Kenneth D. Garbade

Origins of the Federal Reserve Book-Entry System

- In the mid-1960s, U.S. Treasury securities were represented by physical certificates setting forth the government's promises to pay interest and principal on the debt.
- The costs and risks associated with safekeeping and transferring bearer Treasury securities had become so large that market participants sought more efficient ways to manage the securities.
- In response, the U.S. Treasury and the Federal Reserve in 1966 began to convert Treasury securities to book-entry, or nonphysical, form.
- The conversion was driven by the interest of the Reserve Banks and Treasury in lowering their operating costs and risks, the desire of the Reserve Banks and Treasury to preserve market liquidity, and the goal of the Reserve Banks to prune member bank operating costs.
- The book-entry system that emerged led to a Treasury market with sharply lower operating costs and risks.

1. Introduction

It is difficult to imagine the modern Treasury securities market operating in the absence of a book-entry system. Nevertheless, as recently as the mid-1960s, the U.S. government's promises to pay interest and principal were evidenced exclusively by engraved certificates setting forth the promises in writing. That practice changed in 1966, when Treasury securities began to be converted to book-entry, or nonphysical, form. The conversion, completed over two decades (see time line on next page), led to a market with sharply lower operating costs and risks.

This article examines the origins and early development of the Federal Reserve's book-entry system—the system most closely associated with the elimination of definitive, or certificated, Treasury securities. We suggest that the Fed's system was the product of three important factors: the desire of the Reserve Banks and the U.S. Treasury to reduce their operating costs and risks, the interest of the Reserve Banks and the Treasury in preserving the liquidity of the Treasury market, and the goal of the Reserve Banks to decrease member bank operating costs.

Despite the significance of these factors, the early history of the book-entry system suggests that the mere prospect of greater efficiency may not always suffice to bring about rapid change that requires coordination among diverse market

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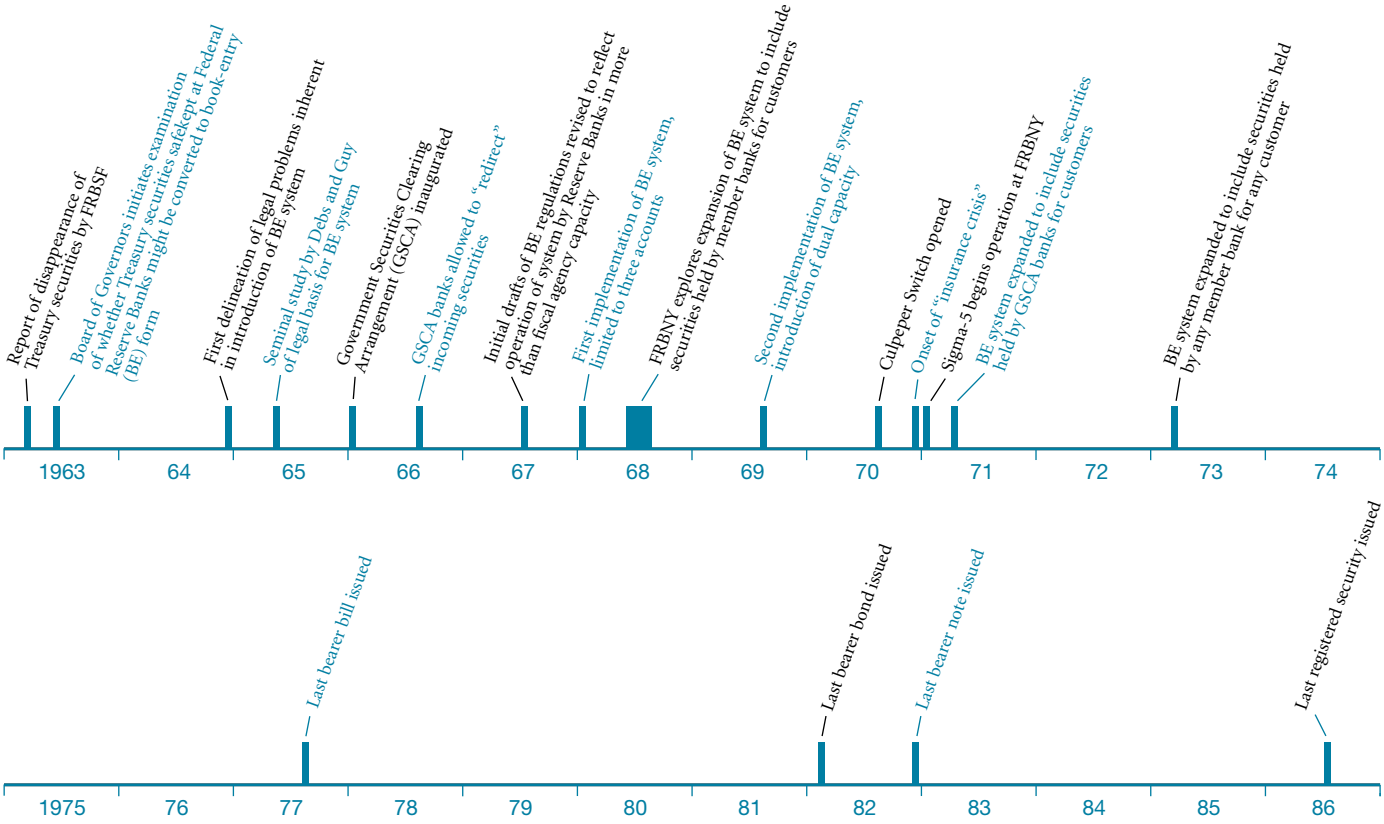
The Early Development of the Federal Reserve Book-Entry System



participants. The pace of change may also depend on incidents that focus attention, provide motivation, and create a commonality of interests. Two such "shocks" spurred the development of the book-entry system. The first, a loss of $7.5 million of Treasury securities at a Federal Reserve Bank in 1962, provided the initial impetus for a limited system designed to reduce the costs and risks of custodial services already provided by the Reserve Banks. The second, an "insurance crisis" that threatened to impair the liquidity of the Treasury market in 1970-71, injected a sense of urgency into expanding the system to include securities that were not safekept at Reserve Banks. The repercussions of these two incidents were critical factors in motivating market participants to move from definitive to book-entry securities as quickly as they did.

The article proceeds as follows. In Section 2, we describe the ownership and transfer of definitive Treasury securities prior to 1966. Section 3 presents the origins of an important early-stage book-entry system: the Government Securities Clearing Arrangement (GSCA), sponsored by the Federal Reserve Bank of New York. Finally, the development of the larger, Systemwide book-entry system is explained in Sections 4 and 5.

2. Ownership and Transfer of Definitive Treasury Securities

As of the early 1960s, definitive Treasury bonds came in two forms: bearer and registered. Outside of residual quantities of three dozen issues due to mature before the end of 2016, neither form exists today. This section describes the two forms and explains why secondary-market transactions were usually settled with bearer bonds.[1]

2.1 Bearer Bonds

A bearer bond consisted of a "corpus," or main body, stating the government's promise to pay principal and interest, and a series of detachable coupons, each of which was a claim to an interest payment on a specific date. The government's promises ran to whomever held the bond, that is, to the bearer; a bondholder could transfer ownership of his claims by physical delivery of the bond. Bearer bonds were issued in a

variety of denominations. A bondholder could effect a denominational exchange by tendering, for example, one $100,000 bond to the Treasury or a Federal Reserve Bank and requesting ten $10,000 bonds. (As described in Box 1, Federal Reserve Banks acted as "fiscal agents" of the United States when they undertook activities such as denominational exchanges of bearer Treasury bonds.)

Since the Treasury had no way of knowing who held a bearer bond when a payment on the bond came due, it could not disburse the payment on its own initiative; it had to wait until the holder asserted a claim. To claim an interest payment, a holder detached the appropriate coupon and sent it, through the banking system, to a Federal Reserve Bank for collection. When the bond matured, the holder asserted his claim for payment of principal by sending the corpus for collection.

2.2 Registered Bonds

A bond was said to be registered if the government's promise to pay principal and interest ran to a person whose name and address were recorded with the Treasury. There was an engraved certificate associated with a registered bond, on the face of which the name of the owner appeared, but it served primarily as a device for effecting change in the record of

Box 1

Federal Reserve Banks as Fiscal Agents of the United States

Section 15 of the Federal Reserve Act provides that the cash balances of the federal government "may, upon the direction of the Secretary of the Treasury, be deposited in Federal reserve banks, which banks, when required by the Secretary . . . shall act as fiscal agents of the United States." Prior to 1913, the Treasury received, carried, and disbursed public funds through nationally chartered banks and through an "Independent Treasury" system that had been in place since 1846. Section 15 reflected the conclusion of Congress and other observers that the system did not meet the needs of the country.[a] On November 23, 1915, Treasury Secretary William McAdoo appointed the twelve Federal Reserve Banks as depositaries and fiscal agents, effective January 1, 1916, and authorized them to accept deposits of public funds and to pay checks written on those deposits, "as well as [to perform] any other services incident to or growing out of the duties and responsibilities of fiscal agents."[b]

Although the principal focus of Section 15 was the role of the Reserve Banks as providers of payment services to the federal government,[c] during World War I the Banks began to provide a variety of debt-related services as fiscal agents. They acted as administrative centers for the Liberty Loan committees set up to market Liberty bonds and Victory notes, they received subscriptions for new securities, and they accommodated requests for denominational exchanges. Additionally, they acted as agents for the sale and redemption of short-term certificates of indebtedness.[d] (The Reserve Banks continue to this day to act as fiscal agents of the United States in the sale and redemption of Treasury bills, notes, and bonds. Manypenny and Bermudez [1992] provide a recent overview of payment-related and debt-related services of the Federal Reserve Banks as depositories and fiscal agents.)

World War I also saw the beginning of what became the Treasury Tax and Loan system. Proceeds from sales of Treasury securities were retained by commercial banks in War Loan Deposit Accounts (rather than transferred to Treasury accounts at Federal Reserve Banks) in order to avoid draining reserves from the private banking system. The banks were required to pledge assets to ensure repayment. The pledged assets were held at Federal Reserve Banks acting as fiscal agents of the United States.[e]

[a] See Kinley (1910) and Chapman (1923, pp. 27-41).

[b] Federal Reserve Board (1915) and U.S. Department of the Treasury (1917, p. 6). Congress discontinued the Independent Treasury system in 1921.

[c] See, for example, the discussion in Committee on Banking and Currency (1913, pp. 27-9).

[d] Federal Reserve Bank of New York (1919, 1922) and Chapman (1923, pp. 70-104).

[e] Treasury Department Circular no. 92, Division of Public Moneys, "Special Deposits of Public Moneys," April 17, 1919, Chapman (1923, pp. 150-63), and U.S. Department of the Treasury (1927, pp. 114-5). The origin and development of the Treasury Tax and Loan program are sketched in Federal Reserve Bank of Dallas (1973), Lovett (1978), and Lang (1979).

ownership. An investor who wanted to convey a registered bond to a new owner inscribed the re-registration instructions on the back of the bond and sent it to the Treasury. The Treasury would then change its records and issue a new certificate to the new owner.

The Treasury's records were the locus of a bondholder's claim to the payments on a registered bond. Because it knew the name and address of the owner, the Treasury could send checks for periodic interest payments directly to the owner on its own initiative, without requiring tender of coupons. It could have done the same for the principal payment, but instead required tender of the certificate as a way to recover matured certificates.

2.3 Advantages and Disadvantages of Bearer and Registered Bonds

Investors could hold bonds in either bearer or registered form, and they could exchange one form for the other. Each form had advantages and disadvantages. Bearer bonds could be transferred readily but had to be kept safe from loss, destruction, and theft. Institutional owners typically contracted with commercial banks for custodial services. Holders of bearer bonds, or their custodial agents, also had to clip and send in for collection the coupons on the bonds. This process was surprisingly expensive for banks that had to clip and collect coupons from thousands of bonds.[2]

Matters of safekeeping, transport, and payment were simpler for registered bonds. The bonds could be replaced if they were lost, stolen, or destroyed, so it was less important to provide exceptionally secure safekeeping. Additionally, the Treasury paid interest on the bonds without requiring tender of coupons. However, changing the record of ownership of a registered bond was a time-consuming process, and the Treasury did not allow transfers during the thirty days preceding an interest payment.

2.4 Treasury Bills

A Treasury bill is a promise of the U.S. government to pay a specified amount on a specified maturity date. Treasury bills mature in no more than one year following issue and do not pay any coupons, either prior to or at maturity. Definitive bills were issued only in bearer form. Like bearer bonds, bills were available in a variety of denominations, had to be presented for payment, and had to be protected against loss, destruction, and theft.

2.5 Settling Purchases and Sales of Definitive Treasury Securities

Prior to 1966, as now, investors valued Treasury securities for their liquidity as well as for their creditworthiness. Many institutional investors kept their bonds in bearer form so that the bonds could be delivered quickly in the event of sale; in the early 1960s, more than 90 percent of marketable Treasury debt was held in bearer form.[3] Treasury bills were never made available in registered form because there was hardly any demand for a short-term security that could not be transferred quickly.

Investors typically settled secondary-market transactions by transferring bearer securities from one custodial bank to another. The process of transferring securities within a city started when a seller ordered its custodial bank to deliver securities to another custodial bank for deposit to a buyer's account. The seller's bank removed the securities from the seller's account (literally taking engraved certificates out of a vault), verified the count, and packaged the securities for delivery. A messenger carried the securities to the buyer's bank and received a receipt and possibly a check for payment. (Payment could also be effected by a separate wire transfer of funds.) The buyer's bank counted the securities, verified the count, credited the buyer's account, and placed the certificates in a vault. The whole process took at least two hours from start to finish.[4]

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case, the securities could be moved by a Commissioner of Public Debt (CPD) transfer—another fiscal agency function of the Reserve Banks.

Suppose, for example, Irving Trust Company (a New York clearing bank for nonbank dealers in the 1960s) wanted to transfer bearer bonds to Bank of America in San Francisco to settle a sale of the bonds by a dealer that cleared through Irving. On instructions from the dealer, Irving would withdraw the bonds from the dealer's account and deliver them to the Federal Reserve Bank of New York with instructions to have the bonds credited to the Federal Reserve Bank of San Francisco for Bank of America's account. The New York Fed would add the bonds to the inventory of unissued securities that it held as a fiscal agent of the United States and send a wire notice to the San Francisco Fed to remove a comparable quantity of the same bonds from the inventory that it held as fiscal agent and deliver the bonds to Bank of America. (Box 2 describes the private wire system used to send messages between Reserve Banks.) Irving could request delivery of the bonds against payment (in which case, the San Francisco Fed would debit Bank of America's reserve account for the invoice price and advise the New York Fed to credit Irving's account for the same amount) or Irving could ask for delivery free of payment (in which case, it would arrange some other way for Bank of America to pay for the bonds).[5]

CPD transfers converted bearer securities in one city into a like amount of securities in another city without physically moving the securities; they essentially eliminated the geographic separation of buyers and sellers in different cities. In 1965, a Reserve Bank charged a flat fee of $5 for each CPD transfer.[6] This fee was comparable to the cost of registered mail (about 20 cents per $1,000) for transfers of $25,000; it was less than the cost of registered mail for larger transfers. However, CPD transfers did nothing to reduce the costs of safekeeping bearer securities, and they did nothing to reduce the costs of transferring securities within a city.

2.6 The Costs of Safekeeping and Transferring Bearer Securities

It is useful to preface our examination of the Fed book-entry system's emergence after 1965 by summarizing the economic incentives for the system:

- Safekeeping bearer securities required expensive vault space and trustworthy workers to clip coupons.
- Transferring bearer securities required counting and re-counting the securities, as well as reliable messengers to deliver the securities.
- Bills and bearer bonds were liable to be lost or stolen, so custodians had to insure themselves against loss.

Box 2
The Federal Reserve Private Wire System

The Federal Reserve private wire system was inaugurated on June 7, 1918, to facilitate telegraphic communication between the twelve District Federal Reserve Banks, the Federal Reserve Board, and the Department of the Treasury. The wire system accommodated an expansion in Federal Reserve System messages that followed the initiation of Federal Reserve clearing and collection of commercial bank checks in mid-1916 and the growth of Treasury financing operations during World War I. (System messages had previously been sent by commercial telegraph.) Message volume was expected to increase further in July 1918, when the frequency of inter-District settlements was to change from weekly to daily.[a]

The private wire system was upgraded several times as a result of technological developments and growth in message volume. A scarcity of telegraph operators in the late 1920s led to the gradual adoption of teletype machines and the replacement of telegraphers with less expensive typists.[b] In July 1953, the system underwent a major upgrade when the manual teletype system was replaced with a perforated paper tape system configured around a semi-automatic switching center in Richmond, Virginia.[c] The paper tape system lasted until 1970, when continued growth in the volume of money and securities transfers prompted the Fed to upgrade again, this time to a fully automatic computer-based system built around a switching center in Culpeper, Virginia.[d] In early 1971, the Federal Reserve Bank of New York installed a new computer, the Sigma-5, to interface with the Culpeper Switch and to maintain the cash and securities accounts of member banks in the Second District.[e] The Culpeper Switch and the Sigma-5 remained in use beyond the end of the time period examined in this article.

[a] Smith (1956, pp. 11-24).

[b] Smith (1956, pp. 32-5).

[c] Smith (1956, pp. 44-7), Federal Reserve Bank of Richmond (1960), and Vollkommer (1970, pp. 23-5).

[d] Vollkommer (1970, pp. 26-8), Hoey and Vollkommer (1971, pp. 23-4), and Board of Governors of the Federal Reserve System (1975).

[e] Federal Reserve Bank of New York (1972a, 1972b, 1984).

By the mid-1960s, the costs of safekeeping and transferring bearer Treasury securities had become so large that market participants began to seek better ways of holding and transferring ownership of the government's promises. The rise

in costs was attributable to two factors: steady growth in the total amount of marketable Treasury debt outstanding and an increasing concentration of that debt at short and intermediate maturities (Chart 1). Short- and intermediate-term debt tended to be held by investors who had relatively volatile cash needs and who bought and sold securities more frequently than those with longer investment horizons who bought long-term bonds. Chart 2 shows that average daily trading volume by reporting dealers rose from about $1.4 billion in 1958 to approximately $1.75 billion between 1962 and 1964.

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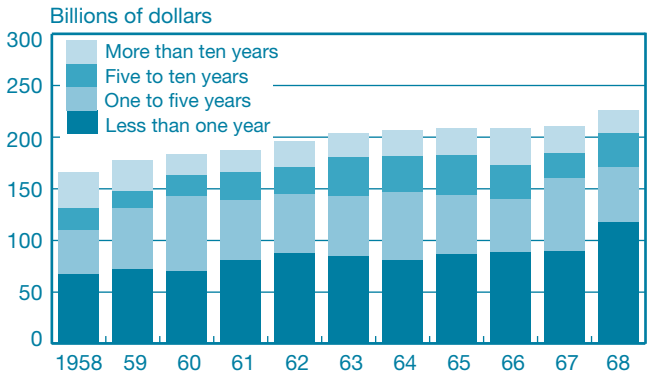
Reliable data on safekeeping costs in the mid-1960s are not available. However, Manypenny (1986, p. 29) reports that the cost of safekeeping a bearer municipal bond in the mid-1980s was about $6 per year, and that safekeeping costs for bearer Treasury bonds in the mid-1960s were comparable. There are, of course, no data on book-entry costs for the mid-1960s, but Manypenny (p. 29) reports that the cost of safekeeping a book-entry Treasury security in the mid-1980s was about $1.50 per year. The prospect of anything remotely similar to a 75 percent reduction in safekeeping costs would have provided a powerful incentive to develop a book-entry system.

Chart 1
Marketable Treasury Debt, 1958-68



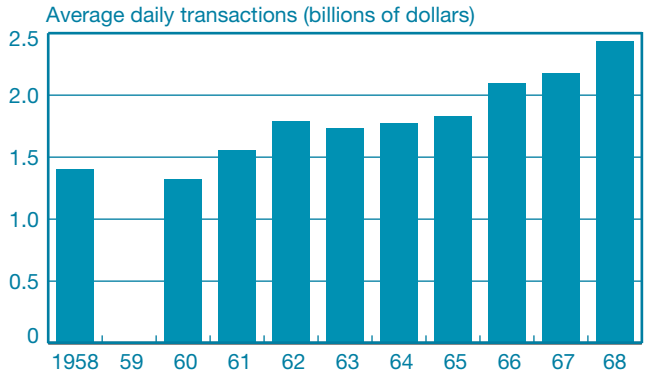
Source: Statistical appendix to *Annual Report of the Secretary of the Treasury for the Fiscal Year Ended June 30, 1968*, p. 74.

3. The Government Securities Clearing Arrangement

The Federal Reserve Bank of New York participated in a disproportionate share of all CPD transfers because many of the largest Treasury dealers, and many of the largest custodial banks, were located in New York. As a result, the New York Fed ran a large and expensive operations department, receiving bearer securities from dealers and custodial banks for wire transfer to buyers elsewhere in the nation and delivering bearer securities pursuant to wire transfers from sellers outside New York. As the volume of trading in Treasury securities rose, the New York Fed developed a growing interest in innovative arrangements that might reduce the costs of CPD transfers. Hoey and Vollkommer (1971, p. 24) note that the New York Fed had been "greatly concerned about the cost . . . to itself and to the commercial banks in New York City, entailed in the physical receipt and delivery of U.S. Government securities." Davis and Hoey (1973, p. 122) observe that "from time to time [the New York Fed had] considered various proposals to reduce the substantial volume of Government securities that are delivered daily to and from the Bank . . . in connection with interdistrict telegraphic transfers of [Treasury] securities."

During the winter of 1964-65, the New York Fed proposed a novel netting plan for CPD transfers. During a business day, it would allow a member bank to request (by teletype) a CPD transfer without requiring simultaneous receipt of the securities to be transferred. It would maintain a record of the bank's requests, as well as of the messages that it received from other Reserve Banks requesting CPD deliveries to the same bank. At about 3 p.m., the New York Fed would compute the

Chart 2
Dealer Transactions in U.S. Government Securities, 1958-68



Sources: *Federal Reserve Bulletin* (various issues); Meltzer and von der Linde (1960, p. 58).

Note: See also "Statistics on the Government Securities Market," *Federal Reserve Bulletin* 47, no. 4, April 1961, pp. 397-404.

bank's net transfers in each outstanding Treasury issue and request that the bank settle up by delivering or receiving bearer securities.[7] This plan, the Government Securities Clearing Arrangement, was viewed as likely to reduce by as much as 80 percent deliveries of the bearer securities required to settle CPD transfers.[8] It was, for all practical purposes, an intraday book-entry system. Two New York Fed officials later noted that "the establishment of the [GSCA] represented a major departure from the time-honored principle that transfers of Government securities required physical delivery to the purchaser, or his agent, of the pieces of paper representing ownership."[9] After a trial program in the second half of 1965, the GSCA was officially inaugurated in January 1966.

The [Government Securities Clearing Arrangement] was the first practical application of the concepts of book-entry ownership and transfer of Treasury securities, it gave the Federal Reserve valuable experience operating an early-stage book-entry system, and . . . it played a crucial role in resolving the "insurance crisis" of 1970-71.

The GSCA initially included only Morgan Guaranty Trust Company and Irving Trust. Six more banks joined in the second half of 1966,[10] motivated by the New York Fed's decision in August 1966 to allow banks to "redirect" incoming securities to other banks. This was a crucial innovation because it allowed a bank to use its book-entry credits to settle an unrelated delivery obligation to another bank. A New York Fed official noted that "this was . . . the first time that Government securities had been transferred between member banks . . . without physical delivery."[11] Subsequently, the GSCA was expanded to accommodate new-issue take-downs and denominational exchanges.[12]

The GSCA was important primarily because it lowered the cost of transferring ownership of Treasury securities. It was never a full-fledged book-entry system because accumulated credits and debits were eliminated every afternoon by physical delivery of bearer securities. The GSCA did not reduce the need for vault space or coupon clipping, and it did not eliminate physical delivery of bearer securities. However, the arrangement was the first practical application of the concepts of book-entry ownership and transfer of Treasury securities, it gave the Federal Reserve valuable experience operating an early-stage book-entry system, and—as we will discuss—it played a crucial role in resolving the "insurance crisis" of 1970-71.

4. Origins of the Book-Entry System

The most significant factor in the early development of the Federal Reserve book-entry system was the familiarity of the District Reserve Banks with safekeeping securities. Their experience resulted primarily from holding securities pledged by member banks as collateral on discount-window loans and against deposits of public funds, such as Treasury Tax and Loan balances. (The role of the Reserve Banks in holding securities pledged against deposits of public funds is described in Box 1.) Additionally, the Reserve Banks safekept unpledged securities owned by geographically remote member banks.[13] This service, provided free to those banks,[14] kept the securities readily accessible if a bank decided to pledge them against a loan or deposit of public funds. (Federal Reserve Banks did not safekeep securities owned by nearby banks because those banks could readily deliver securities from their own vaults and because the Reserve Banks lacked vault space.[15]) The Federal Reserve Bank of New York had particularly deep experience with safekeeping practices because it also safekept securities held for the System Open Market Account.[16] Safekeeping securities gave the Reserve Banks experience running vault facilities, hiring and retaining a trustworthy labor force, and clipping coupons, all of which made Federal Reserve officials well aware of the costs of providing custodial services.

Despite the advantages associated with the Fed's safekeeping of securities, a significant problem ultimately arose. In early 1963, the Federal Reserve Bank of San Francisco reported publicly the disappearance of $7.5 million of bearer Treasury securities sometime in mid-1962.[17] Following a Congressional investigation of the loss,[18] the Board of Governors of the Federal Reserve System asked the Conference of Presidents of the Federal Reserve Banks to examine whether Treasury securities safekept at the Reserve Banks might be converted to book-entry form.[19] The Board was interested in lowering the cost of clipping coupons and relaxing constraints imposed by limited vault space, but it was particularly interested in reducing the risk of lost or stolen securities.[20] A subcommittee of the Conference of Presidents investigated the matter and quickly concluded that a book-entry system was both "practical and desirable."[21]

4.1 Issues in Innovating a Book-Entry System

During the mid-1960s, Federal Reserve officials focused on developing institutional arrangements that would facilitate the conversion to book-entry form of definitive securities already safekept at Reserve Banks; they did not address the possibility of a larger system. However, implementing even a limited book-entry system proved to be extraordinarily difficult. Two particularly vexatious issues—first identified in December 1964 by the Subcommittee of Counsel on Fiscal Agency Operations of the Conference of Presidents and analyzed more fully in a seminal study by Richard Debs and Edward Guy of the Federal Reserve Bank of New York[22]—involved the basis for Reserve Bank operation of a book-entry system and pledges of book-entry securities.

Implementing even a limited book-entry system proved to be extraordinarily difficult. Two particularly vexatious issues . . . involved the basis for Reserve Bank operation of a book-entry system and pledges of book-entry securities.

The threshold issue was whether the Reserve Banks would operate the system in their individual capacities or as fiscal agents of the United States. The Reserve Banks were experienced holding definitive Treasury securities in both capacities. For example, a Reserve Bank acted in an individual capacity when it held securities pledged against discount-window loans, but it acted as a fiscal agent when it held securities pledged against Treasury Tax and Loan balances.

If a Reserve Bank operated a book-entry system strictly in its individual capacity, it might—like a private depository—be obliged to hold definitive securities in its vaults against its book-entry liabilities.[23] This practice would clearly limit the cost savings available from operating the system.

The need to hold definitive securities could be avoided by providing that a Reserve Bank acted as a fiscal agent of the United States when it created, carried, and extinguished book-entry Treasury securities. However, if a Reserve Bank operated a book-entry system strictly as a fiscal agent, it might have to continue to safekeep, in definitive form, unpledged securities owned by member banks and others in order to avoid conflict between its fiscal agency obligations and its custodial responsibilities to the beneficial owners of the safekept securities.[24]

Underlying the question of whether the Reserve Banks should operate a book-entry system in their individual capacities or as fiscal agents was the recognition that a book-entry system might make all but impossible a clean distinction between the two operating bases. One early analysis observed that a book-entry system "by its very nature 'meshes' the actions which a Reserve Bank undertakes as custodian on the one hand and as fiscal agent on the other."[25] This observation suggested that the Banks might have to operate the system in some sort of hybrid capacity.

The second major issue in developing a book-entry system involved liens on Treasury securities. Liens were governed by state law and generally required expensive and time-consuming public filings to be effective against an innocent buyer of a pledged asset. However, possession by a pledgee was sufficient if the asset was a security. This resulted in important savings in creating liens on securities. Since the notion of "possession" of a book-entry security was unclear, there was a distinct possibility that a pledgee who wanted to establish a lien on a book-entry security might have to make a public filing of the lien.[26] Any such requirement would markedly reduce the attractiveness of book-entry securities,[27] but the alternative—amending numerous state laws to eliminate the need for public filings of liens on book-entry securities—was likely to be costly and time-consuming.

4.2 The Initial Implementation

In the interest of limiting the range of problems that had to be resolved, Treasury and Federal Reserve officials kept the initial implementation of the book-entry system quite narrow. The first version went into effect on January 1, 1968,[28] and provided for just three categories of deposits:[29]

1. member bank securities held for investment and deposited with a Federal Reserve Bank for safekeeping,
2. member bank securities pledged as collateral on a loan from a Federal Reserve Bank, and
3. securities pledged as collateral against federal government deposits.

Left out—at least for the time being—were securities held by member banks for trading (rather than investment) purposes, securities safekept by member banks for their customers (including securities owned by nonbank dealers), and securities held by a Federal Reserve Bank as collateral for a purpose other than to secure a Bank loan or federal government deposit.

With respect to securities included in the new system, a member bank could deposit Treasury securities (in bearer or registered form) to its book-entry accounts, withdraw securities (in bearer or registered form) from its accounts, order a transfer of book-entry securities to a book-entry account of another member bank at the same Federal Reserve Bank, or order a Commissioner of Public Debt transfer of securities held in book-entry form. Convertibility of book-entry securities to bearer and registered forms was considered a "cornerstone to the practical acceptance of the book-entry [system]."[30] (Provision for conversion of a novel form of a Treasury claim to a more familiar form was used later to enhance the acceptance of STRIPS and foreign-targeted notes.[31])

The Federal Reserve Bank of New York signaled the importance of the new system when it announced that, for the first time, it was prepared to safekeep, in its book-entry system,

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securities owned by member banks located in Lower Manhattan.[32] Just as CPD transfers had eliminated distance as a significant factor in transferring Treasury securities, the book-entry system would eliminate vault space and coupon clipping as significant factors in holding Treasuries.

The initial implementation of the book-entry system accommodated only two pledgees: a Reserve Bank (pursuant to a discount-window loan) and the United States (pursuant to a deposit of public funds). The question of whether either had to file its liens was resolved by relying on the Supremacy Clause of the United States Constitution and the doctrine of federal preemption of state law.[33] The Treasury regulation authorizing the book-entry system simply *declared* that no filing was necessary and provided that a lien could be established by making an appropriate entry in the records of the system:

> The making of such an entry shall have the effect of a delivery of definitive Treasury securities in bearer form . . . and shall effect a perfected security interest . . . in favor of the pledgee . . . . No filing or recording with a public official or officer shall be necessary to perfect the pledge or security interest.[34]

Importantly, the Treasury did not have to promulgate detailed provisions for security interests on book-entry Treasury securities because its regulation implicitly deferred to state law on all matters other than the method of perfecting a security interest.[35]

Whether the Reserve Banks would operate the book-entry system in their own capacity, as fiscal agents, or in some hybrid capacity was not clearly resolved in the first implementation. Early in the planning process, the Conference of Presidents decided that, in the interests of simplicity, the system should be operated strictly as a fiscal agency function.[36] That decision allowed the Treasury to preempt state law on security pledges. (A Reserve Bank operating a book-entry system strictly in its individual capacity could not have preempted state law on its own.) Early drafts of the Treasury regulation authorizing the system consequently spoke only of the Reserve Banks acting as fiscal agents of the United States.[37]

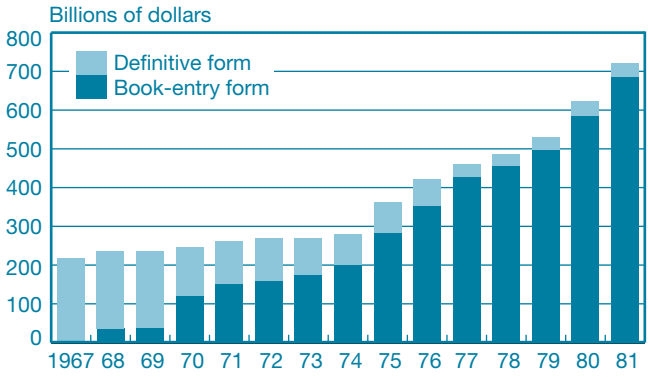
During the spring of 1967, Edward Guy, General Counsel of the Federal Reserve Bank of New York, became uneasy that discount-window loans by that Bank might not be adequately secured by pledges of book-entry securities recorded in a system operated by the Bank solely as a fiscal agent of the United States.[38] Guy also became uneasy that the Bank might be unable to fulfill its responsibilities to the beneficial owners of unpledged securities that it held in safekeeping.[39] As a result of Guy's concerns, the final version of the Treasury regulation authorizing the system provided that:

> The book-entry procedure shall apply to Treasury securities now on deposit or hereafter deposited in accounts with any Reserve Bank (1) as collateral pledged to a Reserve Bank (*in its individual capacity*) for advances by it, (2) as collateral pledged to the United States [against deposits of public funds], and (3) by a member bank … for its sole account and in lieu of the safekeeping of definitive Treasury securities by a Reserve Bank *in its individual capacity* [emphasis added].[40]

The references to individual capacity suggest that a Reserve Bank acted, at least in part, in its individual capacity when it held book-entry securities pledged against discount-window loans and when it safekept unpledged member bank securities. However, the regulation did not indicate how that assessment could be reconciled with a more specific provision that, in operating a book-entry system, a Reserve Bank acted as a fiscal agent of the United States.[41]

The first fruits of the new system were modest. In the beginning of 1968, $218 billion of marketable Treasury debt was outstanding but only $2.6 billion of bearer securities was converted to book-entry form at the Federal Reserve Bank of

Chart 3
Marketable Treasury Debt, 1967-81



Source: Ringsmuth and Rice (1984, p. 32).

New York.[42] However, as Chart 3 shows, by the end of that year the twelve Federal Reserve Banks had, in aggregate, converted to book-entry form more than 10 percent—$36 billion—of Treasury securities.

4.3 The Second Implementation

Eighteen months after the initial implementation, the Treasury and the Reserve Banks extended the book-entry system in two important dimensions.[43] First, they expanded the scope of the system beyond the original three accounts and provided that the system could be used for Treasury securities deposited for *any* purpose in additional accounts maintained by the Reserve Banks.[44]

Second, the Treasury extended the scope of its preemption of state law on security interests to include *all* pledgees of book-entry Treasury securities.[45] This action enabled the Federal Reserve Bank of New York to include securities held for the System Open Market Account and pledged against currency issued by the Reserve Banks. In January 1970, $56 billion of bearer securities held for the System Open Market Account moved to book-entry form.[46] The expanded pledge provision also allowed the Reserve Banks to include securities beneficially owned by member banks and others that were pledged to so-called "third parties"—such as state and local governments and federal bankruptcy courts—as performance guarantees and that were held at Federal Reserve Banks.

The desire of Treasury and Federal Reserve officials to include securities pledged to third parties led to an important change in the operating basis of the book-entry system. Numerous statutes that provided for deposits of securities with a Federal Reserve Bank as performance guarantees contemplated that the securities would be deposited with a Bank acting in its individual capacity rather than as a fiscal agent of the United States. It followed that the securities could not be deposited into a book-entry system operated by the Reserve Banks strictly as fiscal agents.[47]

To facilitate inclusion of securities pledged to third parties, the regulatory provision for the new accounts stated that:

> The application of the book-entry procedure [to securities deposited in the new accounts] shall not derogate from or adversely affect the relationships that would otherwise exist between a Reserve Bank *in its individual capacity* and its depositors concerning any deposits under this paragraph. Whenever the book-entry procedure is applied to such Treasury securities, the Reserve Bank is authorized to take *all action necessary* in respect of the book-entry procedure to enable such Reserve Bank *in its individual capacity* to perform its obligations as depositary with respect to such Treasury securities [emphasis added].[48]

Federal Reserve officials understood that, pursuant to this provision, the Reserve Banks would accept deposits in the new accounts in a *dual capacity*, both as fiscal agents of the United States *and* in their individual capacities.[49] The second sentence in the quoted provision suggests that a Bank's individual responsibility to depositors might, in fact, trump its fiscal agency responsibilities.[50] Officials described the dual-capacity plan as "the most significant" aspect of the second implementation of the book-entry system.[51] The introduction of dual capacity clarified and settled the matter of the operating basis of the system.

By the end of 1970 . . . the Federal Reserve had . . . accomplished the objectives that it had identified in 1963: lowering the cost of clipping coupons, relaxing constraints imposed by limited vault space, and—most importantly—reducing the risk of misplacing securities that it held as custodian or pledgee.

As shown in Chart 3, by the end of 1970, the Federal Reserve book-entry system accounted for $121 billion of Treasury securities—almost half of the $248 billion of marketable Treasury debt outstanding. Virtually all of the definitive

securities formerly held in the vaults of the Reserve Banks had been converted. The Federal Reserve had thus accomplished the objectives that it had identified in 1963: lowering the cost of clipping coupons, relaxing constraints imposed by limited vault space, and—most importantly—reducing the risk of misplacing securities that it held as custodian or pledgee.

5. The Insurance Crisis and the Expansion of the Book-Entry System

Following the second implementation of the book-entry system, only two important categories of Treasury securities remained entirely outside the system: those owned by member banks for trading purposes and those safekept in member bank vaults for bank customers.[52] The Federal Reserve Bank of New York was particularly interested in extending the book-entry system to include those securities and to leverage more fully the economic advantages inherent in book-entry securities.

As early as 1965, two officers of the New York Fed had welcomed the development of a book-entry system because it

> appears to be an efficient and effective method of handling Government securities. This Bank has long been of the view that ultimately a book-entry type of procedure for Government securities should be developed to cover all or nearly all holders of such obligations. Over the long run, such a procedure . . . would appear to be a more efficient and probably less costly procedure for handling the public debt.[53]

In announcing in mid-1967 the first implementation of the new system, the New York Fed emphasized the economic advantages of the book-entry system:

> The . . . procedure is designed to help the Treasury Department and the Federal Reserve Banks handle a large volume of Treasury securities through the use of modern high-speed data-processing equipment. Use of the new procedure should lead to increased efficiency in the handling and servicing of Treasury securities by the Federal Reserve Banks.[54]

More concretely, the New York Fed began planning for the introduction of a new computer, the Sigma-5 (see Box 2), to support the new system.[55]

In the summer of 1968—well before the second implementation of the book-entry system—Federal Reserve Bank of New York officials had begun to seek the cooperation of the large New York banks in developing a more extensive system.[56] The banks expressed interest, but believed that change might not come quickly. One official noted that "some expanded form of book entry procedure is inevitable . . . . But how to work toward it and at what speed are matters that need further discussion."[57]

In late 1970, the cost-benefit calculus of expanding the book-entry system changed swiftly and dramatically. In the wake of several large and well-publicized losses of bearer Treasury securities—including securities worth $13.2 million from Morgan Guaranty Trust Company in October 1969[58]—Continental Insurance Company, the leading writer of insurance policies that covered thefts of securities from commercial banks, announced that it would restrict or terminate coverage in 1971.[59] Continental's announcement threatened to impose severe limits on trading in Treasury securities because dealers and clearing banks could not bear the risk of uninsured losses of the magnitudes that had been occurring.[60] Suddenly, the cost of continuing to settle transactions with bearer securities became immeasurably greater, and the idea of expanding the book-entry system became immeasurably more attractive.

The threat to the liquidity of the Treasury market [in 1970-71] infused Treasury and Federal Reserve officials, as well as private market participants, with a sense of urgency in expanding the book-entry system.

The threat to the liquidity of the Treasury market infused Treasury and Federal Reserve officials, as well as private market participants, with a sense of urgency in expanding the book-entry system.[61] In the closing days of 1970, Continental agreed to continue coverage, giving the Treasury and the Fed time to act.[62] During the first quarter of 1971, the Federal Reserve Bank of New York worked with the banks participating in the Government Securities Clearing Arrangement to bring their trading account securities and the securities owned by their customers—including customers who were nonbank dealers—into the system.[63] The initial effort to expand the system focused on the GSCA banks because those banks "were the most vulnerable to the problem of insurance coverage."[64]

The expansion of the book-entry system to securities owned by customers of the GSCA banks gave those banks and the New York Fed valuable experience operating a system that included securities owned by customers of member banks. The

expansion was viewed by Federal Reserve Bank of New York officials "as a means of experimenting with . . . new procedures and developing a basic pattern of book-entry accounts that could accommodate the operations of all member banks." [65] Additionally, it allowed the New York Fed to begin to integrate its book-entry system with the CPD transfers that continued to lie at the heart of the GSCA. Outgoing CPD transfers could be charged promptly (on a gross basis) to a bank's book-entry account, and incoming transfers could be credited promptly, rather than settled on a net basis with a physical delivery of bearer bonds at the end of the day. Installation of the Sigma-5 computer at the New York Fed in early 1971 facilitated integration of the GSCA and book-entry systems.[66]

Expansion of the book-entry system to accommodate Treasury securities held by *any* member bank for *any* customer was completed in March 1973.[67] (Martin [1985] explains how customers hold book-entry securities indirectly through depository institutions that offer custodial services.) As shown in Chart 3, the completion of the system infrastructure led to a gradual expansion in the fraction of marketable Treasury debt held in book-entry form to 65 percent at the end of 1973 and 78 percent at the end of 1975. By the end of 1980, almost 94 percent of marketable Treasury debt was held in book-entry form.

As increasing amounts of Treasury securities were converted to book-entry form, Treasury officials began to contemplate the elimination of definitive securities in new offerings.[68] In August 1976, the Treasury announced that it would stop issuing fifty-two-week bills in bearer form before the end of the year and that it would stop issuing bearer thirteen- and twenty-six-week bills in 1977.[69] The Treasury stopped issuing bearer bonds in September 1982, and it did not issue bearer notes after December 1982.[70] The last step came in August 1986, when the Treasury introduced a new book-entry system, TreasuryDirect, designed to accommodate retail investors, and announced that it would not subsequently issue notes or bonds in registered form.[71]

6. Conclusion

The conversion of U.S. Treasury securities from physical to book-entry form was a major development in the history of the Treasury market. The process began in 1966 with the introduction of an early book-entry system known as the Government Securities Clearing Arrangement; twenty years later, it ended with the last issue of registered debt.

The first stage of the process—the development of the GSCA in 1965-66—was motivated exclusively by cost considerations, involved only a few market participants with substantially similar interests, and was completed relatively quickly and without any significant reshaping of either legal or regulatory structures. It was, however, the first practical application of book-entry procedures to the Treasury securities market. The second stage—the creation of a book-entry system for securities already safekept at Reserve Banks—began after a loss of securities at the Federal Reserve Bank of San Francisco. Compared with the first stage, it involved a larger number of participants with somewhat divergent interests, took longer, and required a significant reshaping of the legal and regulatory environments. Two key moves were made at the second stage: the Treasury agreed to authorize the Reserve Banks to operate the book-entry system in a dual capacity and the Treasury decided it would preempt state law on perfecting liens on Treasuries. The third stage—the expansion of the book-entry system to include dealer securities and securities owned by customers of member banks—was propelled by the "insurance crisis" of 1970-71, and involved many more participants than the first two phases did.

The book-entry system was the product of three key factors: the interest of the Reserve Banks and the Treasury in lowering their operating costs and risks, the goal of the Reserve Banks and the Treasury of preserving market liquidity, and the desire of the Reserve Banks to prune the operating costs of member banks. The interest in lowering Reserve Bank operating costs and the operating costs of member banks was evident in the GSCA's development (and, to a lesser extent, in the expansion of the book-entry system after 1970); the Federal Reserve's desire to reduce operating risk exposure was a driving force behind the system's initial development; the Federal Reserve's and Treasury's mutual intention to preserve market liquidity vastly accelerated the system's expansion after 1970.

Significantly, the early history of the book-entry system suggests that the prospect of greater efficiency by itself may not always suffice to bring about rapid change that requires coordination among players with varied interests. Rather, the pace of change sometimes depends on exogenous shocks to bring different players together to meet a common goal. It is no doubt difficult to imagine the modern Treasury market existing in the absence of a book-entry system. Yet it is also difficult to imagine market participants moving from bearer to book-entry securities as quickly as they did had they not faced the repercussions of two such shocks: a sizable loss of securities from a Federal Reserve Bank in 1962 and an "insurance crisis" in 1970-71.

Endnotes

1. This section is based on Code of Federal Regulations, title 31, part 306, "General Regulations with Respect to United States Securities," January 1, 1966.

2. Manypenny (1986, pp. 29-30).

3. Committee on Banking and Currency (1963b, p. 23).

4. Vollkommer (1970, p. 5). This labor-intensive and time-consuming settlement process can be compared with modern settlement practices in the Treasury securities market, which are described in Fleming and Garbade (2002).

5. CPD transfers are described in Smith (1956, ch. 9), Vollkommer (1970, pp. 28-31, 41-4), Bureau of the Public Debt (1984, pp. 11-2, I-2, I-3), and Ringsmuth and Rice (1984, pp. 8-9). The terminology derives from the fact that prior to 1941, the Commissioner of Public Debt had to approve each individual wire transfer of a Treasury security (Smith 1956, p. 93). The CPD transfer facility was established in 1921 for certificates of indebtedness and notes to facilitate the development of a national market for those securities (U.S. Department of the Treasury 1927, p. 115; Smith 1956, p. 87). It was extended to bills shortly after they were introduced in 1930 (Smith 1956, pp. 87-8) and to bonds in 1948 (Federal Reserve Bank of New York Circular no. 3306, February 5, 1948, and Circular no. 3310, February 20, 1948).

6. Federal Reserve Bank of New York Operating Circular no. 17, July 23, 1965.

7. The New York Fed made end-of-day deliveries to banks with credit balances by drawing on the stock of unissued securities that it held as fiscal agent (Vollkommer 1970, p. 33, Hoey and Vollkommer 1971, p. 24, and Federal Reserve Bank of New York 1972b, p. 4). Davis and Hoey (1973, p. 124) state that use of fiscal agency stocks was crucial to the success of the plan. A bank with an obligation to deliver securities to the Federal Reserve Bank of New York was essentially running an overdraft in its securities account. A bank had to agree that as long as it ran an overdraft it would retain possession of enough of the same security in bearer form to settle the overdraft ("Clearing Agreement Providing for Transfers of U.S. Government and U.S. Agency Securities," August 4, 1967, paragraph 5). If a bank failed to deliver securities required to settle its position at the end of a business day, the New York Fed could charge the bank's reserve account for the principal amount of the securities. If the bank further failed to deliver the securities on the following business day, the New York Fed could "buy in" the securities and charge the bank for the cost of the buy-in (Vollkommer 1970, p. 52; Hoey and Rassnick 1976, pp. 178-9).

8. Vollkommer (1970, p. 32), Hoey and Vollkommer (1971, p. 24), and Davis and Hoey (1973, p. 122).

9. Hoey and Rassnick (1976, p. 178).

10. The six new members included Bankers Trust Company, Manufacturers Hanover Trust Company, First National City Bank, Chemical Bank, the Chase Manhattan Bank, and the Bank of New York. There were, ultimately, twelve banks in the GSCA, including also Franklin National Bank, Marine Midland Bank, National Bank of North America, and United States Trust Company. Vollkommer (1970, p. 34), "Third Amendment to Revised Clearing Agreement Providing for Transfers of U.S. Government and U.S. Agency Securities, as Amended" (February 5, 1971), Debs (1972, p. 179), and Hoey and Rassnick (1976, p. 177).

11. Vollkommer (1970, p. 34).

12. Vollkommer (1970, pp. 46-8).

13. Bureau of the Public Debt (1984, p. I-8) and Ringsmuth and Rice (1984, p. 10).

14. Bureau of the Public Debt (1984, p. I-8).

15. Ringsmuth and Rice (1984, p. 11).

16. Debs and Guy (1965, p. 8).

17. "$7,500,000 Bonds Disappear at Bank," *New York Times*, March 28, 1963, p. 1. See also "If Lost Securities Were Stolen, Theft Was Biggest in History," *New York Times*, May 28, 1963, p. 58, and "Loss of Securities Remains a Mystery," *New York Times*, May 30, 1963, p. 22.

18. Committee on Banking and Currency (1963a,b).

19. Letter dated June 11, 1963, from Merritt Sherman, Secretary, Board of Governors of the Federal Reserve System, to Watrous Irons, Chairman, Conference of Presidents.

20. In 1965, two officers of the Federal Reserve Bank of New York noted that the "proposal for a book-entry procedure originated with the Board's staff and grew out of repercussions resulting from the

Note 20 continued
loss of certain Government securities at the Federal Reserve Bank of San Francisco; the principal objective of the . . . proposal was the reduction of the risk involved in handling Government securities." Memo dated September 21, 1965, from Harold Bilby and Edward Guy, Federal Reserve Bank of New York, to Secretary's Office.

21. Subcommittee on Fiscal Agency Operations to the Committee on Fiscal Agency Operations of the Conference of Presidents (1963, p. 3).

22. Letter dated December 3, 1964, from the Subcommittee of Counsel on Fiscal Agency Operations, Welford Farmer, Chairman, to Upton Martin, Chairman, Subcommittee on Fiscal Agency Operations, and Debs and Guy (1965). The Debs and Guy study is summarized in Subcommittee of Counsel on Fiscal Agency Operations of the Committee on Fiscal Agency Operations of the Conference of Presidents (1965).

23. A system that immobilized, but did not dematerialize, Treasury securities was contemplated (Subcommittee on Fiscal Agency Operations to the Committee on Fiscal Agency Operations of the Conference of Presidents 1963, p. 4) but never seriously pursued.

24. Debs and Guy (1965, p. 24) ("two parallel sets of accounts would have to be maintained").

25. Letter dated December 3, 1964, from the Subcommittee of Counsel on Fiscal Agency Operations, Welford Farmer, Chairman, to Upton Martin, Chairman, Subcommittee on Fiscal Agency Operations, p. 2.

26. Letter dated December 3, 1964, from the Subcommittee of Counsel on Fiscal Agency Operations, Welford Farmer, Chairman, to Upton Martin, Chairman, Subcommittee on Fiscal Agency Operations, p. 3, and Debs and Guy (1965, pp. 16-9).

27. Rassnick (1971, pp. 613-4) (if a filing were necessary, "the book-entry procedure would not have been feasible for the Federal Reserve") and Hoey and Rassnick (1976, p. 181).

28. Subpart O of Treasury Department Circular no. 300 (promulgated November 7, 1967, effective January 1, 1968) and Federal Reserve Bank of New York Operating Circular no. 21 (effective January 1, 1968). See also Federal Reserve Bank of New York Circular no. 6075, December 12, 1967.

29. The idea of limiting the initial system to three categories of deposits originated with Debs and Guy (1965, p. 29). Treasury and Federal Reserve officials agreed to the suggestion on May 25, 1965 (Subcommittee of Counsel on Fiscal Agency Operations of the Committee on Fiscal Agency Operations of the Conference of Presidents 1965, p. 3), and the Conference of Presidents gave its formal approval on September 27, 1965.

30. Bureau of the Public Debt (1984, p. II-6), quoting a memorandum from the Legal Department of the Federal Reserve Bank of New York.

31. See "Treasury Announces Date for Reconstitution of Securities in STRIPS Program," *Treasury News*, March 31, 1987, and Bennett, Garbade, and Kambhu (2000, pp. 92-3, 104, and endnotes 33-36).

32. Federal Reserve Bank of New York Circular no. 6075, December 12, 1967.

33. Rassnick (1971, p. 614) and Hoey and Rassnick (1976, p. 181).

34. Code of Federal Regulations, title 31, part 306, section 118, January 1, 1968 [hereafter cited in the form 31 CFR 306.118 (January 1, 1968)].

35. The author is indebted to Lee Rassnick for pointing out the practical significance of *how* the Treasury exercised its preemption power.

36. The Conference adopted, on September 27, 1965, a recommendation of the Subcommittee of Counsel on Fiscal Agency Operations of the Committee on Fiscal Agency Operations of the Conference of Presidents (1965), based on the analysis of Debs and Guy (1965), that the system should be operated as an agency function. Treasury officials also favored the agency approach (Subcommittee of Counsel on Fiscal Agency Operations of the Committee on Fiscal Agency Operations of the Conference of Presidents 1965, p. 2).

37. See the draft dated January 24, 1967, of Subpart O of Treasury Circular no. 300 enclosed in a memo dated January 27, 1967, from Welford Farmer, Chairman, Subcommittee of Counsel on Fiscal Agency Operations, to the members of the subcommittee, and the draft dated June 6, 1967, of Subpart O enclosed with a memo dated June 8, 1967, from Farmer to Edward Wayne, Chairman, Committee on Fiscal Agency Operations.

38. Letter dated April 24, 1967, from Guy to Welford Farmer, Chairman, Subcommittee of Counsel on Fiscal Agency Operations ("it would be doubtful that I would be able to render an opinion to our discount officers that advances by the Federal Reserve Bank of New York secured by book entry obligations as provided under the terms of the [January 24, 1967] draft could be said to be adequately and legally secured"), and memo dated June 14, 1967, from Guy to Farmer.

39. Letter dated June 20, 1967, from Guy to John Grosvenor, Assistant Chief Counsel, Treasury Department (noting the need to "provide assurance that the Reserve Banks would be in a position always to fulfill obligations" to their custodial customers).

40. 17 CFR 306.117(a) (January 1, 1968). The crucial "individual capacity" language first appeared in a draft of the regulation dated July 6, 1967. See letter dated July 13, 1967, from Thomas Winston, Chief Counsel, Bureau of the Public Debt, to Welford Farmer, General Counsel, Federal Reserve Bank of Richmond.

41. 17 CFR 306.115(a) (January 1, 1968) (defining a Reserve Bank as "a Federal Reserve Bank . . . acting as Fiscal Agent of the United States").

42. Vollkommer (1970, p. 65).

43. Subpart O of Treasury Department Circular no. 300 (promulgated June 13, 1969, effective July 15, 1969) and Federal Reserve Bank of New York Operating Circular no. 21 (effective August 1, 1969). See also Federal Reserve Bank of New York Circular no. 6379, August 1, 1969.

44. 31 CFR 306.117(b) (July 15, 1969) and Federal Reserve Bank of New York Operating Circular no. 21, section 2(b) (effective August 1, 1969).

45. 31 CFR 306.118 (July 15, 1969).

46. Vollkommer (1970, p. 67).

47. Letter dated July 19, 1968, from Welford Farmer, Chairman, Subcommittee of Counsel on Fiscal Agency Operations, to Thomas Winston, Chief Counsel, Bureau of the Public Debt ("the term 'Federal Reserve Bank' as used in these statutes . . . refers to the Federal Reserve Banks in their individual capacities as distinguished from the Reserve Banks acting as Fiscal Agents"), and memo dated December 4, 1968, from Subcommittee of Counsel on Fiscal Agency Operations to Committee on Fiscal Agency Operations, p. 3 ("it appears that the provisions of law applicable to [securities pledged to third parties] might preclude the deposit of the securities with the Reserve Banks if the latter act solely in their capacity as fiscal agents of the United States").

48. 31 CFR 306.117(b) (July 15, 1969).

49. Memo dated December 4, 1968, from Subcommittee of Counsel on Fiscal Agency Operations to Committee on Fiscal Agency Operations, p. 1 ("the proposed revision of Subpart O provides for the Reserve Banks to act in certain circumstances in a 'dual capacity,' i.e., in an individual capacity and as fiscal agents of the United States"). A subsequent revision of the book-entry regulations provided that, in operating the book-entry system, a Reserve Bank acted "as Fiscal Agent of the United States and when indicated . . . in its individual capacity." 31 CFR 306.115(a) (April 27, 1972).

50. The Subcommittee of Counsel on Fiscal Agency Operations observed that the quoted provision was "designed principally to minimize . . . the risk that the Treasury might take some action in respect of the book-entry Treasury securities or the book-entry procedure that might make it impossible for the Reserve Bank to perform its depositary obligations." Memo dated December 4, 1968, from Subcommittee of Counsel on Fiscal Agency Operations to Committee on Fiscal Agency Operations, p. 4.

51. Memo dated December 4, 1968, from Subcommittee of Counsel on Fiscal Agency Operations to Committee on Fiscal Agency Operations, p. 5.

52. Vollkommer (1970, p. 70).

53. Memo dated September 21, 1965, from Harold Bilby and Edward Guy, Federal Reserve Bank of New York, to Secretary's Office.

54. Federal Reserve Bank of New York Circular no. 6022, August 21, 1967.

55. The Sigma-5 is described in Federal Reserve Bank of New York (1972a, 1972b, 1984). The computer began operation in January 1971.

56. Letter dated June 10, 1968, from Felix Davis, Vice President, Federal Reserve Bank of New York, to John Lee, Executive Vice President, New York Clearing House.

57. Letter dated July 31, 1968, from John Lee, Executive Vice President, New York Clearing House, to Felix Davis, Vice President, Federal Reserve Bank of New York.

58. "Market Place," *New York Times*, October 30, 1969, p. 68, "Securities-Theft Flurry Prompts Insurers to Mull Halting Coverage on Such Losses," *Wall Street Journal*, November 17, 1969, p. 2, and "Stolen Securities Master List Urged," *Journal of Commerce*, June 10, 1970, p. 1. A Treasury official later estimated that about $30 million in bearer Treasury securities was lost or stolen in 1969 ("Small-Bond Thefts Up Sharply, Treasury Aides Tell Senate Unit," *New York Times*, June 11, 1971, p. 49).

59. "Loss of Insurance," *New York Times*, December 6, 1970, section 3, p. 2.

60. "Loss of Insurance," *New York Times*, December 6, 1970, section 3, p. 2, and Debs (1972, p. 180) (noting the risk that "major participants in the market would terminate operations, and the market would cease to function").

61. "Treasury Announces Move to Thwart Securities Theft," *New York Times*, December 21, 1970, p. 61, "U.S. Help Readied for Bond Market," *New York Times*, December 23, 1970, p. 1, Debs (1972, p. 180) (expansion of the book-entry system "greatly accelerated" by the insurance crisis), and Ringsmuth and Rice (1984, p. 16) (crisis "provided momentum which swept away resistance to the novelty of book-entry procedure[s]").

62. "Bond Insurance Sought in Talks," *New York Times*, December 24, 1970, p. 29, and "Continental Insurance Reaches Interim Bond Pact With Banks," *New York Times*, December 25, 1970, p. 47.

63. Federal Reserve Bank of New York Circular no. 6718, April 26, 1971 ("since December, this Bank has been working with the banks participating in the Clearing Arrangement, as well as the Association of Primary Dealers in U.S. Government Securities, with a view to determining general procedures for establishing the necessary new book-entry accounts and to integrating such accounts into the Clearing Arrangement. Such procedures have been agreed to, and the extended book-entry procedure is available to the twelve New York City banks participating in the Clearing Arrangement"). See also Federal Reserve Bank of New York Circular no. 6976, July 21, 1972 ("over the past year, the [book-entry] program has been gradually extended to cover the securities held by [GSCA] banks (a) for account of their customers, including customers which are nonbank dealers in Government securities, and (b) as their 'dealer' inventory in those cases in which the bank is a primary dealer in Government securities").

64. Debs (1972, p. 181).

65. Debs (1972, p. 181). See also Federal Reserve Bank of New York Circular no. 6976, July 21, 1972 ("in the light of the operating experience . . . during the past year, operating procedures and book-entry account patterns have been developed to serve as a basis for the extension of the [book-entry system] to all member banks throughout the country").

66. Federal Reserve Bank of New York (1972a, 1972b). The Bank instituted "real-time" accounting for book-entry securities in early 1974 (Memo no. 54 to Participants in the Government Securities Clearing Arrangement, February 19, 1974, from M. Hoey, Federal Reserve Bank of New York) and terminated the GSCA in December 1977 following continued integration of the wire transfer and book-entry systems (Memo no. 78 to Participants in the Government Securities Clearing Arrangement, August 11, 1977, from E. Powers, Federal Reserve Bank of New York).

67. Subpart O of Treasury Department Circular no. 300 (promulgated March 9, 1973, effective March 30, 1973) and Federal Reserve Bank of New York Operating Circular no. 21 (effective March 30, 1973). At the same time, the Fed announced that it would begin to add federal agency securities to the book-entry system, beginning with securities issued by the United States Postal Service, the Federal Land Banks, the Federal Intermediate Credit Banks, and the Banks for Cooperatives (Federal Reserve Bank of New York Circular no. 7112, March 19, 1973).

68. Federal Reserve Bank of New York Circular no. 7858, April 20, 1976 (reporting that the Treasury and the Federal Reserve would "design and adopt an expanded book-entry system with the ultimate objective of completely eliminating the use of definitive securities in new public debt borrowings").

69. Federal Reserve Bank of New York Circular no. 7939, August 20, 1976.

70. Federal Reserve Bank of New York Circular no. 9363, September 15, 1982. See also Bureau of the Public Debt (1982).

71. Federal Reserve Bank of New York Circular no. 10,058, July 17, 1986, and Circular no. 10,064, July 31, 1986. See also Bureau of the Public Debt (1983). Manypenny (1986) examines the 1976-86 transition to a book-entry-only Treasury securities market.

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