

March 2006

DEBT MANAGEMENT

Treasury Has Refined
Its Use of Cash
Management Bills but
Should Explore
Options That May
Reduce Cost Further



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Highlights of [GAO-06-269](#), a report to the Secretary of the Treasury

Why GAO Did This Study

One result of persistent fiscal imbalance is growing debt and net interest costs. Net interest is currently the fastest-growing “program” in the budget and if unchecked, threatens to crowd out spending for other national priorities. This report was done under the Comptroller General’s authority and examines the Department of the Treasury’s (Treasury) growing use of unscheduled cash management bills (CM bills). GAO describes (1) when Treasury uses CM bills and why, (2) the advantages and disadvantages of CM bills, and (3) steps taken by Treasury to reduce the overall borrowing costs associated with CM bills. GAO identifies possible options Treasury could consider to reduce the use and cost of CM bills further.

What GAO Recommends

GAO recommends that Treasury explore options such as those identified in this report and any others it identifies to help it achieve its lowest-cost borrowing objective. If Treasury determines that any of these changes would be beneficial, GAO encourages Treasury to begin discussions with relevant federal agencies and the Congress about obtaining the necessary authorities.

Treasury generally agreed with our findings, conclusions, and recommendations and is committed to exploring ways to reduce financing costs through changes in the use of CM bills.

www.gao.gov/cgi-bin/getrpt?GAO-06-269.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Susan J. Irving at (202) 512-9142, irvings@gao.gov or Thomas J. McCool at (202) 512-2700, mccoolt@gao.gov.

DEBT MANAGEMENT

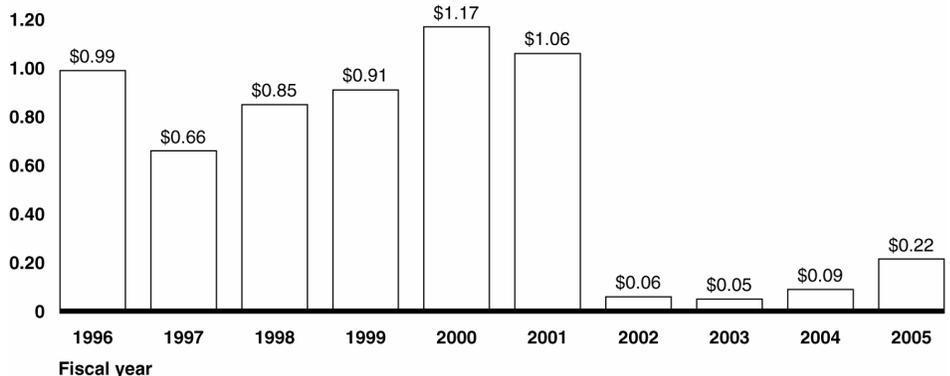
Treasury Has Refined Its Use of Cash Management Bills but Should Explore Options That May Reduce Cost Further

What GAO Found

Treasury makes large, regularly occurring payments, such as Social Security and federal retirement payments, in the beginning of the month and often receives large cash inflows in the middle of the month from income tax payments and note issuances. Because regular bills alone are not sufficient to fill these intramonth cash financing gaps, since 2002 Treasury has increasingly issued CM bills to bridge this gap. CM bills allow Treasury to obtain cash outside of its regular borrowing schedule in varying amounts and maturities, but Treasury pays a premium for doing so. GAO’s analysis found that Treasury paid a higher yield on CM bills than that paid on outstanding bills of similar maturity in the secondary market.

Treasury has taken steps to reduce the use and cost of CM bills. Treasury added a 4-week bill to its regular auction schedule in 2001, which led to reduced CM bill issuance, shorter terms to maturity, and lower borrowing costs in 2002. Treasury has also fine-tuned CM bill issuance by borrowing closer to the time when it needs cash. However, borrowing costs associated with CM bills have increased since 2003.

Borrowing Costs Associated with CM Bills (Fiscal Years 1996–2005)
Dollars in billions



Source: GAO analysis of data from the Bureau of the Public Debt.

While Treasury has made progress towards reducing the cost of CM bills, it may be possible to do more. GAO’s analysis indicates that the yield differential has increased as short-term rates have risen. If these rates rise further, as market participants expect, so will the yield differential. While Treasury does not vary its debt management strategy in response to changing interest rates, it should be mindful of their effect on the relative cost of unscheduled CM bills and explore options to reduce the frequent use of CM bills and ultimately overall borrowing costs. GAO identified options worth exploring such as any additional opportunities for closer alignment of large cash flows; possible options for increasing earnings on excess cash balances; and introduction of a shorter-term regular instrument.

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Abbreviations

BPD	Bureau of the Public Debt
CBO	Congressional Budget Office
CM bill	Cash management bill
DISP	Debt issuance suspension period
DMO	Debt Management Office
Fannie Mae	Federal National Mortgage Association
FMS	Financial Management Service
Freddie Mac	Federal Home Loan Mortgage Corporation
SSA	Social Security Administration
TAD	Treasury Auction Database
TIO	Term Investment Option
TIPS	Treasury Inflation-Protected Securities
Treasury	Department of the Treasury
TT&L	Treasury Tax and Loan
WSJ	Wall Street Journal

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United States Government Accountability Office
Washington, D.C. 20548

March 30, 2006

The Honorable John W. Snow
Secretary of the Treasury

Dear Mr. Secretary:

One result of persistent fiscal imbalance is growing debt and net interest costs. Net interest on the federal debt is currently the fastest-growing “program” in the budget. The Congressional Budget Office (CBO) projects that interest cost will increase by more than 50 percent over the next 5 years. If unchecked, interest spending threatens to crowd out spending for other national priorities such as educating our children, safeguarding the environment, and ensuring national security.¹

The Department of the Treasury’s (Treasury) primary debt management goal is to finance the government’s borrowing needs at the lowest cost over time. To meet this objective, Treasury issues debt through auctions in a “regular and predictable” pattern across a wide range of securities including nominal bills, notes, and bonds, and Treasury Inflation-Protected Securities (TIPS).² According to Treasury, because investors and dealers rely upon the routine availability of Treasury securities they tend to pay a slight premium, which lowers Treasury’s borrowing costs.

Since 1975, Treasury has supplemented its regular and predictable auctions with unscheduled cash management bill (CM bill) auctions to finance short-term cash needs while providing short notice to market participants. However, Treasury officials and researchers indicated that Treasury pays a premium on CM bills in part because of their irregularity and short-term

¹For more information on these trends and our nation’s fiscal challenges, see GAO, *21st Century Challenges: Reexamining the Base of the Federal Government*, [GAO-05-325SP](#) (February 2005).

²Bills are short-term securities that mature in 1 year or less from their issue date. Bills are sold at a discount from their face value. When the bill matures, Treasury pays the investor the face value of the bill. The difference between the purchase price and face value is the interest paid by Treasury or conversely the return to the investor. Treasury notes and bonds are securities that pay a fixed rate of interest every 6 months until they mature and then pay their face value. Treasury notes mature in at least 1 year but not more than 10 years from their issue date. Bonds mature in more than 10 years from their issue date. TIPS are issued in terms of 5, 10, and 20 years. The principal value of TIPS is tied to inflation. TIPS pay interest twice a year, at a fixed rate that is applied to the adjusted principal. At maturity, Treasury pays the adjusted principal or original principal, whichever is greater.

nature. We examined Treasury's use of CM bills to provide insights into options Treasury might consider to reduce CM bill use, the premium paid on CM bills, and ultimately government borrowing costs.

This report is part of GAO's ongoing work on Treasury's cash and debt management practices and was done under the Comptroller General's authority. We examined general patterns of CM bill issuance over the last 10 fiscal years—fiscal years 1996–2005, but focused on the last 4 fiscal years after Treasury introduced a new regular 4-week bill in 2001 to reduce the use of CM bills. The objectives of this report are to (1) describe when Treasury uses CM bills and why, (2) describe the advantages and disadvantages of CM bills, (3) describe steps taken by Treasury to reduce the overall borrowing costs associated with CM bills, and (4) identify possible options Treasury could consider to reduce the use and cost of CM bills further.

Results in Brief

Since 2002, Treasury has increasingly issued CM bills to fill intramonth cash financing gaps that regular bills alone cannot fill. Treasury issues CM bills in the beginning of the month to raise cash for Social Security, federal retirement, and other scheduled payments. Treasury typically sets the maturity of CM bills to the 15th of the month when notes are issued and tax payments are received. Treasury has also relied on CM bills when it is nearing the debt ceiling to help it pay the government's bills while keeping debt under the statutory limit.³

CM bills provide Treasury flexibility to obtain cash outside its regular borrowing schedule, but Treasury pays a premium for doing so. During our study period (fiscal years 1996 through 2005) Treasury paid a higher yield on most CM bills than outstanding bills of similar maturity paid in the

³The statutory debt limit established by 31 U.S.C. Section 3101 is the legal ceiling on the amount of gross federal debt. The limit applies to the total of the face amount of obligations issued under chapter 31 of title 31, United States Code, and the face amount of obligations whose principal and interest are guaranteed by the U.S. government that are outstanding at any one time.

secondary market.⁴ The higher yield, hereafter called the “yield differential,” is measured as the difference between the CM bill yield Treasury obtained at auction and the average secondary market yield on outstanding Treasury bills that are most similar (in terms of maturity) to the CM bill on the day of auction.⁵ Our statistical analysis of certain features of CM bills, such as size issued and dates of issuance and maturity, from fiscal year 2002–2005 (after the introduction of the 4-week bill) shows that, all other things equal, issuing relatively larger CM bills resulted in a higher yield differential. We also found that CM bills that were part of a “multiple tranche”—successively issued CM bills maturing on the same day⁶—tended to have higher yield differentials but this is only significant at the 10 percent level and it is sensitive to the inclusion of other explanatory variables. CM bills maturing around large tax payment dates tended to have lower yield differentials. We also found that a key driver of the yield differential is the general level of short-term yields in the economy, a factor that is outside Treasury’s control. A continuation in the rise of short-term yields is therefore likely to result in higher yield differentials. Although auction performance theoretically has an effect on the yields Treasury obtained at auction, we did not find any statistically significant relationships between the auction performance measures we examined and the yield differential.

Treasury can accumulate and maintain higher cash balances or issue 4-week bills instead of using CM bills to meet short-term cash shortfalls. However, despite their higher yield, CM bills are generally less costly than either of these alternatives. Treasury faces a negative funding spread—the interest earned on cash balances is generally insufficient to cover the cost of increased borrowing necessary to maintain these balances. The negative

⁴Yields are generally equal to the amount of interest divided by the price paid by investors with an adjustment for the portion of the year the bill is outstanding. The secondary market is a market in which an investor purchases a security from another investor rather than the issuer.

⁵Throughout this report, the yield differential is used as a measure of the premium Treasury pays to borrow outside its regular schedule. It is not a measure of the total additional cost of CM bills compared with other alternatives for raising short-term funds. Total borrowing costs are based on the amount borrowed, the yield, and the time the debt is outstanding.

⁶For example, instead of issuing one \$30 billion CM bill on the 1st that matured on the 15th, Treasury has issued three smaller CM bills on the 1st, 3rd, and 9th (all maturing on the 15th). Other meanings of multiple tranche exist. For example, in bond markets a multiple tranche refers to a package of investments offered at the same time. Unlike this definition, Treasury does not announce the tranches together.

funding spread is due in part to the formula it established in 1978 for the interest it earns on cash balances.⁷ As a result, it is generally more cost-efficient to repay debt and then issue a CM bill than run higher cash balances. CM bills are also less costly than a regular 4-week bill for shorter-term needs (i.e., less than 28 days). This is true because although 4-week bills tend to have a lower yield, they are outstanding for a longer period of time. As a result, the borrowing cost of a 4-week bill is generally greater than a CM bill of shorter maturity (less than 28 days).

Treasury has taken steps to lower the use and overall cost of CM bills. In 2001, Treasury introduced the 4-week bill to help reduce the use of CM bills. This led to a reduction in the amount of CM bills issued and their term to maturity. Also, instead of issuing one large CM bill, Treasury has increasingly issued CM bills in multiple tranches. Although CM bills issued as part of a multiple tranche may have higher yield differentials than CM bills not part of a multiple tranche, they allow Treasury to borrow cash closer to the day it is needed, which reduces the average issue size, term to maturity, and annualized amount outstanding. Therefore, the savings that multiple tranche CM bills provide more than offset the higher yields such issues might entail. Declining interest rates, which reached historical lows in recent years, also helped reduce borrowing costs from 2001 to 2002. However, the cost of CM bill issuance has increased since 2003.

CM bills will continue to be a necessary debt management tool to meet unexpected cash needs when Treasury has low cash balances and when Treasury is nearing the debt ceiling. Our analysis indicates that the yield differential has increased as short-term rates have risen. If these rates rise further, as market participants expect, so will the yield differential. While Treasury does not vary its debt management strategy in response to changing interest rates, it should be mindful that increasing rates are likely to raise the relative cost of unscheduled CM bills. As a result, Treasury should consider options that may reduce the frequent use of CM bills and ultimately overall borrowing costs.

We identified a range of options Treasury can consider that may reduce the use of CM bills, the premium paid on CM bills, and overall borrowing costs.

⁷Treasury invests its excess cash—funds that would otherwise cause its balance at the Federal Reserve to rise above the target level of \$5 billion—in Treasury Tax and Loan (TT&L) accounts. TT&L accounts are held at financial institutions and earn interest rates equal to the federal funds rate less .25 percentage points, or 25 basis points.

One of the more promising options is exploring additional opportunities for closer alignment of large cash flows to help eliminate the frequent cash financing gap in the first two weeks of the month. Treasury can also reexamine options for increasing earnings on its excess cash balances, which would narrow the negative funding spread and may ultimately reduce the need to rely on CM bills. Other options include introducing a shorter-term instrument; increasing transparency on the potential size of CM bills; relaxing rules for CM bill auctions; and exploring other nations' debt management practices.

We recommend that Treasury explore options such as those discussed in this report and any others it identifies that may help it achieve its lowest-cost borrowing objective. We recognize that there are a number of trade-offs to consider with each of these options. In its exploration Treasury should consider the costs and benefits, including how options may be combined to produce more beneficial outcomes, and determine whether the benefits—in the form of lower borrowing costs—to the federal government (and so to taxpayers) outweigh any costs imposed on individuals, business, or other nonfederal entities. Implementing some of these options would require changes to statutes or regulations. If Treasury determines that any of these changes would be beneficial, we encourage Treasury to begin discussions with relevant federal agencies and the Congress about obtaining the necessary authorities.

In oral and written comments on a draft of this report, Treasury generally agreed with our findings, conclusions, and recommendations. Treasury said that it is committed to continuing to explore ways to further reduce financing costs through changes in the use of CM bills and that many of the options we identified are embodied in its current debt management policy. Treasury emphasized that statutory authority is needed for some options, particularly changing the timing of receipts and expenditures and improving earnings on excess cash balances. Treasury also suggested some technical changes throughout the report that we have incorporated as appropriate. Treasury's comments appear in appendix IV. In addition, the Federal Reserve Board provided technical comments that we incorporated as appropriate.

Background

Congress has delegated to Treasury the power to borrow the money needed to operate the federal government and manage the government's

outstanding debt subject to a statutory limit.⁸ Treasury's primary debt management goal is to finance the government's borrowing needs at the lowest cost over time. To meet this objective, Treasury issues debt through auctions in a "regular and predictable" pattern across a wide range of securities. Treasury does not "time the market"—or take advantage of lower interest rates—when it issues securities. According to Treasury, because investors and dealers rely upon the routine availability of Treasury securities they tend to pay a slight premium, which lowers Treasury's borrowing costs. In addition, Treasury also states that to support liquidity, it must issue "enough but not too much" at each auction.⁹ If Treasury issued too little, it could not sustain a deep and liquid secondary market for its securities. If it issued too much, Treasury creates concern among primary market participants that they may find it difficult to distribute their holdings in the secondary market.

Treasury publishes a schedule with tentative announcement, auction, and settlement (issue) dates up to 6 months in advance of regular security auctions. Depending on the type of security, Treasury typically auctions and then issues a security within a week or less. Treasury generally issues short-term regular bills with 4-, 13-, and 26-week maturities every Thursday and issues 2- and 5-year notes at the end of each month.¹⁰ Three- and 10-year notes are issued in the middle of each quarter and Treasury reopens 10-year notes 1 month after their initial issuance.¹¹ In addition, Treasury issues TIPS in 5-, 10-, and 20-year maturities in certain months according to the TIPS' maturity. Finally, Treasury issues 30-year bonds in the middle of

⁸Treasury's authorities are codified in chapter 31 of title 31 of the United States Code.

⁹A liquid debt issue is one that is large enough for market participants to trade easily, and one for which the offer and purchase prices differ only slightly.

¹⁰Prior to February 2006, Treasury issued the 5-year note in the middle of each month.

¹¹Instead of issuing a new security, Treasury may add to, or reopen, an existing issue, increasing the amount outstanding of the issue. Larger issues tend to be more liquid and attractive to investors. In addition to the 10-year note, Treasury reopens 30-year bonds 6 months after their initial issuance. It also reopens the 5- and 20-year TIPS 6 months after initial issuance and the 10-year TIPS 3 months after initial issuance. Moreover, shorter-term bills are fungible with previously issued bills, so that every 13-week bill is a reopening of a previously issued 26-week bill and every 4-week bill is a reopening of previously issued 13- and 26-week bills.

February¹² and reopens the bonds in the middle of August. Figure 1 depicts Treasury's April 2005 borrowing schedule.¹³

Figure 1: Treasury's April 2005 Regular Borrowing Schedule

April 2005				
M	T	W	Th	F
				1
4	5	6	7 4-, 13-, 26-week bills	8
11	12	13	14 4-, 13-, 26-week bills	15 5-year note 10-year TIPS
18	19	20	21 4-, 13-, 26-week bills	22
25	26	27	28 4-, 13-, 26-week bills	29 5-year TIPS
May 2005				
2 2-year note	3	4	5 4-, 13-, 26-week bills	6

Source: GAO analysis of Bureau of the Public Debt (BPD) information.

Note: The April 2-year note was issued on May 2 since the end of April fell on a weekend. The 3-year note was not issued since April did not fall in the middle of the quarter (i.e., quarterly refunding months—February, May, August, and November).

¹²Treasury suspended issuance of the 30-year bond in October 2001 and resumed issuance in February 2006.

¹³Treasury's current tentative auction schedule can be viewed at: <http://www.treas.gov/offices/domestic-finance/debt-management/auctions/>.

Treasury supplements its regular and predictable schedule with flexible securities called CM bills. Unlike other securities, Treasury does not publish information on CM bills on its auction schedule. Instead, Treasury generally announces CM bill auctions anywhere from 1 to 4 days ahead of the auction. The term to maturity—or length of time the bill is outstanding—varies according to Treasury’s cash needs. CM bills allow Treasury to finance very short-term cash needs—for as little as 1 day—while providing short notice to market participants.

The United States Treasury is not alone in using CM bill-type instruments to finance short-term needs and smooth cash flows. For example, in the United Kingdom, the Debt Management Office (DMO) issues CM bills to meet temporary cash flow needs that the DMO cannot conveniently meet through its structured bill auctions and to help smooth cash flows. The Bank of Canada, which auctions securities for Canada’s debt management, issues CM bills to help it minimize the level and cost of carrying cash balances. Australia uses short-term securities with 5-, 13-, and 26-week maturities to bridge within-year cash flow mismatches, but may vary the maturities and issue shorter-term securities of 3 to 6 weeks.

Objectives, Scope, and Methodology

To understand when Treasury uses CM bills, we analyzed CM bills issued over the last 10 fiscal years—fiscal years 1996–2005. This time period provides a sufficiently large sample of CM bills—121—and allowed us to analyze and show trends in CM bill use before, during, and after the following events: 4 years of surpluses, five debt issuance suspension periods (DISP) declared by the Secretary of the Treasury,¹⁴ and the introduction of two new debt instruments—TIPS in 1997 and the 4-week bill in 2001. CM bill data were obtained from the Bureau of the Public Debt (BPD). BPD’s online database has 22 different features for each Treasury security, including the amount, announcement, auction and issue dates, the maturity date, and the yield. We examined these features as well as others

¹⁴A DISP is any period for which the Secretary of the Treasury has determined that obligations of the United States may not be issued without exceeding the public debt limit. During DISPs, the Secretary of the Treasury has statutory authority to depart from Treasury’s normal investment and redemption procedures for certain federal government accounts. See GAO, *Debt Ceiling: Analysis of Actions Taken During the 2003 Debt Issuance Suspension Period*, [GAO-04-526](#) (Washington, D.C.: May 20, 2004) for additional information on DISPs and the public debt limit. CM bills may also be issued by Treasury prior to a DISP.

examined in earlier studies of CM bills to identify patterns of CM bill auctions, issuance, and maturity.

To understand why CM bills are issued or mature at these times, we examined Treasury's cash flows from fiscal years 1996–2005 using publicly available data from the Financial Management Service's (FMS) *Daily Treasury Statements*. We also met with Treasury officials from the Office of Debt Management and the Office of Fiscal Projections. We reviewed Treasury documents, including quarterly refunding statements and policy statements, and Treasury Borrowing Advisory Committee reports and minutes from quarterly refunding meetings.¹⁵

We obtained views on the perceived advantages and disadvantages of CM bills for Treasury, Federal Reserve operations, and investors in meetings with Treasury officials, Federal Reserve officials, market participants, including primary dealers and money market fund managers, and market analysts. We also reviewed financial and economic literature. We did not identify any key advantages or disadvantages of CM bills for Federal Reserve operations and as a result these operations are not a focus in this report.

To describe the key disadvantage of CM bills for Treasury—higher yields—we estimated the differential between CM bill yields and the yields on outstanding Treasury bills of similar maturity at the time of auction using data from BPD and the *Wall Street Journal* (WSJ).¹⁶ To determine whether certain features might reduce the yield paid on CM bills, we regressed the yield differential on key features. We determined which features to examine on the basis of previous studies of CM bills and Treasury auctions,

¹⁵Treasury's quarterly refunding process, during which debt management policy is examined and sometimes changed, is held near the middle of each calendar quarter (i.e., February, May, August, and November). As part of this process, Treasury solicits advice and views from the private sector, including primary dealers and the Borrowing Advisory Committee. Primary dealers are banks and securities broker-dealers that trade in U.S. government securities with the Federal Reserve Bank of New York. The Borrowing Advisory Committee is a committee of the Bond Market Association governed by federal statute and comprising senior representatives from firms that actively trade or make large investments in Treasury securities.

¹⁶Similar measures, also called butterfly spreads, were used by Jason Seligman, "Does Urgency Affect Price at Market? An Analysis of U.S. Treasury Short-Term Finance," *Journal of Money, Credit, and Banking* (forthcoming), pp. 6–8 and Michael J. Fleming, "Are Larger Treasury Issues More Liquid? Evidence from Bill Reopenings," *Journal of Money, Credit, and Banking*, vol. 34, no. 3 (August 2002), p. 707.

our interviews with Treasury and market participants, and our own analysis. While we analyzed the yield differential for all CM bills issued during fiscal years 1996–2005, we focused on the 55 CM bills issued during fiscal years 2002–2005 because the introduction of the 4-week bill in 2001 substantially reduced CM bill maturities and caused a structural change in the CM bill market. For more information on our statistical analysis, see appendix I.

Because CM bill rates are determined in auctions, we examined auction performance to determine whether there is any relationship between selected performance measures and the yield differential. We also examined whether CM bill auctions perform as well as regular 4-week bill auctions because the 4-week bill is more similar to a CM bill—in terms of issuance amount variance and its term to maturity—than other Treasury securities. We evaluated each of the 284 CM and 4-week bill auctions in fiscal years 2001–2005 (years since the introduction of the 4-week bill) using proprietary data from the Treasury Auction Database (TAD) and GovPX—an interdealer broker database with information on primary dealer transactions for all U.S. Treasury securities. We analyzed auction performance measures mentioned in Treasury interviews, Treasury studies of auctions,¹⁷ Borrowing Advisory Committee minutes, and economic and financial literature/textbooks describing or evaluating Treasury auction performance. See appendix II for more information on our analysis of CM bill auctions.

We identified possible options to reduce the use and cost of CM bills on the basis of our analysis of CM bill use, the yield differential, and CM bill auction performance. We discussed these options with Treasury, market participants, and others and we include their comments as appropriate.

In order to assess the reliability of data used in this study, including proprietary data from TAD and GovPX, and the publicly available data from FMS, BPD, and WSJ, we examined the data to look for outliers and anomalies and addressed such issues as appropriate. In general, we chose databases that were used by Treasury and researchers to examine Treasury markets and auction performance. Where possible and appropriate, we corroborated the results of our data analysis with other sources. On the

¹⁷For example, see Paul F. Malvey and Christine M. Archibald, *Uniform-Price Auctions: Update of the Treasury Experience* (Washington, D.C.: Department of the Treasury, Oct. 26, 1998).

basis of our assessment we believe the data are reliable for the purposes of this review.

We conducted our review in Washington, D.C., from February 2005 through March 2006 in accordance with generally accepted government auditing standards.

Treasury Uses CM Bills to Help Fill Cash Financing Gaps

Treasury frequently faces a cash financing gap of about 2-weeks duration because of timing differences of large cash inflows and outflows. Treasury makes large regular payments (e.g., Social Security and federal retirement) in the beginning of the month and it often receives large cash inflows in the middle of the month from income tax payments and note issuances. Because regular bills alone are not sufficient to fill this cash financing gap, Treasury has increasingly used CM bills since 2002. Treasury has also relied on CM bills when nearing the debt ceiling to help pay its bills while keeping debt under the statutory limit.

Large Cash Outflows Occur at the Beginning of the Month

Treasury's largest cash outflows generally occur in the beginning of the month. For example, in fiscal year 2005, almost one-quarter of the government's annual fiscal cash outlays (withdrawals excluding debt redemption) were paid in the first 3 days of each month.¹⁸ On or around the 1st of every month Treasury paid about \$14 billion to active duty military personnel, military and civilian retirees, and others. In the beginning of some months, Treasury also paid up to \$6 billion for Medicare. On or around the 3rd of every month it paid about \$21 billion in Social Security benefits. In total, Treasury made \$718 billion cash payments in the first 3 days of months in fiscal year 2005.

These large payments in the beginning of the month are not anticipated to decline soon. A Treasury official explained that Social Security benefits paid on the 3rd of the month are anticipated to remain relatively steady for a number of years and then decline because of steps taken by the Social Security Administration (SSA) in 1997 that have helped smooth cash payments out of Treasury. (Fig. 2 describes these steps in more detail.)

¹⁸Treasury must also repay regular bills that mature on Thursdays and notes that mature in the middle and end of each month. However, Treasury generally pays them by rolling over debt (i.e., issuing new debt to repay maturing debt).

However, because beneficiaries receiving benefits before 1997 continue to receive their benefits at the beginning of the month, we estimate the large payments could last another 10 years. Other federal benefit programs continue to pay all or most of their benefits at the beginning of the month. If these payments were, like Social Security, spread throughout the month, it would help smooth cash flows and might reduce Treasury's need to use unscheduled large CM bills at the beginning of the month.

Figure 2: Smoothing the Payment of Social Security Benefits

In the late 1990s, the SSA took steps to smooth the payment of Social Security benefits—the largest federal benefit payment. Prior to June 1997 regular monthly Social Security benefits were paid on (or around) the 3rd of each month. In 1997, the payment date was changed for beneficiaries filing after May 1997. These new beneficiaries are paid on the 2nd, 3rd, or 4th Wednesdays of the month depending on their date of birth. Beneficiaries with birthdays on or before the 10th of the month are paid on the second Wednesday; those born on the 11th–20th receive their benefits on the third Wednesday; and the rest receive their benefits on the fourth Wednesday. Those receiving benefits before May 1997 and all Supplemental Security Income recipients still receive payments on (or around) the 3rd of each month. In fiscal year 2005, the amount paid on or around the 3rd of each month was at least \$20 billion while the amount paid on the Wednesday schedule averaged only \$4 billion. Over time, Social Security payments will become more even throughout the month.

Source: GAO analysis.

Large Receipts Often Occur in the Middle of the Month

In contrast to outlays, Treasury's largest cash inflows generally occur in the middle of the month. Although the majority of federal tax receipts are already fairly smoothed throughout the year, most corporate and nonwithheld individual tax payments are made in the middle of certain

months throughout the year.¹⁹ Treasury receives large corporate tax payments on (or around) the 15th of March, April, June, September, and December. During fiscal year 2005, Treasury received just over \$213 billion of cash on these days. Treasury also had large receipts in the middle of January, April, June, and September from nonwithheld individual estimated tax payments, and after April 15 from the settlement of prior year individual income tax liability.

In addition to tax receipts, net cash raised from note issuances (i.e., issuance less redemption) on or around the 15th of the month more than tripled from \$78 billion in fiscal year 2002 to \$297 billion in fiscal year 2005. However, some large midmonth cash inflows from note issuance will not endure because Treasury shifted 5-year note auctions from the middle to the end of each month beginning in February 2006. As a result, cash inflows from new 5-year debt issuance shifted from the middle to the end of the month.

Regular Bill Issuances Alone Are Not Sufficient to Fill Cash Financing Gap

To achieve the lowest borrowing costs over time, Treasury seeks to provide the market with a high degree of stability in the amount issued of each security, with the requisite stability increasing with issuance maturity. Treasury officials said they try to limit swings in regular bill offerings. This means regular bill issuances cannot suddenly increase by the amount needed to make large payments in the beginning of the month nor suddenly decrease in the middle of the month to absorb large inflows. In practice, Treasury only varied the amount of 13- and 26-week bills by \$2 billion (less than 10 percent of the average amount issued) from week to week in fiscal year 2005. Since Treasury introduced the 4-week bill in 2001 to help reduce cash balance swings, its issuance size varies more than that of other regular Treasury bills. In fiscal year 2005, the size of the 4-week bill varied by as much as \$13 billion (more than three-quarters of the average amount issued). Even so, to meet cash needs—which in fiscal year 2005 averaged

¹⁹Withheld taxes include personal income, Social Security, and Medicare taxes withheld from employee paychecks by employers. Nonwithheld taxes, such as estimated individual income taxes, and corporate income taxes are paid on a periodic basis. Generally, a corporation must make four payments a year, which are due by the 15th day of the 4th, 6th, 9th, and 12th months of the corporation's tax year, which may vary. So, for corporations with a tax year ending December 31, payments are due on April 15, June 15, September 15, and December 15. If the corporation's year ends June 30, payments are due on the 15th of October, December, March, and June. If any due date falls on a Saturday, Sunday, or legal holiday, the payment is due on the next business day.

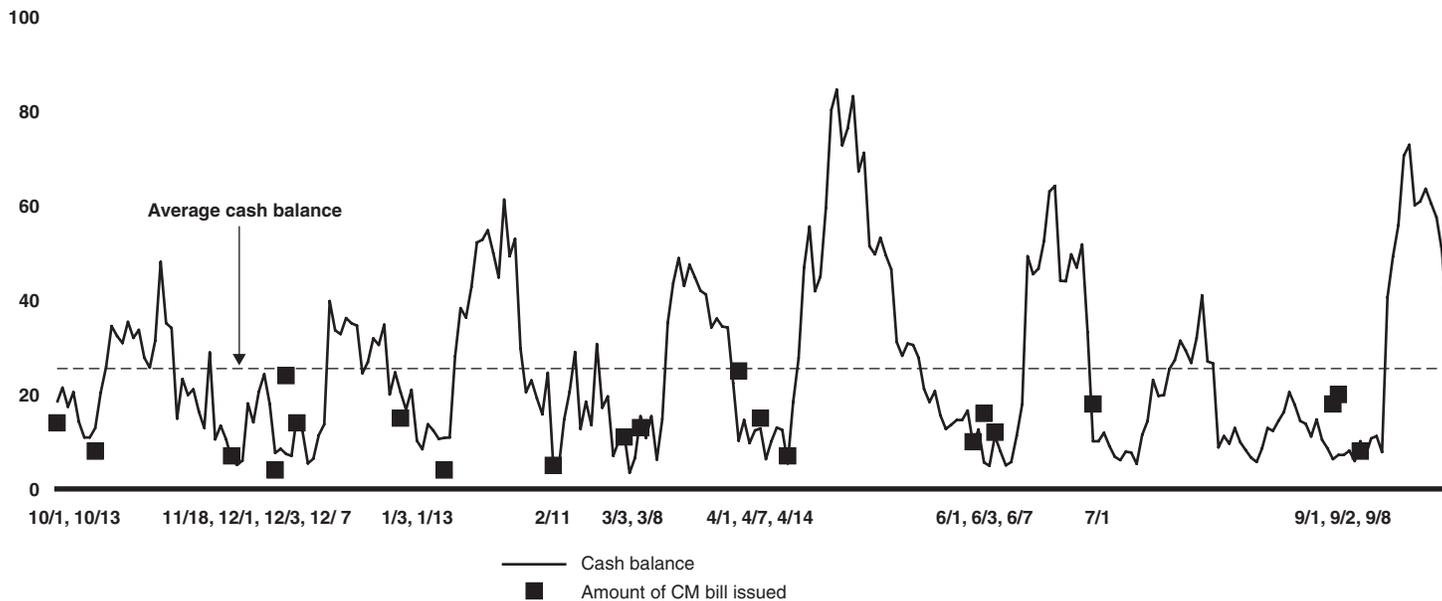
almost \$60 billion at the beginning of the month—Treasury has come to rely on CM bills.

Treasury Has Increasingly Used CM Bills to Fill Frequent Cash Financing Gaps

The combination of low cash balances in the beginning of the month with large cash inflows in the middle of the month has led to a general pattern of CM bill issuance. Our analysis shows that from 2002 to 2005, on average about half of CM bills were issued in the first 3 days of the month. According to Treasury officials, Treasury decides to issue CM bills when it has low cash balances, which often track the timing of large payments. In fiscal year 2005, for example, Treasury issued 11 of its 21 CM bills in the first 3 days of the month when it had below average cash balances (the average cash balance for fiscal year 2005 was \$25.5 billion) (see fig. 3). The amounts issued varied from \$4 billion to \$42 billion.

Figure 3: Cash Balance and CM Bill Issuance during Fiscal Year 2005

Dollars in billions



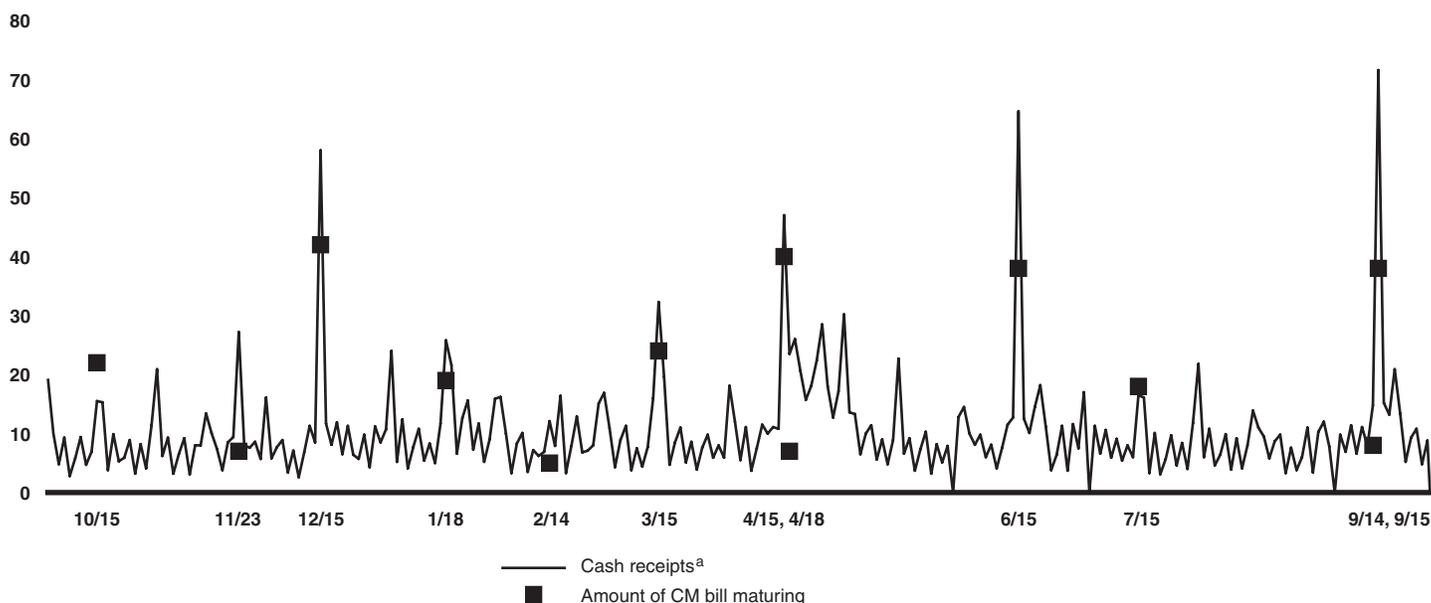
Source: GAO analysis of FMS data.

The maturity dates of CM bills have varied over the 10-year period we examined, but since 2002 CM bills have increasingly matured on the 15th of the month when Treasury receives large cash inflows. In fiscal year 2005, Treasury set 68 percent of its \$268 billion CM bill borrowings to mature in

the middle of March, April, June, September, and December when Treasury receives large corporate and individual income taxes. In these 5 months Treasury received 72 percent (\$213.3 billion) of fiscal year 2005 corporate income tax deposits.²⁰ With only one exception, all CM bills issued in fiscal year 2005, regardless of when Treasury issued them, matured on or around the 15th of the month (see fig. 4).²¹

Figure 4: Cash Receipts and Maturity Dates of CM Bills Issued during Fiscal Year 2005

Dollars in billions



— Cash receipts^a
 ■ Amount of CM bill maturing

Source: GAO analysis of FMS data.

^aCash receipts exclude net issuance of debt.

Since 2002, Treasury has increasingly filled the approximately 2-week financing gap by issuing CM bills at the beginning of the month and setting

²⁰Our calculation of total corporate income tax deposits for fiscal year 2005 does not include the \$4.5 billion payment received on Oct. 1, 2004, that was caused by Congress's postponement of the corporate tax payment date in mid-September 2004.

²¹All 21 CM bill issuances in fiscal year 2005 matured between the 14th and the 18th of the month, except one CM bill that matured on Nov. 23, 2004.

the maturity date of these CM bills for the middle of month.²² Table 1 shows that since 2002, 23 CM bills—or more than 40 percent of the number of CM bills issued—have been issued on the 1st–3rd days of the month and matured on the 15th day of the month. These CM bills accounted for more than half of the total dollar amount of CM bills issued in the last 4 fiscal years.

Table 1: CM Bills Issued on the 1st–3rd Days of the Month That Mature on the 15th Day of the Month

	Number	Percent of total number issued	Amount (billions of dollars)	Percent of total amount issued
1996	0	0%	\$0	0%
1997	1	11	26	16
1998	1	14	15	9
1999	5	45	99	42
2000	1	10	25	11
2001	5	42	162	47
2002	0	0	0	0
2003	3	25	69	39
2004	9	60	202	82
2005	11	52	175	65
Total (1996–2001)	13	20%	\$327	23%
Total (2002–2005)	23	42%	\$446	55%

Source: GAO analysis of BPD data.

Treasury Also Uses CM Bills to Help Smooth Cash Flows during the April Tax Season

Over the last 10 years Treasury has relied on multiple CM bills to help manage cash flows in April. The large cash balance swings in April could not be accommodated by changes in the regular bill issuance schedule according to Treasury officials and our analysis. To help smooth large April

²²It may seem counterintuitive for Treasury to borrow to pay Social Security benefits when the Social Security trust funds are running surpluses. When the Social Security trust funds receive payroll taxes or other contributions that are not needed to pay benefits, the excess cash is invested in special Treasury securities and Treasury uses the cash for other government purposes. Thus, this cash is not on hand to pay Social Security benefits at the beginning of each month.

cash flows, Treasury consistently issued three or more CM bills every year between fiscal years 1996 and 2005 that matured in the later half of April (on the 15th or later), when Treasury typically received large tax receipts. For example, in fiscal year 2005 Treasury issued three CM bills—two matured on April 15 and one matured on April 18—totaling \$47 billion and received about \$41 billion in corporate and nonwithheld income and employment tax payments on those dates.

Treasury Does Not Control the Timing of All Cash Flows

Better aligning or smoothing cash inflows and outflows could reduce or eliminate the frequent financing gap thereby reducing the need for some CM bills but Treasury does not have authority to control the timing of all cash flows. Treasury is a passive agent; it collects and disburses federal funds at agencies' request.²³ It does not determine when major benefit payments are made. For example, the payment dates of civil service and railroad retirement are set by law. Due dates for tax payments are also set by federal statute.²⁴

Treasury does have some control over debt-related cash flows and has considered how changes in its schedule affect cash flows. For example, when making changes to its schedule in 2001, Treasury maintained monthly issuance of 2-year notes, which are issued at the end of the month and could help pay regular benefit payments in the beginning of the following month. More recently, Treasury moved 5-year note issuance from the middle to the end of the month. This change more closely aligns 5-year note issuance with the beginning of the next month's payments and may reduce CM bill issuance in the early part of months.

However, regular securities can only help fill cash financing gaps temporarily. No regular security that matures on the same day another is issued can be used to fill cash financing gaps over the long run because, in a steady state, most, if not all, of the cash raised at each issuance would be needed to pay maturing securities. As a result, Treasury would not raise large amounts of new cash. In addition, Treasury generally sets the issue amount for longer-term securities to cover long-term deficit needs, not

²³However, agencies must give Treasury 5 business days notice for disbursements of \$500 million or more and 2 business days notice for disbursements of between \$50 million and \$500 million. See *Treasury Financial Manual*, Vol. I, Part 6, Chapter 8500 (Washington, D.C.: Department of the Treasury, April 1996).

²⁴26 U.S.C. § 6654(c) and § 6655(c).

short-term cash shortfalls, and thus the new cash raised with the 5-year note may not cover the full amount of cash needs in the beginning of the month. Although Treasury will likely raise new cash at the end of the month with the 5-year note until 2011 when 5-year notes issued in 2006 begin to mature, the change in the auction schedule is not likely to eliminate the need for CM bills.

Treasury Also Relies on CM Bills When Approaching the Debt Ceiling

When debt is nearing the statutory limit, Treasury has to take a number of extraordinary steps to meet the government's obligation to pay its bills while keeping debt under the ceiling.²⁵ Treasury also issues CM bills, among other actions, to accomplish these goals. CM bills, like other Treasury securities, are subject to the debt limit. However, CM bills allow Treasury to borrow cash for shorter time periods than regular bills. On occasion, Treasury has changed scheduled auctions for its regular securities and instead issued CM bills so that the debt ceiling will not be reached. For example, because of debt limit constraints Treasury delayed the 4-week bill auction scheduled for Tuesday, November 16, 2004. Treasury then auctioned a 5-day CM bill for \$7 billion on November 17, 2004. In another example, Treasury said that inaction on the debt ceiling in 2002 led to reduced issuance of 4-week bills and larger, more frequent CM bill issuance than it would have done otherwise. During the five DISPs within the last decade, Treasury issued 19 CM bills totaling \$300 billion. As table 2 shows, Treasury issued most of these CM bills during the lengthy DISPs in fiscal years 1996 and 2003.²⁶

²⁵For information on actions taken during DISPs, see [GAO-04-526](#) and earlier GAO debt ceiling reports.

²⁶Treasury also used cash management bills during the DISP that occurred in fiscal year 2006. The DISP began on February 16, 2006 and lasted until March 20, 2006, when Congress increased the debt limit to \$8,965 billion.

Table 2: DISPs over the Last Decade (Fiscal Years 1996–2005)

Fiscal year	DISP beginning date	DISP ending date	Length (days)	Number of CM bills issued	Amount (billions of dollars)
1996	November 15, 1995	March 29, 1996	135	8	\$130
2002	April 4, 2002	April 16, 2002	12	2	39
2002	May 16, 2002	June 28, 2002	43	2	41
2003	February 20, 2003	May 27, 2003	96	6	83
2005	October 14, 2004	November 19, 2004	36	1	7
Total				19	\$300

Source: GAO analysis of BPD data.

CM bills will continue to be a useful tool for Treasury when it approaches the debt ceiling, but, as discussed on page 20 of this report, Treasury pays a premium for the flexibility CM bills provide.

CM Bills Cannot Be Used in All Circumstances and Other Alternatives No Longer Exist or Are Limited

Although CM bills offer a means to raise cash in as little as a day, CM bills, like other Treasury securities, cannot be used when financial markets are closed or not functioning properly. Previously, Treasury could obtain cash on short notice outside financial markets, but this capability ceased more than twenty years ago. Treasury was also able to draw on compensating balances when financial markets closed after September 11, 2001, but these balances were terminated in 2004.

In the past, Treasury had access to a cash draw authority. Intermittently between 1942 and 1981, Treasury was able to directly sell (and purchase) certain short-term obligations from the Federal Reserve in exchange for cash. Treasury used the cash draw authority infrequently and mostly in times of war or armed conflict. The Federal Reserve held special short-term certificates purchased directly from Treasury on 228 days between 1942 and 1981. In the years Treasury used this authority, it borrowed on about 11 days on average per year. The Treasury Draw Policy, as amended in 1979, stated that Treasury could use the cash draw authority only in

“unusual and exigent circumstances.”²⁷ Congress allowed this authority to expire in 1981.²⁸

Prior to March 2004 Treasury could use compensating balances—noninterest bearing cash balances that were used to compensate banks for various services—as a source of short-term funding when markets were closed or during DISPs. Treasury officials said that compensating balances were not viewed as a substitute backup facility for Treasury to obtain cash in the short term and were only used in extraordinary circumstances. For example, on September 11, 2001, Treasury had to cancel the auction of 4-week bills, which would have settled on Thursday, September 13, 2001. Because of the auction cancellation, Treasury lacked sufficient cash to pay about \$11 billion of maturing 4-week bills on Thursday, September 13. Treasury obtained sufficient cash by drawing down compensating cash balances. However, in March 2004, compensating balances were replaced with direct payments to the banks.

More recently, in the aftermath of Hurricane Katrina, when cash balances fell more than expected, Treasury obtained cash by canceling a planned cash investment. Treasury periodically auctions excess cash to banks through its Term Investment Option (TIO) program. Treasury invests cash through TIOs for a fixed term at a rate determined through a competitive auction process.²⁹ Treasury intended to award a \$5.5 billion investment option on Friday, November 25, 2006. However, additional spending in response to Hurricane Katrina caused Treasury’s cash balance to fall to an unexpected low level on November 23, 2005. In response, Treasury did not follow through on the planned investment option.

Using these investments as a source of cash in the future requires that Treasury actually have excess cash to invest and that it knows it will need the cash before investment. Reliance on excess cash is limited since Treasury has placed increased emphasis on minimizing cash balances in order to reduce overall borrowing costs. One possible consequence of this

²⁷Pub. L. No. 96-18.

²⁸In 1979 Congress also authorized a securities draw authority, which permitted Treasury to borrow securities from the Federal Reserve, sell them, and then repurchase the securities in the open market and return the securities to the Federal Reserve within a specified period, but it was never used. The securities draw authority also expired in 1981.

²⁹For more information on Treasury cash investment, see pages 34–35.

practice is an increased risk that incorrect cash flow predictions or emergencies could lead to Treasury overdrawing its Federal Reserve Bank account. As a result, an important issue for future consideration is how Treasury might obtain funds to finance government operations should normal financial market operations be degraded significantly or closed because of a catastrophic emergency.

CM Bills Generally Had Higher Yields than Outstanding Bills of Similar Maturity but Lower Borrowing Costs than Currently Available Alternatives

CM bills provide Treasury with flexibility to obtain cash outside its regular borrowing schedule, but Treasury generally paid a higher yield on CM bills than outstanding bills of similar maturity paid in the secondary market. The differential between CM bill yields and similar maturing outstanding bills—hereafter called the “yield differential”—varied greatly from fiscal year 1996 through 2005.³⁰ We found several factors, both within and outside Treasury’s control that affected the yield differential. Despite their higher yield, CM bills are generally less costly than maintaining higher cash balances or issuing 4-week bills as means to obtain the cash needed to make large payments, such as Social Security and federal retirement, at the beginning of the month.

CM Bill Yields Closely Track Other Short-Term Rates

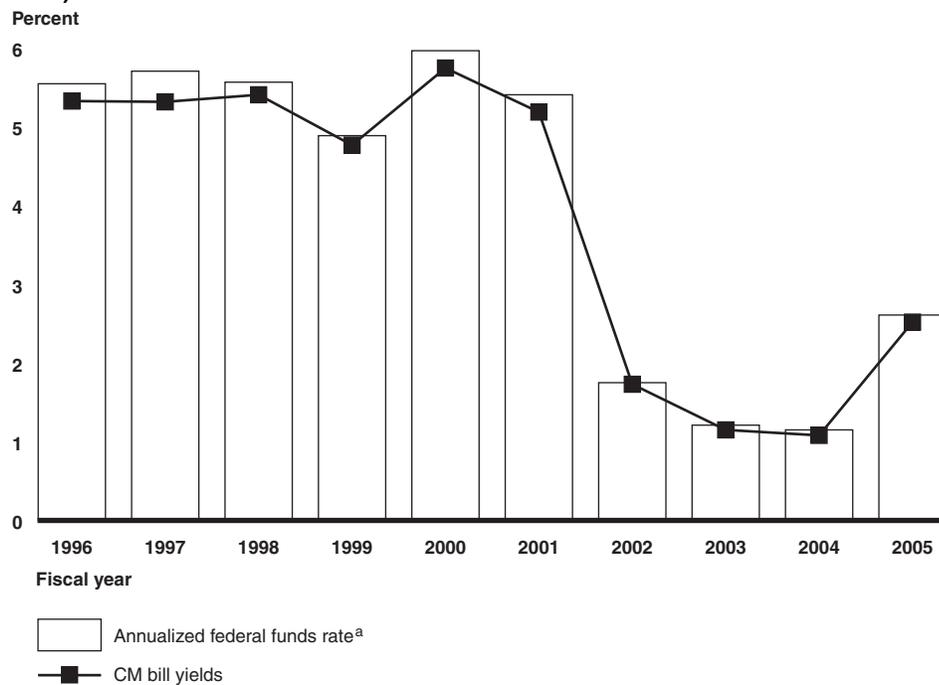
CM bill yields closely track the level of short-term interest rates prevailing at the time of auction. This is because investors see other short-term instruments as close substitutes for CM bills. They can either buy new bills or buy existing bills in the secondary market. In general, investors will not accept a lower yield (bid a higher price) for a new bill than that available on an existing bill. Conversely, investors would not offer a lower price to obtain a higher yield than prevailing in the market since they would likely be underbid. As a result, CM bill yields follow other short-term yields within a narrow range.

Short-term yields change over time in response to changes in economic activity, the demand for credit, investors’ expectations, and monetary policy as set by the Federal Reserve. CM bill yields declined from about 5.8

³⁰The yield differential is the difference between a CM bill yield and the weighted average yield of outstanding Treasury bills maturing before and after the CM bill. The weights on the Treasury bill yields were based on the relative difference in each bill’s maturity date from the CM bill’s maturity date, with the Treasury bill having a closer maturity date receiving a greater weight and the weights summing to one. For more information, see app. I, pages 53–54.

percent in 2000 to 1.1 percent in 2004. This decline reflected the overall reduction in short-term rates driven largely by the Federal Reserve's monetary actions and other market forces. The Federal Reserve started lowering the federal funds rate—the interest rate at which banks lend reserves to other banks overnight—in early 2001, and by 2002 the federal funds rate was at levels not seen since the early 1960s. Beginning in the summer of 2004, the Federal Reserve began to increase the federal funds rate. At the same time, CM bill yields increased to an average 2.5 percent in fiscal year 2005 (see fig. 5).

Figure 5: Annualized Federal Funds Rate and CM Bill Yields (Fiscal Years 1996–2005)



Source: GAO analysis of BPD and Federal Reserve data.

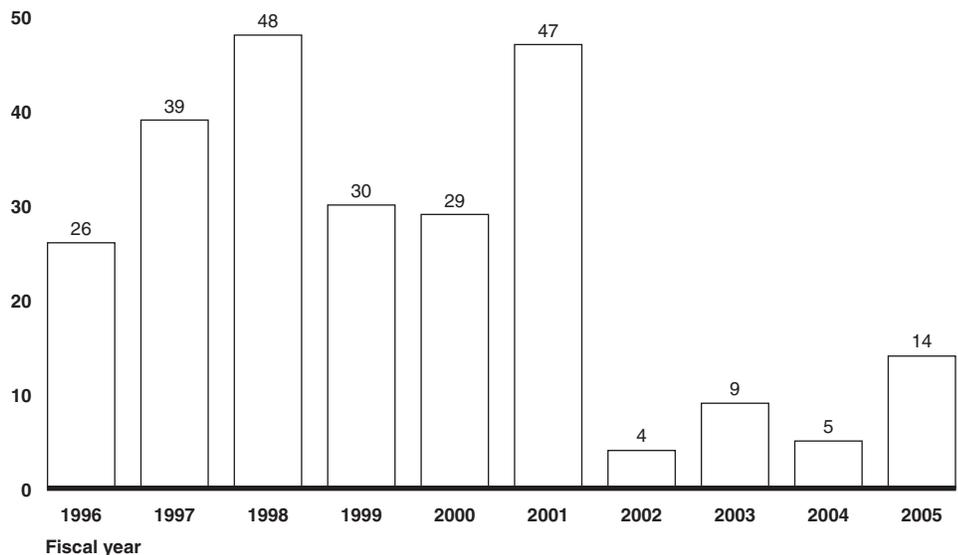
^aAnnualized number based on average of federal funds rates on days of CM bill auctions. CM bill rates converted to money market yields for comparability.

CM Bill Yields Were Generally Higher than Yields on Outstanding Bills of Similar Maturity

Treasury paid a higher yield on most CM bills issued during our study period than outstanding bills of similar maturity paid in the secondary market. The average yield differential fell from 47 basis points³¹ in fiscal year 2001 to 5 basis points in fiscal year 2004 (see fig. 6). In fiscal year 2005, yield differentials grew and CM bill yields were about 14 basis points higher on average than outstanding bills of similar maturity.

Figure 6: Yield Differential (Fiscal Years 1996–2005)

Basis points



Source: GAO analysis of BPD and WSJ data.

Note: The yield differential compares CM bill yields with the weighted average of yields on outstanding Treasury bills maturing before and after the CM bill. For more information, see app. I, pp. 53–54.

Our analysis identified two important factors behind the yield differential decline: lower short-term Treasury yields and reduced CM bill issuance. The first effect was somewhat temporary while the latter effect could last. The level of short-term interest rates is largely driven by Federal Reserve policy and market forces rather than by Treasury. Treasury bill yields have risen and may continue to rise and eventually reach levels that prevailed in the late 1990s, thereby erasing the portion of the decline in the yield

³¹One basis point is equal to 1/100th of 1 percent. Thus, 47 basis points is 0.47 percentage points.

differential caused by lower interest rates. However, because the 4-week bill is now a permanent feature of Treasury's auction schedule and has reduced Treasury's reliance on CM bills, the portion of the decline in the yield differential attributable to relatively lower CM bill issuance is likely to endure. The experience during fiscal years 2002–2005 as a whole suggests that the yield differential could remain about 13 basis points below pre-2002 levels. These findings are discussed in more detail later in this report.

The large reduction in the yield differential has helped reduce borrowing costs associated with CM bills. The daily cost associated with the 47-basis-point yield differential in fiscal year 2001 was about \$12,900 per \$1 billion. In fiscal year 2001, Treasury borrowed \$19.2 billion (annualized amount outstanding) using CM bills.³² Of the \$1.06 billion in total borrowing costs associated with CM bills in that year, \$70 million was associated with the yield differential. Since then, the average yield differential has declined and was 14 basis points, or about \$3,800 a day per \$1 billion borrowed, in fiscal year 2005. During fiscal year 2005, Treasury borrowed about \$8 billion (annualized amount outstanding) using CM bills. Total borrowing costs were \$215 million and the borrowing cost associated with the yield differential was about \$12.8 million. Treasury could achieve savings by further reductions in the yield differential.³³

CM Bill Yields Were Similar to Yields on Overnight Repurchase Agreements

CM bills may have higher yields because, according to Treasury officials and market participants, they are bought for a different purpose than regular bills. According to market participants, some money market funds and foreign central banks purchase CM bills but for the most part they are not widely used as an investment tool because of their irregularity and short-term nature. Instead, CM bills are primarily used by primary dealers as collateral for repurchase agreements. A repurchase agreement is a form of short-term collateralized borrowing used by dealers in government securities. Figure 7 describes repurchase agreements in more detail.

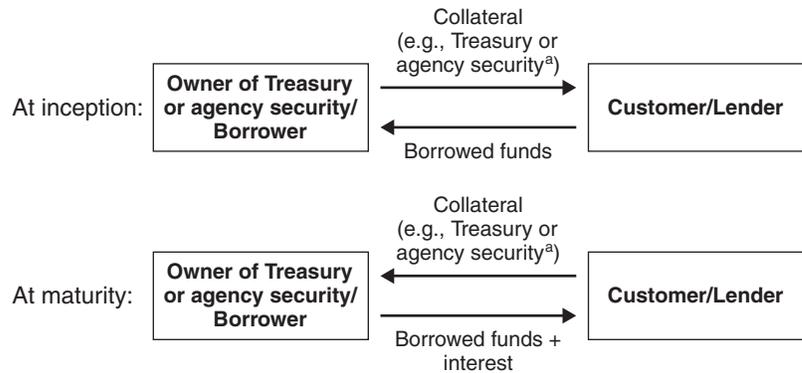
³²The annualized amount outstanding is derived by spreading the amount of each CM bill across the 365-day year. So, for example, a 14-day CM bill with a face value of \$25 billion is multiplied by 0.038 (= 14/365) resulting in an annualized amount outstanding of \$959 million.

³³We identified several features of CM bills within Treasury's control that affect the yield differential. These are discussed on pages 26–29.

Figure 7: Repurchase Agreements

Dealers use repurchase agreements as the primary means for financing their inventory of Treasury securities. For example, a dealer would borrow money from an investor/lender to purchase a security and provide the investor/lender collateral, usually in the form of a Treasury security. The dealer then pays the investor/lender back at an agreed-upon time, usually overnight. A large share of repurchase agreements takes place among dealers. Repurchase agreements also take place between dealers and the Federal Reserve. A repurchase agreement is illustrated below.

Illustration of Repurchase Agreement: At Inception and Maturity



Repurchase agreements are the primary type of operation used by the Federal Reserve to maintain the overnight federal funds rate at or near the target rate. Repurchase agreements allow the Federal Reserve to temporarily increase or decrease the amount of reserves in the monetary system. The amount of Treasury securities available for collateral affects the price of repurchase agreements. A large amount of collateral generally results in higher repurchase agreement rates; conversely, reducing the amount of collateral would generally decrease repurchase agreement rates. Since CM bill issuance patterns affect the amount of Treasury collateral available in the repurchase agreement market, they also can affect the rates that the Federal Reserve receives when conducting its temporary open market operations.

Source: GAO analysis.

^aAgency securities are financing instruments of federal government agencies, such as the Tennessee Valley Authority, or government-sponsored enterprises, such as the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac). Agency securities are not considered risk free but are considered to have high credit quality in part because of the agencies' government affiliation.

We found the yields of CM bills to be near the yields of overnight repurchase agreements. In fiscal year 2005, CM bill yields were within 2

basis points of overnight repurchase agreement yields.³⁴ Although repurchase agreements and CM bills are both short-term investments, there are some differences. For example, repurchase agreements are subject to federal, state, and local taxes whereas CM bills are exempt from state and local taxation. Also, CM bills, like regular Treasury bills, are risk free whereas repurchase agreements issued by private borrowers involve some risk. The high-quality collateral in a repurchase agreement (e.g., Treasury securities or agency securities) reduces the credit risk faced by the lender and allows borrowers to obtain cash at a lower cost than they would obtain otherwise.³⁵ However, the lender is still exposed to credit risk because if the borrower fails to repay the loan, the market value of the collateral may be less than the amount owed. Repurchase agreements are structured carefully to reduce this credit risk exposure, for example, by lending less than market value of the security used as collateral. Nevertheless, repurchase agreements have more risk than securities issued by Treasury and accordingly have higher yields than Treasury securities of similar maturity, which are risk free and are the floor for short-term rates in the money market.

Our Analysis Identified Some Features That Affect the Yield Differential

Our statistical analysis found that, all other things equal, the amount of CM bills issued was positively correlated with the yield differential, meaning that increases in the amount of CM bills issued relative to the amount of similar-maturing Treasury bills outstanding increased the yield differential, and decreases in the amount issued reduced the yield differential.³⁶ We also found that CM bills that were part of a “multiple tranche”—successively issued CM bills maturing on the same day—tended to have higher yield differentials,³⁷ and CM bills maturing around large tax payment dates tended to have lower yield differentials. Changes in the general level

³⁴Based on overnight repurchase agreement rates on the day of CM bill auctions published in the WSJ.

³⁵Repurchase agreement rates are less than federal funds rates because a federal funds transaction has no collateral.

³⁶While we analyzed the yield differential for all CM bills issued during fiscal years 1996–2005, we focused on the 55 CM bills issued during fiscal years 2002–2005 because the introduction of the 4-week bill in 2001 substantially reduced CM bill maturities and caused a structural change in the CM bill market.

³⁷However, this is only significant at the 10 percent level and it is sensitive to the inclusion of other explanatory variables—namely, the announcement day variable.

of short-term yields also affected the yield differential. While the amount and timing of CM bills is somewhat under Treasury's control, the general level of short-term yields in the economy is not.³⁸

Although CM bill yields are determined in auctions, we did not find a statistically significant relationship between the auction performance measures we examined—such as participation, distribution of auction awards, and preauction activity in the when-issued market³⁹—and the yield differential. However, we found that in more concentrated auctions Treasury was less likely to pay more than the yield indicated in the when-issued market at the time of auction, which is a positive auction result.⁴⁰

The Amount of CM Bills Issued Was Positively Correlated with the Yield Differential

While an increase in the relative amount of CM bills might enhance liquidity and thereby reduce their yields, investors might require a higher yield to acquire relatively large amounts of CM bills. Our statistical analysis found that increases in the amount of CM bills issued relative to outstanding bills with similar maturity increased the yield differential. For example, if Treasury had increased its fiscal year 2005 CM bill issuance by \$10 billion, the average yield differential would have been about 4.2 basis points higher according to our analysis. Conversely, reducing the amount of CM bills issued tended to reduce the yield differential. Earlier research by others had similar findings.⁴¹

According to our analysis, the reduced use of CM bills since the 4-week bill was introduced contributed to the overall decline in the yield differential. From fiscal years 1996–2001, the amount of CM bills issued was almost 70 percent of outstanding bills with similar maturity. In fiscal year 2002, the share declined to 30 percent. At the same time, the yield differential declined from about 35 basis points (fiscal year 1996–2001 average) to

³⁸App. I provides more detail on our methodology for analyzing the CM bill yield differential and our findings.

³⁹Treasury auctions are preceded by forward trading in markets known as “when-issued” markets. The when-issued market is important because it serves as a price discovery mechanism that potential competitive bidders look to as they set their bids for an auction.

⁴⁰App. II provides more information on our analysis of CM bill auctions.

⁴¹David P. Simon, “Segmentation in the Treasury Bill Market: Evidence from Cash Management Bills,” *Journal of Financial and Quantitative Analysis*, vol. 26, no. 1 (March 1991), pp. 97–108; David P. Simon, “Further Evidence on Segmentation in the Treasury Bill Market,” *Journal of Banking and Finance*, vol. 18 (1994), pp. 139–51; Fleming, “Are Larger Treasury Issues More Liquid?” p. 707; and Seligman, “Does Urgency Affect Price at Market?”

4 basis points in 2002. According to our analysis, about 35 percent of the yield differential decline can be attributed to Treasury's reduced use of CM bills. CM bill issuance has remained low relative to outstanding bills with similar maturity since 2002. These results suggest that the 4-week bill reduced both the use and cost of CM bills as Treasury intended.

Issuing CM Bills in Multiple Tranches May Increase the Yield Differential but Reduce Overall Borrowing Costs

We also found that consecutive CM bills maturing on the same day—called “multiple tranches”—tended to increase the yield differential. In recent years, Treasury has increasingly issued consecutive, small CM bills with the same maturity date—rather than one larger CM bill—which reduces the average amount outstanding and ultimately reduces borrowing costs. In 2005, three-quarters of the CM bills issued were part of a multiple tranche. Our analysis suggests that issuing consecutive CM bills that mature on the same date might increase the yield differential by 6 basis points over a single CM bill. Market participants suggested if they suspect Treasury might reopen the CM bill later, they may bid less aggressively on a CM bill, which would result in lower prices and higher yields for CM bills.

The evidence that issuing in multiple tranches increases the yield differential should be viewed with caution. The estimated coefficient is only significant at the 10 percent level and is sensitive to the inclusion of other explanatory variables.⁴² For example, with the inclusion of a variable representing the number of days advance notice before auction, the coefficient of multiple tranche CM bills is no longer significant even at the 10 percent level. Moreover, the lower cost of multiple tranches resulting from smaller average issues and shorter term to maturities most likely offsets any increase in the yield. For more information on the cost-saving effects of multiple tranches, see pages 38–39.

CM Bills Maturing on Large Tax Payment Dates May Have Lower Yield Differentials

Increasingly Treasury has issued CM bills that mature on individual and corporate tax payment dates and, according to our analysis, this practice may be leading to lower yields and borrowing costs. Our statistical analysis shows the yield differential on CM bills maturing on or near April 15 or on other tax payment dates (generally the 15th of March, June, September, and December) is 12 basis points lower than other CM bills. This may be explained by empirical evidence suggesting that regular Treasury bills whose maturity dates immediately precede corporate tax payment dates have special value because corporate treasurers may wish

⁴²The probability value for the coefficient estimate is .06.

to invest excess cash in securities whose cash flows can be used to liquidate cash liabilities.⁴³

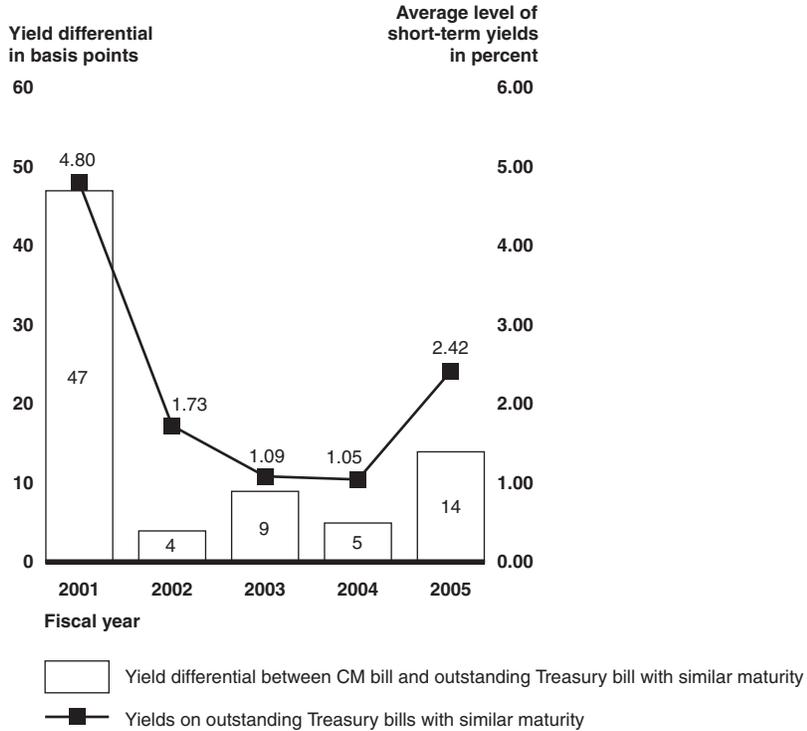
Almost 50 percent (27 of 55) of CM bills Treasury issued over the last 4 fiscal years matured on large tax payment dates. In the last 2 fiscal years, Treasury set at least one CM bill to mature on each of the large tax payment dates. So, to a large extent, Treasury has already captured the cost-savings from this feature. It is also important to note, however, that the 12-basis point difference is unlikely to offset even an extra day of borrowing. CM bills maturing on dates other than large tax payment dates with shorter maturities are likely to cost less than CM bills maturing on a corporate tax payment date with longer maturities because debt is outstanding for a shorter period of time.

Yield Differential Rises and Falls with Short-term Yields

Our analysis showed that the yield differential rises and falls with the overall level of Treasury bill yields. Figure 8 shows short-term Treasury yields declined from an average of about 4.8 percent in fiscal year 2001 to 1.05 percent in fiscal year 2004. At the same time, the average yield differential fell from 47 basis points to 5 basis points. Our analysis suggests the decline in short-term yields explained about 35 percent of the decline. Since mid-2004 when short-term rates started to increase consistent with Federal Reserve actions, the yield differential has started to widen again to about 14 basis points in fiscal year 2005. Thus, absent Treasury actions, further increases in short-term rates are likely to lead to higher CM bill yield differentials in the future. If short-term Treasury yields return to the 1996–2001 average of approximately 5 percent, we found that the yield differential could exceed 20 basis points and the additional cost of CM bills—assuming current issuance patterns—could increase from \$11 million to about \$19 million a year.

⁴³See Kenneth D. Garbade, “Treasury Bills with Special Value,” in *Fixed Income Analytics* (Cambridge, Mass.: MIT Press, 1996), pp. 181–197.

Figure 8: Yield Differential and the Average Level of Short-term Treasury Yields (Fiscal Years 2001–2005)



Source: GAO analysis of BPD and WSJ data.

CM Bills Are Innately Less Predictable than Regular Bills

The yield differential may also be attributable in part to variables that are hard to measure, such as predictability. According to Treasury officials, a regular and predictable borrowing schedule is attractive to investors and helps to achieve Treasury’s objective of lower borrowing costs over time. However, both the timing and amount of CM bill auctions are by nature less predictable than regular Treasury bills. Providing too much advanced notice of CM bill issuance would reduce Treasury’s flexibility to adjust the amount and timing of issuance to best meet cash needs. It could also cause Treasury to use conservative estimates of its cash needs and borrow more than it actually needs. Treasury’s challenge is to provide market participants enough notice to avoid paying too high a premium for uncertainty without reducing its flexibility. Improving cash forecasting could help Treasury determine the amount of CM bills to be issued sooner rather than later and thus provide market participants more notice of CM bill auctions.

Treasury provides limited information on the timing and amount of CM bill auctions ahead of the announcement. The Quarterly Refunding process is Treasury's way to provide market participants with information and get their feedback about changes to its auction schedule and the issues actively under discussion by Treasury. As part of each Quarterly Refunding, Treasury usually issues a statement indicating that it plans to issue CM bills in the coming quarter. Treasury provides general information on the timing of CM bills, such as "early March" or "early April" but does not provide the actual date it expects to issue CM bills.⁴⁴ In contrast, Treasury publishes the auction schedule, including announcement, auction, and issue dates for its regular bills up to 6 months in advance. Treasury typically does not provide an estimated issue amount for CM bills or regular bills in its Quarterly Refunding statements.

Despite the general notice given by Treasury and the somewhat regular pattern of CM bill issuance in recent years, market participants cannot always predict the timing of CM bill auctions with certainty. For example, in fiscal year 2005, a prominent money market analyst predicted the exact date of 6 (out of 21) CM bill auctions at least 1 week ahead of the auction announcement and was off by 1 or 2 days for 9 CM bill auctions. However, the analyst's predicted dates for 2 CM bill auctions were off by 6 days, and the analyst did not predict the remaining four CM bill auctions.

Not only the timing, but also the amount of CM bill issues cannot be predicted with certainty. Treasury uses CM bills to manage cash balance swings and as a result, the amount of CM bills issued varies more than regular and predictable securities. Thus, it is not surprising that market participants cannot predict with certainty the amount of CM bill issuance. Issuing in multiple tranches may exacerbate the issue. For example, one market analyst predicted Treasury would auction one CM bill in the first week of December 2004 for \$28 billion and one CM bill the following week for \$7 billion. Instead, Treasury auctioned three CM bills totaling \$42 billion in the first week and none the following week. Several market participants we spoke with said that uncertainty surrounding the amount offered affects their bidding and ultimately Treasury's borrowing terms. If

⁴⁴The Treasury Borrowing Advisory Committee recommends amounts for each Treasury security, including CM bills, to be issued in the upcoming 2 quarters. However, Treasury is not obligated to follow the committee's recommendations and the actual timing and amount of CM bill issuance has varied from the committee's recommendations. These recommendations are publicly available on Treasury's website. See <http://www.treas.gov/offices/domestic-finance/debt-management/adv-com/reports/>.

market participants are uncertain of the amount, they may not bid as aggressively, which potentially reduces the price and increases the yield Treasury pays on CM bills. In addition, the relative inflexibility of Treasury's demand for cash to avoid a negative cash balance might explain the higher yields on CM bills.⁴⁵

Most Measures We Examined Suggest CM Bill Auctions Perform Less Well Than 4-week Bill Auctions

Given that CM bill auctions are less predictable than regular Treasury bill auctions, it is not surprising that CM bill auctions do not perform as well as regular bill auctions by some measures. Better auction performance can be characterized by greater participation and more preauction activity in the when-issued market. These factors theoretically reduce Treasury's borrowing costs. By most measures of participation and activity we examined, CM bill auctions perform less well than 4-week bill auctions. However, some other measures indicate that Treasury obtained a better price at CM bill auctions compared with 4-week bill auctions and that there is stronger demand for CM bills than 4-week bills.

In order to lower borrowing costs, Treasury seeks to encourage more participation in auctions. In general, large, well-attended auctions improve competition and lead to lower borrowing costs for Treasury. We found that fewer bidders in total are awarded CM bills than 4-week bills. For example, of the 55 CM bill auctions held between 2002 and 2005, more than half had 16 or fewer awarded bidders. In contrast, only about 4 percent of the 209 4-week bill auctions had 16 or fewer awarded bidders while about 50 percent had at least 22 awarded bidders.

We also found that preauction trading activity is sparse before CM bill auctions. Treasury auctions are preceded by forward trading in markets known as "when-issued" markets. The when-issued market is important because it serves as a price discovery mechanism that potential competitive bidders look to as they set their bids for an auction. When-issued trading reduces uncertainty about bidding levels surrounding auctions and also enables dealers to sell securities to their customers in advance of the auction so they are better able to distribute the securities and bid more aggressively, which results in lower costs to Treasury. We counted the number of preauction trades on the day of CM bill auctions and

⁴⁵See Seligman, "Does Urgency Affect Price at Market?"

found that when-issued trading is lower prior to CM bill auctions than regular 4-week bill auctions.

A broad range of participants generally improves competition and theoretically maximizes the price investors pay for Treasury securities. Alternatively a higher concentration—a large share of the auction awarded to few participants—could reduce competition and restrict a security's supply in the secondary market, preventing its efficient allocation among investors. We evaluated the share of the auction awarded to the top five bidders—a measure used by Treasury in its own studies of auction performance—and found that the share was 60 percent or higher in over half (34 of 55) of CM bill auctions from fiscal year 2002 through 2005. In contrast, the share exceeded 60 percent in only 18 percent (37 of 209) of 4-week bill auctions in the same period. While a higher concentration theoretically reduces competition and the price investors pay, according to Treasury a high concentration ratio in CM bill auctions may imply some bidders really want a particular bill, which may drive the price up and yield down.

Although greater participation, a broader distribution of awards, and more preauction activity in the when-issued market theoretically improves Treasury's borrowing costs, we did not find a statistically significant relationship between these factors and the yield differential. However, we did find that concentration was negatively correlated with the auction spread. The auction spread is the difference between the yield Treasury obtains at auction and the yield in the when-issued market at the time of auction. A positive spread (where the auction yield is more than the contemporaneous when-issued yield) indicates Treasury paid a higher yield than expected, which is a negative auction result. Our statistical analysis suggests that Treasury was less likely to pay more than the expected yield indicated in the when-issued market in more concentrated auctions. In other words, higher concentration seemed to improve Treasury's auction results. App. II provides more information on our CM bill auctions analysis.

CM Bills Are Generally Less Costly than Currently Available Alternatives

Treasury could maintain higher cash balances or issue regular Treasury bills (e.g., the 4-week bill) to avoid issuing a CM bill to meet short-term cash shortfalls. When evaluating CM bills relative to other alternatives, it is important to look at total borrowing costs—not just the yield. Treasury's borrowing costs are based on the amount borrowed, the yield it pays to borrow, and the time the debt is outstanding. We found that CM bills are

generally less costly than currently available alternatives despite their higher yield.

CM Bills Are Generally Less Costly than Running Higher Cash Balances

To avoid issuing a CM bill, Treasury could run higher cash balances to bridge cash financing gaps. However, it is generally more cost-efficient to repay debt and then issue a CM bill than run higher cash balances because the interest earned on excess cash balances is generally insufficient to cover borrowing costs. Treasury's current cash balance target is \$5 billion, which represents the amount to be held at the Federal Reserve. Treasury invests excess cash above the \$5 billion target in Treasury Tax and Loan (TT&L) accounts.⁴⁶ TT&L accounts are held at financial institutions and earn interest rates equal to the federal funds rate less 25 basis points.⁴⁷ The rate earned on TT&L accounts is generally less than the average rate Treasury pays on CM and regular short-term bills. As a result, Treasury faces a negative funding spread. The funding spread varies over time and depends on Treasury bill rates relative to the federal funds rate—increases in Treasury bill yields relative to the federal funds rate increase Treasury's negative funding spread, and declines in Treasury bill yields relative to the federal funds rate reduce Treasury's negative funding spread.

As a result of the negative funding spread, Treasury strives to minimize cash balances in order to reduce overall borrowing costs. To do this, Treasury has worked toward improving cash forecasting. Treasury has reduced the average cash forecasting error by one-half over the last 6 years according to Treasury officials. They credited improvements to better technology and communication with their "lockbox banks" that process certain tax payments. For example, the Electronic Federal Tax Payment System provided actual cash flow information to Treasury forecasters through electronic notification of pending tax payments, replacing imperfect forecasts.

⁴⁶Established by Pub. L. No. 95-147, 913 Stat. 1227 (1977), the TT&L program helps stabilize the supply of reserves in the banking system. If Treasury held all its cash in its Federal Reserve account, increases in its cash position would drain reserves from the banking system, and decreases would add reserves. Thus, the Federal Reserve would have to conduct frequent and perhaps large open market operations to mitigate undesired fluctuations in bank reserves and the federal funds rate. The TT&L program also helps Treasury manage federal tax receipts and earn interest on public funds.

⁴⁷Set in 1978, the TT&L rate was originally intended to reflect the rate paid on overnight repurchase agreements, a similar transaction. See fig. 9 for more information.

Increasing the earnings on excess cash balances is another way to narrow the negative funding spread. Figure 9 below describes steps Treasury has taken to increase earnings on its excess cash balances.

Figure 9: Steps Taken in Recent Years to Increase the Rate Paid on Treasury's Cash Balances

In the late 1990s, Treasury considered changing the rate paid on TT&L balances but banks objected. The TT&L rate—the federal funds rate less 25 basis points—was set in 1978 and originally intended to reflect the rate paid on overnight repurchase agreements, a similar transaction. However, repurchase agreement rates were not widely reported in the 1970s and the average spread between the federal funds rate and overnight repurchase agreements declined to less than 5 basis points from 1990 to 1999. In 1999, Treasury proposed to set the TT&L rate equal to the repurchase agreement rate, which would in effect increase the amount Treasury earned on its cash balances and reduce its negative funding spread.^a However, banks argued that the 25 basis points were necessary and appropriate compensation for the operational cost of collateralizing Treasury balances and reflected the value of the option granted to Treasury to call its balances at any time.^b Treasury decided not to change the rate paid on TT&L accounts.

In 2002, Treasury introduced the Term Investment Option (TIO) program, which is intended to add investment capacity to the TT&L program and to increase the rate that Treasury earns on invested funds. Through TIOs, Treasury places excess cash with TT&L depositories for a defined term, which can vary. (In fiscal year 2005, the terms varied from 1 to 17 days.) The rate is determined through a competitive auction process and has resulted in higher interest earned than in the TT&L program. According to Federal Reserve researchers, Treasury earned more—an average of 17 basis points—on balances in TIOs than it would have in the TT&L accounts between April 2002 and April 2004.^c

Source: GAO analysis.

^a*Federal Register*, vol. 64, no. 146 (July 30, 1999), pp. 41748–41749.

^b*Federal Register*, vol. 67, no. 51 (Mar. 15, 2002), pp. 11573–11577.

^cKenneth D. Garbade, John C. Partlan, and Paul J. Santoro, “Recent Innovations in Treasury Cash Management,” *Current Issues in Economics and Finance*, vol. 10, no. 11, Federal Reserve Bank of New York (November 2004).

CM Bills Are Generally Less Costly than Issuing Longer-term Regular Securities

To make large payments when cash balances are low, Treasury can issue a CM or a regular Treasury bill, although as explained earlier Treasury tries to limit changes in the size of regular bill issuance from week to week. When comparing the cost of a CM bill with the cost of a 4-week bill—the regular bill with the shortest maturity—we see that the CM bill is generally less costly for shorter-term needs (i.e., less than 28 days) despite its higher

yield. While the 4-week bill may have a lower yield, the amount borrowed is generally outstanding for a longer period. For example, Treasury issued a CM bill on June 3, 2005, for \$16 billion. The daily cost of borrowing was about \$1.3 million. If Treasury had borrowed \$16 billion using the 4-week bill issued the day before, the daily borrowing cost would have been only \$1.2 million but the amount would have been outstanding for 16 days longer and cost an additional \$18.4 million (see table 3). However, the extra cost of the 4-week bill would be partially offset by the amount earned on cash balances.

Table 3: Illustrative Comparison of 4-week and CM Bill Borrowing Costs

	Amount borrowed (billions of dollars)	Term (days)	Yield (percent)	Daily cost of borrowing (millions of dollars)	Total cost of borrowing ^a (millions of dollars)
4-week bill	\$16	28	2.784	\$1.2	\$34.1
CM bill	16	12	2.979	1.3	15.7
Difference (4-week bill - CM bill)					\$18.4

Source: GAO analysis of BPD data.

^aThis refers only to interest payments and excludes earnings on any excess cash balances.

Note: The illustrative example shown above uses the actual yields paid on the 4-week bill issued on June 2, 2005, and the CM bill issued on June 3, 2005. However, for comparability, we assumed bills of equal amounts (the actual amount of the 4-week bill issued on June 2, 2005, was \$20 billion). In reality, the yield would be affected by the amount offered.

To compare the total cost of the 4-week bill with the cost of a CM bill requires also looking at what happens to the cash that would have been used to pay the maturing CM bill. CM bills are typically issued in months with midmonth cash inflows. If Treasury issued a 4-week bill instead of a CM bill in these months, these midmonth cash flows could be held in TT&L accounts.⁴⁸ However, since Treasury generally earns less on excess cash balances than it pays to borrow, the additional borrowing costs associated with the 4-week bill may not be completely offset.

⁴⁸Excess cash balances could also be invested in TIOs, which typically earn more than TT&L accounts. As discussed later in this report, increasing balances in TIOs relative to the TT&L accounts would help Treasury increase earnings on its cash balances and may ultimately reduce the use of some CM bills. Excess cash balances could also be used to reduce other Treasury debt, however, in general, Treasury limits week-to-week changes in the issue size of its regular bills.

Treasury Has Refined Its Use of CM Bills but Costs Have Begun to Increase

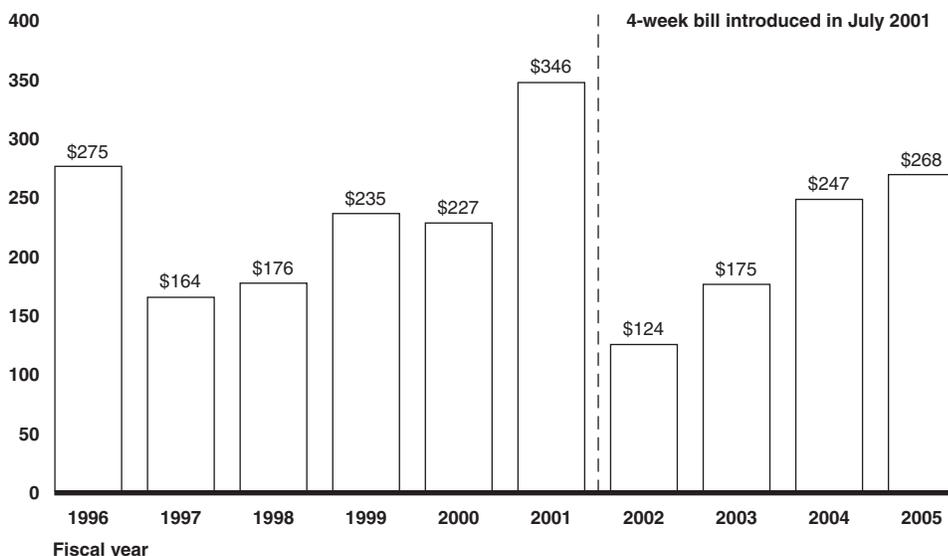
Treasury has taken steps to reduce use and overall cost of CM bills. Lowering borrowing costs of CM bills could be achieved by combinations of reducing the dollar amount issued or reducing the term to maturity (i.e., the number of days outstanding). Recognizing that CM bills were a relatively costly way to absorb cash balance swings, Treasury introduced the 4-week bill in 2001 to help reduce the use of CM bills. Treasury has also increasingly issued CM bills in multiple tranches, which contributes to smaller average issues, shorter terms to maturity, and lower total borrowing costs. Borrowing costs declined in 2002 as Treasury reduced the use of CM bills for longer-term borrowing (i.e., 28 days or more) and short-term rates declined. However, borrowing costs associated with CM bills have increased since 2003.

Treasury Initially Reduced the Amount of CM Bill Issuance Following the Introduction of the 4-week Bill

Treasury has reduced reliance on CM bills since 2001. Initially, Treasury reduced the total amount of CM bills issued by more than half from \$346 billion in fiscal year 2001 to only \$124 billion in fiscal year 2002 (see fig. 10). This was the lowest amount issued in the previous 6 years. The decline in CM bill issuance, however, was only temporary. Since 2002, Treasury has increased its use of CM bills and in fiscal year 2005, Treasury issued \$268 billion in CM bills.

Figure 10: Amount of CM Bill Issuance (Fiscal Years 1996–2005)

Dollars in billions



Source: GAO analysis of BPD data.

In 2001, Treasury said that CM bills were not the most cost-efficient means to absorb cash balance swings. At that time, the yield differential was about 47 basis points and the amount of CM bills issued was about 20 percent of Treasury’s short-term financing. Treasury introduced the 4-week bill in 2001 to help reduce the need for CM bills by helping to smooth swings in cash balances. In general, shorter-term securities provide Treasury greater flexibility to adjust cash balances and outstanding debt in response to actual cash needs. From fiscal year 2002 through 2005, CM bills represented only 7 percent on average of Treasury’s short-term debt issuance. However, according to Treasury, the ability of the 4-week bill to absorb cash balance swings is limited to swings in cash balances that are longer than the two-week cash financing gap at the beginning of most months.

Issuing CM Bills in Multiple Tranches Has Helped Reduce Borrowing Costs

Treasury has taken steps to borrow cash closer to the day it is needed, which contributes to smaller average issues, shorter terms to maturity, and lower borrowing costs. Since 2003, Treasury has increasingly issued CM bills in multiple tranches—successive shorter-term CM bills that mature on the same day. For example, instead of issuing one \$30 billion or \$40 billion

CM bill on the 1st that matured on the 15th, Treasury might issue three smaller CM bills on the 1st, 3rd, and 7th (all matured on the 15th). As mentioned earlier, issuing in multiple tranches may increase the rate paid, but it allows Treasury to borrow closer to the time when cash is needed and ultimately reduces borrowing costs by reducing the average term to maturity and annualized amount outstanding. Table 4 shows how issuing in multiple tranches would have reduced borrowing costs in June 2005.

Table 4: Illustrative Effect of Issuing CM Bills in Multiple Tranches on Borrowing Costs

	Amount borrowed (billions of dollars)	Term (days)	Borrowing cost (millions of dollars)
Multiple tranches			
June 1, 2005	\$10	14	\$11
June 3, 2005	16	12	16
June 7, 2005	12	8	8
Total	38		34
Single tranche			
June 1, 2005	38	14	43
Total difference (Multiple-Single)			-\$8

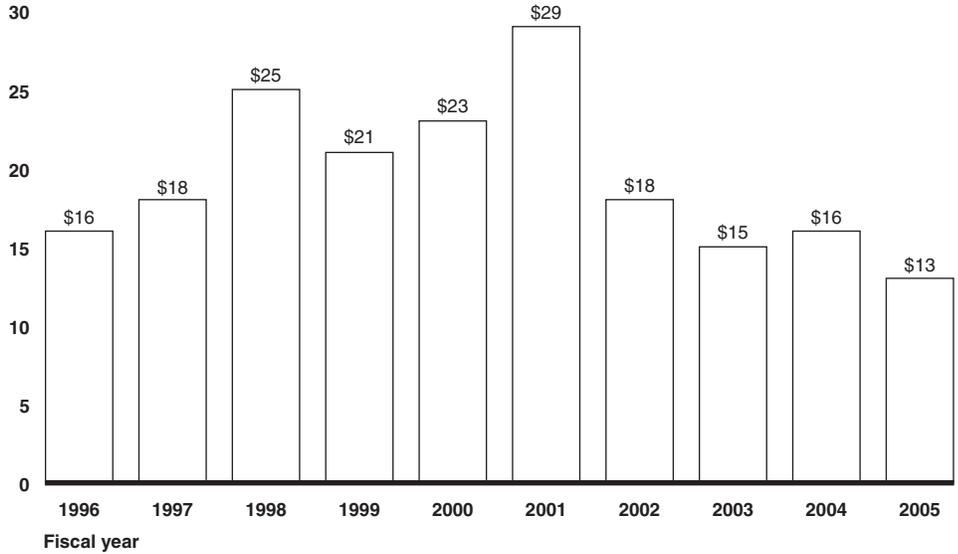
Source: GAO analysis.

Note: The illustrative example shown above assumed Treasury would pay the same discount rate on one CM bill as it did on the first part of the multiple tranche. In reality, the discount rate would be different because the rate depends on the amount auctioned, among other things. When considering Treasury's total borrowing cost, the earnings on excess cash balances held from the 1st-7th would partially offset borrowing costs.

The move toward multiple tranches has led to smaller CM bill issues on average. Figure 11 shows that the average CM bill issue has declined by more than half since 2001.

Figure 11: Average Size of CM Bills Issued (Fiscal Years 1996-2005)

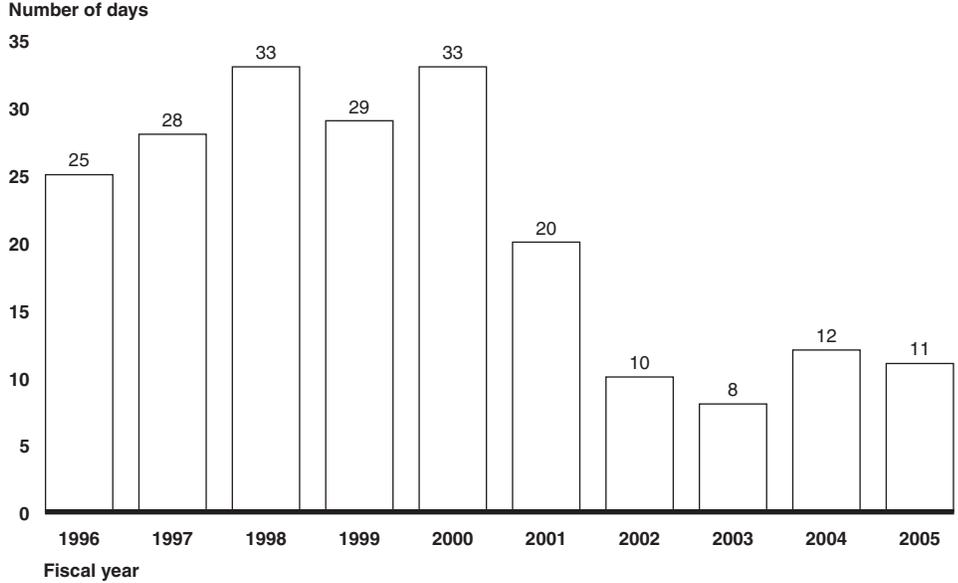
Dollars in billions



Source: GAO analysis of BPD data.

Following introduction of the 4-week bill in 2001, Treasury reduced the use of CM bills for longer-term borrowing (i.e., 28 days or more). Figure 12 shows that Treasury has reduced the average term to maturity (i.e., length of time outstanding) for CM bills issued by about half since 2001. Prior to fiscal year 2002, Treasury issued CM bills with terms as long as 83 days. Since 2002, the longest maturing CM bill was 19 days.

Figure 12: Weighted Average Term to Maturity of CM Bills (Fiscal Years 1996–2005)



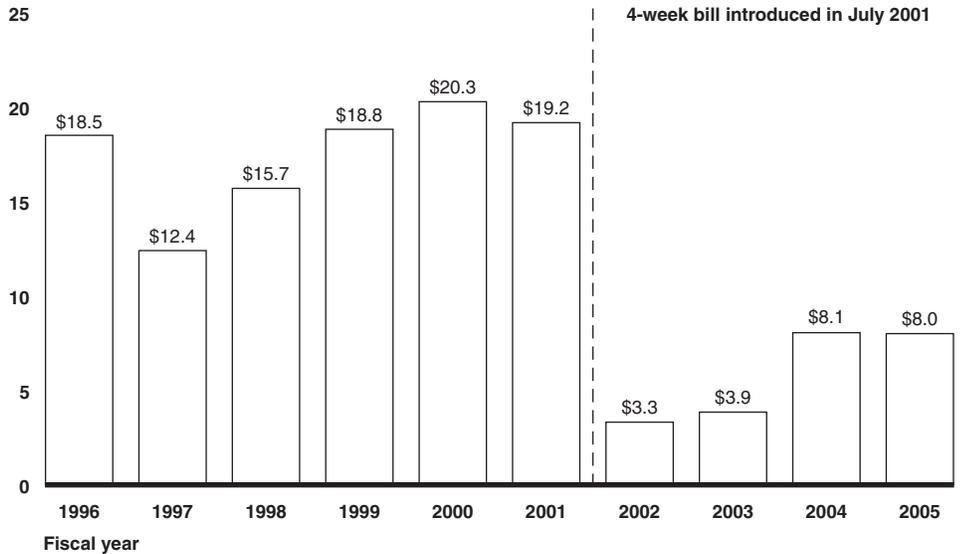
Source: GAO analysis of BPD data.

Note: Term to maturity of each CM bill is weighted by the amount issued. Because CM bill issuance amounts vary, the weighted average maturity of CM bills was calculated in order to reflect each CM bill's relative importance in the total amount issued during the period.

Lower average issue sizes together with the reduced term to maturity contributed to lower borrowing on an annual basis (see fig. 13). After Treasury introduced the 4-week bill in 2001, the annualized amount of CM bills outstanding declined dramatically from \$19.2 billion in fiscal year 2001 to \$3.3 billion in fiscal year 2002. However, since then the amount has generally increased as Treasury increased the use of CM bills to finance intramonth cash financing gaps. From fiscal year 2003 to fiscal year 2004, the annual amount outstanding more than doubled to \$8.1 billion. Treasury issued a similar amount of CM bills in fiscal year 2005.

Figure 13: Annualized Amount Outstanding^a (Fiscal Years 1996–2005)

Dollars in billions



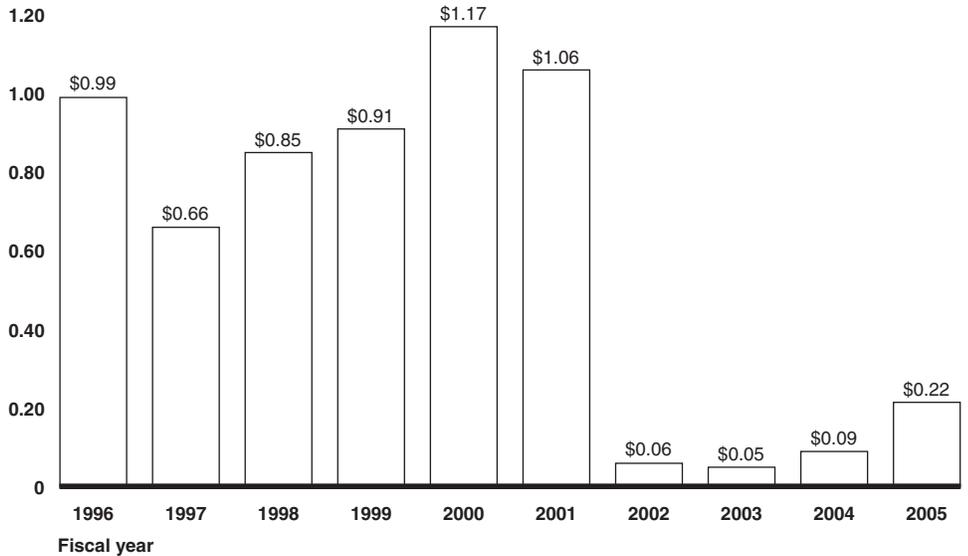
Source: GAO analysis of BPD data.

^aThe annualized amount outstanding is derived by spreading each CM bill across the 365-day year. So, for example, a 14-day CM bill with a face value of \$25 billion is multiplied by 0.038 (= 14/365) resulting in an annualized amount outstanding of \$959 million.

Borrowing Costs Declined Dramatically in 2002 but Have Since Increased

While Treasury’s actions from fiscal years 2001 to 2002 reduced CM bill borrowing costs, overall declining interest rates also helped. Borrowing costs began declining in 2001 and dropped dramatically in 2002 (see fig. 14). Treasury’s smaller CM bill issuances and reduced term to maturity helped reduce the annual amount outstanding. According to our analysis, these actions taken by Treasury contributed to about \$610 million of the reduction in borrowing costs from 2001 to 2002. We estimated that the remaining decline was due to reductions in the yield paid on CM bills. As noted earlier the yield differential varies with the overall level of short-term yields in the economy. As these yields declined so did the yield differential—by 43 basis points from fiscal year 2001 to 2002.

Figure 14: Total Borrowing Costs Associated with CM Bills (Fiscal Years 1996–2005)
Dollars in billions



Source: GAO analysis of BPD data.

However, since 2003 the borrowing costs associated with CM bills have increased. Our analysis indicates that almost all of the increase in CM bill borrowing costs is due to increasing rates. While Treasury cannot control the overall level of short-term interest rates in the economy, it can continue to take steps to reduce the use of CM bills and, according to our analysis, the CM bill yield differential.

Options Exist That May Reduce the Use and Cost of CM Bills

We identified a range of options that may reduce the use or cost of CM bills. The most promising options in our view—exploring ways to better align cash flows and increasing the earnings on cash balances—are discussed first. Other options, such as introducing a new shorter-term regular bill and enhancing the transparency of CM bill auctions, are discussed later.

Better Aligning Cash Flows Might Reduce Cash Financing Gap

Given that Treasury has increasingly used CM bills to fill regular cash financing gaps, taking steps to better align large cash flows might help reduce the use of CM bills. There are three ways to do this: smoothing the payment of large federal expenditures, smoothing the payments of corporate and nonwithheld individual tax payments, and aligning increased

debt issuance with large payments. If cash flows had been aligned to better fill the frequent cash financing gaps, Treasury may not have needed the 11 CM bills it issued on the 1st through the 3rd of the month that matured on the 15th of the month during fiscal year 2005 and could have reduced CM bill borrowing cost by as much as \$174 million or about 80 percent in fiscal year 2005.⁴⁹

Statutory and regulatory changes would be required to change the timing of federal benefit payments and tax collections. While implementing any changes is outside debt managers' control, Treasury could start a discussion with other agencies and Congress to identify the costs and benefits of alternatives to align or more evenly distribute federal expenditures and tax receipts and seek any statutory authority necessary to better smooth them. However, changing the timing of benefits and tax collections, either jointly or independently, will have direct and indirect effects not only on borrowing costs but also on individuals, nonfederal entities, and federal government operations. These of course, would have to be considered when making decisions about whether and how to smooth federal cash flows. Looking at SSA's experience with spreading the payments for new Social Security beneficiaries throughout the month may be useful.

Treasury could also explore aligning increased borrowing capacity with large payments in the beginning of the month to help reduce the cash financing gap and reduce the use of some CM bills. Overall borrowing needs are projected to be significant and grow over the long term and Treasury will need to consider changes to its debt portfolio and auction schedule to increase borrowing. Cash flow considerations can be a tiebreaker when choosing between equally attractive alternatives. In the past, when making changes to the range of maturities offered, Treasury has considered aligning cash inflows with outflows in the beginning of the month. Going forward, Treasury may reduce its reliance on CM bills—at least temporarily—by continuing to consider adjustments that would better align its increased debt issuance with its largest cash payments in the beginning of the month.

⁴⁹This interest savings estimate does not take into account all the benefits and costs that should be considered including costs imposed on individuals, businesses, and other nonfederal entities.

Increasing Earnings on Cash Balances Would Reduce the Costs Associated with Running Higher Cash Balances to Avoid Issuing CM Bills

Currently, Treasury faces a negative funding spread and as a result it is more costly to maintain high cash balances to meet upcoming payments than issue a CM bill. However, increasing the earnings on cash balances would reduce the costs associated with running higher cash balances and may ultimately reduce the use of some CM bills. Treasury previously explored increasing the rate earned on TT&L accounts; however, banks objected. Since then, Treasury introduced the TIO program,⁵⁰ which pays higher rates on cash balances than the TT&L program. Increasing balances in TIOs relative to the TT&L accounts would help Treasury increase earnings on its cash balances. However, Treasury would lose some flexibility because TIO balances are not callable in the event cash balances unexpectedly fall below cash needs.

Treasury could also explore broader options to increase earnings on cash balances. For example, some countries' debt management offices engage in reverse repurchase agreements. In a reverse repurchase agreement, Treasury would lend market participants cash to purchase securities in the secondary market. The borrower would then return the cash borrowed plus interest at a specified time, usually overnight. Reverse repurchase agreements could potentially narrow Treasury's negative funding spread because repurchase agreement rates are generally higher than rates earned on TT&L accounts. Treasury could explore the benefits and cost of designing a new system to perform these transactions but implementing reverse repurchase agreements would require legislative authority according to Treasury.

Shorter-term Regular Bills Might Reduce the Need for Some CM Bills

Another way to smooth cash flows would be to introduce a shorter-term instrument. The 4-week bill was partially successful in smoothing cash flows throughout the year and reducing the use of CM bills. However, in recent years, Treasury has increasingly used CM bills to fill cash financing gaps that frequently occur in the first two weeks of the month. Introducing a regular shorter-term bill might help fill the frequent cash financing gap and reduce the use of CM bills further. A new bill that matures on Thursdays like other regular bills would not give the Treasury the same flexibility as CM bill issuance because the beginning-of-month outflows and midmonth inflows often fall on different days of the week. Alternatively, a

⁵⁰Fig. 9 provides more information on Treasury's TIO program.

new short-term security with specific issue and redemption dates (rather than day of the week) might help the Treasury manage cash flow gaps.

In Treasury's view, a shorter-term security would not likely generate market interest in a way that would distinguish it, on a cost basis, from CM bills. However, our analysis of CM and similar-maturing outstanding bills in the secondary market shows that buyers pay higher prices (or accept a lower yield) for short-term bills than Treasury currently accepts (or pays) for CM bills. Market participants we spoke with expressed mixed views on the demand for another short-term Treasury security. While some said there may not be enough demand for a short-term instrument, others said that bills maturing on the 15th, for example, would have natural buyers and give investors more flexibility by offering another maturity date for short-term instruments. Our analysis shows that CM bills maturing on the 15th of months when tax payments are due likely have lower yields than CM bills maturing on other days. Treasury can examine whether it would obtain better prices on a shorter-term bill with issue and maturity dates on specific days of the month.

Enhancing Transparency of CM Bill Auctions May Reduce CM Bill Yields

Increased transparency on the potential size of CM bills might improve bidding in CM bill auctions and potentially reduce the yield Treasury pays on CM bills. While market participants might expect Treasury to issue CM bills in the beginning of the month, market participants told us that they do not always know the size of the CM bill offering. As a result, they may not bid as aggressively. However, there are tradeoffs to consider. In order to provide market participants more advanced notice on the general size and timing of CM bills, Treasury would have to improve its own cash forecasting. Also, Treasury achieves lowest-cost financing in part by providing the market with certainty. Trying to add certainty to CM bill issuance would eliminate the benefit of flexibility they provide and may actually increase borrowing costs.

Relaxing the 35-percent Cap on CM Bill Auction Awards May Reduce CM Bill Yields

Treasury limits the maximum auction award to a single bidder to 35 percent of the total amount offered to the public.⁵¹ The 35-percent cap is intended, in part, to foster a liquid secondary market for a new issue by ensuring adequate and wide distribution of the supply of a security among investors and prevent temporary shortages or “short squeezes.” However, our analysis suggests that relaxing the 35-percent rule for CM bill auctions (and thus allowing higher concentration) might promote more aggressive bidding, improve auction prices for Treasury, and thus reduce the borrowing costs associated with CM bills. There are a number of issues to explore. For example, market participants may come to expect poorer liquidity for CM bills, which may lead to less aggressive bidding over time. Further, there would be a higher risk of a squeeze in the CM bills market, although the risk would be relatively small in our view because CM bill trading is sparse both before auctions and after auctions according to our analysis. (See app. II for more information.) Treasury could explore adjusting the per-bidder cap on an experimental basis and determine whether there are benefits of relaxing the existing 35-percent rule in CM bill auctions.

Exploring Other Countries’ Short-term Cash and Debt Management Practices May Provide Useful Insights

Lastly, exploring other countries’ practices may provide useful insights. For example, other countries’ debt management offices use repurchase agreements as a tool to support their cash management. Exploring other countries’ experiences may provide insights on the benefits and costs of repurchase agreements for a central government. Although repurchase agreements generally have slightly higher yields than CM bills, they provide an alternative way to obtain cash for short periods, usually overnight. In fiscal year 2005, Treasury announced that it was examining the feasibility of a securities lending facility, which would operate much like a repurchase agreement. Although this facility is still in its early proposal process, Treasury generally intends to lend securities that are in such short supply that they may threaten the settlement of Treasury market transactions in a timely manner. In return, Treasury would receive cash or bonds. While Treasury intends borrowers to use this facility at their discretion and does not plan to use it for Treasury’s own cash needs, it might also consider how

⁵¹This is based on a complicated formula that takes into account the bidder’s “reportable net long position” in the security. For more information on this and auction mechanics, see Kenneth D. Garbade and Jeffrey F. Ingber, “The Treasury Auction Process: Objectives, Structure and Recent Adaptations,” *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, vol. 11, no. 2 (February 2005).

the facility would affect its cash balances and whether the lending facility could be used to obtain cash for very short periods.

Conclusion

In the face of persistent federal deficits and growing net interest costs, reexamining debt management practices is warranted. Treasury has made progress toward reducing the cost of CM bills, but it may be possible to do more. This report presents options worth exploring that taken alone or in combination may further reduce federal borrowing costs by reducing either the use or the cost of unscheduled CM bills. CM bills will continue to be a necessary debt management tool to meet unexpected cash needs when Treasury has low cash balances or when Treasury is nearing the debt ceiling. However, in recent years, Treasury has increasingly used CM bills to fill cash financing gaps that frequently occur in the first two weeks of the month. Our analysis indicates that the yield differential between CM bills and outstanding bills of similar maturity has increased as short-term rates have risen. If these rates rise further, as market participants expect, and return to levels consistent with a longer-term historical average, the CM bill yield differential is likely to rise above levels seen in recent years. While Treasury does not vary its debt management strategy in response to changing interest rates, it should be mindful that increasing rates are likely to raise the relative cost of unscheduled CM bills. As a result, Treasury should consider options, including better aligning cash flows and increasing earnings on cash balances, that may reduce the frequent use of CM bills and ultimately overall borrowing costs.

Recommendation for Executive Action

We identified options that could potentially reduce the use and cost of CM bills. We recommend that Treasury explore options such as those discussed in this report and any others it identifies that may help Treasury meet its objective of financing the government's borrowing needs at the lowest cost over time. We recognize that there are a number of tradeoffs to consider. In its exploration, Treasury should consider the costs and benefits of each option and determine whether the benefits—in the form of lower borrowing costs—to the federal government (and so to taxpayers) outweigh any costs imposed on individuals, businesses, and other nonfederal entities. Treasury should also consider how options may be combined to produce more beneficial outcomes.

Implementing some of these options would require changes to statute or regulations. If Treasury determines that any of these changes would be

beneficial, we encourage Treasury to begin discussions with relevant federal agencies and the Congress about obtaining the necessary authorities.

Agency Comments

We requested comments on a draft of this report from Treasury and the Federal Reserve. In oral and written comments, Treasury generally agreed with our findings, conclusions, and recommendations. Treasury said that it is committed to continuing to explore ways to further reduce financing costs through changes in the use of CM bills and that many of the options we identified are embodied in its current debt management policy. Treasury emphasized that statutory authority is needed for some options, particularly changing the timing of receipts and expenditures and improving earnings on excess cash balances. Treasury also suggested some technical changes throughout the report that we have incorporated as appropriate. Treasury's comments appear in appendix IV. In addition, the Federal Reserve Board provided technical comments that we incorporated as appropriate.

As you know, 31 U.S.C. § 720 requires the head of a federal agency to submit a written statement on actions taken to address our recommendations to the Senate Committee on Homeland Security and Governmental Affairs and to the House Committee on Government Reform not later than 60 days after the date of this report. A written statement must also be submitted to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of this report. Because agency personnel serve as the primary source of information on the status of recommendations, we request that the agency also provide it with a copy of your agency's statement of action to serve as preliminary information on the status of open recommendations.

We are sending copies of this report to the Chairs and Ranking Members of the House Committee on Ways and Means, the Senate Committee on Finance, the House Committee on Financial Services, the Senate Committee on Banking, Housing and Urban Affairs, and other interested parties. We will also make copies available to others upon request. In addition, the report will be available at no charge on GAO's Web site at <http://www.gao.gov>. If you or your staff have any questions about this report please contact Susan J. Irving at (202) 512-9142 or irvings@gao.gov

or Thomas J. McCool at (202) 512-2700 or mccoolt@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff making key contributions to this report are listed in appendix V.

Sincerely yours,



Susan J. Irving
Director, Federal Budget Analysis
Strategic Issues



Thomas J. McCool
Director, Center for Economics
Applied Research and Methods

Detailed Methodology and Findings of Statistical Analysis of Cash Management Bill Yield Differential

To identify which cash management bill (CM bill) features, if any, explained the higher yields paid on CM bills, we performed a statistical analysis of CM bills issued during fiscal years 1996–2005. The dependent variable in the regressions was the difference between a CM bill’s investment yield at the time of auction and the investment yield on similar-maturity Treasury bills (i.e, the “yield differential”), where the latter is measured by the weighted average yield on Treasury securities that mature immediately before and after the CM bill.¹ We regressed the yield differential on key CM bill features including announcement period, term to maturity, issuance amount, and whether the CM bills were off-cycle or a reopening of a previous issue. We also examined the effects of CM bills with different issue and maturity dates, such as whether the CM bills were issued on the 1st–3rd, matured on a large tax payment date, or were issued during a debt issuance suspension period (DISP). While we analyzed the yield differential for all CM bills issued during fiscal years 1996–2005, we focused on the 55 CM bills issued during fiscal years 2002–2005 because the introduction of the 4-week bill in 2001 led to a significant reduction in the amount and term to maturity of CM bills and caused a structural change in the CM bill market.

Our empirical results suggest that several variables affected the yield differential during the period studied. Lower yield differentials appeared to be associated with lower short-term interest rates, relatively low CM bill auction amounts, and maturity around large tax payment dates. There is also some evidence that CM bills have higher yields when issued in multiple tranches, which are successively issued CM bills with the same maturity date. Despite these findings, the opportunity for Treasury to achieve additional savings by further exploiting characteristics that affect CM bill yields appears limited.

¹Similar measures, also called butterfly spreads, were used by Jason Seligman, “Does Urgency Affect Price at Market? An Analysis of U.S. Treasury Short-Term Finance,” *Journal of Money, Credit, and Banking* (forthcoming), pp. 6–8 and Michael J. Fleming, “Are Larger Treasury Issues More Liquid? Evidence from Bill Reopenings,” *Journal of Money, Credit, and Banking*, vol. 34, no. 3 (August 2002), p. 717.

Previous Research Based on Earlier Data Suggests Some CM Bill Features May Reduce Costs

The existing literature on CM bills and their costs is limited. In an early study of CM bills issued from 1980 through 1988, Simon found that from 1 day before to 1 day after announcement, the average interest rate differential between CM bills and adjacent-maturity Treasury bills increased by 20 basis points to a statistically significant 28 basis points.² An analysis of variance demonstrated that the increase in the differential was greater for CM bills that had shorter maturities, were part of larger issues, or had shorter when-issued periods.³ In a later study, Simon found that from January 1985 through October 1991 CM bills cost about 6 basis points more than regular bills.⁴ There have been many fundamental changes in the way Treasury raises short-term cash since the article's publication that may make its findings less applicable now. These changes include the move from multiple-price to single-price auctions, the growth of the repurchase agreement market and the prevalence of off-cycle CM bills. Most important was the addition of the 4-week Treasury bill to Treasury's regular borrowing schedule in 2001, which led to a significant reduction in the amount and term to maturity of CM bills.

In a study of the effect of reopenings on the liquidity of Treasury bills, Fleming included a binary variable identifying CM bill reopenings.⁵ Fleming studied Treasury bills issued from 1996 to 2000 and found that reopenings of any kind had a positive and significant effect on yields. Moreover, the CM bill variable was significantly positive for 13-week bills, demonstrating that regular bills reopened as CM bills tend to have higher yields. Fleming interpreted the results as showing that the yield-reducing effect of enhanced liquidity is more than offset by the yield-increasing effect of an increase in supply.

In a recent paper, Seligman evaluated the differential between CM bill yields and the yields on Treasury bills with similar maturity dates.⁶

²David P. Simon, "Segmentation in the Treasury Bill Market: Evidence from Cash Management Bills," *Journal of Financial and Quantitative Analysis*, vol. 26, no. 1 (March 1991), pp. 97–108.

³The when-issued period runs from the CM bill's announcement to its issuance.

⁴David P. Simon, "Further Evidence on Segmentation in the Treasury Bill Market," *Journal of Banking and Finance*, vol. 18 (1994), pp. 139–51.

⁵Fleming, "Are Larger Treasury Issues More Liquid?" pp. 707–35.

⁶Seligman, "Does Urgency Affect Price at Market?"

Seligman found that CM bills that were issued off-cycle or were large (relative to outstanding Treasury bills of similar maturity) had higher yields than other CM bills. In contrast, CM bills with longer durations or that had 2-day notices before auction had lower yields than other CM bills. This study suggested that Treasury could reduce the yields of CM bills by avoiding off-cycle issuances, reducing their relative size, issuing CM bills with longer terms, and giving 2 days notice in advance of auctions.

However, the data in Seligman's study covered auctions held between 1990 and 1999. Seligman's sample did not cover more recent CM bill auctions that occurred since 2001 when the 4-week bill was introduced and only very short-term CM bills were issued. Hence, the findings of his study may not apply to the current environment.

In another recent study based predominantly on auctions held before the introduction of the 4-week Treasury bill, Christopher found that the cost of CM bills, as measured by the spread between CM bill and repurchase agreement yields, is negatively influenced by the time between the sale of a security and the settlement date.⁷ The rationale offered for this finding is that the delay allows administrative efficiencies. Christopher, like Seligman, found that longer-maturity CM bills have lower yields than shorter maturities. She suggests that the optimum maturity of a CM bill is nearly 93 days. This finding highlights the inapplicability of earlier research to the current environment when 4-week Treasury bills are available to help meet short-term financing needs.⁸

Comparing CM Bill Yields with Secondary Market Yields on Similar-maturing Treasury Bills

Choosing the appropriate reference point for CM bill yields is important, and differed in earlier studies. Christopher focused on the difference between CM bill and repurchase agreement yields instead of the difference between yields on CM bills and Treasury bills with similar maturities, which was the focus of Simon's earlier research, Seligman's, and our own research. Although repurchase agreements and CM bills are both means to obtain cash in the short-term, they have a major difference—CM bills, like

⁷Jan E. Christopher, "Determinants of the Spread between Repo and Cash Management Bill Yields: Technical Report," unpublished manuscript (2005).

⁸Christopher (ibid., p. 21) uses principal components analysis to estimate the share of the variation in the yield differential explained by different factors from 2001 through 2004, but does not show the effect on the yield differential in terms of basis points or whether the effect is positive or negative.

regular Treasury bills, are risk free whereas repurchase agreements issued by private borrowers involve some risk. As a result, we focus on the difference between CM bill and outstanding Treasury yields because it provides a more direct indicator of the higher yield that Treasury pays when issuing CM bills. Financial market analysts we spoke with agreed that this yield differential measure was an appropriate focus for our research.

Specifically, our estimate of the yield differential is the difference between a CM bill's yield and the average secondary-market yield on other Treasury bills that are most similar (in terms of maturity) to the CM bill on the day of auction. That is, we compare CM bill yields with yields on the two nearest-maturing—one before and one after—Treasury bills.⁹ CM bill yields were obtained from the Bureau of the Public Debt (BPD) while rates on similar-maturity outstanding Treasury bills were obtained from the *Wall Street Journal* (WSJ). For each Treasury bill, the bid and ask rates were converted to yields and averaged. Next, the weighted average yield for the two bills nearest in maturity to the CM bill was derived. The weights were based on the relative difference in each bill's maturity date from that of the CM bill, with the Treasury bill having a closer maturity date receiving a greater weight and the weights summing to one. In the final step, the weighted average Treasury bill yield was subtracted from the CM bill auction yield to obtain the yield differential.

There are limitations of our yield differential estimate. For example, any effect from the announcement of CM bills on yields for similar-maturing bills is not captured. If the announcement of a CM bill increased the yield on similar-maturing bills, then our estimate may be understated. Also, in some cases, the surrounding Treasury bills we used could include CM bills that were reopenings of regular Treasury bills. This would also lead to an understatement of the yield differential because the yield on the outstanding securities including CM bills would be higher than outstanding securities that did not include CM bills. However, few CM bills issued in fiscal years 2002–2005 were reopenings. Alternatively, if the yield curve were upward sloping and concave, the curvature of the yield curve would

⁹In some cases the surrounding Treasury bills we used could include CM bills. In this sense, our methodology differs from Seligman's, which always compared CM bills with the two nearest-maturity regular bills that did not include CM bills. By including some CM bills, the yield differential may be slightly understated because the yield on the outstanding securities including CM bills would likely be higher than outstanding securities that did not include CM bills.

result in a positive estimate of the spread even before considering the effects of other factors and create a positive bias in our calculation of the yield differential.

The Introduction of the 4-week Treasury Bill Reduced CM Bill Maturities and Their Relative Importance in Short-term Financing

Table 5 provides data on key attributes of CM bills, many of which we used in an attempt to explain the yield differential. The table divides the data into two subperiods. The first subperiod covers auctions held from fiscal year 1996 through fiscal year 2001 before the introduction of the 4-week Treasury bill, while the second subperiod includes auctions held from fiscal year 2002 through fiscal year 2005 after the 4-week bill's introduction.

Table 5: Key Features of CM Bills before and after the 4-week Treasury Bill's Introduction

	Pre-4-week Treasury Bill (Fiscal years 1996–2001)			Post-4-week Treasury Bill (Fiscal years 2002–2005)		
	Number of CM bill auctions: 66			Number of CM bill auctions: 55		
	Mean	Maximum	Minimum	Mean	Maximum	Minimum
CM bill yield (percent)	5.36	6.56	3.82	1.76	3.52	0.91
Yield on outstanding bills with similar maturity (percent)	5.01	6.38	3.34	1.67	3.47	0.79
CM bill yield less yield on outstanding bills with similar maturity (percent)	0.350	1.086	-0.038	0.091	0.553	-0.035
Percent difference between CM bill yield and yield on outstanding bills with similar maturity	7.3	21.2	-0.7	6.0	35.3	-3.7
Repurchase agreement yield (percent)	5.39	6.57	3.99	1.76	3.53	0.94
CM bill term to maturity (days)	27.4	83	1	9.6	19	2
Amount of CM bills issued (dollars in billions)	21.6	42	6	14.8	32	4
Ratio of bids tendered to the amount of CM bills issued (i.e., the bid-to-cover ratio)	2.9	5.3	1.5	3.2	5.9	1.7
Average amount of outstanding bills with similar maturity (dollars in billions)	33.1	66.8	21.1	65.9	86.6	52.9
CM bill issued as a percent of outstanding bills with similar maturity	68.7	136.7	17.2	23.0	50.4	5.6
Number of days from announcement to auction	2.4	9	1	1.5	4	0
Portion of CM bills auctioned during DISP ^a (percent)	12.1	n.a.	n.a.	20.0	n.a.	n.a.

**Appendix I
Detailed Methodology and Findings of
Statistical Analysis of Cash Management Bill
Yield Differential**

(Continued From Previous Page)

	Pre-4-week Treasury Bill (Fiscal years 1996–2001)			Post-4-week Treasury Bill (Fiscal years 2002–2005)		
	Number of CM bill auctions: 66			Number of CM bill auctions: 55		
	Mean	Maximum	Minimum	Mean	Maximum	Minimum
Portion of CM bills issued on 1 st –3 rd days of month ^a (percent)	63.6	n.a.	n.a.	49.1	n.a.	n.a.
Portion of CM bills maturing on tax due date ^a (percent)	21.2	n.a.	n.a.	49.1	n.a.	n.a.
Portion of CM bills issued on 1 st –3 rd days of month that mature on tax due date ^a (percent)	18.2	n.a.	n.a.	30.9	n.a.	n.a.
Portion of CM bills maturing April 15–30 ^a (percent)	33.3	n.a.	n.a.	20.0	n.a.	n.a.
Portion of CM bills maturing on tax days other than April 15 ^a (percent)	18.2	n.a.	n.a.	38.2	n.a.	n.a.
Portion of CM bills issued off-cycle ^a (percent)	39.4	n.a.	n.a.	85.5	n.a.	n.a.
Number of days from CM bill maturity to end of month	8.2	14	1	10.3	17	3
Days from auction to settlement	1.6	5	0	1.3	3	1
Portion of CM bills in a multiple tranche ^a (percent)	30.3	n.a.	n.a.	49.1	n.a.	n.a.
Tail: high minus median discount rate (percent)	.022	.100	.000	.013	.040	.000
Portion of CM bills auctioned on Wednesday and maturing after end of month ^a (percent)	12.1	n.a.	n.a.	7.3	n.a.	n.a.

Source: GAO analysis of data from BPD and WSJ.

Note: n.a. = not applicable.

^aBinary variable.

Table 5 highlights the significant difference in CM bill maturities between the two subperiods. For the 66 CM bills auctioned in fiscal years 1996 through 2001, the average maturity exceeded 27 days while the longest-maturity CM bill had a term of 83 days. In contrast, in the 55 CM bill auctions held from fiscal year 2002 through 2005 the average maturity of the CM bills was only 9.6 days while the longest-maturity CM bill had a term of 19 days. In the more recent period even the maximum maturity of 19 days was much shorter than the average maturity of 27.4 days during the 6 years before 4-week Treasury bills were introduced.

Treasury also reduced its reliance on CM bills for short-term financing after 2001. The average dollar amount of CM bills issued at each auction declined from \$21.6 billion in fiscal years 1996 through 2001 to only \$14.8 billion in fiscal years 2002 through 2005. In contrast, Treasury increased issuance of regular short-term Treasury bills. Before fiscal year 2002 the average amount of outstanding Treasury bills with similar maturities to

newly auctioned CM bills was \$33.1 billion. The average rose to \$65.9 billion in the more recent period. As a result, newly auctioned CM bills averaged less than one-fourth of the average amount of outstanding Treasury bills with similar maturities during the more recent subperiod compared with three-fourths during the earlier subperiod. This reflects the importance of 4-week Treasury bills during the later period.

Many of the features listed in table 5 were represented by binary variables set equal to 1 if a CM bill had the characteristic and 0 if it did not. Binary variables include: auction during a DISP, issuance on the 1st–3rd days of the month, maturation on a tax due date and a combination of issuance on the 1st–3rd days and maturation on a large tax due date. Additional binary variables capture whether or not a CM bill matured between April 15 and the end of the month and whether or not a CM bill was part of a multiple tranche. For each binary variable, table 5 shows the percentage of CM bills that had a particular feature. Among the most notable change in these characteristics between the two subperiods was the more than twofold increase in the share of CM bills issued off-cycle from 39 percent to 86 percent.

Our Study Focused on CM Bills Issued during Fiscal Years 2002–2005

Because of the dramatic decrease in CM bill maturities and reduced reliance on CM bills for short-term financing after the introduction of the 4-week bill, our effort to identify characteristics that might affect the yield differential focused on CM bill auctions held from fiscal years 2002 through 2005. Column A of table 6 provides the estimated coefficients and summary statistics for an equation that includes attributes that have a significant effect on the yield differential. Using the same specification for the 66 CM bill auctions for the earlier period that extended from fiscal years 1996 through 2001 produced results that differ significantly from the estimates for the more recent period. Testing this specification for structural change using a Chow test resulted in an F-statistic of 5.18, which permitted us to reject the hypothesis that the relationship remained stable between the two periods at the .01 level of confidence. This test result provided support for our decision to focus on auctions held after the 4-week Treasury bill was introduced.

Appendix I
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Table 6: Regressions Explaining the Yield Differential (Fiscal Years 2002–2005)

Variable	A		B		C		D		E	
	Coefficient	t-stat								
C	0.001	0.04	-0.009	-0.24	-0.005	-0.13	0.019	0.37	-0.040	-1.21
CM bill issued as a percent of the average amount of similar-maturity Treasury bills outstanding	0.282 ^a	3.30	0.253 ^a	3.50	0.281 ^a	3.31	0.268 ^a	2.59	0.250 ^b	3.14
CM bills maturing April 15–30	-0.118 ^a	-3.99	-0.122 ^a	-3.72	-0.116 ^a	-4.20	-0.115 ^a	-3.54	-0.125 ^a	-4.29
CM bills maturing on large tax due dates other than April 15	-0.117 ^a	-3.28	-0.119 ^a	-3.15	-0.115 ^a	-3.52	-0.113 ^a	-2.80	-0.125 ^a	-3.55
Treasury yield	0.038 ^b	2.28	0.038 ^b	2.30	0.037 ^b	2.12	0.038 ^b	2.20	0.044 ^b	3.05
Multiple-tranche CM bills	0.060 ^c	1.91	0.055 ^b	2.00	0.059 ^c	1.92	0.058 ^c	1.77	0.042	1.48
Term to maturity			0.002	0.66						
Days from auction to settlement					0.005	0.25				
Off-cycle							-0.018	-0.54		
Number of days from announcement to auction									0.034 ^b	2.56
Included observations:	55		55		55		55		55	
R-squared	0.379		0.386		0.380		0.383		0.448	
Adjusted R-squared	0.316		0.309		0.303		0.306		0.379	
S.E. of regression	0.081		0.082		0.082		0.082		0.078	
DW-Stat	1.793		1.794		1.810		1.792		1.808	
Mean dependent var.	0.091		0.091		0.091		0.091		0.091	
S.D. dependent var.	0.099		0.099		0.099		0.099		0.099	

Source: GAO analysis.

Notes: Estimated using White heteroskedasticity-consistent standard errors and covariance.

^aSignificant at the 1 percent level.

^bSignificant at the 5 percent level.

^cSignificant at the 10 percent level.

Yield Differential Is Positively Correlated with Level of Treasury Bill Yields

Our analysis suggests that investors may require a proportionate rather than an absolute differential as compensation for unscheduled CM bills. While previous research has not examined whether the yield differential is correlated with the overall level of Treasury bill yields, figure 8 in the main text indicates that the differential may tend to move in the same general direction as the level of secondary-market yields on Treasury bills with similar maturity. The estimated coefficient of the Treasury bill yield shown in column A of table 6 is 0.038, which suggests that a 1-percentage-point increase in the Treasury bill yield is associated with a 3.8-basis-point increase in the yield differential. During fiscal year 2005, for example, the average yield on Treasury bills with maturities comparable to newly auctioned CM bills was 2.42 percent and the yield differential averaged 13.5 basis points. If the yields on comparable-maturity Treasury bills had been 5 percent¹⁰ instead of 2.42, the results imply that yield differentials would have been about 10 basis points higher in fiscal year 2005 than they actually were. A continuation in the rise in Treasury bill yields that began in 2004 is therefore likely to result in an increase in the yield differential.

Yield Differential Is Positively Correlated with Auction Amounts

Our results show that as the supply of a CM bill rises relative to the supply of similar investment alternatives, the relative price of the CM bill declines and the yield differential increases. The results for the 55 auctions held from fiscal years 2002 through 2005 suggest that the yield differential rises with an increase in the ratio of the amount of CM bills auctioned to the average amount of similar-maturity Treasury bills outstanding, as shown by the positive and significant coefficient of 0.282 for this variable. The variable's significant positive coefficient is consistent with the results of Simon, Fleming, and Seligman. In studying the relationship between auction size and yields, Seligman noted that an increase in the relative amount of CM bills auctioned could have two opposite effects on their relative yields. On the one hand, a higher relative amount could increase liquidity and therefore reduce the yield differential. On the other hand, a higher yield differential might be necessary to attract sufficient investor interest when the amount of CM bills being auctioned is large relative to outstanding Treasury bills with similar maturities. Our results suggest the supply effect dominates.

¹⁰The yield on comparable-maturity Treasury bills averaged 5.01 from fiscal years 1996 through 2001.

The estimated coefficient—0.282—of the average amount of similar-maturity Treasury bills outstanding implies that a \$1 billion increase in the amount of CM bills auctioned would raise the yield differential 0.43 basis points in 2005, other things constant.¹¹ This coefficient can also be used to indicate how much higher the yield differential might have been if CM bills had remained as important a source of short-term Treasury financing in fiscal year 2005 as they were in the years before the 4-week Treasury bill was introduced. Multiplying the coefficient of 0.282 by 0.687, which was the average ratio of the amount of CM bills to the average amount of similar-maturity Treasury bills from 1996 through 2001, rather than the actual 2005 ratio of 0.190 raises the yield differential 14 basis points. In other words, if CM bills were used as intensively in fiscal year 2005 as they were during earlier years before the 4-week Treasury bill's introduction, the yield differential might have been 28 basis points in 2005 instead of the actual differential of 14 basis points.¹²

Maturity on or around Large Tax Payment Dates Reduces Yield Differential

Our work suggests that maturity on or around a tax due date, which is a feature not studied in previous research, reduces the yield differential. Table 6 shows that there is a 12 basis point reduction for CM bills that mature from the 15th to the end of April. Similarly, CM bills that mature on tax due dates other than April 15 (i.e., the 15th of March, June, September, or December) tend to have lower yield differentials by nearly 12 basis points.¹³ This may be explained by empirical evidence suggesting that regular Treasury bills whose maturity dates immediately precede corporate tax payment dates have special value because corporate treasurers may wish to invest excess cash in securities whose cash flows can be used to liquidate cash liabilities.¹⁴

¹¹This is the product of the coefficient and the inverse of \$67.5 billion (average amount of similar-maturing Treasury bills for fiscal year 2005).

¹²Because of the structural change in the relationship determining the yield differential, similar calculations cannot be applied to the period before the introduction of the 4-week Treasury bill.

¹³If the 15th fell on a holiday or weekend, the tax due date was the following business day.

¹⁴See Kenneth D. Garbade, "Treasury Bills with Special Value," in *Fixed Income Analytics* (Cambridge, Mass.: MIT Press, 1996).

CM Bills Issued in Multiple Tranches May Require Higher Yield Differentials

Financial market participants informed us that CM bills issued in several tranches may lead to cautious bidding and therefore require higher yields to attract investors. Multiple-tranche CM bills are CM bills that are issued on different days within a short period that have the same maturity date. Previous research has not studied this feature of CM bills. Reliance on multiple-tranche CM bills increased from slightly less than one-third of issues in the earlier subperiod to approximately one-half of CM bills issued during fiscal years 2002–2005. To test whether multiple-tranche issues affect CM bill yields, we included a variable identifying this type of CM bills in the equation shown in table 6, column A.

The results suggest that CM bills that are part of a multiple tranche might have yields that are 6.0 basis points higher than other CM bills. However, while the coefficient is significant at the 10 percent level, it is not significant at the 5 percent level.¹⁵ Moreover, the estimated multiple-tranche coefficient is not as robust as other coefficient estimates. For example, with the inclusion of a variable representing the number of days advance notice before auction in column E, the coefficient of multiple-tranche CM bills is no longer significant even at the 10 percent level. Accordingly, the evidence that multiple-tranche issues increase the yield differential should be viewed with caution.

Yield Differential Is Not Affected by Timing of Issuance

We also tested whether the issuance of CM bills on the 1st–3rd days of the month or during DISPs affected the yield differential. Because one-half of all CM bills were issued on the 1st–3rd days of the month in recent years, these issues might in some sense be considered more regular and thus require lower yields than CM bills issued at other times. However, the estimated coefficient of a variable identifying CM bills issued on the 1st–3rd days of the month was insignificant.¹⁶

CM bills have been a useful tool for Treasury when approaching the debt ceiling. From fiscal years 2002 through 2005, 20 percent of CM bills were issued during DISPs—a period for which the Secretary of the Treasury has determined that obligations of the United States may not be issued without

¹⁵The probability value for the coefficient estimate is .06.

¹⁶The probability value of the coefficient for CM bills issued on the 1st–3rd days of the month was .42.

exceeding the debt ceiling. While the coefficient of a variable identifying CM bills issued during DISPs had a negative sign, it was not significantly different from zero.¹⁷

Several Findings from Earlier Studies Are No Longer Supported

Studies by Seligman and Christopher identified several other variables that had significant effects on the differential between yields on CM bills and either the yield on regular bills with similar maturity or the yield on repurchase agreements.¹⁸ As noted earlier, however, these studies employed samples consisting either entirely or mainly of observations from CM bill auctions held before the introduction of the Treasury bill in fiscal year 2001. The only finding from earlier studies that appears to remain valid in this new environment of shorter-maturity CM bills is that an increase in the ratio of CM bills auctioned to the outstanding amount of similar-maturing bills tends to increase the yield differential.

Both Seligman and Christopher found that CM bills with longer terms to maturity were relatively less costly. The equation in Column B of table 6 includes a variable for a CM bill's term to maturity. In contrast to earlier findings, we found that the coefficient for term to maturity is positive and insignificant. This may be because CM bills are now concentrated at the very short end of the maturity spectrum leaving little room for increases in maturity to affect the yield differential.

Christopher found that the number of days between the auction of a CM bill and the settlement date reduced the differential between the CM bill yield and the yield on repurchase agreements. The explanation for this relationship is that the delay allows administrative efficiencies. However, the estimated coefficient of the number of days between auction and settlement (in column C of table 6) is insignificant.

In the sample of CM bill auctions that Christopher studied, CM bills that were auctioned on a Wednesday and had a maturity date beyond the end of the month tended to have lower yields. Since the inception of the 4-week Treasury bill and the truncation of CM bill maturities, only 4 of 55 issues were in this category. In an equation that also included the other variables

¹⁷The probability value for the coefficient of the DISP variable was .292.

¹⁸See Seligman, "Does Urgency Affect Price at Market" and Christopher, "Determinants of the Spread between Repo and Cash Management Bill Yields."

in column A of table 6, the coefficient for a binary variable designating such issues had a t-statistic of only 0.161 which led to the rejection of the hypothesis that CM bills auctioned on Wednesdays and maturing after the end of the month have lower yields.

Instead of issuing a new security, Treasury may add to, or reopen, an existing issue, increasing the amount outstanding of the issue. CM bill reopenings are fungible with previously issued regular bills and may enjoy their liquidity. Seligman found that CM bills issued off-cycle were significantly more costly than those that reopened a previous issue. However, contrary to Seligman's results, our analysis indicates that off-cycle CM bills are not more costly than reopenings. Column D of table 6 shows the sign of the coefficient of the off-cycle variable is negative rather than positive although, more relevantly, the coefficient is not significantly different from zero. The descriptive statistics in table 5 show that 86 percent of CM bills issued during the more recent period were issued off-cycle compared with about 40 percent in the earlier period. Off-cycle issuance has become a regular feature of CM bills and does not command an extra return.

Seligman also hypothesized that an increase in the number of business days between CM bill announcement and auction would reduce the yield differential. While his estimates suggest that 2 business days advanced notice reduces the yield differential, he found that increasing the announcement period beyond 2 days did not further reduce the differential. In contrast, we found that the sign for the coefficient of the number of days of advance notice was positive and significant, as shown in column E of table 6. This has the unexpected implication that increasing the number of business days notice before auction increases rather than reduces the yield differential. Because markets usually penalize uncertainty, this result appears counterintuitive and should be studied further to determine whether it arose because of a statistical problem such as the correlation between the advanced notice variable and an omitted variable that may be unobservable.

Selected CM Bill Features Reduce Yields but Opportunities for Additional Exploitation of These Features May Be Limited

Our analysis of CM bill yield differentials from fiscal year 2002 through 2005 revealed several features of CM bills that affect the yield differential; however, Treasury's ability to achieve additional savings by further exploiting these features may be limited. The average yield differential was substantially lower during the period from fiscal years 2002 through 2005 than it was in the preceding several years. The two most important factors behind the yield differential decline between the pre- and post-2002 period were (1) the substantial decline in the general level of short-term rates and (2) the major reduction in the ratio of CM bills issued to the average amount of Treasury bills outstanding. The level of short-term interest rates is largely determined by Federal Reserve policy and market forces rather than Treasury. Treasury bill yields may continue to rise and reach levels that prevailed in the early period, thereby erasing the portion of the decline in the yield differential caused by lower interest rates. However, because the 4-week bill is now a permanent feature of Treasury's auction schedule and has reduced Treasury's reliance on CM bills, the portion of the decline in the yield differential attributable to the reduced ratio of CM bills to similar-maturity Treasury bills is likely to endure. The experience from fiscal year 2002 through 2005 as a whole suggests that the yield differential could remain about 13 basis points below pre-2002 levels.

While Treasury may have some ability to change the relative amount of CM and regular bills issued, the mix is affected by cash flow patterns largely beyond its control. Aligning cash outflows and inflows could reduce the amount of CM bills issued, but Treasury does not have authority over the timing of all cash flows. However, Treasury does have control over debt-related cash flows. Efforts to better align the timing of net increases in debt with its largest cash payments could reduce both the size of CM bills and the yield differential.

To the extent that Treasury can increase the share of CM bills that mature on dates when taxes are due, additional savings might be achieved. Already more than 60 percent of CM bills met this criterion in fiscal year 2005, so the possibility of achieving further savings through this feature may be minimal. Moreover, Treasury's short-term borrowing needs do not uniformly occur shortly before large tax due dates.

Nearly one-half of CM bills issued since fiscal year 2002 have been issued in multiple tranches. Our results provide somewhat limited evidence that multiple tranche issues may be more costly. Even if such issues were to require higher yields, however, multiple tranche issues have the advantage

Appendix I
Detailed Methodology and Findings of
Statistical Analysis of Cash Management Bill
Yield Differential

of reducing borrowing costs by minimizing the duration of the amounts borrowed in later tranches. For example, instead of borrowing \$20 billion for 10 days, Treasury might use two tranches to borrow \$10 billion for 10 days and \$10 billion for 9 days, thereby saving 1 day's interest on the second tranche. Accordingly, the savings that multiple tranche CM bills provide by reducing the number of days that interest is paid on later tranches is likely to more than offset the higher yields such issues might entail.

Finally, the positive correlation found between the number of days of advanced notice and the yield differential appears counterintuitive and probably should not be used as a basis for reducing the notification period.

Analysis of CM Bill Auctions

Given that CM bill auctions are innately less predictable than regular Treasury bill auctions, it is not surprising that, by some measures, CM bill auctions are less successful than regular auctions. Better auction performance can be characterized by greater participation, a broader distribution of awards, and more preauction activity in the when-issued market. These factors theoretically improve Treasury's borrowing costs. By most measures of participation and activity we examined, CM bill auctions perform less well than 4-week bill auctions. However, some other measures indicate that Treasury obtained a better price at CM bill auctions compared with 4-week bill auctions and that there is stronger demand for CM bills than 4-week bills. However, we did not find a statistically significant relationship between any auction performance measures and yield differentials.¹ We did find that in more concentrated auctions, Treasury was less likely to pay more than the yield indicated in the when-issued market at the time of auction.

Trading Activity Was Lower Prior to CM Bill Auctions than 4-week Bill Auctions

Treasury auctions are preceded by forward trading in markets known as "when-issued" markets. The when-issued market is important because it serves as a price discovery mechanism that potential competitive bidders look to as they set their bids for an auction. When-issued trading reduces uncertainty about bidding levels surrounding auctions and also enables dealers to sell securities to their customers in advance of the auction so they are better able to distribute the securities and bid more aggressively, which results in lower costs to Treasury.

However, we found that trading activity is sparse before CM bill auctions. We counted the number of preauction trades on the day of CM bill auctions and found that when-issued trading is lower prior to CM bill auctions compared with regular 4-week bill auctions (see table 7). There is generally more activity after CM bill auctions than before the auction.

¹The yield differential is measured as the difference between CM bill yields and the weighted average of yields on outstanding Treasury bills maturing before and after the CM bill.

Table 7: Pre- and Postauction Trading Activity in CM Bills and 4-week Bills (Fiscal Years 2002–2005)

	Average number of trades			
	CM bills		4-week bills	
	Preauction	Postauction	Preauction	Postauction
2002	250	283	419	315
2003	63	144	271	218
2004	94	154	226	220
2005	97	149	322	290
Average 2002–2005	112	173	309	261

Source: GAO analysis of GovPX data.

Note: GovPX data provide information on primary dealer transactions through the interdealer brokers for all U.S. Treasury securities.

Yield Treasury Paid on CM Bills Generally Reflected Market Information at the Time of the Auction

To evaluate the yield obtained at auction, Treasury’s auction studies used the difference between yields at auction and the contemporaneous when-issued yield at time of an auction, usually 1:00 p.m. We refer to this measure as the contemporaneous auction spread. According to Treasury, this is a good benchmark to measure auction yields because potential bidders have a choice between purchasing securities at auctions or purchasing securities in the when-issued market. A negative spread (where the auction yield is less than the contemporaneous when-issued yield) indicates Treasury paid a lower yield than expected, which is a positive auction result. Alternatively, a positive spread (the auction yield is greater than the contemporaneous when-issued yield) indicates Treasury paid a higher yield than expected from information in the market at the time of auction. This would indicate a poor auction result. By this measure, CM bill auctions performed better than 4-week bill auctions. The contemporaneous auction spread of CM bill auctions from fiscal year 2002 through 2005 was approximately zero (see table 8), which implies that the yield Treasury paid on CM bills generally reflected market information at the time of the auction. In contrast, the auction spread for 4-week bill auctions averaged a positive 0.3 basis points for fiscal years 2002 through 2005. The information derived from the auction spread depends in part on

whether the when-issued market is liquid around the time of the auction.² Because the level of trading activity is relatively sparse before CM bill auctions, the information provided by the contemporaneous auction spread may be limited.

Table 8: Average Spread between Auction and When-issued Yields at Time of Auction (Fiscal Years 2002–2005)

Basis points	CM bills	4-week bills
2002	0.3	0.4
2003	-0.5	0.3
2004	-0.3	0.6
2005	0.4	0.1
Average 2002–2005	0.0	0.3

Source: GAO analysis of GovPX data.

CM Bill Auctions Are More Concentrated and Have Fewer Awarded Bidders than 4-week Bill Auctions

In order to lower borrowing costs, Treasury seeks to encourage more participation in auctions. In general, large, well-attended auctions improve competition and lead to lower borrowing costs for Treasury. For example, in the 1990s Treasury switched its auctions from multiple-price to uniform-price format in order to encourage more aggressive bids and a broader distribution of auction awards. Treasury found that the share of the auction awarded to the top five competitive bidders declined under the new auction format to about 35 percent for 2-year notes and 36 percent for 5-year notes. Using similar estimates of bidder participation in CM bill auctions, we found that the share of the auction awarded to the top five bidders was 60 percent or higher in over half of CM bill auctions held during fiscal years 2002–2005. The share exceeded 60 percent in only 18 percent (37 of 209) of 4-week bill auctions held during fiscal years 2002–2005.

²Kjell G. Nyborg and Suresh Sundaresan, “Discriminatory versus Uniform Treasury Auctions: Evidence from When-issued Transactions,” *Journal of Financial Economics*, vol. 42 (1996), pp. 63–104.

Treasury limits the maximum auction award to a single bidder to 35 percent of the offering in part to foster a liquid secondary market for a new issue.³ A higher concentration could reduce competition and restrict a security's supply in the secondary market preventing its efficient allocation among investors and possibly generating a "short squeeze." The term "short squeeze" is used by market participants to refer to a shortage of a security relative to willing buyers for the same security. These squeezes arise because Treasury allows dealers to sell the security short to its customers (or other dealers) in the when-issued market before securities are auctioned. Lack of competition could also result in lower prices (higher yields) at auction. In contrast, we found generally negative correlations between concentration measures and auction spreads for CM bill auctions. In other words, in more concentrated auctions, Treasury was less likely to pay more than the yield indicated in the when-issued market at the time of auction. According to Treasury, a high concentration ratio in CM bill auctions may imply some bidders really want a particular bill, which drives the price up and yield down.

Not only are CM bill auctions more concentrated, but fewer bidders in total are awarded CM bills than 4-week bills. According to Treasury officials, short-term securities have a more limited audience. From fiscal year 2002 through 2005, about 17 bidders on average were awarded CM bills in each auction compared with 22 bidders in 4-week bill auctions. More than half of the CM bill auctions had 16 or fewer awarded bidders. In contrast, only about 4 percent of 4-week bill auctions had 16 or fewer awarded bidders.

Although greater participation, a broader distribution of awards, and more preauction activity in the when-issued market theoretically improves Treasury's borrowing costs, we did not find a statistically significant relationship between these factors and the yield differential.

³This is based on a complicated formula that also takes into account the bidder's "reportable net long position" in the security. For more information on this and auction mechanics, see Kenneth D. Garbade and Jeffrey F. Ingber, "The Treasury Auction Process: Objectives, Structure and Recent Adaptations," *Current Issues in Economics and Finance*, vol. 11, no. 2, Federal Reserve Bank of New York, (February 2005).

More Common Performance Measures Indicate High Demand for CM Bills but Greater Uncertainty in CM Bill Auctions Compared with 4-week Bill Auctions

More commonly cited measures of auction performance, such as bid-to-cover ratios and auction tails (difference between the high and average discount rates) provide information on the demand for Treasury securities and the dispersion of bids, but these measures are limited.⁴ The bid-to-cover ratio is the ratio of the amount of bids received in a Treasury security auction compared with the amount of accepted bids. In general, higher ratios signal higher demand for the security being auctioned. From fiscal year 2002 to 2005, the bid-to-cover ratio for CM bill auctions averaged 3.17 (see table 9). In contrast, the bid-to-cover ratio for 4-week bills averaged only 2.30. This suggests a stronger demand for CM bills than regular 4-week bills; however, these results should be interpreted with caution. Some market participants suggested that a high bid-to-cover ratio may arise because many dealers participate in CM bill auctions to fulfill auction requirements that are less costly to meet by participating in short-term CM bills auctions than in auctions of longer-term securities.

Table 9: Bid-to-cover Ratios for CM and 4-week Bills (Fiscal Years 2002–2005)

Average ratio of amount tendered to amount accepted		
	CM bills	4-week bills
2002	3.12	2.34
2003	3.45	2.32
2004	3.18	2.23
2005	3.02	2.32
Average 2002–2005	3.17	2.30

Source: GAO analysis of BPD data.

Auction tails—the number of basis points between the high and average discount rates—are a measure of the dispersion of the bids. Auction theory suggests that the more diverse the beliefs of the bidders and the more uncertain they are about the demand for the bills, the more dispersed the bids submitted. In contrast, narrower tails indicate strong bidding and therefore lower costs to Treasury. When evaluating the auction tails of CM

⁴The difference between the highest and lowest winning tender is also used. For example, see Sushil Bikhchandani, Patrik L. Edsparr, and Chif-fu Huang, “The Treasury Bill Auction and the When-Issued Market: Some Evidence,” draft (Aug. 30, 2000).

bills compared with regular Treasury securities, we found that CM bill tails were slightly larger than 4-week bill auctions (see table 10).

Table 10: Auction Tails for CM and 4-week Bill Auctions (Fiscal Years 2002–2005)

Basis points	CM bills	4-week bills
2002	1.71	1.66
2003	1.33	1.00
2004	1.00	0.80
2005	1.29	1.21
Average 2002–2005	1.27	1.17

Source: GAO analysis of BPD data.

Note: Auction tails are measured as the difference between high and average discount rates.

In summary, most measures suggest CM bill auctions perform less well than 4-week bill auctions. However, the low participation and high concentration of CM bill auctions do not explain why Treasury paid higher yields on CM bills than investors paid for similar-maturing bills in the secondary market.

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Comments from the Department of the Treasury



DEPARTMENT OF THE TREASURY
WASHINGTON

March 16, 2006

ASSISTANT SECRETARY

Susan J. Irving
Director, Federal Budget Analysis
General Accountability Office
Washington, D.C.

Dear Ms. Irving:

Thank you for your letter of February 21 to Secretary Snow enclosing the draft report entitled *Debt Management: Treasury Has Refined Its Use of Cash Management Bills But Should Explore Options That May Reduce Cost Further*. As discussed during our teleconference on March 9, we wish briefly to respond to several of the larger issues raised in the report.

First, the report recommends that the Department of the Treasury explore options for reducing the use and cost of cash management bills to fund short term cash needs. Treasury is committed to minimizing financing costs. It has been Treasury's long-standing debt management practice to hold discussions with market participants about the costs and benefits of shorter-term instruments, to examine the value of additional transparency of cash management bill issuance, and to explore alternative approaches to debt management like those used in other countries. While Treasury's current debt issuance practices reflect this policy, consistent with the thoughtful recommendations in your report we will continue to evaluate ways to further reduce financing costs through changes in the use of cash management bills.

Second, the report recommends that Treasury explore the feasibility of aligning cash flows, and increasing earnings on cash balances. As noted in the report, there are statutory, regulatory, and practical constraints limiting Treasury's ability to change the timing of large, recurring receipts and expenditures. Nevertheless, when there is an opportunity to better align any of our major cash flows, either receipts, expenditures or marketable debt issuances, we will certainly explore doing so. In addition, we are currently exploring opportunities to increase the capacity and flexibility of our investment program and improve earnings on our excess cash. As these improvements would broaden Treasury's investment authority, legislative action will be needed to implement the changes.

Thank you for the opportunity to review and comment on the draft report, and we look forward to a continuing dialogue with you on these topics.

Sincerely yours,

Emil W. Henry, Jr.
Assistant Secretary for Financial Institutions

GAO Contacts and Staff Acknowledgments

GAO Contacts

Susan J. Irving (202) 512-9142
Thomas J. McCool (202) 512-2700

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