

Shifts in Money Demand: Consumers versus Business

The year 1982 was particularly difficult for interpreting M-1 data. The growth of money (M-1) during 1982, whether viewed in terms of velocity (Chart 1) or in terms of the levels predicted using a conventional money demand equation (Chart 2), was much stronger than past experience would have suggested. Moreover, rapid M-1 growth has continued through the first half of 1983. Not only was the strength in M-1 surprising, but virtually all of the strength was in the money holdings of the consumer sector and concentrated in NOW account deposits. The business sector, in contrast, economized on cash balances.

These markedly different trends among the components of M-1 raise questions about whether the relationship between M-1 and the level of economic activity is changing. A higher percentage of total money holdings is in the consumer sector. Of these holdings a higher percentage is being held in interest-bearing deposits. Moreover, in recent years consumers have been offered additional liquid market-rate-yielding alternatives to transactions balances. This makes it very likely that the response of consumer money holdings to changes in interest rates is quite different from what it was before.

In many ways, 1982 was a year that points to several problems that are likely to be encountered in the future with M-1 as an intermediate target for monetary policy. And the data available thus far in 1983 point to the conclusion that these problems are persisting beyond 1982. Thus, it is important to learn as much as possible from monetary developments in 1982.

Of course, 1982 was not the first time there was a

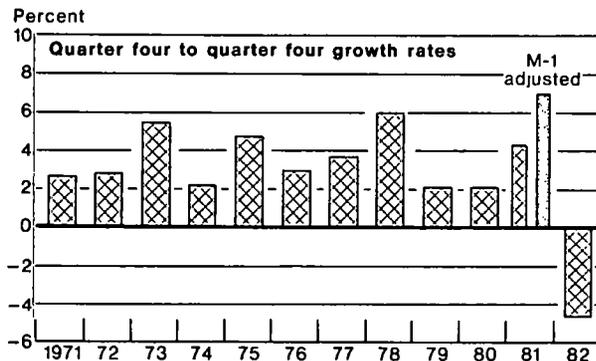
sizable disparity between the actual growth of M-1 and the growth predicted by a conventional money demand equation (Chart 2). For example, in 1974 and 1975, the money stock tended to grow at rates considerably less than would have been expected from past relationships with income and interest rates, *i.e.*, a negative prediction error. In contrast, from 1976 to 1980, the prediction error over each year tended to be rather small.¹ But in 1981 there appears to have been another substantial overprediction of money (perhaps even larger than in 1974 or 1975) and in 1982 a sizable underprediction. Not only is an underprediction of money surprising during a period of advancing technology in managing money balances, but in absolute terms the 1982 prediction error is one of the two largest out-of-sample errors for any year in the post-1973 simulation period! Thus, the stability of the public's demand for money has become an issue once again.

In this article, the consumer and business sectors are examined individually. Clearly, the money holdings of the two sectors were not responding to the same sets of forces in 1982 or, for that matter, in 1981.

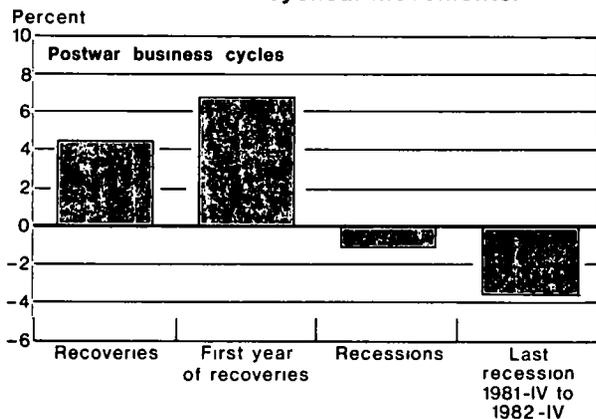
¹ In Chart 2, errors are plotted from a static simulation in which the actual values of the lagged money stock are used during the projection period rather than the values predicted by the equation. If the predicted values had been used and a "dynamic" simulation run had been taken, the overall pattern in the errors would have been roughly the same, although the downward shift in the mid-1970s would appear somewhat larger. Some deterioration in the equation's ability to track movements in money would have been expected as the simulation period is extended farther away from the sample period, but nonetheless the recent behavior of M-1 relative to the forecasts is quite striking compared with the 1976-80 period.

Chart 1

In 1982 the velocity of M-1 was extremely weak, whether viewed relative to recent years . . .



. . . or in terms of cyclical movements.



Consumers were permitted to hold interest-bearing checking accounts—NOW accounts—while firms were not. Businesses, however, it could be argued, continued to emphasize cash management, particularly in 1981 when interest rates were very high. Thus, it should be more revealing to examine separately the checkable deposit holdings of these two sectors during the past few years, rather than to look just at economy-wide velocity or money demand results for the M-1 measure of money.

In the next section of this article, velocity trends for the consumer and business sectors are examined for a general idea of their contributions to the large decline in aggregate velocity in 1982. The section following that explores the problem in terms of separate checkable-deposit-demand equations for the two sectors, while in the third section some of the possible

reasons for the steep decline in velocity in the consumer sector are explored in more detail. In the conclusion, some of the policy implications are spelled out.

By and large, the analysis suggests that rapid growth of NOW account balances held by the consumer sector was the primary reason for the decline in velocity during 1982.

- New NOW accounts continued to be opened in 1982 and hence, as was the case in 1981, M-1 was inflated somewhat as savings and demand deposits were combined into NOW accounts.
- The responsiveness of M-1 to changes in market rates appears to be increasing in part because NOW accounts earn a 5¼ percent rate of interest and in part because several highly liquid alternatives to M-1 deposits that bear market yields have become widely used in recent years by the consumer sector. After allowing for the opening of new accounts in 1982, even a very conservative market rate response by the consumer sector would explain the increase in deposits.

This conclusion, of course, has important implications for policy in the future because money market deposit accounts (MMDAs) could add further to the market interest rate response of the consumer sector's money holdings. This will be offset, at least in part by the Super NOW account—a component of M-1 that bears a market-related rate. Nevertheless, all these developments mean that it will be difficult to interpret M-1 for some time, and alternative approaches will be required in implementing policy.

Velocity trends in the consumer and business sectors

Prior to 1979, velocity—GNP/checkable deposits—in both the consumer and business sectors was increasing (Chart 3) and the sectoral velocities tended to move in a parallel manner. (Box 1 gives more detail on the sectoral decomposition of demand deposits and total checkable deposits.) Since that time, however, it has not been widely noted that the velocity of checkable deposits—demand deposits plus NOW deposits—in the consumer sector has been *declining*, while in the nonfinancial business sector velocity has continued to increase. In fact, velocity in the business sector increased so rapidly in the past few years that the volume of demand deposits held by businesses at the end of 1982 was virtually equal to what it was four years earlier. This occurred even though nominal GNP rose 36 percent over that period. In contrast, the consumer sector increased its holdings of checkable deposits by 81 percent during that time.

What this means is that the predictability or stability in the trend of aggregate velocity in 1979, 1980, and especially 1981 was the result of a coincidence. The divergent movements in the consumer- and business-sector velocities just happened more or less to offset each other in those three years. Consequently, aggregate velocity appeared to be roughly in line with its trend over the previous ten years. The year 1981 was particularly fortuitous in that velocity in the business sector increased by 15 percent, while simultaneously velocity in the consumer sector decreased by 13 percent. But it is difficult to imagine that offsetting movements such as these would continue indefinitely. And, in 1982, velocity growth in the business sector returned to its long-run trend, while velocity growth in the consumer sector remained as weak as it had been in 1981. These developments thereby produced the remarkable drop in aggregate velocity observed in 1982.

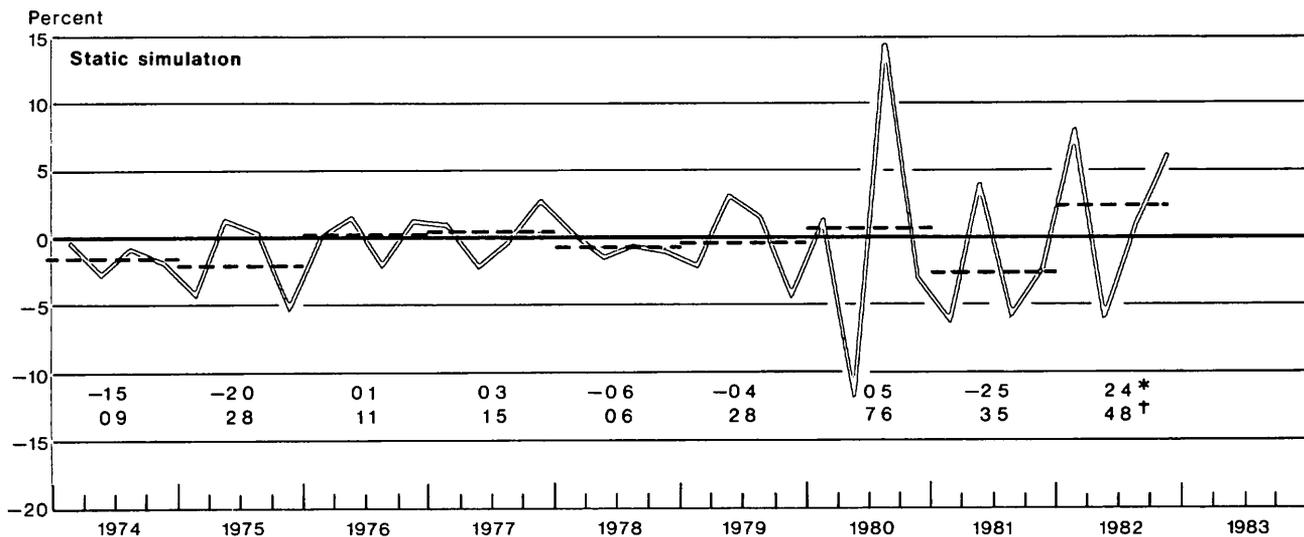
As a result of the large increase in checkable deposit holdings by the consumer sector over the past

few years, compared with no increase by the business sector, consumers held at the end of 1982 about 48 percent of total checkable deposits and the business sector 38 percent. As recently as 1976, the breakdown was 38 percent for the consumer sector and 52 percent for the business sector, a swing of 10 to 14 percentage points in relative checkable deposit holdings. (Other sectors currently hold about 14 percent of total checkable deposits.) Because of this shift in the composition of total checkable deposits, changes in the trend of aggregate velocity and in its behavior over the business cycle could occur, particularly since consumers can also earn interest on certain types of checkable deposits. Moreover, for the same reasons, estimates of economywide money demand equations could suffer from considerable aggregation bias. And, finally, the changing sectoral composition of M-1 points to potential problems for the implementation of monetary policy based on M-1 as the intermediate target.

Chart 2

Errors from Conventional Money Demand Equation

Quarterly growth rates and annual averages



Estimation period is 1959-II through 1973-IV

$$M = 0.61 + 0.69M(-1) - 0.016CP - 0.024RCBP + 0.16Y$$

(181) (674) (361) (179) (438)

$\bar{R}^2 = 0.98$

M = ln (M-1/GNP deflator)

CP = ln (commercial paper rate)

RCBP = ln (commercial bank passbook rate)

Y = ln (real GNP)

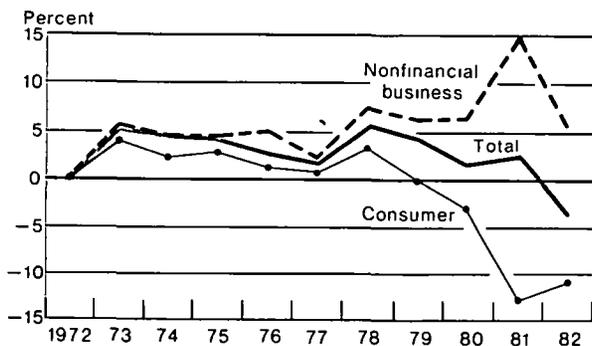
* Row of figures indicates annual average errors for indicated years

† Row of figures indicates average quarterly absolute deviation for indicated years.

Chart 3

Velocity Growth of Checkable Deposits

Fourth quarter to fourth quarter



Source Federal Reserve Bulletin

Checkable-deposit-demand equations for the consumer and business sectors

Tracking velocity trends is one of two approaches frequently used to analyze the growth of money or checkable deposits. In this statistical section of the article, separate checkable-deposit-demand equations for the consumer and business sectors are employed. The regression equations indicate that for the consumer sector the demand for checkable deposits remained stable through 1980 but shifted sharply upward in 1981 and again in 1982. By the end of 1982, the consumer sector was holding about \$33 billion more of checkable deposits than past experience would have suggested. In contrast, the equation for the business sector points to a relatively stable demand in that sector in the 1981 and 1982 period, although business money holdings were overpredicted to a moderate degree, about \$7 billion.

For the consumer sector, however, a variable that serves as a proxy for the number of NOW accounts opened stabilizes the coefficient estimates of the equation when the sample period is extended through 1981. Moreover, when this modified equation is simulated through 1982, the prediction error is reduced to \$8 billion. The remaining error appears to have been associated with the decline in interest rates, and that aspect as well as others are explored in the section on 1982 growth of checkable deposits and the decline in market interest rates.

In estimating the regression equations for the two sectors, three difficulties immediately arise. First, the quarterly Demand Deposit Ownership Survey (DDOS), from which the breakdown for consumer and business

demand deposit holdings is obtained, begins in 1971, thereby limiting the sample period over which any such equation might be estimated. Second, it is difficult to incorporate the effects of technological change and financial innovation on money demand in the two sectors.² And, third, the widespread use of NOW accounts by consumers is not the only important change in financial services affecting the checkable deposit holdings of consumers. Most notably, over the past few years there has been a considerable change in the instruments used by consumers for liquid savings and, therefore, also in the closest alternatives to holding checkable deposits. Consumers have moved largely from conventional savings and small time deposits earning low, fixed rates of interest to money market certificates (MMCs), money market mutual funds (MMMFs) and most lately MMDAs, all earning market rates of interest and in some cases offering limited transactions features.

Recognizing that these difficulties limit the confidence that can be placed in the results, a checkable-deposit-demand equation was estimated first for the consumer sector over the 1971-II to 1978-IV period, and then reestimated with the sample period extended one year at a time through 1982-IV. The results are reported below.³ Since the DDOS is not seasonally adjusted, seasonal dummy variables were also included in the regressions, but the coefficient estimates are not reported.⁴

- (1) 1971-II to 1978-IV.

$$TCD = -6.60 + 0.98Y - 0.23PBR - 0.09D1$$
 $\bar{R}^2 = 0.88$
 $\rho = 0.31$
(13.7) (13.3) (2.8) (7.0)
- (2) 1971-II to 1979-IV.

$$TCD = -6.90 + 1.03Y - 0.25PBR - 0.10D1$$
 $\bar{R}^2 = 0.90$
 $\rho = 0.24$
(15.4) (14.8) (2.8) (6.8)
- (3) 1971-II to 1980-IV.

$$TCD = -6.87 + 1.03Y - 0.25PBR - 0.10D1$$
 $\bar{R}^2 = 0.90$
 $\rho = 0.27$
(15.4) (14.2) (2.6) (6.5)
- (4) 1971-II to 1981-IV.

$$TCD = -0.53 + 0.29Y - 0.59PBR - 0.12D1$$
 $\bar{R}^2 = 0.15$
 $\rho = 0.99$
(0.1) (0.6) (1.7) (1.6)

² A dummy variable is included in each equation to account for the shift in the demand for checkable deposits since 1974

³ To allow for lagged effects in the demand for checkable deposits, the independent variables are two-quarter moving averages. The equations were estimated with an adjustment for first-order autocorrelation

⁴ While the use of dummy variables is a simple way to allow for seasonal variation, it is unlikely that alternative methods would have affected the results substantially. For example, when the money demand equation used to simulate the 1974-82 period as shown in Chart 2 is estimated with not seasonally adjusted M-1 data and seasonal dummies rather than with seasonally adjusted M-1, the coefficient estimates as well as the predicted values of M-1 are much the same

(5) 1971-II to 1982-IV:

$$\text{TCD} = -0.94 + 0.16Y - 0.70\text{PBR} - 0.14\text{D1} \quad \bar{R}^2 = 0.19$$

$$(0.2) \quad (0.3) \quad (2.0) \quad (1.9) \quad \rho = 0.99$$

where: TCD = ln (total real checkable deposit holdings of the consumer sector, obtained by using the implicit price index for personal consumption expenditures).

Y = ln (real consumption expenditures).

PBR = ln (passbook rate).

D1 = a dummy variable that increases from zero to one over the 1974 to 1976 period.

A comparison of equations (1), (2), and (3) indicates that the demand for checkable deposits remained stable in the consumer sector through 1980—the coefficient estimates are virtually the same, and the explanatory power of the equation remained high and quite constant. But adding to the sample just the four observations for 1981 causes the explanatory power of the equation to fall sharply, the \bar{R}^2 drops from 0.90 to 0.15. This implies that the increase in NOW account holdings during that year could *not* have represented just a substitution of demand deposits for NOW account deposits, leaving the demand for total money balances unchanged. Indeed, when equation (3) is simulated out of sample for the 1981-82 period, the underestimate—amount by which the actual value exceeds the predicted—by the fourth quarter of 1982 reaches \$33 billion. About \$13 billion or 40 percent of the total error for the period occurs in the first quarter of 1981, when NOW accounts were introduced nationwide, and about another \$11 billion in the fourth quarter of 1982 (Table 1), right after short-term interest rates had declined sharply.

The second large increase in the cumulative prediction error suggests that this equation does not capture the market interest rate response of consumer checkable deposit holdings, since a large part of these holdings is in the form of NOW account deposits and consumers have and use more market-yielding alternatives to checkable deposit holdings than in the past, *i.e.*, MMMFs and MMCs. Regardless of the exact nature of the additional \$33 billion of money holdings by the consumer sector, this figure represents about 43 percent of the total increase in NOW account volume over the 1981-82 period (and 54 percent of the increase in checkable deposits held by the consumer sector). It shows that the introduction of NOW accounts nationwide has changed dramatically the desired quantity of checkable deposits the consumer sector holds.

What about the business sector? The velocity charts shown earlier pointed out that this sector, in contrast to the consumer sector, has been holding lower balances

than would be expected from past relationships. The demand for checkable deposits in the business sector, as can be seen from the regression results reported below, appears to have remained relatively stable through 1982, although there has been a fairly large increase in absolute value in the income and interest rate coefficients, as well as the intercept, when the sample period includes the past two years.

(6) 1971-II to 1978-IV:

$$\text{DD} = -1.92 + 0.94Y - 0.04\text{CP} - 0.44\text{D2} \quad \bar{R}^2 = 0.91$$

$$(0.9) \quad (3.2) \quad (1.3) \quad (4.2) \quad \rho = 0.76$$

(7) 1971-II to 1979-IV:

$$\text{DD} = -1.59 + 0.89Y - 0.05\text{CP} - 0.43\text{D2} \quad \bar{R}^2 = 0.89$$

$$(0.8) \quad (3.2) \quad (1.8) \quad (4.8) \quad \rho = 0.64$$

(8) 1971-II to 1980-IV:

$$\text{DD} = -1.60 + 0.89Y - 0.05\text{CP} - 0.43\text{D2} \quad \bar{R}^2 = 0.90$$

$$(1.0) \quad (4.0) \quad (2.4) \quad (6.6) \quad \rho = 0.62$$

(9) 1971-II to 1981-IV:

$$\text{DD} = -3.51 + 1.17Y - 0.08\text{CP} - 0.52\text{D2} \quad \bar{R}^2 = 0.90$$

$$(1.8) \quad (4.3) \quad (3.4) \quad (7.4) \quad \rho = 0.73$$

(10) 1971-II to 1982-IV:

$$\text{DD} = -4.18 + 1.27Y - 0.08\text{CP} - 0.57\text{D2} \quad \bar{R}^2 = 0.92$$

$$(2.3) \quad (5.0) \quad (3.3) \quad (9.9) \quad \rho = 0.77$$

where: DD = ln (real demand deposit holdings of the business sector obtained by using the GNP implicit price index).

Y = ln (real GNP).

CP = ln (three-month commercial paper rate).

D2 = a dummy variable that increases gradually from zero to one over the 1974-82 period.

If equation (8), estimated through 1980, is simulated for the next two years, it *overpredicts* demand deposit holdings of the business sector by about \$7 billion by the fourth quarter of 1982 (Table 2). This is in sharp contrast to the \$33 billion *underprediction* for the consumer sector's holdings of total checkable deposits.⁵

The cumulative error for the business sector at the end of 1981 was about \$7 billion but grew no larger during 1982. This pattern in the prediction error agrees with what was noted earlier in the discussion of Chart 3: the business sector's velocity-increasing cash management practices did not offset the velocity-reducing buildup in consumer NOW accounts to so large a degree in 1982 as in 1981, and thus the large decline in overall velocity in 1982 resulted.

With the growth of M-1 in 1982 concentrated in the consumer sector's holdings of other checkable deposits, the question arises as to what extent the rapid growth of M-1 could be attributed to consumers con-

⁵ A further indication that aggregate money demand equations could suffer considerable aggregation bias comes from the opposite signs of the errors for these two sectors

Box 1: Demand Deposit Ownership Survey

The results of the Demand Deposit Ownership Survey (DDOS) are published in the Federal Reserve *Bulletin* Four times each year, the Federal Reserve System conducts a survey of 232 banks concerning the demand deposit holdings of individuals, partnerships, and corporations. From the survey's findings, estimates are made of demand deposit holdings of five ownership categories: financial business, nonfinancial business, consumer, foreign, and other. The estimates are on a daily average basis for the last month of each quarter. To calculate the total checkable deposits of the consumer sector, other checkable deposits—consisting primarily of NOW account deposits—for the last month of each quarter are added to the consumer sector's demand deposits as shown in this survey.

The Board of Governors' staff tested the validity of the DDOS data indirectly and found it to be "reasonably reliable." This test was part of the study by Helen T. Farr, Richard D. Porter, and Eleanor M. Pruitt, "Demand Deposit Ownership Survey", in *Improving the Monetary Aggregates* (Staff Papers, Board of Governors of the Federal Reserve System, 1978). For additional information on the DDOS, see the Federal Reserve *Bulletin* (June 1971).

tinuing to shift funds from outside M-1 into NOW accounts as they opened additional NOW accounts. An estimate of the number of accounts opened nationwide can be derived from a survey on average balances in NOW accounts (Box 2). Incorporating this information in the regression equation can then give an estimate of how much the opening of NOW accounts has been adding to the total checkable deposit holdings of the consumer sector. The results from estimating the demand equation with a number-of-NOW-accounts variable (N) included are shown in equation (11).⁶

$$(3) \text{ 1971-II to 1980-IV:} \\ \text{TCD} = -6.87 + 1.03Y - 0.25\text{PBR} - 0.10\text{D1} \quad \bar{R}^2 = 0.90 \\ (15.4) \quad (14.2) \quad (2.6) \quad (6.5) \quad \rho = 0.27$$

$$(11) \text{ 1971-II to 1981-IV (with number-of-accounts variable)} \\ \text{TCD} = -6.86 + 1.03Y - 0.25\text{PBR} - 0.095\text{D1} + 0.014\text{N} \\ (15.8) \quad (14.5) \quad (2.7) \quad (6.6) \quad (12.0) \\ \bar{R}^2 = 0.96 \\ \rho = 0.23$$

$$(4) \text{ 1971-II to 1981-IV (without number-of-accounts variable).} \\ \text{TCD} = -0.53 + 0.29Y - 0.59\text{PBR} - 0.12\text{D1} \quad \bar{R}^2 = 0.15 \\ (0.1) \quad (0.6) \quad (1.7) \quad (1.6) \quad \rho = 0.99$$

⁶ Prior to the introduction of nationwide NOWs in January 1981, the value of this variable is zero. It is not intended to control for the gradual development of NOW accounts in a few states prior to 1981 but for the introduction of NOWs nationwide in 1981.

Comparing equations (3) and (11), it can be seen that with the number-of-accounts variable included in the regression the estimated coefficients remained very stable when the sample period was extended through 1981. In contrast, with the number-of-accounts variable omitted the estimated coefficients not only change drastically but also become insignificant (equation 4). This result for 1981 raises the question whether a very significant portion of the M-1 growth during 1982 was due to consumers combining savings and transactions balances when opening a NOW account (The transfer of savings into NOW accounts is probably partly to meet the higher minimum balance requirements on NOW accounts than on demand deposit accounts). When equation (11) is simulated through 1982-IV, it underpredicts consumer money holdings by \$7.6 billion, whereas if it is simulated keeping the number-of-accounts variable constant at the 1981-IV level, the prediction error is \$15.8 billion. This implies that approximately \$8 billion represents funds flowing into checkable deposits from outside M-1 because of the opening of new accounts (Box 2). That leaves an additional \$7½ billion of consumer checkable deposit holdings to be explained by other factors. All of this remaining prediction error is concentrated in the fourth quarter of 1982, following the large decline in short-term interest rates in the third quarter. The timing suggests a sizable response on the part of consumers, especially those that hold NOW accounts, to the decline in market interest rates. This possibility is explored in more detail in the next section.

1982 growth of checkable deposits and the decline in market rates

With the econometric results of the previous section in mind, the article now explores in more detail whether the strength in the consumer sector's holdings of checkable deposits can be explained by the decline in market interest rates. A basic problem, however, in attempting to attribute the observed strength to the decline in market rates in 1982 is that this strength could just as well have been the consequence of an increased precautionary demand for money. The severe recession of 1981-82 certainly created a sense of financial insecurity, or at least caution, on the part of households. Consequently, to some unknown extent, consumers enlarged their overall holdings of liquid precautionary balances. Small time deposits and MMMF shares grew very rapidly—6.0 percent and 31.6 percent—and, after exhibiting a general decline for the past few years, even passbook savings accounts showed a significant increase. (These were measured from December 1981 to November 1982 before the introduction of the MMDA.) Along with these increases,

some of the growth of NOW accounts, since they earn nearly the same rate of interest as passbook accounts, must have represented additions to precautionary, rather than transactions, balances. This makes it difficult to estimate how much of the bulge in M-1 was due to the decline in market rates.⁷

Even though it is not possible to disentangle the effects of an increased precautionary demand for money during 1982 from the decline in interest rates, the question remains whether a reasonable interest rate elasticity can be used to explain the buildup in consumer checkable deposit holdings. The differential between the explicit rates paid on checkable deposits (0 percent for demand deposits, 5¼ percent for NOW and ATS accounts) and the rates paid on the savings vehicles most popular among consumers during 1982—MMCs and MMMFs—narrowed considerably.⁸ During 1981-IV consumers were able to earn about 12.5 percent on highly liquid savings but during 1982-IV only about 8.5 percent. This means that the opportunity cost of holding demand deposits fell by about one third, and the opportunity cost of holding NOW and ATS deposits fell by over one half, from about 7.25 percent (12.5 percent minus 5¼ percent) to about 3.25 percent (8.5 percent minus 5¼ percent).

According to the conventional theory of the demand for money, an increase in consumer checkable deposit holdings would be expected as the opportunity cost of holding checkable deposits falls. The magnitude of the increase depends on the value of the elasticity of demand with respect to opportunity cost. Thus, to get a rough idea of how great an increase could have

⁷ A further problem in attributing all the strength in M-1 to the consumer sector stems from the consideration that the demand deposit holdings of financial businesses at commercial banks increased \$7 billion or 25 percent during 1982 after holding fairly steady for a number of years. Financial businesses include thrift institutions, securities dealers, insurance companies, finance companies, and investment companies. The rise in the deposit holdings of this category, however, is very difficult to interpret in terms of M-1. Some of the deposit holdings of the thrift institutions are netted out of M-1 when the demand deposit component is consolidated across institutions. Hence, part of this \$7 billion increase shown in the DDOS might not show up at all in M-1. Furthermore, it is hard to believe that government securities dealers and some of the other financial businesses would increase their demand deposit holdings very much while nonfinancial businesses are not increasing their holdings because these financial businesses are among the most sophisticated of cash managers. It could be argued, of course, that some increase in the deposit holdings of these firms might be expected as a result of the increased volume of trading in the stock market in the second half of 1982. But, again, while that might increase consumers' or some nonfinancial businesses' demand for checkable deposits for the purpose of making financial transactions, it is still hard to understand why the deposit holdings of the sophisticated dealers and brokers would increase very much.

⁸ The rate on MMCs is the discount rate on 26-week Treasury bills, set at auction, plus 25 to 50 basis points, the rate on MMMFs is roughly the market rate on one-month certificates of deposit (CDs) less the charges imposed, usually around 50 basis points.

Table 1

Prediction Errors from a Simulation of Equation (3)

In billions of dollars

Period	Actual	Predicted	Error
1981 I	144.8	131.6	13.2
II	149.9	138.3	11.6
III	153.8	142.4	11.4
IV	165.0	145.9	19.1
1982 I	168.4	146.3	22.1
II	170.9	150.7	20.2
III	176.6	154.3	22.3
IV	192.1	159.1	33.0

Table 2

Comparison of Errors for Consumer and Business Sectors

In billions of dollars

Period	Consumer	Business	Total
1981 I	13.2	-6.3	6.9
II	11.6	-5.0	6.6
III	11.4	-3.7	7.7
IV	19.1	-7.4	11.7
1982 I	22.1	-7.1	15.0
II	20.2	-4.8	15.4
III	22.3	-6.6	15.7
IV	33.0	-6.8	26.2

Table 3

Predicted Increases in Consumer Checkable Deposits during 1982

In billions of dollars

Interest rate elasticity	Scale variable*	Demand deposits	Other checkable deposits†	Total checkable deposits
0.05	C	8.5	9.5	18.0
0.10	C	10.4	13.1	23.5
0.15	C	12.3	16.9	29.2
0.05	DI	6.8	8.0	14.8
0.10	DI	8.5	11.5	20.0
0.15	DI	10.5	15.2	25.7
		Actual increases		
		1.5	25.6	27.1

*C=consumption expenditures, DI=disposable income

†Primarily NOW accounts

been expected as a result of the fall in short-term rates during 1982, an estimate of the opportunity-cost elasticity's value in the consumer demand for checkable deposits is needed. But, because consumers have made extensive use of liquid, market-yielding savings instruments for only a brief time, an estimate from regression analysis of this elasticity in the current environment could not be made directly. However, some estimates are available for the period before 1973, when passbook savings accounts and consumer time deposits, while subject to interest rate ceilings, were nonetheless the principal liquid savings vehicles. The estimates are usually in the range of 0.15 to 0.40, and the estimate obtained in the previous econometric section of this article was around 0.25. Nevertheless, a few preliminary calculations suggested that it would not even be necessary to assume a value as large as that to explain the bulge in consumer money holdings, and the assumed values used here for sake of illustration vary from 0.05 to 0.15, a fairly conservative range.

In this setting, to illustrate the possible effect of the

sharp drop in short-term interest rates on the consumer demand for checkable deposits, six sets of predicted increases in the levels of demand deposits and other checkable deposits were calculated and are presented in Table 3. These sets of predicted increases differ depending on (1) the proxy for transactions employed (consumption expenditures or disposable income to which unitary elasticity in the demand function was applied, consistent with the findings in the econometric section) and (2) the assumed elasticity (0.05, 0.10, or 0.15) applied to the opportunity cost of holding a demand or NOW account deposit.

For example, in the top line of Table 3, an \$8.5 billion increase in demand deposits was predicted for 1982 from the \$86.6 billion level of December 1981. Part of this increase was due to a 7.7 percent rise over the year in consumption expenditures, to which unitary elasticity of demand was applied. The rest of the \$8.5 billion increase was due to a fall in the opportunity cost of holding a demand deposit, from 12.5 percent to 8.5 percent per year, to which in this case an elas-

Box 2: Opening of NOW Accounts during 1982

Survey results from a limited sample show that the average balance in NOW (negotiable order of withdrawal) and ATS (automatic transfer service) accounts increased about 9 percent from November 1981 to November 1982, from \$5,079 to \$5,520. If it is assumed that these average balance figures are representative for the nation as a whole, then it is possible to construct estimates of the number of NOW and ATS accounts in existence by dividing the volume of deposits in these accounts by the average balances held in them. The estimates show that the number of accounts, after growing very rapidly in 1981 when NOW accounts were introduced nationwide, increased another 22 percent in 1982. Thus, in explaining the 33 percent increase in the dollar volume of NOW and ATS accounts from November 1981 to November 1982, the increase in the number of accounts was about 2½ times more important than the increase in the size of the average balance. The importance of additional NOW accounts still being opened in 1982 is that the M-1 data would have been inflated during that year, just as they were in 1981 but to a lesser degree.

Roughly speaking, a little over 70 percent or \$18 billion of the \$25 billion increase in NOW account balances appears to be due to the growth of the number of accounts. Of that \$18 billion, the results from the econometric section suggest that \$8 billion or 44 percent came from outside M-1, leaving about \$10 billion or 56 percent coming

Estimates on NOW and ATS Accounts

Period	Total volume (billions of dollars)	Average balance (dollars)	Number of accounts (millions)
November 1981	75.2	5,079	14.81
February 1982	83.4	5,156	16.18
May 1982	87.4	5,154	16.96
August 1982	91.8	5,206	17.63
November 1982	100.1	5,520	18.13
November 1982 over November 1981 (per- centage increase) . .	33.1	8.7	22.4

Source: Board of Governors of Federal Reserve System.

from demand deposits. The 44 percent coming from outside M-1 seems high in light of previous experience with NOW accounts and probably should be viewed more as an upper limit.*

*For more detail on the earlier experience with NOW accounts, see Joanna H. Frodin and Richard Startz, "The NOW Account Experiment and the Demand for Money", *Journal of Banking and Finance* (1982), pages 179-93. For 1981, the Board of Governors' staff estimated that about 25 percent of the growth of NOW accounts came from outside M-1.

ticity value of 0.05 was applied. Similarly, other checkable deposits—primarily NOW accounts—were predicted to increase \$9.5 billion from the level of \$78.4 billion as the result of the rise in consumption and the fall in the opportunity cost of holding these deposits from 7.25 percent to 3.25 percent per year. (In each case, the same elasticity values were applied to other checkable deposits as to demand deposits.) The predicted increases in demand deposits and other checkable deposits together imply an increase in total checkable deposits of \$18.0 billion. The five other sets of predicted increases shown in the table were obtained in the same manner.

By interpolating, it can be seen that the observed increase in *total* checkable deposits is consistent with that predicted when it is assumed that the opportunity-cost elasticity value is about 0.13 and consumption expenditures measure transactions, or when it is assumed that the value of the opportunity-cost elasticity is about 0.16 and disposable income measures transactions.⁹ While reasonable elasticities will explain the increase in *total* checkable deposits held by the consumer sector, the predicted increase in demand deposits is considerably too high, and the predicted increase in other checkable deposits is far too low. If it is in fact correct to apply the same elasticity to both NOWs and demand deposits, then these figures, too, suggest that funds were switched from demand deposits into NOWs as new accounts were opened during 1982.

These calculations, however, do not incorporate the estimate, reported in the previous section, of about \$8 billion of funds deposited into the new NOW accounts that came from outside M-1. Using the \$8 billion estimate to adjust downward the increase in total checkable deposits leaves an increase of around \$19 billion to be explained by changes in the level of interest rates and the volume of transactions. By interpolating between the calculations shown in the table, an increase of \$19 billion is consistent with an assumed opportunity-cost elasticity of about 0.06 if consumption expenditures are used to measure transactions or an assumed opportunity-cost elasticity of about 0.09 if disposable income measures transactions. As would be expected, these elasticities are somewhat smaller than those found consistent with the unadjusted increase in *total* checkable deposits. Looking

next at the two components of total checkable deposits on an adjusted basis: (1) if the estimated transfer of funds from demand deposits to new NOW accounts (\$10 billion) is subtracted from NOWs and added back into demand deposits and (2) if the \$8 billion flow from outside M-1 into new NOW accounts is subtracted from NOW accounts, then the adjusted increases in demand deposits and other checkable deposits are, respectively, \$11½ billion and \$7½ billion.¹⁰ These adjusted figures are still somewhat different from the predicted increases of about \$8 billion for demand deposits and about \$10.5 billion for other checkable deposits but are reasonably close. So, whether or not explicit account is taken of the effect of additional NOW accounts being opened in 1982, even a rather small market rate response on the part of the consumer sector would explain the increase in that sector's total checkable deposit holdings. However, to explain the increases in the components, adjustments for shifts of funds into new NOW accounts are necessary.

As noted in the econometric section, to assign much of the growth of M-1 during 1982 to a fall in short-term rates implies that the new instruments (MMMFs and NOWs) have made the consumer-sector holdings of transactions balances much more responsive to market rate changes than in the past. If this argument is in fact valid, then part of the reason why an aggregate money demand equation—estimated with data prior to 1979—underpredicts M-1 growth in 1982 is because the estimated market interest rate elasticity was the combined response of the business and consumer sectors covering a period when consumers did not use extensively either NOW accounts or market-yielding alternatives to M-1 (Chart 2). The continued opening of new accounts added to this tendency for the equation to underpredict.

Conclusions and implications for policy

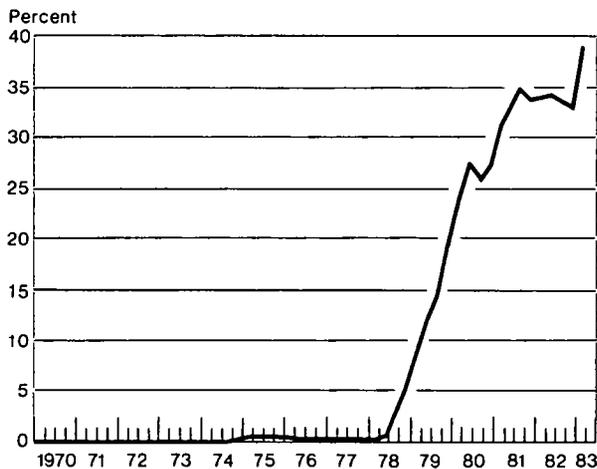
In summary, what appears to be behind the large decline in the velocity of M-1 during 1982? First, whether looking at the question from the perspective of sectoral velocity or sectoral checkable-deposit-demand equations, the buildup in money balances that caused the reduction of M-1's velocity was in the consumer sector and concentrated in consumer NOW account holdings. But, because NOW accounts have been used extensively for just a little more than two years, not

⁹ Compared with the elasticities estimated in earlier studies using the passbook rate (0.15 to 0.40), these figures appear rather small. However, with respect to market rates, the consumer sector did not appear to be very responsive until the introduction of liquid market-yielding instruments such as MMMFs. As a result, consumers have become more responsive to changes in market rates than in the past, but this "responsiveness" is not yet so large as earlier estimates made with respect to changes in the passbook rate.

¹⁰ As shown in Box 2, the increase in the number of accounts explains a little over 70 percent, or about \$18 billion of the \$25 billion increase in NOW account deposits in 1982. If, as estimated in the econometric section, \$8 billion came from outside M-1, then about \$10 billion was transferred from demand deposit accounts, and the volume of demand deposits would need to be adjusted by that amount.

Chart 4

Noninstitutional MMMFs, Six-month MMCs, and MMDAs as a Percentage of M-2

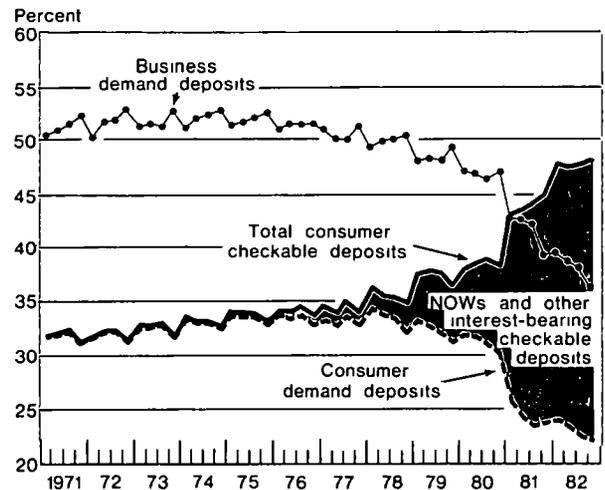


enough time has passed as yet to establish the degree to which consumers view them as a savings instrument. Furthermore, for similar reasons, it is not possible to determine what the demand elasticities of consumer money holdings are, not only relative to the rate paid on conventional time and savings accounts, but also with respect to the rates on market-yielding instruments (MMDAs and MMMFs) which have been growing very rapidly as a percentage of consumers' liquid assets (Chart 4). Nevertheless, after allowance is made for the consideration that consumers continued to open NOW accounts during 1982, much of the increase in consumer money holdings can be explained by using what would be considered, even by very conservative standards, reasonable market interest rate elasticities for total money holdings demanded by the consumer sector. (These elasticities are considerably less than those estimated in earlier studies for regulated time and savings accounts.) Hence, one explanation for the rapid M-1 growth in 1982 is that these relatively new unregulated savings instruments are, at least for the time being, increasing the market interest rate sensitivity of M-1 in the sense that consumers can more easily substitute in and out of M-1 as market rates change.

But that explanation does not rule the others out. It is thus difficult to anticipate what the relationship between M-1 and the economy will be. The severity of the recession may have temporarily increased con-

Chart 5

Changing Composition of Checkable Deposits
Sectors as percentage of total



sumers' demand for liquid precautionary balances. This leaves open the possibility of a sudden reversal at some later date, causing velocity to rise sharply. It also increases the uncertainty about the degree to which M-1's response to movements in interest rates has changed over the last few years. Moreover, even if consumers' demand for money holdings has become more sensitive to market rates over time, that is not the same as saying that any past elasticity estimates are good guides to the future. It appears that MMDAs, like MMMFs could increase even further the sensitivity of consumer money demand to interest rates, particularly since they are covered by FDIC insurance.

On the other hand, the new Super NOW account, because it is a component of M-1 that does not have any limitations on the rate of interest that can be paid, will tend to offset some of the added market interest rate response for the consumer sector caused in recent years by the MMMFs and MMCs and just recently by the MMDAs. Super NOWs could also result in some further combining of savings and transactions balances. This would be done to meet minimum balance requirements and for the sake of having all liquid balances conveniently in one place. The key point is that not only is the composition of M-1 changing, that is, becoming more and more consumer oriented, but even the characteristics of the money holdings within the consumer sector are changing—shifting from noninterest-bearing to interest-bearing forms (Chart 5).

At the same time, new liquid alternatives for holding narrow money are being offered to consumers. Thus, M-1, in general, and the money holdings of the consumer sector, in particular, are likely to deviate from past relationships for some time.

This, of course, raises serious questions for monetary policy. How much weight should M-1 have in the

policy process when its sectoral composition as well as its responsiveness to movements in market interest rates are changing? Should alternative approaches to policy be tried because of the uncertainty of M-1's interpretation? These are questions that the experience of 1982 and early 1983 suggests will need to be explored in considerable depth.

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