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Working Paper

Buybacks in treasury cash and debt management

Staff Report, No. 304

Provided in Cooperation with:

Federal Reserve Bank of New York

Suggested Citation: Garbade, Kenneth D.; Rutherford, Matthew (2007) : Buybacks in treasury cash and debt management, Staff Report, No. 304, Federal Reserve Bank of New York, New York, NY

This Version is available at:

<https://hdl.handle.net/10419/60616>

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Federal Reserve Bank of New York
Staff Reports

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Kenneth D. Garbade
Matthew Rutherford

Staff Report no. 304
October 2007

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Buybacks in Treasury Cash and Debt Management

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JEL classification: G2, H6

Abstract

This paper examines the use of buybacks in Treasury cash and debt management. We review the mechanics and results of the buyback operations conducted in 2000-01, during a time of budget surpluses, and assess the prospective use of buybacks in the absence of a surplus. Possible future applications include (i) managing the liquidity of the new-issue markets when deficits are declining (by allowing Treasury officials to postpone a decision to discontinue a series without also being compelled to shrink new-issue sizes); (ii) actively promoting the liquidity of the new-issue markets (by repurchasing outstanding debt on a regular basis and funding the purchases with larger offerings of new debt); (iii) limiting the accumulation of large Treasury cash balances (for example, in the second half of April and early May, when many taxpayers make final payments of taxes on income earned in the prior year); and (iv) smoothing week-to-week fluctuations in Treasury bill offerings.

Key words: buybacks, reverse auctions, debt management

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1. Introduction

A Treasury buyback is a purchase of United States Treasury debt by the Treasury and subsequent cancellation of that debt. A buyback differs from redemption at maturity or pursuant to exercise of a call option because it involves a *consensual* transaction. A buyback is neither contractually required, as is redemption at maturity, nor is it the result of a discretionary exercise of a unilateral right to redeem a security before its final maturity date.

The Treasury has undertaken two series of buybacks in the past century. The first series took place in the 1920s, during a string of eleven consecutive fiscal year budget surpluses. Between mid-1919 and mid-1930, interest-bearing Treasury debt fell from \$25.2 billion to \$15.9 billion as the Treasury redeemed three of the five large Liberty loans issued to finance World War I. As described in more detail in Appendix 1, the post-war buybacks were used to whittle down the outsized loans to more manageable sizes.

More recently, the Treasury bought back \$67.5 billion of outstanding bonds in a series of 45 reverse auctions conducted between March 2000 and April 2002. The first 42 operations, conducted in 2000 and 2001, brought bond redemptions into better balance with redemptions of short- and intermediate-term notes during a period of substantial budget surpluses. The last three operations were conducted in the second half of April 2002, during a period of seasonally strong tax receipts.

This paper examines the recent series of buybacks and assesses the possibility of making more active use of buybacks for Treasury cash and debt management in the future. (Treasury debt management concerns the broad range of actions taken to finance budget deficits and refinance maturing debt. The policy objective of Treasury debt management is financing at least cost over time, subject to the constraint of satisfying the government's funding requirements.¹ Treasury cash management focuses more narrowly on the cash balances used to pay the bills and maturing liabilities of the federal government.)

¹ "Remarks of Under Secretary of the Treasury Peter Fisher to the Futures Industry Association," March 14, 2002, available at www.treas.gov/press/releases/po1098.thm.

To provide a concrete setting for our analysis, we begin in Section 2 by reviewing the 2000-2001 buybacks, pointing out how the buybacks contributed to Treasury debt management objectives and describing the mechanics of the buyback process. The following sections examine the prospective use of buybacks in four contexts: managing the liquidity of the new issue markets when deficits are declining (Section 3), actively promoting the liquidity of the new issue markets (Section 4), facilitating Treasury cash management (Section 5), and smoothing week-to-week fluctuations in Treasury bill offerings (Section 6).

We conclude that buybacks can make positive contributions to Treasury debt and cash management objectives even in the absence of a budget surplus. In particular, buybacks can,

- enhance the ability of Treasury officials to manage the liquidity of the new issue markets when deficits are declining – by allowing them to postpone a decision to discontinue a series without also being compelled to shrink new issue sizes,
- give Treasury officials the ability to actively promote the liquidity of the new issue markets – by instituting a program of buying back outstanding debt on a regular basis and funding the purchases with larger offerings of new debt,
- enhance the ability of Treasury officials to limit the accumulation of large – and sometimes costly – Treasury cash balances (such as in the second half of April and early May, when many taxpayers make final payments of taxes due on income earned in the prior year), and
- enhance the ability of Treasury officials to smooth week-to-week fluctuations in Treasury bill offerings.

It should be noted that the first, third, and fourth applications contemplate buyback operations on a sporadic, “as needed,” basis, at a scale determined by the respective application. In contrast, the second application envisions buybacks on a regular and routine basis, at a scale left to the discretion of Treasury officials. For reasons discussed in Section 4, Treasury officials may have difficulty identifying a maximum appropriate scale.

2. The Debt Management Buybacks of 2000-2001

Between March 2000 and December 2001, the Treasury bought back \$63.5 billion of outstanding Treasury bonds in a series of 42 reverse auctions. This section describes the background and mechanics of the buybacks.

Background

The decision to begin buying back Treasury debt stemmed from a steady narrowing of the federal budget deficit during the 1990s. Between fiscal 1992 and fiscal 1997, strong economic growth and rising tax receipts pushed the deficit down from \$290 billion to \$22 billion. In fiscal 1998 the federal government recorded a surplus – of \$70 billion – for the first time in almost thirty years.² The Congressional Budget Office predicted that the surplus would increase steadily over the next ten years and would reach \$381 billion in fiscal 2009.³

The shrinking deficit, and subsequent surplus, led to a concomitant decline in Treasury financing needs. Treasury officials reduced their monthly offerings of 2-year notes from \$18½ billion in 1996 to as little as \$12 billion in 1998. Over the same interval, quarterly offerings of 3-year notes fell from \$19 billion to \$10 billion and weekly offerings of 13- and 26-week bills fell from around \$14 billion each to \$5¾ and \$7¼ billion, respectively.

The simplest way for debt managers to accommodate the rising tide of tax receipts would have been to continue scaling back new issues, paying off more of each maturing issue with cash and refinancing less with new debt. However, shrinking issue sizes began to threaten the liquidity of when-issued trading and trading in on-the-run securities in the late 1990s.⁴ The

² *Treasury Bulletin*, March 1995, p. 18, and March 2000, p. 13.

³ Congressional Budget Office (1999, p. xiv).

⁴ A “when-issued” transaction is a transaction in a security that has not yet been issued, for settlement on the date of issue. When-issued trading “benefits the Treasury by serving a price discovery function and by stretching out the actual distribution period for each issue, thereby allowing the market more time to absorb large issues without disruption.” (Department of the Treasury et. al., 1992, p. 9.) An “on-the-run” security is the most recently auctioned security in a particular series, such as six-month bills or ten-year notes.

quarterly reports of the Treasury Borrowing Advisory Committee (TBAC) to the Secretary of the Treasury from that period refer repeatedly to the importance of maintaining the size of new offerings in order to preserve liquidity.⁵ For example,

- the May 1998 report suggested that that Treasury “refocus coupon offerings around less frequent larger offerings of benchmark securities, to help preserve the attractive liquidity features of the Treasury coupon market,”
- the August 1998 report expressed support for “the general objectives of moving to less frequent larger coupon offerings, in order to preserve liquid benchmark issues...”, and
- the August 1999 report noted that “It has been the Committee’s view for some time that, with the exception of inflation-indexed securities, individual issues are now near a minimum size that would allow sufficient liquidity to maintain benchmark status.”

The liquidity of the new issue markets is important to the Treasury because investors, dealers, and other market participants value liquidity – the ability to trade quickly, in large size, on narrow bid-ask spreads, and with minimal impact on market prices – and are willing to pay a premium for more liquid issues.⁶

In order to bolster new issue sizes, in May 1998 the Treasury discontinued quarterly offerings of 3-year notes and switched offerings of 5-year notes from monthly to quarterly –

Trading in highly liquid on-the-run issues provides benchmark, or reference, yields on credit-risk free debt and facilitates hedging, market-making, and other risk management processes. Garbade and Kambhu (2006).

⁵ The quarterly reports of the Treasury Borrowing Advisory Committee, prepared prior to mid-quarter refundings, are available at [/www.treas.gov/offices/domestic-finance/debt-management/adv-com/reports/](http://www.treas.gov/offices/domestic-finance/debt-management/adv-com/reports/).

⁶ Amihud and Mendelson (1991), Warga (1992), Kamara (1994), and Carayannopoulos (1996). See also Bennett, Garbade, and Kambhu (2000) and Fleming (2003). Boudoukh and Whitelaw (1991, 1993) provide related evidence from the market for Japanese government bonds.

thereby eliminating twelve offerings a year and concentrating refinancing operations in a smaller number of larger issues.⁷

Reducing the number of new issues postponed further reductions in issue size but did not affect a second important consequence of declining Treasury financing requirements: a steady increase in the average maturity of the debt. The increase occurred because a significant amount of short- and intermediate-term debt was being paid down as it matured, while all of the Treasury's longer-term debt remained outstanding. At the end of September 1996 the average maturity of Treasury debt was 5 years and 3 months; by November 1998 it had increased to 5 years and 8 months and, absent a change in debt management policies, was expected to continue to increase in the future.⁸ Treasury officials were concerned that, because the yield curve typically has a positive slope, the increasing average maturity of the debt would result in unnecessarily high interest costs. (Between January 1988 and December 1998, the yield on 10-year notes averaged 84 basis points above the yield on 2-year notes and the yield on 30-year bonds averaged 114 basis point above the yield on 2-year notes.)

Concerned with deteriorating liquidity and lengthening average maturity, Treasury officials began to explore alternative debt management initiatives. The first formal recognition that the Treasury was considering a buyback program appeared in the minutes of the February 1998 TBAC meeting:

The Committee discussed the purposes for which the Treasury might use a repurchase program and how a repurchase program might be implemented. The consensus of the members was that a repurchase program should be available to the Treasury. A repurchase program could help the Treasury smooth out increases in the cash balance,

⁷ "Remarks at the May 1998 Treasury Quarterly Refunding," May 6, 1998, available at www.treas.gov/press/releases/rr.2416.htm.

⁸ *Treasury Bulletin*, March 1999, p. 26, and "Statement of Treasury Secretary Lawrence Summers," January 13, 2000, available at www.treas.gov/press/releases/ls330.htm.

allow the Treasury to maintain the issue sizes of new securities, and conceivably reduce the Government's cost of borrowing.⁹

In May 1999 the TBAC pointed out that “the use of a buyback tool could well be preferable to further cutbacks in the size and frequency of regular bill and coupon offerings” and urged Treasury to move ahead “expeditiously to develop rulemaking proposals to guide execution of a secondary market buyback program...”¹⁰

Treasury officials published a draft buyback rule in August 1999.¹¹ In announcing the proposed rule, Secretary of the Treasury Lawrence Summers cited several advantages of buybacks, including maintenance of “larger auction sizes than would otherwise be possible” – thereby enhancing the liquidity of Treasury's benchmark securities, lowering interest costs, and promoting overall market liquidity – and preventing “what would otherwise be a potentially costly and unjustified increase in the average maturity of [Treasury] debt...”¹²

Treasury adopted a final rule in January 2000.¹³ Concurrently, Secretary Summers announced that Treasury officials would be initiating buyback operations in the near future and

⁹ “Minutes of the Meeting of the Treasury Borrowing Advisory Committee,” February 3, 1998. The minutes of the quarterly meetings of the Treasury Borrowing Advisory Committee are available at www.treas.gov/offices/domestic-finance/debt-management/adv-com/minutes/.

¹⁰ “Report to the Secretary of the Treasury from the Treasury Borrowing Advisory Committee,” May 4, 1999.

¹¹ “Marketable Treasury Securities Redemption Operations; Proposed Rule” *Federal Register*, August 5, 1999, p. 42626.

¹² “Statement by Lawrence H. Summer, Secretary of the Treasury,” August 4, 1999, available at www.treas.gov/press/releases/ls42.htm. Under Secretary of the Treasury Gary Gensler stated similarly that buybacks would allow the Treasury to maintain larger issue sizes and enhance its control over the maturity structure of its debt. “Remarks at the August 1999 Treasury Quarterly Refunding,” August 4, 1999, available at www.treas.gov/press/releases/ls43.htm. See also “Remarks at the February 2000 Treasury Quarterly Refunding,” February 2, 2000, available at www.treas.gov/press/releases/ls365.htm (noting that “The use of debt buybacks will help us maintain the liquidity of our remaining issues, while also managing the average maturity of Treasury debt.”).

¹³ “Marketable Treasury Securities Redemption Operations; Final Rule,” *Federal Register*, January 19, 2000, p. 3114.

suggested that they would repurchase as much as \$30 billion of debt in calendar year 2000.¹⁴ Subsequently, on March 7, 2000, Treasury announced the first buyback: a reverse auction for \$1 billion of bonds maturing between February 2015 and February 2020.

Buyback Mechanics

Figure 1 shows the timing and size of the 42 buybacks conducted between March 2000 and December 2001. The operations were held on a twice-a-month basis – generally in the second half of a month, when Treasury cash flow is relatively strong.¹⁵ The average size of an operation was \$1.5 billion.

Over the course of the 42 operations the Treasury expressed an interest in buying back a total of 42 different bonds. The shortest eligible bond was the 11¾ percent bond of February 2010, the longest was the 6⅛ percent bond of November 2027. However, Treasury never solicited offerings of all 42 bonds simultaneously. After the fourth operation (in which Treasury sought to repurchase \$3 billion of securities and solicited offerings of 26 different bonds) proved

¹⁴ “Statement of Treasury Secretary Lawrence Summers,” January 13, 2000, available at www.treas.gov/press/releases/l3330.htm. In his statement, Summers reiterated the “concrete advantages” of buybacks: “[T]hey allow us to enhance the liquidity of Treasury benchmark securities, which promotes overall market liquidity and should reduce the government’s interest costs over time,” and “[B]y paying off debt that has substantial remaining maturity, buybacks enable us to prevent what would otherwise be a potentially costly and unjustified increase in the average maturity of our debt, which has grown from 5¼ years in 1997 to 5¾ years in 1999 and, absent countervailing action, would be projected to rise to almost 8 years by 2004.” See also “U.S. Says It Plans to Buy Back Some Debt,” *New York Times*, January 14, 2000, p. C6.

¹⁵ The Treasury adopted a regular buyback schedule (twice a month, in the second half of each month) in May 2000. See “Remarks at the May 2000 Treasury Quarterly Refunding,” May 3, 2000, available at www.treas.gov/press/releases/l3602.htm, and “Remarks at the August 2000 Treasury Quarterly Refunding,” August 2, 2000, available at www.treas.gov/press/releases/l3821.htm.

unwieldy,¹⁶ debt managers systematically limited the size of an operation to not more than \$2 billion and limited the set of eligible bonds to about ten or twelve issues.

Figure 2 shows the bonds eligible in each of the 42 operations. Beginning with the September 28, 2000, operation, Treasury officials rotated the list of eligible bonds sequentially across four panels:

- callable bonds maturing between February 2010 and November 2014,
- non-callable bonds maturing between February 2015 and 2019,
- non-callable bonds maturing between 2019 and 2022 or 2023, and
- non-callable bond maturing between 2022 or 2023 and November 2027.

Figure 3 shows that there were wide differences in the outstanding amounts of the 42 bonds. As of December 31, 1999, outstanding amounts in public hands, i.e., not held in U.S. government accounts or by the Federal Reserve, ranged from \$1.6 billion of the 11¾ percent bonds of February 2010 to \$30.1 billion of the 8 percent bonds of November 2021.

The mechanics of a reverse auction were similar to conventional Treasury auction mechanics. Treasury gave one or two days notice of a forthcoming buyback, specifying the size of the operation (denominated in billions of dollars of par value of bonds sought to be repurchased) and the bonds eligible for repurchase. An auction tender had to identify the security offered, the principal amount offered, and the offering price (expressed as a percent of principal, net of accrued interest, with fractions of a percent in 32^{nds} and eighths of a 32nd).¹⁷ There was no limit on the number of offers that an auction participant could submit, of the same security or of different securities.¹⁸

¹⁶ The fourth operation attracted a large number of tenders that took time to process because there was a manual step in the processing sequence.

¹⁷ 31 Code of Federal Regulations 375.13(b). The amount offered had to be an integer multiple of \$100,000.

¹⁸ 31 Code of Federal Regulations 375.13(c).

Following the 11:00 a.m. close of an auction, Treasury officials evaluated the offers and, at about 11:05 a.m., informed individual offerors which, if any, of their offers had been accepted. All of the auctions followed a multiple-price format: each accepted offer was settled at its respective offer price, plus accrued interest to the settlement date.¹⁹ At about 11:15 a.m. the Treasury announced the auction results in a press release that disclosed, for each eligible bond, the par amount offered, the par amount accepted, the highest accepted offer price, and the weighted average accepted offer price. Settlement followed two business days later.

There was one significant difference between the reverse auctions of 2000-2001 and conventional Treasury auctions. Only “primary dealers,” i.e., government securities dealers designated as counterparties to the Federal Reserve Bank of New York in Federal Reserve open market operations conducted by that Bank, were permitted to offer bonds in a buyback operation.²⁰ (This paralleled a comparable restriction that only banks could submit tenders in the three reverse auctions that the Treasury conducted in the mid-1920s – see Appendix 1.) However, other market participants could submit orders *through* a primary dealer.²¹

¹⁹ The Treasury adopted a multiple-price auction format, even though it was contemporaneously auctioning new issues in a single-price format, in order “to make immediate use of the Federal Reserve Bank of New York’s electronic system for executing open market transactions.” “Marketable Treasury Securities Redemption Operations; Final Rule,” *Federal Register*, January 19, 2000, p. 3115. However, officials noted that “At some future time ... we might want to evaluate the potential merits of a single-price process.”

²⁰ 31 Code of Federal Regulations 375.11(a). Information on the primary dealer program is available at www.newyorkfed.org/markets/primarydealers.html. The limitation to primary dealers was a further consequence of the Treasury’s decision, noted in the preceding footnote, to use the electronic execution facilities of the Federal Reserve Bank of New York.

²¹ 31 Code of Federal Regulations 375.11(b).

Buyback Results

Treasury never failed to receive sufficient offers to cover a buyback operation. As shown in Figure 4, coverage ratios ranged from a low of 2.14 to a high of 8.98 and averaged 4.39.²²

Treasury generally sought to buy back bonds that were offered at relatively attractive prices – given their coupon rates, maturities, and call provisions – compared to other bonds offered in the same operation and compared to secondary market prices for Treasury securities at the time an auction closed.²³ On average over the course of the buyback program, about 14 percent of the amount of a bond publicly held at the end of 1999 was bought back. However, as shown in Figures 5 and 6, the ratio of amount bought back to amount outstanding varied from bond to bond. For example, the Treasury bought back slightly more than half of the \$6 billion of the 10⁵/₈ percent bond of August 2015, but did not buy back any of the \$17³/₄ billion of the 7¹/₄ percent bond of May 2016.

Impact of the Buyback Program

The most significant impact of the buyback program was an unusual, and unusually steep, inversion of the long end of the yield curve in early 2000. On January 12, 2000 – the day before Secretary Summers announced the imminent launch of the program – the yield curve had a positive slope: yields on longer-term securities were higher than yields on shorter-term securities. Within days after the announcement, however, market participants began to

²² The coverage ratio of a buyback operation is the ratio of the aggregate par amount of bonds offered, divided by the aggregate par amount of bonds sought to be repurchased by Treasury.

²³ Treasury never disclosed the criteria it used in accepting one offer in lieu of another. The Federal Register notice of the proposed buyback rule published in August 1999 stated only that “Calculation of redemption operation results would occur at the Federal Reserve Bank of New York ... using a methodology determined by Treasury.” “Marketable Treasury Securities Redemption Operations; Proposed Rule,” *Federal Register*, August 5, 1999, p. 42627. Merrick (2005) concludes that the Treasury generally avoided buying back relatively expensive bonds, but did not succeed in limiting its repurchases to relatively cheap bonds.

appreciate that the new program was likely to drive long-term yields below shorter-term yields and they began to buy bonds in anticipation of the change.²⁴ During the next two weeks, market conditions sometimes verged on the chaotic as investors scrambled for long-term investments.²⁵

As shown in the lower panel of Figure 7, between January 18 and February 3 anticipatory buying drove yields on 30-year bonds down by 58 basis points, from 6.75 percent to 6.17 percent, while yields on 5-year notes declined only 9 basis points and yields on 2-year notes *rose* 9 basis points. By the second buyback auction on March 16 the yield curve beyond the 2-year sector had inverted, with yields on longer-term securities now significantly *lower* than yields on shorter-term securities. (Over the same interval the yield curve out to two years remained positively sloped – see the upper panel of Figure 7. The curve reverted to a positive slope in 2001 when the Fed began to lower short-term interest rates in response to a weakening economy.)

Treasury officials did not undertake any systematic *ex post* assessment of the costs and benefits of the buyback program. However, in November 2000, Gary Gensler, the Under Secretary of the Treasury for Domestic Finance, stated that,

We continue to be pleased with the results [of the buyback program] to date. Buybacks have been beneficial in a number of ways:

- First, debt buybacks have helped us manage the maturity structure of Treasury's outstanding debt, bringing more balance to our debt paydown... Absent buybacks, all of the paydown would have been in maturing shorter-term debt. Indeed, to date the average life of outstanding Treasury debt would have lengthened by an additional 2 months without the buyback program.

²⁴ See, especially, "A Bond Master Reflects on Flirting with Disaster," *New York Times*, February 27, 2000, p. BU1.

²⁵ See "Bonds' Rise Sends Traders Into Turmoil," *New York Times*, February 4, 2000, p. C1 (reporting that "Chaos swept through the bond market yesterday as traders and investors tried to make sense of a spectacular and damaging rise in the price of longer-term Treasury bonds."), "Rumors of Big Losses in Treasury Trading Fray Nerves on Street," *Wall Street Journal*, February 4, 2000, p. C1, and "After Turbulent Week, Treasury Says Bond Market Will be Orderly with Less Supply," *New York Times*, February 7, 2000, p. C12.

- Second, buybacks have enabled us to add to the liquidity of our benchmark issues. In fact, buybacks have enabled us to issue securities that we may not have otherwise been able to continue issuing.²⁶

3. Tactical Debt Management Buybacks

Although the buybacks of 2000-2001 were prompted by budget surpluses, buybacks can contribute to Treasury debt management objectives even in the absence of a surplus. For example, buybacks can facilitate Treasury efforts to maintain the liquidity of the new issue markets when deficits are declining.

The problem of maintaining new issue liquidity in the face of declining deficits arises because Treasury debt managers have three ways of responding to declining deficits:

- shrink new issue sizes,
- reduce the frequency at which a series is issued, or
- discontinue a series.

The first action can be scaled to the pace of the decline in financing requirements, but the last two are, of necessity, discrete, discontinuous actions that can sometimes appear to be either “too early” and not justified by contemporaneous data or “too late” and behind the curve. If the Treasury acts too soon to discontinue a series, the resulting increase in offering sizes of other series may overburden the markets for those series. On the other hand, the cost of delay in discontinuing a series is an interim reduction in offering sizes that can jeopardize liquidity.

To better appreciate the problem of series management, it will be instructive to review the recent evolution of Treasury finance. Figure 8 shows offerings of 2-year notes since 1995. Three aspects of that graph are particularly prominent:

1. the declining size of offerings between 1996 and 1998 that stemmed from the budget surpluses described in the previous section,²⁷

²⁶ “Remarks at the November 2000 Treasury Quarterly Refunding,” November 1, 2000, available at www.treas.gov/press/release/ls995.htm.

2. the rapid rise in offering sizes after mid-2001 that stemmed from a slowdown in economic activity and growing budget deficits, and
3. the decline in offering sizes since mid-2003.

Offerings of 2-year notes initially declined after mid-2003 because Treasury officials decided to diversify their financing operations, restarting the 3-year series (Figure 9),²⁸ moving 5-year notes back to a monthly offering schedule (Figure 10),²⁹ and reopening 10-year notes in the third month of each of each quarter (Figure 11).³⁰ After the end of 2003, however, the Treasury began offering progressively less of *every* series as a result of declining deficits. From early 2004 to the spring of 2007, offerings of 2-year notes fell from \$26 billion per month to \$18 billion, offerings of 3-year notes fell from \$24 billion per quarter to \$15 billion, offerings of 5-year notes fell from \$16 billion per month to \$13 billion, and offerings of 10-year notes fell from \$27 billion per quarter to \$21 billion.

The declining offering sizes thrust upon Treasury officials the same problem their predecessors faced in 1998: how to maintain new issue liquidity when financing requirements are contracting. In January 2007, Assistant Secretary of the Treasury Anthony Ryan noted that “Treasury has made recent cuts in ... coupon issuance. Continued strength in the fiscal outlook may necessitate additional adjustments to our marketable borrowing. Treasury may need to

²⁷ The increase in offering size in mid-1998 is a result of the reallocation of financing requirements that followed the discontinuation of 3-year note offerings and the change to offering 5-year notes at a quarterly, rather than monthly, frequency.

²⁸ “Quarterly Refunding Statement,” February 5, 2003, available at www.treas.gov/press/releases/js09.htm.

²⁹ In February 2003 the Treasury announced that it would reopen the mid-quarter offering of 5-year notes in the middle of the third month of a quarter (“Quarterly Refunding Statement,” February 5, 2003, available at www.treas.gov/press/releases/js09.htm), but announced in April 2003 that it would move 5-year notes to a regular monthly offering schedule in August (“Quarterly Refunding Statement,” April 30, 2003, available at www.treas.gov/press/releases/js223.htm).

³⁰ “Quarterly Refunding Statement,” April 30, 2003, available at www.treas.gov/press/releases/js223.htm.

*reduce auction sizes further or institute changes in the frequency or composition of the current auction cycle.”*³¹ Three months later Treasury officials discontinued the 3-year series, saying that the action would “allow Treasury to ensure large liquid benchmark issuances ...”³²

The Case for Tactical Debt Management Buybacks

When financing requirements are declining, buybacks offer a way for debt managers to postpone a decision to discontinue a series – or to reduce the frequency at which a series is offered – without also being compelled to shrink new issue sizes. If Treasury officials believe, but are not highly confident, that a series should be discontinued, they might decide to continue to issue securities in that series *at the existing rate* for several more months or quarters, using the “extra” proceeds to buy back outstanding debt.³³ If the budget picture evolves as expected, officials can subsequently discontinue the series with greater confidence. If it reverses course, they can reduce or terminate the buyback program. We suggest that this is preferable to discontinuing the series too soon (and running the risk of overburdening other series and/or reversing course in a few months or quarters), as well as preferable to waiting to discontinue the series, shrinking new issue sizes in the interim and possibly impairing the liquidity of the new issue markets.

More generally, buybacks can provide debt managers with a way to adjust *net* issuance to the pace of a decline in financing requirements without jeopardizing the liquidity of the new issue markets and without taking large, discontinuous actions (like discontinuing a series or

³¹ “February 2007 Quarterly Refunding Statement,” January 31, 2007, available at www.treas.gov/press/releases/hp233.htm. Emphases added.

³² “May 2007 Quarterly Refunding Statement,” May 2, 2007, available at www.treas.gov/press/releases/hp375.htm.

³³ Since there would be no intent to affect average maturity, the buybacks could be spread across the entire yield curve, limiting the likelihood that they would have the same dramatic effect on the shape of the curve as the 2000-2001 program. As was the case with the 2000-2001 program, any single operation would likely focus on only a narrow segment of the curve. Successive operations would likely focus on contiguous segments.

reducing the frequency at which a series is issued) in advance of what is clearly justified by the data.

Disadvantages of Tactical Debt Management Buybacks

Using buybacks as a tool for tactical debt management has two potential disadvantages. First, buybacks move the Treasury away from its practice of avoiding arbitrary changes to the outstanding amount of an issue.³⁴ Buybacks have inherently unpredictable outcomes and hence go in the opposite direction.³⁵ In addition, like any market operation, buybacks open the possibility for costly operational mistakes and errors – both by the Treasury and by private market participants. The likelihood of mistakes and errors is not large, but neither is it zero.

4. Strategic Debt Management Buybacks

Having broached the question of using buybacks as a *tactical* debt management tool to manage new issue liquidity, we can push the envelope a bit and ask whether buybacks might also be used more strategically to boost offering sizes on a *routine* basis. That is, would it make sense for Treasury to regularly buy back – monthly or quarterly – outstanding, off-the-run, debt and fund the repurchases with larger offerings of new issues? ³⁶ The objective would be to

³⁴ Since the mid-1970s, Treasury has emphasized “regular and predictable” sales of new issues as a way to minimize borrowing costs. Garbade (2007).

³⁵ On the other hand, buybacks would likely be limited to less actively traded issues, for which supply uncertainty may be relatively less important.

³⁶ This is not a new idea. In the summer of 1999 the *New York Times* reported that “Wall Street has been pushing for some new tool that would allow the Treasury to streamline the inventory of bonds that are in the public’s hands ... The hope ... was that the Treasury would be able to buy back the ‘odds and ends’ – bonds in the less popular maturities – and replace them with bonds that have become more useful as hedging instruments.” “The Dwindling Market in U.S. Treasury Bonds,” *New York Times*, August 5, 1999, p. C1. See also “How to Play the Treasury Bond Buyback,” *New York Times*, August 15, 1999, p. BU8 (quoting one market participant’s description of the nascent buyback program: “They’re taking inactive [bonds] out and issuing more on-the-run.”)

actively promote – not just maintain – the liquidity of the new issue markets and thereby enhance the auction market value of new Treasury issues.

In principle, there is no reason why Treasury could not seek to expand new issues at the expense of outstanding securities. However, Treasury officials may have difficulty identifying the maximum appropriate scale for such a program.

Identifying the Maximum Appropriate Scale of a Strategic Debt Management Buyback Program

Ceteris paribus, the Treasury can benefit from buying back off-the-run debt and expanding new issue offerings if it can sell new issues at lower yields than the yields at which it can buy back off-the-run debt of a similar maturity.³⁷

Figure 12 shows note and bond yields in the 10-year sector of the yield curve on June 29, 2007. The on-the-run 10-year note, the 4½ percent note of May 15, 2017, clearly traded at a lower yield than the old 30-year bond that matures on the same date. The off-the-run 10-year notes maturing in November 2016 and February 2017 also traded at relatively low yields, but older 10-year notes traded at yields comparable to those on 30-year bonds with the same maturities. This suggests that the Treasury could have benefited from issuing more 10-year notes in May 2007 and using the proceeds to buy back either 30-year bonds maturing in May 2017 or a mix of (a) 10-year notes and 30-year bonds maturing before November 2016 and (b) 30-year bonds maturing in 2018.

³⁷ Treasury officials commented at the time they adopted the final version of the buyback rule in January 2000 that, “although not a primary reason for conducting buybacks, we may occasionally be able to reduce the government’s interest expense by purchasing ‘off-the-run’ debt and replacing it with lower-yielding ‘on-the-run’ debt.” “Marketable Treasury Securities Redemption Operations; Final Rule,” *Federal Register*, January 19, 2000, p. 3114. However, as described in more detail in footnote 44, the marginal value to the Treasury of offering an additional unit of a new issue and using the proceeds to buy back comparable off-the-run debt will diverge from the new issue premium if the new issue premium depends on the total size of the offering.

There are two reasons why new Treasury issues sometimes trade at lower yields than off-the-run issues. The first reason, noted in the preceding section, is the greater liquidity of new issues. The second reason is that investors can frequently earn ancillary income by lending new issues to short sellers. Because new issues are so liquid, dealers and other market participants commonly sell on-the-run Treasury issues short to hedge some of the (interest rate) risk of holding other fixed income securities long. Since a seller of Treasury securities does not get paid until it delivers the securities that it sold, short sellers need to borrow securities (to deliver against their short sales). Over the past three decades this has led to the development of a highly sophisticated market for borrowing and lending Treasury securities.³⁸ Security borrowers pay security lenders a fee for the loan of their securities, either directly or by lending money to the security lenders at interest rates below where the security lenders can relend the money.³⁹ The fees are an ancillary source of income to holders of sought-after securities and make the securities relatively more valuable.⁴⁰

Larger offerings of new issues will increase the outstanding supply of those issues and could lead to lower borrowing fees.⁴¹ Any such reduction in borrowing fees will, on the margin,

³⁸ Duffie (1996), Keane (1996), Fisher (2002), Fleming and Garbade (2004), Moulton (2004), and Garbade (2006).

³⁹ The latter transactions are “special collateral repurchase agreements.”

⁴⁰ Duffie (1996), Jordan and Jordan (1997), Krishnamurthy (2002), and Cherian, Jacquier, and Jarrow (2004).

⁴¹ It is instructive to note that the Treasury has twice acted to increase, or accelerate an increase in, the supply of an issue following severe shortages in the securities loan market (evidenced by a high borrowing fee or, equivalently, a low rate on special collateral repurchase agreements). In November 1992 Treasury reopened the 6³/₈ percent note of August 2002 “to alleviate an acute, protracted shortage” of the note. “Treasury November Quarterly Financing,” *Public Debt News*, Department of the Treasury, November 3, 1992, and “Talking Points for the Financing Press Conference,” November 3, 1992, available at www.treas.gov/offices/domestic-finance/debt-management/historical-documents/policy-statements/ps-1992-q4.pdf. See also, “Treasury to Expand Offering to Stem Shortage of Note,” *New York Times*, November 4, 1992, p. D1 (noting that the special collateral repurchase agreement rate for the note “has not been far above zero for several weeks.”). In October 2001 Treasury reopened the 5 percent note of August 2001 a month ahead of

reduce the attractiveness of new issues.⁴² Thus, it is not necessarily the case that larger offerings of new issues (coupled with bigger buybacks) will always be better for Treasury than smaller offerings (coupled with smaller buybacks).

The key question that Treasury has to face in implementing a program of strategic debt management buybacks is whether it can identify, to some reasonable approximation, the point at which the cost to the Treasury of additional issuance (in the form of lower auction prices attributable to reduced borrowing fees on new issues or otherwise) exceeds the gain to the Treasury from additional issuance (in the form of higher auction prices attributable to greater liquidity). It is not difficult to identify when an on-the-run Treasury security is relatively expensive to off-the-run issues of a similar maturity. There is, however, no reliable method for identifying the *marginal* consequences of additional supply for the size of the new issue premium and thus no reliable method for identifying the maximum appropriate scale of a strategic buyback program.⁴³

schedule to alleviate a “chronically high fails rate” following the attacks of September 11, 2001. “U.S. Sells \$6 Bln in 10-Year Notes to Help Overcome Shortage,” *Bloomberg*, October 4, 2001, 1:16 p.m. Chronic fails are associated with high security borrowing fees. Fleming and Garbade (2002, 2004, 2005).

⁴² Several authors, including Simon (1991, 1994), Duffee (1996), and Fleming (2002), have reported adverse supply effects on Treasury bill prices.

⁴³ Let Q denote the amount of an offering and $P(Q)$ the new issue premium, per unit security, as a function of Q . (For expositional convenience we assume that there is an off-the-run issue with the same coupon rate and maturity date as the new issue. The new issue premium is the difference between the price of the new issue and the price of the comparable off-the-run security.) We expect that $P(Q)$ is initially an increasing function of Q – due to the superior liquidity of larger issues – but that it may begin to decline at some point – due to the erosion of fee income received by security lenders.

The total value to the Treasury of the new issue premium is $V = Q \cdot P(Q)$. The marginal value of offering an additional unit of the new issue and using the proceeds to buy back the comparable off-the-run security is the first derivative of V with respect to Q : $\frac{dV}{dQ} = Q \cdot \frac{dP}{dQ} + P$. This shows immediately that the new issue premium P is *not* the correct measure of marginal value; we also have to account for the effect of an additional unit of the new issue on infra-marginal issuance. If an additional unit of the new issue depresses the

5. Cash Management Buybacks

This section assesses the prospective benefits of making more active use of Treasury buybacks during intervals of unusually strong receipts, such as in the second half of April and early May when most individuals make their final payments of taxes due on income earned in the preceding calendar year. We begin with a brief discussion of some relevant features of Treasury cash management.

Treasury Cash Management

Treasury cash management presents important public policy issues primarily because the amounts involved are immense. For example, in fiscal 2006 aggregate federal receipts and expenditures averaged \$23 billion per business day, exclusive of settlements of new issues and redemptions of maturing issues. Receipts come primarily from personal and corporate income taxes and social security contributions. Money is disbursed to pay for purchases of goods and services, civilian and military salaries, transfer payments such as social security, and interest on the national debt.

The Treasury maintains two types of deposit accounts to hold funds until needed and to make payments:

- (1) a Treasury General Account (TGA) at the Federal Reserve, and

new issue premium, i.e., if dP/dQ is negative, and if Q is large enough, the additional unit could have a *negative* marginal value to Treasury even if P is positive at the given Q .

If V is a maximum at Q^* , then the first derivative of V with respect to Q vanishes at Q^* : $Q \cdot \frac{dP}{dQ} + P = 0$ when $Q = Q^*$. This implies that the elasticity of the new issue premium with

respect to the offering amount is -1 at Q^* , i.e., that $\frac{dP}{dQ} \cdot \frac{Q}{P} = -1$ when $Q = Q^*$, so that a 1

percent increase in the offering amount is associated with a 1 percent decrease in the new issue premium, leaving the total value of the premium unchanged (to a first order approximation). The key problem for Treasury is identifying the maximum appropriate offering amount Q^* .

(2) Treasury Tax and Loan (TT&L) Note Accounts at commercial banks and other depository institutions.⁴⁴

Some receipts are deposited directly into the TGA while others are deposited into TT&L accounts. Virtually all payments are made from the TGA. TT&L balances are subject to “call,” or transfer to the TGA, when the TGA needs to be replenished. The Treasury’s Total Operating Balance (hereafter, “cash balance”) is the sum of the cash it holds at the Fed and in TT&L accounts.

The Treasury generally seeks to keep its cash balance at a minimum because it typically earns less on that balance than it pays on its note and bond borrowings. TT&L balances earn interest at rates that range between (a) 25 basis points less than the Federal funds rate and (b) a few basis points less than the Federal funds rate.⁴⁵ On average over the interval from January 1990 to June 2007, 2-year notes yielded 51 basis points *more* than Federal funds and 10-year notes yielded 144 basis points *more* than Federal funds. Treasury bills were a break-even proposition: on average over the same interval, 3-month Treasury bills yielded 16 basis points *less* than Federal funds and hence cost the Treasury about what it earns on TT&L balances. Figure 13 shows monthly average bill and note yield spreads to Federal funds between 1990 and 2007.

Inflows of funds in excess of contemporaneous expenditures necessarily lead to either a reduction in Treasury debt or an increase in Treasury’s cash balance, and in either case lead to a reduction in Treasury debt *net* of its cash balance (hereafter, “net Treasury debt”). For example,

⁴⁴ Note Account balances include tax receipts credited directly to TT&L accounts as well as discretionary transfers from the TGA, such as direct investments, special direct investments, term investments, and repo investments. Garbade, Partlan, and Santoro (2004) describe the Treasury Tax and Loan system.

⁴⁵ Garbade, Partlan, and Santoro (2004) and Hrung (2007). Treasury balances at the Fed implicitly earn interest because the Fed has to replace the reserves removed by the Treasury from the banking system with open market purchases and repurchase agreements – both of which result in income to the Fed – and because the Fed returns income in excess of expenses to the Treasury.

as shown in Figure 14, strong tax receipts in the second half of April and early May 2007, pushed net Treasury debt (shown in red) down from \$5,080 billion to \$4,880 billion.

To the extent that receipts are predictable and not too large, episodes of declining net indebtedness can be accommodated through debt contraction alone and without any substantial expansion in Treasury cash balances. Treasury debt managers routinely issue securities targeted to mature when receipts are expected to arrive and reduce issuance of new securities after receipts begin to arrive. For example, as shown in Table 1, the Treasury issued \$72 billion of cash management bills between March 30 and April 13, 2007, to mature between April 16 and April 18. Redemption payments on the maturing bills prevented any significant increase in Treasury cash balances (shown in green in Figure 14) when income tax payments began to arrive during the week of April 16 to April 20. Additionally, as shown in Figure 15, officials reduced their weekly offerings of 4-week Treasury bills from \$25 billion in March to \$8 billion between mid-April and early May. The reductions resulted in a net paydown of \$70 billion. More modest reductions in 13- and 26-week bills over the same interval resulted in additional paydowns of \$13 billion and \$11 billion, respectively (Figures 16 and 17).

However, Treasury receipts are sometimes so large or so unexpected that they overwhelm the ability of debt managers to structure debt maturities and debt issuance in an accommodative fashion. In particular, officials may be reluctant to cut new issue sizes sharply enough to absorb all of the incoming funds. Deep cuts in offering amounts are not an attractive policy option for the Treasury because they can reduce issue sizes to levels at which securities become illiquid and because such cuts are unattractive to investors who want to be able to roll over maturing investments on a predictable basis.⁴⁶

⁴⁶ In an extreme case, the Treasury could cancel a new issue outright. Treasury officials cancelled sales of 2-year notes in March and June, 1973, following unusually strong sales of special nonmarketable issues to foreign central banks. 1973 Treasury Annual Report, pp. 12 and 22, and “Treasury Postpones \$2 Billion Note Offering,” *Wall Street Journal*, April 2, 1973, p. 17. However, consistent with the emphasis placed on “regular and predictable” as a debt management strategy since the second half of the 1970s (Garbade, 2007), Treasury has

Figure 18 shows daily Treasury cash balances from the beginning of 1996 to mid-2007. The figure suggests that unusually high balances tend to appear between April 15 and May 15, when most individuals make their final payments of taxes due on income earned in the preceding calendar year. With eight exceptions, the largest one percent of daily balances all fell between mid-April and mid-May.⁴⁷ The three largest balances, held on April 30 and May 1 and 2, 2007, exceeded \$115 billion.⁴⁸

Stabilizing Reserve Balances in the Face of Fluctuations in Treasury Cash Balances.

Rising Treasury cash balances have important consequences for the Federal Reserve System because, *ceteris paribus*, they drain reserves from the banking system: a deposit to the TGA is settled by a transfer of funds from the Federal Reserve account of the payor's bank to the Treasury's Fed account. Unless reversed by a transfer back to the banking system – or otherwise offset by Federal Reserve open market operations – any such reserve drain will contribute to upward pressure on the Federal funds rate. (Conversely, a declining TGA supplies reserves to the banking system and, unless reversed or offset, puts downward pressure on interbank rates.)

not subsequently cancelled an offering merely to run off cash balances. (Treasury has cancelled offerings because of interest rate ceilings, including 20- and 30-year bonds between April and August 1982, 20-year bonds in March 1986, and 30-year bonds in August 1988. It also cancelled an offering of 4-week bills in the wake of the terrorist attacks of September 11, 2001.)

⁴⁷ The exceptions are the last six days in 1999, when Treasury was holding large precautionary balances at the turn of the millennium, and two other dates, June 21, 2000, and January 21, 2007, that also fell during periods of heavy tax receipts.

⁴⁸ The bulge in Treasury's cash balance at the end of April 2007 was exacerbated by a net issuance of \$17.4 billion in new securities on April 30, 2007. On April 24, 25, and 26, 2007, the Treasury auctioned \$8 billion of 5-year Treasury Inflation-Protected Securities (TIPS), \$18 billion of 2-year notes, and \$13 billion of 5-year notes, respectively, to refund \$21.6 billion of maturing securities and to raise new cash. All three offerings settled on April 30. The new cash would be needed to fund future expenditures, but came at an inopportune time. Maintenance of issue size may have been important in Treasury's decision to proceed with the auctions of TIPS, 2-year notes, and 5-year notes in late April.

Since World War I, the Treasury has sought to offset fluctuations in reserves available to the banking system attributable to fluctuations in Treasury cash balances by actively stabilizing its Fed balance. In recent years the Treasury has targeted a TGA balance of \$5 billion and sought to transfer any significant accumulation in excess of that amount to depository institutions. (Conversely, if the TGA is expected to fall significantly *below* \$5 billion, the Treasury transfers funds *from* TT&L accounts at depository institutions to the TGA.)

Since November 2003, the Term Investment Option (TIO) has been the primary instrument for shifting Treasury balances to depository institutions.⁴⁹ When the Treasury has cash balances that it projects it will not need for several days or weeks, it auctions the balances to a panel of participating institutions on a competitive rate basis for a specified interval of time. Table 2 shows that, between April 20 and May 29, 2007, the Treasury placed a total of \$108 billion in 22 TIO auctions. Figure 19 shows the variation in cumulative TIO placements from day to day. Placements peaked at \$68 billion at the close of business on May 7 and May 8.

There are, however, limits to the ability of the Treasury to use the TT&L system to stabilize the TGA. Depository institutions have to pledge collateral against TIO awards and other TT&L deposits and generally limit the amount of collateral they make available. This places an upper limit on the capacity of the TT&L system to accept funds from the Treasury. During periods of strong receipts, Treasury may accumulate a cash balance in excess of the sum of the TGA target balance and what can be maintained at TT&L depositories. Treasury then has no choice but to leave more than the target balance in the TGA.

In April 2007 the Federal Reserve anticipated that Treasury cash balances in late April and early May would be so large that the TGA would significantly exceed the \$5 billion target level. (As shown in Figure 20, the TGA in fact exceeded \$12 billion on April 25 and averaged \$27 billion on April 30 and May 1 and 2.) To forestall a drain on bank reserves, the Fed undertook offsetting open market operations. On April 25 it supplied \$14.5 billion in eight-day

⁴⁹ Hrung (2007). The TIO program is part of the overall TT&L system.

repurchase agreements that would terminate on May 3 and it contracted to supply an additional \$18.0 billion on forward settling repurchase agreements that would start on April 30 and end on May 3. The Fed used multi-day and forward settling repurchase agreements because the prospective need to offset high TGA balances came at an inopportune time: when Treasury bill issuance was low and the availability of collateral for repurchase agreements was limited. The Fed was concerned that if it tried to provide reserves on a day-to-day basis exclusively with overnight repurchase agreements, it might not be able to provide all that was needed.⁵⁰

The net effect of the Fed's operations is shown in the last column of Table 3. Excluding April 25 and 30 and May 1 and 2, the Fed supplied an average of about \$22.7 billion per day through repurchase agreements with primary dealers between April 23 and May 4. To offset high TGA balances, it supplied an *additional* \$15 billion on April 25 and an average of an *additional* \$26 billion per day on April 30 and May 1 and 2.

Managing Large Treasury Cash Balances with Buybacks

Large cash balances are costly for the Treasury when the Federal funds rate is materially below what the Treasury is paying on its notes and bonds and, in extreme cases, can force the Federal Reserve to conduct unusually large open market operations at inopportune times. However, Treasury officials have only a limited number of policy instruments and actions to cope with large balances, including (as discussed above) issuing debt to mature when receipts are arriving and reducing issuance of new securities after receipts begin to arrive. (In addition, as discussed in Appendix 2, Treasury at one time issued *callable* short-term debt.)

The Treasury could use buybacks to supplement other efforts to limit large cash balances. In the 2000-2001 buybacks, the Treasury repurchased \$1.5 billion of deeply off-the-run bonds in a typical operation and conducted two operations per month, spaced about a week apart in the

⁵⁰ As things turned out, TGA balances on April 26 and 27 and on May 2 were not as large as expected and the Fed drained off – with reverse repurchase agreements – some of the reserves it had previously supplied on those days.

second half of a month. It does not seem unreasonable to suppose that the Treasury could repurchase as much as \$3 billion of securities per week if it solicited short- and intermediate-term notes as well as bonds, gave market participants one or two days notice of an impending operation, and provided for settlement two business days after a reverse auction.⁵¹ (At the present time the Federal Reserve routinely executes outright purchases for the System Open Market Account of up to \$2 billion of Treasury securities for next-day settlement on 30 minutes notice to market participants.) Spread over a three week period running from mid-April to early May, these operations could potentially absorb \$9 billion of tax payments. This wouldn't have been enough to avoid the need for offsetting open market operations in April 2007 but it would have reduced the size of the operations by about a third. And when the Federal funds rate is materially below what the Treasury is paying on its notes and bonds, buybacks could result in significant interest savings over the interval before Treasury has to issue new debt to replace the funds expended in the buybacks.⁵²

⁵¹ The manual processing step that delayed the fourth buyback operation in 2000 (noted in footnote 16 above) has been eliminated and no longer precludes buybacks involving more than \$2 billion of securities or more than a dozen eligible issues.

⁵² It should be noted that the Treasury used buybacks to absorb cash balances on one occasion in the past, when the yield on 2-year notes was about 1½ percent above the funds rate and the yield on 10-year notes was about 3½ percent above the funds rate. In October 2001, as a result of moderating economic activity, Treasury officials announced that the decision to undertake buybacks after January 2002 would depend on budget and *cash balance* projections, as well as on an assessment of how best to minimize borrowing costs over time. "Remarks at the November 2001 Quarterly Refunding," October 31, 2001, available at www.treas.gov/press/releases/po749.htm. (The reference to cash balance projections reflected a modest shift in program emphasis. Treasury officials had noted in 1999 that the contemplated buyback program could contribute to cash management objectives. "Statement of Lawrence H. Summer, Secretary of the Treasury," August 4, 1999, available at www.treas.gov/press/releases/l42.htm, and "Remarks at the August 1999 Treasury Quarterly Refunding," August 4, 1999, available at www.treas.gov/press/releases/l43.htm. However, cash management was not subsequently mentioned as a significant policy objective until October 2001.) The Treasury decided to conduct three buyback operations in the second half of April 2002 and reduced its cash balance by \$4 billion as a result of the operations.

Cash management buybacks would be less disruptive to the new issue markets than sharp reductions in the sizes of new issues. However, buybacks are more complicated than reducing offering amounts and, as noted in Section 3, would move the Treasury away from its practice of not altering unpredictably the outstanding amount of an issue and open the possibility for potentially costly mistakes and errors.

Cash management buybacks also have two unique disadvantages:

1. The need to replace, at some later date, the notes bought back would increase month-to-month variation in note issuance.
2. The Treasury would suffer economic loss if replacement notes are sold at yields higher than the yields on the notes bought back.

Unlike debt management buybacks, cash management buybacks are a way to *reduce* Treasury indebtedness *and* Treasury cash balances. (Debt management buybacks would change the form of Treasury indebtedness – from off-the-run debt to on-the-run debt – but keep total indebtedness, as well as Treasury cash balances, constant.) However, in the absence of a budget surplus Treasury will ultimately need to reacquire those cash balances (to fund ongoing expenditures) and thus will have to restore the previously extinguished indebtedness. The separation, in time, of a buyback and the subsequent refinancing exposes the Treasury to risk that it would not otherwise have to bear.

6. Smoothing Week-to-Week Fluctuations in Treasury Bill Offerings

The previous section suggested that buybacks can supplement “other efforts” to limit large Treasury cash balances. The “other efforts” include, especially, reductions in new Treasury bill offerings. This section pushes the analysis a bit further and asks whether buybacks could provide a *substitute* for reductions in bill offerings when cash balances are high, and thereby smooth fluctuations in bill supply.

Figures 21, 22, and 23 show weekly bill offerings from 2002 to mid-2007. There has been non-trivial variation in offerings of 13- and 26-week bills, but offerings of 4-week bills

have been especially volatile.⁵³ Moderating the variation would be consistent with Treasury's continuing commitment to enhancing the regularity and predictability of its offerings.

The idea of using buybacks to maintain a more stable new issue calendar is not complex. Instead of, for example, reducing an offering of 13-week bills from \$18 billion to \$15 billion, the Treasury might choose instead to issue \$18 billion of bills and use the extra \$3 billion to repurchase \$3 billion of short- and intermediate-term notes. Three months later, the Treasury could redeem the extra \$3 billion of maturing bills by issuing new notes.

Using buybacks to smooth bill issuance looks to be feasible for 13- and 26-week bills. We noted in the previous section that a buyback program of about \$3 billion per week does not seem unreasonable – particularly if the buybacks are temporary and would be effectively extinguished in the proximate future with new issuance. Figures 22 and 23 show that \$3 billion would be adequate to fill in a reasonable fraction of the low points of 13-week and 26-week bill issuance. Given some flexibility about the exact time of refinancing a maturing block of “extra” bills, it doesn't seem unreasonable to suppose that a refinancing could be accommodated with additional 2-year and 5-year notes offered on a monthly schedule.⁵⁴ In contrast, however, the prospect for smoothing fluctuations in offerings of 4-week bills is less sanguine because, as shown in Figure 21, the range of variation in 4-week offerings is far in excess of \$3 billion.

Using buybacks to smooth fluctuations in Treasury bill offerings is a matter of temporarily increasing bill issuance at the expense of other, already outstanding, securities. As pointed out above, when the extra bills mature, the Treasury will have to issue other securities – essentially replacing the securities that it bought back earlier. Thus, buybacks used to smooth fluctuations in bill offerings raise issues similar to those raised by cash management buybacks:

⁵³ The greater volatility of 4-week bill offerings is not necessarily an unfavorable state of affairs. It may be that Treasury has concluded that using 4-week bills to bear the brunt of fluctuations in financing requirements contributes to least cost financing over time.

⁵⁴ It should be noted that this could temporarily inflate Treasury cash balances if the refinancing notes have to be issued two or three weeks before the “extra” bills mature.

they would increase variation in issuance of other securities and they would expose the Treasury to risks that it would not otherwise have to bear.

7. Summary and Conclusions

This paper assessed the prospective use of buybacks for Treasury cash and debt management in the absence of a budget surplus. We considered four possible applications:

- managing the liquidity of the new issue markets when financing requirements are shrinking,
- actively promoting the liquidity of the new issue markets,
- reducing Treasury cash balances, and
- smoothing week-to-week fluctuations in Treasury bill offerings.

Stripped down to basics, buybacks are a device to reduce the quantity of off-the-run Treasury debt and either increase the quantity of some other Treasury liability or decrease the quantity of a Treasury asset. In the case of the third application the off-setting change is a decrease in Treasury cash balances. In the other three cases the off-setting change is an increase in on-the-run Treasury debt, either to maintain or promote the liquidity of the new issue markets (the first two cases) or to reduce week-to-week fluctuations in Treasury bill offerings (the fourth case).

Buybacks conducted to reduce cash balances or to smooth bill offerings give rise to a requirement to raise new cash in the future – either to replenish Treasury’s cash balance or to refinance maturing bills – that exposes the Treasury to the possibility of economic loss if the yield on a new issue exceeds the yield on repurchased debt of a similar maturity. (There is also, of course, a symmetric opportunity for gain if the yield on a new issue is less than the yield on repurchased debt.) This risk is largely absent in the two cases of debt management buybacks because the buybacks and the related new issues are more nearly contemporaneous.

We considered two types of debt management buybacks. The first would be used sporadically, at times when Treasury officials think, but are not highly confident, that it may be

efficient to discontinue a series or reduce the offering frequency of a series. Tactical debt management buybacks would allow the Treasury to continue issuing securities at the existing rate pending the acquisition of additional information on receipts and expenditures. The second type of debt management buyback would be used more regularly, to enhance new issue sizes at the expense of off-the-run securities. The difficulty with such strategic buybacks is knowing when to stop, i.e., identifying the point past which further increases in the size of a new issue conflicts with the debt management objective of least cost financing.

Appendix 1. Treasury Buybacks in the 1920s

During the 1920s the Treasury regularly applied surplus funds to the repurchase of outstanding Treasury securities, buying back securities in conventional secondary market purchases and reverse auctions and with tender offers.

Secondary Market Purchases. The New York Stock Exchange was the most liquid secondary market for Treasury bonds during World War I and for several years thereafter. During the first half of the 1920s the Treasury insisted that its bond buybacks be executed on the Exchange. In 1922, Under Secretary of the Treasury S. Parker Gilbert stated his belief that “the Treasury gets the best execution of its orders if handled on the exchange.” Gilbert felt that “The execution of orders on the stock exchange leaves the Treasury undisclosed in the operation, gives a public record of the transaction, and insures reflection of the order in the controlling market for the bonds.”⁵⁵

In contrast to bond trading, the New York Stock Exchange never sponsored trading in short-term Treasury certificates of indebtedness or intermediate-term Treasury notes. In the spring of 1920 the Treasury began to relax its wartime opposition to trading in certificates below par and, more generally, to the development of an open secondary market for the securities.⁵⁶ By

⁵⁵ Letter dated October 17, 1922, from S. Parker Gilbert, Under Secretary of the Treasury, to Benjamin Strong, Governor, Federal Reserve Bank of New York (Federal Reserve Bank of New York file 410.5). See also letter dated September 28, 1922, from Gilbert to J. H. Case, Deputy Governor, Federal Reserve Bank of New York (Federal Reserve Bank of New York file 410.5) (expressing the view that “New York being the central market for the country, it would naturally be designated by the Treasury from time to time to carry out given operations.”).

⁵⁶ “Favor Open Market for Federal Paper,” *New York Times*, March 3, 1920, p. 20 (Treasury seen as “likely to announce its willingness to pursue a more lenient attitude than in the past”), “See Open Market for Certificates,” *New York Times*, May 13, 1920, p. 23 (“[I]t is understood that the Treasury officials have receded somewhat from their attitude regarding the ‘pegging’ of certificates at par.”), Federal Reserve Bank of New York (1940, p. 5) (“As the first move toward a free market the Treasury indicated in April and May, 1920, that it would not continue its policy of discountenancing open market trading by dealers in outstanding certificates of indebtedness at prices below par.”) and Harris (1948, pp. 7-8)

mid-May the *Wall Street Journal* was reporting that, “Quite an extensive open market for United States Government Treasury certificates of indebtedness is being established here.”⁵⁷ The following year the Treasury began a program of issuing intermediate-term notes as part of its post-war debt management program⁵⁸ and actively encouraged the development of a liquid over-the-counter market for the new securities.⁵⁹

After 1922, trading in Treasury bonds began to migrate from the New York Stock Exchange to the over-the-counter market, in part as a result of Treasury reliance on certificates and notes for its financing needs: investors wanted to trade bonds in the same venue as their more active trading in certificates and notes. Additionally, an over-the-counter dealer market for Treasury bonds seemed to better serve the interests of institutional investors than auction trading on the floor of the Exchange.⁶⁰ In a particularly illuminating episode in June 1923, the British

(“Early in 1920 as a first move toward a free market, the Treasury indicated that it would not continue its policy of discountenancing open market trading by dealers in outstanding issues of certificates of indebtedness at prices below par.”)

⁵⁷ “Open Market for U.S. Bills Growing,” *Wall Street Journal*, May 13, 1920, p. 11.

⁵⁸ “Drastic Revision of Federal Taxes Urged by Mellon,” *New York Times*, May 2, 1921, p. 1 (reporting the statement of Secretary of the Treasury Andrew Mellon that “It will ... be the Treasury’s policy to vary its monthly offerings of Treasury certificates of indebtedness from time to time when market conditions are favorable with issues of short-term notes in moderate amounts with maturities of from three to five years, with a view to gradual distribution of the short-dated debt through successive issues of notes in convenient maturities extending over the period from 1923 to 1928... This program will make the short-dated debt more manageable and facilitate the refunding operation which will be necessary in connection with the maturity of the Victory Liberty Loan.”)

⁵⁹ Federal Reserve Bank of New York (1940, pp. 6-7) (“When in June, 1921, a program of issuing Treasury notes ranging in maturity from three to five years was inaugurated by the Treasury, the Reserve Banks were asked by the Secretary [of the Treasury] to cooperate in establishing a market for Treasury notes in the same way that the certificate of indebtedness market had been developed.”).

⁶⁰ A dealer could step in to buy, with its own capital, a large block of bonds from an impatient seller, it could supply bonds from its own inventory to an impatient buyer, and it could keep in virtually continuous contact with potential counterparties around the country throughout the day. See, for example, the discussions in Federal Reserve Bank of New York (1940, pp. 7-9) and Harris (1948, p. 10-12). Beckhart, Smith, and Brown (1932, p. 361) state that “The

Government acquired almost \$70 million of Liberty bonds entirely through purchases in the over-the-counter market. One dealer remarked that “an attempt to acquire a like amount of bonds solely on the Stock Exchange ... would have materially advanced the market level for all Liberty bonds.”⁶¹

As a result of the growing liquidity of the over-the-counter Treasury bond market and at the urging of its fiscal agent, the Federal Reserve Bank of New York, the Treasury switched its operations from the Exchange to the over-the-counter market in 1925.⁶²

Reverse Auctions. The Treasury conducted reverse auctions on three occasions in the 1920s:

1. On November 27, 1925, the Treasury announced a reverse auction for \$50 million, “or thereabouts,” of Third Liberty bonds maturing September 28, 1928.⁶³

transfer of a large proportion of dealings in long-term government bonds from the Stock Exchange to [the] over-the-counter market, took place gradually but persistently, beginning in 1920. It was due primarily to the inability of brokers on the New York Stock Exchange to handle the tremendous volume of business necessary in this market. Quotations [on the Exchange] were as a rule for 100-bond lots or less and transactions involving a million dollars were rare. It was therefore difficult for brokers to match purchases and sale and to carry out large orders without unduly influencing the price.” See also “Liberty Bonds Active and Higher,” *Wall Street Journal*, June 2, 1923, p. 5. (“Heavy buyers [of Liberty bonds] are said to be [bidding] from three to six thirty-seconds higher for large lots of bonds than exchange prices. They say any buying through exchange would immediately advance official quotations while buying on the outside is not reflected in market quotations. It is partly on this account that volume of official trading has declined to relatively small proportions.”). Meeker (1930, p. 260) states that “The growth of [the over-the-counter bond market] was facilitated by the development of the telephone...”

⁶¹ “Tells How England Got Liberty Bonds,” *New York Times*, July 17, 1923, p. 24.

⁶² U.S. Treasury and Federal Reserve System (1959, p. 97) (“By the mid-1920’s ... the volume of trading in Government securities on the over-the-counter dealer market far exceeded that on the Exchange. Since the bulk of the trading was outside the Exchange, there were obvious advantages in shifting Treasury orders from the Exchange to the over-the-counter market, and at the suggestion of the Federal Reserve Bank of New York its operations for Treasury account were transferred to that market in 1925.”).

⁶³ Treasury Department Circular no. 363, November 27, 1925, reprinted in 1926 Treasury Annual Report, p. 199.

The auction closed on December 10 and settled on December 29. The Treasury received tenders for \$176 million of bonds and accepted \$66,274,750 of the tenders.⁶⁴

The novel transaction (it was characterized as a “departure in Government finance,”⁶⁵ an “experiment”⁶⁶) was undertaken “to determine the feasibility of making ... purchases ... directly from the holders, and thus giving all holders of third Liberty loan bonds the opportunity to sell their bonds to the Government...”⁶⁷ Market participants conjectured that the Treasury also wanted to avoid “running up the price” on Third Liberties.⁶⁸

2. On March 1, 1926, the Treasury announced a reverse auction for \$100 million, “or thereabouts,” of Third Liberty bonds.⁶⁹ The auction closed on March 10 and settled on March 23. The Treasury received tenders for more than \$148 million of bonds and accepted \$121,584,750 of the tenders.⁷⁰
3. On June 16, 1927, the Treasury announced a reverse auction for “a limited amount” of Second Liberty bonds that had been called for early redemption on

⁶⁴ 1926 Treasury Annual Report, p. 43.

⁶⁵ “Treasury Will Buy \$50,000,000 3rd Libertys,” *Wall Street Journal*, November 28, 1925, p. 8.

⁶⁶ “Liberty Bonds Rise on Treasury Offer,” *New York Times*, November 28, 1925, p. 19.

⁶⁷ 1926 Treasury Annual Report, pp. 42-43.

⁶⁸ “Liberty Bonds Rise on Treasury Offer,” *New York Times*, November 28, 1925, p. 19, “Treasury Will Buy \$50,000,000 3rd Libertys,” *Wall Street Journal*, November 28, 1925, p. 8, “Dealers are Well Supplied with Bonds,” *Wall Street Journal*, December 2, 1925, p. 4, and “Liberty Bonds Up on Mellon’s Offer,” *New York Times*, March 2, 1926, p. 8 (“Before the November innovation Liberty bonds desired for sinking fund purposes were purchased in the open market, and every time the Treasury started to buy the prices advanced. It was to overcome this, as well as to save commission charges ..., that the new plan was decided upon. The transactions bear out frequent reports in the financial district that Liberty bonds have become concentrated in a comparatively few strong hands, and [that] it is difficult to dislodge them in the amounts desired by the Government for sinking fund purposes.”).

⁶⁹ Treasury Department Circular no. 366, March 1, 1926, reprinted in 1926 Treasury Annual Report, p. 201.

⁷⁰ 1926 Treasury Annual Report, p. 43.

November 15, 1927.⁷¹ The auction closed on June 22 and settled on June 28. The Treasury received \$72 million of tenders and accepted \$62,966,250.⁷²

Auction participants other than banks and trust companies were required to submit their proposals through a bank or trust company to a Federal Reserve Bank. Accepted propositions were settled by delivering bonds through a bank or trust company to a Federal Reserve Bank. The Treasury did not itself accept either auction proposals or bonds, and investors other than banks and trust companies could not participate directly in an auction.

Tender Offers. The Treasury extended fixed price tender offers to holders of maturing debt on three occasions in the 1920s:

- On February 9, 1922, the Treasury announced that it was calling for early redemption on June 15 all of the outstanding 3¾ percent Victory Liberty notes.⁷³ The Treasury also announced that it would redeem any of the called notes tendered *prior* to June 15 at par plus accrued interest to the tender date.
- On July 26, 1922, the Treasury announced that it was calling for early redemption on December 15 about half of the \$2 billion of 4¾ percent Victory Liberty notes that remained outstanding.⁷⁴ The Treasury also announced that it would redeem any of the called notes tendered prior to December 15 at par plus accrued interest to the tender date. Redemptions prior to December 15 retired \$74 million Victory notes.⁷⁵
- On May 9, 1927, the Treasury announced that it was calling all of the Second Liberty bonds for early redemption on November 15, 1927.⁷⁶ The Treasury subsequently

⁷¹ Treasury Department Circular no. 384, June 16, 1927, reprinted in 1927 Treasury Annual Report, p. 286.

⁷² “Treasury Offer Drew Few,” *New York Times*, June 23, 1927, p. 23 and 1927 Treasury Annual Report, p. 39.

⁷³ Treasury Circular no. 277, February 9, 1922, reprinted in 1922 Treasury Annual Report, pp. 175-178.

⁷⁴ Treasury Circular no. 299, July 26, 1922, reprinted in 1922 Treasury Annual Report, pp. 179-181.

⁷⁵ 1923 Treasury Annual Report, p. 168.

⁷⁶ Treasury Circular no. 381, May 9, 1927, reprinted in 1927 Treasury Annual Report, pp. 278-280.

announced that it would redeem Second Liberties in the weeks prior to November 15 at a fixed price plus accrued interest to the date of tender. The Treasury offered to pay par and 3/32nds (plus accrued interest) between October 17 and October 22, par and 2/32nds between October 24 and October 29, par and 1/32nd between October 31 and November 7, and par thereafter.⁷⁷ Between mid-October and mid-November 1927 it purchased \$94 million of bonds.⁷⁸

All of the tender offers were made for the convenience of investors and to even out the Treasury's workload in processing securities presented for redemption. A sale of bonds pursuant to a tender offer was settled by delivering the bonds to a Federal Reserve bank or branch.

Appendix 2. Callable Short-term Debt

Treasury officials first faced the problem of managing large cash balances in an environment where funds are disbursed relatively smoothly over time but receipts arrive in clusters during World War I. Bond sales and income taxes caused most of the problems.⁷⁹

Officials quickly developed a variety of tools to better manage large, lumpy receipts, including sales of bond and tax anticipation certificates of indebtedness (similar to the cash management bills used by Treasury today), installment sales of bonds, and permitting bond and tax payments in the form of credits to Treasury War Loan Deposit Accounts at commercial banks (the forerunner of today's payments into TT&L accounts).

In addition, they sold short-term certificates of indebtedness that could be called for early redemption.⁸⁰ Treasury exercised its right to call certificates for early redemption several times

⁷⁷ Treasury press releases dated October 17, 24, and 31, 1927, reprinted in 1927 Treasury Annual Report, pp. 295-296.

⁷⁸ 1927 Treasury Annual Report, p. 40.

⁷⁹ The Treasury offered war bonds on four occasions during World War I and a Victory Liberty note six months after the end of hostilities. Each of the five issues was more than an order of magnitude larger than any pre-war Treasury offering. Additionally, all of the taxes due on income earned in 1917 came due at one time, in June 1918. Taxes assessed on 1918 incomes came due in four installments, in the middle of March, June, September, and December, 1919.

⁸⁰ For example, certificates dated August 9, 1917, and scheduled to mature on November 15, 1917, included a provision that "Upon ten days' notice ... the series of ... certificates now

during the war. For example, on November 23, 1917, the Treasury called certificate series II-C for redemption on December 6 and series II-D for redemption on December 11 – the two series had been scheduled to mature on December 15 – because investors had made unexpectedly large installment payments for the Second Liberty loan on November 15 and officials wanted to accelerate the return of the funds to the banking system.⁸¹

offered may be redeemed as a whole, at par and accrued interest...” 1918 Treasury Annual Report, p. 188.

⁸¹ “M’Adoo to Circulate Liberty Loan Money,” *New York Times*, November 24, 1917, p. 18, “Record Treasury Balance,” *New York Times*, November 25, 1917, p. RE11, and Hollander (1919, pp. 85-87). Similarly, the Treasury called series IV-D (scheduled to mature on December 5, 1918) for redemption on November 21, 1918, series IV-E (scheduled to mature on January 2, 1919) for redemption on December 19, 1918, and series V-G (scheduled to mature on July 29, 1919) for redemption on July 1, 1919. “Call for Prepayment,” *New York Times*, November 9, 1918, p. 17, “Treasury Note Payments,” *New York Times*, December 6, 1918, p. 16, “Indebtedness Certificates Called,” *Wall Street Journal*, June 21, 1919, p. 5, and 1919 Treasury Annual Report, pp. 288-289.

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Figure 1. Treasury Buybacks, March 2000 to December 2001

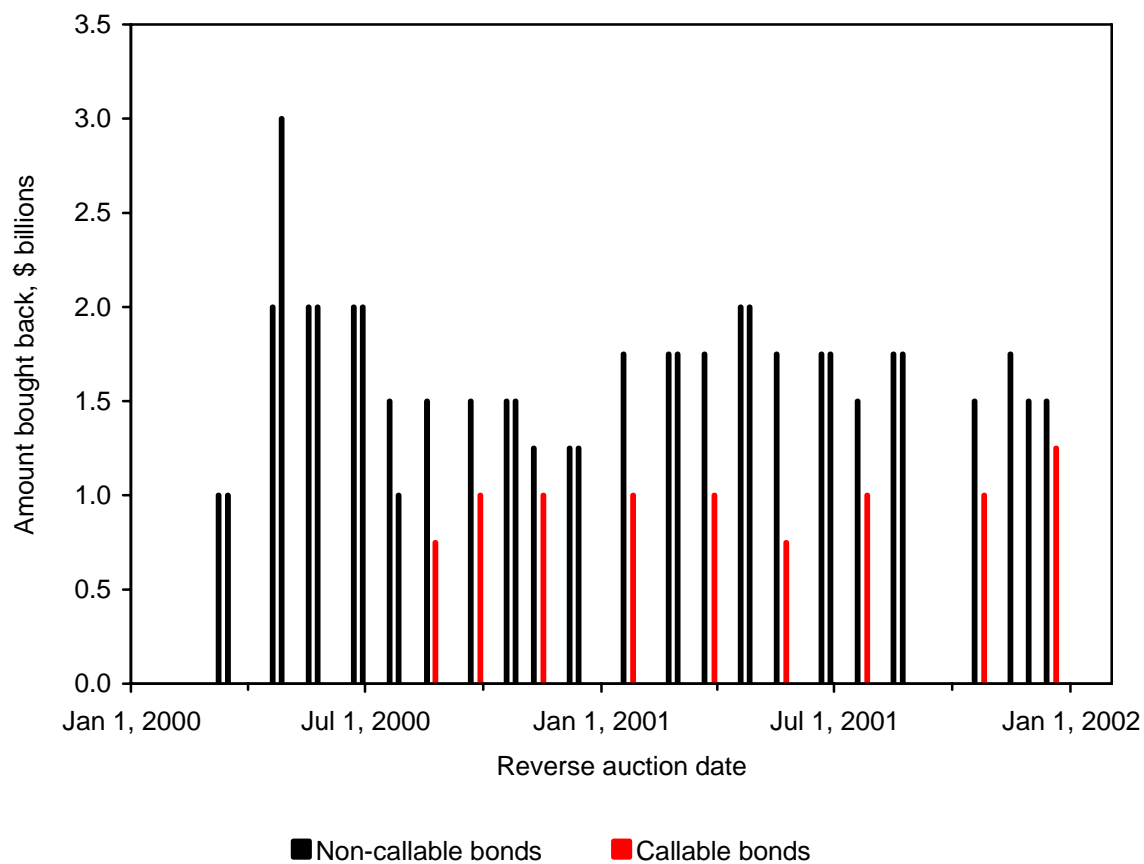
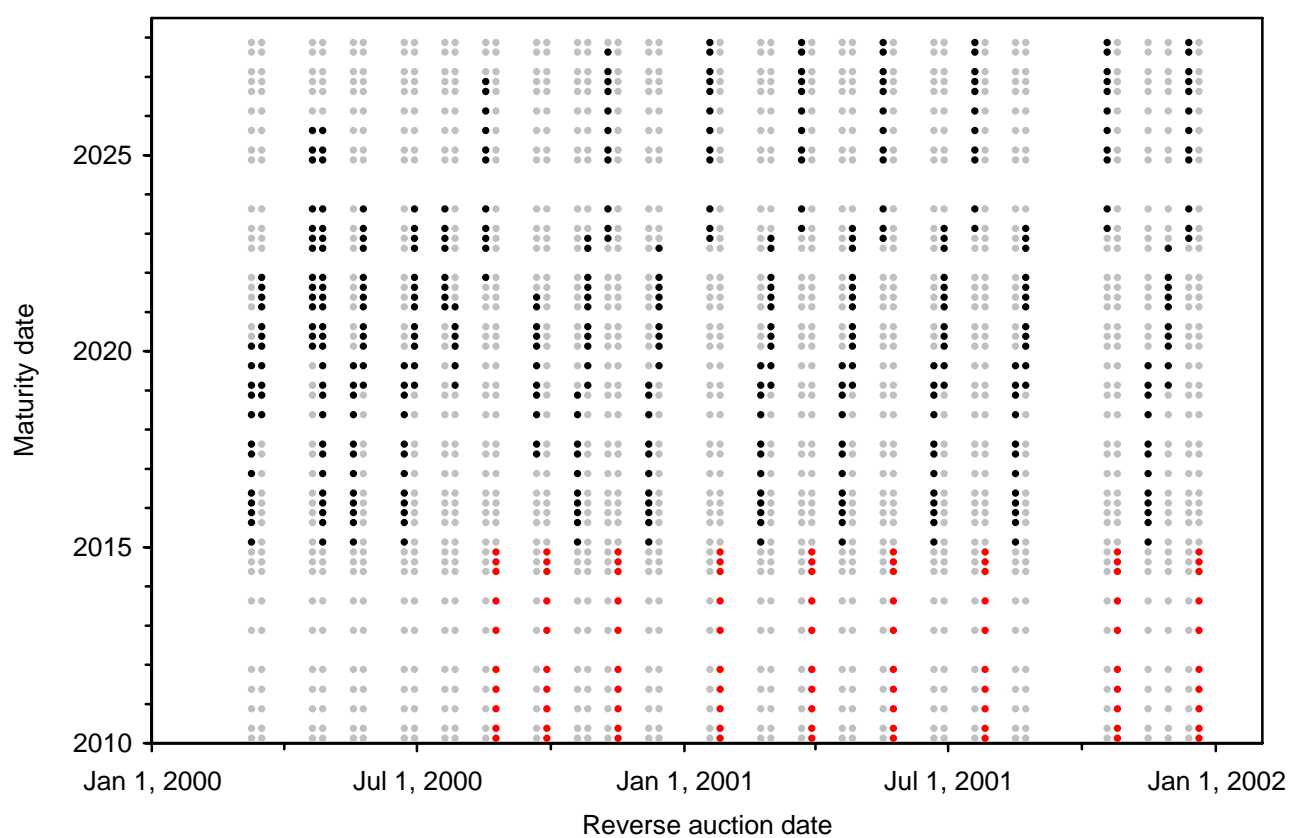


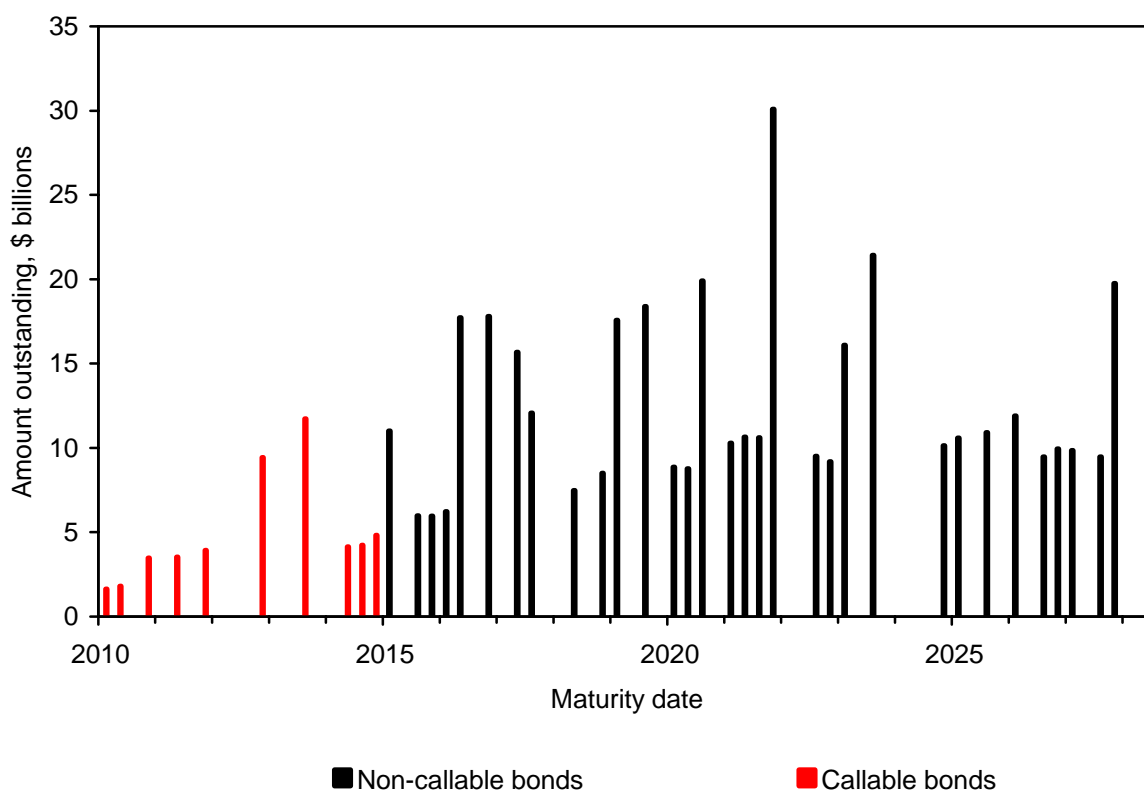
Figure 2. Bonds Eligible for Repurchase by the Treasury in Buyback Operations, March 2000 to December 2001

Red balls denote eligible callable bonds, black balls denote eligible non-callable bonds, gray balls denote ineligible bonds.



Source: www.treasurydirect.gov/instit/annceresult/buybacks/buybacks.htm.

Figure 3. Amount Outstanding in Public Hands, as of December 31, 1999, of Bonds Eligible for Repurchase by the Treasury in Buyback Operations Conducted Between March 2000 and December 2001



Source: *Treasury Bulletin*, March 2000, p. 34.

Figure 4. Coverage Ratios in Treasury Buybacks, March 2000 to December 2001

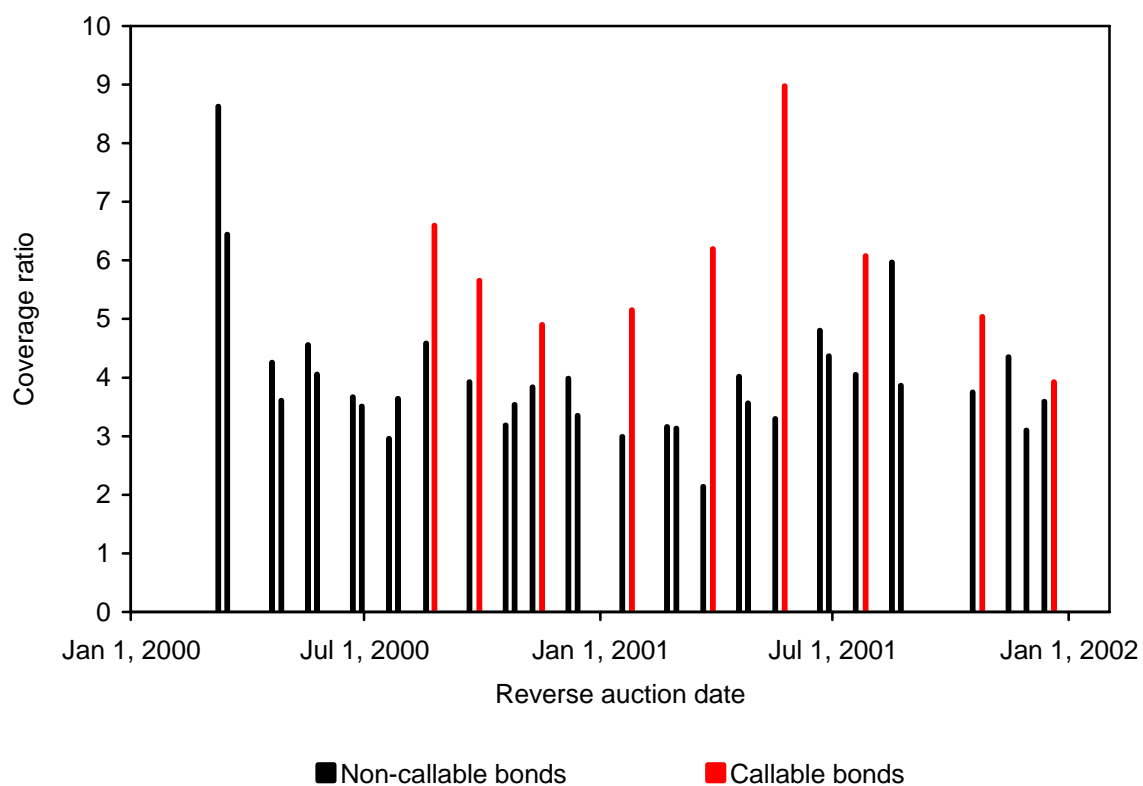
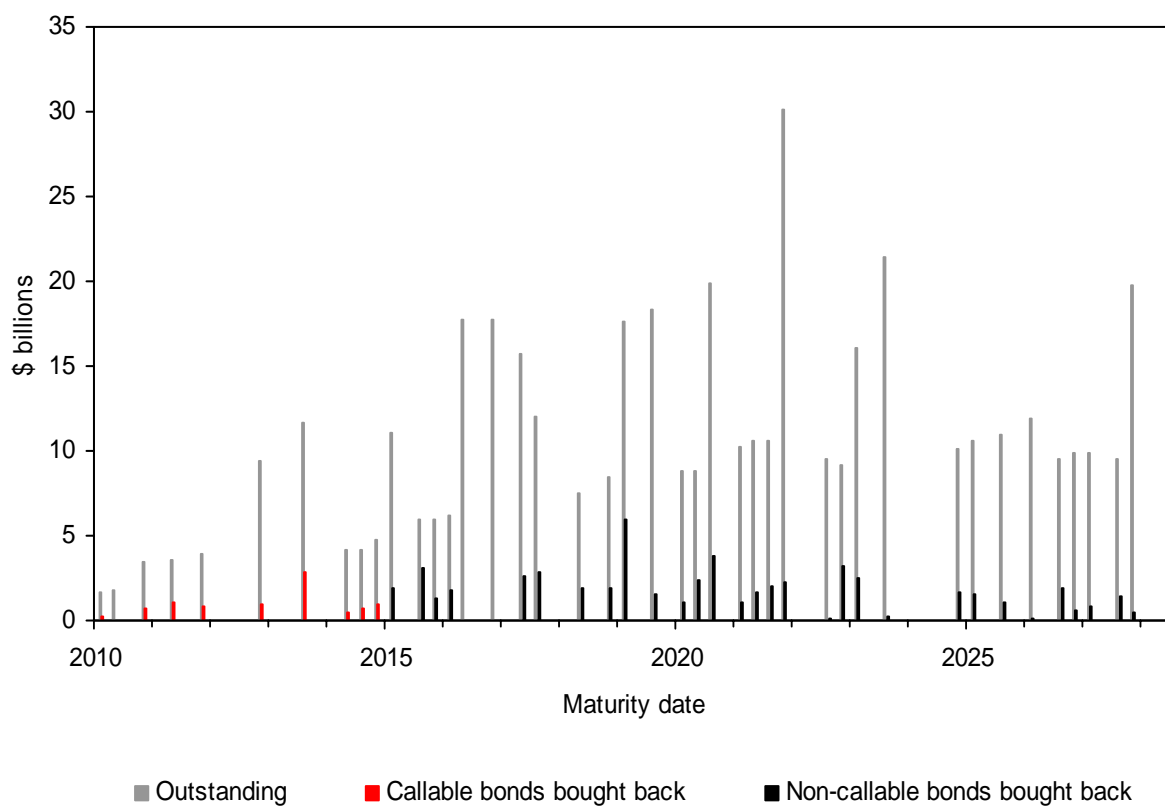
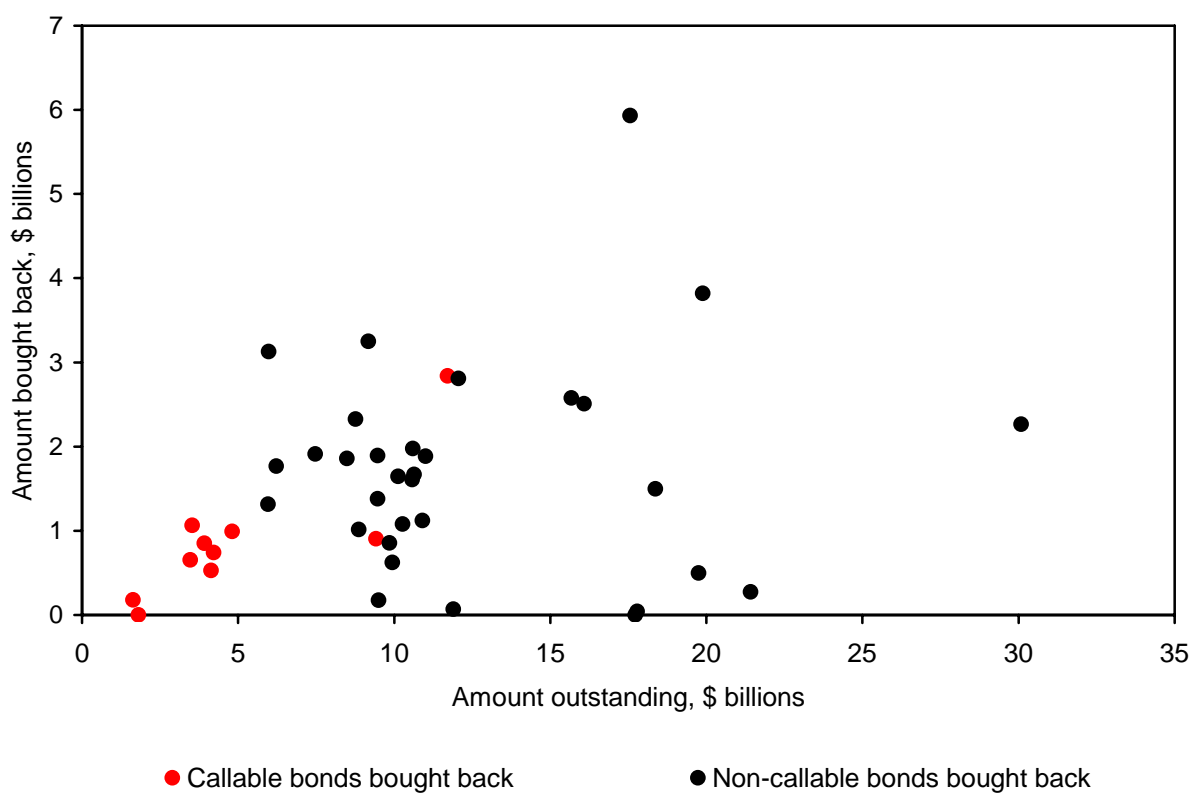


Figure 5. Amount of Bonds Bought Back by the Treasury, March 2000 to December 2001



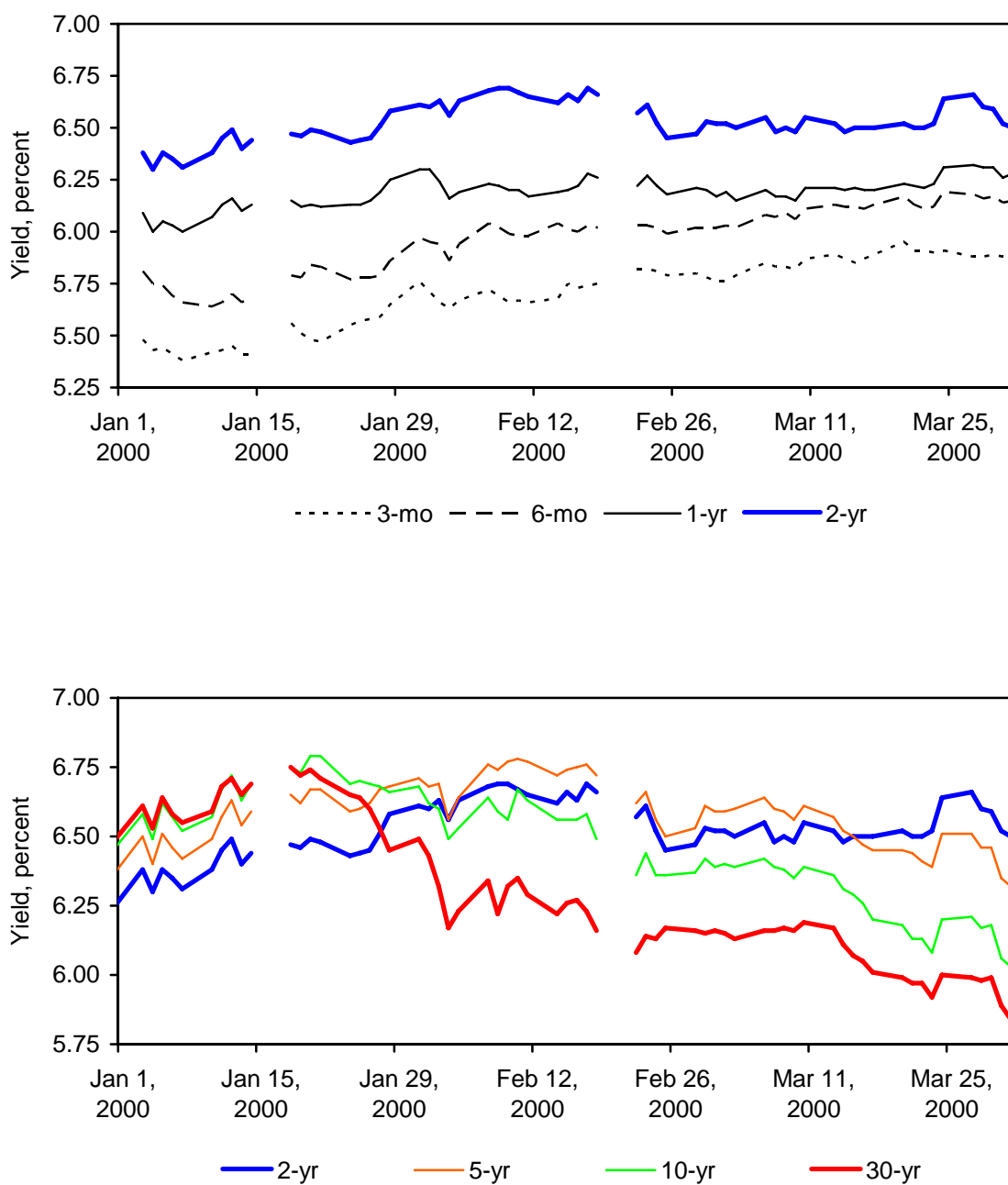
Source: *Treasury Bulletin*, March 2000, p. 34, and www.treasurydirect.gov/instit/annceresult/buybacks/buybacks.htm.

Figure 6. Amount of Bonds Bought by the Treasury in Buyback Operations Conducted Between March 2000 and December 2001, as a Function of Amount Outstanding in Public Hands as of December 31, 1999



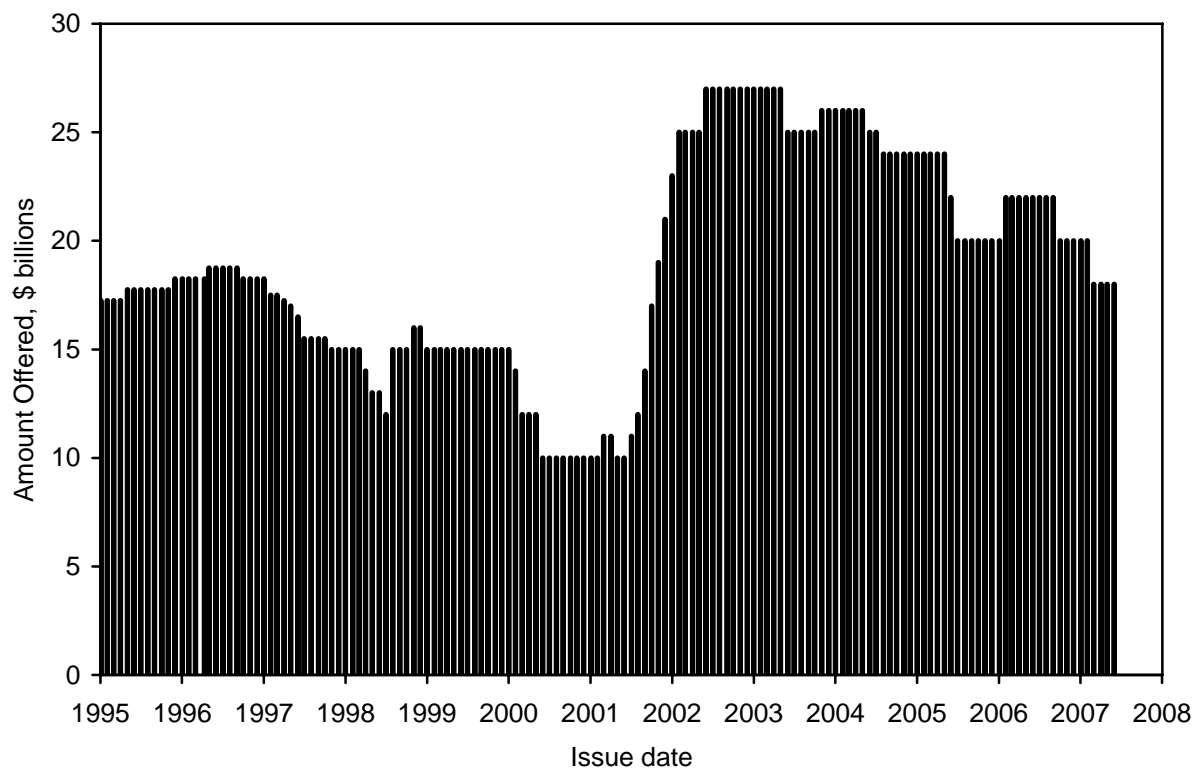
Source: *Treasury Bulletin*, March 2000, p. 34, and www.treasurydirect.gov/instit/annceresult/buybacks/buybacks.htm.

Figure 7. Yields on Treasury Securities, January 3, 2000 to March 31, 2000



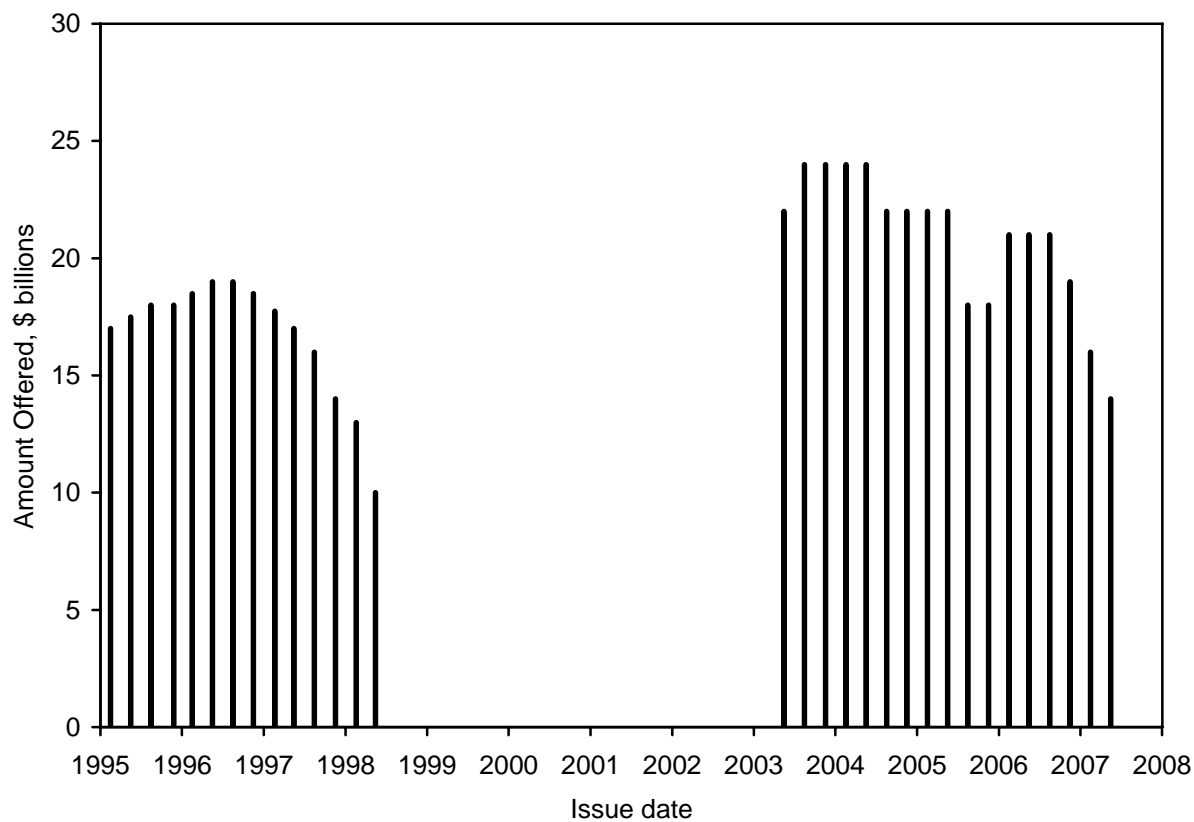
Source: Federal Reserve System Statistical Release H.15.

Figure 8. Auction Offerings of 2-year Notes, January 1995 to May 2007



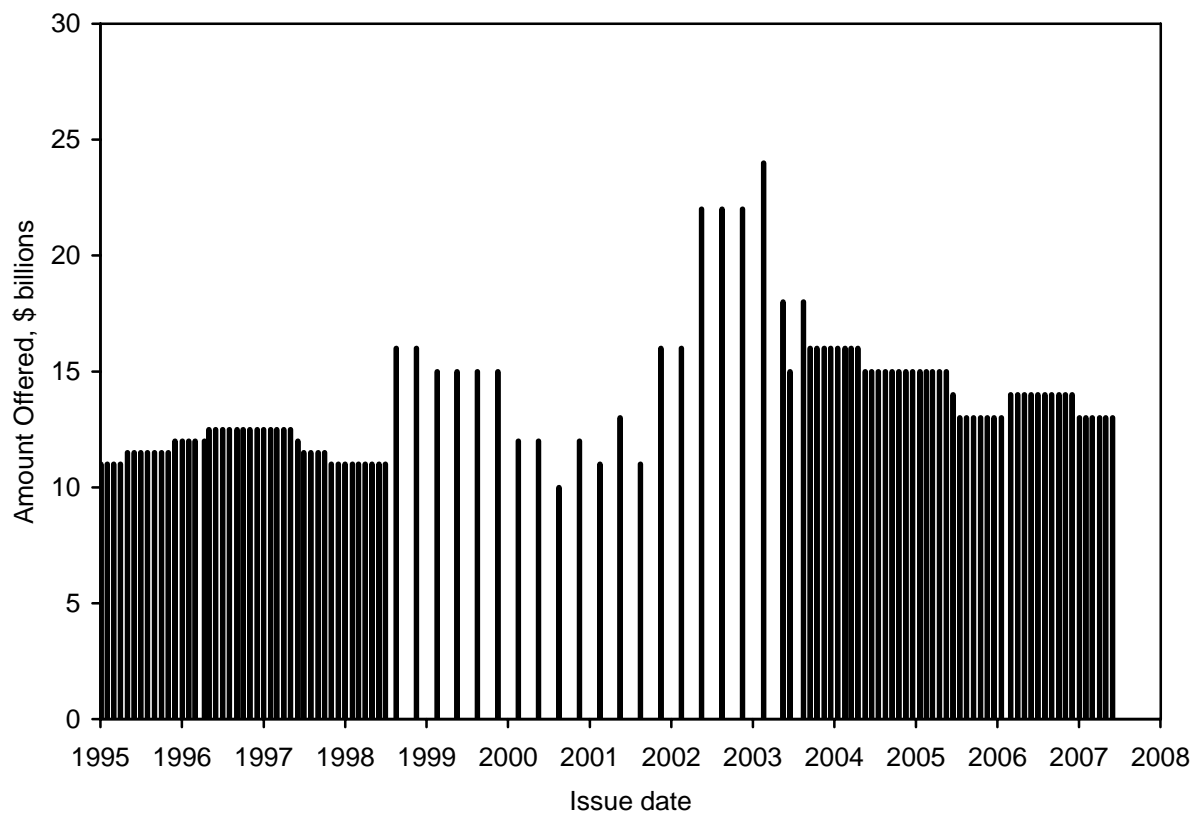
Source: Bureau of the Public Debt, Department of the Treasury.

Figure 9. Auction Offerings of 3-year Notes, February 1995 to May 2007



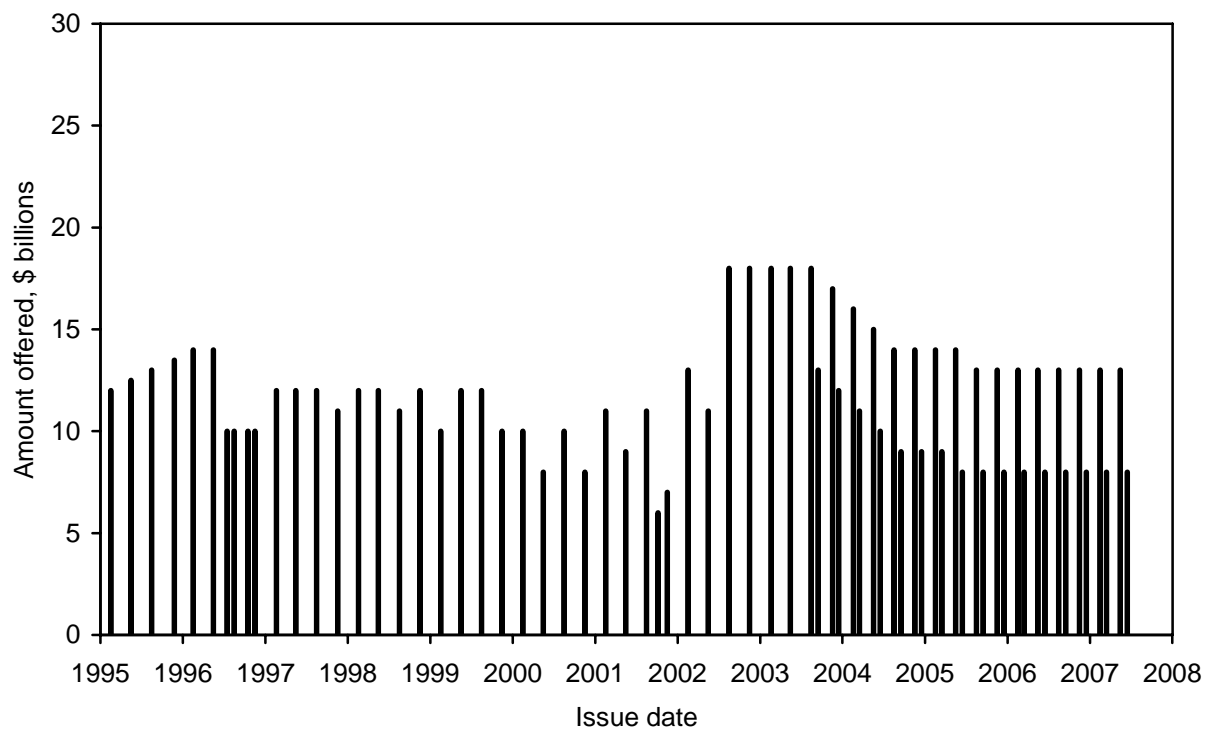
Source: Bureau of the Public Debt, Department of the Treasury.

Figure 10. Auction Offerings of 5-year Notes, January 1995 to May 2007



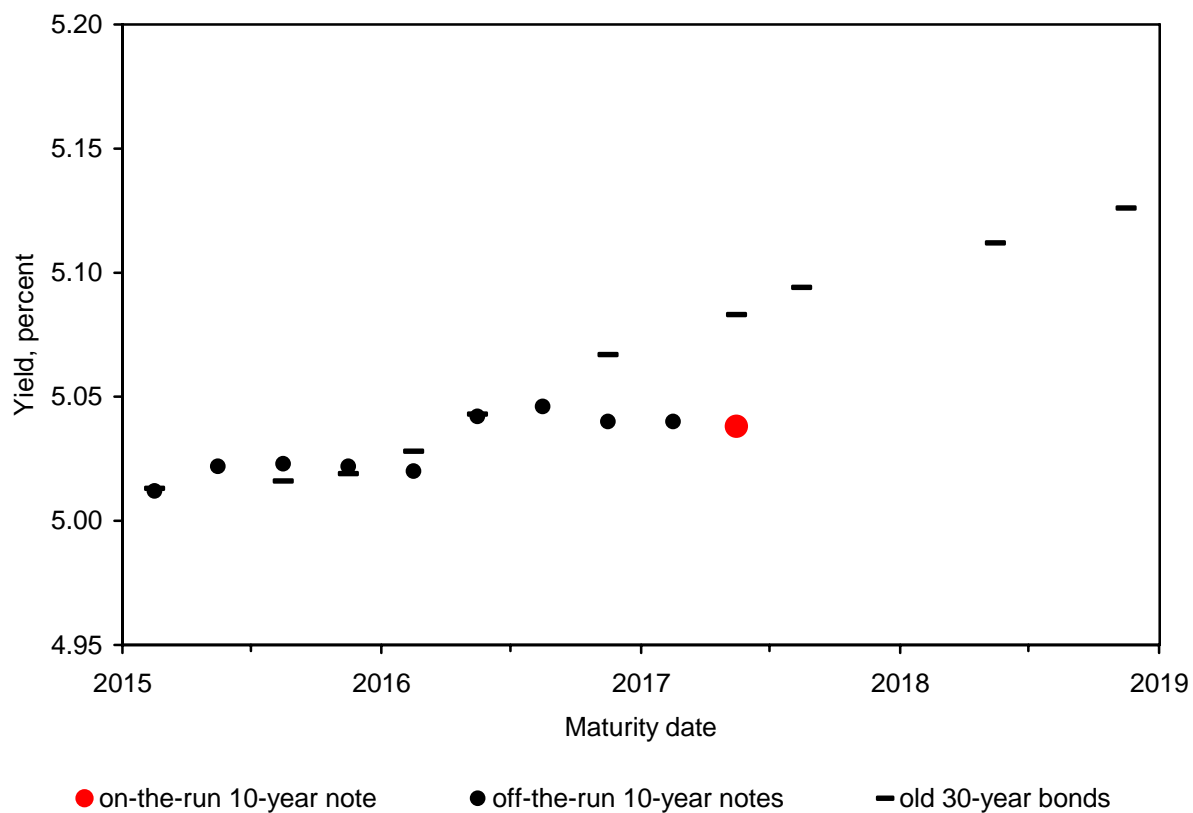
Source: Bureau of the Public Debt, Department of the Treasury.

Figure 11. Auction Offerings of 10-year Notes, February 1995 to May 2007



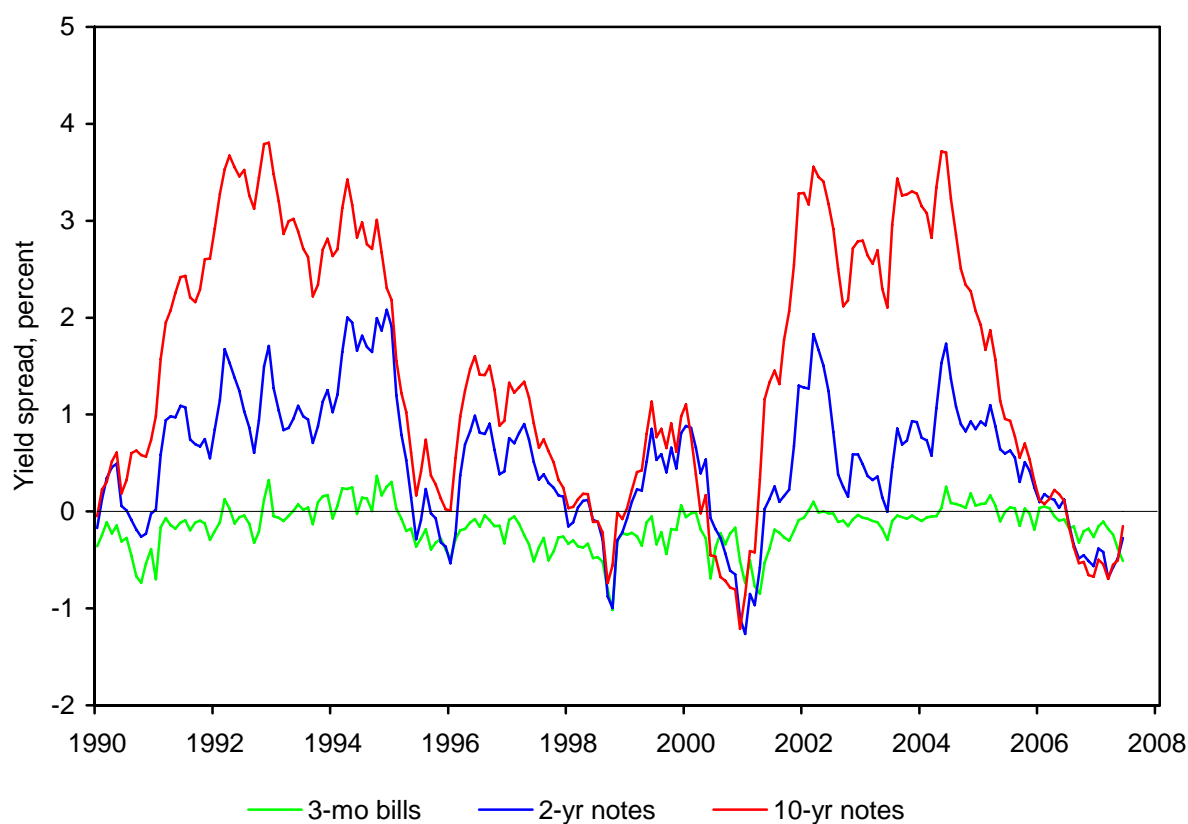
Source: Bureau of the Public Debt, Department of the Treasury.

Figure 12. Yields on June 29, 2007



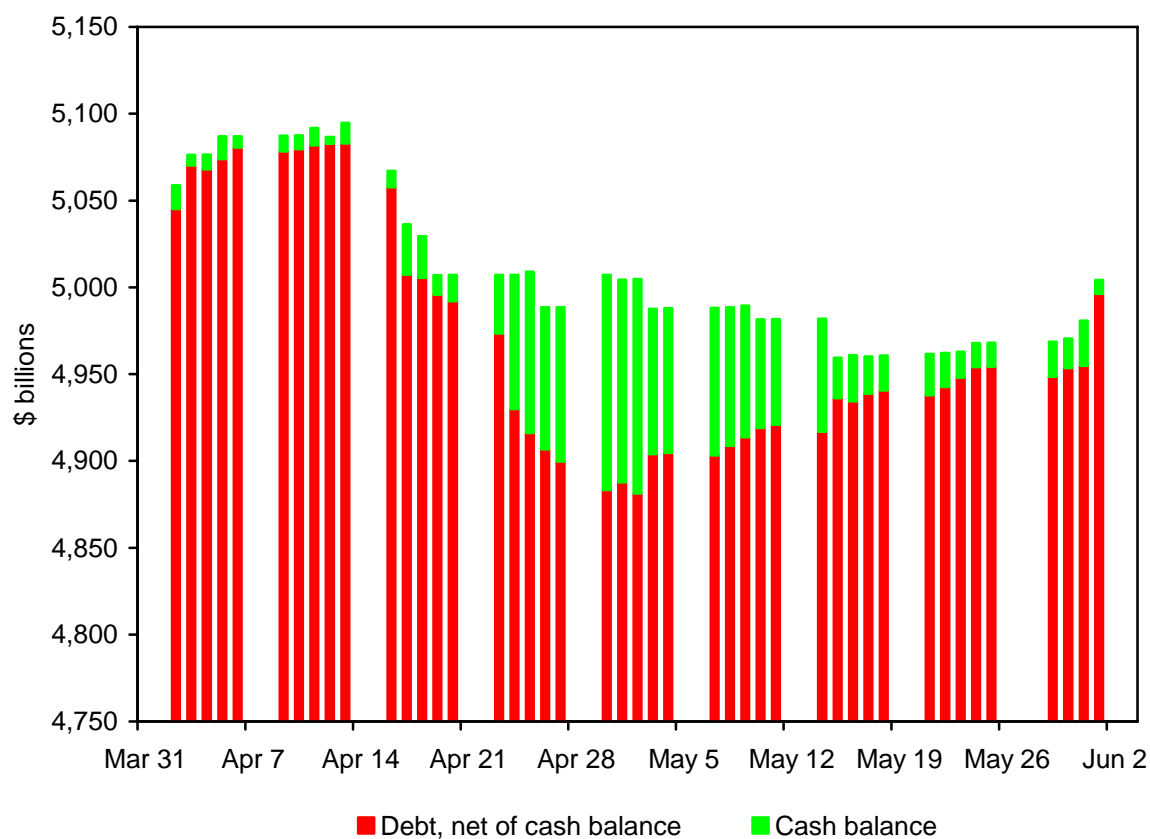
Source: *Wall Street Journal*.

Figure 13. Yield on 3-Month Treasury Bills, 2-Year Notes, and 10-Year Notes Relative to the Federal Funds Rate, monthly average, January 1990 to June 2007



Source: Federal Reserve Statistical Release H.15.

Figure 14. Treasury Debt Held by the Public (Net of Treasury Cash Balance) and Treasury Cash Balance, April 2, 2007 to June 1, 2007



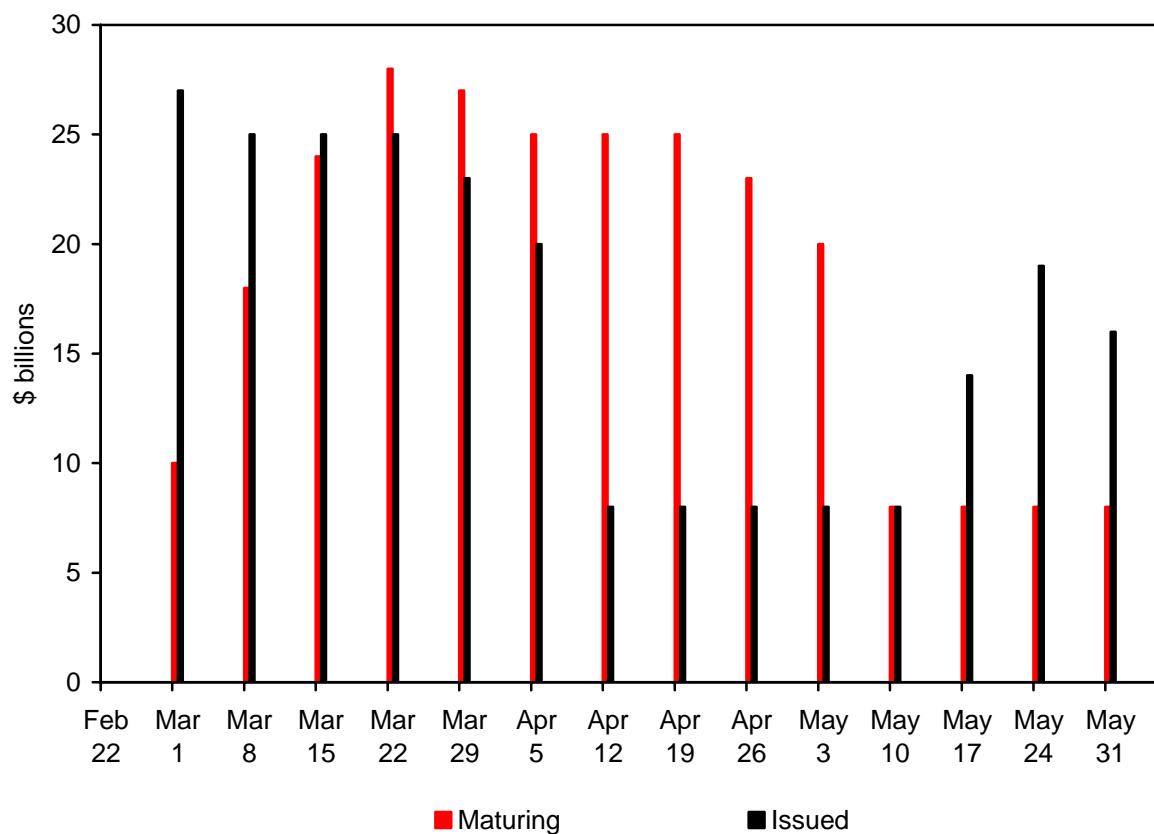
Source: Daily Treasury Statement, Table I (operating balance) and Table III-C (debt held by the public).

Table 1. Cash Management Bills Maturing in the Second Half of April 2007

Auction	Issue	Maturity	Amount
			\$ billions
Mar 28	Mar 30	Apr 16	17
Apr 2	Apr 3	Apr 16	16
Apr 4	Apr 5	Apr 17	16
Apr 10	Apr 12	Apr 17	15
Apr 12	Apr 13	Apr 18	8

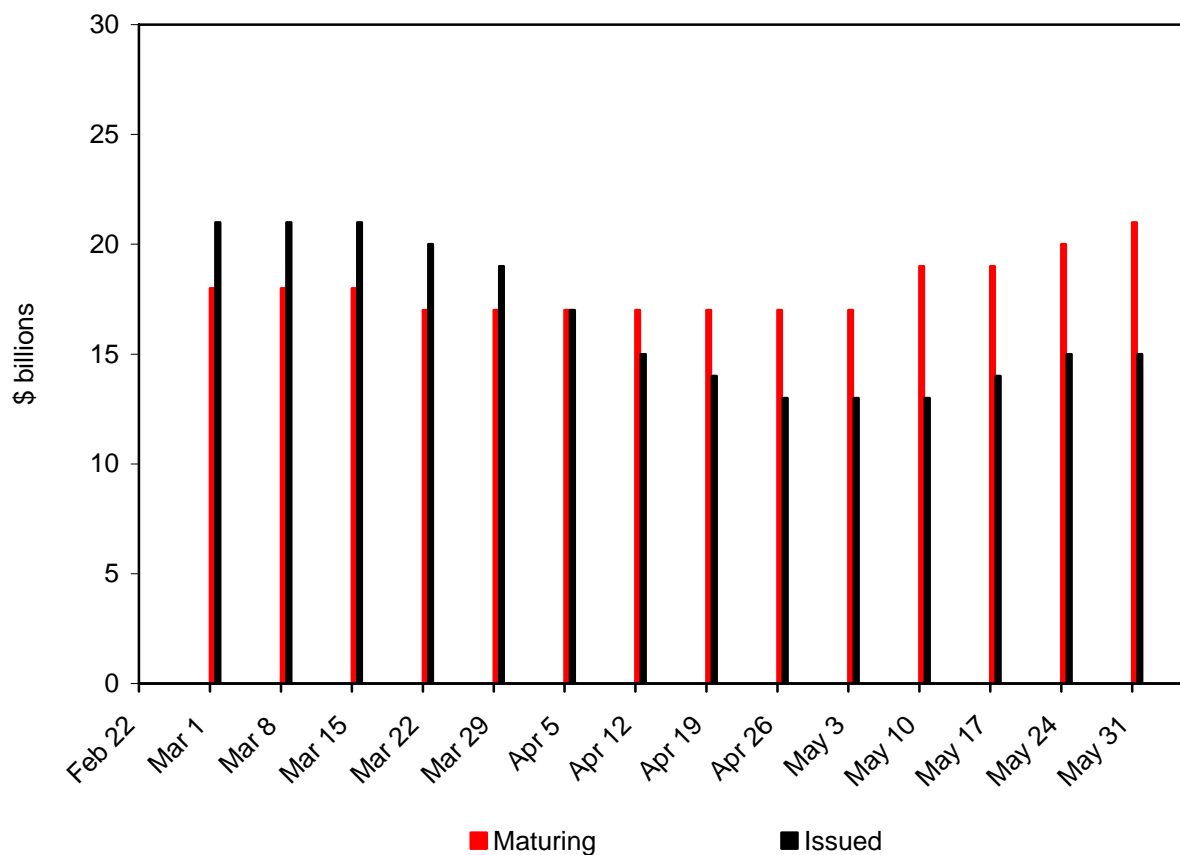
Source: Bureau of the Public Debt, Department of the Treasury.

Figure 15. 4-Week Treasury Bills Maturing and Issued Between March 1, 2007, and May 31, 2007



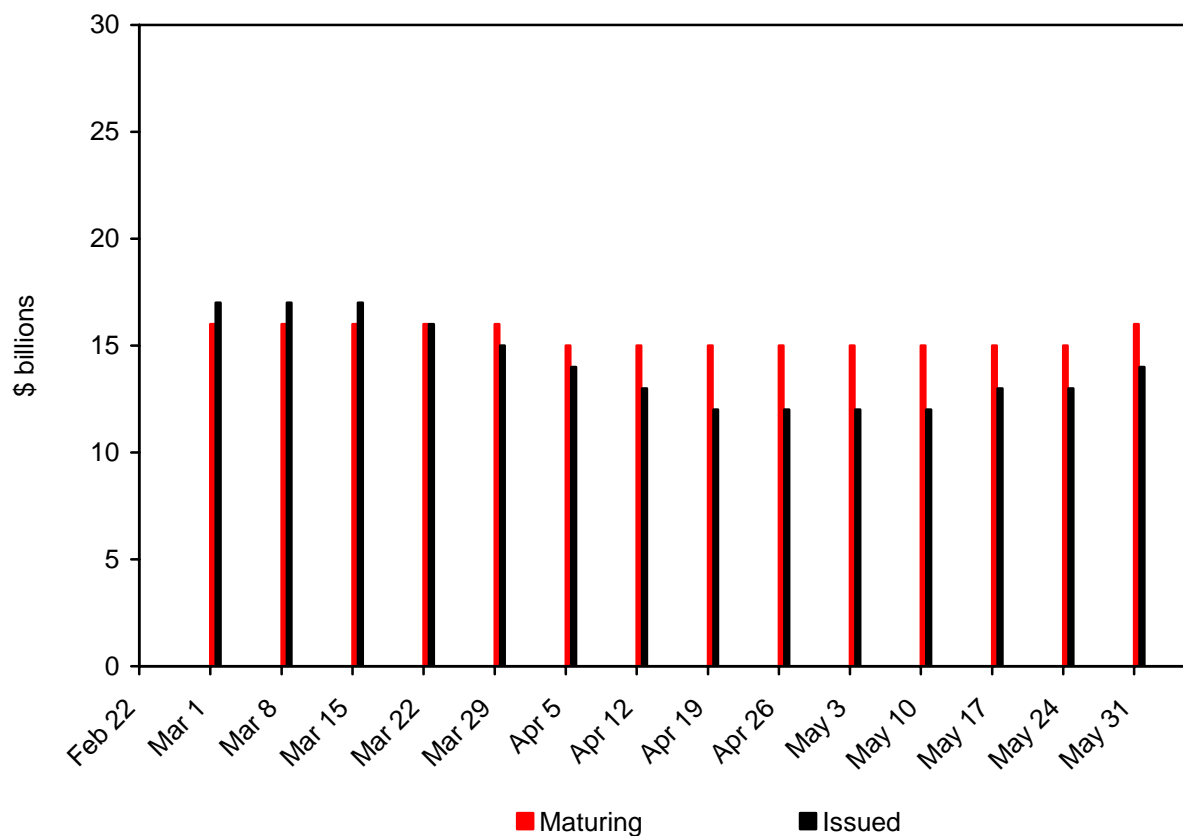
Source: Bureau of the Public Debt, Department of the Treasury.

Figure 16. 13-Week Treasury Bills Maturing and Issued Between March 1, 2007 and May 31, 2007



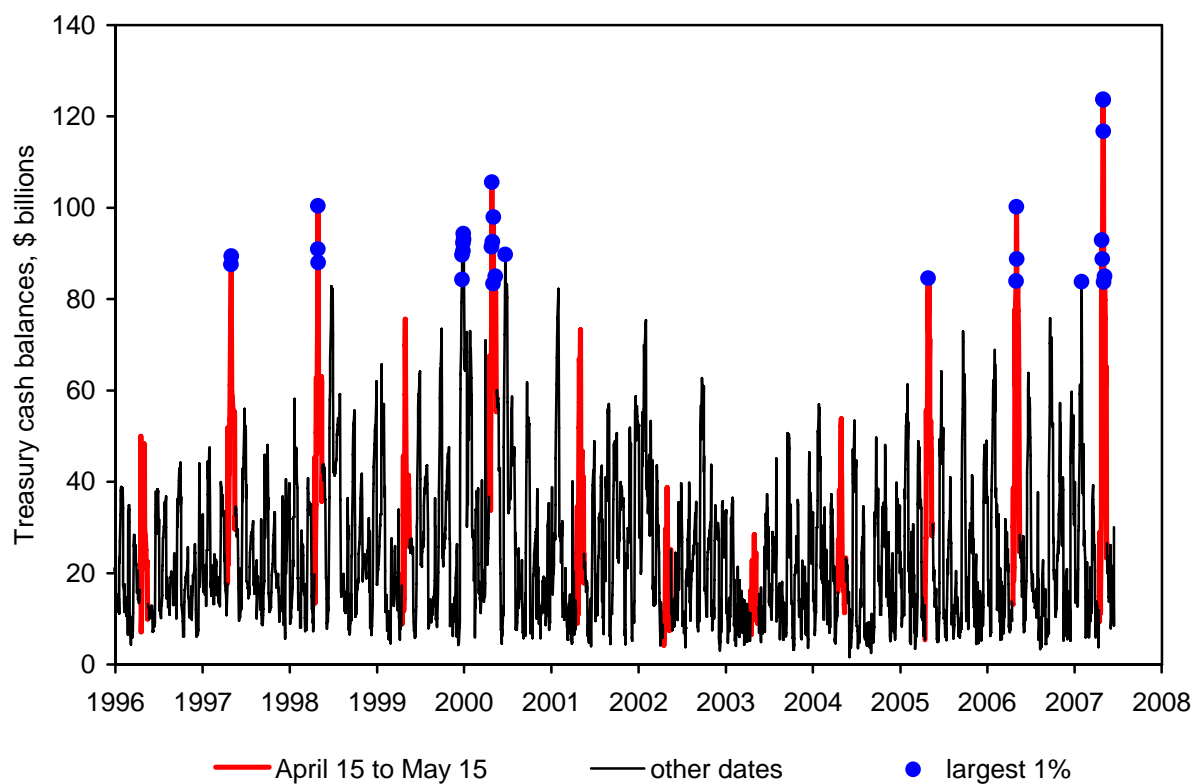
Source: Bureau of the Public Debt, Department of the Treasury.

Figure 17. 26-Week Treasury Bills Maturing and Issued Between March 1, 2007, and May 31, 2007



Source: Bureau of the Public Debt, Department of the Treasury.

Figure 18. Daily Treasury Cash Balance, January 1996 to June 2007



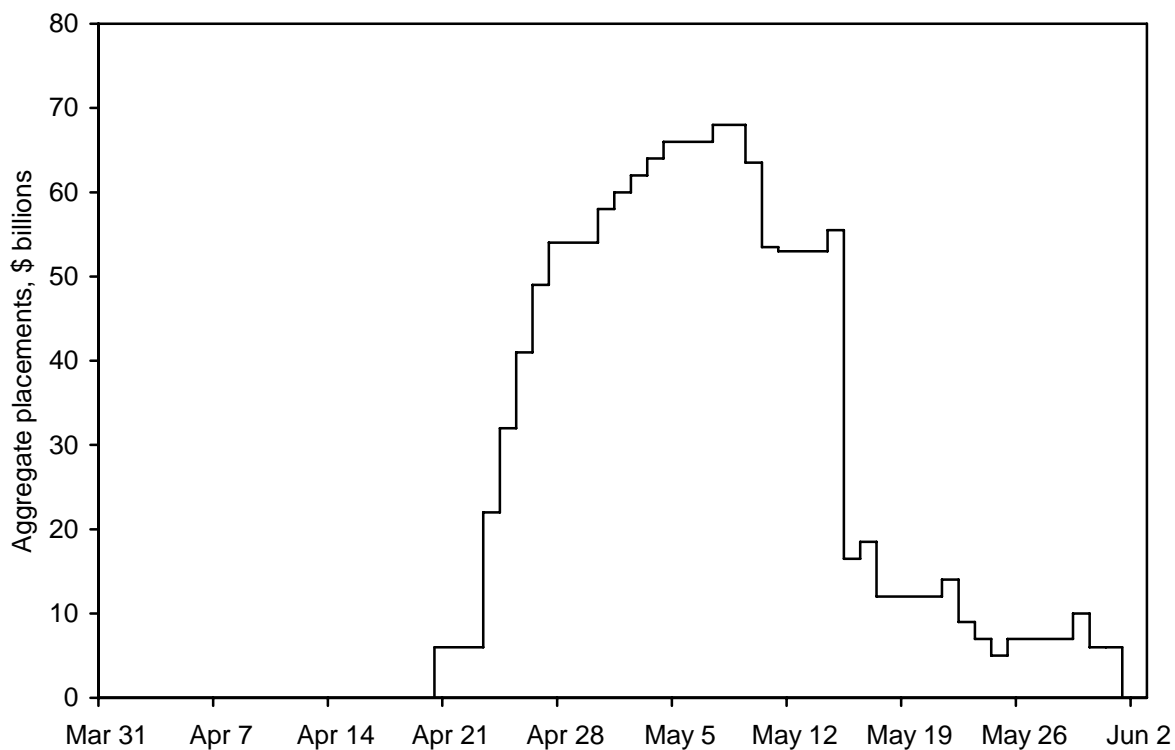
Source: Daily Treasury Statement.

Table 2. Term Investment Option Auctions in April and May 2007

Auction	Placement	Maturity	Amount \$ billions
Apr 19	Apr 20	May 10	6
Apr 20	Apr 23	May 15	16
Apr 23	Apr 24	May 15	10
Apr 24	Apr 25	May 15	9
Apr 25	Apr 26	May 9	8
Apr 26	Apr 27	May 10	5
Apr 27	Apr 30	May 10	4
Apr 30	May 1	May 10	2
May 1	May 2	May 10	2
May 2	May 3	May 11	2
May 3	May 4	May 11	2
May 4	May 7	May 15	2
May 8	May 9	May 15	3½
May 9	May 10	May 17	9
May 10	May 11	May 15	3½
May 11	May 14	May 23	2½
May 14	May 15	May 22	5
May 15	May 16	May 24	2
May 16	May 17	May 23	2½
May 18	May 21	May 25	2
May 22	May 23	Jun 1	3
May 24	May 25	May 30	4
May 25	May 29	Jun 1	3

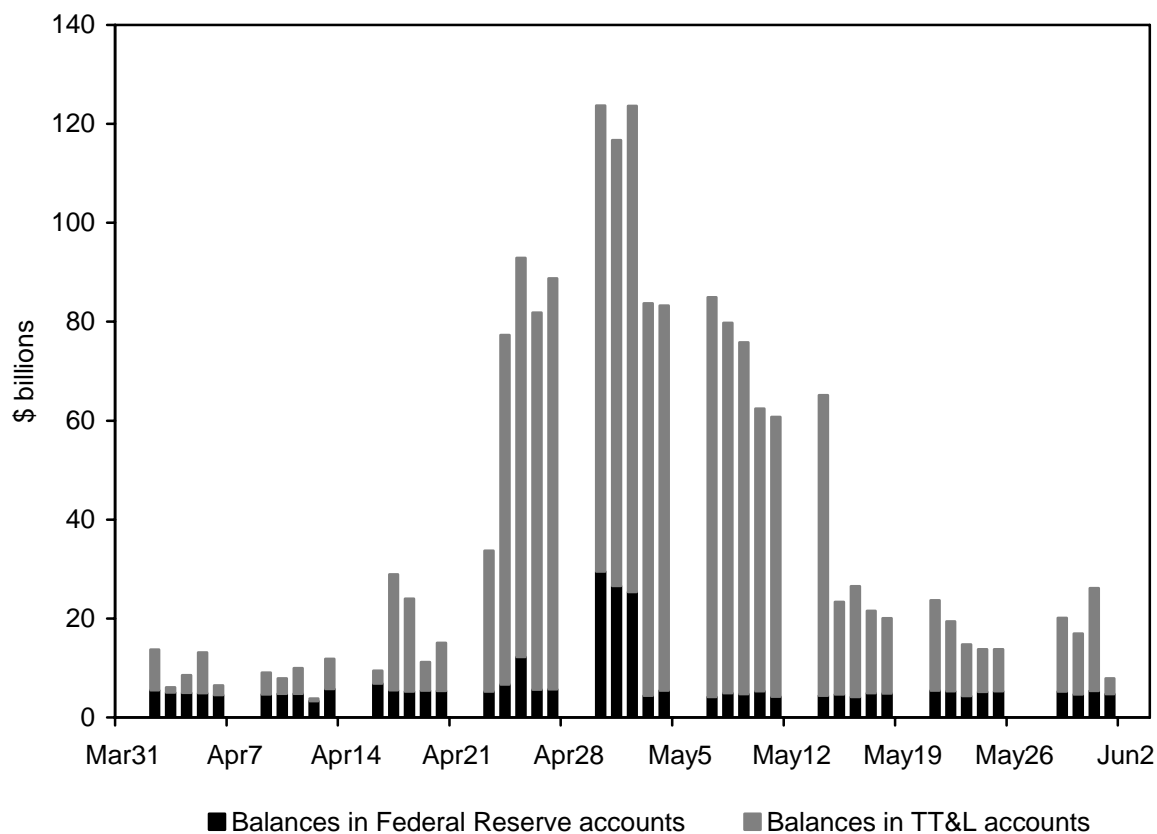
Source: Financial Management Service, Department of the Treasury.

Figure 19. Aggregate Term Investment Option Placements in April and May 2007



Source: Financial Management Service, Department of the Treasury.

Figure 20. Treasury Balances in Federal Reserve Accounts and in Treasury Tax and Loan Accounts, April 2, 2007 to June 1, 2007



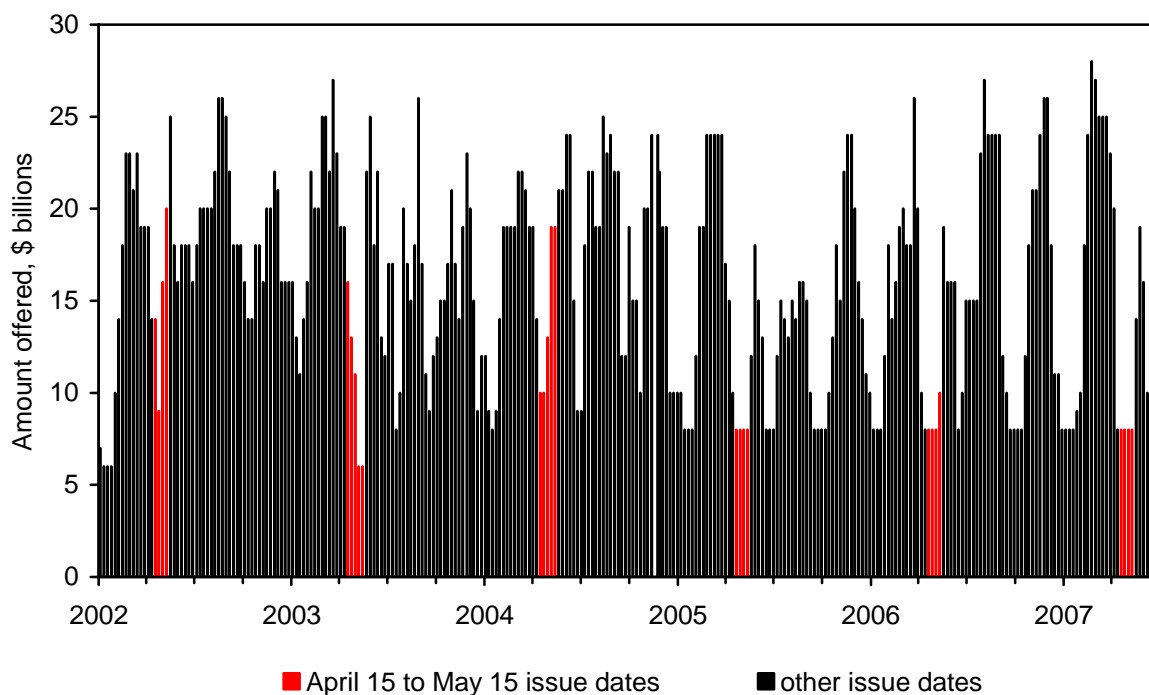
Source: Daily Treasury Statement, Table I .

Table 3. Treasury Cash Balances and Funds Supplied through Federal Reserve Repurchase Agreements with Primary Dealers in April and May 2007

	Treasury Cash Balance		Federal Reserve Repurchase Agreements			
	Outside of Federal Reserve Banks	At Federal Reserve Banks	Long-term RPs	Short-term RPs	Reverse RPs	Total
Apr 16	2.6	6.9	22.00	10.75		32.75
Apr 17	23.4	5.5	22.00	10.25		32.25
Apr 18	18.7	5.2	22.00	2.00		24.00
Apr 19	5.8	5.4	17.00	5.00		22.00
Apr 20	9.7	5.4	17.00	5.50		22.50
Apr 23	28.4	5.2	17.00	8.75		25.75
Apr 24	70.7	6.6	17.00	4.50		21.50
Apr 25	80.7	12.3	17.00	21.00		38.00
Apr 26	76.2	5.6	11.00	19.00	5.25	24.75
Apr 27	83.1	5.7	11.00	19.00	6.50	23.50
Apr 30	94.2	29.5	11.00	40.50		51.50
May 1	90.2	26.6	11.00	40.75		51.75
May 2	98.3	23.4	11.00	37.00	5.75	42.75
May 3	79.3	4.4	12.00	8.25		20.25
May 4	77.9	5.4	12.00	8.25		20.25
May 7	80.8	4.2	12.00	14.25		26.25
May 8	74.9	4.9	12.00	11.50		23.50
May 9	71.1	4.7	12.00	17.00		29.00
May 10	57.2	5.3	14.00	5.50	1.50	18.00
May 11	56.5	4.2	14.00	0.00		14.00

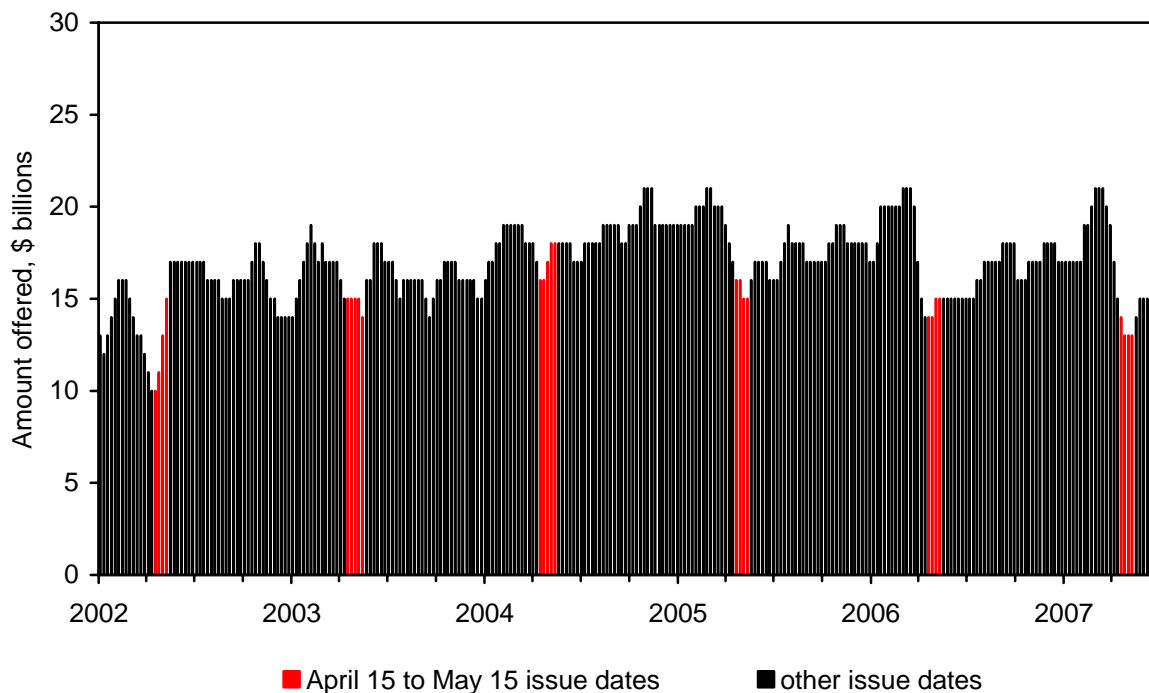
Source: Daily Treasury Statement and Federal Reserve Bank of New York.

Figure 21. Auction offerings of 4-Week Treasury Bills, January 3, 2002, to June 28, 2007



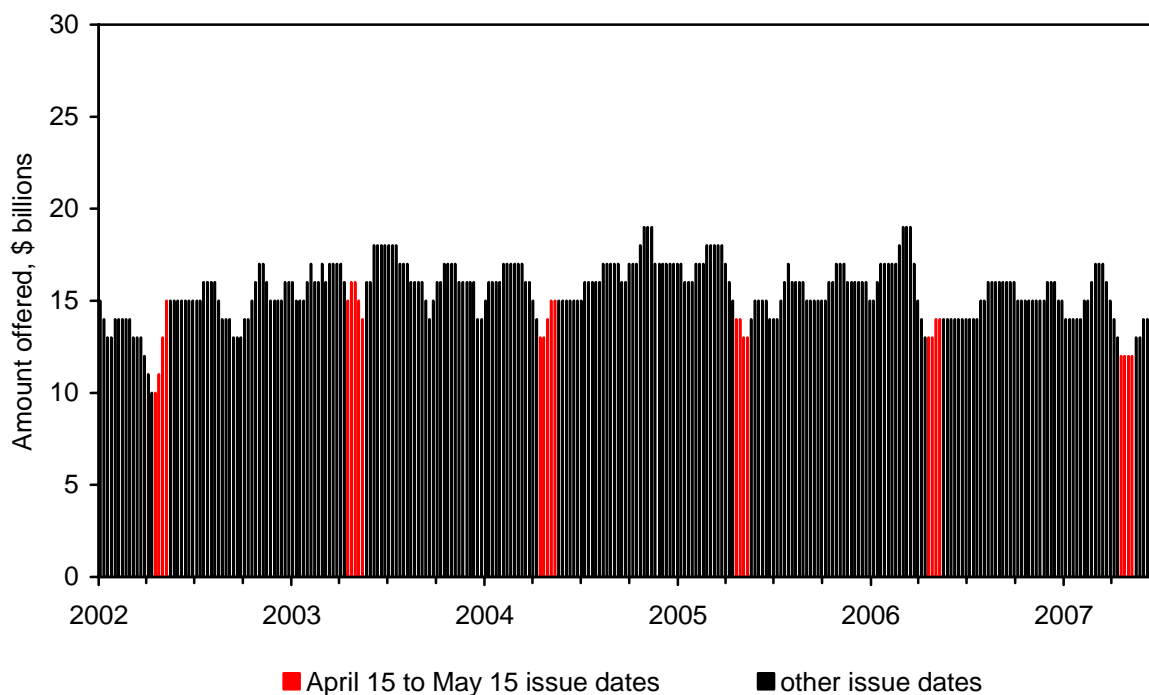
Source: Bureau of the Public Debt, Department of the Treasury.

Figure 22. Auction Offerings of 13-Week Treasury Bills, January 3, 2002, to June 28, 2007



Source: Bureau of the Public Debt, Department of the Treasury.

Figure 23. Auction Offerings of 26-Week Treasury Bills, January 3, 2002, to June 28, 2007



Source: Bureau of the Public Debt, Department of the Treasury.