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Adjusted Monetary Base

Richard G. Anderson  
Robert H. Rasche

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FEDERAL RESERVE BANK OF ST. LOUIS  
Research Division  
411 Locust Street  
St. Louis, MO 63102

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# A REVISED MEASURE OF THE ST. LOUIS ADJUSTED MONETARY BASE

## ABSTRACT

The Federal Reserve Bank of St. Louis' adjusted monetary base combines in a single index Federal Reserve actions that affect the *supply* base money -- open market operations, discount window lending and unsterilized foreign exchange market intervention -- with actions that affect depository institutions' *demand* for base money -- changes in statutory reserve requirements. The adjusted monetary base equals the sum of the monetary base and a reserve adjustment magnitude (RAM) that maps changes in reserve requirements into equivalent changes in the (unadjusted) monetary base. This paper presents a revised measure of the adjusted total reserves component of the monetary base and a new RAM. The revised measure of the adjusted reserves component differs from the current measure by including the aggregate amount of depository institutions' required clearing balance contracts with the Federal Reserve. The new RAM differs from the current RAM by recognizing that, since the Monetary Control Act of 1980, an increasing number of depository institutions have not significantly changed their demand for base money (vault cash and Federal Reserve deposits) relative to transactions deposits following changes in statutory reserve requirements. The new adjusted reserves data suggest that the stance of monetary policy, measured by the growth rate of adjusted reserves, has been more volatile since 1980 than suggested by the current measure.

**JEL CLASSIFICATION:** E51, E52, E58

**KEYWORDS:** monetary base, required clearing balances, total reserves

Richard G. Anderson  
Assistant Vice President  
Federal Reserve Bank of St. Louis  
411 Locust  
St. Louis, MO 63102  
anderson@stls.frb.org

Robert H. Rasche  
Professor of Economics, Michigan State  
University and Visiting Scholar, Federal  
Reserve Bank of St. Louis  
Department of Economics  
Michigan State University  
East Lansing, MI 48824  
rasche@pilot.msu.edu

## A Revised Measure of the St. Louis Adjusted Monetary Base\*

Richard G. Anderson and Robert H. Rasche

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The Federal Reserve Bank of St. Louis' adjusted monetary base has been widely monitored as an indicator of Federal Reserve quantitative monetary policy actions since its introduction in 1968.<sup>1</sup> The adjusted monetary base is a valuable indicator of the stance of monetary policy because extended periods of rapid growth of the monetary base have often preceded accelerations of inflation in the United States and other countries. Historical evidence also shows that supportive growth of the monetary base is necessary for inflation to continue for an extended period.<sup>2</sup> In addition, the monetary base plays central roles in models of monetary economies as a default risk-free asset used for portfolio adjustment, including satisfying reserve requirements for depository institutions, and as the medium for final settlement of debts arising from the exchange of goods and services.<sup>3</sup> In model and in real economies, the ability of depository institutions to issue new liabilities and acquire earning assets is limited both by reserve requirements and by the institutions' need to maintain

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<sup>1</sup> Andersen and Jordan (1968).

<sup>2</sup> See for example Sargent (1982, 1986).

<sup>3</sup> See for example Tobin (1969), Brunner and Meltzer (1976), Wallace (1977), Bryant and Wallace (1979) and Kareken and Wallace (1980).

an adequate stock of base money to settle interbank payments.<sup>4</sup>

The adjusted monetary base combines in a single index Federal Reserve actions that affect the *supply* of base money -- open market operations, discount window lending and unsterilized foreign exchange market intervention -- with actions that affect depository institutions' *demand* for base money -- changes in statutory reserve requirements. To measure the adjusted monetary base, we need a mechanism for translating the effects of reserve requirement changes into "equivalent" changes in the monetary base, measured in terms of open market operations or other actions. The reserve adjustment magnitude, or RAM, provides such a mechanism by measuring the amount of base money "absorbed" or "liberated" by the change in requirements.<sup>5</sup> The adjusted monetary base equals the sum of the monetary base and RAM.<sup>6</sup>

We present in this article a revised measure of the monetary base and a new RAM. The revised measure of the monetary base differs from the current measure by including the aggregate amount of depository institutions' required clearing balance contracts with the Federal Reserve.<sup>7</sup> The current measure excludes required clearing balance contracts from the

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<sup>4</sup> The need for banks to settle interbank payments in base money (central bank deposits) is an important part of the demand for the monetary base in countries without reserve requirements against deposits. See Bank of Canada (1987, 1989, 1991). Note that in these countries all central bank deposits held by depository institutions are (voluntary) clearing balances. In the United States, the Federal Reserve also supplies significant amounts of intra-day Federal Reserve deposits used for payments activity. During 1994, these deposits averaged approximately \$50 billion per day, or nearly twice the close-of-business amount of Federal Reserve deposits included in the monetary base. See Richards (1995), p. 1066.

<sup>5</sup> The terminology of absorption and liberation of reserves through changes in legal reserve ratios can be found in official Federal Reserve publications at least as early as 1954. See Board of Governors of the Federal Reserve System (1954), p. 51.

<sup>6</sup> See Burger and Rasche (1977).

<sup>7</sup> An additional difference is the inclusion of float-pricing related as-of adjustments.

monetary base.<sup>8</sup> The new RAM differs from the current RAM by recognizing that, since the Monetary Control Act of 1980, an increasing number of depository institutions have not significantly changed their demand for base money (vault cash and Federal Reserve deposits) relative to transactions deposits following changes in statutory reserve requirements. The RAM currently included in the St. Louis adjusted monetary base is based on an assumption that all depository institutions will promptly change their holdings of base money following a change in required reserves due to a change in reserve requirements. The new RAM seeks to separate those depository institutions that have responded in this way from those institutions that have not.

#### **CURRENT AND REVISED MEASURES OF THE MONETARY BASE: DIFFERENCES**

The current St. Louis monetary base equals the sum of *reserve balances* of depository institutions at Federal Reserve Banks plus currency in circulation outside the Treasury and the Federal Reserve. The revised measure of the monetary base equals the sum of the *Federal Reserve deposits* of depository institutions plus currency in circulation.<sup>9</sup> The currency component of the monetary base is unchanged. The revised measure of the monetary base differs from the current measure by including all deposits of domestic depository institutions at Federal Reserve Banks, whether used to satisfy legal reserve requirements, to satisfy required clearing balance contracts or for any other purpose. The principle difference between the current and revised measures of the monetary base is the inclusion of the aggregate amount of

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<sup>8</sup> The aggregate nominal amount of required clearing balance contracts is excluded, rather than the amount of Federal Reserve deposits used to satisfy the contracts, because data on the latter are not available.

<sup>9</sup> By including all Federal Reserve deposits, the revised measure corresponds more closely than the current measure to the concepts of the monetary base discussed by Brunner (1961), Friedman and Schwartz (1963), Cagan (1965), and Balbach and Burger (1976).

depository institutions' required clearing balance contracts.

### ***Reserve Balances and Required Clearing Balance Contracts***

“Reserve balances” is an accounting concept intended to measure the aggregate amount of reserves available to support depository institutions' deposits.<sup>10</sup> Reserve balances are measured by subtracting the aggregate amount of depository institutions' required clearing balance contracts from the aggregate amount of their Federal Reserve deposits.<sup>11</sup>

Required clearing balance contracts were introduced by the Federal Reserve in February 1981 after some depository institutions experienced problems with overdrafts on their Federal Reserve deposit accounts.<sup>12</sup> Prior to November 1980, the use of Federal Reserve interbank payment services (including check clearing and wire transfer) was the almost exclusive province of member banks.<sup>13</sup> Because the reserve requirements imposed on member banks were relatively high, the Federal Reserve deposits held by member banks were generally sufficient to absorb the debits and credits resulting from interbank payments activity without overdrafts on their Federal Reserve accounts.<sup>14</sup> The Monetary Control Act reduced reserve

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<sup>10</sup> Reserve balances data are published weekly on the Board of Governors' statistical releases, and monthly in the *Federal Reserve Bulletin*.

<sup>11</sup> In addition to the amount of required clearing balance contracts, some other bookkeeping entries are subtracted. The total of these items is referred to as “service-related balances and adjustments” on the Board of Governor's weekly H.4.1 data release.

<sup>12</sup> *Federal Reserve Bulletin*, March 1981, pp. 247-49, and December 1982, p. 756.

<sup>13</sup> Nonmember banks held clearing deposits at Federal Reserve Banks before the Monetary Control Act, but the amounts are small. See Cagan (1965), p. 335, Friedman and Schwartz (1963), p. 748, and *Banking and Monetary Statistics 1941-1970*, (1976), p. 518.

<sup>14</sup> In 1977 required reserve ratios at member banks ranged from a minimum of seven percent on the first two million of net demand deposits to 16.25 percent on net demand deposits in excess of 400 million dollars. The required reserve ratio on savings deposits was three percent and the reserve requirements on time deposits maturing in less than 180 days were three percent on the first five million dollars and six percent on time deposits in excess of five million dollars. (*Federal Reserve Bulletin*, December, 1977, p. A9)

requirements on member banks and also granted nonmember institutions the right to use Federal Reserve payments services. Overdrafts on Federal Reserve accounts became a problem for some institutions because the Act's requirements were phased-in and many nonmember institutions initially satisfied their reserve requirements with vault cash.

The Federal Reserve's required clearing balance program began as a way to increase the amount of Federal Reserve deposits maintained by depository institutions without discouraging them from purchasing payment services from the Federal Reserve, rather than from private correspondent banks. Through negotiation, depositories were encouraged to enter into contracts requiring that they maintain additional deposits at the Federal Reserve, called *required clearing balances*, above and beyond the amount necessary to satisfy their legal reserve requirements.<sup>15</sup> To offset the opportunity cost of maintaining these deposits, the Federal Reserve granted "earnings credits" to the depositories at approximately the federal funds rate, similar to the practice of private correspondent banks.<sup>16</sup> These credits could be used to defray the cost of Federal Reserve services but could not be withdrawn in cash nor used to pay penalties.<sup>17</sup>

During the 1980s, the required clearing balance program came to more closely

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<sup>15</sup> Required clearing balance contracts are negotiated because the Monetary Control Act prohibits the Federal Reserve from imposing payments-related reserve requirements.

<sup>15</sup> Analogies between Federal Reserve deposits and the deposits of respondents at correspondent banks also may account, in part, for the exclusion of required clearing balance contracts from current measures of the monetary base and bank reserves. Antecedents extend back to the initial three-year phase-in of the Federal Reserve Act. As national banks "transferred" deposits to the newly-created Reserve Banks, some historical accounts suggest that the Federal Reserve failed to fully recognize its role as the *creator* rather than the *recipient* of these deposits, and its responsibility for (and ability to control) the total amount of such deposits. See Friedman and Schwartz (1963), pp. 195-6 and Burgess (1936), chapter 3.

<sup>16</sup> Earnings credits accrue at the federal funds rate adjusted for (implicit) reserve requirements. See Stevens (1993).

resemble a voluntary reserve management tool offered by the Federal Reserve to depository institutions than an external, regulatory constraint. Soon after its introduction, and especially after the introduction of contemporaneous reserve accounting in February 1984, some depository institutions realized that maintaining a voluntary required clearing balance contract could simplify the management of their Federal Reserve deposit account. The additional Federal Reserve deposits held to satisfy the contract are available to make interbank payments in exactly the same way as other Federal Reserve deposits. Furthermore, the additional deposits provide a buffer against unanticipated increases in reservable deposits or payments-related debits. Federal Reserve accounting rules always first apply a depository's Federal Reserve deposits to satisfy the institution's required reserves, and only thereafter does the Fed apply the remaining deposits to satisfy the institution's required clearing balance contract. Although a shortfall of Federal Reserve deposits relative to required reserves is likely to trigger significant penalties and increased regulatory scrutiny, a small shortfall relative to the amount of their clearing balance contract incurs no penalty. Larger shortfalls relative to the contracted amount are penalized at either a 2 percent or 4 percent annual rate, often less costly than borrowing in the federal funds market or at the discount window.

The clearing balance program expanded rapidly during the early 1980s, and then slowed.<sup>18</sup> In March 1981, about 75 depositories had required clearing balance contracts; by March 1985, about 4800 depositories had contracted to maintain about \$1.3 billion in required clearing balances. The numbers were about the same during the third quarter of 1990, with 4600 depositories contracted to maintain about \$1.5 billion. Interestingly, about half of these

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<sup>18</sup> Feinman (1993) and Hilton (1993) survey the growth of required clearing balance contracts since 1980.



institutions apparently held Federal Reserve deposits solely for payments activity, since they fully satisfied their required reserves with vault cash. Both the number of institutions with contracts and the aggregate amount of required clearing balance contracts increased sharply following the December 1990 - January 1991 and April 1992 reductions in reserve requirements.<sup>19</sup> During the third quarter of 1992, about 5000 institutions contracted to maintain about \$5.0 billion, triple the amount two years earlier. Moreover, about two-thirds of these institutions fully satisfied their reserve requirements with vault cash, and hence likely held Federal Reserve deposits primarily for payments purposes. This apparent substitution by some depository institutions of voluntary clearing balance requirements for statutory reserve requirements suggests that required clearing balance contracts should be included in the monetary base.

Gilbert (1983, p. 23) provides a clear statement of the rationale that led in the early 1980s to the exclusion of required clearing balance contracts from the current measure of the monetary base:

Depository institutions maintain clearing balances at Federal Reserve Banks as a means of payment for the fees Federal Reserve Banks now charge for services. Depository institutions receive implicit interest on their clearing balances at the federal funds rate, which may be used to pay the fees on services. Required clearing balances are subtracted in computing the [monetary] source base because clearing balances are part of total reserve balances held by depository institutions at Federal Reserve Banks, but are not related to the levels of deposit liabilities.<sup>20</sup>

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<sup>19</sup> The 1990-91 reduction in reserve requirements was followed by a significant increase in daylight overdrafts during a period when the Federal Reserve was increasing its scrutiny of overdrafts; see Richards (1995), pp. 1069-70 and Figure 3, p. 1070. We do not know if concern regarding the level of daylight overdrafts led to increases in Federal Reserve deposits and required clearing balance contracts, but the timing is suggestive.

<sup>17</sup> Authors' note: Contrary to the terminology in the quotation, required clearing balances are not included in Federal Reserve data on reserve balances.

Gilbert's argument would be persuasive if required clearing balances were a separate, distinct type of deposit at Federal Reserve Banks, used *solely* used to defray the cost of Federal Reserve payment-related services. Some depository institutions may indeed have treated their Federal Reserve deposits used to satisfy clearing balance contracts in this way during the early 1980s. For at least the last decade, however, required clearing balance contracts have been a flexible, voluntary commitment to maintain a larger Federal Reserve deposit balance than necessary to satisfy required reserves; they are neither a distinct type nor separate category of deposit.<sup>21</sup>

The inclusion of clearing balance contracts also is suggested by Balbach and Burger's (1976, p.3) conceptual basis for identifying and measuring the monetary base:

"... (the monetary base) can therefore be identified in any monetary system by ascertaining and summing the following:

1. those assets which the consolidated banking sector [depository institutions] uses to settle interbank debt; and
2. those items, aside from bank [depository institution] liabilities, which are used as money."

The deposits at Federal Reserve Banks used to satisfy required clearing balance contracts fall clearly within this definition because the deposits are used to settle interbank payments. Indeed, for many depository institutions during the early 1980s, required clearing balance contracts arose *because* the institutions actively used their Federal Reserve accounts to settle interbank payments. Proper measurement of the monetary base requires the inclusion of deposits at Federal Reserve Banks that are applied to satisfy required clearing balance contracts, since these deposits are available for and used to settle interbank debts. The

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<sup>18</sup> There is one exception to this statement. A nonmember depository institution may have a separate clearing balance deposit account at a Federal Reserve Bank if it satisfies its required reserves via a passthrough contract with another eligible depository institution.

omission of required clearing balances has allowed the current measure of the monetary base to drift further and further from its conceptual basis.

Table 1 provides a detailed comparison of the current and revised monetary base measures. The factors that supply base money, lines 1 through 4 in the table, are unaffected by the revision. The largest factor, Reserve Bank credit (line 1), varies directly with changes in the quantity of securities held by the Federal Reserve (line 1a), the amount of Federal Reserve lending to financial institutions (line 1b), Federal Reserve float (line 1c) and other assets acquired by the Federal Reserve (line 1d). Because the longer-term growth of Reserve Bank credit is determined almost entirely by Federal Reserve actions and because Reserve Bank credit supplies about 90 percent of base money, the Federal Reserve can closely control the long run growth of the monetary base.

The current measure of the St. Louis monetary base (line 6) equals the sum of currency in circulation outside the Treasury and Federal Reserve (line 6a) plus reserve balances of depository institutions (line 6b). Uses of base money not included in the monetary base are shown in line 7. The revised measure of the monetary base recognizes the similarity of required clearing balance contracts (line 7d) to reserve balances (line 6b), and the differences between required clearing balance contracts and the other three excluded uses (lines 7a, b, and c). First, required clearing balance contracts represent Federal Reserve deposits of depository institutions, similar to reserve balances (line 6b); the other excluded uses do not. Second, depository institutions may use the Federal Reserve deposits represented by required clearing balance contracts to make or receive interbank payments in the same way as reserve balances, and the deposits also may be converted into vault cash as necessary; the other excluded items cannot. Finally, the three excluded uses other than required clearing balance contracts are the actual dollar amounts of base money used (lines 7a, b, and c); for

required clearing balances, only the contractual amount (line 7d) is excluded, not the amount of Federal Reserve deposits used to satisfy the contracts.

The revised measure of the monetary base (line 8) includes all Federal Reserve deposits of domestic depository institutions (line 8b); specifically, required clearing balance contracts are not subtracted from depository institutions' Federal Reserve deposits. The inclusion of required clearing balance contracts increases the amount of Federal Reserve deposits included in the monetary base (line 8b) by about one-fourth; equivalently, about one-fifth of the Federal Reserve deposits held by depository institutions during December 1995 were not used to satisfy required reserves. The other uses of base money excluded from the monetary base (lines 9a, b, and c) are unchanged by the revision.

The difference between the current and revised measures of the monetary base since 1980 is shown in Figure 1, and largely reflects changes in the aggregate amount of required clearing balance contracts.

#### **CURRENT AND NEW RESERVE ADJUSTMENT MAGNITUDES**

Conditional on assumptions about which types of depository institutions respond to changes in reserve requirements, the reserve adjustment magnitude (RAM) translates the effects of changes in reserve requirements into equivalent changes in the monetary base. Depository institutions hold base money for three reasons: to satisfy statutory reserve requirements, to convert retail deposits into currency on request, and to absorb debits and credits due to interbank payments. The current RAM assumes that the quantity of base money (vault cash and Federal Reserve deposits) depository institutions demand will change about dollar for dollar with changes in required reserves due to changes in statutory reserve requirements. Although a reasonable assumption for member banks before 1980, since the Monetary Control Act an increasing number of depository institutions have not responded to

changes in reserve requirements in the way the current RAM assumes.

### *Two Classes of Depository Institutions*

The new RAM presented in this article is a generalization of the RAM proposed by Burger and Rasche (1977).<sup>22</sup> In that RAM, depository institutions were separated into two groups based on the likelihood that a depository would change its holdings of vault cash and Federal Reserve deposits following a change in statutory reserve requirements. Member banks, subject to relatively high statutory Federal Reserve reserve requirements, were assumed to reduce their holdings of Federal Reserve deposits about dollar for dollar with a change in required reserves due to a change in statutory requirements. Nonmember banks and thrifts, not subject to Federal Reserve reserve requirements, were assumed not to respond to changes in statutory reserve requirements. Only member banks were included in calculation of RAM because only at member banks did changes in reserve requirements liberate or absorb base money.

The new RAM is constructed from a panel data set consisting of individual depository institution data submitted to the Federal Reserve weekly since 1980 by about 12,000 depository institutions. Absent a fully worked out model of depository institution reserve management, we use statistical tests to separate depository institutions into two classes.<sup>23</sup> Institutions in the first class are assumed to respond to changes in reserve requirements by changing their holdings of Federal Reserve deposits approximately dollar for dollar with

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<sup>22</sup> Several previous variants of the Burger-Rasche reserve adjustment magnitude have been included in the adjusted monetary base since 1980; see Gilbert (1980, 1987). The RAM used from November 1980 through December 1981 excluded both the deposits and required reserves of nonmember institutions on the grounds that these institutions seemed likely to satisfy their initial reserve requirements with vault cash, and hence their holdings of base money would not be affected by changes in reserve requirements; see Gilbert (1980), p 4. The RAM adjustment we present in this article is conceptually similar to that earlier RAM.

<sup>23</sup> The tests, basically analysis-of-variance tests, are described in Anderson and Rasche (1996).

changes in their required reserves, and hence are included in the calculation of RAM.

Institutions in the second class are assumed to have a business need for base money that exceeds the amount of their required reserves. As a result, the quantity of base money held by these institutions is assumed not to vary with changes in reserve requirements, but rather to be determined primarily by their need to convert deposits into currency and to settle interbank payments.<sup>24</sup> These institutions are omitted from RAM.

For dates following implementation of the Monetary Control Act in November 1980, our analysis suggests that three groups of depository institutions belong in the second class, thereby excluding them from the calculation of RAM:

- Institutions that fully satisfied their required reserves with vault cash (or, in other words, were legally nonbound), beginning with the reserve maintenance period ending November 19, 1980. Our analysis suggests that these institutions tended not to adjust their holdings of base money, relative to net transactions deposits, following a change in reserve requirements. If these institutions' vault cash is determined primarily by their need to convert customer deposits into currency, it seems reasonable that their holdings of base money, including Federal Reserve deposits, will be insensitive to changes in reserve requirements. Since 1985 more than half of the depositories with required clearing balance contracts have been legally nonbound, satisfying their required reserves with vault cash.
- Institutions that were subject to a maximum 3 percent marginal reserve requirement on net transaction deposits and did not satisfy their required reserves with vault cash (or in other words were legally bound), beginning with the reserve maintenance period ending January 7, 1991. These small bound institutions are included in the first class (and hence in RAM) prior to January 1991.<sup>25</sup>

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<sup>24</sup> Some studies of firms' money demand have noted an analogous result, in a different context: loan-based compensating balance requirements were not binding on firms during the 1970s when the firms' transactions need for demand deposits exceeded the amount of demand deposits required by the compensating balance requirement. See Enzler, Johnson and Paulus (1976), p. 274.

<sup>25</sup> Evidence for the inclusion of small bound institutions prior to January 1991 is weaker than for the inclusion of other groups of institutions. Some tests suggest that these institutions, as a group, might be excluded from RAM beginning in 1980, as are small nonbound institutions. As a result, we are continuing to study and model the reserve management behavior of smaller banks.

- Institutions with net transactions deposits of less than about \$135 million, beginning with the reserve maintenance period ending January 7, 1991.<sup>26</sup>

Examination of the responses of these institutions to the December 1990 - January 1991 and April 1992 reductions in reserve requirements suggests that their base money holdings were likely determined by the business needs of the institutions, rather than statutory reserve requirements, after January 1991.

### ***Calculating RAM***

The new RAM adjustment is calculated as follows. For each week (through January 1984) or reserve maintenance period (beginning February 1984), a reserve adjustment magnitude is calculated for each institution included in RAM by subtracting the institution's actual required reserves during that period from an estimate of what the institution's required reserves would have been if the reserve requirements that prevailed during the reserve maintenance period ending January 7, 1991, had been in effect. This approach is the Burger-Rasche (1977) adjustment applied to individual institutions, using the reserve requirements in effect during the January 7, 1991 reserve maintenance period as the base period for calculation of RAM. This base period is convenient because reserve requirements on nontransactions deposits and Eurodollar liabilities at weekly reporting institutions were reduced to zero on that date.<sup>27</sup> The aggregate RAM for each reserve maintenance period equals the sum of the

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<sup>26</sup> The value for 1991 is \$135 million. The value increases annually by the percentage increase in the aggregate net transactions deposits of all depository institutions. Although this procedure is supported by preliminary tests, we are continuing to study and model the reserve management behavior of these medium-size banks.

<sup>27</sup> Choice of an earlier base period would have required recomputing required reserves on nontransactions as well as transactions deposits, particularly difficult during the Monetary Control Act 1980-84 phase-in period for member banks. Mergers and acquisitions also must be accounted for in computing RAM. The the required reserves of a combined institution are reduced during

individual reserve adjustment magnitudes across all depository institutions.

The current and new RAM are shown in Figure 2, both series normalized to equal zero in December 1980.<sup>28</sup> The two series begin to diverge in 1983, and major differences appear following reductions in reserve requirements in December 1990 - January 1991 and in April 1992. On the first of these dates, reserve requirements on nonpersonal time deposits and Eurodollar borrowings were reduced from 3 percent to zero; on the second, the marginal reserve requirement on net transactions deposits over about \$42 million was reduced from 12 to 10 percent. Board of Governors' staff estimate that these actions reduced aggregate required reserves by about \$13.2 and \$8.9 billion, respectively. Largely reflecting the change in required reserves, the current RAM increases by about \$13.1 and \$9.1 billion during the same periods, respectively. The new RAM, which omits depository institutions estimated to have not responded to the reductions, increases by about \$12.3 and \$7.3 billion, respectively.<sup>29</sup>

From January 1936 - October 1980, the revised measure of the St. Louis adjusted monetary base presented in this article is based on the adjusted monetary base developed by Tatom (1980), Table 1. Tatom (1980) measured RAM in segments, renormalizing RAM when

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the eight quarters following an acquisition by a phase-out of the acquired institution's low reserve tranche. In our calculations, we have assumed that an institution eligible for such a tranche loss adjustment in a maintenance period remains eligible when the reserve requirements from January 7, 1991 are applied to that period, except that the size of the tranche loss adjustment is increased or decreased by the percentage change in the tranche between that period and the base period. We also omit depository institutions granted the Federal Reserve's "bankers' bank" exemption from reserve requirements.

<sup>28</sup> Actual values of the current and revised RAM series are about -\$2.2 and -\$18.5 billion, respectively, in December 1980.

<sup>29</sup> Some of our statistical tests suggest that small bound banks should be excluded from RAM before the January 7, 1991 maintenance period. A RAM that excludes these institutions increases by \$9.9, rather than \$12.3, billion between December 1990 and January 1991. Overall, this alternative RAM closely resembles the one shown in Figure 2. The series is available from the authors on request.



the structure of reserve requirements changed significantly. Tatom constructed separate RAM adjustments for 1935 - 1972, 1972-74 and 1975 - October 1980, chaining these together to form an adjusted monetary base index. The new adjusted monetary base presented in this article is chained to Tatom's series in October 1980 using his methodology, and hence has the same growth rate as Tatom's data from January 1935 - October 1980.<sup>30</sup>

#### **OLD AND NEW ADJUSTED TOTAL RESERVES: DIFFERENCES**

The new monetary base and RAM presented in this article change only the adjusted reserves component of the adjusted monetary base (currency in circulation is unchanged). The current and new adjusted reserves series are shown in Figure 3. Since the difference between the levels of the series is largely determined by the choice of a base period for RAM, it is differences in the growth rates (not the levels) of the alternative series that matter. Year-over-year growth rates are shown in Figure 4, and the differences between the growth rates are shown in Figure 5. The growth of the new adjusted reserves series accelerates more rapidly than the current series during periods of ease in monetary policy such as 1985-1987 and 1992-1993, and slows more rapidly during tightening policy, including 1983-1984, 1990-1991 and 1994-1995. Overall, the new series suggests greater swings in the stance of monetary policy, measured by the growth rate of adjusted reserves, than does the old.

#### **SUMMARY**

We have introduced a new measure of the adjusted reserves component of the St. Louis adjusted monetary base. The new measure reflects the significant changes in financial markets and institutions that have occurred since implementation of the Monetary Control Act

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<sup>30</sup> A more detailed description of the chained series is available from the authors on request.

in 1980.

The definition of the monetary base is revised by including the contractual amount of required clearing balances at Federal Reserve Banks. Required clearing balances are not a separate type of Federal Reserve deposit, but rather are a contractual commitment by a depository institution to maintain more Federal Reserve deposits than are necessary to satisfy the institution's statutory reserve requirements. The deposits used to satisfy the contract are available for interbank payments and other business activity of the depository institution, in the same way as deposits used to satisfy statutory reserve requirements. As such, Federal Reserve deposits held to meet contractual required clearing balance contracts belong in the reserves component of the monetary base.

The new RAM is a generalization of the RAM proposed by Burger and Rasche (1977). The adjustment recognizes that some depository institutions will not respond fully, in terms of changing the quantity of base money demanded, to reductions in required reserve ratios as is assumed in the calculation of the current RAM. Absent a fully specified model of depository institutions' demand for the monetary base, the new RAM employs statistical tests to separate depositories into two classes. Institutions in one class find reserve requirements the binding constraint on their holdings of base money, and are assumed to reduce their demand for base money about dollar-for-dollar with any reduction in required reserves. Institutions in the other class find their demand for base money driven primarily determined by the business needs of the depository, including making interbank payments. As a working hypothesis, the quantity of base money held by institutions in the latter class is assumed to be insensitive to changes in reserve requirements. In contrast, the current RAM assumes that all depositories essentially reduce their holdings of base money dollar for dollar with reductions

in required reserves.

Since the Monetary Control Act, many depository institutions have found their demand for base money driven more by their retail deposit and interbank payments activity than by legal reserve requirements. Ignoring this change, previous measurements of RAM have overstated the amount of base money absorbed or liberated by changes in reserve requirements.

The new adjusted reserves data presented in this article suggest that the stance of monetary policy, measured by the growth rate of adjusted reserves, has been more volatile since 1980 than suggested by the current measure. Additional research will be required to refine the calculation of RAM and to determine the importance of the revised data in econometric studies, as well as the appropriate role of the revised adjusted monetary base in monetary policy decision making.

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Table 1  
Current and Revised Measures of the Monetary Base, December 1995

Factors Supplying Base Money

(1) Reserve Bank credit		
(a) Securities held by the Federal Reserve	387.132	
(b) Loans to depository institutions	0.209	
(c) Federal Reserve float	1.223	
(d) Other Federal Reserve assets	<u>32.212</u>	
Total Reserve Bank credit		420.776
(2) Gold stock	11.050	
(3) SDR certificates	10.168	
(4) US Treasury currency and coin outstanding	<u>23.958</u>	
Total supply of base money other than Reserve Bank credit		45.177
(5) Total supply of base money		465.952

Factors Using Base Money: Current Measure of the Monetary Base

(6) The Monetary Base: Current Measure		
(a) Currency and coin in circulation	419.615	
(b) Reserve balances of depository institutions at Federal Reserve Banks	<u>20.402</u>	
Total monetary base		440.016
(7) Uses of base money other than as the monetary base		
(a) Treasury cash holdings	0.271	
(b) Deposits of other than domestic financial institutions at Federal Reserve Banks	7.349	
(c) Other Federal Reserve liabilities and capital	12.841	
(d) Deposits, other than reserve balances, of domestic financial institutions at Federal Reserve Banks, including contractual amount of required clearing balances	<u>5.487</u>	
Total other factors using base money		25.947

Factors Using Base Money: Revised Measure of the Monetary Base

(8) The Monetary Base: Revised Measure		
(a) Currency and coin in circulation	419.615	
(b) Deposits of financial institutions at Federal Reserve Banks (revised measure)	<u>25.888</u>	
Total monetary base		445.503
(9) Uses other than as the monetary base		
(a) Treasury cash	0.271	
(b) Deposits of other than domestic financial institutions at Federal Reserve Banks	7.349	
(c) Other Federal Reserve liabilities and capital	<u>12.841</u>	
Total other factors using base money (revised measure)		20.460

billions of dollars, not seasonally adjusted  
Components may not add to totals due to rounding.

Source: Board of Governors of the Federal Reserve System

*Difference Between  
Current and Revised Monetary Base*  
Monthly Data, Billions of Dollars, Not Seasonally Adjusted

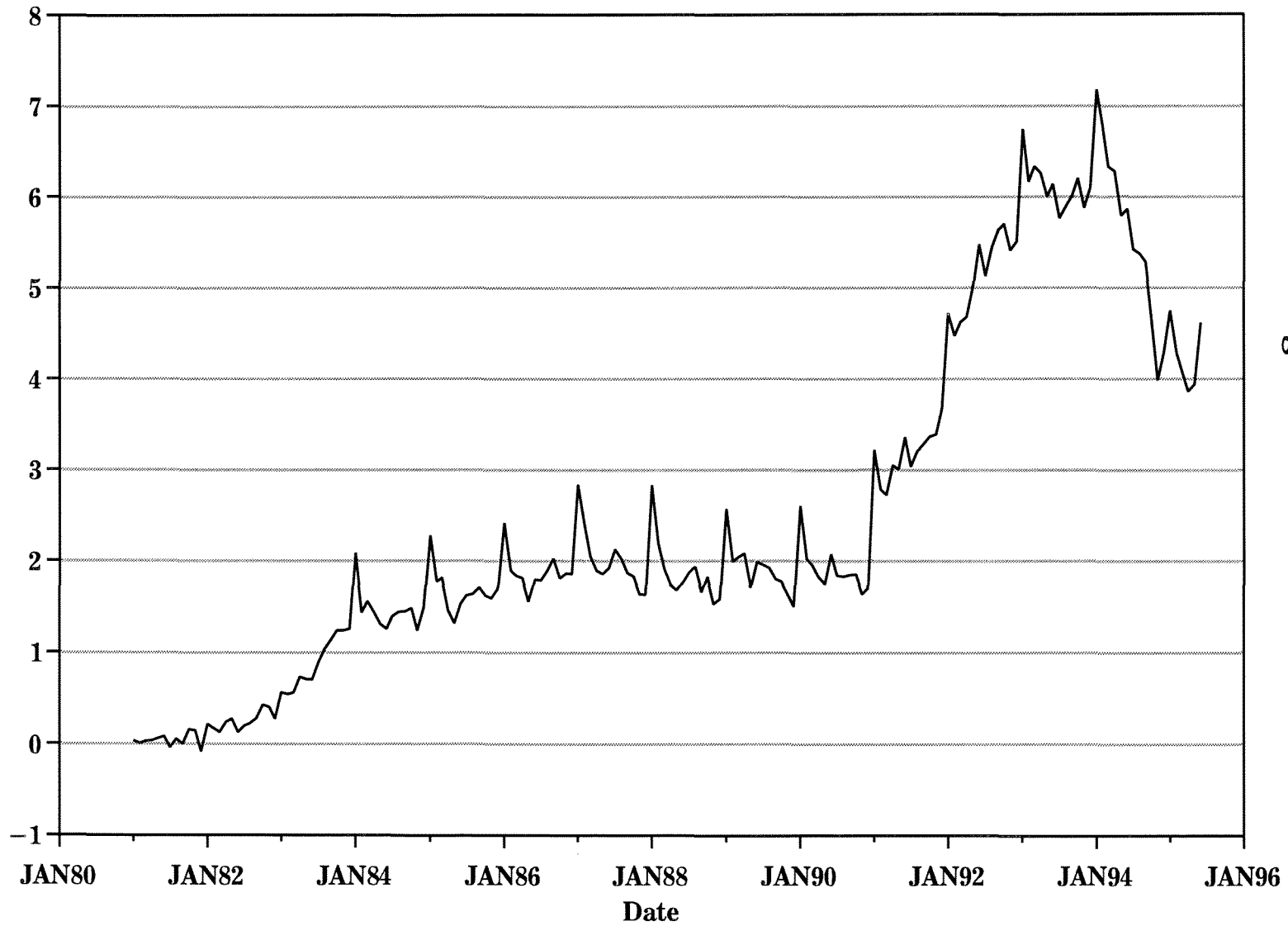


Figure 1

# *Current and Revised Reserve Adjustment Magnitude*

Monthly Data, Billions of Dollars, Not Seasonally Adjusted

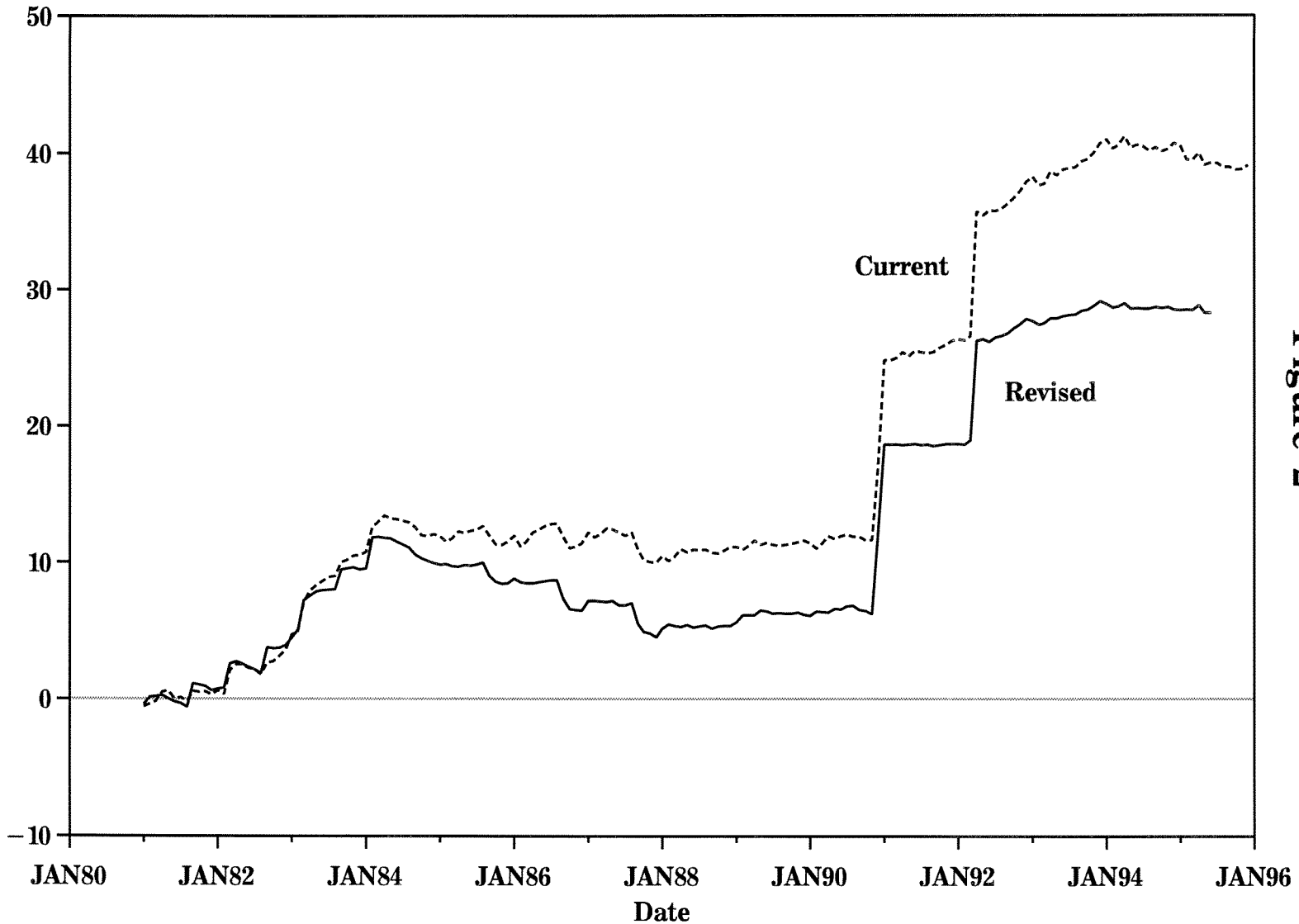


Figure 2

Note: December 1980 = 0



# *Current and Revised Adjusted Reserves*

Monthly Data, Billions of Dollars, Not Seasonally Adjusted

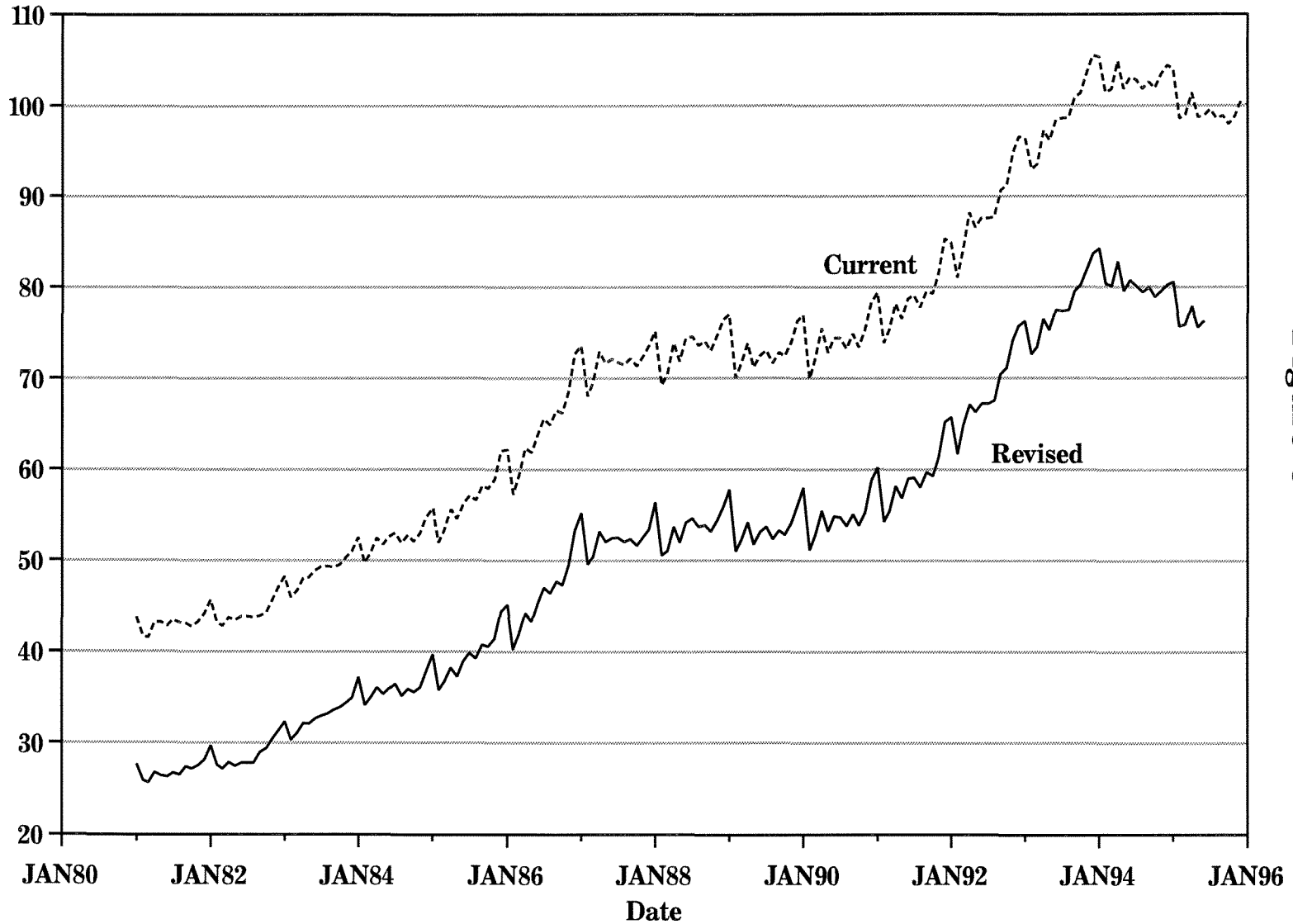


Figure 3

# *Growth Rates of Current and Revised Adjusted Reserves*

Quarterly Data, Year – Over – Year Growth Rates, Not Seasonally Adjusted

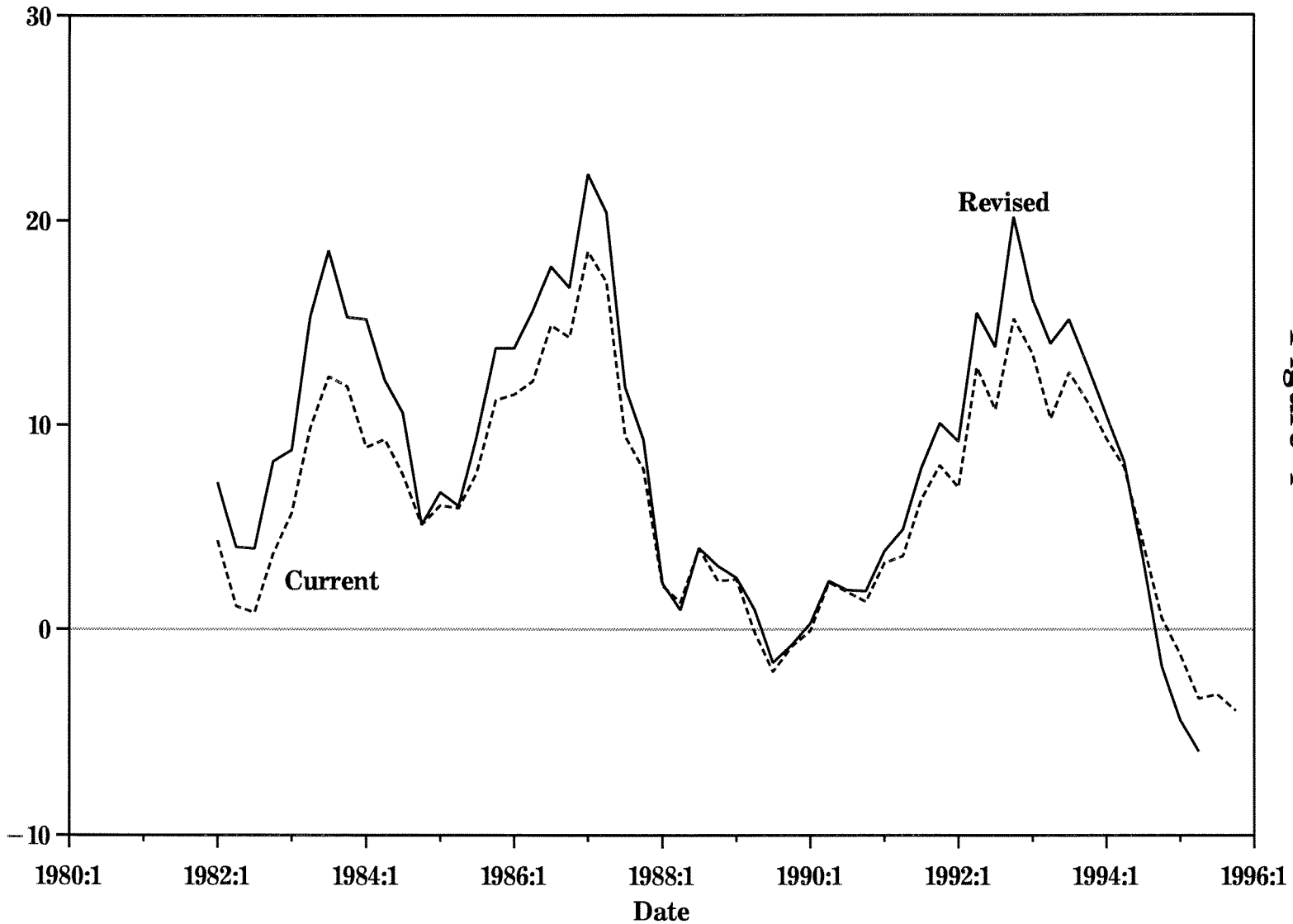


Figure 4

# *Revision to Growth Rate of Adjusted Reserves (Revised – Current)*

Quarterly Data, Year – Over – Year Growth Rates, Not Seasonally Adjusted

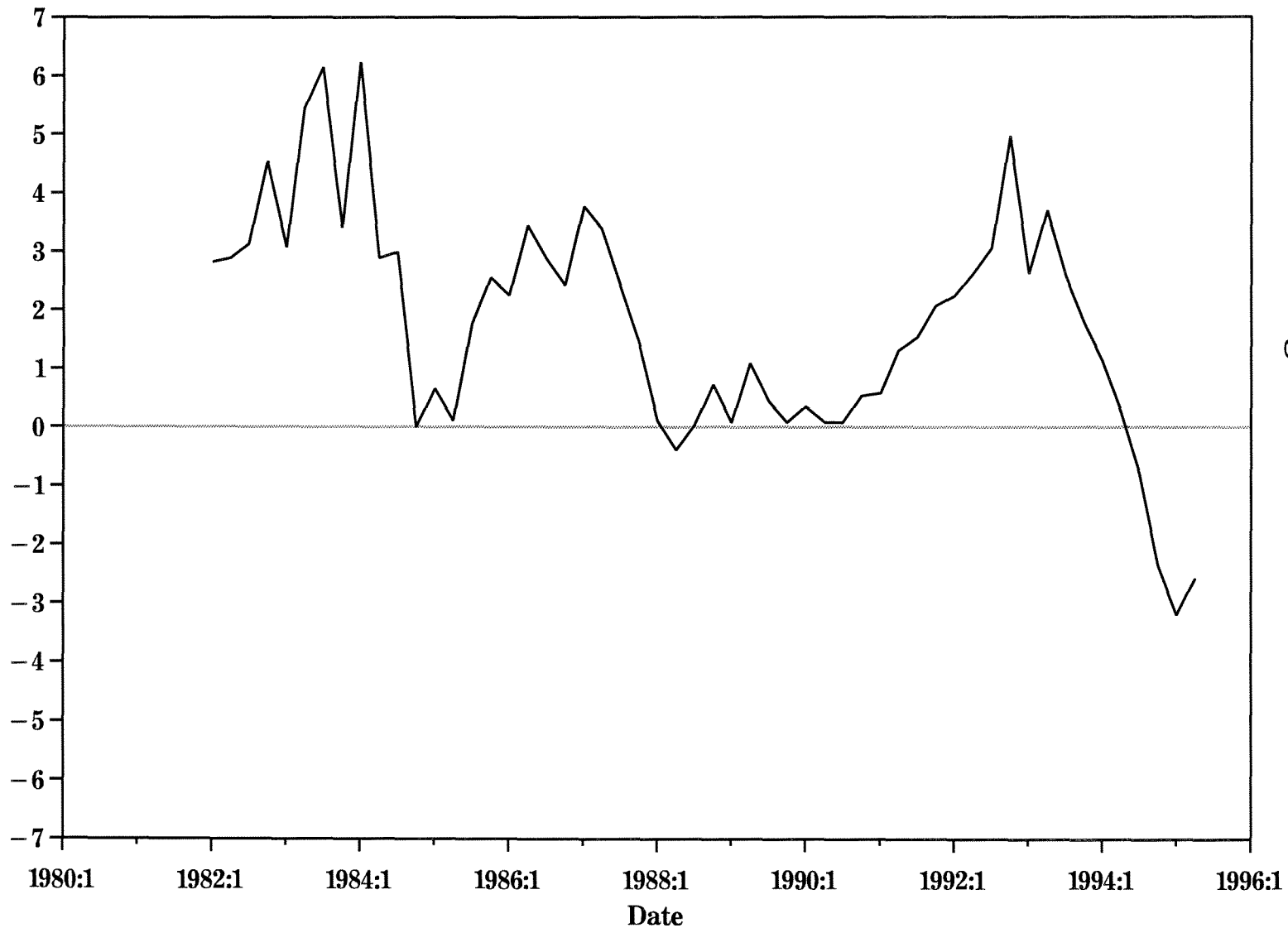


Figure 5

**A REVISED MEASURE OF THE  
ST. LOUIS ADJUSTED MONETARY BASE**

Richard G. Anderson\* and Robert H. Rasche\*\*

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\*Assistant Vice President and Economist  
Federal Reserve Bank of St. Louis  
P.O. Box 442  
St. Louis, MO 63166  
anderson@stls.frb.org

\*\*Professor of Economics, Michigan State University  
and Visiting Scholar, Federal Reserve Bank of St. Louis  
Department of Economics  
Michigan State University  
East Lansing MI 48824  
rasche@pilot.msu.edu

The views expressed are those of the author(s) and do not necessarily reflect official positions of the Federal Reserve Bank of St. Louis or the Federal Reserve System.

## Abstract

### A Revised Measure of the St. Louis Adjusted Monetary Base

Richard G. Anderson and Robert H. Rasche

The Federal Reserve Bank of St. Louis' adjusted monetary base combines in a single index Federal Reserve actions that affect the *supply* of base money -- open market operations, discount window lending and unsterilized foreign exchange market intervention -- with actions that affect depository institutions' *demand* for base money -- changes in statutory reserve requirements. The adjusted monetary base equals the sum of the monetary base and a reserve adjustment magnitude (RAM) that maps changes in reserve requirements into equivalent changes in the (unadjusted) monetary base. This paper presents a revised measure of the adjusted total reserves component of the monetary base and a new RAM. The revised measure of the adjusted reserves component differs from the current measure by including the aggregate amount of depository institutions' required clearing balance contracts with the Federal Reserve. The new RAM differs from the current RAM by recognizing that, since the Monetary Control Act of 1980, an increasing number of depository institutions have not significantly changed their demand for base money (vault cash and Federal Reserve deposits) relative to transactions deposits following changes in statutory reserve requirements. The new adjusted reserves data suggest that the stance of monetary policy, measured by the growth rate of adjusted reserves, has been more volatile since 1980 than suggested by the current measure.