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The Puzzling Growth of the Monetary Aggregates in the 1980s

MODERN macroeconomic analysis assigns the key role in aggregate demand management to monetary policy. This role is carried out through changes in the monetary aggregates. Since there are several monetary aggregates — M1, M2 and M3 — considerable confusion may develop about the meaning of their behavior, particularly when they do not move in lock step with each other or with the growth of the monetary base. Such confusion is especially likely to happen when, as has happened in the 1980s, their movements are quite unusual by historical standards.

The monetary base can be thought of as the foundation on which all the monetary aggregates are built; it is also the set of monetary assets most closely related to Federal Reserve actions. Prior to the early 1980s, there was a fairly stable relationship on an annual basis between the growth rate of the monetary base and the growth rates of M1, M2 and M3. The monetary base grew about 1 percentage point faster than M1; and the other two aggregates, M2 and M3, grew about 2 or 3 percentage points faster than the monetary base. Thus, when Federal Reserve actions resulted in a 6 percent annual growth rate of the monetary base, M1 would grow at about 5 percent, M2 at 8 percent and M3 at about 9 percent.

In the 1980s, these relationships changed quite dramatically. From 1984 through 1987, the monetary base growth averaged about 6 percent to 8 percent. In sharp contrast to its previous historical relationship, M1 growth averaged 7 percent to 12 percent; in 1986 alone, M1 grew 4 percentage points faster than the base. Meanwhile, the growth rates of M2 and M3 declined relative to the growth of the base: in 1986, they fell below base growth, and in 1987, base growth exceeded the growth of M2 and M3 by more than 2 percentage points.

Major shifts in the public's holdings of monetary assets have accounted for these changed relationships. This article describes a framework that both incorporates the relative amounts of different monetary assets the public desires to hold and relates the growth of M1, M2 and M3 to the monetary base. This framework is then used to analyze the unusual movements of these aggregates during the past few years.

SOURCES AND USES OF THE MONETARY BASE

The monetary base is essentially derived from the Federal Reserve's balance sheet and can be

Table 1

Components of the Monetary Base: December 1987 (billions of dollars, not seasonally adjusted)

Sources		Uses	
Federal Reserve holdings of government securities	$227.8	Depository institution deposits at Federal Reserve banks	$ 37.7
Federal Reserve loans	0.8	Currency held by depository institutions	30.9
Float plus other Federal Reserve assets	17.3	Currency held by nonbank public	196.5
Other items[1]	19.4		
Source base	265.0	Source base	265.0
Reserve adjustment[2]	7.7	Reserve adjustment[2]	7.7
Monetary base	272.8	Monetary base	272.8

[1]Other items include: Treasury deposits at Federal Reserve Banks, special drawing rights, Treasury currency outstanding, Treasury cash holdings, foreign and other deposits with Federal Reserve Banks, service-related balances and adjustments, and other Federal Reserve liabilities and capital.

[2]Adjustment for reserve requirement ratio changes.

computed either from the sources side — the items that supply base — or from the uses side — the items that absorb base.[1] As table 1 shows, the major source of the monetary base is Federal Reserve holdings of government securities. Changes in this item reflect the Fed's open market operations; during the last 10 years, it has accounted for about 80 percent of the total change and most of the year-to-year fluctuations in the base.

When the Federal Reserve makes an open market purchase of government securities, other factors the same, more monetary base is supplied to the financial sector and the public. This increase in the base is then "used" by the public and depository institutions as additions to their holdings of currency and reserves. The increase in reserves forms the base from which to expand derivative monetary assets created by financial institutions. Because the public chooses the relative proportions of these types of assets they want to hold, it determines the relationship between the growth of the base and the resulting growth of the various monetary aggregates.

THE LINK BETWEEN THE MONETARY BASE AND THE MONETARY AGGREGATES

The relationship between the monetary base and any monetary aggregate can be expressed in the following manner:

$$M = mB.$$

The monetary base (B) is related to the specified monetary aggregate (M) by a money multiplier (m). Given the monetary base, the multiplier summarizes the effect of portfolio decisions by the public and financial institutions on a monetary aggregate.

In terms of growth rates, this expression can be written:

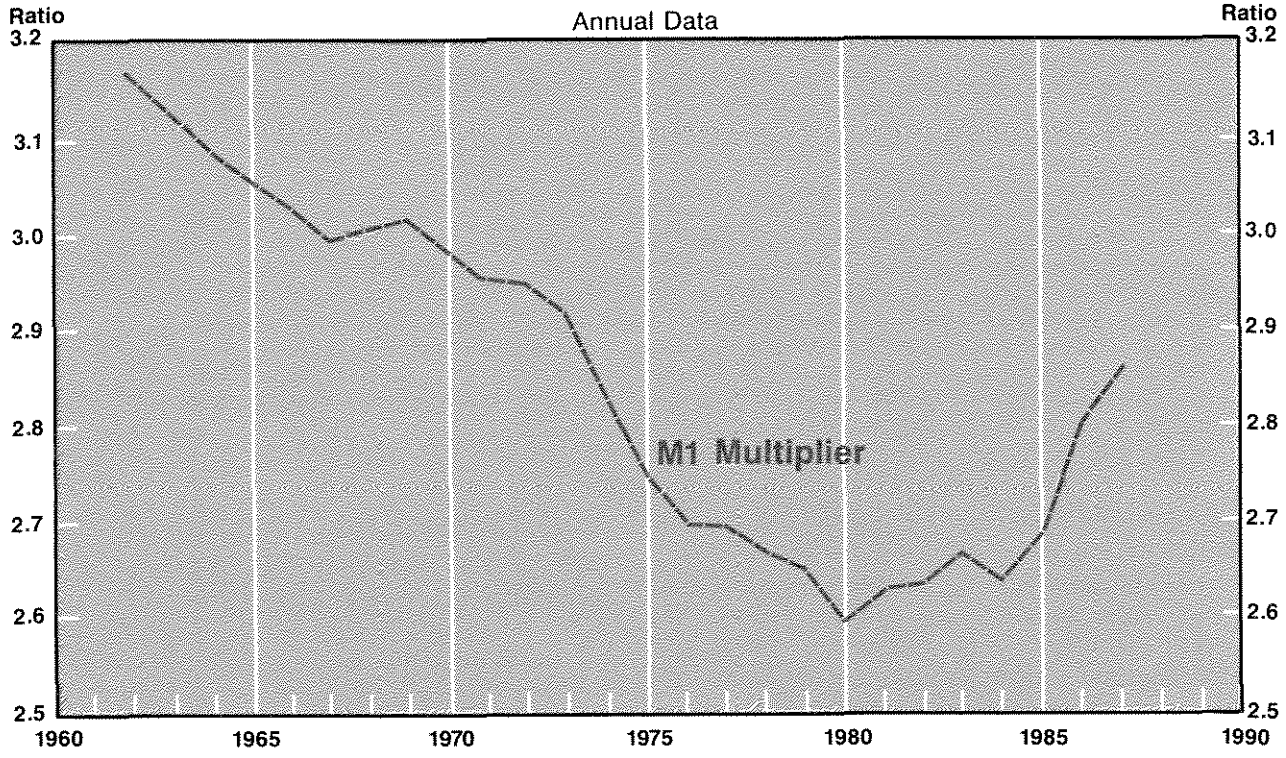
$$\dot{M} = \dot{m} + \dot{B},$$

where the dot above each item denotes its growth rate. If the money multipliers were constant over time, then the growth rates of the monetary aggregates would follow the same pattern as the growth

[1]For a discussion of the concept and derivation of the monetary base, see Burger and Balbach (1976). There are two available measures of the monetary base, one published by the Federal Reserve Board and the other by the Federal Reserve Bank of St. Louis. The Board's measure is a "uses" concept and the Federal Reserve Bank of St. Louis' is a "sources" concept. The major difference is that the St. Louis Fed treats all vault cash contemporaneously while the Board lags the vault cash component of total reserves, reflecting its treatment as total reserves. In analyzing periods of two or more quarters, the differences in results between the two base concepts is very small. For a further discussion of these measures, see Burger (1979).

The source base is usually "adjusted" to incorporate the influence of reserve requirement changes into movements in the adjusted monetary base. For a discussion of this adjustment, see Burger and Rasche (1976), Burger (1979) and, for the most recent method of calculating this adjustment, Gilbert (1987).

Chart 1
M1 Multiplier



of the monetary base, and all aggregates would grow together.

As the next section shows, however, these multipliers have not been constant. Consequently, although the growth rates of M1 and the monetary base have been highly correlated, there have still been periods such as 1974–76 and 1985–87 when they diverged substantially. The growth rates of M2 and M3 have been less closely tied to the growth of the monetary base and, although both have been highly correlated, they have frequently diverged from the growth of M1.

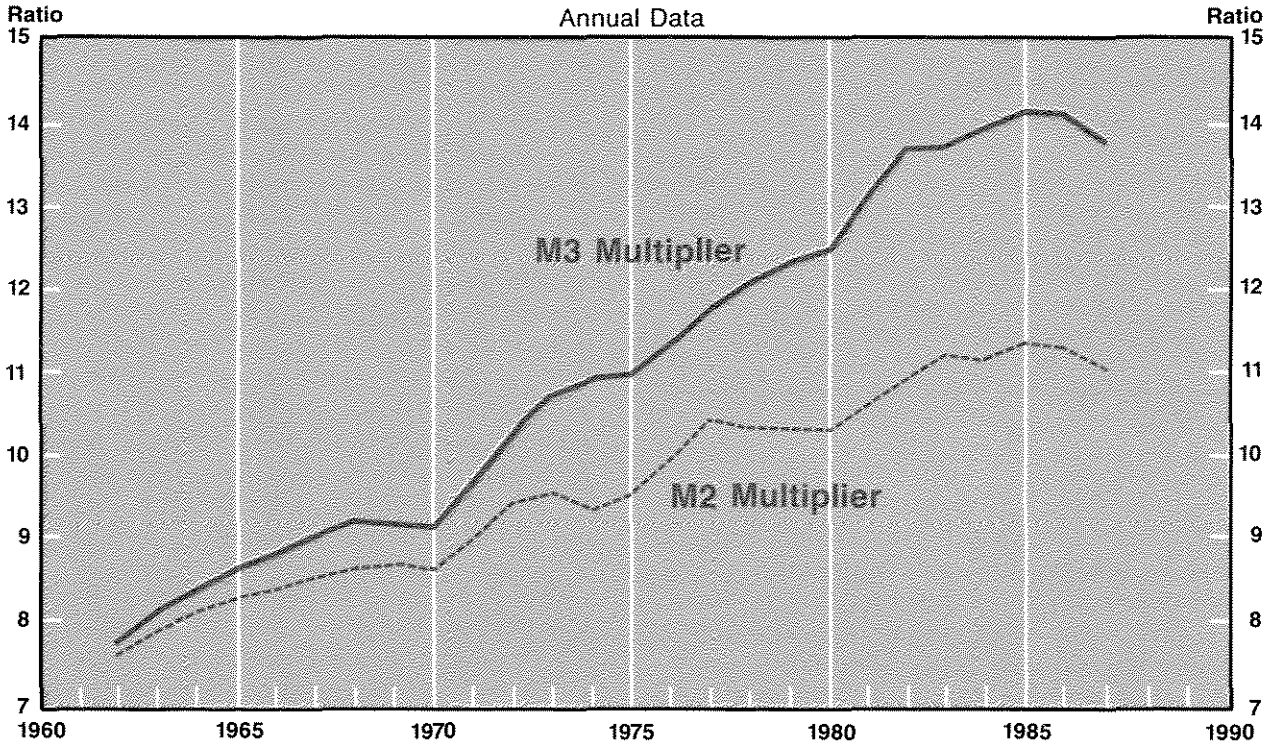
EXAMINING THE BEHAVIOR OF THE MULTIPLIERS

As chart 1 shows, from the early 1960s through the 1970s, there was a long-run downward trend in the M1 multiplier. The multiplier drifted lower from the early 1960s through 1973, declining at about a 1 percent annual rate. During the next three years, it fell faster at about a 3 percent annual rate. This was reflected in a widening spread between the growth of the monetary base and M1.

For the remainder of the 1970s, the M1 multiplier decline slowed to about its 1962–73 pace. Then, about mid-1980, the M1 multiplier flattened out and showed little growth on average until early 1985, when its behavior changed markedly. It rose at a 1.7 percent annual rate in 1985; in 1986 its growth increased to 4 percent. The M1 multiplier declined somewhat in mid-1987; however, when measured on an annual basis, it still rose another 2 percent in 1987. As chart 1 indicates, this prolonged and substantial rise was without precedent since the early 1960s.

Chart 2 shows that the M2 and M3 money multipliers have followed very different paths. They generally rose for most of the period since the early 1960s, while the M1 multiplier was falling. In the last few years, while the M1 multiplier has been rising, however, the M2 and M3 multipliers have fallen. During the period shown in chart 2, three broad growth patterns emerge in the M2 and

Chart 2
M2 and M3 Multipliers



M3 multipliers. From the early 1960s through early 1982, they increased on average at about a 2 percent rate. In early 1983, they came to a halt, and for the next two years, they showed essentially no growth. In early 1986, however, the M2 and M3 multipliers began a decline that has lasted into 1988.

A Model of the Money Multipliers

The substantial break in the usual behavior of the money multipliers in the 1980s was reflected in the unusual behavior of the monetary aggregates relative to the growth of the monetary base, and to each other. To examine why this was the case, one must develop explicit forms of the respective multipliers to analyze how the changing portfolio preferences of the public have affected them.

Given the following definitions,

$m1 = M1/B$,
$m2 = M2/B$,
$m3 = M3/B$,
R = reserves of depository institutions adjusted for reserve requirement changes,
C = currency held by the public,
B = monetary base $= R + C$,
D = checkable deposits,
k = the public's desired currency ratio $= C/D$,
$t2$ = the public's desired nontransactions balance ratio $= (M2 - M1)/D$,
$t3 = (M3 - M2)/D$, and
r = reserve ratio $= R/D$,

the following explicit forms of the multipliers can be derived (see appendix 1 for this derivation):

$$m1 = \frac{1+k}{r+k} \qquad m2 = \frac{1+k+t2}{r+k} \qquad m3 = \frac{1+k+t3}{r+k}$$

In this framework, a distinction can be made among three major classes of assets. As table 2 shows, M1 represents transaction balances, (M2 − M1) represents liquid savings balances, and (M3 − M2) represents managed liabilities of de-

Table 2

Components of the Monetary Aggregates: December 1987 (not seasonally adjusted)

		Monthly Average
M1	Currency	$199.4
	Total checkable deposits	560.1
M2-M1	Savings deposits	410.0
	Small time deposits	914.6
	MMDA	525.2
	Money market mutual funds	221.1
	Overnight RP and Eurodollars	78.1
M3-M2	Large time deposits	485.4
	Term RP and Eurodollars	196.3
	Institution-only MMMF	89.6

pository financial institutions. When either the specific characteristics or the relative yields of these assets change, the public responds by altering the amounts of these assets they wish to hold. The k, t2 and t3 ratios capture the effects of the public's shifting preferences among these assets on the growth rates of M1, M2 and M3. A rise in the r-ratio reflects an increase in depository institutions' desired holdings of reserves relative to deposits; hence, a rise in this ratio reduces all three multipliers.

Given this framework, we can now examine the behavior of these ratios and determine their contribution to the money multiplier movements, especially in recent years.

The Currency Ratio

A rise in the k-ratio reflects an increase in the public's desired holdings of currency relative to checkable deposits. For a given amount of monetary base, this means a reduction in the portion of base held by depository institutions (reserves) and, consequently, a reduction in checkable deposits. Therefore, a rise in the k-ratio reduces all three money multipliers.

It has been long recognized that, given the growth of the monetary base, variations in the k-ratio exert a dominant influence on movements in M1 and a strong influence on movements in other monetary aggregates.[2] As chart 3 illustrates, movements in the M1 multiplier are essentially the mirror image of movements in the k-ratio. Thus, deviations of M1 growth from base growth are predominantly due to sharp changes in the growth of the currency ratio (the quantitative effects of these changes are derived in appendix II).

Chart 3 shows that the currency ratio increased from the early 1960s until the early 1980s. On an annual basis, the k-ratio showed no noticeable decline in this 21-year period; indeed, there were few years when it did not increase by at least 1 percent. During the early 1980s, the currency ratio showed little growth. Then, in early 1985, instead of the public increasing its currency holdings relative to checkable deposits, as had been its long-term pattern, the public began to do just the opposite. Consequently, there was a major change in the behavior of the k-ratio. During 1985, the k-ratio fell 2.8 percent; in 1986, it declined 7.7 percent; and, in 1987, it dropped another 4.1 percent.

Studies indicate that major changes in the growth of the k-ratio are related primarily to factors that affect the checkable deposit component of this ratio. Although attempts have been made to trace the rise in the k-ratio in the 1970s to a sharp increase in currency demand along with the rise of the "underground economy,"[3] currency demand has been found to be stable over long periods of time.[4]

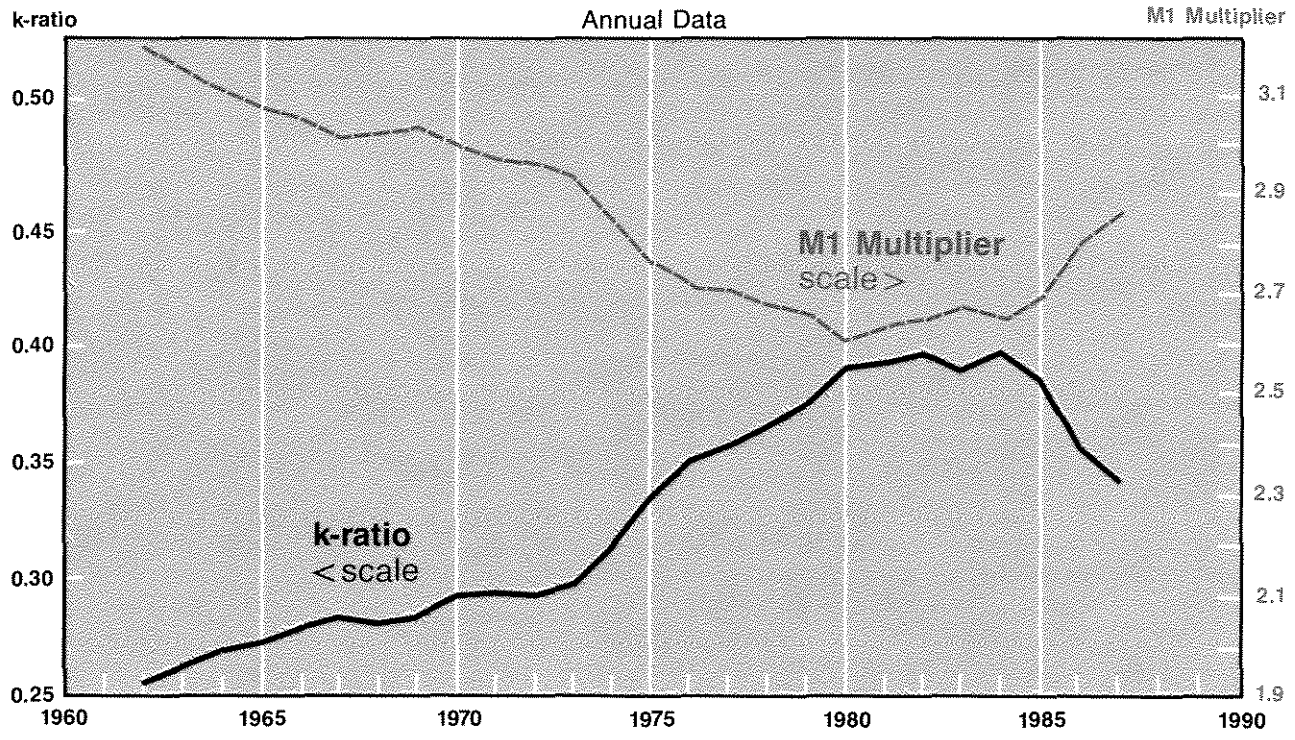
The amount of transaction balances that individuals and firms desire to hold relative to other assets is influenced by such factors as current and expected rates of inflation, relative yields on other assets and available alternative assets. In the 1970s, inflation accelerated, interest rates rose, new forms of savings accounts were offered to the public and new cash management techniques became available to business. Unlike the demand for currency, the demand for checkable deposits was substantially affected by these developments, particularly the financial innovations. For example, business holdings of transaction balances relative to financial assets declined from about 74 percent in 1970 to about 38 percent in 1981. This decline was most closely related to the rise of cash

[2]See Cagan (1958).

[3]See Gutmann (1977).

[4]See Garcia (1978) and Dotsey (1988).

Chart 3
Currency Ratio and M1 Multiplier



management techniques.[5] The major effect of these developments fell on the checkable deposit component of transaction balances, resulting in an accelerated rise in the currency ratio from 1972 through the rest of the decade.

In 1978 and 1979, small-denomination time deposits of varying maturities, with interest rates tied to Treasury certificates of comparable maturities, were authorized. In 1980, with the passage of the Depository Institutions Deregulation and Monetary Control Act, a six-year phase-out of interest rate ceilings on time deposits was established[6]; moreover, nationwide NOW accounts were authorized at the end of 1980. In 1982, new types of time deposits that paid market interest rates were introduced and the Garn-St. Germain Act was passed which authorized money market deposit accounts. By the end of 1983, almost all interest rates on time deposits were deregulated and super-NOW accounts (NOW accounts with no minimum maturity and no ceiling on yields) were permitted.

This deregulation blurred the sharp distinction between transaction and savings accounts that had existed for nearly 50 years. The Banking Act of 1933 had prohibited the payment of interest on demand deposits, making the checkable component of M1 a relatively unattractive savings vehicle, especially in times of rising interest rates. Some changes to this situation took place in the 1970s, but did not have a major effect on the unique transaction characteristics of M1. Then, in the 1980s, checkable deposits that yielded explicit interest and had many of the characteristics of savings deposits were introduced.

The yields on these new checkable deposits adjusted very sluggishly to changes in market

[5]From 1972 to 1980, the demand deposit share of liquid assets fell at about a 6 percent annual rate. The decline in households' holdings of transaction balances as a proportion of liquid assets was relatively minor. The rate of decline of neither household nor business holdings of transaction balances seems closely tied to interest rate fluctuations in the 1970s (Kopcke, 1987).

[6]See Gilbert (1986).

interest rates.[7] Consequently, as market interest rates fell sharply in the 1980s, the spread between the rates offered on checkable deposits and market interest rates on other short-term liquid assets closed rapidly. The public responded by holding more checkable deposits.[8] The demand for currency, however, was much less affected by these developments, causing the currency ratio to flatten out from 1980 to 1984, then decrease sharply in 1985.

In addition to its dominant effect on the M1 multiplier, the k-ratio also exerts a strong influence on the movements of the other monetary aggregates. A comparison of charts 2 and 3, however, shows that the M2 and M3 multipliers were rising when the k-ratio rose then flattened out in recent years when the k-ratio fell sharply. Clearly, for the M2 and M3 multipliers, the influence of other factors dominated the effect of the k-ratio.

The t2-Ratio

A rise in the t2-ratio reflects the public's desire to hold more savings-type deposits (M2 − M1) relative to checkable deposits. Since the t2-ratio enters directly into the numerator of the M2 and M3 multipliers, a rise in this ratio increases these multipliers.[9] Chart 4 shows the dominant influence of the t2-ratio on the M2 and M3 multipliers. Although the rising k-ratio exerted a negative influence on these multipliers for most of the period shown in the chart, its influence was offset by the movement of the t2-ratio. (Appendix II quantifies the influence of each of these ratios on the M2 and M3 multipliers.) The greater disparity between the mean growth rate of these multipliers and that of the base (than that between M1 and the base) during most of the 1960s and 1970s was the result of the 4 percent annual rate of growth of the t2-ratio.

The 1985–87 period stands out in contrast to previous periods. Although the t2-ratio declined, as shown in chart 4, the M2 and M3 multipliers did not decline as much as one would have expected, given the decline in the t2-ratio alone. In this period, however, the falling k-ratio, as shown in chart 3, partly offset the t2-ratio's negative effect on these multipliers.

As chart 5 shows, movements in the t2-ratio have been dominated by relative movements of savings (SVG) and small time deposits (STD). During the 1970s, the sharply rising proportion of small time deposits relative to checkable deposits (STD/D) provided the major impetus for the rise in the t2-ratio. The strong negative influence of the savings component in the late 1970s and early 1980s was further offset by a sharp rise in other liquid savings instruments such as MMDAs, MMMFs and overnight RPs relative to checkable deposits (OL/D). When the t2-ratio declined in late 1985 through mid-1987, it was predominantly because of a sharp fall in the ratio of small time deposits to checkable deposits.

The t3-Ratio

In recent years (1983–87), the spread between the growth rates of M3 and M2 has been much narrower than it was in the 1970s and early 1980s. This change can be explained by the behavior of the t3-ratio. This ratio, which captures the public's desired holdings of assets included solely in M3 compared with checkable deposits determines the spread between the M3 and M2 multipliers. Chart 6 shows that, as this ratio rose sharply from the early 1970s to the early 1980s, the spread between the M3 and M2 multipliers rose steadily. After 1982, however, as the t3-ratio fell, the spread between the M3 and M2 multipliers stabilized.

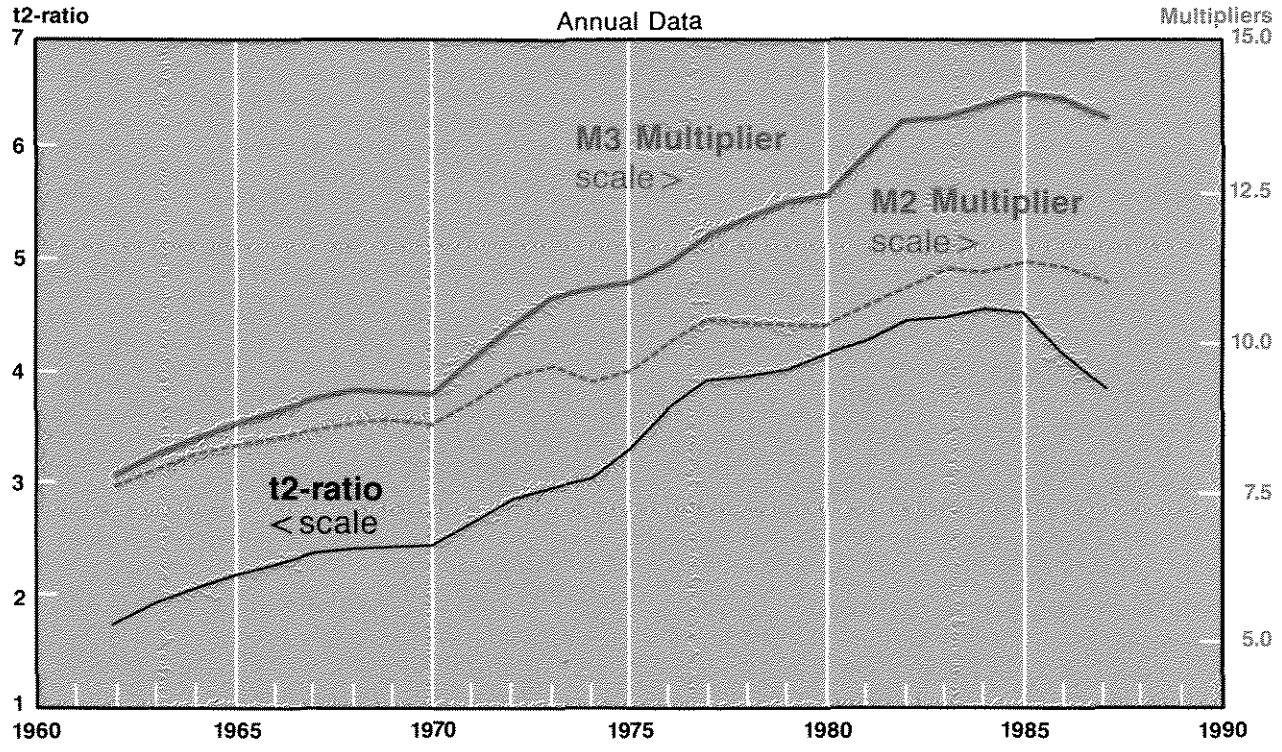
Movements of large time deposits have dominated movements of the t3-ratio. The other components of (M3 − M2) constituted no more than 20 percent of the total until 1977. Although these other managed liabilities (term RPs and Eurodollars and institution-only MMMFs) rose rapidly enough to account for 36 percent of the total by 1987, fluctuations in large time deposits continued to be the dominant cause of t3-ratio fluctuations. The sharp break in this ratio's long-run pattern that occurred in late 1984 and continued over the

[7] See Wenninger (1986) and Roth (1987).

[8] A Federal Reserve survey of changes in the use of cash and transaction accounts from 1984 to 1986 found that individuals consolidated their accounts, increased their use of checking accounts as a family savings vehicle and diminished their use as a media for transactions. The study also found that average cash balances increased with the decline in interest rates, while portfolio considerations became more important and transaction motives less important in how people managed cash and transaction accounts between 1984 and 1986 (Avery et. al., 1987).

[9] To the extent that (M2 − M1) contains reservable liabilities, an increase in time and savings deposits absorbs reserves and reduces the multipliers. In previous formulations of the multiplier, a t-ratio appears in the denominator of all the multipliers (see Burger, 1971). In the multipliers presented in this paper, this effect is not separated out in the denomination of the multipliers, but its effect is reflected in movements in the r-ratio. This influence varies between the period before 1980 and after 1980, because of the definition of adjusted reserves that appears in the r-ratio. The exact nature of this influence is shown in Gilbert (1987).

Chart 4
M2 and M3 Multipliers and t2-Ratio



next nine quarters reflected a slowing of the growth of large time deposits relative to the growth of checkable deposits. Although the growth of other managed liabilities slowed in 1985, it resumed its previous pace in 1986 and 1987.

SUMMARY

Looking at past relationships, one might be tempted to conjecture that, in the 1980s, the monetary aggregates became totally disconnected from Federal Reserve actions as summarized in the monetary base. By presenting a framework that can be used to explain the movements of the aggregates both relative to each other and relative to the growth of the monetary base, this article has shown this not to be the case. During the 1980s, new financial assets were introduced and major changes occurred in inflation, interest rates and the basic characteristics of most of the traditional monetary assets. In response to these events, the public made sizable shifts in its portfolio, which affected the various monetary aggregates in disparate ways. The framework presented in this article is one way to isolate the shifts that influenced the monetary aggregates and illustrate their effects on the growth rates of the aggregates.

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Chart 5
Components of the t2-Ratio

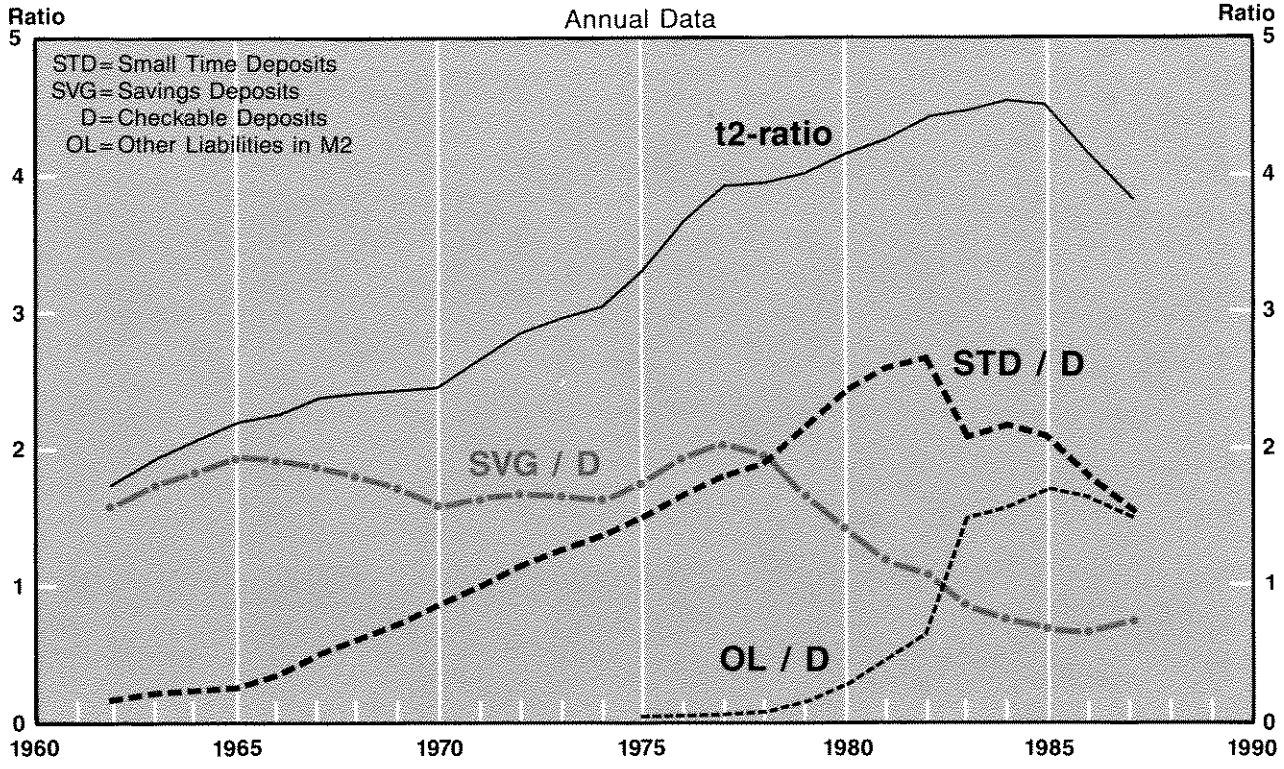

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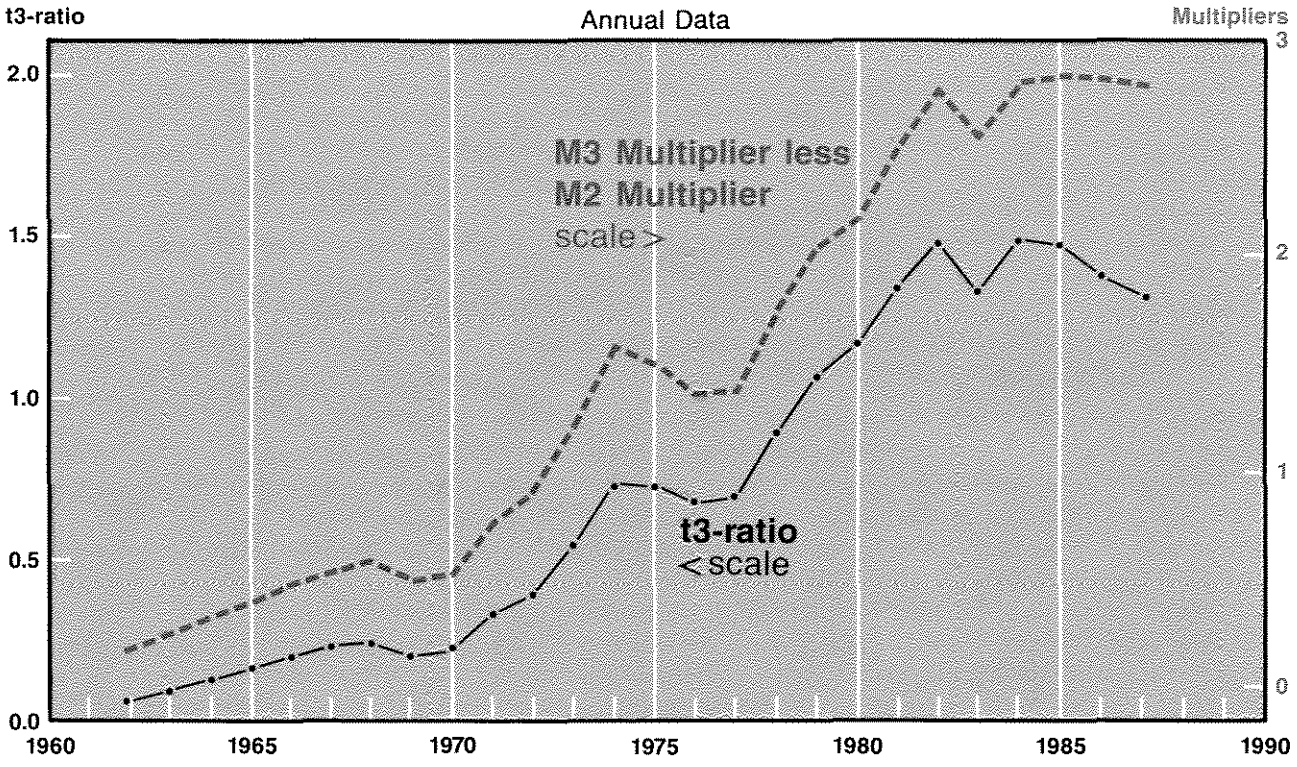
Chart 6
Spread Between M3 and M2 Multipliers and t3-Ratio



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Appendix I
Derivation of Multipliers

M1 multiplier (m1)

$$AMB = R + RAM + C$$

$$M1 = C + D$$

$$m1 = \frac{M1}{AMB} = \frac{C + D}{R + RAM + C}$$

$$= \frac{\left(1 + \frac{C}{D}\right)}{\left(\frac{R + RAM}{D}\right) + \left(\frac{C}{D}\right)}$$

$$m1 = \frac{1 + k}{r + k}$$

M2 multiplier (m2)

$$m2 = \frac{C + D + M2 - M1}{R + RAM + C}$$

$$= \frac{\left(1 + \frac{C}{D}\right) + \left(\frac{M2 - M1}{D}\right)}{\left(\frac{R + RAM}{D}\right) + \left(\frac{C}{D}\right)}$$

$$m2 = \frac{1 + k + t2}{r + k}$$

M3 multiplier (m3)

$$m3 = \frac{C + D + M2 - M1 + M3 - M2}{R + RAM + C}$$

$$= \frac{\left(1 + \frac{C}{D}\right) + \left(\frac{M2 - M1}{D}\right) + \left(\frac{M3 - M2}{D}\right)}{\left(\frac{R + RAM}{D}\right) + \left(\frac{C}{D}\right)}$$

$$m3 = \frac{1 + k + t2 + t3}{r + k}$$

Appendix II
Magnitude of the Influence of the Component Ratios on the Multipliers

The size of the effect that each of the ratios exerts on the growth of the money multipliers depends both on the growth rate of each ratio and the responsiveness of the multiplier to a change in the ratio. This responsiveness can be quantified by calculating the partial elasticities of each of the multipliers with respect to its component ratios, as shown below. These results show that, in this formulation, although the response of all the multipliers to a change in the r-ratio are the same, there are differences in the response of the multipliers to the other ratios.

ELASTICITIES OF THE MULTIPLIERS WITH RESPECT TO THEIR COMPONENT RATIOS

$e(m1,k) = k(r-1)/(r+k)(1+k) < 0$
$e(m2,k) = k(r-1-t2)/(r+k)(1+k+t2) < 0$
$e(m3,k) = k(r-1-t2-t3)/(r+k)(1+k+t2+t3) < 0$
$e(m2,t2) = t2/(1+k+t2) > 0$
$e(m3,t2) = t2/(1+k+t2+t3) > 0$
$e(m3,t3) = t3/(1+k+t2+t3) > 0$
$e(m1,r), e(m2,r), e(m3,r) = -r/(r+k) < 0$

Table A1 presents the computed annual averages of these elasticities. The values of these elasticities change over time as the ratios change. For example, the rise in t2-ratio has affected the relationship between the response of m2 and m3 to a change in the t2-ratio. In the early 1960s, e(m2,t2) and e(m3,t2) were both about the same. By the early 1980s, the e(m2,t2) had risen to about .76 while e(m3,t2) was still about .62. In 1985–87, these elasticities fell as the t2- and t3-ratios declined.

The magnitude of the influence of the portfolio shifts embedded in the k-, t2-, and t3-ratios on the growth of the multipliers can be isolated using the following formula:

Table A1

Elasticities of the Multipliers with Respect to Their Component Ratios

Year	e(m1,k)	e(m2,k)	e(m3,k)	e(m2,t2)	e(m3,t2)	e(m3,t3)	e(m,r)	Year
1965	−0.44	−0.57	−0.58	0.63	0.60	0.04	−0.35	1965
1966	−0.44	−0.58	−0.58	0.64	0.61	0.05	−0.34	1966
1967	−0.44	−0.58	−0.58	0.65	0.61	0.06	−0.34	1967
1968	−0.44	−0.58	−0.58	0.65	0.61	0.06	−0.34	1968
1969	−0.44	−0.59	−0.59	0.65	0.62	0.05	−0.34	1969
1970	−0.45	−0.59	−0.60	0.65	0.62	0.05	−0.33	1970
1971	−0.44	−0.59	−0.60	0.67	0.62	0.08	−0.33	1971
1972	−0.44	−0.59	−0.60	0.69	0.63	0.09	−0.33	1972
1973	−0.44	−0.60	−0.60	0.69	0.62	0.11	−0.33	1973
1974	−0.43	−0.60	−0.61	0.70	0.60	0.14	−0.33	1974
1975	−0.43	−0.61	−0.62	0.71	0.61	0.14	−0.32	1975
1976	−0.44	−0.63	−0.63	0.73	0.64	0.12	−0.30	1976
1977	−0.44	−0.64	−0.64	0.74	0.66	0.12	−0.30	1977
1978	−0.44	−0.64	−0.65	0.74	0.64	0.14	−0.29	1978
1979	−0.44	−0.65	−0.66	0.74	0.62	0.16	−0.28	1979
1980	−0.44	−0.65	−0.66	0.75	0.62	0.17	−0.28	1980
1981	−0.45	−0.66	−0.68	0.75	0.61	0.19	−0.27	1981
1982	−0.46	−0.67	−0.69	0.76	0.61	0.20	−0.26	1982
1983	−0.46	−0.68	−0.69	0.76	0.62	0.18	−0.26	1983
1984	−0.46	−0.68	−0.69	0.76	0.61	0.20	−0.26	1984
1985	−0.46	−0.68	−0.69	0.76	0.61	0.20	−0.26	1985
1986	−0.47	−0.67	−0.68	0.75	0.60	0.20	−0.27	1986
1987	−0.47	−0.66	−0.67	0.74	0.59	0.20	−0.28	1987

$$\dot{m} = e(m,k)(\dot{k}) + e(m,t2)(\dot{t2}) + e(m,t3)(\dot{t3}) + e(m,r)(\dot{r}).$$

In the above formula, e(m,___) represents the partial elasticity of the respective multiplier with respect to the specified ratio. For example, e(m1,k) would represent the partial elasticity of the M1 multiplier (m1) with respect to the k-ratio. The dots above the ratios denote growth rates. The results of this decomposition of the growth rates of the respective multipliers are shown in tables A2, A3 and A4. The results through 1984 were computed using annual growth rates of the component ratios that appear in the multipliers, and the elasticities are the ones reported in table A1. Quarterly data for I/1985–I/1988 were computed using quarterly growth rates and quarterly elasticity measures.

Over the three years ending in 1984, the k-ratio, on average, showed essentially no growth. Then, from fourth quarter 1984 to first quarter of 1986, it fell at an annual rate of about 5 percent; over the next four quarters, it fell 10 percent. This effect is shown in tables A2, A3 and A4, as the negative contributions of the k-ratio to the growth rates of the multipliers became smaller in the early 1980s and then turned into large positive effects beginning in 1985. This effect dominated the growth of m1, leading to a pronounced change in the relationship between the growth of M1 and the monetary base. From fourth quarter 1985 to first quarter 1987, the growth of M1 exceeded the growth of the monetary base by about 7 percentage points.

In the 1985–87 period, the effect of the declining k-ratio on the relationships between the growth of M2 and M3 and the growth of the monetary base was not nearly as marked as was the case with M1. Tables A3 and A4 show that the changed behavior of t2- and t3-ratios acted to offset the changed behavior of the k-ratio on these multipliers.

Since early to mid-1987, the k-, t2- and t3-ratios all have risen, resuming patterns that are more in line with their historical behavior. Since the relative growth rates of the aggregates depend on the influence of each of these ratios on the respective multipliers, the rise in the k-ratio, which has been especially strong relative to its historical pattern (from II/1987 to I/1988, the k-ratio rose at an 8 percent rate), has dominated the growth of all three multipliers, as shown in tables A2, A3 and A4. Consequently, the M1 multiplier has fallen and the growth of the monetary base has exceeded the growth of M1, as was generally the case before 1985. The multipliers associated with M2 and M3, however, have fallen since early 1987; as a result, the growth rate of the monetary base also has exceeded the growth of these aggregates. This pattern is quite different from that experienced before 1985.

Table A2

Contribution of the Component Ratios to the Growth Rate of m1

Year	EEMK	EER	MULX
1965	−0.59	−0.46	−1.02
1966	−0.94	0.07	−0.85
1967	−0.65	−0.41	−1.05
1968	0.27	−0.04	−0.26
1969	−0.48	0.75	0.30
1970	−1.43	0.37	−1.05
1971	−0.21	−0.91	−1.06
1972	0.11	−0.34	−0.20
1973	0.67	−0.37	1.00
1974	−2.31	−0.63	−2.90
1975	−2.68	−0.41	−2.99
1976	−2.10	0.18	−1.79
1977	−0.82	0.43	−0.31
1978	−0.93	−0.11	−1.02
1979	−1.22	0.51	−0.67
1980	−1.83	−0.16	−1.99
1981	−0.25	−1.36	1.16
1982	−0.48	0.83	0.33
1983	0.86	0.37	1.17
1984	−0.91	−0.18	−1.08
1985	−1.30	0.43	1.74
1986	3.59	0.51	4.04
1987	1.93	0.29	2.19
Quarter	**EEMK**	**EER**	**MULX**
1985.1	2.60	0.53	3.20
1985.2	1.97	0.69	2.70
1985.3	3.50	0.67	4.28
1985.4	2.55	0.03	2.48
1986.1	1.50	0.29	1.77
1986.2	5.27	0.80	6.01
1986.3	6.15	0.75	6.87
1986.4	5.93	0.72	6.49
1987.1	2.47	−0.43	2.06
1987.2	−0.46	0.22	−0.28
1987.3	−4.12	0.53	−3.48
1987.4	−3.66	0.32	−3.34
1988.1	−3.59	−0.77	−4.28

EEMK = contribution of k-ratio to growth of m1
EER = contribution of r-ratio to growth of m1
MULX = actual growth rate of m1

Table A3

Contribution of the Component Ratios to the Growth Rate of m2

Year	EEM2K	EEM2T2	EER	MUL2X
1965	−0.77	3.86	−0.46	2.59
1966	−1.24	2.15	0.07	0.98
1967	−0.86	3.00	−0.41	1.71
1968	0.36	1.13	−0.04	1.45
1969	−0.64	0.41	0.75	0.53
1970	−1.91	0.78	0.37	−0.74
1971	−0.28	5.13	−0.91	3.90
1972	0.15	4.95	−0.34	4.71
1973	−0.92	2.75	−0.37	1.45
1974	−3.20	1.94	−0.63	−1.88
1975	−3.79	5.71	−0.41	1.51
1976	−3.01	7.80	0.18	4.92
1977	−1.18	5.00	0.43	4.22
1978	−1.36	0.72	−0.11	−0.75
1979	−1.77	1.12	0.51	−0.12
1980	−2.70	2.59	−0.16	−0.26
1981	−0.37	2.06	1.36	3.07
1982	−0.71	2.76	0.83	2.87
1983	1.26	0.86	0.37	2.47
1984	−1.34	1.22	−0.18	−0.31
1985	1.89	−0.61	0.43	1.72
1986	5.12	−6.22	0.51	−0.60
1987	2.71	−5.45	0.29	−2.47
Quarter	**EEM2K**	**EEM2T2**	**EER**	**MUL2X**
1985.1	3.83	0.49	0.53	4.87
1985.2	2.89	−4.58	0.69	−0.99
1985.3	5.11	−6.32	0.67	−0.52
1985.4	3.71	−5.78	0.03	−2.05
1986.1	2.17	−3.44	0.29	−0.98
1986.2	7.56	−7.48	0.80	0.88
1986.3	8.74	−8.91	0.75	0.59
1986.4	8.34	−10.51	0.72	−1.48
1987.1	3.46	−7.57	−0.43	−4.53
1987.2	−0.64	−3.79	0.22	−4.22
1987.3	−5.80	3.75	0.53	−1.48
1987.4	−5.16	1.54	0.32	−3.29
1988.1	−5.10	−4.39	−0.77	−1.46

EEM2K = contribution of k-ratio to growth of m2
EEM2T2 = contribution of t2-ratio to growth of m2
EER = contribution of r-ratio to growth of m1
MUL2X = actual growth rate of m2

Table A4

Contribution of the Component Ratios to the Growth Rate of m3

Year	EEM3K	EEM3T2	EEM3T3	EER	MUL3X
1965	−0.77	3.69	1.10	−0.46	3.43
1966	−1.25	2.04	0.87	0.07	1.68
1967	−0.87	2.83	0.99	−0.41	2.48
1968	0.36	1.06	0.41	−0.04	1.79
1969	−0.65	0.39	−0.90	0.75	−0.47
1970	−1.92	0.74	0.43	0.37	−0.37
1971	−0.28	4.74	3.17	−0.91	6.26
1972	0.15	4.52	1.47	−0.34	5.70
1973	−0.93	2.44	3.82	−0.37	4.52
1974	−3.26	1.66	4.20	−0.63	1.57
1975	−3.85	4.93	−0.07	−0.41	0.58
1976	−3.05	6.87	−0.84	0.18	3.00
1977	−1.20	4.42	0.21	0.43	3.84
1978	−1.38	0.61	3.65	−0.11	2.42
1979	−1.81	0.94	2.86	0.51	2.34
1980	−2.75	2.14	1.66	−0.16	0.87
1981	−0.37	1.66	2.74	1.36	5.29
1982	−0.72	2.20	1.98	−0.83	4.24
1983	1.28	0.71	−2.08	0.37	0.15
1984	−1.37	0.97	2.40	−0.18	1.73
1985	1.93	−0.49	−0.20	0.43	1.68
1986	5.22	−4.97	−1.33	0.51	−0.58
1987	2.77	−4.35	−0.91	0.29	−2.22
Quarter	**EEM3K**	**EEM3T2**	**EEM3T3**	**EER**	**MUL3X**
1985.1	3.91	0.39	−1.89	0.53	2.94
1985.2	2.95	−3.66	−1.70	0.69	−1.71
1985.3	5.20	−5.07	−3.36	0.67	−2.55
1985.4	3.78	−4.63	−0.73	0.03	−1.56
1986.1	2.22	−2.74	1.75	0.29	1.48
1986.2	7.71	−5.97	−2.56	0.80	−0.02
1986.3	8.91	−7.13	−2.91	0.75	−0.37
1986.4	8.50	−8.44	−3.72	0.72	−2.96
1987.1	3.52	−6.08	−1.52	−0.43	−4.50
1987.2	−0.66	−3.03	1.33	0.22	−2.16
1987.3	−5.92	2.98	2.58	0.53	0.20
1987.4	−5.27	1.22	1.95	0.32	−1.78
1988.1	−5.21	3.48	0.85	−0.77	−1.64

EEM3K = contribution of k-ratio to growth of m3
EEM3T2 = contribution of t2-ratio to growth of m3
EEM3T3 = contribution of t3-ratio to growth of m3
EER = contribution of r-ratio to growth of m3
MUL3X = actual growth rate of m3