Reserves against Debits

Financial developments during the last few years have provided some valuable insights into the problems the Federal Reserve is likely to encounter in targeting a narrow monetary aggregate over the next few years. The rapid growth of NOW accounts since 1981 illustrates how difficult it is to interpret M-1 growth when a single account contains both savings and transactions balances. Working in the opposite direction, the increased emphasis on cash management by the corporate sector has spurred the development of financial innovations, resulting at times in weak growth of M-1 relative to income and interest rates since the mid-1970s. Analysts are increasingly questioning the future usefulness of M-1 as a guide to policy.[1]

As the financial system continues to evolve, that is, as interest rate ceilings are phased out and consumers and corporations continue to find new ways to hold transactions and investment balances, it will become increasingly difficult to measure a transactions concept of money. This raises the question whether monetary policy should be formulated in terms of a reserves path linked to balances in certain types of accounts or whether the reserves path should be tied to deposits in some way other than daily average balances.

This issue has been raised before, and it seems worthwhile to reexamine the solutions that were proposed as a first step toward finding answers for current policy problems. In 1932, the Committee on Bank Reserves of the Federal Reserve System proposed that reserve requirements be placed, not only on the level of deposits, but also on the volume of debits to those deposits:[2]

> These withdrawals, which are shown by debit entries on the books of member banks, are the only real test of the activity of a deposit account and furnish the only basis by which that activity can be equitably and effectively reflected in requirements for reserves. Under this proposal, therefore, each deposit will carry a total reserve based on its activity as well as on its amount.

Could a reserves path approach to policy be improved if reserve requirements were also placed on the daily average outflows or debits from certain accounts rather than only on balances in accounts used for transactions purposes? Debits, it can be argued, give a good indication of the volume of transactions a given account is used for whether or not it contains some savings balances as well as transactions balances. Hence, with reserve requirements on debits in addition to balances, an account of a given size used extensively for transactions would have a higher re-

[1] For example, Frank E Morris, "Do the Monetary Aggregates Have a Future as Targets of Federal Reserve Policy?", *New England Economic Review* (March/April 1982); Anthony M Solomon, "Financial Innovation and Monetary Policy", *Annual Report-1981* (Federal Reserve Bank of New York)

[2] *Annual Report* (Board of Governors of the Federal Reserve System, 1932), page 262

serve requirement than one of the same size not used for transactions as much because it also contains savings balances Because the volume of income-related transactions or debits should reflect the state of the economy, reserve requirements on debits would automatically give a signal about undesired strength or weakness in the economy, as the demand for reserves deviates from path. Moreover, the structure of reserve requirements on debits and balances could be so designed that financial innovations would not necessarily result in an easing in policy which could occur when reserve requirements are placed on balances only. The additional debits necessary to manage balances at lower levels would still generate reserves pressures as would the income-related debits. In some sense, it could even be said that such an approach would bridge part of the gap between those arguing that the Federal Reserve should focus on money and those arguing that the Federal Reserve should target nominal GNP directly.

Debits have been growing much more quickly than GNP or M-1 since about the mid-1960s (Chart 1).[3] The more rapid growth of debits, however, should not be surprising during a period of increasing inflationary pressures As higher inflation rates were reflected in higher nominal rates of interest, the increased emphasis on cash management not only reduced desired cash balances but also increased the volume of debits required to keep money balances at the lower desired levels This has resulted in much more rapid growth of velocity, measured as the ratio of debits to money, than in the more conventional measure of velocity calculated as the ratio of GNP to money balances

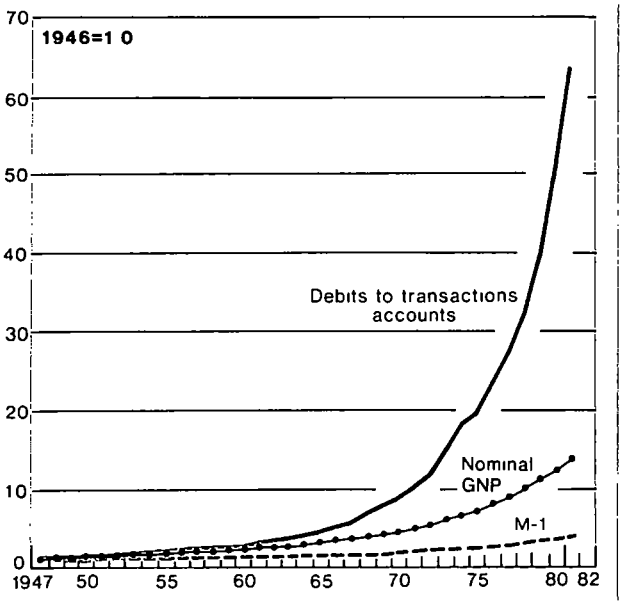
In the next section of this article, the potential use of debits in the policy process is explored in detail Some econometric results are presented in Appendix 1, using the debit statistics to show the effects of financial innovation on the demand for money since the mid-1970s The results suggest that:

- Prior to 1973 debits explained the transactions demand for money about as well as income.
- Since 1973, however, debits appear to be a better proxy for financial transactions undertaken to reduce money balances while still allowing the same volume of income-related transactions.

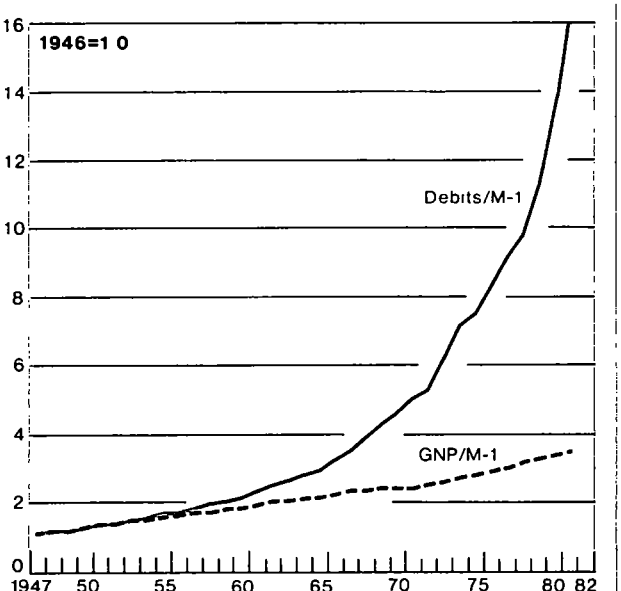
[3] The debit statistics are published in the *Federal Reserve Bulletin* The series is based on a limited sample which has been changed over the years On a month-to-month and quarterly basis, the debits statistics are very volatile For a detailed discussion of this series, see George Garvy, "Debits and Clearing Statistics and Their Use" (Board of Governors of the Federal Reserve System, 1958)

Chart 1

With the volume of debits to transactions accounts growing much faster than M-1 or nominal GNP . . .



. . . the velocity of M-1 measured in terms of debits has increased much more rapidly than velocity measured in terms of GNP.



Source Board of Governors of the Federal Reserve System

Table 1

Effects on Required Reserves of Alternative Reserve Requirements on Debits*

In dollars; figures in parentheses are percentage deviations from initial conditions

Example	Daily average balances	Daily average debits: Income related	Daily average debits: Financial	Levels of required reserves†: r = 0 15, y = 0	r = 0 05, y = 0.05	r = 0 02, y = 0 065	Velocity = income debits ÷ total balances
Initial conditions ...	200	400	0	30 00	30 00	30 00	2.0
(1)	130	400	10	19 50 (−35)	27 00 (−10)	29 25 (−2 5)	3.1
(2)	130	260	10	19.50 (−35)	20 00 (−33 33)	20.15 (−32 83)	2.0
(3)	130	120	10	19 50 (−35)	13 00 (−56 67)	11 05 (−63.17)	0.9
(4)	130	400	70	19 50 (−35)	30.00 (0 00)	33.15 (10 50)	3.1
(5)	200	200	0	30 00 (0.0)	20 00 (−33 33)	17 00 (−43 33)	1.0

* The table was constructed assuming that the $200 in NOW account balances in the initial conditions case is equally divided into savings and transactions balances ($100 each) In all the examples, the assumption is made that transactions balances are held in a constant proportion to income debits (4 = $400/$100). Savings balances are assumed not to be related to the level of income debits The figures in parentheses represent percentage deviations in required reserves for examples (1) through (5) from the levels in the initial conditions case

† Assuming reserve ratios (r on balances, y on debits), first, for a 15 percent reserve requirement on daily average balances only, second, for a 5 percent reserve requirement on daily average balances and debits, and, third, for a 2 percent reserve requirement on daily average balances and 6 5 percent on daily average debits

* * * *

This part of the table is intended for readers who desire a more general understanding of the example above. It is not necessary for following the main points of the article. If money (M) has both a savings (S) and a transactions (T) component, then total income-related debits (D) are equal to debits to the savings component (DS) plus debits to the transactions component (DT).

(1) $M = S + T$
(2) $D = DS + DT$

The income turnover or velocity of transactions balances (VT) is equal to the volume of income-related debits to the transactions component (DT) divided by the level of transactions balances (T). Similarly, the income turnover of savings (VS) is calculated as income-related debits to the savings component (DS) divided by savings balances.

(3) $VT = DT/T$
(4) $VS = DS/S$

Required reserves (R) are equal to the reserve ratio on deposits (r) multiplied by the daily average level of deposits plus the reserve ratio on debits (y) multiplied by the daily average volume of debits.

(5) $R = rM + yD$

Equation (5) can also be written as:

(6) $R = rS + rT + yDS + yDT$

Solving equations (3) and (4) for DT and DS and then substituting into equation (6) yields:

(7) $R = (r + yVT)T + (r + yVS)S$

If VS is equal to VT, then a change of a given size in either savings or transactions balances will result in the same short-run movement in the demand for reserves. (This is also the result when there are reserve requirements on balances only.) But, since VT is considerably greater than VS, reserve requirements on debits give greater weight, in effect, to movements in the transactions component.* In the numerical example above, VT (income debits/transactions balances) was set equal to 4, and VS equal to zero by assuming there were no income debits to savings balances. VT and VS were treated as constants. But they could vary in practice. If so, the impact on the demand for reserves would depend upon the relative sizes of S and T, and whether the change in VS or VT was caused by a movement in income debits or in balances.

* Here, the focus has been on income-related debits If the analysis is extended to include the financial debits as well, total velocity of each component (income debits plus financial debits/balances) would determine the relative weights given to the transactions and savings components

Appendix 2 contains an analysis of placing reserve requirements on debits in the context of a simple IS-LM model. The main conclusions are:

- Reserve requirements on debits could help stabilize income from shocks originating in both the monetary and real sectors.
- At what level to set reserve requirements on debits relative to requirements on balances is an open question. It depends upon the type of shocks the economy is likely to encounter.

Potential use of debits in monetary policy

Would monetary policy be more responsive to changes in economic activity if reserve requirements were placed against debits as well as balances? In this section, this question is explored for both the corporate and consumer sectors. Suppose that an increase in the demand for transactions balances occurs because income is expanding more rapidly than expected. Businesses are assumed to manage demand deposits at minimal levels on a continuous basis. Thus, they would increase the volume of debits to their demand accounts, as sales improved and more funds than usual accumulated in their accounts and needed to be invested daily in liquid (overnight) instruments. Likewise, debits would increase as corporate payrolls and other variable business costs rose along with the more rapid growth of aggregate demand and production. Under such circumstances, the increased demand for reserves relative to the target path caused by the greater volume of debits would push interest rates higher. Conversely, as the economy slowed in response to higher rates, a smaller volume of funds would accumulate each day in corporate accounts for overnight investment, and firms would cut back on their spending for labor and other variable factors of production. This would cause the volume of debits to fall, thereby easing reserve pressures. Under the assumption used here—that firms in the future will be very effective in managing cash balances—reserve requirements against debits would automatically apply pressure to correct deviations in the demand for "money" and hence reserves from target. In contrast, under the same assumption that firms manage balances at constant minimal levels, reserves on balances only would have little automatic effect on controlling "money" held by the corporate sector.

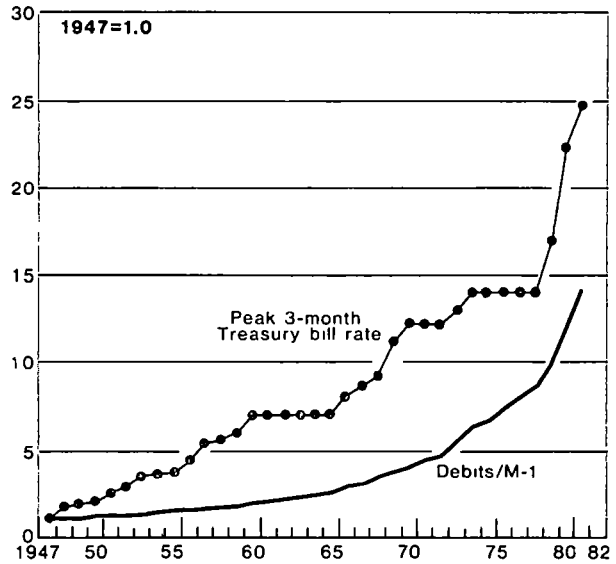
For consumers, who would be holding both savings and transactions balances in their NOW accounts, the consequences of having reserve requirements on both debits to and balances in NOW accounts are more difficult to analyze. To illustrate how it might work, a simple example was constructed (Table 1). The numbers were chosen for the sake of ease of illustration. In the first row, the example shows three different ways a given level of required reserves ($30) could be generated. The first column shows daily average balances, the second column daily average income-related debits, and the third column financial transactions. The numbers in the middle group of figures of the table are required reserves, first under the assumption of a 15 percent reserve requirement on daily average balances only, then under the assumption of a 5 percent reserve requirement on both daily average debits and daily average balances, and finally required reserves when there are reserve requirements of 2 percent on daily average balances and 6.5 percent on daily average debits. In each of the next three examples, it is assumed that balances in NOW accounts are reduced by $70 from the levels in the "initial conditions" case as a result of a single substitution out of NOW accounts into some other financial instrument at the beginning of the week. Therefore, daily average financial debits for the week increase by $10 ($70 ÷ 7). Depending on the source of that $70 reduction of NOW account balances (savings or transactions balances), the percentage drop in the demand for required reserves will vary in the short run according to how reserve requirements are set.

The *first example* is constructed to show what would happen to the demand for reserves in the short run when NOW account balances decline from $200 to $130 because of a $70 reduction of the savings component of NOWs. Since the reduction stems from a decline in savings balances, income debits remain at the same level and velocity measured in terms of total balances rises from 2 to 3.1 (final column of table). If reserve requirements are on balances only, there is a 35 percent reduction of the demand for reserves, compared with the initial conditions. But, if there are reserve requirements on debits also, a much smaller percentage decline in the demand for required reserves would occur. The latter seems to be a more correct result when the savings or investment component, not the transactions component of NOWs, is being reduced. In other words, if the reserves levels in the initial conditions are target levels, then the interest rate reduction with reserve requirements on debits and balances would be smaller than with reserve requirements on balances only. And, since economic activity has not declined even though total NOW account balances have, the smaller reduction of rates seems more appropriate.

In the *second example,* savings and transactions balances are reduced in proportional amounts. As a result, the decline in total NOW account balances is proportional to the fall in income debits, and velocity

Chart 2

Peak Three-Month Treasury Bill Rate and Velocity of M-1 in Terms of Debits



Source Board of Governors of the Federal Reserve System

is stable. Thus, in this very special case, the decline in total NOW account balances is an accurate indicator of what is happening to economic activity, even though NOW accounts contain both savings and transactions balances Under these circumstances, the decline in the demand for reserves is much the same, regardless of how reserve requirements are set

Turning next to the *third example*, it is assumed that the $70 reduction of NOW account balances occurs because of a reduction of the transactions component of NOW accounts Income velocity—measured in terms of total balances—declines to about one as a result. In other words, the economy declined more sharply than total NOW account balances. As in the previous two examples, if reserve requirements are on balances only, the demand for reserves in the short run declines by 35 percent. But, when there are reserves on debits also, the percentage decline in reserves demand is considerably larger because of the greater percentage decline in income debits than in total balances. In this case, if the reserves levels in the initial conditions case are the target levels for reserves, interest rates would decline considerably more, when there are also reserve requirements on debits, than when reserves are on balances only Again, this seems to be a more correct policy response

Example four is designed to show what happens if a financial innovation is developed that enables the consumer to undertake the same volume of income-related debits with lower average transactions balances. In this example, balances are reduced 35 percent by a $70 overnight investment at the end of each business day. It is assumed that the next day the funds are brought back into the account and can be used again for transactions purposes. Thus, rather than having a daily average volume of $10 in financial debits as was the case in examples (1) through (3), financial debits average $70 because withdrawals are done daily, not just once, to attain the lower average balance. In this case, reserves only on balances give completely the wrong signal, that is, the demand for reserves falls 35 percent below the assumed reserves path even though the economy has not weakened With equal reserve requirements on debits and balances, the reserves freed by lower average balances are absorbed by the higher volume of financial debits, and there is no deviation from path as a result. When there is a higher ratio on debits than on balances, required reserves would increase. The latter would produce an unnecessary tightening in the reserves market.

In the *fifth example*, the economy is assumed to be weakening Transactions balances decline as a result, but total balances remain unchanged because it is assumed that consumers increase precautionary savings balances Income velocity falls because, while balances remain unchanged, income debits decline along with the drop in transactions balances. With reserves on balances only, the demand for reserves remains unchanged If there are reserves on debits also, the demand for reserves falls, leading to an easing in the reserves market, an appropriate policy response since the economy has weakened In the bottom panel of Table 1 is the basic model underlying the numerical examples just discussed It is not necessary to read that part of the table to understand the rest of the article

When the proposal was made back in 1932 to put reserves against debits as well as balances, stable growth of money did not seem to be an issue Basically, the concern was that, even if the Federal Reserve controlled the reserves base and therefore in some sense money, income could still expand more rapidly than desired because of an increase in velocity that might not be recognized immediately When reserve requirements are against debits as well as balances, policy would automatically tighten when velocity increases and ease when it falls. Moreover, the

higher the reserve ratio on debits is set relative to the reserve requirements on balances, the greater would be the policy response to changes in velocity. The 1932 Federal Reserve committee, in fact, proposed setting reserve requirements on balances at 5 percent and on debits at 50 percent. However, at that time the distinction between income-related debits and cash-management debits had not been made, and the above examples suggest that under certain circumstances it might be better to set the same reserve requirement ratio on both debits and balances (Appendix 2).

Is such an approach practical?

It appears at least in theory that monetary policy might be more responsive in the future to changes in economic conditions if required reserves were linked to debits against transactions accounts as well as to balances in those accounts. But the practical implementation of such an approach would still require far more research.[4] If an increase in financial debits not related to cash management occurred, both the balances in transactions accounts (as is the case currently) and debits could increase, causing the demand for reserves to be above path. To the extent that this represented "speculation" in the stock, bond, money, or commodities markets, some tightening of monetary policy might be desirable. But to the extent the increase in financial debits represented a financial panic or crisis, during which the public shifted from one type of financial asset to another, such a tightening in policy would not appear to be appropriate.

It is also possible that the volume of transactions debits associated with a given level of GNP could change over time, causing monetary policy to ease or tighten for reasons not related to the general level of economic activity. For example, the degree of integration of different business activities within one company influences the number of transactions routed through banks. A shift toward smaller firms would cause an increase in the volume of debits associated with a given level of GNP. Moreover, if banks explicitly charged customers according to the volume of debits against their accounts, there would be an incentive to use currency more for transactions and perhaps find other ways to avoid debiting accounts when making transactions.

In addition, the debits statistics, as currently compiled, are very volatile on a month-to-month and even on a quarterly basis. This would probably add to interest rate variability. However, it is difficult to know how much of a problem this would be in practice because the statistics are now based on a limited sample. Moreover, much of the volatility of the debits statistics might be eliminated if reserve requirements were not placed on the accounts of certain dealers and brokers of financial instruments. All in all, it appears that much more work is needed on this topic before any firm conclusions could be reached, but it does appear to be a proposal that is worthwhile reconsidering some fifty years later.

John Wenninger

[4] For additional discussion of difficulties with such an approach W L Smith, "Reserve Requirements in the American Monetary System", *Monetary Management* (Commission on Money and Credit), 1963

Appendix 1: Debits and the Demand for Money

From the point of view of money demand, it is not clear how debits fit in. Some analysts have argued that debits are a better measure of the total transactions demand for money than GNP because debits would also allow for demand for money for non-GNP transactions and financial transactions.* However, those financial transactions (debits) undertaken to manage money balances more efficiently, *i.e.*, overnight repurchase agreements (RPs) or sweeps into money funds, would be actions that reduce money balances, as measured at the close of business, not increase the demand for money. To the extent that the growth of debits since the mid-1960s and the even more rapid growth of debits since the mid-1970s (Chart 1) represent increased emphasis on cash management, the growth of debits might serve as a reasonable proxy for the effects of financial innovation on the demand for money. Some analysts have proxied for the effects of financial innovation by using an interest rate ratchet variable, *i.e.*, a variable that rises to new peaks but never declines.† Chart 2 shows the close timing in the movements of this variable as compared with the debits/M-1 ratio, suggesting that perhaps the volume of debits might also be a relatively good proxy for the effects of financial innovation on money demand once the levels of income and interest rates are allowed for. Reported in Table 2 are some results using a standard money demand equation.

Equations (1) and (2) are money demand equations estimated through 1982-III and 1973-IV, respectively. As has been well documented in other studies, the equation deteriorates when the sample period is extended, with the coefficient on the lagged dependent variable rising to almost one and the income elasticity declining sharply. Equations (3) and (4) show the results of using debits rather than income as the transactions variable. For the shorter sample period, debits work about as well as income—compare equations (2) and (4)—but for the longer sample period the estimated coefficient on debits becomes insignificant. In equations (5) and (6) both debits and income are used. Debits are insignificant in the shorter period —equation (6)—suggesting debits and income are both measuring transactions and competing for explanatory power prior to 1974. In the longer sample period, however, both debits and income are significant, but debits have a negative coefficient. This could be because debits are increasing relative to income as a result of financial transactions geared toward managing money balances more efficiently, and hence more aggressive cash management has changed the relationship between debits and money demand.

* For example, Charles Lieberman, "The Transactions Demand for Money and Technological Change", *Review of Economics and Statistics* (August 1977)

† Richard D Porter, Thomas D Simpson, and Eileen Mauskopf, "Financial Innovation and the Monetary Aggregates", *Brookings Papers on Economic Activity*, 1979

Table 2

Regression Results

(1)	$M = -0.12 + 0.02Y - 0.02R + 0.97M(-1)$ (2.3) (2.6) (4.1) (36.6)	$\bar{R}^2 = 0.96$	M = ln (M-1/GNP deflator) Y = ln (nominal GNP/GNP deflator) R = ln (three-month Treasury bill rate) D = ln (debits/GNP deflator)
(2)	$M = -0.55 + 0.12Y - 0.01R + 0.71M(-1)$ (3.6) (3.4) (2.7) (6.4)	$\bar{R}^2 = 0.97$	
(3)	$M = -0.002 + 0.005D - 0.01R + 0.99M(-1)$ (0.1) (1.7) (3.3) (41.0)	$\bar{R}^2 = 0.96$	
(4)	$M = 0.04 + 0.05D - 0.01R + 0.70M(-1)$ (1.0) (3.2) (2.0) (6.2)	$\bar{R}^2 = 0.92$	
(5)	$M = -0.63 + 0.13Y - 0.04D - 0.01R + 0.88M(-1)$ (3.7) (3.7) (3.1) (3.4) (22.1)	$\bar{R}^2 = 0.97$	
(6)	$M = -0.63 + 0.13Y - 0.01D - 0.01R + 0.75M(-1)$ (2.8) (2.8) (0.6) (2.9) (6.8)	$\bar{R}^2 = 0.98$	

Regressions were run with quarterly data, adjusted for first-order autocorrelation Each equation was run for two time periods 1959-II through 1982-III and 1959-II through 1973-IV The shorter sample period equations are reported in the second position in each group Statistics in parentheses beneath coefficients are t-values

Appendix 2: Economic Consequences of Reserve Requirements on Debits

A simple IS-LM model can be used to illustrate some of the economic consequences of putting reserve requirements on debits. Table 3 shows the basic model —equations (1), (2), and (3)—as well as the resulting reduced-form equations for income with and without reserve requirements on debits, equations (4) and (5). In this simple model, it is assumed that debits can be divided into three groups: income-related debits, cash-management-related debits that result in a shift in the money demand equation, and all other debits such as purely financial or non-GNP transactions.*

Equation (4) is the reduced form for income with reserve requirements on debits and balances, and equation (5) is the reduced-form equation when reserve requirements are placed on balances only. Comparing the coefficients on autonomous expenditures (X) in equations (4) and (5), it can be seen that the numerator is the same in both cases but the denominator is larger in equation (4). Thus, when there are reserve requirements on debits, a given increase in autonomous expenditures will have a smaller impact on income than when reserve requirements are on balances only The same holds true for shifts in the demand for money (Z). This is because, when income begins to increase in response to an exogenous shock (an increase in autonomous expenditures or a reduction of money demand), it begins to absorb reserves and, given the fixed supply of reserves, the money stock is reduced.

An increase in cash management debits (CD) at first glance would seem to reduce income because it would absorb reserves. But, since it results in a reduction of the demand for money of the same size, there would be no effect on income as long as the reserve ratio on balances (m) is equal to the reserve ratio on debits (y). Hence, if more aggressive management of cash balances is expected to reduce the demand for money further in future years, it might be worthwhile to consider setting the same reserve requirement on balances and debits. For this particular problem, the level of the reserve requirement ratios does not matter, only whether or not they are equal.†

However, for changes in autonomous expenditures or shifts in money demand not related to a greater volume of cash management debits, a greater reserve ratio for debits than for balances would help stabilize income. For example, looking at the coefficient on X, the greater the reserve requirement on debits (y), the smaller the impact a change in autonomous expenditures will have on income. If y is set equal to m, however, the reserve ratios cancel out of both the numerator and the denominator and it does not matter what level is set.

Thus, how to set the reserve ratios remains an open question. If it is felt that the major problem will be a greater volume of cash management debits being used to lower money demand, then it would pay to set the reserve ratios at the same level. On the other hand, if the major problems are likely to be other types of shifts in the demand for money or changes in autonomous expenditures, then the reserve ratio on debits should be set higher than the one on balances. This, of course, was the position taken by the 1932 Committee on Bank Reserves. Finally, if debits other than those related to income and cash management (OD) are very large and volatile, it might be better not to place reserve requirements on debits.

* For the sake of ease of presentation, it is assumed that the volume of income-related debits is equal to the level of income In practice, however, there would be a proportionality factor involved that would not alter the results as long as it remained constant The nonincome-related debits are assumed to be exogenous

† It is implicitly assumed that the cash management debits are overnight investments only Thus, the reduction of balances on a daily average basis equals the increase in cash management debits To the extent that the investments are longer than overnight, the reduction of balances would be greater than the increase in daily average debits

Table 3

Comparison of Reduced-Form Equations for Income with and without Reserve Requirements on Debits

(1) $M = -ar + bY + Z$

(2) $Y = -cr + X$

(3) $R = mM + yY + yCD + yOD$

(4) $$Y = \frac{c}{yc + ma + bmc} R + \frac{ma}{yc + ma + bmc} X - \frac{mc}{yc + ma + bmc} Z - \frac{yc}{yc + ma + bmc} CD - \frac{yc}{yc + ma + bmc} OD$$

(5) $$Y = \frac{c}{ma + bmc} R + \frac{ma}{ma + bmc} X - \frac{mc}{ma + bmc} Z$$

M = narrow money stock
r = the interest rate
Y = income
Z = money demand shift
X = autonomous expenditures
R = total reserves, determined exogenously
CD = cash management debits
OD = debits for other than income or cash management
m = reserve ratio on deposits
y = reserve ratio on debits
a, b, c = structural parameters