



BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM
WASHINGTON, D. C. 20551

STRICTLY CONFIDENTIAL (FR)
CLASS I - FOMC

TO: Federal Open Market Committee

DATE: May 11, 1988

FROM: Normand Bernard *N.B.*

SUBJECT: Memos on Monetary Base -
Agenda Item 6.

The attached memorandum from Mr. Kohn, dated May 11, 1988, together with the memorandum from President Melzer, dated May 10, 1988, relate to the scheduled discussion of the monetary base at next Tuesday's meeting (agenda item 6). President Melzer's proposal (dated February 3, 1988) is appended to his current memorandum.

The earlier memoranda on this issue circulated to the Committee were as follows:

1. "A Proposal for the Adoption of Monetary Base Constraints" by President Melzer and attached St. Louis Bank staff paper "Selected Aggregates as Intermediate Policy Targets: Some Initial Evidence" (February 3, 1988).
2. Board staff paper, "The Monetary Base as an Intermediate Target" (February 5, 1988).

Attachment

BOARD OF GOVERNORS
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Class I - FOMC

Office Correspondence

Date May 11, 1988

To Federal Open Market Committee

Subject Role of the Monetary Base in Monetary

From Donald Kohn

Policy

This memorandum is intended to provide background for the Committee's discussion of the role the monetary base could play in monetary policy. Drawing on the two previous memos distributed to the Committee before the February meeting, it summarizes some of the characteristics of the base, and its behavior, and assesses various possible forms of base targets.² It is not intended to provide background for choice of specific numerical objectives, which could be considered in July if the Committee were to decide that some form of base target should be set.

Consideration of the base as a guide for policy is occasioned in part by the proposal of President Melzer, which the Committee agreed to revisit before establishing long-run ranges in July. (A separate memorandum from him summarizing the case for this proposal also has been sent to the Committee.) In addition, in association with the hearings in February, both Congressional Committees involved in monetary policy oversight requested that the Federal Reserve evaluate and report to them on establishing objectives for the monetary base.³

1. David Lindsey contributed to this memorandum.

2. See memos and attached papers to the Federal Open Market Committee from President Melzer and Mr. Kohn dated February 3 and February 5, 1988, respectively.

3. For example, conclusion 5 of the House report stated: "...[The Federal Reserve] should give serious consideration to reporting target ranges for the monetary base, and should either adopt target ranges for the monetary base, or should explain why such ranges would be less useful than the ranges it now adopts for M2 and M3."

Characteristics of Demand for the Base

The demand for the base is derived from demands for its components--currency and reserves. The demand for reserves, in turn, depends on the demands for excess reserves and for the deposits against which reserves are required--primarily transactions deposits in M1, but also including interbank and U.S. government deposits excluded from the aggregates, and nonpersonal time and savings deposits with a relatively small weight reflecting their 3 percent reserve requirement.

Table 1, reproduced from the memorandum of February 5, 1988, gives interest and income elasticities for the base as compared to other monetary aggregates.⁴ These elasticities were derived from the underlying equations for demands for currency and transactions deposits used in the Board's quarterly model. The base tends to have a smaller interest elasticity than M1 and, over the short- and intermediate-runs, than M2 as well. Except in the long-run, its income elasticity tends to be a little below those of the transaction aggregates, M1 and M1-A. These characteristics reflect the considerably higher weight of currency in the base than in M1 or M2, as well as the influence of non-M1 components in the broader aggregate.

4. Of course these income and interest elasticities and the following discussion of their implications are relevant only to the extent a base target is being used to guide monetary policy over time. Under the proposal of President Melzer, the base would trigger a policy response only when its growth was outside a range. However, the interaction of the base and other variables does provide important background for considering the appropriateness of keying policy to the base even occasionally, and for judging the possible movements in income and interest rates likely to result when the base is constraining policy.

Table 1

Estimated Properties of the Monetary Aggregates

<u>Time Horizon</u>	INTEREST ELASTICITIES ²			
	<u>Base</u>	<u>M1-A</u>	<u>M1</u>	<u>M2</u>
One quarter	-.04	-.03	-.12	-.06
Four quarters	-.08	-.07	-.25	-.13
Long run	-.06	-.09	-.11	-.07

1. For M1-A and M1, based on Board quarterly model; for M2 based on single-equation quarterly aggregate model.
 2. With respect to the federal funds rate. Incorporates estimated responses of Treasury bill rates and deposit rates.

<u>Time Horizon</u>	INCOME ELASTICITIES			
	<u>Base</u>	<u>M1-A</u>	<u>M1</u>	<u>M2³</u>
One quarter	.47	.64	.76	.32
Four quarters	.92	1.02	1.02	.96
Long run ⁴	.98	.99	.99	1.00

3. Incorporates estimated response of wealth to changes in income, both of which are used as scale variables in the M2 equation.
 4. Long-run income elasticities for all components and aggregates, except those for currency and currency in circulation, are constrained to equal unity in the long-run.

	TREND VELOCITY GROWTH ⁵ (percent)			
	<u>Base</u>	<u>M1-A</u>	<u>M1</u>	<u>M2</u>
	.8	1.6	1.0	.2

5. Assumes unchanged interest rates.

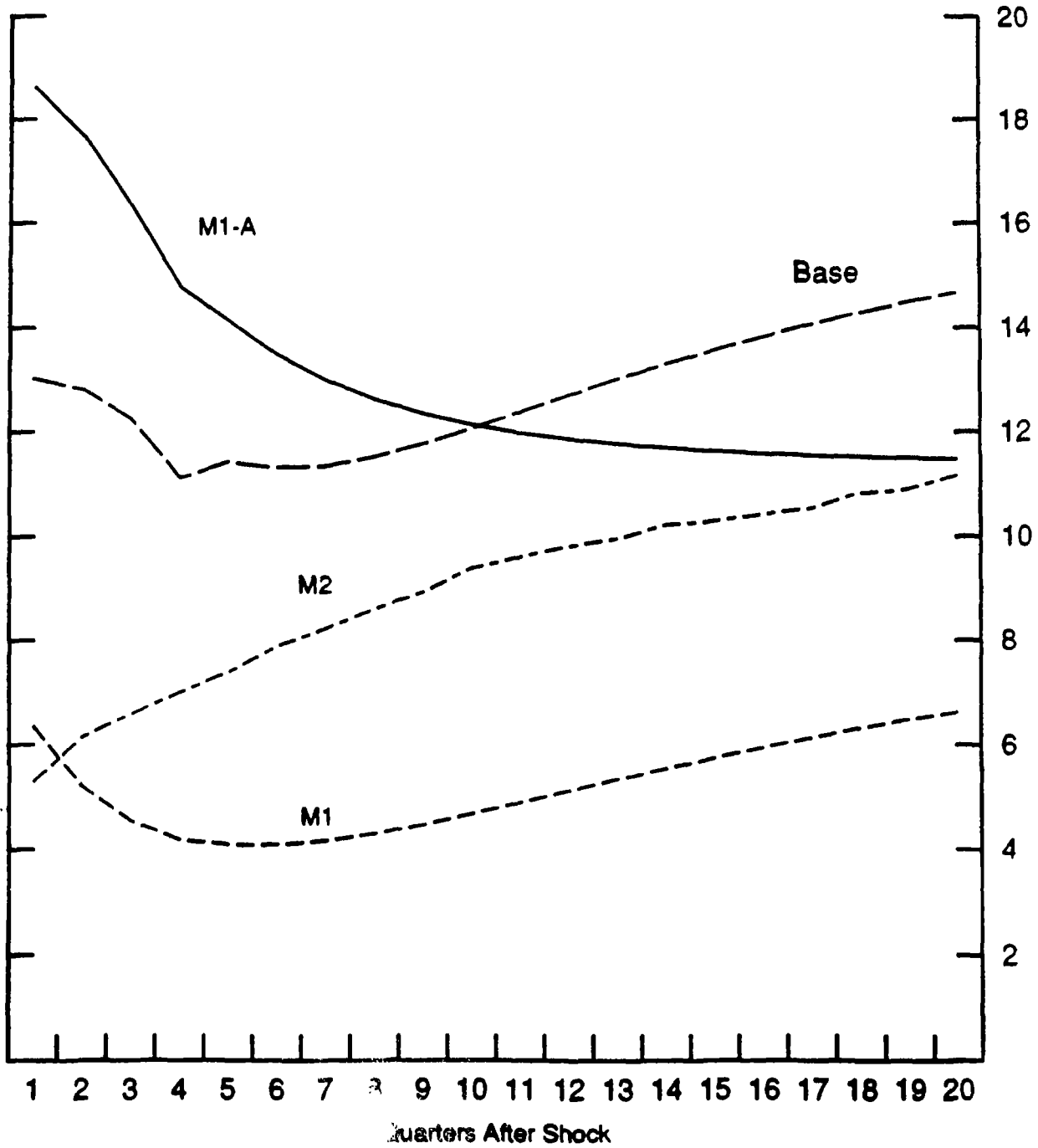
Chart 1, also from that memo, compares the ratios of the income and interest elasticities for the different aggregates over various time horizons. Higher values of the ratio, that is, low interest elasticities relative to income elasticities, are desirable for a monetary target, other things equal, in the event of a shock to spending, since such a shock will be accompanied by a stronger response of interest rates, and these interest rate movements will tend to damp the effects of the shock on the economy. As can be seen in the chart, the ratio for the base runs above the for M1 and M2. If, for example, spending were to strengthen unexpectedly, holding the base to a predetermined path would tend to produce the higher interest rates needed to induce spending back closer to original path over time.

More generally, the lower interest elasticity of the base implies that holding it to a given objective would be accompanied by greater interest rate volatility than would be true with M1 and M2 objectives.⁵ Although this variability in interest rates would be desirable in some circumstances, it may be excessive or counterproductive in others. For example, self-reversing shocks to spending also would be accompanied by disturbances to at least short-term interest rates. And shifts in the demand for the base relative to spending and initial interest rates in the face of a preset supply would imply relatively large responses in interest rates, which could cause income to deviate from expected levels.

5. Indeed, in simulation exercises using the MPS model, very tight base targeting tends to produce explosive oscillations in interest rates over time, reflecting the combined effects of a low base interest elasticity in the short run and lags in the impact of rates on spending.

Chart 1

RATIO OF INCOME ELASTICITY TO INTEREST ELASTICITY (Absolute Value of Ratio)



But demand for the base has tended to be fairly predictable, especially compared to M1 and M1-A. This importantly reflects the influence of currency demands, which have been relatively stable.⁶ Although disturbances in demands for deposits can have important effects on base demand, their effects are muted to an extent by the incomplete coverage and fractional nature of reserve requirements. In addition, errors in deposit and currency equations have tended to be negatively correlated over time, perhaps reflecting unpredictable substitutions between these assets. Nonetheless, currency plus reserve demands are subject to unanticipated shifts, sometimes of size, especially over periods as short as a quarter. If such swings in demand were not accommodated--perhaps because the base was at one boundary of a predetermined range--substantial variations in interest rates would be likely to occur, especially in the short run. On balance, interest rate volatility stemming from disturbances to the demand for the targeted aggregate would tend to be greater with the base than with a strict M2 target, considering both the lower interest elasticity of the base and the tendency for M2 equations to be subject to slightly smaller disturbances in percentage terms.⁷

6. Although the level of currency outstanding seems inexplicably high, movements in that level typically respond in a fairly predictable fashion to measures of spending and market interest rates.

7. Root mean squared errors of one-quarter ahead post-sample projections of annualized growth rates for various aggregates from 1985 QI through 1988 QI in percentage points were: Base, 1.7; M1-A, 3.2; M1, 2.5; M2, 1.4. These errors resulted from simulations of the demand equations used to derive the elasticities given in Table 1; in one-third of the quarters, the demand equations' predictions made larger errors than these figures. The offsetting nature of deposit and currency prediction errors is suggested by comparing RMSEs of 2.3 and 3.4 for currency and required reserves, respectively, over the same period with the 1.7 RMSE for the base.

The net effects of these behavioral characteristics of the base are captured in the movements of its velocity, shown in Chart 2. Base velocity tends to have varied somewhat less than the velocities of the other aggregates, which have been more subject to the influences of innovation and deregulation, with resultant heightened short-run interest elasticities. As can be seen in Chart 2, the trend in base velocity changed in 1980, but by less than for M1, and short and intermediate-term variations in base velocity have been somewhat smaller than for M2. Statistical evidence on changes in the relationship of the base to underlying economic variables since 1980 has been mixed. Christiano finds no shift in the relationship between growth rates of the base and prices (or M2 and prices) after 1979, though some deterioration in forecasting performance.⁸ Others have found a shift in the growth rate relationships around 1980, but relatively stable relationships thereafter.⁹ In reduced-form equations predicting nominal GNP from current and lagged monetary aggregates, without taking account of any shift in the relationship, out-of-sample GNP forecast errors in the 1980s using the base are considerably

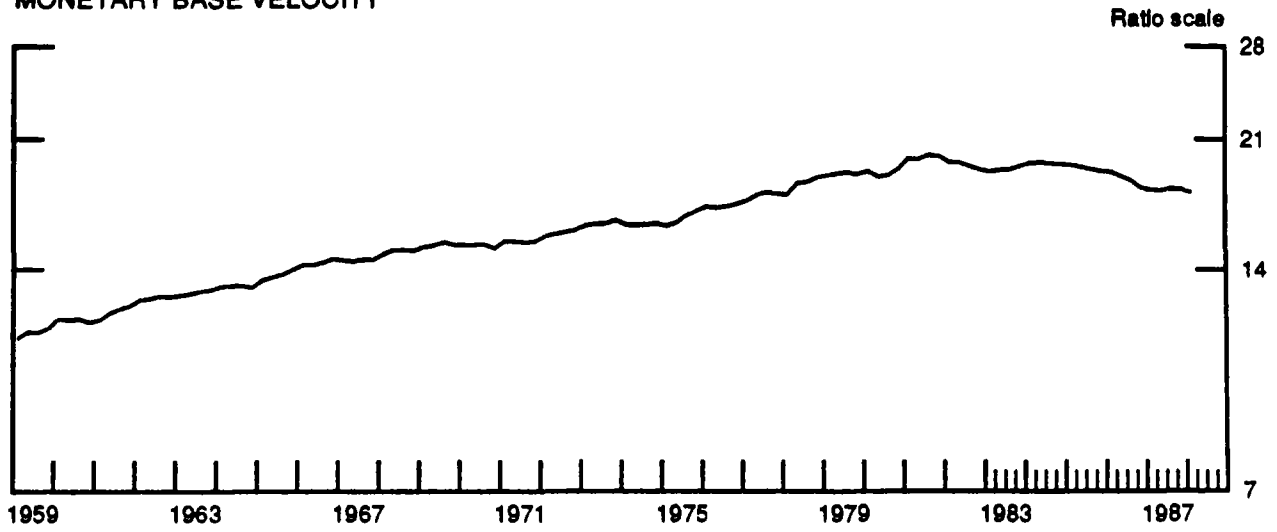
8. See "Money and the US Economy in the 1980's: A Break from the Past?", Quarterly Review, Federal Reserve Bank of Minneapolis, summer, 1986.

9. Robert Rasche, "Demand Functions for U.S. Money and Credit Measures" (prepared for the Board's Conference on Monetary Aggregates and Financial Sector Behavior in Interdependent Economies, May 26 and 27, 1988) finds a shift in growth rate demand relationships in 1980, which he accommodates with a dummy variable, and he also finds a need to model interest rate elasticities differently to take account of heightened sensitivities in 1980s. In the findings reported by the Federal Reserve Bank of St. Louis in the paper sent to the FOMC in February, the relatively better performance of the base in predicting GNP emerges only in equations fitted from 1981 on.

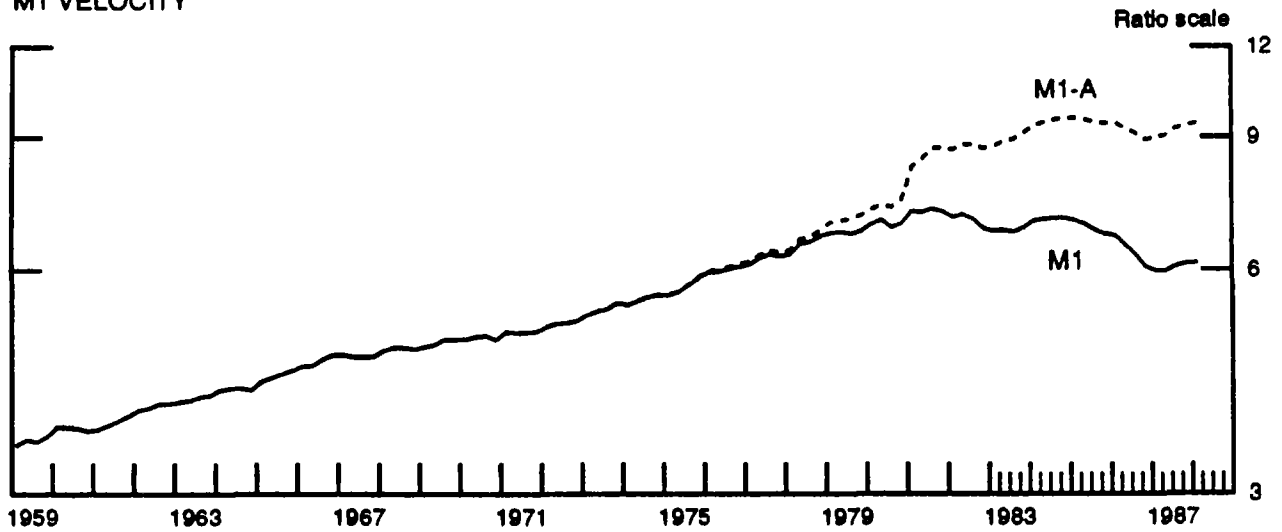
Chart 2

Velocity of Monetary Aggregates

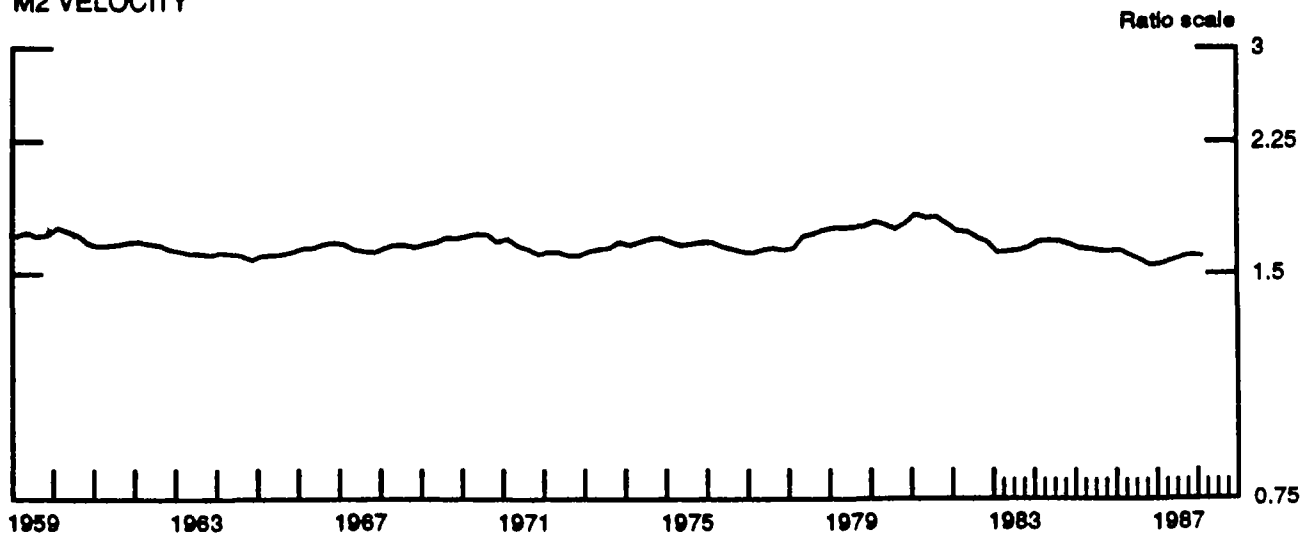
MONETARY BASE VELOCITY



M1 VELOCITY



M2 VELOCITY



larger than using M2, though less than for M1 and M1-A. (Errors for all the aggregates are quite large.)

The nonborrowed base (currency plus nonborrowed reserves) has not been subject to the same kind of empirical scrutiny as has the total base. From the demand side, it would appear to be a little more interest elastic than the total base, reflecting the role of the discount window. Interest rates would not have to increase or decrease as much as with a total base constraint in response to unexpected shifts in spending or money demand, because changes in discount window borrowing would accommodate a portion of the resulting changes in demand for the base. For example, an increase in the demand for the base, whatever its origin, would be accommodated in part by an increased supply of borrowed reserves as the greater demand drove the federal funds rate further above the discount rate. Combining the staff's work on the response of borrowing to the federal funds rate spread over the discount rate with the elasticities on table 1 suggests that the four-quarter demand elasticity of the nonborrowed base might be on the order of .01 greater in absolute value than the total base--that is, $-.09$ compared with $-.08$. Such a difference, while small, would tend to damp interest-rate volatility somewhat if the nonborrowed base rather than the total base were being controlled.

Supply of the Monetary Base and its Control

For the most part, the Federal Reserve historically has supplied monetary base to accommodate changes in demand. This has been a consistent policy with regard to demands for currency. With respect to reserves, the interactions have been more complex. Except in the 1979-82 period, policy

reactions to deviations of reserves from expectations have been quite indirect. In the short-run, any increases or decreases in demands for reserves have been completely accommodated through open market operations. Over time, deviations in money (and implicitly reserves) from objectives have occasionally prompted adjustment of federal funds rate or discount borrowing objectives, especially when they have coincided with unwelcome developments in the economy.

From late 1979 through late 1982 the Federal Reserve used nonborrowed reserve objectives keyed to achieving goals for money growth over time. Even so, total reserves were not closely controlled during this period, since borrowed reserves were allowed to expand or contract in response to deviations in money growth from objectives. In fact, close control of total reserves or the total base would require a revamping of institutional arrangements, including the elimination of the remaining two-day lag of required reserves behind transactions deposits. In addition, steps would need to be taken to minimize adjustment and perhaps seasonal borrowing at the discount window in normal circumstances, possibly via a floating penalty discount rate.

Under current institutional arrangements, control of total reserves or the monetary base would need to be indirect, working through the effects of changes in interest rates on the demand for the components of the base. In that sense, the mechanism of control for the base is qualitatively the same as for the monetary aggregates. Most econometric work suggests that any of these measures is reasonably controllable over a

couple of quarters, and certainly over a year, if the FOMC were willing to accept the interest rate volatility that might be entailed.

Under current institutional arrangements, the Federal Reserve could exercise direct short-run control over the nonborrowed base, as it did over nonborrowed reserves. Aside from short-run fluctuations in market factors affecting reserves, such as float, these nonborrowed concepts consist of balance-sheet items that are directly controllable.

Policy Options

1. Continue to give the base no special weight in policy.

Continuation of the current policy of giving no role to the base might be justified on several grounds. First, the base has not proven to be all that closely related to income and other ultimate goals of policy. Its velocity, while less variable than other aggregates, still has fluctuated substantially, and GNP forecast errors have been large in the 1980s using admittedly simplistic reduced-form models with current and lagged base growth as the main explanatory variable. In the simulations done with the more complex MPS structural model, standard deviations of income and prices around desired paths using a base target also amounted to several percentage points over an horizon of a few years, only marginally better than the outcomes with other aggregates. An implication of these results is that deviations of base growth from expectations--even when these deviations become sizable--may not necessarily indicate a need for a policy response.

Although the base may track concurrent spending trends to a degree, it is not clear that it adds significantly to the information from other possible indicators--financial and nonfinancial--taken together.

Although errors in the demand equations for currency and deposits tend to be partly offsetting, when the base is strong generally the other aggregates are as well. To the extent the base has some superior qualities as a monetary indicator, these derive from the behavior of the demand for its currency component and the relatively high weight of that component in the base compared with demand deposits and OCD. Although currency demand equations perform reasonably well over time, the inability to explain the use of much of the currency outstanding raises the possibility of shifts in currency demand arising from unknown sources. Indeed, currency growth in 1987 and early 1988 has been somewhat stronger than predicted.

Moreover, in circumstances in which a base target was constraining, interest rates probably would move quite substantially if the Federal Reserve chose to resist strongly any tendency for the base to get out of line. Such rate movements might be needed to minimize or reverse any tendency for cumulative deviations of income and prices from objectives, but they could also reflect temporary influences on the economy or shifts in base demand relative to GNP. Indeed, such shifts could come not only from currency and transactions deposits, but also, particularly in the short-run, from movements in interbank or government deposits or in excess reserves.

On the other hand, the base does have some qualities that may make some form of base targeting a useful supplement to existing indicators. Its combination of relatively low interest elasticity and fairly good predictability suggests that on many occasions its movements would be conveying some information about the trend of spending in the economy. At

the very least, substantial and sustained accelerations or decelerations in the base are very likely to be associated with underlying developments in the economy. Because of its damped interest elasticity, the base is more likely to conform to the general cyclical contours of the economy than are the other aggregates, including M2. Generally, periods of rapid growth in the base in recent years have been followed, with a lag, by a tightening of monetary policy. In some cases (1983, 1986) these have been periods in which the Federal Reserve had been easing. Greater attention to the base might have tempered the degree to which policy was previously eased, reducing the need for subsequent tightening, and damping the cyclical variations in interest rates, albeit at the expense of some greater short-term interest rate volatility. And in 1987, growth of the base decelerated substantially less than did growth of the other monetary aggregates, evidently more accurately signalling the course of the economy in 1988.

If the FOMC wished to establish some sort of base guide it could chose among a number of alternatives.

2. A "fail-safe" or "speed limit" range. This type of range encompasses the proposal of President Melzer, which is discussed in a memo also being distributed to the FOMC. It would provide for complete discretion as long as the monetary base was growing within a range, but would imply a strong reaction when the base got to one of its bounds. The ranges could be set wide enough to trigger response only in the most extreme situations--when base growth was unambiguously signalling the potential for inflation or recession. In such situations, variations in reserve pressures and money market interest rates would be keyed to

returning the base to its range within a relatively short period. As long as base growth threatened the limits, the Federal Reserve would be giving up discretionary reserve-pressure adjustments in response to a variety of signals.

To be an effective discipline, the ranges should be set in advance over a long horizon. Given recent trends in base growth and inflation, it seems unlikely that a range ultimately consistent with price stability could be set at this time without entailing abrupt adjustments in the real economy. Consequently, the FOMC might want to contemplate pre-establishing downward steps in the base growth range over the next several years. It should be noted, though, that a sharp decline in inflation and nominal interest rates, such as occurred earlier this decade, could boost the growth of demand for the base for a time, complicating the choice of the appropriate path of base ranges consistent with the transition to price stability.¹⁰

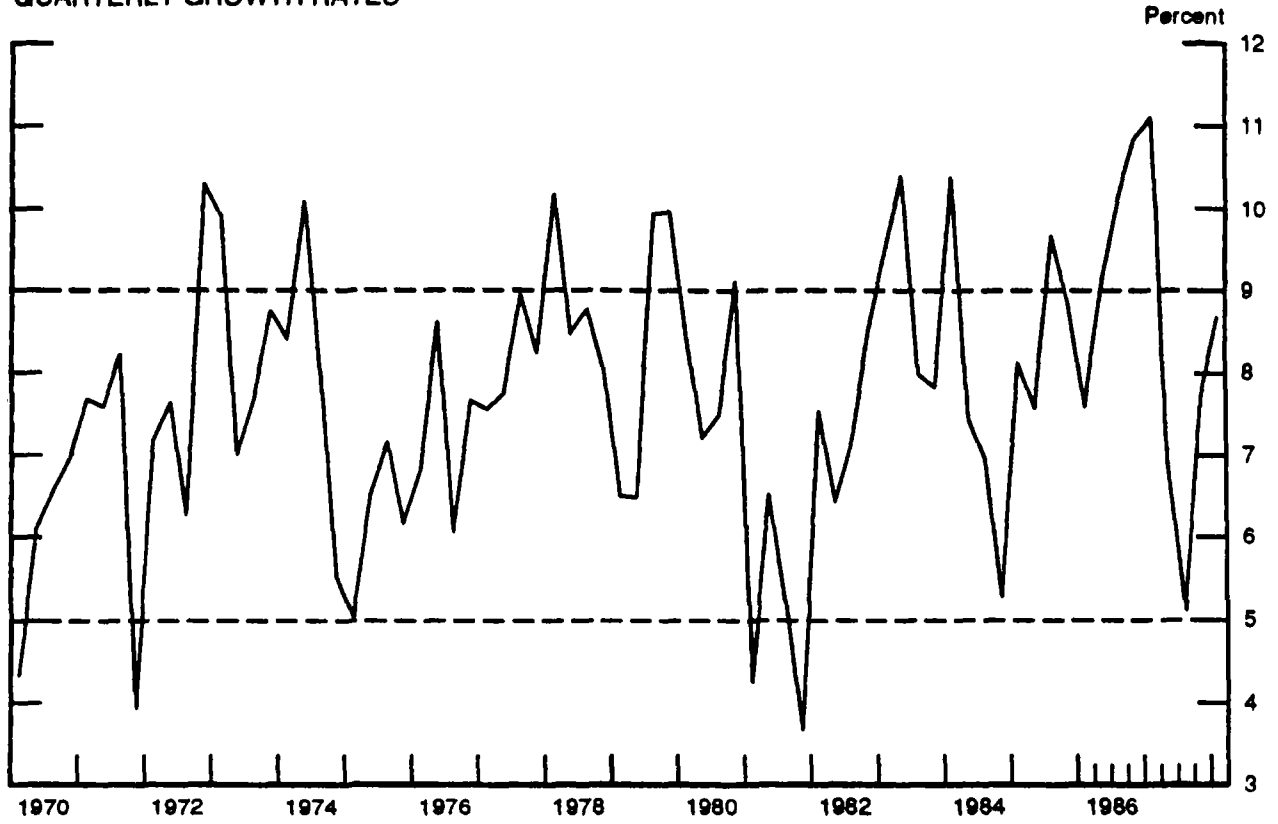
Four possible alternatives for measuring growth of the base used in such ranges are presented in the following charts. (The dashed lines in the charts are for purposes of orientation, rather than a staff proposal of possible ranges.) The first two possibilities involve the total monetary base. The top chart coincides with President Melzer's proposal to key off of quarterly growth rates in the base. The bottom panel attempts to smooth through some of the quarterly observations by using a four-quarter moving average. An advantage of the latter is that it is less likely to trigger a

10. This of course would be even more of a problem for announced very long-run ranges for other monetary aggregates that are even more interest elastic.

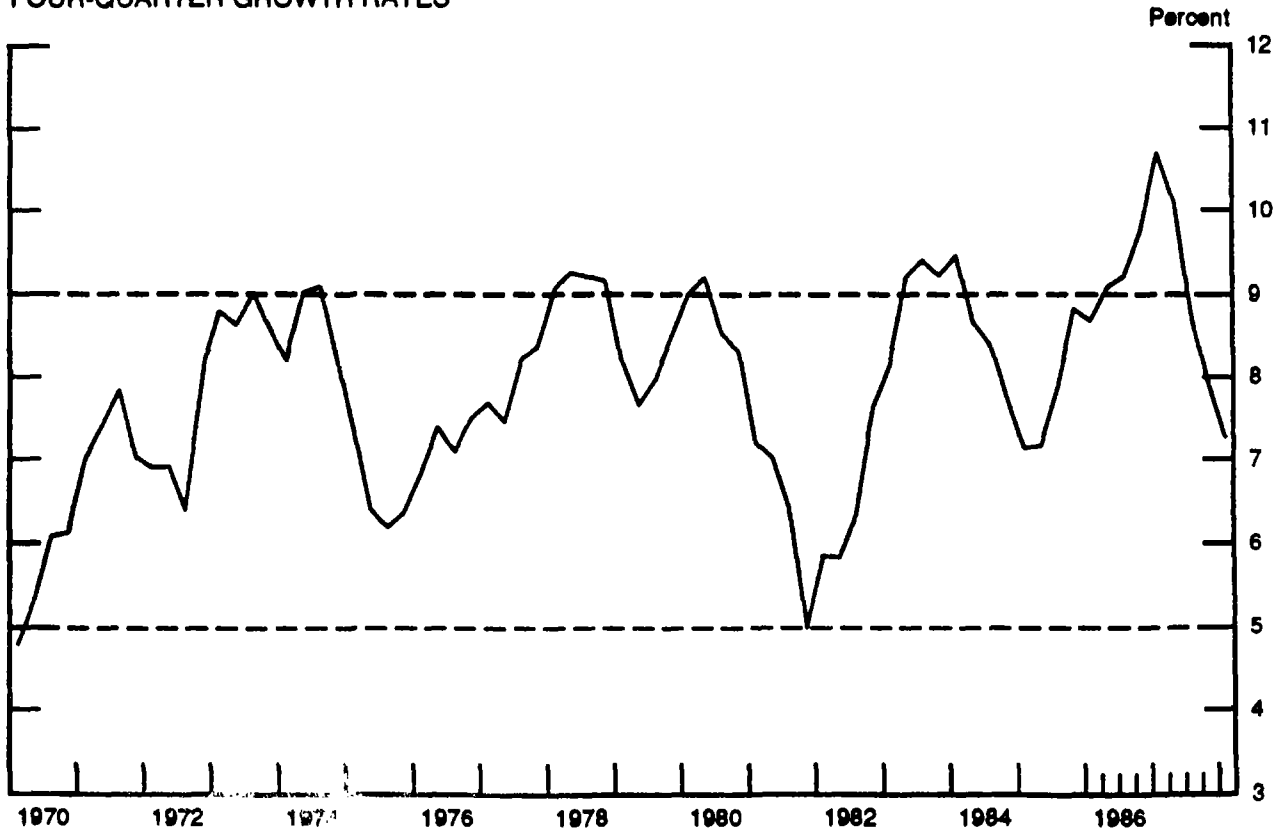
Chart 3

Board Monetary Base

QUARTERLY GROWTH RATES



FOUR-QUARTER GROWTH RATES

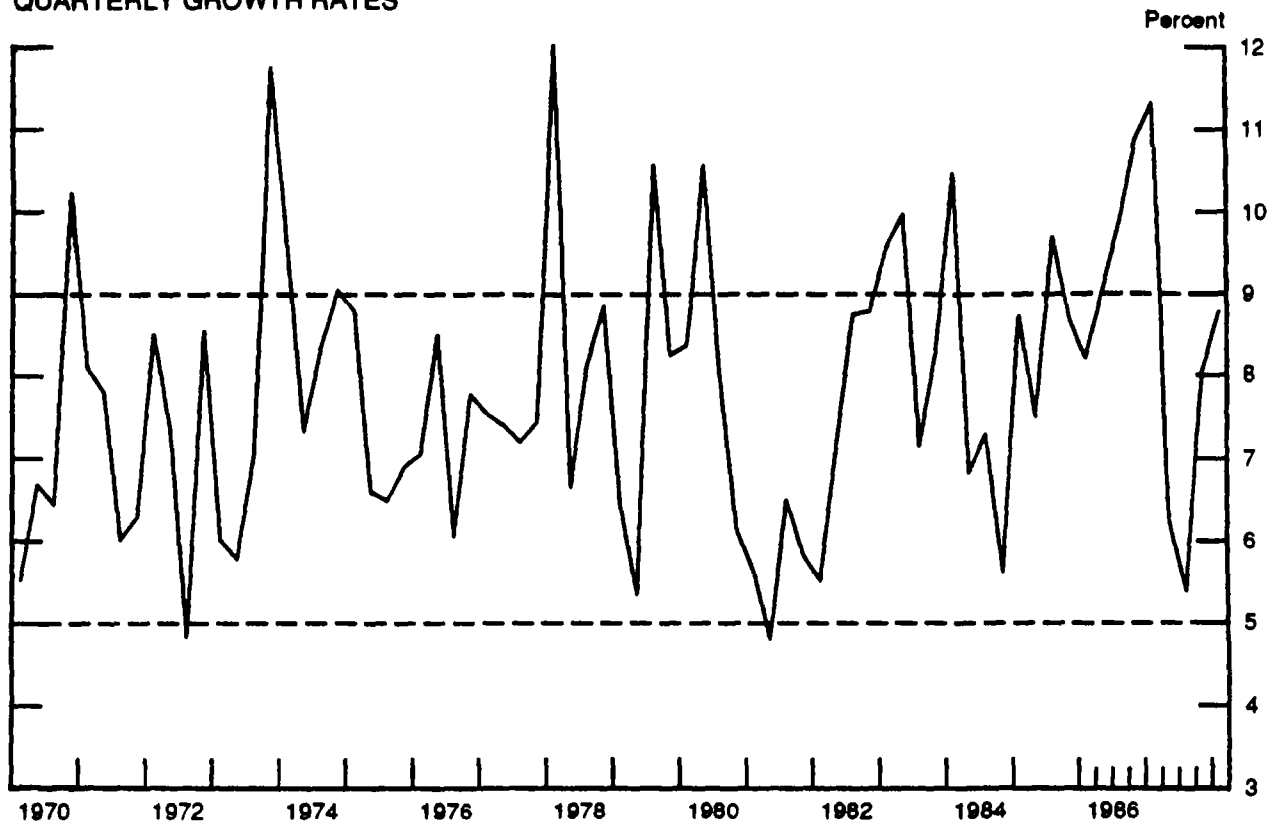


NOTE: Series is break adjusted and seasonally adjusted.

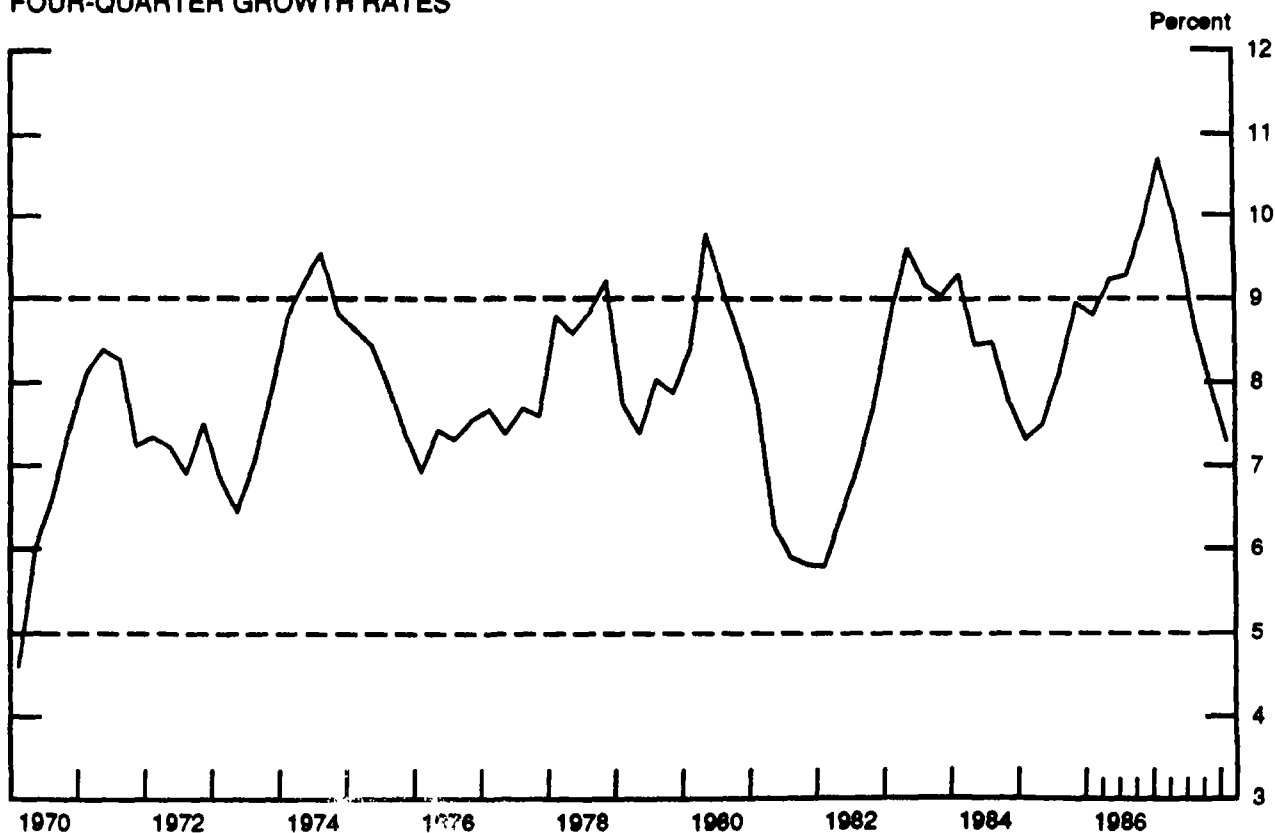
Chart 4

Board Nonborrowed Base

QUARTERLY GROWTH RATES



FOUR-QUARTER GROWTH RATES



NOTE: Series is break adjusted and seasonally adjusted.

Federal Reserve response to transitory movements in demands for currency or reserves. Since the total base is controllable only indirectly, choice of this measure would raise issues as to the nature of the policy response to a breaching of the limits. By contrast, the nonborrowed base, shown in the next chart, is directly controllable, and thus these issues could be avoided; the nonborrowed base simply could be prevented from moving outside the growth rate ranges. Because its demand is a little more sensitive to interest rates, a tendency to breach the ranges would give rise to smaller, though still substantial, fluctuations in interest rates.

3. A growth rate range similar to those for M2 and M3. Under this policy approach, an annual growth rate range could be announced for the monetary base as a supplement to, and on a similar basis as, those for M2 and M3. In effect, the monetary base would represent the primary narrow monetary aggregate tracked by the FOMC--replacing M1, for which announced ranges were discontinued in 1987. The substantial interest sensitivity of M1 that undercuts its usefulness as an intermediate policy guide could well persist for some time, because depository institutions are unlikely to alter markedly their compensating balance arrangements or NOW account pricing behavior in coming years. The much lower interest sensitivity for the monetary base than for M1, along with its typically more predictable demand, provide a rationale for such a policy approach.

With this approach, the range for the monetary base would be accorded similar treatment to present ranges for M2 and M3. The range would be set for the upcoming year each July, and reviewed at the following February and July meetings, in accordance with analysis of its likely

behavior given recent and prospective developments of the economy, prices and financial conditions. Unlike the "speed-limit" approach just discussed, movements of the base within its annual range would receive some attention in implementing policy, while growth outside the range might not be strongly resisted, depending on the surrounding economic circumstances and any unexpected special factors affecting the demand for the base relative to GNP. Especially because the Committee could judge that a violation of the base range would be acceptable without necessarily inducing a policy response, use of the total base would seem advisable with this approach, thereby avoiding the complications involved in explaining and interpreting the less familiar concept of the nonborrowed base.