
Reserve Requirements: History, Current Practice, and Potential Reform

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Laws requiring banks and other depository institutions to hold a certain fraction of their deposits in reserve, in very safe, secure assets, have been a part of our nation's banking history for many years. The rationale for these requirements has changed over time, however, as the country's financial system has evolved and as knowledge about how reserve requirements affect this system has grown. Before the establishment of the Federal Reserve System, reserve requirements were thought to help ensure the liquidity of bank notes and deposits, particularly during times of financial strains. As bank runs and financial panics continued periodically to plague the banking system despite the presence of reserve requirements, it became apparent that these requirements really had limited usefulness as a guarantor of liquidity. Since the creation of the Federal Reserve System as a lender of last resort, capable of meeting the liquidity needs of the entire banking system, the notion of and need for reserve requirements as a source of liquidity has all but vanished. Instead, reserve requirements have evolved into a supplemental tool of monetary policy, a tool that reinforces the effects of open market operations and discount policy on overall monetary and credit conditions and thereby helps the Federal Reserve to achieve its objectives.

While useful as an auxiliary policy tool, reserve requirements also have important implications for the efficacy of the Federal Reserve's primary tool, open market operations. In the early 1980s, for example, when open market operations were geared toward fostering fairly precise, short-run control of narrowly defined money (M1), reserve requirements were designed to help facilitate this control by establishing a relatively stable, contem-

poraneous link between reserves and M1 deposits. Although the Federal Reserve is no longer pursuing this type of short-run control of money, reserve requirements still play an important role in the conduct of open market operations, which are now aimed at influencing general monetary and credit conditions by varying the cost and availability of reserves to the banking system. By helping to ensure a stable, predictable *demand* for reserves, reserve requirements better enable the Federal Reserve to achieve desired reserve market conditions by controlling the *supply* of reserves; in so doing, they help prevent potentially disruptive fluctuations in the money market.

Reserve requirements are not costless, however. On the contrary, requiring depositories to hold a certain fraction of their deposits in reserve, either as cash in their vaults or as non-interest-bearing balances at the Federal Reserve, imposes a cost on the private sector equal to the amount of forgone interest on these reserves—or at least on the fraction of these reserves that banks hold only because of legal requirements and not because of the needs of their customers. The higher the level of reserve requirements, the greater the costs imposed on the private sector; at the same time, however, higher reserve requirements may smooth the implementation of monetary policy and damp volatility in the reserves market.

The Federal Reserve could resolve this policy dilemma by paying interest on required reserves, or at least on the part of these reserves that banks would not hold were it not for legal requirements. Paying an explicit, market-based rate of return on these funds would effectively eliminate much of the costs of reserve requirements without jeopardizing the stable demand for reserves that is needed for open market operations and for the smooth functioning of the reserves market.

The Federal Reserve Board has long supported legislation that would explicitly allow interest to be

paid on the balances that depositories are required to hold in reserve—though not on the cash they hold in their vaults, which is assumed to be held primarily to meet customer needs—but to no avail.¹ Opposition has typically centered on the adverse implications such a move would have for Treasury revenue. If the Federal Reserve paid interest on required balances, its net earnings would decline, and because it turns the vast majority of its earnings over to the Treasury, the Treasury's revenues would decline as well. On the other hand, eliminating the costs of reserve requirements would remove one government-mandated impediment to deposit-taking and lending through the banking system. Recently, the costs of depository intermediation have risen sharply because of higher deposit insurance premiums, stiffer capital requirements, more stringent standards for interbank lending, and other regulatory burdens. Much of these increased costs have likely been passed on to the customers of depositories in the forms of higher loan rates and lower deposit rates; paying interest on reserves would be one way of countering some of these government-mandated increases in costs.

BASIC CONCEPTS AND CURRENT RULES OF RESERVE REQUIREMENTS

Under current regulations, all depository institutions—commercial banks, savings banks, thrift institutions, and credit unions—are required

to maintain reserves against transaction deposits, which include demand deposits, negotiable order of withdrawal accounts, and other highly liquid funds.² Reserves against these deposits can take the form either of currency on hand (vault cash) or balances at the Federal Reserve. The Federal Reserve may vary the percentage of transaction deposits that must be kept in reserve, but only within fairly narrow limits prescribed by law; requirements may also be imposed on certain types of nontransaction accounts, though again only within specified limits.³ At present, the required reserve ratio on nontransaction accounts is zero, while the requirement on transaction deposits is 10 percent, which is near the legal minimum.

Most depositories are able to satisfy their entire reserve requirement with vault cash, which they hold primarily to meet the liquidity needs of their customers and would likely hold even in the absence of reserve requirements. For these institutions, reserve requirements are essentially costless. About 3,000 depositories, however, have vault cash holdings that are insufficient to satisfy their entire reserve requirement. To meet their requirements, these institutions must also maintain deposits, called required reserve balances, at the Federal Reserve.

Reserve Requirements as a Tax

Some uncertainty exists as to whether the Federal Reserve Act permits interest to be paid on reserves. In fact, the Federal Reserve has never actually paid

1. See, for example, "Statement by Arthur F. Bums, Chairman, Board of Governors of the Federal Reserve System, before the Subcommittee on Financial Institutions of the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, June 20, 1977," *Federal Reserve Bulletin*, vol. 63 (July 1977), pp. 636-43; "Statement by J. Charles Partee, member, Board of Governors, before the Subcommittee on Financial Institutions Supervision, Regulation and Insurance of the Committee on Banking, Finance and Urban Affairs, U.S. House of Representatives, October 27, 1983," *Federal Reserve Bulletin*, vol. 69 (November 1983), pp. 840-52; and "Statement by Alan Greenspan, Chairman, Board of Governors of the Federal Reserve System, before the Subcommittee on Domestic Monetary Policy of the Committee on Banking, Finance and Urban Affairs, U.S. House of Representatives, February 19, 1992," Government Printing Office, Serial No. 102-98 (1992), pp. 42-43. The Federal Reserve has also requested the lifting of the prohibition on the payment of interest on demand deposits. See, in particular, the statement by J. Charles Partee, October 27, 1983.

2. For a formal definition of depository institutions and transaction accounts, see Federal Reserve Regulation D (Reserve Requirements of Depository Institutions), sections 204.1 and 204.2.

3. At present, required reserve ratios may be set between 8 percent and 14 percent on transaction accounts in excess of \$46.8 million, and between 0 and 9 percent on nonpersonal savings deposits, nonpersonal time deposits with original maturities of eighteen months or longer, and net Eurocurrency liabilities. Transaction deposits of less than \$46.8 million, in the so-called low reserve tranche, are reservable at 3 percent, while the first \$3.8 million of transaction deposits at each depository are exempt from reserve requirements altogether. The Federal Reserve cannot alter the cut-offs for the low reserve tranche or the exemption, which are adjusted each year according to a formula provided by law.

interest on required reserve balances.⁴ Requiring depositories to hold idle, non-interest-bearing balances is essentially like taxing these institutions in an amount equal to the interest they could have earned on these balances in the absence of reserve requirements. This forgone interest, or reserve “tax,” directly affects only the depository system and its customers, and not other parts of the financial system. Hence, it creates an artificial incentive for depositors and borrowers to bypass the depository system, and in so doing it may redirect credit flows in ways that impair the efficiency of resource allocation. In particular, by distorting the relative price of transaction accounts at depositories, the reserve tax may induce a smaller level of transaction services than what would be ideal for the functioning of the economy. The reserve tax also creates an incentive for depositories to expend resources trying to minimize required reserves by fashioning new financial products aimed solely at delivering transactions services without creating reservable liabilities.

As is true for most taxes, determining precisely who bears the burden of the reserve tax is difficult. That determination depends in a complicated way on the degree of competitive pressure in the markets for deposits and loans and the associated sensitivities of borrowers, lenders, and depositories to changes in prices and interest rates. One thing is certain, however: Depositories and their shareholders do not bear all of the costs but rather pass at least some of them on to their customers in the forms of lower deposit rates and higher loan rates. In compensating-balance arrangements, for example, in which customers maintain non-interest-bearing deposits as compensation for bank services, the customers typically “pay” the reserve tax by holding additional balances. Similarly, to the extent that some borrowers, such as small and

medium-sized businesses, have few alternatives outside of the depository system, these borrowers may ultimately bear some of the burden of the reserve tax in the form of higher costs of credit.

Current Estimates of the Reserve Tax

Table 1 presents estimates of the current dollar magnitude of the reserve tax. In the fourth quarter of 1992, the required reserve balances of all depositories totaled \$23½ billion. Because many of the financial transactions in our economy flow through these reserve accounts, even in the absence of reserve requirements depositories would likely hold some balances at the Federal Reserve as a buffer against the normal uncertainties surrounding payment flows. Thus, \$23½ billion should be considered an upper bound on the amount of balances truly idled by reserve requirements in the fourth quarter of 1992. Even if banks had invested all of these funds, moreover, the gains would probably not have been large because short-term interest rates are currently at relatively low levels. Using a federal funds rate of 3 percent as a proxy for the potential earnings rate on idle balances, the lost interest income due to reserve requirements totals only about \$700 million, at an annual rate, based on \$23½ billion of balances. About \$600 million of this would have accrued to commercial banks and their customers; even in the unlikely event that banks were able to retain all of this increased revenue, it would have boosted their pretax return on assets for 1992 by only about 2 basis points compared with an actual pretax rate of return on assets of a little more than 130 basis points.

On an after-tax basis, the earnings would be even smaller because depositories and their customers would have to pay extra taxes on this additional income. Regardless of the precise figure, however,

4. The Federal Reserve Board has, however, at least in the past, taken the position that it has the discretion to pay interest on reserves, though individual members of the Congress opposed such payments at the time of the enactment of the Federal Reserve Act in 1913 and again as recently as 1978. For details on a Federal Reserve proposal to pay interest on required reserve balances in 1978, see *Federal Reserve Bulletin*, vol. 64 (July 1978), pp. 605–10. For congressional reaction to this proposal, see, “Monetary Control and the Membership Problem,” *Hearings before the Committee on Banking, Finance and Urban Affairs on H.R. 13476, H.R. 13477, H.R. 12706, and H.R. 14072*, 95 Cong. 2 Sess. U.S. House of Representatives (GPO, 1978), p. 781.

1. Burden of reserve requirements, 1992:Q4

Billions of dollars

Type of institution	Required reserve balances	Forgone interest
All depositories	23.5	.7
Commercial banks	21.1	.6
Thrift institutions	2.4	.1

1. Forgone interest is annualized, based on a federal funds rate of 3 percent.

if the Federal Reserve paid interest on all required reserve balances, the private sector would enjoy a net increase in after-tax income, whereas the Treasury would see its net revenues reduced. Of course, if interest rates were higher, the burden of reserve requirements and the private-sector cost savings and government revenue losses stemming from paying interest on required reserve balances would be commensurately larger than the amounts shown in table 1. The distortions to resource allocation would be more pronounced as well. Indeed, the burden of reserve requirements has, at times, been considerably larger than it is now, as a result of both higher interest rates and higher reserve requirements.

Because reserve requirements are a tax on the private sector that may distort the optimal allocation of resources in the financial sector, the question arises as to why these requirements were imposed in the first place. The next section traces the historical evolution of reserve requirements and their rationales to see how our current system developed. Subsequently, several options for reforming the current system to eliminate the reserve tax without jeopardizing the effective conduct of monetary policy are analyzed.

HISTORICAL REVIEW OF RESERVE REQUIREMENTS AND THEIR RATIONALES

Reserve requirements have played a part in our nation's financial system from the earliest days—long before the creation of a national currency or a central bank.

Early State Laws and Practices

The first commercial banks in this country were chartered by the states and were not required to keep reserves either against deposits, which were little used at the time, or against their own, more ubiquitous, bank notes. In the absence of a national currency, bank notes were commonly used as a medium of exchange, though high transaction costs of redeeming the notes and limited information about the underlying solvency of the issuer generally confined the use of any individual bank's notes to a small geographic area. To facilitate the more widespread use of their notes, banks in New York

and New England entered into voluntary redemption arrangements as early as 1820. Under these arrangements, one bank agreed to redeem another bank's notes at par, provided that the issuing bank maintained a sufficient deposit of specie (gold or its equivalent) on account with the redeeming bank as backing for the notes. In essence, these deposits represented the first required reserves. The primary purpose of these reserves was to increase the liquidity of bank notes by ensuring their convertibility into specie. Although in subsequent years some states began to require banks to maintain reserves against their notes, and a few even began to require reserves against deposits, most states still had no legal reserve requirements when the Civil War broke out in 1861.

The National Bank Era

Reserve requirements were first established at the national level in 1863 with the passage of the National Bank Act. This act provided banks an opportunity to organize under a national charter and created a network of institutions whose notes could circulate more easily throughout the country. In exchange for this charter, banks had to hold a 25 percent reserve against both notes and deposits—a much higher requirement than that faced by most state banks. Although banks in “redemption” cities—designated in the act as cities where notes were likely to accumulate for redemption—had to hold reserves entirely in the form of “lawful” money (specie or greenbacks), banks outside these cities could maintain 60 percent of their reserves in interest-bearing balances at banks in redemption cities.

Reserve requirements were seen as necessary for ensuring the liquidity of national bank notes and thereby reinforcing their acceptability as a medium of exchange throughout the country. Concentrating reserves in areas where demands for liquidity were likely to be most acute was thought to be the surest means of promoting the widespread use and acceptance of national bank notes. At the same time, allowing banks outside redemption cities to earn interest on a portion of their reserves made the burden of reserve requirements less onerous for banks that faced more limited demands for liquidity.

The federal government had a keen interest in seeing the use of national bank notes flourish because, in addition to reserve requirements, national bank notes were also required to be backed by holdings of government bonds, which were needed to finance the Civil War. To make the issuance of national bank notes less costly, reserve requirements against these notes were lowered for banks outside redemption cities from 25 percent to 15 percent in 1864, and banks in redemption cities outside New York City were allowed to meet half of their requirements with interest-bearing balances at a bank in New York. Still dissatisfied with the rate of growth of national bank notes, the Congress imposed a tax on state bank notes in 1865, effectively guaranteeing the primacy of national bank notes as a medium of exchange. Indeed, in subsequent years, these notes began to circulate widely throughout the country and were rarely redeemed. With their convertibility no longer in question, reserve requirements against national bank notes were lifted in 1873. Requirements remained in place on deposits, however, which were just emerging as an accepted means of payment. As time wore on, the role of deposits expanded, and they eventually supplanted bank notes as the preferred medium of exchange for many transactions, with their convertibility supposedly reinforced by reserve requirements.

A series of bank runs and financial panics in the late nineteenth and early twentieth centuries made it patently clear that reserve requirements could not really guarantee the convertibility of deposits for the entire banking system. In fact, reserve requirements were really no help at all in providing liquidity during a panic because a given dollar of reserves could not be used simultaneously to meet a customer's demand for cash and to satisfy reserve requirements. What was lacking from the national banking system or, for that matter, from any fractional reserve system—one with reserve requirements of less than 100 percent—was a mechanism for accommodating temporary variations in the public's demand for liquidity by adjusting the quantity of reserves available to the entire banking system. Absent such a mechanism, systemic panics and crises stemming from fluctuating liquidity needs were all too common. Though an individual bank might be able to meet a temporary surge in the demand for cash with little attendant adverse

effect on the economy, the banking system as a whole could not without selling securities or calling in loans, thereby squeezing credit supplies, driving up interest rates, and precipitating a general financial crisis.

Creation of the Federal Reserve System

The Federal Reserve Act of 1913 created a system of Reserve Banks that could act as lenders of last resort by accommodating the temporary liquidity needs of the banking system and thereby alleviating the periodic financial disruptions that plagued the national bank era. By discounting eligible assets of member banks, Federal Reserve Banks provided a ready, accessible source of liquidity that had been missing from the national banking system.

Although the creation of the Federal Reserve System seemingly eliminated any remaining liquidity rationale for reserve requirements, banks that were members of the System were still required to hold reserves, though requirements were lower than those previously in effect for most national banks. In the original Federal Reserve Act, banks had to hold in reserve different percentages of their demand deposits—deposits that could be withdrawn on demand—depending on whether they were classified as central reserve city banks (18 percent), reserve city banks (15 percent), or country banks (12 percent).⁵ In addition, all member banks faced a 5 percent requirement on time deposits.⁶ Member banks outside central reserve cities were not allowed, however, to meet part of their requirements with interest-bearing balances at a bank in a central reserve city. Starting in 1917, moreover, member banks could no longer use vault cash to satisfy reserve requirements: They had to

5. Originally, the rationale for these distinctions among cities was a carryover from the designation of redemption cities in the national bank era. In 1913, banks in New York, Chicago, and St. Louis were classified as central reserve city banks, and banks in about fifty other cities were designated as reserve city banks. In 1922, St. Louis was reclassified as a reserve city, and in 1962 the central reserve city designation was eliminated altogether. Over the years, the number of reserve cities changed somewhat as some cities were added and others deleted by the Federal Reserve Board.

6. For details on the history of changes in reserve requirements since the inception of the Federal Reserve, see the appendix.

meet their requirements entirely with non-interest-bearing balances at a Federal Reserve Bank.

On net, therefore, the effective burden of reserve requirements in terms of forgone interest was somewhat higher for member banks than for non-member banks, particularly for those outside central reserve cities. To help offset this increased burden, in 1917 reserve requirements on demand deposits were pared further, to 13 percent, 10 percent, and 7 percent respectively for the three types of member banks, and requirements on time deposits were reduced from 5 percent to 3 percent for all members. These reductions, coupled with the benefits of access to Federal Reserve credit at the discount window and free Federal Reserve services—such as check clearing and currency distribution—were considered sufficient encouragement for banks to become members of the System, despite the higher reserve requirement burden that such membership often entailed. In later years, however, the burden of reserve requirements would become more acute, making membership less desirable for many institutions.

Reserve Requirements as a Means of Influencing Credit Conditions

In the 1920s and 1930s, the Federal Reserve gradually began to expand its original, reactive role as lender of last resort and guarantor of the liquidity of the banking system and adopted a more proactive posture in attempting to influence the nation's credit conditions. As the emphasis of monetary policy evolved, so too did the rationale for reserve requirements. In fact, by 1931, the Federal Reserve had officially abandoned the view that reserves were a necessary or useful source of liquidity for deposits, arguing instead that reserve requirements provided a means for influencing the expansion of bank credit.⁷ Specifically, the Federal Reserve believed that requiring banks to hold reserves against the additional deposits needed to fund each increment of new loans could help restrain an overly rapid expansion of credit.

7. See "Member Bank Reserves—Report of the Committee on Bank Reserves of the Federal Reserve System," in Board of Governors of the Federal Reserve System, *19th Annual Report, 1932* (Board of Governors, 1933), pp. 260–85.

In practice, however, reserve requirements were of little help in containing the rapid credit growth that occurred in the late 1920s. During this period, the primary tool used by the Federal Reserve to influence credit conditions was the discount rate. Because this rate was generally kept below market rates and only marginal administrative pressure was used to dissuade banks from availing themselves of the discount window, banks had an incentive to borrow the reserves they needed to finance their rapidly expanding assets from the Federal Reserve, and they responded vigorously to this incentive. Throughout much of the 1920s, discount window borrowings were more than half of total Federal Reserve assets. With the Federal Reserve effectively accommodating much of the increased credit expansion, reserve requirements placed no significant constraint on lending. In addition, the Federal Reserve had no authority to raise reserve requirements even if it had wanted to make them a more binding constraint on credit expansion.

During the Great Depression, as market interest rates plunged and loan demand all but dried up, reserve requirements were obviously not needed to curtail credit growth. In fact, through much of this period, banks held large quantities of reserves in excess of their reserve requirements, suggesting that reserve requirements were not in any way constraining credit expansion. The Federal Reserve was concerned that these large excess reserves could eventually be used to support an overly rapid buildup of deposits and loans that could ultimately prove inflationary. Therefore, it exercised its newly acquired powers under the Banking Act of 1935 and doubled the required reserve ratios on both demand and time deposits, thereby effectively absorbing much of extant excess reserves.⁸ By 1938, however, as evidence mounted that the nascent economic recovery was imperiled, the Federal Reserve moved to trim reserve requirements on both demand and time deposits, hoping to free up additional funds for lending.

8. The Thomas Amendment of 1933 first granted authority to the Federal Reserve Board to raise reserve requirements, subject to presidential approval, provided that a national emergency was declared. The Banking Act of 1935 eliminated the need for presidential approval or the declaration of an emergency, though it also precluded the Board from reducing requirements below the levels then in force or from more than doubling those requirements.

In the years surrounding World War II, monetary policy considerations became subordinate to financing the government debt. During this period, the Federal Reserve abandoned an active monetary policy role and chose as its highest priority to accommodate the government's financing needs by buying Treasury securities at low interest rates.

Postwar Issues: Membership Attrition and Monetary Control

In 1951, the Federal Reserve resumed an active, independent monetary policy. In subsequent years, reserve requirements were adjusted numerous times, usually to reinforce or supplement the effects of open market operations and discount policy on overall monetary and credit conditions. In the short run, however, reserve requirements placed little constraint on the expansion of deposits because the Federal Reserve largely accommodated any such expansion through open market operations. Over time, though, if the Federal Reserve sought to reduce the availability of money and credit by providing reserves less generously through open market operations, it could and often did augment its actions by raising reserve requirements.

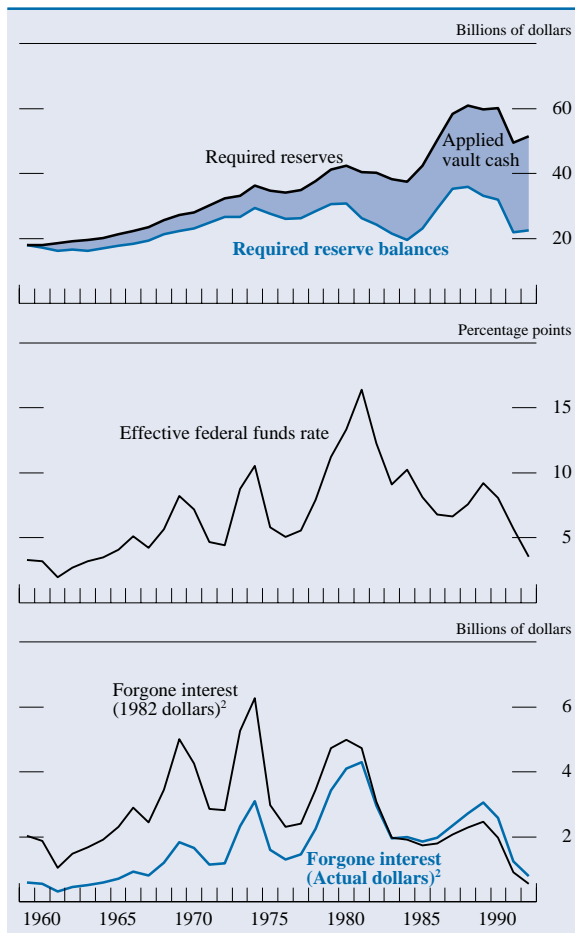
The use of reserve requirements as a supplemental tool of monetary policy was particularly prevalent in the 1960s and 1970s, as the Federal Reserve sought to influence the expansion of money and credit in part by manipulating bank funding costs. As financial innovation spawned new sources of bank funding, the Federal Reserve began to adapt reserve requirements to these new financial products and often changed requirements on the specific bank liabilities that were most frequently used as marginal sources of funding. As banks began to rely more heavily on the issuance of large-denomination time deposits (CDs) to fund their asset acquisitions in the 1960s, for example, the Federal Reserve began periodically to alter reserve requirements on these instruments, thereby affecting their cost of issuance and, thus, the supply of credit through banks. It sometimes supplemented its actions by placing a *marginal* reserve requirement on large time deposits—that is, an additional requirement applied only to each new increment of these deposits.

Reserve requirements were also imposed on other, newly emerging liabilities that were the functional equivalents of deposits. For example, as banks started to rely more on Eurodollar borrowings as a funding source in the late 1960s, partly in an effort to circumvent existing reserve requirements, the Federal Reserve imposed marginal requirements on these liabilities and adjusted these requirements periodically throughout the 1970s. The imposition of reserve requirements on these and other managed liabilities was especially useful in the late 1970s, as the Federal Reserve aggressively sought to curb the expansion of money and credit and thereby ease price pressures.

Throughout this period, reserve requirements also had important implications for membership in the Federal Reserve System. Since membership was optional for state-chartered banks, some of these institutions began to leave the System in the 1950s to take advantage of the lower reserve requirements imposed by most state regulatory authorities, some of whom also allowed banks to meet part of their requirements with interest-earning assets. The Federal Reserve feared that if enough banks left the System, changes in the cost and availability of reserves to the remaining member banks might have a diminished effect on overall monetary and credit conditions, thus undermining the efficacy of monetary policy.

Change in vault cash accounting. To reduce the burden of reserve requirements and stem the erosion of membership in the System, legislation was enacted allowing banks to resume using vault cash to satisfy their reserve requirements. This change, which was phased in beginning December 1959, provided the greatest relief to small banks, which tended to hold relatively large quantities of vault cash to meet their customers' liquidity needs. Permitting this vault cash to be used to meet reserve requirements reduced the amount of non-interest-bearing balances these banks had to hold at the Federal Reserve. Because smaller banks were most apt to leave the System, it was hoped that this reform would help stanch membership attrition. Although larger banks tended to benefit less from this rule change, they were less likely to leave the System because they often reaped the greatest benefits from free Federal Reserve services, par-

1. Burden of reserve requirements, 1959–92¹



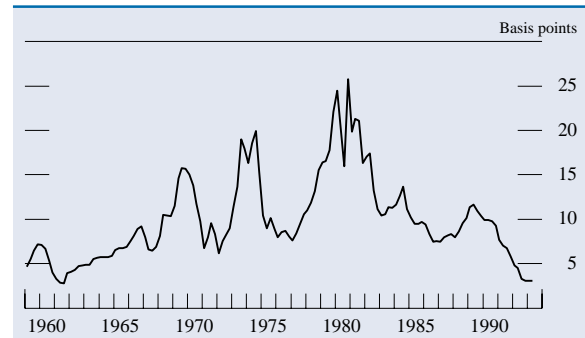
1. Data are annual averages.
2. Forgone interest is defined as required reserve balances multiplied by the federal funds rate.

ticularly those related to the clearing of financial transactions.

The change in vault cash accounting did in fact reduce the level of required reserve balances somewhat in the early 1960s (top panel of chart 1). This decline, coupled with a drop in short-term interest rates (middle panel of chart 1), helped lighten the burden of reserve requirements in terms of the interest forgone on required reserve balances (bottom panel of chart 1).

Proposals to change the structure of reserve requirements. This relief proved temporary, however. As interest rates climbed in the late 1960s and into the 1970s, the burden of reserve requirements

2. Marginal reserve tax on transaction deposits, 1959–93:Q1¹



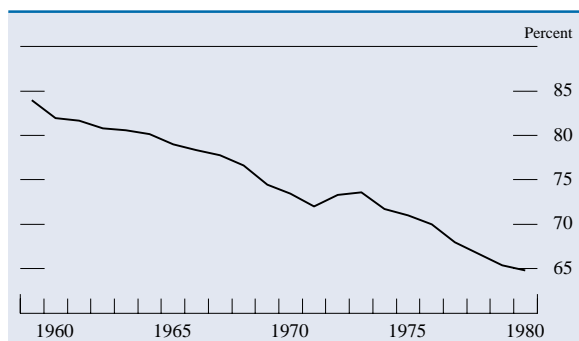
1. The marginal reserve tax is the quarterly average effective federal funds rate times the highest reserve requirement on transaction deposits during the quarter.

became more onerous; with higher interest rates, banks were being forced to forgo more earnings by holding non-interest-bearing required reserve balances. Indeed, the marginal tax rate on transaction (demand) deposits—the reserve tax on an additional dollar of these deposits, as measured by the reserve requirement times the rate of interest forgone—rose through much of this period as well (chart 2). As a result, more banks began to leave the Federal Reserve System, taking with them an ever-increasing share of the deposits in the banking system. By the early 1970s, for example, the share of transaction deposits held by member banks had fallen below 75 percent from nearly 85 percent in the late 1950s (chart 3). In response, the Federal Reserve began to argue for additional legislation aimed at stemming the corrosive effects of the decline in membership on monetary control. Either all depository institutions should be subject to reserve requirements established by the Federal Reserve, thereby rendering the membership issue irrelevant, the System argued, or interest should be paid on required reserve balances, thereby removing banks' primary motive for leaving the System.⁹

Opposition to both proposals proved strong, however, with nonmember banks leading the crusade against universal reserve requirements and

9. Each Annual Report of the Board of Governors of the Federal Reserve System between the years 1964 and 1979 argued for the adoption of legislation aimed at reforming the structure of reserve requirements to combat the problem of membership attrition.

3. Member bank transaction deposits as a share of total transaction deposits, 1959–80¹



1. Transaction deposits are defined as net demand deposits plus NOW accounts. Data are expressed as annual averages.

with both the legislative and executive branches of the federal government opposed to interest on reserves out of concern about Treasury revenues. In fact, a 1963 presidential commission cautioned against any significant cuts in reserve requirements to avoid a sharp drop in Treasury revenue.¹⁰ Most academics, by contrast, usually supported retaining and even increasing reserve requirements to tighten the link between reserves and money, while paying interest on reserves to eliminate the distortional effects of the reserve tax.¹¹

Lagged reserve requirements. Thwarted in its attempts to promote substantive change in the structure of reserve requirements, the Federal Reserve took several smaller, unilateral steps aimed at stemming membership attrition. In 1968, a system of lagged reserve requirements (LRR) was implemented in which a bank's required reserves were computed based on its deposit levels from two weeks earlier. Previously, the computation period for deposits had been essentially contemporaneous with the maintenance period for reserves. By switching to LRR, the Federal Reserve hoped to make it less difficult and costly for banks to calculate their reserve requirements and to manage their

reserve positions. One problem with LRR was that it weakened the direct, contemporaneous link between reserves and money, thus making it harder, in principle, to manipulate reserves to control money, at least in the short run. This problem was not considered a serious one, however, because Federal Reserve procedures at that time were not directed at tight, short-run control of money through a reserves operating target.

Graduated reserve requirements. In the late 1960s, the Federal Reserve also began to move away from a system of reserve requirements based on geographic distinctions, as embodied in the reserve city bank and country bank designations. By 1972, the old system was eliminated altogether, and a new system with a progressive, graduated reserve requirement schedule was implemented. Under the new system, reserve requirements increased with the level of each bank's deposits, independent of its location. Although the specifics were somewhat complicated (see the appendix for details), the upshot of the change was to reduce reserve requirements for smaller banks, which were still most likely to leave the System. At the same time, however, the move to a system with many reserve requirements based on different deposit levels further weakened the link between the aggregate level of reserves and the total amount of deposits in the banking system. Again, however, because the Federal Reserve was not trying to maintain control of deposits through a reserves-targeting procedure, this effect was not a major concern.

Continued decline of membership. Despite the efforts of the Federal Reserve, the decline of membership in the System continued unabated, with the proportion of transaction deposits at member banks falling below 65 percent of total transaction deposits by the late 1970s (chart 3), in part because rising interest rates were enlarging the reserve tax (charts 1 and 2). In response, the Federal Reserve began to argue more vociferously for changes in the structure of reserve requirements to prevent membership attrition from further undermining the efficacy of monetary policy.¹² In 1978, it even went

10. *Report of the Committee on Financial Institutions to the President of the United States*, Walter W. Heller, Chairman (GPO, 1963).

11. See, for example, Milton Friedman, *A Program for Monetary Stability* (Fordham University Press, 1959), pp. 65–76; Thomas Mayer, "Interest Payments on Required Reserve Balances," *Journal of Finance*, vol. 21 (March 1966), pp. 116–18; and George S. Tolley, "Providing for Growth of the Money Supply," *Journal of Political Economy*, vol. 65 (December 1957), pp. 477–85.

12. See "Statement by G. William Miller, Chairman, Board of Governors of the Federal Reserve System, before the Committee

so far as to propose a unilateral plan to pay interest on reserves, which elicited strenuous congressional opposition.¹³

The relative decline in the deposit base at member banks became particularly worrisome after October 1979, when the Federal Reserve adopted a reserves-based operating procedure designed to maintain close, short-run control of M1. The success of this procedure depended in part on how tight the link was between reserves at member banks and the level of M1 deposits in the entire banking system—a link that was being weakened by the continued decline in membership as well as by some of the steps the Federal Reserve had taken to try to reverse this decline, including switching to LRR and instituting graduated reserve requirements.

The Monetary Control Act and M1 Targeting

After years of debate, the Congress finally adopted legislation to reform reserve requirement rules in order to end the problem of membership attrition and facilitate control of M1. The Monetary Control Act of 1980 (MCA) mandated universal reserve requirements to be set by the Federal Reserve for all depository institutions, regardless of their membership status. The act also vastly simplified the graduated reserve requirement schedule, further tightening the link between reserves and money. Although the key focus was on transaction (M1) deposits, all of which were made subject to reserve requirements, certain types of nontransaction deposits also became subject to requirements, which effectively broadened the reserve base and required more depositories to hold reserve balances. In this way, the Federal Reserve's ability to influence aggregate deposit levels by manipulating the quantity of reserves was improved. The MCA

also granted the Federal Reserve authority to impose a supplemental reserve requirement of up to 4 percent on transaction accounts. Finally, as a result of MCA, the number of depositories required to report their deposits to the Federal Reserve increased markedly, thus improving the accuracy and timeliness of data necessary for monetary control.

To ease the burden of reserve requirements, the MCA initially set the basic reserve requirement on transaction deposits at 12 percent—below the 16¼ percent maximum that had been in effect for member banks—and prohibited the Federal Reserve from raising this requirement above 14 percent. It also set a 3 percent reserve requirement on the first \$25 million of deposits at each institution—the so-called low reserve tranche—as a special concession to smaller depositories.

In 1982, the Garn–St Germain Act went even further by exempting from reserve requirements altogether the first \$2 million of deposits. The law mandated annual adjustments to the cutoffs for the exemption and the low reserve tranche based on aggregate growth in reservable liabilities and transaction deposits respectively. To help smooth the transition for nonmember banks and thrift institutions, a multiyear phase-in period was put in place, and the Federal Reserve was also prohibited from putting reserve requirements on personal time and savings deposits, which were particularly important sources of funds for these institutions. Finally, all institutions with reservable deposits, not just member banks, now had access to the discount window as well as to Federal Reserve services, including check clearing, funds transfers, and the like, though these services were no longer to be provided free of charge.

The MCA did not specifically prohibit or authorize the payment of interest on required reserves, although it mandated the payment of interest on supplemental reserves should the Federal Reserve ever impose them. The legislative history of the MCA indicates that the Congress was concerned about the possible adverse effects of the act on Treasury revenues, so much so that the MCA even prohibits the Federal Reserve from lowering the reserve requirement to less than 8 percent on transaction deposits. The legislative history also indicates that the Congress was concerned that payment of interest on reserves would give the Federal

on Banking, Finance and Urban Affairs, U.S. House of Representatives, July 27, 1978," *Federal Reserve Bulletin*, vol. 64 (August 1978), pp. 636–42; and "Statement by Paul A. Volcker, Chairman, Board of Governors of the Federal Reserve System, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, February 4, 1980," *Federal Reserve Bulletin*, vol. 66 (February 1980), pp. 643–48.

13. For details on the Federal Reserve's proposal, see *Federal Reserve Bulletin*, vol. 64 (July 1978), pp. 605–10. For congressional reaction, see "Monetary Control and the Membership Problem." *Hearings*.

Reserve, in its role as a provider of financial services, an unfair competitive advantage over depository institutions, which are prohibited from paying interest on demand deposits. Appreciative of this concern and aware of the distortions created by the prohibition of interest payments on demand deposits, the Federal Reserve advocated removal of this prohibition in conjunction with the payment of interest on reserves.¹⁴ Neither proposal was adopted, however. Thus, the reserve tax on depositories and their customers remained.

In 1982, the Federal Reserve took another step to improve its short-run control of M1 by deciding to switch to a contemporaneous reserve requirement (CRR) scheme. By making the period in which banks are required to maintain their reserves against transaction deposits virtually contemporaneous with the period in which deposit levels are computed for the purpose of determining reserve requirements, this move tightened the real-time link between reserves and M1.¹⁵ In so doing, it remedied a weakness in the short-run monetary control mechanism of the existing, reserves-based operating procedure.

Reserve Requirements since the Abandonment of M1 Targeting

Ironically, by the time CRR was instituted in 1984, the Federal Reserve had shifted its focus away from short-run control of M1 via a reserves-based operating procedure, preferring instead to influence monetary and credit conditions by adjusting the cost and availability of reserves to depositories. It also shifted its focus more toward M2, as this aggregate was seen as more closely linked to the ultimate objectives of monetary policy than M1, which had become overly sensitive to interest rates after the authorization of nationwide NOW accounts and the general deregulation of deposit rates. Thus, the basic structure of reserve requirements, which had been meticulously designed to

facilitate the control of M1 through a reserves-oriented targeting procedure, had seemingly become an anachronism.

In fact, however, reserve requirements continued to play an important role in the conduct of monetary policy, in part by providing a stable, predictable demand for aggregate reserves. Absent reserve requirements, banks would still hold some balances at the Federal Reserve to meet their clearing needs. Given the size and volatility of the financial transactions that clear through these reserve accounts, depositories need to maintain a cushion of balances in these accounts to provide some protection against uncertain debits that can potentially leave their accounts overdrawn at the end of the day and subject to stiff penalties.¹⁶ The exact amount of balances that banks wish to hold for clearing purposes may vary considerably from day to day, however, and cannot be forecast with much precision by the Federal Reserve. By making reserve requirements the binding constraint on banks' demand for reserves—that is, by keeping required reserve balances above the uncertain level needed for clearing purposes—the Federal Reserve can more accurately determine the banking system's demand for reserves. In this way, it can more readily achieve any desired degree of pressure on bank reserve positions and associated reserve market conditions simply by manipulating the maintenance-period-average supply of reserves.

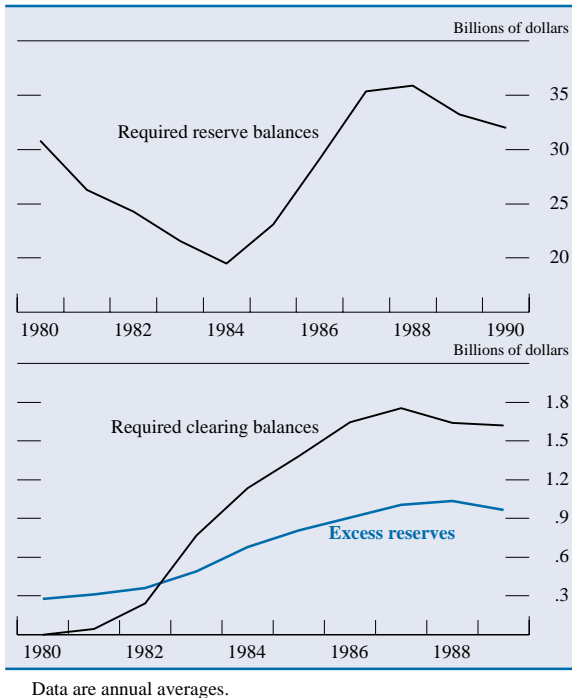
By requiring banks to hold an average amount of reserves over a two-week maintenance period rather than a specific amount on each day, current regulations allow considerable flexibility in daily reserve management. Banks can use this flexibility to arbitrage anticipated, intraperiod variations in the cost of reserves (the federal funds rate), by substituting reserves on one day of the period when they are expected to be less costly for reserves on another day when they are expected to be more costly. This sort of intraperiod arbitrage serves to reduce day-to-day fluctuations in the cost of reserves. The lower the level of required reserve balances, however, the less leeway a bank has for manipulating the intraperiod profile of its reserve

14. See statement by J. Charles Partee, October 27, 1983.

15. Actually, banks were required to hold an average amount of reserves over a two-week maintenance period ending every other Wednesday, based on average deposit levels in a two-week computation period that ends on a Monday two days before the end of the maintenance period.

16. At present, the penalty rate on overnight overdrafts is the higher of 200 basis points above the federal funds rate on the day, or 10 percent. In addition, banks have to offset overdrafts later in the period to meet their reserve requirements.

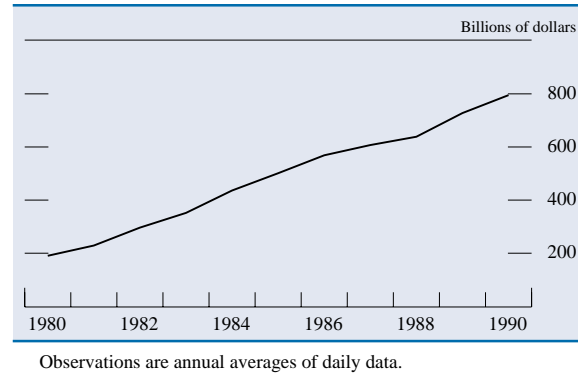
4. Reserve and clearing balances, 1980–89



position without jeopardizing its overnight overdraft protection; hence, the bank will be less able to arbitrage day-to-day variations in the federal funds rate.

Banks that find their required reserve balances insufficient to meet their clearing needs—that is, to provide them with adequate overdraft protection—are able, under the provisions of MCA, to open clearing balances. Banks can contract with the Federal Reserve to hold an average amount of these balances in their reserve accounts over the two-week reserve maintenance period. If they fail to hold the amount required under the contract, they are penalized, much as would be the case if they failed to hold sufficient balances to meet their reserve requirements. Unlike required reserve balances, however, which do not earn interest, banks receive earnings credits on the amount of clearing balances they are required to hold under their contractual agreement. They can, in turn, use these earnings credits to defray the costs of Federal Reserve priced services. Thus, from a bank's perspective, opening a clearing balance is a virtually costless way to boost the average balance it is required to hold in its reserve account over the

5. Volume of funds transactions clearing through reserve accounts, 1980–90



maintenance period and hence to provide extra insurance against overdrafts and added flexibility to reserve management.

Not surprisingly, in the years immediately after passage of MCA, as required reserve balances fell as a result of the phased reductions in reserve requirements for member banks (top panel of chart 4), many of these institutions opened clearing balances to help replenish their diminished protection against overdrafts. Indeed, by 1986, the banking system as a whole had contracted to hold roughly \$1¾ billion of clearing balances (bottom panel of chart 4). To a lesser extent, other banks, particularly those using small amounts of priced services from the Federal Reserve and those new to managing reserve accounts, increased their holdings of excess reserves to help meet their clearing needs. These changes, coupled with a rebound in required reserve balances, provided banks with more of a cushion to handle a sharp increase in the volume of funds transactions clearing through their reserve accounts (chart 5).

RECENT CUTS IN RESERVE REQUIREMENTS

In the decade after passage of the MCA in 1980, the Federal Reserve left reserve requirements essentially unchanged. More recently, however, it has taken two steps to reduce these requirements. In December 1990, the required reserve ratio on nontransaction accounts—nonpersonal time and savings deposits and net Eurocurrency liabilities—was pared from 3 percent to zero, and in April

1992, the 12 percent requirement on transaction deposits was trimmed to 10 percent.

Rationale

These actions were motivated in part by developments in credit markets, where evidence had emerged suggesting that some lenders had adopted a more cautious approach to extending credit. This caution was exerting a restraining effect on the cost and availability of credit to some types of borrowers. By reducing depository funding costs and thus providing depositories with easier access to capital markets, the cuts in reserve requirements were designed to put banks in a better position to extend credit. In particular, the cut in the requirement on nonpersonal time deposits was aimed directly at spurring bank lending because these accounts are often used as a marginal funding source. Of course, it was recognized that some, if not all, of the benefits stemming from the reserve requirement cuts would likely be passed on, over time, to borrowers and lenders.¹⁷

The cuts in reserve requirements were also motivated by the Federal Reserve's recognition that much of the early-1980s rationale for reserve requirements had evaporated with the abandonment of a reserves-oriented operating procedure geared to short-run control of M1. At the same time, it realized that reserve requirements still played a vital role in policy implementation. Indeed, it chose not to make even deeper cuts in requirements for fear that required balances would fall to levels insufficient to satisfy the normal clearing needs of the banking system.

Effects of Reserve Requirement Cuts on the Size of the Reserve Tax

The elimination of the 3 percent reserve requirement on nontransaction accounts at the end of 1990 reduced the level of required reserve balances roughly \$11½ billion, or about one-third (table 2).

17. For details on the rationales for the recent cuts in reserve requirements, see *Federal Reserve Bulletin*, vol. 77 (February 1991), pp. 95–96; and *Federal Reserve Bulletin*, vol. 78 (April 1992), pp. 272–73.

2. Effect of recent cuts in reserve requirements

Effective date of cut	Reduction in required reserve balances (billions of dollars)	Federal funds rate (percent)	Reduction in interest forgone (millions of dollars)
December 1990	11½	7.0	800
April 1992	8½	4.0	350

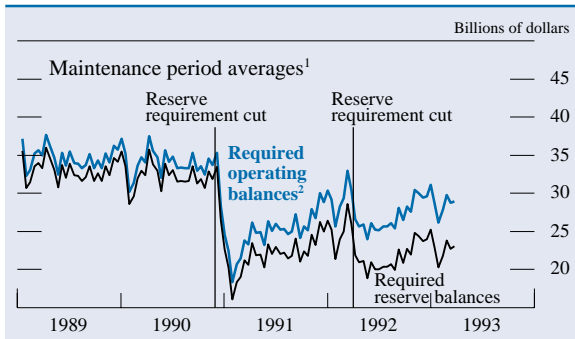
Using the 7 percent federal funds rate that prevailed at the time as a proxy for the interest that could have been earned on these balances, the cut in reserve requirements translated into an increase of about \$800 million in the annual, pretax earnings of depositories and their customers.

As a result of this cut in reserve requirements, about 2,500 depositories whose vault cash had formerly been insufficient to meet their reserve requirements were no longer bound to hold balances at the Federal Reserve. For these institutions, therefore, the reduction in the nontransaction requirement essentially eliminated the reserve tax. Trimming the required reserve ratio on transaction accounts in April 1992 relieved several hundred additional institutions from having to hold balances at the Federal Reserve. Overall, this second cut in reserve requirements reduced the required reserve balances of the entire banking system about \$8½ billion, resulting in annual pretax savings of roughly \$350 million for the private sector, given the 4 percent federal funds rate that prevailed at the time.

Effects on Bank Reserve Management and Open Market Operations

In the immediate aftermath of the December 1990 cut in reserve requirements, the level of required operating balances—the sum of required reserve balances and the amount of clearing balances required to be held under contractual arrangements between depositories and the Federal Reserve—plunged (chart 6). By early February 1991, these balances reached a trough of about \$18¼ billion—barely more than half their level in the period preceding the cut in requirements and nearly 40 percent below their seasonal low in early February 1990. Required operating balances typically reach a low point at this time of the year because

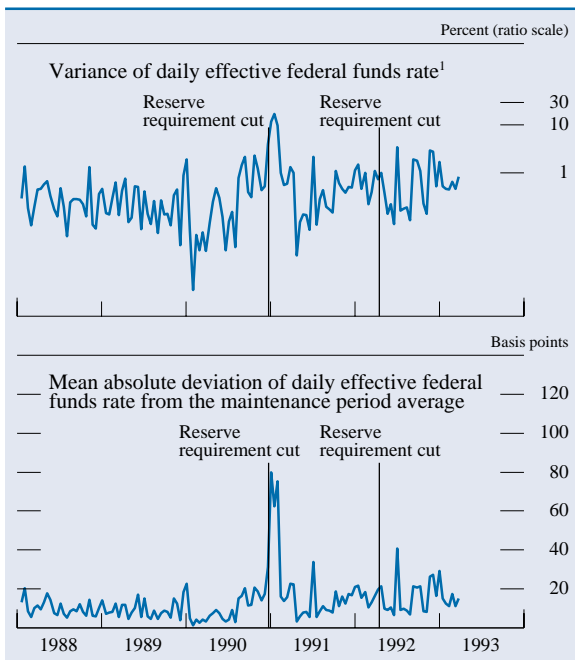
6. Reserve balances, 1989–March 31, 1993



1. Reserve maintenance periods run for two weeks, so that there are twenty-six periods each year. In this chart and in charts 7, 8, and 9, there are twenty-six observations for each full year.
2. Required operating balances are required reserve balances plus required clearing balances.

required reserves fall from their end-of-year peak. Also, owing to regulations stipulating that depositories apply their vault cash holdings from two maintenance periods earlier in meeting their current reserve requirements, the enlarged holdings of vault cash from year-end do not become available for use in meeting reserve requirements until late January and early February.

7. Reserve market volatility, 1988–March 31, 1993



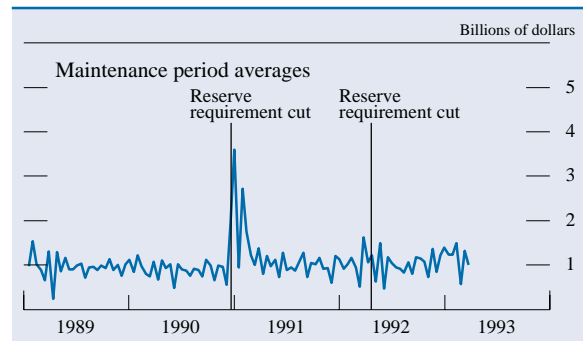
1. Computed around the maintenance period average.

With required operating balances falling below the levels needed by many depositories for daily clearing purposes, the marginal dollar of reserve demand often stemmed from clearing needs on the day, rather than from a reserve requirement averaged over two weeks. As a result, banks had less scope for manipulating their reserve positions from one day to the next and, consequently, for arbitraging anticipated intraperiod variations in the cost of reserves. Not surprisingly, a variety of measures of federal funds rate volatility posted significant increases (chart 7). At the same time, many depositories held levels of excess reserves that greatly exceeded those seen in comparable periods of recent years in order to restock their depleted overdraft protection (chart 8). Because the extent to which banks wanted to boost their holdings of excess reserves was unknown to the Federal Reserve, it became more difficult to estimate the demand for reserves and, thus, to conduct open market operations.

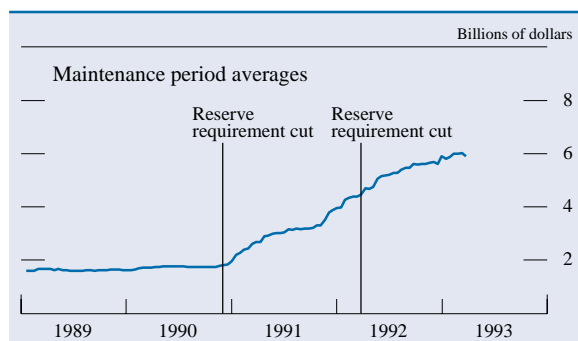
Transition to a More Orderly Reserve Market

Over the next few months, reserve market conditions returned to normal, with both excess reserves and the volatility of the funds rate falling back more or less to levels seen before the cut in reserve requirements. Although the reasons for the more stable reserve market climate varied, the rapid rebuilding of required operating balances was probably the most important. The higher level of balances provided banks with more adequate overdraft protection and greater flexibility in managing their reserve positions, thus reducing the need for excess

8. Excess reserves, 1989–March 31, 1993



9. Required clearing balances, 1989–March 31, 1993



balances and providing additional leeway for arbitrage in the funds market.

The pronounced rebound in required operating balances over the remainder of 1991 owed in part to a surge in required reserves stemming from rapid growth in transaction deposits. Furthermore, deliberate efforts by depositories to hold additional balances also played a role in the faster-than-usual increase in required operating balances. For example, banks used clearing balances much more after the cut in reserve requirements (chart 9). Evidence also suggests that some banks sought to economize on their vault cash holdings to boost their required reserve balances. In addition, depositories may have learned to manage their reserve accounts more efficiently, making use of improved, real-time information on the status of their reserve balances throughout the day to lower the cushion they needed to hold as insurance against uncertain debits that can result in overdrafts.

The Cut in the Transaction Requirement

With the reserve market functioning reasonably well again, the Federal Reserve believed that it could safely lower reserve requirements once more. As it turned out, the cut in the transaction requirement in April 1992 was relatively uneventful. Although required operating balances initially dropped sharply, the decline was not nearly as precipitous as that seen in early 1991; not only was this cut smaller in terms of its effect on required reserve balances, it also came at a time of the year when these balances tend to be high because of the buildup of transaction deposits in anticipation of the April 15 tax date. Moreover, required operating

balances quickly made up all their lost ground, spurred by continued rapid growth in required reserves and another surge in the use of clearing balances. Indeed, these balances now total about \$6 billion, or more than three times their level before the first cut in reserve requirements; they now make up nearly 20 percent of required operating balances versus about 5 percent in late 1990.

The Federal Reserve also made several changes in reserve accounting rules to help banks better manage their accounts in a world of lower requirements and to aid the implementation of monetary policy. First, to smooth the seasonal pattern in required operating balances, the Federal Reserve reduced the lag on the application of vault cash for use in meeting reserve requirements from two maintenance periods to one, effective in the period beginning November 12, 1992. By more closely synchronizing the movements in required reserves and applied vault cash, this change was designed to temper seasonal declines in required operating balances, particularly the most severe decline, which occurs in late January and early February. To give depositories greater flexibility in managing their reserve positions from one period to the next, the Federal Reserve also doubled the carryover privilege, which enables banks to carry forward into the next maintenance period small reserve surpluses and deficiencies.¹⁸

These changes, coupled with the rebound in required operating balances, helped prevent the cut in the transaction requirement from having adverse effects on the functioning of the reserve market or on the conduct of open market operations. In fact, most measures of the volatility of the federal funds rate are up only marginally relative to their levels before December 1990, and aggregate excess reserves are running only a shade higher than before the cuts in reserve requirements. Some evidence suggests, however, that banks do have a bit less flexibility in managing their reserve positions from day to day; in particular, some systematic patterns in the behavior of the federal funds rate within reserve maintenance periods have intensified, suggesting that banks may not have as much

18. Since September 1992, depositories have been able to carry forward one maintenance period the greater of 4 percent of required reserve plus clearing balances, or \$50,000; the carryover allowance had previously been the greater of 2 percent, or \$25,000.

scope to arbitrage in the funds market as they once did.¹⁹

Concerned that additional declines in required operating balances would complicate reserve management and the conduct of open market operations, the Federal Reserve has not made further cuts in reserve requirements. Nevertheless, owing to the cuts it did make as well as to declines in short-term interest rates, the reserve tax has been falling sharply in recent years (chart 1). Consequently, the marginal tax rate on transaction deposits has dipped to its lowest level in thirty years (chart 2). Even so, this tax still represents a burden on the private sector, and one that could rise significantly if interest rates were to increase. Cognizant of the actual and prospective burden of the reserve tax, depositories continue to work to fashion financial products aimed largely at exploiting loopholes in reserve regulations.

POTENTIAL REFORMS TO THE CURRENT SYSTEM

Several suggestions have been put forth over the years for reforming the system of reserve requirements. In this section, I review some of these proposals, drawing heavily on the lessons learned from the recent cuts in reserve requirements as well as from the experiences of other countries that have lowered reserve requirements in recent years.

Eliminate Reserve Requirements

Although this proposal would clearly eliminate the reserve tax, recent experience suggests that it would also engender a significant increase in volatility in the reserves market and seriously complicate the conduct of open market operations. Moreover, absent reserve requirements, the Federal Reserve would be unable to reinstitute an effective,

reserves-oriented targeting procedure to control money growth if it ever deemed this action appropriate.

Recent Trends in Other Countries

Several other countries have significantly reduced, and in some cases essentially eliminated, reserve requirements in recent years. In the United Kingdom and Switzerland, for example, reserve requirements no longer effectively constrain bank behavior. In these countries, most banks find that their required reserves fall short of their daily clearing needs, so that at the margin the latter essentially determine their demand for reserves. More recently, Canada has also begun to phase out reserve requirements, and by 1994, their requirements will be completely eliminated.

These countries have taken different steps, based on their own unique institutional structures, to facilitate bank reserve management and the conduct of open market operations in a world of non-binding reserve requirements. The Bank of England (BOE), for example, has adopted a more flexible operating procedure, often intervening in the money markets several times a day to fine tune the cost and availability of reserves to meet ever-changing clearing needs. In addition, banks in the United Kingdom are usually willing to borrow from the BOE late in the day to meet their clearing needs. Banks in the United States, by contrast, have become increasingly reluctant in recent years to avail themselves of Federal Reserve discount window credit, in part out of concerns that doing so might be interpreted by market participants as a sign of financial weakness. Even so, the volatility of overnight interest rates in the United Kingdom has tended, on average, to be somewhat higher than that in the United States, where reserve requirements are still binding for many institutions.

The Swiss National Bank (SNB) has adopted a different approach than the BOE. Although it now places somewhat greater emphasis on smoothing short-term interest rates than it did in the past, it has been much less accommodative in offsetting temporary fluctuations in clearing needs than has the BOE. As a result, Switzerland has experienced greater volatility in overnight rates than the United Kingdom, and Swiss banks have chosen to hold substantial excess reserves, in part because over-

19. Specifically, the federal funds rate has tended to be lower on Fridays, when reserves count three times in the calculation of a bank's period-average position; depositories are apparently more reluctant to build up their reserve balances on these days for fear that they will be unable to work them off later in the period without jeopardizing their overdraft protection. On settlement days, by contrast, the funds rate has tended to be higher, as banks move more aggressively to meet their reserve requirements. The persistence of systematic, intraperiod patterns in the funds rate suggests that arbitrage opportunities are not being fully exploited.

night overdrafts are prohibited. At the same time, however, the ability of Swiss banks to access SNB credit at their own discretion, albeit at a penalty rate, has likely served to temper reserve market volatility somewhat.

Although the jury is still out on the full ramifications of Canada's elimination of reserve requirements, which is in the process of being phased in, the Bank of Canada (BOC) feels that its financial system is amenable to functioning smoothly in the absence of reserve requirements. Specifically, Canada's system is highly concentrated, with a handful of large depositories controlling the lion's share of financial assets and handling the vast majority of financial transactions. These "direct clearers" will be required to clear all transactions through reserve accounts at the BOC, and although they will have no reserve requirements, they will be penalized if their reserve accounts are overdrawn. Thus, a demand for reserve liabilities at the central bank will be preserved, thereby enabling the BOC to implement monetary policy by manipulating the supply of reserves relative to this demand. Because the number of direct clearers is so small, moreover, the BOC can readily gauge the demand for clearing balances simply by keeping in close contact with the relevant banks. Finally, the BOC is also able to adjust the supply of reserves late in the day by moving government deposits between accounts in commercial banks and accounts at the BOC, thereby helping to mitigate volatility in the reserves market.

Other central banks, such as the Bundesbank and the Bank of Japan (BOJ), which operate in financial environments more akin to those found in the United States, have not eliminated reserve requirements. Echoing arguments made by the Federal Reserve, both the Bundesbank and the BOJ believe that reserve requirements are essential for providing the stable, predictable demand for reserves that is needed for the conduct of open market operations and the prevention of undesirable money market volatility. Thus, although the Bundesbank has pared reserve requirements in recent years, these requirements are still binding for most German banks.

Overall, based on the recent experience in the United States and the experiences of other countries, it seems clear that the Federal Reserve would have to alter its other tools of monetary policy

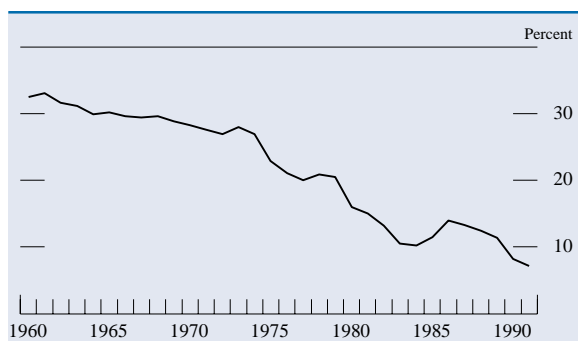
dramatically if it eliminated reserve requirements. In particular, to preserve its ability to conduct open market operations, it would have to ensure that depositories still had a demand for reserve liabilities at the Federal Reserve. To this end, it would likely have to require at least some depositories to clear their financial transactions through the Federal Reserve and to continue to subject them to penalties for overnight overdrafts. At the same time, it would probably also have to do something to make depositories less reluctant to use the discount window as a safety valve to defuse reserve market pressures. Even so, volatility in the money market is likely to rise significantly, and the Federal Reserve's ability to achieve desired reserve market conditions might be undermined as a result of the difficulty in gauging the banking system's demand for reserves.

Pay Interest on Required Reserve Balances—the Preferred Solution

Paying interest on reserves is a preferable alternative to eliminating reserve requirements. Specifically, if the Federal Reserve paid a market-based rate of interest on required reserve balances, the reserve tax would essentially be eliminated, as would the distortional effects of this tax on resource allocation. Households and businesses would not face an artificially imposed incentive to redirect credit flows away from depositories. Furthermore, depositories would no longer have an incentive to devote resources to new methods of reserve avoidance. If required reserve balances earned interest, moreover, the Federal Reserve could even raise reserve requirements if it wanted to provide banks with greater flexibility in managing their reserve positions, reduce volatility in the money markets, and simplify the conduct of open market operations, without having to worry about imposing a tax on the private sector.²⁰

20. An alternative proposal would have the Federal Reserve raise reserve requirements and pay interest only on the increased balances depositories were required to hold. Though this plan would not reduce Treasury revenue, it would also not do anything to reduce the deleterious effects of the current reserve tax. For details on this proposal, see Spence Hilton, Melissa Gerdtz, and Roxann Robinson, "Paying Interest on Reserves," in Federal Reserve Bank of New York, *Reduced Reserve Requirements: Alternatives for the Conduct of Monetary Policy and Reserve Management* (New York: FRBNY, 1993).

10. Required reserve balances as a percentage of total Federal Reserve liabilities, year-end, 1960–91



In the past, proposals to pay interest on required reserve balances have encountered resistance largely because they would reduce the earnings remitted by the Federal Reserve to the Treasury. Required reserve balances have been declining as a share of total Federal Reserve liabilities for years, however, and now make up only about 7 percent of the total (chart 10). As a result of this decline, which owes to reductions in reserve requirements as well as to relatively rapid growth of currency in circulation, the payment of interest on required reserve balances would now engender a relatively smaller reduction in the amount of Federal Reserve earnings remitted to the Treasury than ever before. In addition, it had often been argued in the past that the reserve tax on the depository system and its customers was more than offset by the government-backed deposit insurance program, which provided a subsidized, implicit government guarantee that conferred an advantage on depositories in their competition with other financial intermediaries. More recently, however, the price of this government guarantee has risen substantially. Not only have deposit insurance premiums been raised sharply, but capital requirements for depositories have been increased, more stringent standards for interbank lending have been imposed, and certain restrictions on deposit pricing have resurfaced. Taken together, these changes have served to increase the costs of intermediation through the depository system. Partly as a result of these increased costs, the share of new credit flows intermediated through the depository system has fallen dramatically in recent years. Although many of the credits formerly booked by banks and thrift institutions have been picked up by other intermediaries

or have been channeled directly through the capital markets, with little attendant effect on the cost or availability of credit to most borrowers, some credits that are less easily substitutable, such as loans to small and medium-sized businesses, may have been curtailed, at least partly as a result of the increases in depository intermediation costs. Thus, it may be these borrowers who ultimately pay much of the price of the higher, government-mandated costs on depositories. Paying interest on required reserve balances would be one way of offsetting some of these higher costs.

APPENDIX: SUMMARY OF RESERVE REQUIREMENTS SINCE 1913

The tables in this appendix summarize changes in required reserve ratios since the inception of the Federal Reserve System in 1913.

Three major structures of reserve requirements have been used since 1913. The first two, which preceded passage of the Monetary Control Act of 1980, applied reserve requirements only to banks that were members of the Federal Reserve System. The first structure was based on geographic distinctions among member banks (table A.1). From 1913 to 1962, reserve requirements of member banks varied depending on whether the bank was located in a central reserve city, a reserve city, or elsewhere. In 1962, the authority of the Federal Reserve to classify or reclassify cities as central reserve cities was terminated.

In 1966, the Federal Reserve moved toward the next structure, involving graduated reserve requirements based on the level of deposits at each bank. Each deposit interval shown in table A.2 represents that part of the deposits of each bank that was subject to the reserve requirement shown. For example, in July 1966, the first \$5 million of time deposits at banks was subject to a 4 percent requirement; each additional dollar of time deposits was reservable at 5 percent. By 1972, a full-fledged graduated reserve requirement schedule was put in place, without regard to reserve city or country bank designations (table A.3).

Another change in reserve regulations involved the definition of “net” demand deposits (tables A.1 and A.2). In 1935, net demand deposits were defined as total demand deposits minus cash items in the process of collection and demand balances

A.1. Reserve requirements based on geographic distinctions among member banks, 1913–66

Percent of deposits

Effective date	Net demand deposits			Time deposits (all classes of banks)
	Central reserve city banks	Reserve city banks	Country banks	
1913—December 23	18	15	12	5
1917—June 21	13	10	7	3
1936—August 16	19.5	15	10.5	4.5
1937—March 1	22.75	17.5	12.25	5.25
May 1	26	20	14	6
1938—April 16	22.75	17.5	12	5
1941—November 1	26	20	14	6
1942—August 20	24			
September 14	22	↕	↕	↕
October 3	20			
1948—February 27	22			
June 11	24	↕	↕	↕
September 24, 16	26	22	16	7.5
1949—May 5, 1	24	21	15	7
June 30, July 1	↕	20	14	6
August 1	↕	20	13	6
August 11, 16	23.5	19.5	12	5
August 18	23	19	↕	↕
August 25	22.5	18.5	↕	↕
September 1	22	18	↕	↕
1951—January 11, 16	23	19	13	6
January 25, February 1	24	20	14	↕
1953—July 9, 1	22	19	13	↕
1954—June 24, 16	21	19	13	5
July 29, August 1	20	18	12	↕
1958—February 27, March 1	19.5	17.5	11.5	↕
March 20, April 1	19	17	11	↕
April 17	18.5	17	↕	↕
April 24	18	16.5	↕	↕
1960—September 1	17.5	↕	↕	↕
November 24	17.5	↕	12	↕
December 1	16.5	↕	↕	↕
1962—July 28	↕	↕	↕	↕
October 25, November 1	↕	↕	↕	4

In this table and in table A.2, when two dates appear on the same line, the first applies to the change at central reserve city banks and the second applies to the change at country banks.

The appendix continues on page 588.

due from other depositories. In 1969, reserves also began to be required against net balances due from domestic offices to their foreign branches.

From June 21, 1973, through December 11, 1974, under the structure of graduated reserve requirements, member banks were subject to varying marginal reserve requirements against increases in the following: (1) time deposits of \$100,000 or more; (2) funds obtained through issuance by any affiliate of the bank of obligations subject to reserve requirements on time deposits; and (3) funds from sales of finance bills (table A.3). The requirements applied only to balances above a specified base:

They were not applicable to banks having aggregate obligations of these types of less than \$10 million.

Beginning November 2, 1978, a supplementary reserve requirement of 2 percent was added to the existing requirements on time deposits in excess of \$100,000 and for certain other liabilities. This supplementary requirement was eliminated with the maintenance period beginning July 24, 1980. Also, effective with the reserve computation period beginning November 16, 1978, domestic deposits of Edge corporations were subject to the same reserve requirements as member banks.

A.2. Reserve requirements based on geographic distinctions among member banks and on the level of deposits, 1966-72

Percent of deposits

Effective date	Net demand deposits				Time deposits (all classes of banks)		
	Reserve city banks (deposit intervals in millions of dollars)		Country banks (deposit intervals in millions of dollars)		Savings	Other time (deposit intervals in millions of dollars)	
	0-5	More than 5	0-5	More than 5		0-5	More than 5
1966—July 14, 21	16.5	16.5	12	12	4	4	5
September 8, 11	↑	↑	↑	↑	4	4	6
1967—March 2	↓	↓	↓	↓	3.5	3.5	↑
March 16	↓	↓	↓	↓	3	3	↓
1968—January 11, 18	↓	17	↓	12.5	↑	↑	↓
1969—April 17	17	17.5	12.5	13	↓	↓	↓
1970—October 1	17	17.5	12.5	13	↓	↓	5

A.3. A graduated reserve requirement schedule for member banks, 1972-80

Percent of deposits

Effective date	Net demand deposits (deposit intervals in millions of dollars)					Time and savings deposits						
						Savings	Time (deposit intervals in millions of dollars)					
	0-5, by maturity			More than 5, by maturity								
	0-2	2-10	10-100	100-400	More than 400		30-179 days	180 days to 4 years	4 years or more	30-179 days	180 days to 4 years	4 years or more
1972—November 9	8	10	12	16.5	17.5	3	3	3	3	5	5	5
November 16	↑	10	12	13	17.5	↑	↑	↑	↑	↑	↑	↑
1973—July 19	↓	10.5	12.5	13.5	18	↓	↓	↓	↓	↓	↓	↓
1974—December 12	↓	10.5	12.5	13.5	17.5	↓	↓	↓	6	3	3	3
1975—February 13	7.5	10	12	13	16.5	↓	↓	↓	↑	↑	↑	3
October 30	↑	↑	↑	↑	↑	↓	↓	1	↑	↓	↓	1
1976—January 8	↓	↓	↓	↓	↓	↓	↓	2.5	↑	↑	2.5	↑
December 30	7	9.5	11.75	12.75	16.25	↓	↓	2.5	↓	↓	2.5	↓

A.4 Reserve requirements since passage of the Monetary Control Act of 1980

Percent

Effective date	Net transaction accounts	Nontransaction accounts
1980—November 13	12	3
1990—December 26	12	0
1992—April 2	10	0

Effective with the maintenance period beginning October 25, 1979, a marginal reserve requirement of 8 percent was added to managed liabilities in excess of a base amount. These liabilities included large time deposits, Eurodollar borrowings, repurchase agreements against U.S. government and agency securities, and federal funds borrowings from nonmember institutions. This marginal requirement was raised to 10 percent on April 3, 1980, lowered to 5 percent on June 12, 1980, and then eliminated altogether on July 24, 1980.

Since passage of the Monetary Control Act in November 1980, after an initial phase-in period, all depository institutions have been subject to reserve requirements. Required reserve ratios are the same for all depository institutions under the current system and apply to transaction accounts and nontransaction accounts (table A.4). Transaction accounts include all deposits on which the account holder is permitted to make withdrawals by negotiable or transferable instruments, payment orders of withdrawal, and telephone and preauthorized transfers (in excess of three per month) for the purpose of making payments. The reserve requirements on transaction accounts shown in table A.4 apply only to those accounts that exceed the exemption and the low reserve tranche, the cutoffs for which adjust each year according to a formula provided by law. In 1993, for example, the first \$3.8 million of transaction accounts at each depository is exempt from reserve requirements and the next \$46.8 million is reservable at 3 percent. Only deposits in excess of this low reserve tranche are reservable at 10 percent. For the purposes of reserve requirements, nontransaction accounts include nonpersonal time and savings deposits that are not transaction accounts and in which the beneficial interest is held by a depositor that is not a natural person, as well as net borrowings by banks in the United States from banks outside the country.

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