

Required Clearing Balances

by E.J. Stevens

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Introduction

Few people realize that in addition to complying with a Federal Reserve System regulation for holding a required reserve balance, many banks simultaneously meet an additional requirement to hold a clearing balance in their account at a Federal Reserve Bank. This clearing balance requirement differs from the familiar reserve requirement in three significant ways. First, a bank's agreement to meet the requirement is typically a business decision, not a legal necessity. Second, the amount of the requirement is mostly discretionary, not a fixed percentage of the bank's deposit liabilities. And third, the rate of return on a clearing balance is about equal to the federal funds rate, not zero, although a bank can use the earnings only to pay for services it buys from a Federal Reserve Bank.

About 5,000 banks now maintain required clearing balances, ranging from small retail depositories with a \$25,000 minimum requirement to giant money center banks with clearing balance requirements of several hundred million dollars.¹ Forty-five percent of all required reserve balances and 85 percent of all required clearing balances are held by banks that use a mixed deposit account at a Federal Reserve

Bank to comply with the combined requirements. For each of these institutions, the consequences of modest account deficiencies or surpluses are reckoned on the basis of required clearing balance rules. Only if a bank fails to meet *any* of its clearing balance requirement does it face the familiar "discount rate plus 2 percent" penalty for a required reserve deficiency. Likewise, such a bank wastes surplus balances by earning no rate of return only if its actual balance exceeds its required balance by more than a preestablished margin.

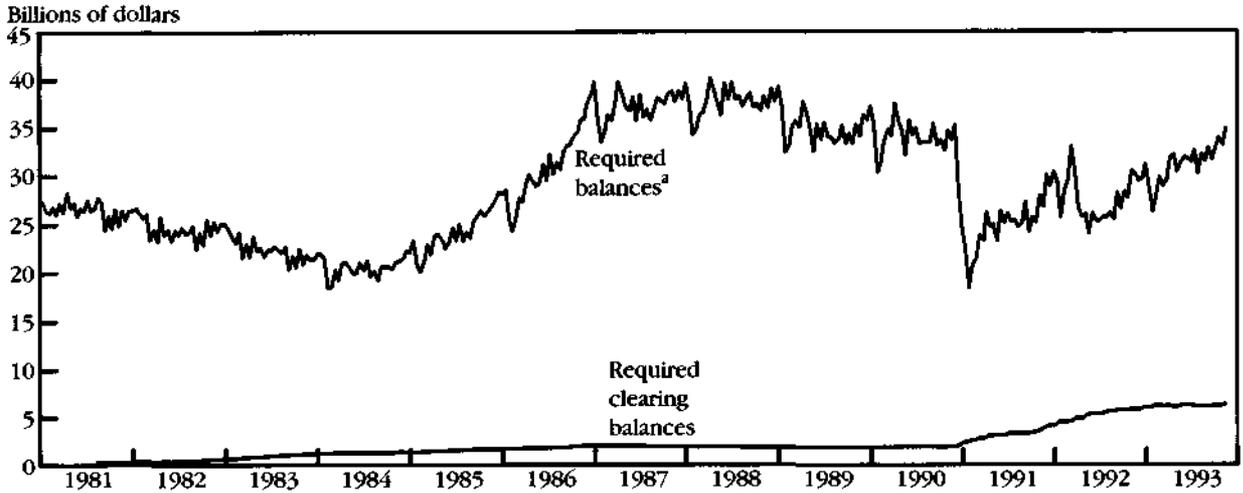
Almost all analyses of bank reserve management behavior focus entirely on reserve requirements, ignoring clearing balances because they are a relatively recent innovation.² Clearly, however, an important set of banks now maintains balances at the Fed following a somewhat different set of rules than they would if they held only required reserve balances. Knowledge of these rules is of more than accounting interest. For one thing—contrary to most models of the banking

■ 1 For simplicity, I use the term banks to mean all depository institutions.

■ 2 A good survey might start with Poole (1968) and include Coats (1976), Spindt and Tarhan (1978), Friedman and Roberts (1983), Evanoff (1989), and Feinman (1993).

FIGURE 1

Required Balances at Federal Reserve Banks



a. Required balances equal required reserve balances plus required clearing balances.

SOURCE: Board of Governors of the Federal Reserve System.

system and of monetary policy implementation — standard indicators of Federal Reserve policy, including total and excess reserves and the monetary base, probably contain a growing (albeit very small) component that effectively has a positive rate of return.

For another thing, banks seem to be substituting required clearing balances for required reserve balances. In the aggregate, banks now hold about \$33 billion of required balances at the Federal Reserve, including \$27 billion of required reserve balances and \$6 billion of required clearing balances. Required reserve balances have declined about \$6 billion over the past three years, while required clearing balances have almost tripled (see figure 1).³ Although banks surely welcome lower reserve requirement taxes, the Federal Reserve must deal with the payment system risk and monetary policy implementation repercussions of a banking system operating on a smaller cash deposit base. These repercussions may be muted, however, to the extent that banks replace required reserve balances with required clearing balances. The question, then, is why have required clearing balances grown so rapidly, and, more particularly, would further cuts in reserve requirements be offset by further growth of required clearing balances?

■ 3 The dollar volume of required clearing balances is reported as footnote 3 in *Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of F.R. Banks* (Federal Reserve Release H.4.1), and as part of the larger "service-related balances and adjustments" item in the data table "Reserve and Depository Institutions and Reserve Bank Credit" (*Federal Reserve Bulletin*, table 1.11). Clearing balance data are also reported in the pro forma balance sheet for Federal Reserve priced services in the Board of Governors' *Annual Report*.

This article is intended primarily to describe the little-known rules governing required clearing balances and to introduce some related issues. The first two sections include background information about clearing balances and a look at how a bank might manage a combined required reserve and required clearing balance. More precise institutional details are spelled out in the appendix. The third section outlines three areas in which issues warrant further investigation. One is the way in which measures of bank reserves and the monetary base have come to include an interest-bearing component as a result of required clearing balances. The next points to ambiguity in explanations of the rapid growth of required clearing balances. A third sketches some related central banking concerns about monetary policy implementation and payment service delivery.

I. Some Background

The Depository Institutions Deregulation and Monetary Control Act of 1980 extended coverage of Federal Reserve System reserve requirements from member banks to all depository institutions. At the same time, all depositories gained access to the Federal Reserve discount window and to Reserve Bank payment services. Services had to be priced at levels intended to recover their full cost of provision, including an allowance for the interest costs and profit required by competing private suppliers, such as correspondent banks.

Fair pricing requires a careful cost-accounting distinction between Federal Reserve non-priced, *central bank* activities such as reserve requirements and the discount window, and its *priced service* activities such as check clearing. Both activities may lead a bank to maintain a deposit balance in an account at a Federal Reserve Bank.

Banks whose vault cash is not sufficient to satisfy their reserve requirement can meet the remainder of the requirement in either of two ways. They can maintain funds in a deposit account at a correspondent bank on a pass-through basis, making it easier for them to use the services of correspondents without also having to maintain an account at a Federal Reserve Bank to handle their payment needs. Alternatively, banks can maintain the required funds on deposit at a Federal Reserve Bank.

The Federal Reserve's priced service activities are those for which it is not the sole supplier. These include collection of commercial checks, processing of commercial automated clearinghouse items, wire transfer of funds and government securities, safekeeping of definitive securities, collection of noncash items, and transportation of cash.⁴

A bank that uses these priced services needs an account to which its payments and receipts can be posted. Three possibilities exist. First, a bank can contract to have its activity posted to a correspondent bank's Fed account. As just noted, this might be especially appealing to those institutions already maintaining required reserve deposits at a correspondent on a pass-through basis. Second, a bank that maintains a required reserve deposit at a Federal Reserve Bank might have its activity posted to that account. Historically, this has been the typical choice of banks using the Reserve Banks' payment services. Third, if required reserve deposits are unnecessary or inadequate for transaction purposes, a bank might maintain additional balances in its Fed account under the required clearing balance arrangement.⁵ Since 1981, banks have been able to pay for priced services with earnings credits on required clearing balances.

■ 4 The Reserve Banks also provide fiscal agent services for the U.S. Treasury. A bank may use its Fed account to make and receive payments associated with these services, whose costs are covered by fees paid by either the banks or the Treasury.

■ 5 Federal Reserve Banks have always been able to provide an account for customers who do not need to keep a required reserve balance but who wish to make and receive payments there. Historically, this normal banking practice apparently involved only an incidental aggregate amount of overnight balances in clearing accounts.

Whatever its choice, a bank will want to ensure that unexpected charges to its account do not result in either penalties for daylight or overnight overdrafts or reserve deficiencies, and that unexpected receipts do not lead to "wasted" excess reserves. Moreover, the Federal Reserve Bank will need some assurance, as a prudent banker, that charges to a bank's account are made against a sufficient balance. Required clearing balances address these needs.

The mechanism for maintaining required clearing balances and receiving earnings credits was introduced in 1981 and modified in 1982 to include a penalty-free band.⁶ (See the appendix for a more detailed description.) This arrangement is comparable to the compensating balance method that some respondent banks and commercial firms use to pay for commercial bank services. A required clearing balance is an average amount that a bank contracts to hold in a deposit account during a reserve maintenance period. This balance is over and above any required reserve balance it must hold in that period. A bank's required reserve balance is determined by deducting its holdings of vault cash from its total required reserve, which in turn is a percentage of the bank's deposits specified by regulation. A bank's required clearing balance is self-determined, presumably so that it may avoid overdrafts and receive earnings credits commensurate with its monthly bill from the Federal Reserve Bank.

Periodically, a bank's actual maintained balance is compared with its required balance. Each business day, payments flow into and out of a bank's Federal Reserve account. For each institution, the Reserve Bank records end-of-day account balances and then averages these maintained balances for a reserve maintenance period of one or two weeks, depending on the size of the bank. If the bank has no required clearing balance, its average maintained balance (after certain "carryover" adjustments discussed below) should equal or exceed the required re-

■ 6 Each of the 12 District Banks provides official circulars and other marketing materials informing customer banks about the terms on which priced services are available, including the required clearing balance option. Operating to some extent as 12 distinct businesses, Banks have followed procedures for maintaining clearing balances that have differed somewhat in detail in the past. The most notable difference was in allocating maintained balances between reserve and clearing requirements. Some Banks allocated balances first to the required and then to clearing requirements, while others did the reverse. This practice affected the penalty structure on the initial amount of a deficiency, with some Banks assessing required clearing balance penalties and others assessing required reserve penalties. However, banking consolidation across Federal Reserve District lines, as well as consolidation of some operations among the 12 Banks, has led to the uniform current set of procedures described here (see Conference of First Vice Presidents (1993)).

serve balance (required reserves minus applied vault cash). If the bank also has a required clearing balance, the average maintained balance, after carryover, should equal or exceed the total required balance plus or minus a penalty-free band.⁷

Maintained balances satisfy the reserve requirement first, and the remainder is used to satisfy the clearing balance requirement. A bank is penalized if its balance falls short of the required amount by more than a penalty-free band, at the rate of 2 percent on amounts up to 20 percent of the required clearing balance, then 4 percent on amounts up to the whole required clearing balance, and at the discount rate plus 2 percent on any remaining deficiencies in required reserves. The bank receives earnings credits, based on the daily effective federal funds rate, on balances in excess of its required reserve up to the amount of its required clearing balance plus the penalty-free band (adjusted according to the bank's marginal reserve ratio; see appendix).⁸ Beyond that point, a bank penalizes itself for balances in excess of the required amount plus the penalty-free band, because the excess funds receive no earnings credits.

The penalty-free band is the greater of 2 percent of a bank's required clearing balance or \$25,000. Thus, a bank with a minimum required clearing balance of \$25,000 could satisfy the requirement and receive earnings credits on the amount by which its balance exceeds its required reserve by anywhere from zero to \$50,000, without penalty. A bank with a \$200 million required clearing balance would receive earnings credits on any balance above its required reserve up to \$204 million, and would satisfy its clearing balance requirement without penalty when this balance reached \$196 million.

Required clearing balances affect the Fed's cost of providing priced services in two largely offsetting ways. Total cost includes the earnings credits that Reserve Banks grant on clearing balances (\$177.8 million in 1992), reduced by an offset for unused credits. Total cost also is lowered by an offset for the income that Reserve Banks earn on assets financed with required clearing balances. This offset is imputed at the coupon-equivalent yield on three-month Treasury bills (\$180.2 million in 1992).⁹

II. Managing a Bank's Fed Balance

In general, managing a bank's balance at its Federal Reserve Bank is rather like managing one's fuel supply on an extended automobile trip.

Frequent stops to fill up take time and may preclude unforeseen opportunities to buy gas at a lower price. However, buying gas at a low price only when the tank is nearly empty risks running out of gas. So, too, a bank that buys and sells funds frequently in order to keep its balance close to the required amount at all times may waste opportunities to buy or sell at bargain rates, while buying or selling only when the funds rate is a bargain raises the risk of overdrafts and failure to satisfy requirements, or of wasted balances.

Banks work toward a target balance over seven or 14 calendar days (normally, five or 10 banking days), depending on the size of the institution. Thus, a bank's cumulative required balance is seven or 14 times its average required balance. During the period, the account manager has a daily opportunity to target the day's closing balance to add to the cumulative maintained balance.

The cost of financing an extra dollar of balances is essentially the rate at which a bank might borrow or lend in the federal funds market. This rate can vary noticeably over the course of a single banking day, over differing risk categories of borrower, and over days of a maintenance period. A bank does better, the more likely its manager is to "hit" the market when the rate is attractive, in effect filling up the fuel tank at places where gas is cheapest. Clearly, the attractiveness of the rate depends on the manager's judgment about how expensive funds are relative to what they might be over the remainder of the period (and, with carryover, over the following period).

Ultimately, at the end of a maintenance period, the value of an extra dollar of balances is determined by the structure of penalties and earnings credits within which the Reserve Banks administer requirements, including their permissiveness in waiving penalties. For a bank operating with only a required reserve balance, ignoring carryover, a deficiency would be penalized at a rate 2 percent above the discount rate, and frequent deficiencies would bring consultations aimed at changing management's be-

■ 7 Hereafter, "required balance" will be used to indicate the sum of a required reserve balance and a required clearing balance.

■ 8 Earnings credits are not added to the balance in the account, but accumulate for use in offsetting charges for priced services (on a first-in, first-out basis) within 52 weeks.

■ 9 The amounts of these two items for calendar years are reported as components of "Other income and expenses" in the pro forma balance sheet for Federal Reserve priced services, published in the Board of Governors' *Annual Report*.

havior. An excess would be wasted, costing something to finance but earning no interest.

With this general background, the rationale for a bank's decision to hold a required clearing balance can be investigated in three different time dimensions—a day, one or two maintenance periods, and the long run of many maintenance periods.

A Day

Uncertainty can be a dominant factor in a single banking day. For a full-service bank, particularly a very large one, the level of its final end-of-day balance results from its last-minute interbank loan market maneuvering. A bank is likely to be involved in daily payments and receipts whose aggregate value is thousands of times larger than the required reserve balance. Thus, even slight deviations of payments or receipts from projected levels might flood or drain the bank's Fed account during a day relative to the typical desired end-of-day balance. The manager of this account nonetheless must be able to come close to a targeted daily balance by arranging overnight borrowing or lending in the waning hours of the banking day in amounts that can be far larger than the target balance itself, and at attractive rates.

The protection that required clearing balances provide against daylight and overnight overdrafts has become increasingly important over the past decade. Reductions in reserve requirements and increased use of vault cash to satisfy requirements have left banks with smaller required reserve balances, but with no necessary change in the volume, time pattern, or predictability of charges and receipts for transactions. All else equal, this would be expected to increase the size and incidence of overdrafts, both daylight and overnight.

The Federal Reserve Banks have measured and monitored daylight overdrafts with increasing precision over the last 10 years, with amounts in excess of a minimum slated to become subject to a fee in April 1994. Overnight overdrafts already are subject to penalty (the greater of 2 percentage points above the discount rate or 10 percent). A bank without a required clearing balance might employ a variety of strategies to reduce the probability of overdrafts, including targeting a higher level of non-interest-bearing excess reserves. Contracting to hold a required clearing balance would accomplish the same thing at almost no net cost, as long as the bank could use its earnings credits.

A Maintenance Period

A bank needs a strategy for maintaining a set of overnight Fed balances whose average will most profitably satisfy its balance requirements for the period, taking into account both the previous period's reserve surplus or deficiency and the possibility of carrying a reserve deficiency or surplus into the next period.

No single reserve management strategy appears to dominate banking practice. Some banks target the average daily balance necessary to meet the required balance (perhaps including a margin of safety), recalculated daily for the remaining days of the maintenance period. Others try to accumulate balances toward requirements only when the funds rate seems low relative to the expected rate for the period. Still others deliberately keep a lean position early in a period, lest a negative surprise in required reserves or a positive surprise in receipts provide more excess reserves than they could work off over the remainder of the period without overnight overdrafts. Also, some banks try to alternate surplus and deficient periods, while others aim for a stable positive average balance, using the carryover feature only to deal with big surprises.

Carryover. Without a required clearing balance, a large bank's average balance for a maintenance period could be above or below the required level by as much as 8 percent of its required reserves (not just its required reserve *balance*). Large banks are permitted to carry over to the next period a surplus or deficiency of up to 4 percent of required reserves, but they cannot carry any resulting surplus or deficiency into the following period. Eight percent would result from using the maximum allowable carryover of a surplus/deficiency from the previous period and carryout of the maximum deficiency/surplus to the next period.

Adding a required clearing balance widens the range within which a bank can allow its maintained balance to fluctuate from one period to the next while still satisfying requirements. With the addition of a required clearing balance, the bank could be above or below the (higher) required level by as much as 8 percent of required reserves plus 8 percent of the required clearing balance. This is because the clearing balance requirement itself provides a penalty-free band of plus or minus 2 percent of the required clearing balance, and maximum allowable carryover is 4 percent of required reserves, plus 4 percent of the required clearing

balance, minus the penalty-free band of 2 percent of the required clearing balance.

A smaller bank (required reserves less than \$1.25 million) without a clearing balance requirement could be above or below the required level of balances by as much as \$100,000, because banks may carry over the *larger* of 4 percent of required reserves or \$50,000. However, adding a \$25,000 minimum clearing balance requirement would not change the range within which that same small bank could allow its balance to vary. Allowable carryover would actually decrease to \$25,000 (\$50,000 net of the minimum \$25,000 penalty-free band), offset by the ability to utilize that penalty-free band.

The Long Run

Opting to maintain a required clearing balance has obvious advantages for a bank. It can earn a market rate of return on relatively small balances that might not fetch such an attractive rate if sold as odd lots. Targeting a larger balance means, on average, *holding* a larger balance, thereby creating a greater buffer against daylight and overnight overdrafts. Moreover, the bank gains flexibility in managing its balance, with the penalty-free band providing a convenient, costless margin of error around the targeted balance that would be absent if it were targeting a zero balance or only a required reserve balance.

With these benefits in mind, it might seem surprising that all banks do not obligate themselves for as large a clearing balance as their need for earnings credits would support. Presumably, this is because a bank's capital is a scarce resource, if for no other reason than that banking regulations specify minimum levels of capital per dollar of total assets. Banks may restrict the volume of their required clearing balances to the level at which, at the margin, it is more profitable to allocate scarce capital coverage to other assets that promise a better return than the expected spread between the earnings credit rate on required clearing balances and their cost of financing.

Adopting a required clearing balance thus has the following effects on a bank's management of its Fed balance:

- It holds a larger balance, with the addition likely to be financed at little or no net out-of-pocket cost, but requiring a modest allocation of capital.
- Its incidence of daylight and overnight overdrafts would likely be lower.

- Allowable carryover, whether positive or negative, may be greater, providing a larger base either for interperiod rate arbitrage or for a bigger pool of funds from which to absorb unforeseen shocks to the closing balance on the last day, as well as for the period.

- The penalty-free band absorbs small deviations of actual from target balances without either penalty or wasted earnings.

III. Three Issues Related to Required Clearing Balances

Measuring Bank Reserves and the Monetary Base

Traditional measures of Federal Reserve monetary policy activity, including total and excess reserves and the monetary base, are being affected by the growing influence of required clearing balances. The required clearing balance facility can create an interest-bearing component of measured bank reserves quite distinct from the traditional non-interest-bearing reserve assets.

The potential influence of clearing balances can be seen by considering how the reserve and monetary base aggregates are constructed from six measured values, each of which is an average for a two-week reserve maintenance period. In addition to required clearing balances, the other five measured values include

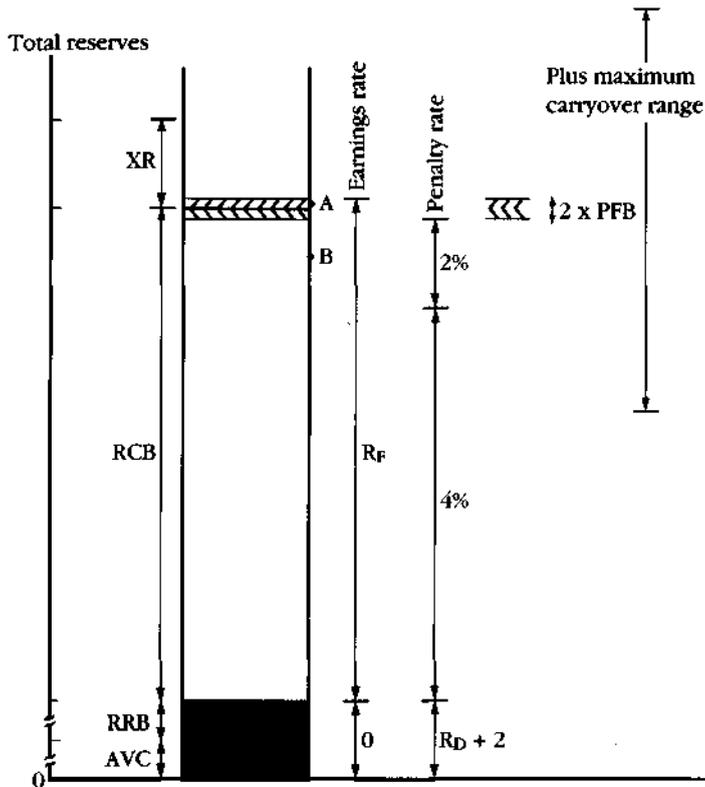
- 1) Fed balances: The aggregation of overnight balances of all depository institutions.
- 2) Applied vault cash: The amount of prior-period vault cash holdings being used to satisfy current-period reserve requirements.
- 3) Other vault cash: The difference between banks' current and applied vault cash.¹⁰
- 4) Currency in M1: The portion of currency in circulation held by the nonbank public.
- 5) Required reserves: The total amount of reserves that banks are required to hold, as specified in Federal Reserve Regulation D.

Data are derived from banks' reports of deposits to the Federal Reserve and are assembled with and without "adjustments to eliminate the effects of discontinuities," or "breaks," associated with changes in reserve requirements. The *adjusted* series estimates the amount of transaction deposit reserve requirements that would have prevailed in the past, had current reserve requirements been in effect; the *unadjusted* se-

■ 10 This is not the same as surplus vault cash (see Garfinkel and Thornton (1991)).

FIGURE 2

Reserve and Clearing Balance Requirements: The Rules



NOTE: XR = excess reserves; RCB = required clearing balance; RRB = required reserve balance; AVC = applied vault cash; PFB = penalty-free band; R_F = federal funds rate; and R_D + 2 = discount rate.
 SOURCE: Author.

ries reports the then-current actual requirements.

Required clearing balances are *excluded* from all measures of reserves, by definition, and from the adjusted monetary base, but are *included* in the unadjusted monetary base. This treatment is consistent with the differing purposes of the two measures of the monetary base.

The adjusted series emphasizes the role of base money as actual or potential reserve assets. These are the high-powered "tickets" that banks must hold when issuing reservable deposits, with the amount issued per ticket constrained by a reserve requirement. The adjusted monetary base includes the reserve assets held both by banks (adjusted total reserves plus vault cash not being used to meet reserve requirements) and by the nonbank public (currency in M1). A historically consistent measure of adjusted total reserves has been derived by adding the actual historical quantity of excess reserves to adjusted required reserves. Similarly, because banks' balances held to meet a clearing balance requirement cannot be used to satisfy reserve requirements, the adjusted monetary base excludes required clearing balances.

The unadjusted monetary base emphasizes the federal government's role in providing monetary assets directly to users in the private sector, rather than distinguishing between the quantities of private and public issues of money. The monetary base consists of all federally issued currency held by banks and the public (applied vault cash plus other vault cash plus currency in M1), plus all deposit liabilities of Federal Reserve Banks to private banks (Fed balances, including required clearing balances). The associated measure of total reserves adds applied vault cash to Fed balances and then subtracts required clearing balances (because they are not reserves). Excess reserves is the difference between this measure of total reserves and required reserves.

Measuring total or excess reserves thus involves distributing aggregate account balances between reserve balances and clearing balances. The current method does so by measuring reserve balances as all current balances other than *required* clearing balances.¹¹ Any excess of maintained balances above the required clearing balance level, even within the penalty-free band (for example, point A in figure 2), thus augments aggregate total and excess reserves. Similarly, any deficiency of maintained balances from the required clearing balance level, both within and below the penalty-free band (for example, point B in figure 2), reduces aggregate total and excess reserves, even though the bank may have satisfied its reserve requirement.

A potential implication of this measurement convention can be illustrated by imagining an extreme case. Suppose that *all* banks were to move simultaneously from the upper to the lower edge of their respective penalty-free bands between adjacent maintenance periods. Within a 2 percent penalty-free band above and below the current \$6 billion of required clearing balances, actual total and excess reserves would vary by about a quarter of a billion dollars, with banks largely indifferent to the change. That is, their earnings loss from holding a lower balance at the Fed would be approximately equal to their earnings gain from financing a lower balance. With many banks, some holding more and some holding less than their required clearing balances, positive and negative deviations from required clearing balances within penalty-free bands would likely

■ 11 *Adjusted* total reserves equals adjusted required reserves plus actual excess reserves, which in turn equals applied vault cash plus Fed balances net of required reserves and required clearing balances. *Unadjusted* total reserves equals applied vault cash plus Fed balances net of required clearing balances.

tend to be offsetting. More generally, however, the greater the participation in required clearing balance arrangements, the more probable that modest variations either in the supply of bank balances at the Fed, in total and excess reserves, or in the adjusted monetary base would be a matter of little moment to banks, since their net earnings would be unaffected.¹²

The essential issue here is whether total and excess reserves, as now measured, match any useful economic concept. The measures have no necessary counterpart at the level of an individual bank managing its reserve position, because carryover and penalty-free bands are unrecognized. Banks that perpetually maintain current balances in excess of current requirements truly have current-period "excess" reserves. Other banks, however, will be in different stages of using carryover, either satisfying some of their current reserve requirements with surplus balances from adjacent periods, or using current surplus balances to satisfy some of their reserve requirements in adjacent periods.

Carryover itself does not destroy the utility of the current measures: A positive shock to the supply of reserves in one period, for example, tends to imply a comparable negative shock to demand for total and excess reserves in the next period, and the System can rely on that carryover relationship in managing next-period supply. The difficulty comes from the addition of a penalty-free band, which makes it impossible to know whether a shock to reserve supply will affect next-period demand through carryover, or simply be accommodated as earning assets this period through the penalty-free band.

Sources of Growth in Required Clearing Balances

Managing a bank's required reserve balance at successively lower levels of reserve requirements has been likened to landing an airplane on a shrinking aircraft carrier. As the target balance gets closer to zero, there is less room for error. Averaging within a maintenance period provides less opportunity to absorb surprises, as does the possibility of carrying forward excesses and deficiencies. Overall, the banking

system becomes less effective in smoothing interest rates.¹³

With these impediments in mind, the rapid growth of required clearing balances in recent years might be linked to the cuts in reserve requirements of December 1990 and April 1992.¹⁴ Banks increased their required clearing balances by more than a third in the month following the December 1990 cut and doubled their requirements within a year (see figure 1). However, it would not be easy to distinguish the impact of lower reserve requirements from that of either rising bills for priced services or declining interest rates.

The utility of earnings credits lies in paying bills for priced services, so the size of these bills places an upper limit on the volume of clearing balances that banks could find useful. In the aggregate, the percentage of total sales of priced services paid with earnings credits, while growing, was still less than 20 percent in 1992. There is some indication that banks, including some with the largest required clearing balances, do tend to adjust their requirements in concert with the magnitude of their bills. What would be difficult to discover, however, is the extent to which annual growth of billings has "caused" the growth of required clearing balances. More important for the future would be to determine what portion of the remaining 80 percent of the priced services revenue billed to banks would be capitalized as additional required clearing balances if reserve requirements were cut further.¹⁵

Many banks could be expected to adjust balances to keep pace with bills because their required clearing balances are likely to be financed at a slightly positive rate spread, making priced services cheaper when paid from earnings credits. Earnings credits are calculated on the basis of the daily effective federal funds rate, which is the quantity-weighted average rate paid by all borrowers of unsecured overnight balances each day. Large banks operating actively in the interbank funds markets

■ 12 Paying interest on total or excess reserves would not preclude effective monetary policy. See Dotsey's (1991) investigation of monetary policy operating procedures in New Zealand, where there are no reserve requirements and where banks settle using a below-market interest-bearing asset whose supply is controlled by the central bank.

■ 13 Feinman (1993) provides an excellent analysis of these relationships.

■ 14 The 1990 action reduced the 3 percent reserve requirement against nontransaction deposits to zero, lowering required reserves by an estimated \$13.7 billion. The 1992 action reduced from 12 percent to 10 percent the highest marginal reserve requirement on net transaction deposits, cutting required reserves by an estimated \$8.9 billion.

■ 15 Hillon, Cohen, and Koonmen (1993) have investigated this question, as well as a variety of techniques that might expand the use of required clearing balances.

thus might expect to acquire marginal financing at rates averaging less than the effective rate, because foreign buyers and some others typically pay risk premiums that large domestic banks, for example, do not pay. This would insert a profit wedge between the effective rate used in calculating earnings credits and the cost of financing required clearing balances. With this in mind, some of the past growth in required clearing balances probably reflects the increase in total sales of priced services and the attraction of paying with earnings credits. In fact, if this relationship were one for one, about 14 percent of the growth of required clearing balances since 1990 might reflect growth of total sales of priced services.

Putting aside billing magnitudes, the level of the federal funds rate can also exert an independent, powerful influence on the size of a required clearing balance needed to produce a dollar's worth of earnings credits. For example, to hold earnings credits constant at their 1990 value, the substantially lower federal funds rate would have called for a 61 percent increase in required clearing balances by 1992.

Even if, for purposes of argument, demand for required clearing balances had been directly proportional to billings and inversely proportional to the level of the federal funds rate, banks added about \$1 billion more to their holdings of required clearing balances after 1990 than the hypothetical amounts these two forces would have produced. This suggests that banks have been induced to replace required reserve balances with required clearing balances. The relative influences of the three forces are not clear, however, because their movements have been correlated. Clarifying their relative importance will be crucial in dealing with some of the policy issues with which required clearing balances may become associated.

Monetary Policy Issues

Reserve requirements are a tax whose cost has become a serious issue in the United States in recent decades, as the competitive niche of traditional banking has faded in financial markets. Lower requirements can increase Federal Reserve payment system risk exposures through daylight and overnight overdrafts, can contribute to volatile overnight interest rates that could hamper monetary policy implementation, and can degrade the value of central bank payment services (Stevens [1989, 1991b, 1993]). Further

cuts in reserve requirements might bring significant institutional changes in banking and payment arrangements, with increased privatization of payment services to avoid daylight overdrafts, or with new Federal Reserve arrangements to ensure that deposit balances at the Fed remain an effective vehicle for monetary policy implementation (Meulendyke, ed. [1993], Stevens [1991a, 1992]).

Additional cuts in required reserves could reduce the System's effectiveness in interperiod smoothing of short-term interest rates. Reserve carryover plays a role in this smoothing process, allowing the banking system to absorb unintended variations in the System's supply of balances. The penalty-free band can serve the same purpose, but has different implications for policy implementation. Banks tend to "make up" reserve deficiencies and surpluses in the next period, providing the System with a vital clue to interperiod variations in demand for the balances it supplies.¹⁶ This is lacking in the operation of the penalty-free band. Thus, the System could face multiperiod runs of demand for balances below or above a required level.

An additional policy implementation problem may arise from the earnings credit feature of required clearing balances. Restrictive policies will carry within themselves the seeds of their own disorganization. That is, as the federal funds rate rises, the quantity of clearing balances needed to pay for a given quantity of Reserve Bank priced services will decline, increasing the possibility of the interest-rate variability associated with low balances. A high interest-rate policy might also discourage use of some Federal Reserve payment services, by reducing the nominal quantity of Fed balances available for immediate transfer within overdraft limits.

Relying on required clearing balances as the vehicle for implementing monetary policy thus raises a more general question. Is a bank's required clearing balance a by-product of its choice of the Fed as the best among alternative suppliers of services, or is the choice of the Fed's priced services a by-product of the bank's need for a larger balance? In either case, the Monetary Control Act's neat distinction between central bank activities and priced service activities is not as clear-cut as it once appeared.

■ 16 Feinman (1993) finds that for a sample of large banks from 1987 to 1991, excess reserves and carryin had opposite signs about 90 percent of the time.

IV. Conclusion

The emergence of required clearing balances is changing the institutional setting in which individual banks manage their Fed balances. Banks are able to hold balances substantially larger than dictated by reserve requirements, providing greater flexibility in avoiding overdrafts and meeting reserve requirements—and at minimal cost.

Familiar aggregate data series are being affected by bank holdings of required clearing balances. In effect, a definable, probably small, but as yet unmeasured portion of the total and excess reserves of the banking system is now earning assets, rather than being held as non-interest-bearing vault cash or reserve deposits. More important, marginal variations in banks' Fed balances increasingly take place within the earnings and cost structure of required clearing balances, not required reserve balances.

Growth of required clearing balances relative to required reserve balances raises questions that need further investigation. Can required clearing balances be expected to replace required reserve balances if reserve requirements are cut further? How would monetary policy implementation be influenced when a change in the money market stance of policy affects not only the marginal cost but also the marginal revenue of many banks' Fed balances? To what extent does the demand for clearing balances reflect a desire to pay bills with earnings credits, and to what extent does it reflect a demand for larger balances? If demand is mainly for convenient bill paying, could Federal Reserve priced services generate a pool of balances large enough to maintain a smoothly operating money market when interest rates are high? On the other hand, if demand is mainly for a level of balances high enough to accommodate transaction needs, could banks use all of the Federal Reserve priced services their balances could buy when interest rates are high?

Congress created the Federal Reserve System as a single response to the joint desire for a more uniform national payment system and for a regulator of the nation's money supply. The mandate of the Monetary Control Act of 1980 was that these two functions should exist independently, in the sense that the Federal Reserve Banks could no longer provide free payment services to offset banks' costs of maintaining required reserves. Subsequent cuts in reserve requirements have allowed the banking system to reduce its holdings of non-interest-

bearing required reserve balances at the Federal Reserve Banks to historically low levels relative to bank deposits and the monetary base. All else equal, continuing along this trend would require some combination of changes in monetary policy implementation and in the payment system to accommodate the absence of cash inventories in the banking system. Alternatively, required clearing balances could provide a new basis for banks to hold deposits at the Federal Reserve Banks, but whether this is feasible remains to be demonstrated.

Appendix

Required Balances: The Rules¹⁷

Current reserve and clearing balance requirements include two types of rules: those for computing and maintaining required balances and those for calculating earnings credits and penalties.

Many banks are "unbound"—that is, either they have a zero reserve requirement or they meet the requirement entirely with vault cash. These banks nonetheless may maintain a required clearing balance. Other banks are "bound" by a positive reserve requirement that exceeds their vault cash. They must maintain a required reserve balance, but do not hold a required clearing balance. A large number of banks, however, are both bound to hold a required reserve balance and elect (or have been asked) to hold a required clearing balance.

The rules laid out here, and summarized in figure 2, are for a bank that must meet a combined reserve and clearing balance, maintained on the biweekly basis that is typical of a relatively large institution. The other two cases may be derived by dropping all references to a required reserve balance or to a required clearing balance, as the case may be. Note that in maintaining a balance, a bank that holds only a required clearing balance cannot use the carryover feature, and a bank that holds only a required reserve balance cannot use the penalty-free-band feature.

■ 17 From Standard Operating Procedure 10.0, Conference of First Vice Presidents (1993). See also Board of Governors of the Federal Reserve System, *Monetary Policy and Reserve Requirements Handbook*, Washington, D.C.: Federal Regulatory Service.

Computing and Maintaining a Required Balance

A bank's required balance, *RB*, is not a unique dollar amount, but a range around the combined required balance.

$$RB = (RRB + RCB) \pm PFB.$$

The combined required balance includes a required reserve balance, *RRB*, that is the bank's total reserve requirement, *RR*, net of its applied vault cash, *AVC*.

$$RRB = RR - AVC.$$

The total reserve requirement is computed by applying appropriate marginal reserve requirement ratios to the amount of a bank's transaction deposit liabilities in each of three "tranches." In 1993, requirements are zero on the first \$3.8 million of deposits, 3 percent on additional deposits up to \$46.8 million, and 10 percent on deposits in excess of \$46.8 million.

Requirements typical of large banks are computed on the basis of daily average transaction deposit liabilities outstanding during successive two-week reserve computation periods ending every other Monday. Applied vault cash is the bank's daily average holdings during the 14-day period that ends three days before the beginning of the maintenance period.

The required clearing balance, *RCB*, is normally a dollar amount agreed to by the bank and its Federal Reserve Bank, with a \$25,000 minimum. As stated by the Federal Reserve Bank of Cleveland (1992),

The prescribed level of an institution's clearing balance will be determined in consultation with the institution on the basis of the deposit size of the institution, the volume and type of services that are or will be used, and the need to avoid account overdrafts.... This Bank may make adjustments in the prescribed level of an institution's clearing balance from time to time as may be appropriate. Such adjustments will normally be made no more than once a month and will be effective on the first Thursday of the month that coincides with the first day of a maintenance period.

The penalty-free band, *PFB*, for required clearing balances establishes a range of balances that will satisfy the combined required balance, because actual holdings are allocated first toward the required reserve balance, with the remainder

allocated toward the required clearing balance. The band is 2 percent of the required clearing balance, or \$25,000 if the required clearing balance is less than \$1.25 million.

A bank's maintained balance, *MB*, is the average daily closing balance in its Fed account, averaged over a two-week maintenance period (for a typical large bank) that begins on a Thursday and ends on a Wednesday, two days after the end of the required reserve computation period.

Carryover provisions allow a bank to carry forward to the next maintenance period an excess or deficiency in its maintained balance to the extent that it is offset by a deficiency or excess in the next period. The amount of carryover can be no more than $(0.04 [RR + RCB] - PFB)$ and cannot be carried forward more than one period. Note that the limit on eligible carryover is based on a bank's reserve requirement, *RR*, not on its reserve *balance* requirement.

Earnings Credits, Penalties, and Wasted Balances

Earnings credits provide a return on required clearing balances that can be used only to pay for Federal Reserve Bank priced payment services.¹⁸ Required reserve and surplus balances earn nothing. The return is based on the average federal funds rate during the maintenance period in which the required clearing balance was held. The funds rate is applied on an annualized basis to the actual average daily clearing balance (within the upper limit of the penalty-free band), adjusted by the bank's marginal reserve requirement ratio. A bank subject to the 10 percent marginal reserve requirement will earn the funds rate on its entire allowable clearing balance, a bank subject to a 3 percent marginal requirement will earn the funds rate on only 93 percent of that balance, and a bank subject to a zero marginal reserve requirement will earn the funds rate on only 90 percent of the balance.

The marginal reserve requirement adjustment incorporates two factors that allow Federal Reserve Banks and correspondent banks to provide similar services to customer banks on the "level playing field" envisioned in the Mone-

■ 18 More specifically, earnings credits *cannot* be used to pay penalties for clearing balance deficiencies or to cover charges related to non-priced service functions of the Federal Reserve Banks, such as penalties for deficient required reserve balances, interest on discount window loans, and cost recoveries for providing accounting information services.

tary Control Act. To illustrate, first suppose that correspondent banks have a 10 percent marginal reserve ratio and that the incidence of the cost of a correspondent's reserve requirement is on its respondent customer banks. This suggests that the Reserve Banks might give earnings credits on only 90 percent of a required clearing balance to avoid placing themselves at an advantage relative to correspondent banks in providing priced services.

Second, recognize that a bank paying for correspondent bank services with earnings credits on balances held with the correspondent is able to deduct the amount of those balances from its own deposit liabilities subject to reserve requirements. (Deducting amounts "due from other banks" avoids double-reserving of interbank deposits.) If the same bank were to buy services of equal value from a Federal Reserve Bank and pay for them with earnings credits on a required clearing balance, it would lose the deduction. This is irrelevant for a bank with a zero marginal reserve requirement, but not for those reserving 3 percent or 10 percent at the margin. Therefore, the Fed should give earnings credits on 93 percent or 100 percent of required clearing balances, depending on the customer's marginal reserve ratio, to avoid placing itself at a disadvantage relative to correspondents in providing priced services.

Penalties are imposed on a bank whose maintained balance is deficient, to the extent that the deficiency is not offset by carryover from the previous period or to the next period. Maintained balances are allocated first toward the required reserve balance, with the remainder allocated toward the required clearing balance. A bank pays a penalty at an annual rate that rises with the size of the deficiency: no penalty on the first 2 percent (or \$25,000) of the required clearing balance (the penalty-free band), 2 percent of the next 18 percent of the required clearing balance (or of the next 20 percent minus \$25,000), and 4 percent of the remainder of the required clearing balance. Deficiencies that extend into the required reserve balance are penalized at a rate 2 percentage points above the discount rate.

Balances can be said to be wasted to the extent that they exceed the required range and are not carried forward to the next period. Such balances do not contribute to satisfying a reserve or clearing balance requirement and do not receive earnings credits.

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