

Alternative Measures of the Monetary Base

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BECAUSE this Bank has long considered the monetary base an important variable in economic analysis, it has published monetary base data since August 1968 and has published numerous articles explaining the derivation of the monetary base and its uses in monetary analysis.¹ Several months ago, the Board of Governors of the Federal Reserve System (BOG) began publishing monetary base data in their H.3 and H.9 Statistical Releases and in the Federal Reserve *Bulletin*. Beginning on March 16, 1979, they published two monetary base series: a *level* series which did not incorporate the effects of reserve requirement changes and a *growth rate* series which incorporated such effects. Since the St. Louis series is adjusted for these effects, this Bank designated it the "Adjusted Monetary Base" to facilitate a clearer public differentiation between the alternative monetary base levels then being published. On June 15, 1979, the BOG began publishing the adjusted monetary base from which their previously published growth rate series had been derived.

There are several important differences among the various monetary base series now being published.

¹This Bank publishes monetary base data in its weekly publication, "U.S. Financial Data," and its monthly publication, "Monetary Trends." See also Leonall C. Andersen and Jerry L. Jordan, "The Monetary Base—Explanation and Analytical Use," this *Review* (August 1968), pp. 7-11; Albert E. Burger, Lionel Kalish III, and Christopher T. Babb, "Money Stock Control and Its Implications for Monetary Policy," this *Review* (October 1971), pp. 6-22; Albert E. Burger, "Explanation of the Growth of the Money Stock: 1974-Early 1975," this *Review* (September 1975), pp. 5-10; Albert E. Burger, "The Relationship Between Monetary Base and Money: How

This article explains the key distinctions between the series in order to clarify the public's understanding of these differences.

Computation of the Unadjusted Monetary Base: Similarities and Differences

The St. Louis unadjusted base and the unadjusted monetary base initially published by the BOG have much in common. The basic components of both are (1) member bank deposits at Federal Reserve Banks and (2) currency in circulation, which consists of currency held by the nonbank public and vault cash in commercial banks. Also, as shown in Table I, the largest "source" of the unadjusted monetary base is Federal Reserve holdings of Government securities, which accounts for about 80 percent of the total.

Two minor ways in which computation of the St. Louis and the BOG unadjusted monetary base differ are in the methods of (1) treatment of member bank vault cash and (2) seasonal adjustment of data. They differ primarily in the degree of emphasis placed on the "sources" relative to the "uses" of the monetary

Close?" this *Review* (October 1975), pp. 3-8; Leonall C. Andersen, "Selection of a Monetary Aggregate for Economic Stabilization," this *Review* (October 1975), pp. 9-15; Anatol B. Balbach and Albert E. Burger, "Derivation of the Monetary Base," this *Review* (November 1976), pp. 2-8; Albert E. Burger and Robert H. Rasche, "Revision of the Monetary Base," this *Review* (July 1977), pp. 13-23; and Leonall C. Andersen and Denis S. Karnosky, "Some Considerations in the Use of the Monetary Aggregates for the Implementation of Monetary Policy," this *Review* (September 1977), pp. 2-7.

Table I

Sources and Uses of the Unadjusted Monetary Base¹

(Millions of Dollars)

| Sources ² | | Uses |
|---|-----------|---|
| Federal Reserve Credit | | |
| Holdings of Government Securities | \$114,963 | Member Bank Deposits at Federal Reserve Banks \$ 29,844 |
| Discounts and Advances | 1,396 | Currency in Circulation |
| Float | 6,407 | Currency Held by the Public 101,700 |
| Other Federal Reserve Assets | 6,288 | Vault Cash of Banks 14,100 |
| Other Sources of Monetary Base | | Unadjusted Monetary Base \$145,644 |
| Gold Stock | 11,328 | |
| Special Drawing Rights | 1,800 | |
| Treasury Currency Outstanding | 12,349 | |
| Treasury Deposits at Federal Reserve Banks | -3,270 | |
| Treasury Cash Holdings | -378 | |
| Foreign Deposits with Federal Reserve Banks | -284 | |
| Other Liabilities & Capital Accounts | -4,293 | |
| Other Federal Reserve Deposits | -662 | |
| Unadjusted Monetary Base | \$145,644 | |

¹Monthly averages of daily figures for June 1979, not seasonally adjusted.²The sign attached to each item indicates its direction of influence on the monetary base. For example, the item Treasury deposits at Federal Reserve Banks has a negative sign attached to it because an increase in these deposits reduces bank reserves and currency held by the public.

base (Table I). In general, these differences result in only small divergences between the growth rates of the two unadjusted monetary base series, as shown in Table II.

Vault Cash — The BOG unadjusted monetary base series includes the vault cash that member banks can use to meet their reserve requirements in the current week. Under the present system of lagged reserve accounting, this consists of vault cash held by member banks two weeks earlier (the member bank vault cash component of member bank reserves as reported in the *Federal Reserve Bulletin*). Since the St. Louis unadjusted monetary base is computed from a balance sheet identity (the sources of the base equal its uses), the current week's member bank vault cash appears in this series.

Seasonal Adjustment — The monetary base is "used" by commercial banks as member bank reserves and vault cash held by nonmember banks, and is also "used" by the nonbank public as currency. These items represent the *demand* for the base. The Board of Governors seasonally adjusts each of these three use components of the base separately, then totals them to obtain its unadjusted monetary base. In contrast, the Federal Reserve Bank of St. Louis focuses on the "sources" of the monetary base, which reflect the factors that change the total amount of base *supplied*

to the public and banks. Consequently, the source components of the base are first totalled (with appropriate sign), then this total is seasonally adjusted.

The Rationale for Adjusting the Monetary Base for Changes in Reserve Requirements

The monetary base has three main characteristics that make it useful in monetary analysis. First, it comprises the set of assets that constrain the amount of money supplied to the public. Second, it can be measured and controlled on a short-term basis by the Federal Reserve. Finally, it can be used as a summary measure of the *net* effect of Federal Reserve actions on the money stock.²

The monetary base incorporates the effects of two of the three major direct Federal Reserve actions that influence the money stock: open market operations (changes in Federal Reserve holdings of Government

²In the Report of the Advisory Committee on Monetary Statistics, "Improving the Monetary Aggregates," Board of Governors of the Federal Reserve System (June 1976), p. 8, the Advisory Committee on Monetary Statistics acknowledged the importance of the monetary base, noting that "it is the total among those considered here that can probably be most accurately measured and most precisely controlled by the Fed [and] . . . this total does have the great advantage of being less subject to influence by financial innovations than are broader totals. Hence, we recommend that the Fed regularly publish figures on the base . . ."

Table II

Growth Rates of the St. Louis and Board of Governors Unadjusted Monetary Base Series: Selected Periods of Reserve Requirement Changes
(Compounded Annual Rates)

| Period | St. Louis Unadjusted Monetary Base Series | Board of Governors Unadjusted Monetary Base Series ¹ | Difference |
|--------------|--|---|------------|
| II/62-I/63 | 1.7% | 1.6% | 0.1% |
| I/63-II/66 | 5.4 | 5.4 | 0.0 |
| II/66-IV/66 | 5.4 | 5.7 | -0.3 |
| IV/66-II/67 | 3.8 | 4.2 | -0.4 |
| II/67-IV/67 | 7.2 | 7.0 | 0.2 |
| IV/67-I/68 | 9.0 | 8.7 | 0.3 |
| I/68-I/69 | 7.1 | 7.0 | 0.1 |
| I/69-II/69 | 6.0 | 6.2 | -0.2 |
| II/69-III/69 | 1.5 | 2.8 | -1.3 |
| III/69-IV/69 | 7.6 | 6.7 | 0.9 |
| IV/69-III/70 | 5.6 | 5.9 | -0.3 |
| III/70-I/73 | 6.4 | 6.3 | 0.1 |
| I/73-IV/73 | 9.8 | 10.1 | -0.3 |
| IV/73-I/77 | 6.3 | 6.2 | 0.1 |
| I/77-III/78 | 8.8 | 8.9 | -0.1 |
| III/78-I/79 | 12.2 | 12.0 | 0.2 |

¹These growth rates are computed from the levels of monetary base initially published by the Board of Governors in the March 16, 1979 Statistical Release H.3.

securities) and Federal Reserve Bank loans to member banks. However, it excludes the effects on the monetary aggregates of the third major direct policy action, changes in legal reserve requirement ratios. If the monetary base is to be used as a measure that summarizes the effects of all Federal Reserve actions on the monetary aggregates, the effects of reserve requirement changes must also be included in the computation of the base.

If legal reserve requirement ratios were never changed and were uniform for all banks and all sizes of deposits, growth rates of both an adjusted and an unadjusted monetary base would be virtually the same. For example, there were no changes in legal reserve requirement ratios that noticeably affected required reserves from I/63 to II/66 and from I/77 to III/78. During these periods, the growth rates of all of the monetary base series, both adjusted and unadjusted, were approximately the same (Tables II and III).

However, whenever legal reserve requirement ratios are changed, the growth rates of a monetary base that

Table III

Growth Rates of the St. Louis Adjusted and Unadjusted Monetary Base Series: Selected Periods of Reserve Requirement Changes
(Compounded Annual Rates)

| Period | St. Louis Adjusted Monetary Base Series | St. Louis Unadjusted Monetary Base Series | Difference | Amount of Reserves Released by Changes in Legal Reserve Requirement Ratios |
|--------------|--|--|------------|--|
| II/62-I/63 | 4.3% | 1.7% | 2.6% | \$ 770 |
| I/63-II/66 | 5.8 | 5.4 | 0.4 | 0 |
| II/66-IV/66 | 3.5 | 5.4 | -1.9 | -865 |
| IV/66-II/67 | 5.9 | 3.8 | 2.1 | 850 |
| II/67-IV/67 | 6.8 | 7.2 | -0.4 | 0 |
| IV/67-I/68 | 7.3 | 9.0 | -1.7 | -550 |
| I/68-I/69 | 6.5 | 7.1 | -0.6 | 0 |
| I/69-II/69 | 3.0 | 6.0 | -3.0 | -660 |
| II/69-III/69 | 3.6 | 1.5 | 2.1 | 0 |
| III/69-IV/69 | 5.4 | 7.6 | -2.2 | -415 |
| IV/69-III/70 | 6.4 | 5.6 | 0.8 | 0 |
| III/70-I/73 | 8.0 | 6.4 | 1.6 | 3,700 |
| I/73-IV/73 | 7.6 | 9.8 | -2.2 | -1,315 |
| IV/73-I/77 | 8.3 | 6.3 | 2.0 | 4,135 |
| I/77-III/78 | 9.3 | 8.8 | 0.5 | 0 |
| III/78-I/79 | 8.0 | 12.2 | -4.2 | -3,000 |

incorporates these effects and one that does not incorporate these effects usually diverge markedly. This is what happened, for example, at the end of 1978. During the first ten months of that year, the growth rate of the "base" was about 10 percent regardless of the base measure used. However, from October 1978 to February 1979, an adjusted series indicates a deceleration in base growth to a 6.3 percent rate. In sharp contrast, a growth rate calculated using the levels of an unadjusted series, shows an acceleration in base growth to a 12.7 percent rate. This difference occurred in the November-December period when a change in reserve requirement ratios on time deposits (Table IV) increased member bank required reserves by about \$3 billion. A monetary base that incorporates the effect of higher reserve requirements indicates that the base grew at a 6.6 percent rate during this period. A monetary base that does not include such an adjustment indicates a 21.8 percent rate of growth.

This is not an isolated instance of the importance of incorporating the impact of changes in reserve requirements into a monetary base measure. Between mid-1960 and early 1977, the Board of Governors made

Table IV

Changes in Legal Reserve Requirement Ratios

| <u>Effective Date</u> | <u>Change</u> |
|-----------------------|---|
| September 1, 1960 | The reserve requirement of central reserve city banks against their net demand deposits was reduced from 18 percent to 17½ percent. This action reduced required reserves approximately \$120 million. |
| November 24, 1960 | The reserve requirement of country banks against their net demand deposits was increased from 11 percent to 12 percent. This action increased required reserves approximately \$380 million. |
| December 1, 1960 | The reserve requirement of central reserve city banks against their net demand deposits was reduced from 17½ percent to 16½ percent. This action reduced required reserves approximately \$250 million. |
| October 25, 1962 | The reserve requirement of reserve city banks against their time deposits was reduced from 5 percent to 4 percent. This action reduced required reserves approximately \$410 million. |
| November 1, 1962 | The reserve requirement of country banks against their time deposits was reduced from 5 percent to 4 percent. This action reduced required reserves approximately \$360 million. |
| July 14, 1966 | The reserve requirement of reserve city banks against time deposits (other than savings deposits) in excess of \$5 million was increased from 4 percent to 5 percent. This action increased required reserves approximately \$350 million. |
| July 21, 1966 | The reserve requirement of country banks against time deposits (other than savings deposits) in excess of \$5 million was increased from 4 percent to 5 percent. This action increased required reserves approximately \$70 million. |
| September 8, 1966 | The reserve requirement of reserve city banks against time deposits (other than savings deposits) in excess of \$5 million was increased from 5 percent to 6 percent. This action increased required reserves approximately \$370 million. |
| September 15, 1966 | The reserve requirement of country banks against time deposits (other than savings deposits) in excess of \$5 million was increased from 5 percent to 6 percent. This action increased required reserves approximately \$75 million. |
| March 2, 1967 | The reserve requirement of all member banks against savings deposits and the first \$5 million of time deposits was reduced from 4 percent to 3½ percent. This action reduced required reserves approximately \$425 million. |
| March 16, 1967 | The reserve requirement of all member banks against savings deposits and the first \$5 million of time deposits was reduced from 3½ percent to 3 percent. This action reduced required reserves approximately \$425 million. |
| January 11, 1968 | The reserve requirement of reserve city banks against net demand deposits in excess of \$5 million was increased from 16½ percent to 17 percent. This action increased required reserves approximately \$360 million. |
| January 18, 1968 | The reserve requirement of country banks against net demand deposits in excess of \$5 million was increased from 12 percent to 12½ percent. This action increased required reserves approximately \$190 million. |
| April 17, 1969 | The reserve requirement of all member banks against net demand deposits was increased ½ percentage point. This action increased required reserves approximately \$660 million. |
| October 16, 1969 | A 10 percent marginal reserve requirement was established on certain foreign borrowings, primarily Eurodollars, by member banks and on the sale of assets to their foreign branches. This action increased required reserves approximately \$415 million. |
| October 1, 1970 | The reserve requirement of all member banks against time deposits (other than savings deposits) in excess of \$5 million was reduced from 6 percent to 5 percent. At the same time, a 5 percent reserve requirement was imposed against funds obtained by member banks through the issuance of commercial paper by their affiliates. This action reduced required reserves approximately \$500 million (net). |

30 adjustments to legal reserve requirement ratios, as shown in Table IV. Twenty-five of these adjustments took place in the approximately 10-year period from mid-1966 to early 1977. Table III shows that these changes frequently resulted in a divergence of 2 to 3 percentage points between the growth rates of an adjusted and an unadjusted measure of monetary base. More important, the *direction* of change was usually different — one measure indicating an acceleration in

the base, the other measure indicating a deceleration or no change in the growth rate.

The data in Table III show a consistent relationship between the difference in the growth rates of the two base series and changes in legal reserve requirements. For example, during a period when reserve requirement ratios were increased (denoted in Table III by a minus sign preceding the amount of

| <u>Effective Date</u> | <u>Change</u> |
|-----------------------|---|
| January 7, 1971 | The reserve percentage required to be maintained against certain foreign borrowings, primarily Euro-dollars, by member banks, and the sale of assets to their foreign branches was raised from 10 percent to 20 percent. This action had little effect on required reserves. |
| November 9, 1972 | Regulations D and J were revised to (1) adopt a system of reserve requirements against demand deposits of all member banks based on the amount of such deposits held by a member bank, and (2) to require banks — member and nonmember — to pay cash items presented by a Federal Reserve Bank on the day of presentation in funds available to the Reserve Bank on that day. These changes reduced required reserves approximately \$2.5 billion, effective November 9; \$1.0 billion, effective November 16; and increased required reserves \$300 million, effective November 23. |
| June 21, 1973 | The Board amended its Regulation D to establish a marginal reserve requirement of 8 percent against certain time deposits and to subject to the 8 percent reserve requirement certain deposits exempt from the rate limitations of the Board's Regulation Q. In addition, reserves against certain foreign branch deposits were reduced from 10 percent to 8 percent. These changes had little effect on required reserves. |
| July 12, 1973 | Reserve requirements were imposed against finance bills. This action increased required reserves approximately \$90 million. |
| July 19, 1973 | The reserve requirement against all net demand deposits, except the first \$2 million, was increased $\frac{1}{2}$ percentage point. This action increased required reserves approximately \$760 million. |
| October 4, 1973 | The marginal reserve requirement against certain time deposits was increased from 8 percent to 11 percent. This action increased required reserves approximately \$465 million. |
| December 27, 1973 | The marginal reserve requirement against certain time deposits was reduced from 11 percent to 8 percent. This action reduced required reserves approximately \$360 million. |
| September 19, 1974 | The marginal reserve requirement against time deposits in denominations greater than \$100,000 and more than four-month maturity was eliminated. This action reduced required reserves approximately \$510 million. |
| December 12, 1974 | The reserve requirement against all time deposits with an original maturity of six months or longer was reduced from 5 percent to 3 percent; the reserve requirement against all time deposits with an original maturity of less than six months was increased from 5 to 6 percent; and the reserve requirement against net demand deposits over \$400 million was reduced from 18 percent to $17\frac{1}{2}$ percent. In addition, the 3 percent marginal reserve requirement on large certificates of deposit with an initial maturity of less than four months was removed. This action reduced required reserves approximately \$710 million. |
| February 13, 1975 | The reserve requirement against all categories of net demand deposits up to \$400 million was reduced by $\frac{1}{2}$ percentage point, and the reserve requirement against net demand deposits of more than \$400 million was reduced 1 percentage point. This action reduced required reserves approximately \$1,065 million. |
| May 22, 1975 | The reserve requirement against foreign borrowings of member banks, primarily Eurodollars, was reduced from 8 percent to 4 percent. This action reduced required reserves approximately \$80 million. |
| October 30, 1975 | The reserve requirement against member bank time deposits with an original maturity of four years or more was reduced from 3 percent to 1 percent. This action reduced required reserves approximately \$360 million. |
| January 8, 1976 | The reserve requirement on time deposits maturing in 180 days to 4 years was reduced from 3 percent to $2\frac{1}{2}$ percent. This action reduced required reserves by approximately \$500 million. |
| December 30, 1976 | The reserve requirement against net demand deposits up to \$10 million was reduced by $\frac{1}{2}$ percentage point, and the reserve requirement against net demand deposits over \$10 million was reduced by $\frac{1}{4}$ percentage point. This action reduced required reserves by approximately \$550 million. |
| November 2, 1978 | A supplementary reserve requirement of 2 percentage points was imposed on time deposits of \$100,000 or more. This action increased required reserves approximately \$3.0 billion. |

reserves released), an unadjusted monetary base exhibits a faster growth rate than one which has been adjusted. The opposite is clearly the case when reserve requirement ratios are lowered.

The growth rates of the two monetary base series diverge primarily because the Federal Reserve tends to use open market operations to offset the effects of changes in reserve requirement ratios. An increase in

reserve requirement ratios, by itself, leads to a sharp rise in the Federal funds rate. Since the Federal Reserve usually follows a policy of preventing sharp fluctuations in the Federal funds rate, it engages in open market operations (increases its rate of purchases of Government securities) to offset the impact of the rise in reserve requirement ratios on interest rates. The effect of open market operations is included in an unadjusted base series, but the opposite effect of

the increase in reserve requirement ratios is not. Consequently, an unadjusted series shows an acceleration in base growth. When reserve requirement ratios are lowered, the opposite prevails: the unadjusted series shows a reduction in the growth rate of the monetary base.

Therefore, during periods when legal reserve requirement ratios are changed, an unadjusted series

gives a misleading indication of both the "intent" and the "effect" of Federal Reserve policy actions. It would be hard to argue that the intent of raising reserve requirement ratios is to "ease" monetary policy, or the intent of lowering them is to "tighten" policy. Furthermore, the only way one can actually judge the effect of such actions on the monetary aggregates is to balance them against the impact of contemporaneous open market operations.

Alternative Adjustments for Reserve Requirement Changes

This Bank uses the reserve adjustment magnitude (RAM) to incorporate into the monetary base measure the effects of changes in legal reserve requirement ratios on the monetary aggregates. In general, the computation of RAM involves the following steps:³

- (1) Determine the distribution of member bank demand and time deposits subject to reserve requirements according to reserve requirement categories two weeks earlier.
- (2) Compare the current reserve requirement ratio with the corresponding 1929 equivalent ratio for each reserve requirement category. Multiply the difference between the 1929 equivalent ratio and the current ratio by the amount of deposits in that category two weeks earlier. If the current reserve requirement ratio exceeds the 1929 ratio, RAM is reduced. If the current ratio is less than the 1929 ratio, RAM is increased.
- (3) Subtract the amount of required reserves on all deposits subject to special reserve requirements.
- (4) Add the amount of waiver privileges.
- (5) Add the amount of vault cash held by member banks two weeks earlier.

The BOG uses an alternate approach to computing RAM for the adjusted monetary base series they began publishing on June 15, 1979. The BOG computation involves the following steps:⁴

³The derivation and computation of RAM is described in detail in Burger and Rasche, "Revision of the Monetary Base," p. 22.

⁴For a technical description of the method used by the BOG to adjust their monetary base, contact the Banking Section of the Division of Research and Statistics at the Board of Governors in Washington, D. C.

- (1) For the week in which reserve requirements against deposits, net demand or time and savings, change due to a change in Regulation D, required reserves are calculated on both the old and the new reserve requirement basis for the type of deposits affected.
- (2) The ratio of "new" required reserves to "old" required reserves for the particular deposit type is calculated and this ratio is applied to actual required reserves for that deposit type for all weeks prior to the change in Regulation D.
- (3) As the ratio is applied back through time, it is adjusted for earlier breaks in series due to changes in Regulation D by multiplying the current ratio by the ratio calculated at the time of the previous change in Regulation D. (This procedure is carried back, weekly, to January 1959; monthly averages are derived from prorations of the weekly data.)
- (4) Adjustments for breaks in series due to changes in Regulations D and M affecting other reservable liabilities (i.e., commercial paper, finance bills, Eurodollar borrowings, and marginal reserve requirements against large denomination (\$100,000 or more) CDs in effect from mid-1973 to late 1974) are made additively. That is, required reserves for earlier periods are raised or lowered by the estimated difference in reserve requirements that would have been implied if the regulation had been in effect in earlier periods.

The major difference between these two alternate procedures is that the BOG method requires that a new historically adjusted series which reflects the latest reserve requirement be constructed each time Regulation D or M changes. In contrast, the St. Louis approach leaves the *past* data unaltered.

