

## **CONTEMPORANEOUS VERSUS LAGGED RESERVE REQUIREMENTS: ISSUE OR NONISSUE FOR MONETARY POLICY?**

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Recently<sup>1</sup> the Board of Governors of the Federal Reserve System solicited comment on a proposal to return to a lagged reserve requirement structure such as that in effect from September 1968 until February 1984. Under such a system the reserve computation period would end well before the beginning of the reserve maintenance period. Individual depository institutions would know their required reserves in advance, and the Federal Reserve would know aggregate required reserves in advance. With the current levels of reserve requirements and the present structure of the depository institution industry, it is unlikely that the proposed change would have any substantive effect on depository behavior, or on the conduct of Open Market Operations by the Federal Reserve.

### **1968, 1984, and 1998: This is not your Father's Oldsmobile**

In September 1968 when the system of lagged reserve requirements was first introduced, the depository institution structure in the U.S. differed considerably from the current structure. Federal Reserve regulations applied only to member banks. Nonbank depository institutions such as thrifts and credit unions were prohibited from offering checkable deposits. Legal reserve requirements applied to member banks covered both demand and time deposits (and ranged from 12.5 to 16.5 percent of net demand deposits and from 3 to 6 percent of time deposits).

By 1984, when quasi-contemporaneous reserve requirements were introduced, the provisions of the Monetary Control Act and the Garn-St. Germain Act were substantially implemented. The phase-in of reserve requirements on member banks was completed and the transition for former nonmember banks and thrift institutions was well underway. All depositories were subject to Federal Reserve reserve requirements. When fully implemented the Monetary Control Act and the Garn-St. Germain Act provided for an

exemption from reserve requirements for a very small amount of transactions deposits, a low reserve tranche of transactions deposits that were subject to a three percent reserve requirement ratio, and a 12 percent marginal reserve requirement on net transactions deposits above this tranche. Nonpersonal savings and time deposits were subject to a three percent reserve requirement.

With this structure of reserve requirements in place, some depositories were observed to hold quantities of vault cash that were more than adequate to satisfy their reserve requirements. These institutions were labeled as nonbound, under the presumption that their vault cash holdings reflected a transactions demand for cash and thus their asset portfolio decisions were not affected on the margin by the legal reserve requirements. Vault cash held by such depositories above the amount required to fully satisfy their reserve requirements was labeled *surplus vault cash*. (It should be noted that prior to the Monetary Control Act, all nonmember banks and thrift institutions satisfied this definition of nonbound institutions, and hence all vault cash held at that time by such institutions was surplus vault cash). Anderson and Rasche (1996a) distinguish such depositories as 1-nonbound (for legally nonbound). They consider another class of depositories that, while not holding vault cash in sufficient quantity to fully satisfy their reserve requirements, held amounts of vault cash and Federal Reserve deposits to meet transactions demands and clearing requirements that were more than sufficient to satisfy their reserve requirements. Such institutions were defined as e-nonbound (for economically nonbound.)

Anderson and Rasche (1996b) investigated the response of individual depositories in different size classes to the reductions of reserve requirements at the beginning of 1991 and in April 1992. They concluded that while approximately 4500 depositories were e-bound in November 1990, only about 500 depositories remained e-bound between January 1991 and April 1992. In 1995-1997, without consideration of the effect of “sweeps” activities, the estimated number of e-bound depositories further declined to around 250 institutions, in part because of merger and acquisition activities among larger depositories.

We now have available new biweekly time series data for e-bound and e-nonbound depositories on vault cash, Federal Reserve balances, and net transactions deposits over

the period 1984 through 1997. The ratios of vault cash, Federal Reserve Balances, and base money to net transactions deposits at those depositories classified as e-bound are shown in Figure 1. The comparable ratios for depositories classified as e-nonbound are shown in Figure 2. The data are not adjusted for seasonal variation. There is distinctly different behavior of the time series for those institutions classified as e-bound before and after early 1994. In contrast there are no substantial changes in the behavior of either the vault cash ratio or the Federal Reserve balance ratio of those depositories classified as e-nonbound before or after early 1994. For the latter institutions, the vault cash ratio may have a very small negative trend before early 1994 which is reversed after that date, but the distinguishing characteristic is considerable high frequency fluctuation around a mean slightly more than .05.<sup>2</sup> The Federal Reserve balance ratio for these institutions shows a slight negative trend through the period plotted here. The base money ratio for these institutions fluctuates around a mean of .073 without trend between 1992 and 1996; in 1997 it is somewhat higher.

Prior to early 1994, the vault cash and Federal Reserve Balance ratios at the depositories classified as e-bound behaved similarly to those of the e-nonbound institutions. The vault cash ratio in Figure 1 has a small negative trend before early 1994 and the Federal Reserve balance ratio is either constant or has a small positive trend. Both ratios are around .05. During this period the vault cash ratio at the e-bound depositories is only marginally higher than that at the e-nonbound depositories. This is consistent with the hypothesis that vault cash holdings at all depositories are determined by transactions demand and institutional structures and not by the reserve requirement that is imposed. The larger Federal Balance ratio at e-bound institutions during this time reflects the marginal reserve requirement ratio of 10 percent and an average reserve requirement of close to 10 percent given the large size of the depositories in this group.

After early 1994 the behavior of the vault cash and Federal Reserve Balance ratios for e-bound institutions changes dramatically. The vault cash ratio exhibits a strong positive trend and the Federal Reserve Balance ratio shows a strong negative trend. The sum of these two ratios, the base money ratio, has a distinct positive trend from the beginning of 1995 through 1996, after which the series appears to level off.

The trends observed in these two graphs are consistent with the hypothesis that much of the “sweeps” activity that has been instituted since the beginning of 1994 is at those depositories classified as e-bound. “Sweeps” activity involves reducing the amounts of net transactions deposits reported to the Federal Reserve relative to the amount of net transactions deposits held for customers, by “sweeping” transactions balances into Money Market Deposit Accounts which are exempt from reserve requirements. If vault cash holdings are determined by transactions demands generated by the “true” volume of net transactions deposits, then a growing understatement in reported net transactions deposits associated with an increasing amount of “sweeping” will generate a positive trend in ratio of vault cash to reported net transactions deposits as observed in Figure 1. If the amount of Federal Reserve Balance held by e-bound depositories before 1994 had been determined by transactions demands (i.e. these institutions were really e-nonbound during that period), then the reclassification of deposits for computing reserve requirements would not have resulted in any reduction in balances held by the “sweeping” depositories at the Federal Reserve. Hence, as the amount of “sweeping” increased, the Federal Reserve Balance ratio at these institutions would have shown the same positive trend as that observed in the vault cash ratio. Such a positive trend is not observed. The absence of such a trend is strong evidence in support of the hypothesis that these institutions were e-bound before the beginning of “sweeps” activity. In contrast, the Federal Reserve Balance ratio at the e-bound depositories develops a strong negative trend after early 1994. This implies that since that time these depositories have been able to reduce their holdings of Federal Reserve balances more than proportional to the reduction in their reported net transactions deposits. The increase in their holdings of vault cash relative to reported net transactions deposits is allowing them to reduce their Federal Reserve Balances relative to their reported net transactions deposits and still meet their average reserve ratio of about ten percent.

There is no clear economic incentive for e-nonbound depositories to engage in “sweeps” activity. Nevertheless there are reports that even some 1-nonbound depositories have instituted “sweeps” programs. In Figure 2 there is evidence of a small positive trend in the vault cash ratio of those institutions we have classified as e-nonbound, and a continuation of the small negative trend in the Federal Reserve balance

ratio at these institutions. Prior to 1997 these trends offset and the aggregate base money ratio of these depositories is trendless. Our hypothesis is that these institutions would not engage in a significant amount of “sweeping” and that these two ratios should not exhibit strong trends. Our judgment is that the evidence is not grossly inconsistent with this hypothesis.

How then might we judge whether all depositories have become e-nonbound as a result of extensive “sweeps” activity? As more and more of the depositories we have classified as e-bound after the 1990-1 reduction in required reserve ratios reduce their holdings of vault cash and Federal Reserve balances to the minimum levels determined by transactions requirements, then we predict that either “sweeps” activity will stabilize in which case both the vault cash ratio and the Federal Reserve Balance ratio will stabilize, or that both the vault cash and Federal Reserve Balance ratios (measured relative to reported net transactions balances) will exhibit positive trends. In Figure 1 this has not occurred by the end of 1996 and reports of new “sweeps” activity continued throughout in 1997. However, the trends in the vault cash ratio and the Federal Reserve ratio are smaller (in absolute value) in 1997 and the base money ratio is almost trendless during 1997.

By the end of 1997 the Federal Reserve ratio at those depositories we have classified as e-bound in 1991 is rapidly converging on the level of the Federal Reserve Balance ratio at those institutions we have classified as e-nonbound in 1991 (Figure 3). It seems likely that the depositories in the e-bound group will become e-nonbound with a Federal Reserve Balance ratio greater than or equal to the same ratio for the institutions we have classified as e-nonbound in 1992. Thus it is likely that by the present (early 1998) almost, if not all, depositories have achieved e-nonbound portfolios. This is supported by the data on initial “sweeps” activity reported by the Board of Governors. With the exception of September, the monthly values of this series in the second half of 1997 are small. While some of the depositories we have classified as e-bound may remain so at the end of 1997, “sweeps” activity has clearly reduced required reserves below the minimum levels required by transactions activity for some of the depositories in this group. This is evidenced by the positive trend in the base money ratio for these

depositories since 1995. The level of this series is not substantially greater than the .10 marginal reserve requirement ratio.

Another way of viewing the current regulatory environment is to consider that the marginal and average reserve requirement tax has been reduced to zero. Here the reserve requirement tax is defined as the impact of the reserve requirement regulation on the profits of depository institutions, not as the product of an interest rate and the amount of required reserves. Given that depositories have nonzero transactions demand for cash assets, it is only the loss of earnings from the additional cash assets held in the regulated environment beyond the cash assets that would be held in a world of zero reserve requirements that constitutes a tax on the economic activity of such institutions. When all depositories have achieved e-nonbound status, then both the marginal and average reserve requirement tax rate have reached zero.

Therefore our conclusion is that at the present time the structure of legal reserve requirements is essentially irrelevant for the portfolio decisions of any depositories in the U.S. since for the most part these reserve requirements are not a binding constraint on their portfolio behavior. Changing the reserve computation period from quasi-contemporaneous to lagged is unlikely to affect the demand for Federal Reserve balances in any significant fashion.

### **Federal Funds Rate Volatility Under Contemporaneous and Lagged Reserve Requirements**

One question that arises is why, if the demand for cash assets by depositories is effectively determined by transactions demand at the present time, are “excess reserves” so low? The answer lies in the official definition of excess reserves, which is a carry-over from the pre Monetary Control Act regime. Excess reserves are defined as Total Reserves less Required Reserves. However, total reserves are not defined to include total cash assets held by depositories. Rather total reserves are defined as “applied vault cash” plus balances held at the Federal Reserve net of contracted clearing balances.<sup>3</sup> These definitions are discussed in detail in Anderson and Rasche (1996a,b). Applied vault cash is that portion of vault cash utilized to satisfy reserve requirements and hence excludes all “surplus vault cash” held at 1-nonbound depositories. Contracted clearing balances are

minimum balances that depositories negotiate with the Federal Reserve to hold in their deposit accounts beyond their required reserves. These can be utilized to cover normal clearing activity through these accounts, but cannot be applied towards their reserve requirement. Depositories receive “earnings credits” on these contracted balances, at the Federal funds rate. These can be used to offset charges for priced services provided by the Federal Reserve System. Depositories that fail to maintain the minimum contracted balance in their reserve account are charged a penalty on the short-fall at minimal rates of interest. Since the reserve requirement is assessed against the balance in the reserve account before the computation of the clearing balance, the clearing balances are very close substitutes for reserve balances. Yet the official definition of “excess reserves” implicitly assumes that they are not substitutable for reserve balances. Hence the official definition of “excess reserves” ignores the institutional developments that have driven the portfolio behavior of depository institutions over the past 17 years.

Contemporary analyses of the demand for cash assets also ignore the developments of the Monetary Control Act era. Typically such analyses argue that it is impossible to affect an operating procedure that focuses on control of either total reserves or the monetary base in a world with lagged reserve accounting without introducing extreme funds rate volatility. The argument is that since in the aggregate depositories hold very small amounts of excess reserves, and since required reserves are predetermined in a world of lagged reserve requirements, then the demand for total reserves becomes perfectly inelastic at the predetermined level of required reserves (or at a slightly higher level). In effect in such a regime the Federal Reserve is forced to supply at least whatever amount of reserves are required to cover the previous deposit creation activity of the depositories and their loan customers.

This argument ignores the possibility that the reserve requirement (quasi contemporaneous or lagged) may not be an effective constraint on depository portfolio behavior. In this case the demand curve for total cash assets always lies substantially to the right of the current level of required reserves (whether simultaneously or predetermined) and may not be particularly inelastic. In this circumstance there would be no difference in the volatility of interest rates under a total reserves or monetary base operating procedure between the quasi-contemporaneous and lagged reserve requirement

regimes. Interest rate volatility might be judged to be unacceptably high under such operating procedures, but there is no basis for the argument that the problem is exacerbated by the choice of reserve requirement structures. This contrasts with the experience under the New Operating Procedures during 1979-82, a period during which banks were e-bound. There is no basis for extrapolating interest rate volatility observed at that time to any monetary aggregate operating procedure that might be considered with the present level of reserve requirements.

Several recent analyses (Bennett and Hilton 1997), Sellon and Weiner (1997), pp. 19-22; Edwards (1997), pp. 873-4) have failed to find evidence that the lower level of reserve requirements in effect since 1992 or the introduction of “sweeps” activity since 1994 has produced any significant increase in the short-run volatility of the Federal funds rate. However, it is unlikely under current operating procedures, when such demand is driven by transactions activity rather than regulatory constraints, that an examination of the volatility of the funds rate can reveal anything about the impact of lower levels of reserve requirements or the volatility of the demand for cash assets.

To understand this conclusion consider the implementation of the current operating procedure. The FOMC establishes a funds rate target and the desk attempts to maintain the effective funds rate within a narrow band around that target with the exception of the final day of reserve maintenance periods. The funds rate behaves much like the price of gold in the Classical Gold Standard regime. In the latter case countries established a parity for their currency in terms of gold, and the price of gold in each currency fluctuated between upper and lower gold points that were determined by the costs of shipping gold between national markets. So long as the costs associated with transshipment of gold did not change, the gold points did not change, and the volatility of the price of gold in terms of individual currencies changed little, regardless of the volatility of the demand for gold. Similarly under the current operating procedures, as long as the Desk is able to implement its band for the effective funds rate, volatility of the funds rate is insensitive to volatility in the demand for reserves.

The question of whether the movement to a transactions based demand for reserves rather than a regulatory-based demand for reserves has consequences for current operating procedures must be investigated in a different dimension of the data than the

volatility of the funds rate. Again consider the analogy of the Classical Gold Standard. Assume two different regimes: the first in which the demand for the currency of a particular country is subject to large random shocks (the high volatility regime) and the second in which the demand for the currency is subject to much smaller random shocks (the low volatility regime). In the former case we should observe highly volatile shipments of gold into and out of the country. In the latter case, transshipments of gold should be relatively infrequent and the variance of such shipments should be relatively small. If the demand for currency is very stable, no currency shipment would be observed. The same feature characterizes the Federal Funds market if the volatility of the demand for reserves has increased with the lowered reserve ratios. In order to maintain a given band around the funds rate target, the Desk should have to work harder when faced with more volatile demand for reserves. Working harder here is revealed by larger variability in Desk interventions in the market and/or shorter intervals between interventions. Such interventions are the analog to the sold shipments under the Classical Gold Standard. Since historically the Desk has usually intervened every business day, the more sensitive metric will be the variability of the Desk interventions. Monthly data on Desk activity are published in the *Federal Reserve Bulletin*; we are in the process of constructing daily time series on Desk activity from unpublished sources.

### **Alternative Reserve Requirement Regimes**

Probably the simplest change that can be implemented to smooth out short-run variability in the Funds rate would be to introduce staggered reserve settlement periods, or even longer reserve maintenance periods. In 1984 with the introduction of quasi-contemporaneous reserve requirements, reserve maintenance periods were lengthened from one to two weeks. This has the advantage that a given reserve shortfall on any particular day has a smaller effect on the average reserve balance level for the entire maintenance period. It is not clear that there is anything special about a two-week period. Some foreign central banks use reserve maintenance periods of a month or more (Borio, 1997, Table 8, pp. 50-51). Staggered reserve settlements seems the logical way to smooth high frequency funds rate fluctuations. Under current regulations where all depositories end the maintenance period on the same day of the week (Wednesday) and

the Desk staff makes a substantial forecasting error on Wednesday morning, Federal funds will trade at either a very high rate or close to zero toward the end of the day, since no depository can arbitrage between Wednesday and Thursday funds. Assigning depositories with roughly one-fourth of reservable transactions deposits to one of four maintenance periods ending Monday through Thursday would allow the remaining depositories with approximately three-fourths of reservable transactions deposits to arbitrage across the end of maintenance periods dates.<sup>4</sup>

Under existing Open Market procedures, the Desk generally intervenes at most once during a day, generally late in the morning and conducts transactions only with established primary dealers in government securities (Meulendyke, 1989, pp. 170-173, Edwards, 1997, pp. 866-868). Such procedures could be modified along the lines adopted by foreign central banks that are also operating in a world with reduced legal reserve requirement ratios (Borio, 1997). One such change would be for the Desk to conduct multiple daily interventions, or to intervene later in the day.

A third change would have more far reaching implications. This would be to allow the Desk to conduct Repos directly with depository institutions, rather than only with established primary dealers. However, this would require serious reconsideration of the operation of the discount window, since discount window borrowing, which is collateralized borrowing, is the economic equivalent of a term Repo. Direct RP transactions between Desk and depository institutions in effect would open up an additional discount window, where lending to depositories would take place at a market determined rather than administratively set rate.

## **Big Questions**

The presumption is that in the future the FOMC will continue to issue directives to the Desk in terms of a Federal funds (or similar interest rate) target, and that while such a target is in effect, the Desk will continue to maintain day-to-day fluctuations in the funds rate within a band around this target. There is a long tradition of such operating procedures at the Fed and similar traditions at most other central banks in the world. There are three substantive economic issues that warrant discussion within this context which are considerably more important than the question of contemporaneous versus

lagged reserve requirements. First, how frequently should the interest rate target be changed? Undoubtedly a major source of accelerations in the rate of inflation during the late 1960s and 1970s in the U.S. was inertia on the part of the FOMC in adjusting their interest rate targets. The significant improvement in the inflation history of the U.S. in the 90s may be attributable in large part to more frequent changes in the funds rate target. A second issue is the size of the tolerance band for funds rate fluctuations around the target set by the FOMC. It is evident that funds rate volatility has not increased significantly over the past decade. However, there does not seem to be any substantive analysis of the costs and benefits of maintaining such a low level of volatility. It is unlikely that Western Civilization would be fatally damaged as a result of a 25 basis point increase in funds rate volatility, but on the other hand substantial macroeconomic benefits to such increased short-run volatility is problematic as long as the FOMC is prepared to adjust the interest rate target in a timely fashion. Finally, there is the question of what information should be included in the feedback rule, or reaction function, that the FOMC uses to determine when changes in the funds rate target are warranted. In particular, what role do observed changes in monetary aggregates have in such a policy rule? At the present time it appears that such variables are given no significant attention in FOMC deliberations.

### **Preserving Options for the Future**

Some analysts have argued that quasi-contemporaneous reserve requirements should be maintained in order to preserve options for the future. In particular the existence of a lagged reserve requirement structure undoubtedly complicated operating procedures during the New Operations Procedures period. It is ironic that when the present system of quasi-contemporaneous reserve requirements was established in 1984, the New Operating Procedures were history. It is argued that if sometime in the future the FOMC should choose to return to an operating procedure that focused on a monetary aggregate (perhaps a broad monetary aggregate such as M2), then it would be desirable to have preserved the current contemporaneous reserve requirement structure. This argument presumes that were such a revision to operating procedures to be made at some future date that reserve requirements would be a binding constraint on depository

institutions. Absent future increases in legal reserve requirement ratios on transactions deposits, restoration of positive legal reserve requirement ratios on personal time and savings deposits, and prohibition of “sweeps” type activity to “shelter” transactions deposits from the reserve requirement on such deposits, it is unlikely that significant numbers of depositories will be e-bound in the future. Such reversion to the regulatory past seems improbable. Thus, in the future the demand of reserve assets (vault cash and Federal Reserve balances) most likely will be determined by transactions requirements and the contemporaneous or lagged structure of reserve requirements will be irrelevant for the hypothetical monetary aggregate operating procedure.

There is one development that could recreate effective reserve requirement regulation at the current low reserve requirement ratios and current relaxed regulatory attitudes towards “sweeps” activity. This might occur if we experience large-scale merger and acquisition activity among depositories, which creates an industry dominated by a few large depositories operating on a nationwide basis. Such institutions could internalize much of the present inter-institution clearing activity, thus substantially reducing their demand for clearing balance and/or vault cash relative to transactions deposits.

## NOTES

The aggregate data for e-bound and e-nonbound banks utilized in this analysis are constructed from data for individual depository institutions as part of an ongoing research project at the Federal Reserve Bank of St. Louis to measure the Adjusted Monetary Base. The underlying individual institution data are not publicly available. The helpful support of the Research Department of the Federal Reserve Bank of St. Louis and the staff of the Board of Governors is gratefully acknowledged. The opinions expressed here are not necessarily shared by the Federal Reserve Bank of St. Louis, the Board of Governors, or their respective research staffs.

<sup>1</sup>The Federal Reserve Press release, dated November 10, 1997 requesting comment on the proposed change is available on the Board of Governors Web site at: <http://www.bog.frb.fed.us/boarddocs/press/BoardActs/1997/19971110/>

<sup>2</sup>The interesting question is why depositories hold so much vault cash. They have not always done so. Prior to 1961, when all vault cash became eligible to satisfy reserve requirements, data on vault cash holdings are sparse. Wednesday data for a sample of weekly reporting member banks is available back to 1941. These data indicate very low vault cash ratios at this sample of banks through the mid 1950s—less than 1.5 percent of net demand deposits. In the late 1950s, but well before vault cash became an eligible reserve asset, the Wednesday vault cash ratio at this sample of banks started trending upward. By the mid 60s it had reached 2.5 percent of net demand deposits. There is no noticeable change in the trend over the 59-61 period. Data on daily average vault cash at all member banks are available beginning in 1961. This ratio is higher than the average Wednesday data at weekly reporting banks, but this is not surprising, since the weekly reporting banks exclude small institutions that are likely to have larger average vault cash relative to net demand deposits. The vault cash ratio on a daily average basis at all member banks starts around 2.5 percent in 1961, and increased to around 3.75 percent by 1970. The trend in the two series between 1961 and the middle of 1965 is identical.

<sup>3</sup>For definitions see *Federal Reserve Bulletin*, Table 1.12.

<sup>4</sup>It is probably not desirable to establish reserve maintenance periods ending on Fridays, since reserve accounting is done on a seven-day week basis with Friday balances counting for three days.

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