority, would result in dollar-for-dollar changes in the money stock in the same direction—regardless of the demand for money.

In this 100 percent reserve requirement world, the monetary authority would change the monetary base through open market operations in some asset. Typically, it is assumed that the monetary authority conducts its open market operations in some financial asset such as government securities. But the monetary authority could just as well conduct open market operations in a nonfinancial asset, say washing machines.¹⁷ The monetary authority could reduce the stock of money by selling washing machines from its portfolio. But in order to induce the public to exchange money for washing machines, the monetary authority would have to lower the price of washing machines relative to the price of other assets. As long as the demand for the asset in which the monetary authority conducts open market operations is not completely price-inelastic, then the monetary authority can change the money stock by bidding up or down the relative price of the asset in question. This is true whether deposits pay a market rate of interest or not. If the monetary authority chose to conduct open market operations in credit market instruments, say bonds, the same qualitative results would obtain as long as the public's demand for credit has some interest elasticity.¹⁸ It is not the demand for money but the demand for the asset in which the monetary authority conducts open market operations that plays the key role in money stock determination.

The assumption of 100 percent reserve requirements is not critical to reaching the conclusion that the money stock is determined independent of the demand for money. At the other extreme, an assumption of no legal reserve requirements also would yield the same conclusion as long as banks desire to hold some

finite quantity of reserves for check clearing and currency withdrawal purposes. Because the monetary authority has a monopoly on the production of bank reserves, it can set the price or interest rate on reserve credit which, ultimately, will influence the determination of the money stock.

The key to understanding this is to realize that in a fractional reserve banking system, part of bank deposits and thus, the money stock, is created as a by-product of banks' acquisitions of earning assets, i.e., the extension of bank credit. Banks attempt to maximize their profits by increasing their holdings of earning assets to the point at which the expected return on an additional dollar of acquired earning assets is equal to the expected cost of funding that additional dollar of earning assets over its term to maturity, i.e., until marginal revenues equal marginal costs. The federal funds rate, being the cost of overnight reserve credit, can be viewed as a proxy for banks' marginal cost of funds.¹⁹

It is through changes in the federal funds rate relative to the marginal rate of return on earnings assets that banks' portfolio behavior and, ultimately, their deposits, a component of the money stock, are affected. If, for example, the federal funds rate should fall relative to the return on banks' earning assets, then banks will acquire more loans and investments. This increased acquisition of earning assets will cause their prices to be bid up or, what is the same thing, cause their yields to fall. An individual bank will continue to acquire earning assets until the marginal return on them is again equal to the federal funds rate. For the banking system, the increase in assets will be matched by an increase in the liability item, deposits. What is relevant, then, for an individual bank's asset portfolio decision is the cost of reserve or funds credit relative to the return on earning assets.

The federal funds rate, like any other price, is determined by supply and demand, in this case, specifically the supply and demand for reserves. Through its policy tool of, say, open market operations, the monetary authority affects the supply of reserves. Banks' demand for the reserve stock will be a function of any legally imposed reserve requirements (which could be zero) and precautionary motives related to check clearings and currency withdrawals. The monetary authority changes

the federal funds rate by affecting the supply of reserves relative to the demand for reserves. In summary, then, the monetary authority can use its policy tools to change the supply of reserves in order to change the federal funds rate or the marginal cost of funds to banks, which, in turn, affects banks' asset portfolio behavior, and, ultimately, the level of deposits for the banking system.²⁰ Through its effect on banks' asset portfolio behavior rather than the public's demand for money, then, the federal funds rate is the "cutting edge" of monetary policy.²¹

An implication of reduced variability in the opportunity cost of holding money (which could occur if transactions deposits paid market interest rates) is *not* that the stock of money would be any more or less difficult for the monetary authority to control, but that a *given change* in the stock of money, assuming no shift in the public's demand for money, would produce larger movements in interest rates and nominal GNP as economic agents reallocated their portfolios in response to the changed money stock.

As discussed earlier, a changing opportunity cost of holding money, which occurs with binding legal deposit rate ceilings, acts as a shock absorber for changes in the supply of money. In the 100 percent reserve requirement example of the open market sale of washing machines, economic agents' portfolios are in what has been referred to as a "momentary" equilibrium rather than a long-run equilibrium. The public willingly exchanged money for washing machines at what it perceived to be an attractive relative price.²²

But portfolios are out of equilibrium because the "yield" on money has now risen relative to the yield on other assets except washing machines. The reason the yield on money has risen is related to an assumption of diminishing marginal utility of monetary services. That is, the transactions services produced by each additional unit of money diminish as the quantity of money increases. Because open market sales of washing machines by the monetary authority have reduced the quantity of money, it is assumed that the yield or marginal utility of money has increased.

Thus, the public holds less money and more of other assets than it desires. In order to re-equilibrate portfolios so that the marginal return or yield across all assets in individual portfolios is the same, individuals will sell non-

money assets in an attempt to restore money balances. Some assets sold might be bonds. This would put upward pressure on nominal interest rates. If deposit rates were legally fixed, then the increased opportunity cost of holding money as a result of increased nominal interest rates would lead, all else the same, to a decline in the quantity of money demanded. The fall in the quantity of money demanded implies that individuals' portfolios will be brought into equilibrium with less of an increase in interest rates and less of a fall in nominal GNP than would be the case if the opportunity cost of holding money did not change as much, i.e., if deposit rates were allowed to vary with other market interest rates.

Money stock as leading indicator

As mentioned earlier, some analysts have suggested that if transactions deposits paid market interest rates, then the money stock would no longer serve as a good intermediate monetary policy target because it would have a contemporaneous rather than leading relationship with nominal GNP. It is not clear, however, that money would lose its leading relationship with GNP after deposit rate deregulation. The argument presented for a contemporaneous relationship explicitly associates money stock determination with the demand for money.

According to this view, with a constant or less variable opportunity cost of holding money, the principal avenue for changing the stock of money is for the monetary authority to change interest rates in order to change GNP which, in turn, will cause the quantity of money demanded to change in the same direction and, by some unspecified means, also cause the stock of money to change.

An alternative view is that the monetary authority can set the nominal money stock at whatever level it chooses regardless of the public's demand for it. Indeed, this is how changes in the money stock produce changes in GNP. The monetary authority creates a temporary portfolio disequilibrium, changing the stock of money so that, in the first instance, it is different from the quantity demanded by the public. It is this portfolio imbalance that leads to further changes in explicit and implicit interest rates and ultimately to changes in nominal GNP. Long-run equilibrium is then

re-established when nominal GNP has changed sufficiently so that the public's demand for real money balances is once again equal to the real stock of money balances outstanding.

But even if the time lag between changes in the money stock and changes in GNP approached zero, this still would not diminish the money stock's role as an intermediate monetary policy target, especially if the demand for money became more stable as a result of deposit rate deregulation. Regardless of the chosen intermediate target, monetary policy affects GNP through changes in explicit and implicit interest rates.

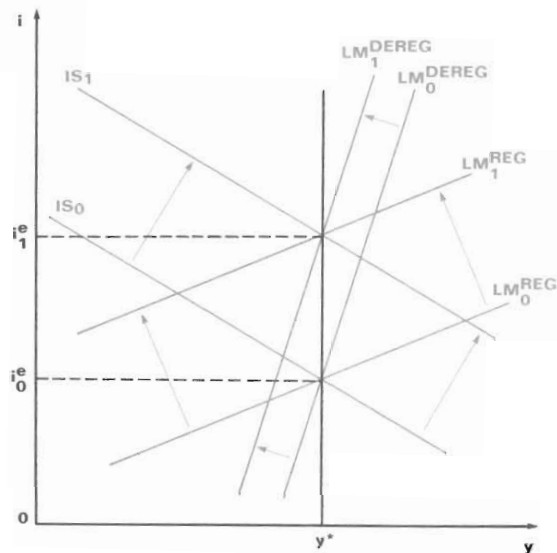
By choosing the money stock as the intermediate target of monetary policy, the monetary authority is implicitly using it as a guide for moving interest rates. For example, if the money stock is above target, then, all else the same, this means that the monetary authority will have to manipulate its policy tools or instruments in such a way as to raise interest rates in order to lower the stock of money. If, because of deposit rate deregulation, the demand for money is more stable, implying a more stable money-GNP relationship, money stock targeting will provide an even better guide to interest rate movements for the monetary authority. Only if the money stock should become a *lagging* indicator of GNP would it be unsuitable as an intermediate target of monetary policy.

Destabilizing interest rate volatility?

Another related argument advanced against using the money stock as an intermediate target if deposit rates were deregulated is that control of the money stock would imply interest rate volatility that would be destabilizing to the economy. One of the problems with this argument is that it fails to recognize that if GNP stabilization is the goal of macro policy, then at any point in time there exists a unique interest rate determined by productivity and thrift that is consistent with desired GNP. Writing at the turn of the last century, the noted Swedish economist Knut Wicksell called this unique interest rate the "natural rate of interest."²³

In terms of the traditional IS-LM framework, this interest rate would be determined by the intersection of the IS curve with a vertical line drawn from a point on the real in-

Figure 4



come axis representing desired real GNP. In Figure 4, this equilibrium interest rate would be i_0^e . Two LM curves have been included in Figure 4, both intersecting the IS curve IS_0 at i_0^e . The more steeply sloped LM curve, LM^{Dereg} , represents a world of deposit rate deregulation in which the interest elasticity of the demand for money is presumed to be relatively low. In a world of regulated deposit rate ceilings, the interest elasticity of the demand for money would be relatively higher as represented by LM^{Reg} . Notice that the equilibrium interest rate, i_0^e , is independent of the interest elasticity of the demand for money. If, for some reason, the aggregate demand for real goods and services should increase, causing a rightward shift in the IS curve (to IS_1 in Figure 4), then a new higher equilibrium interest rate (i_1^e in Figure 4) is indicated if the policymakers' target level of real GNP (y^* in Figure 4) has not changed. Again, this higher equilibrium interest rate is independent of the interest elasticity of the demand for money. Notice that in order to maintain the targeted level of real GNP, y^* , the money stock would have to be changed by *less* in a world of deposit rate deregulation than would be the case in one of legally imposed binding deposit rate ceilings. (In terms of Figure 4, less of a horizontal shift is required in LM^{Dereg} than in LM^{Reg} .)

Unless cogent arguments can be made that the public's demand for real goods and services will become more unstable as a result of deposit rate deregulation, there is no reason to expect greater volatility in the *equilibrium* interest rate from autonomous changes in "IS" factors. That leaves increased instability in either the demand for or supply of money functions as the cause of assumed greater interest rate volatility. As argued above, deposit rate deregulation should result in a net increase in the stability of the demand for money.

There is no reason to expect any *increased* instability in the money supply function as a result of deposit rate deregulation. However, any extant instability in the money supply function in combination with a more stable and less interest-elastic money demand function does imply greater interest rate volatility. It also implies greater GNP volatility. As discussed earlier, the increased penalty in terms of interest rate and GNP volatility that would result from money supply variability in a world of deregulated deposit rates suggests that the monetary authority should adopt a reserve accounting system and operating procedure that would maximize its control over the money supply.

Summary

In recent years there has been a trend toward the elimination of interest rate ceilings on deposits—including those on transactions deposits. Some analysts have argued that the payment of market rates of interest on transactions balances might produce instability in the public's demand for money and might impair the monetary authority's ability to control the money stock. If these arguments proved to be correct, the monetarist policy prescription of a steady rate of growth in the nominal stock of money would be severely flawed. The analysis in this paper indicates that the elimination of legally imposed interest rate ceilings on transactions accounts could strengthen rather than weaken the case for the monetarist policy prescription. By muting a major source of money demand instability—namely, the incentive to create new interest-bearing transactions instruments—the payment of explicit market rates of interest on transactions accounts could contribute to a more stable money demand function on net. Moreover, the deregulation

of deposit rates was shown not to have detrimental effects on the monetary authority's ability to control the stock of money. What was shown, however, is that the penalty for imprecise control of the money stock in terms of GNP and interest rate variability is higher when transactions deposits earn market rates of interest.

¹ Milton Friedman in *Monetarism and the Federal Reserve's Conduct of Monetary Policy, Compendium of Views*, prepared for the use of the Subcommittee on Monetary and Fiscal Policy of the Joint Economic Committee, Congress of the United States, 97th Cong., 2nd Sess. (U.S. Government Printing Office, December 30, 1982), p. 73.

² The analysis assumes that the period of adjustment to deregulated deposit rates has been completed and, therefore, does not address difficulties that might arise during the transition period from regulated to deregulated rates.

³ John P. Judd and John L. Scadding, "The Search for a Stable Money Demand Function: A Survey of the Post-1973 Literature," *The Journal of Economic Literature*, 20 (September 1982), p. 1014.

⁴ The IS curve is a locus of nominal interest rate and real GNP combinations at which the market for real goods and services is in equilibrium. When this market is in equilibrium real investment (I) equals real saving (S), hence the acronym IS. The IS curve slopes down and to the right because as interest rates decline, real spending on goods and services increases, implying higher levels of real GNP. The LM curve is a locus of nominal interest rate and real GNP combinations at which the market for real money balances is in equilibrium. When this market is in equilibrium, the public's demand for real money balances, sometimes referred to as its liquidity preference (L), equals the supply of real balances (M). The LM curve slopes up and to the right because as interest rates increase relative to the rate paid on transactions balances, the public economizes on its holdings of these balances. This incipient excess supply of real money balances leads to an increase in real GNP which increases the demand for money, thus re-equilibrating the supply and demand for real money balances. For a detailed description of the IS-LM framework, see Martin J. Bailey, *National Income and the Price Level: A Study in Macroeconomic Theory* (New York: McGraw-Hill, 1971), pp. 3-85.

⁵ See William Poole, "Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model," *Quarterly Journal of Economics*, 84 (May 1970), pp. 197-216.

⁶ There would still be some incentive for the creation of money substitutes if reserve requirements, which act as a tax, were imposed on checkable deposits bearing market interest rates. Part of this "tax" is reduced to the degree that the social cost of deposit insurance is subsidized. For an ingenious proposal to link reserve requirements with deposit insurance premiums, see Robert D. Laurent, "Reserve Requirements, Deposit Insurance, and Monetary Control," *Journal of Money, Credit and Banking*, 13 (August 1981), pp. 314-24. Another method of eliminating the reserve requirement tax would be for the monetary authority to pay a market rate of interest on required reserves.

⁷ If, for some reason, movements in the interest rate paid on transactions deposits lagged movements in market interest rates, then the relative change in the opportunity cost of holding these deposits could increase over what it would be if no explicit interest were paid on transactions deposits. For example, if the market rate were 10 percent and the rate paid on transactions deposits were 8 percent, a 1 percentage point fall in the market rate would represent a 50 percent decline in the explicit opportunity cost versus a 10 percent decline in the explicit opportunity cost if deposits paid no explicit interest.

Despite possible larger changes in the relative opportunity cost, the demand for transactions deposits bearing an explicit market-related rate of interest could still be less elastic with respect to movements in market interest rates. This elasticity of demand with respect to market interest rates ($E_{m,i}$) can be decomposed into the product of two other elasticities—the elasticity of demand for deposits with respect to their opportunity cost ($E_{m,opp}$) and the elasticity of the opportunity cost with respect to market interest rates ($E_{opp,i}$). Although $E_{opp,i}$ might be higher if movements in the rate paid on transactions deposits lag those of market interest rates, if $E_{m,opp}$ is sufficiently small, then $E_{m,i}$ also will be small. If the absolute value of $E_{m,opp}$ varies directly with the level of the opportunity cost, then presumably $E_{m,opp}$ would be relatively small for deposits earning market-related rates of interest. Whether it would be sufficiently small to offset the larger $E_{opp,i}$ is an empirical question. For a discussion of this issue see Thomas D. Simpson, "Changes in the Financial System: Implications for Monetary Policy," *Brookings Papers on Economic Activity*, No. 1, 1984, pp. 253-256.

⁸ John P. Judd and John L. Scadding (in "Financial Change and Monetary Targeting in the United States," *Interest Rate Deregulation and Monetary Policy*, Federal Reserve Bank of San Francisco, Proceedings of a Conference at Asilomar Conference Center, Monterey, California, November 28-30, 1982, p. 97) using Goldfeld-type money demand equations found that the absolute value of the interest elasticity of M2, a more broadly-defined money stock measure, decreased substan-

tially after rate deregulation occurred for a number of deposit categories in M2. The absolute value of the interest elasticity went from .28 in the period of 1960:Q4 to 1978:Q2 to .06 in the period of 1978:Q3 to 1981:Q4. This evidence for M2 is consistent with the qualitative expectations for the behavior of M1 interest elasticity if explicit market interest rates were paid on transactions deposits.

⁹ John P. Judd, "Deregulated Deposit Rates and Monetary Policy," Federal Reserve Bank of San Francisco, *Economic Review* (Fall 1983), p. 30. For similar arguments see Betsy Buttrill White, "Monetary Policy Without Regulation Q," Federal Reserve Bank New York *Quarterly Review* (Winter 1981-82), p. 6, and Thomas D. Simpson, "Changes in the Financial System: Implications for Monetary Policy," *Brookings Papers on Economic Activity*, No. 1, 1984, pp. 259,261.

¹⁰ In "Are NOWs Being Used as Savings Accounts?" Federal Reserve Bank of Richmond, *Economic Review* (May/June 1985), pp. 3-13, Timothy Q. Cook and Timothy D. Rowe evaluate whether other checkable deposits (OCDs), i.e., deposits included in the Federal Reserve's M1 definition of money that bear explicit rates of interest, were being used as savings balances. After examining survey information on consumer transactions and savings accounts and data on OCD average balances, transactions activity, and seasonal behavior, the authors find no evidence of widespread use of OCDs for savings purposes. Rather, their evidence suggests that the characteristics of OCDs more closely resemble those of regular checking accounts.

¹¹ Moreover, the rationale for the 1930s legislation prohibiting the payment of explicit interest on demand deposits was related to bank safety and soundness reasons. Although possible, it would have been quite a coincidence if this prohibition also would have contributed to the efficacy of monetary policy. This point is made by Thomas Mayer in "Roundtable," *Interest Rate Deregulation and Monetary Policy*, Federal Reserve Bank of San Francisco, Proceedings of a Conference at Asilomar Conference Center, Monterey, California, November 28-30, 1982, p. 122.

¹² Figure 2 can be used to illustrate this point. The more vertical LM curves indicating a lower interest elasticity of money demand would apply to a regime of deregulated deposit rates and the more horizontal LM curves would apply to a regulated regime. As shown in the diagram, a given decrease in the money stock (leftward shift in the LM curves) would result in a higher interest rate and a lower level of real GNP in a deregulated regime compared with a regulated regime.

¹³ In a deregulated regime, autonomous shifts in the demand for money also would be expected to

produce larger variations in nominal GNP and interest rates for the same reason as in the case of money supply changes. As discussed above, however, the demand for money could be expected to become more stable in a deregulated regime. Therefore, if, in a regulated regime, the money stock were deemed to be the best intermediate target variable to stabilize nominal GNP, then a move to a regime of deregulated deposit rates should enhance the desirability of the money supply as the monetary authority's intermediate target variable.

¹⁴ For alternative arrangements that purport to enhance money stock control see Robert D. Laurent, "Reserve Requirements: Are they Lagged in the Wrong Direction?" *Journal of Money, Credit and Banking*, 11 (August 1979), pp. 301-10 and William Poole, "A Proposal for Reforming Bank Reserve Requirements in the United States," *Journal of Money, Credit, and Banking*, 8 (May 1976), pp. 137-47.

¹⁵ The mechanism that causes the money stock to contract concomitant with the decline in the quantity of money demanded is seldom explained.

¹⁶ For descriptions and discussions of this view, see E. Gerald Corrigan, "Economic Prosperity: An Eclectic View," Federal Reserve Bank of Minneapolis, *Annual Report*, 1983, p. 10; Richard G. Davis, "Monetary Targeting in a 'Zero Balance' World," *Interest Rate Deregulation and Monetary Policy*, Federal Reserve Bank of San Francisco, Proceedings of a Conference at Asilomar Conference Center, Monterey, California, November 28-30, 1982, pp. 20-51; John P. Judd, "Deregulated Deposit Rates and Monetary Policy," Federal Reserve Bank of San Francisco, *Economic Review* (Fall 1983), pp. 38-39; Thomas D. Simpson and Patrick M. Parkinson, "Some Implications of Financial Innovations in the United States," Board of Governors of the Federal Reserve System, *Staff Studies No. 139*, September, 1984, pp. 15-19; and Betsy Buttrill White, "Monetary Policy Without Regulation Q," Federal Reserve Bank of New York, *Quarterly Review* (Winter 1981-82), p. 7.

¹⁷ For a discussion of the macro equivalence of open market operations in nonfinancial assets versus financial assets, see Phillip Cagan, "Why Do We Use Money in Open Market Operations?" *Journal of Political Economy*, 66 (February 1958), pp. 39-40.

¹⁸ This point concerning the public's interest elasticity of credit demand was made by David Laidler in "Roundtable," *Interest Rate Deregulation and Monetary Policy*, Federal Reserve Bank of San Francisco, Proceedings of a Conference at Asilomar Conference Center, Monterey, California, November 28, 30, 1982, p. 131.

¹⁹ The marginal funding costs of maturities longer than 1 day are related to the current overnight reserve credit rate via the expectations theory of the

term structure of interest rates. The expectations theory hypothesizes that the levels of longer-term interest rates are a function of current and expected future short-term rates. Thus, the 90-day CD rate, the 90-day marginal cost of bank funds, would be a function of the current level of the federal funds rate and the levels of the 1-day federal funds rates expected to prevail over the next 89 days.

²⁰ Double entry bookkeeping for the banking system assures that a change in assets (an entry on the left hand side of the balance sheet in the U.S.) must result in an equal net change in the sum of the right hand side balance sheet entries (liabilities and net worth). The change in the right hand side could result in the polar cases of only a change in transactions deposits, or no change in transactions deposits, depending on the public's preferences. Despite the public's preferences, however, the monetary authority could change the level of transactions deposits to a targeted level.

One way to accomplish this would be to impose reserve requirements on transactions deposits *only*. If, say, the monetary authority wanted to increase transactions deposits, it would increase reserves which would result in a fall in the federal funds rate and an increase in banks' earning assets and liabilities and/or net worth. Abstracting from changes in net worth, if the public wished to hold the bulk of these increased bank liabilities in the form of non-transactions deposits exempt from reserve requirements, then the demand for reserves, being primarily a function of legal reserve requirements, would not increase commensurate with the increase in the supply of reserves. As a result, the federal funds rate would continue to fall and banks' earning assets would continue to increase until reserveable transactions deposits increased enough to re-equilibrate the demand and supply of reserves. In the case of no legal reserve requirements, the monetary authority would simply keep increasing reserves and thus lowering the federal funds rate until the targeted level of transactions deposits appeared. Only in the extreme cases where the public did not wish to change its holdings of transactions deposits at either a zero level or infinite level of nominal interest rates would the monetary authority not be able to hit its target level of transactions deposits in a banking system with less than 100 percent reserve requirements.

²¹ This view that the demand for money need not play a role in the determination of the money stock

may, at first, seem at odds with conventional economic analysis. Economists usually assume that prices and quantities are determined by the interaction of supply and demand. But when the government has a monopoly in the production of a good or service and its supply curve is completely price inelastic, i.e., the quantity supplied is totally unresponsive to price, the demand for this good or service is irrelevant in the determination of the quantity that will be produced. As an example, the U.S. Treasury has a monopoly in the production of Treasury securities. The quantity of Treasury securities outstanding is strictly a function of the federal government's spending and taxing policies. The relevance of the public's demand for Treasury securities is in determining at what price or interest rate the stock of securities will be held.

Similarly, because the monetary authority has a monopoly in the production of high-powered money, it can set the *nominal* quantity of money at whatever level it chooses, but the public, through its demand for real money balances, will determine the price at which this nominal quantity will be held. Because the price of money is the amount of goods and services a unit of it will buy or, what is the same thing, the inverse of the general price level, it can be said that the public's demand for real money balances determines the general level or inflation rate given the nominal stock of money produced by the monetary authority.

²² Milton Friedman and David Meiselman in "The Relative Stability of Monetary Velocity and the Investment Multiplier in the United States, 1897-1958," *Stabilization Policies* (Englewood Cliffs, N.J.: Prentice-Hall, 1963), p. 219, argue that this situation is a momentary equilibrium because "[m]oney is a temporary abode of purchasing power to which the proceeds from attractive selling opportunities can be added pending decisions what to buy and from which attractive buying opportunities can be financed pending the finding of attractive selling opportunities." This fundamental attribute of money appears to be similar to what is referred to as the role of money as a "buffer stock" in John P. Judd, "Deregulated Deposit Rates and Monetary Policy," Federal Reserve Bank of San Francisco, *Economic Review*, (Fall 1983), pp. 39-41.

²³ See Knut Wicksell, *Interest and Prices*, translated by R. E. Kahn (London: Royal Economic Society, 1936).