CONGRESS OF THE UNITED STATES
CONGRESSIONAL BUDGET OFFICE

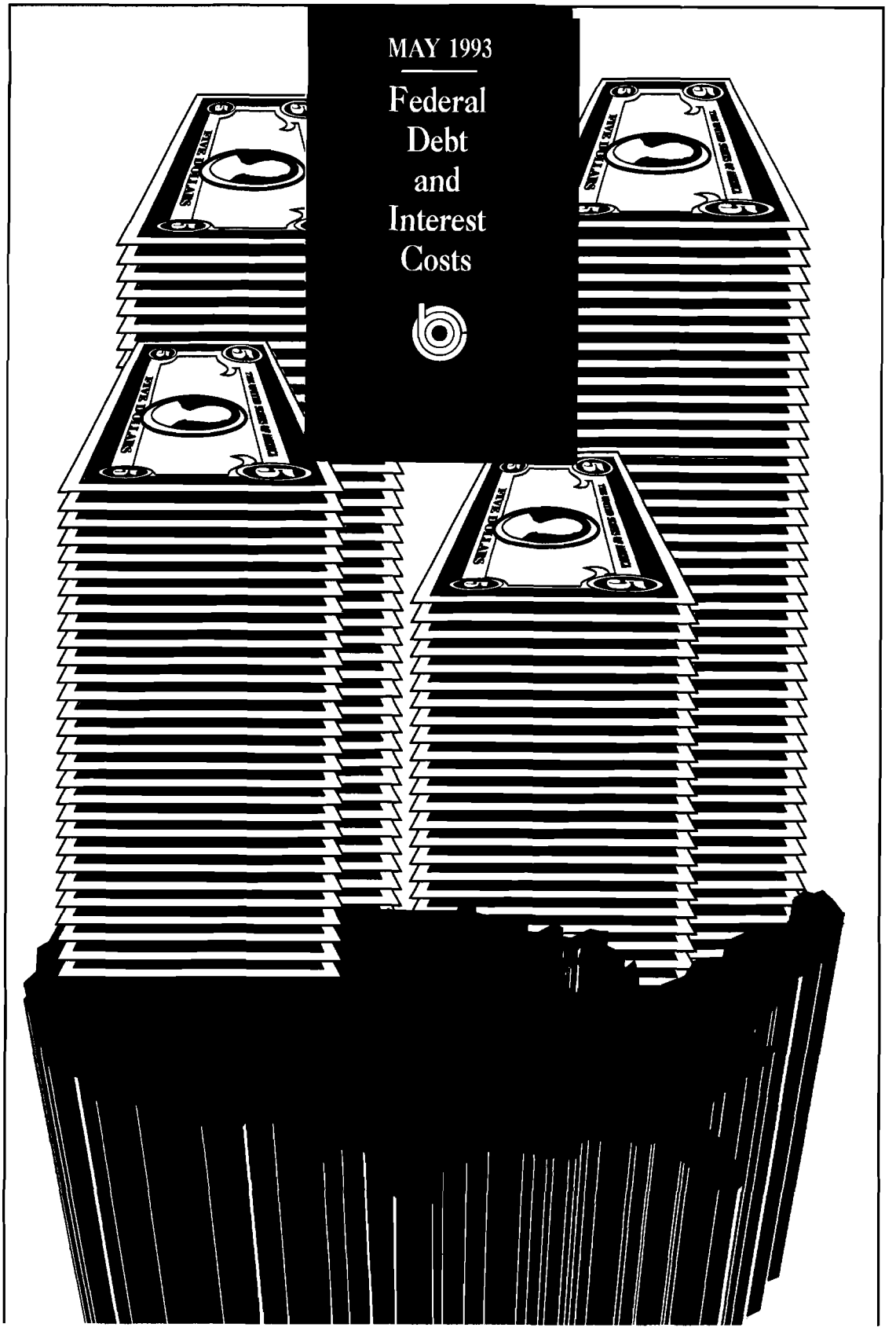
A

CBO

STUDY

MAY 1993

Federal Debt and Interest Costs



FEDERAL DEBT AND INTEREST COSTS

The Congress of the United States
Congressional Budget Office

NOTES

Unless otherwise indicated, all years referred to in this report are fiscal years.

Numbers in the text and tables of this report may not add to totals because of rounding.

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Preface

The federal debt has grown rapidly in the past decade, and this trend is projected to continue. Interest costs have grown commensurately and now account for about one of every seven dollars spent by the government. In response to a request from the House Committee on Ways and Means, this study provides background material on federal debt and interest costs--their components, their sensitivity to assumptions about future deficits and interest rates, and the choices that the Treasury faces in deciding the mix of securities it will offer.

Ellen Hays, Jeffrey Holland, and Kathy Ruffing of the Congressional Budget Office's (CBO's) Budget Analysis Division wrote the study under the supervision of C.G. Nuckols, Paul Van de Water, and James Horney. Kathy Ruffing wrote Chapters 1, 3, 4, and 7 and Appendix A; Jeffrey Holland wrote Chapters 2 and 6 and Appendix B; Ellen Hays wrote Chapter 5. Robert Arnold of CBO's Macroeconomic Analysis Division conducted the bootstrap simulations described in Chapter 7 (assisted by Michael Simpson) and, with Kathy Ruffing, wrote Appendix C. Frank Russek, Joyce Manchester, Kim Kowalewski, Paul Cullinan, Robert Hartman, and Pearl Richardson of CBO offered insightful comments and criticisms. Chapter 7 also benefited from discussion at the November 1992 meeting of CBO's Panel of Economic Advisers.

Sherry Snyder edited the manuscript. Chris Spoor provided editorial assistance. Marion Curry produced numerous drafts. With the assistance of Martina Wojak-Piotrow, Kathryn Quattrone prepared the study for publication.

Robert D. Reischauer
Director

May 1993

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Chapter One

Summary and Introduction

The large budget deficits of the 1980s and early 1990s have caused the federal debt to soar, a trend that is projected to continue. At the end of 1992, the debt held by the public was nearly $3 trillion. If there are no changes in federal taxing and spending policies, the Congressional Budget Office (CBO) estimates that debt held by the public will mount to $4.8 trillion in 1998 and to $7.5 trillion by 2003 (see Figure 1). And as a share of gross domestic product (GDP), it will top 77 percent in 2003, up from 51 percent today.

The debt's surge stems from large peacetime deficits that have no precedent in U.S. history. The government borrowed massively to finance World War II; in 1946, debt held by the public reached a staggering 114 percent of GDP. But for the next quarter of a century, the debt hardly grew--inching up from $242 billion in 1946 to $283 billion in 1970, or by an average of less than $2 billion a year. Thus, during this period the government neither paid off the debt incurred in World War II nor added much to it. And as the economy grew at a healthy clip, the ratio of debt to gross domestic product steadily drifted down, falling to 29 percent in 1970. By virtually every measure--relative to GDP, adjusted for inflation, or in per capita terms--except raw dollars, the debt sank during these decades.

The 1970s witnessed the first interruption in this trend. Battered by two oil price shocks, inflation, and sluggish growth, federal budgets were unbalanced for the entire decade, and debt held by the public more than doubled in dollar terms between 1970 and 1980. Even so, during this period when inflation swelled GDP, the debt-to-GDP ratio drifted to a postwar low of 25 percent in mid-decade before creeping up again; in 1980, it stood at 27 percent, little different from 1970's figure.

But the 1980s saw a spiraling of federal debt that has yet to stop. Two recessions early in the decade, the tax cuts and defense buildup of the first Reagan Administration, the steady growth of federal entitlement programs, and (by decade's end) the burgeoning outlays to tackle insolvent savings and loan institutions and banks all contributed to large deficits and growing debt. The 1990 budget summit between Congressional leaders and the Bush Administration, the most ambitious of several such efforts, was expected by many, including CBO, to tame the deficit and nearly balance the budget by the mid-1990s. This belief was too optimistic. Unexpected developments--chiefly weak economic growth and surging outlays for health care programs--have put this goal out of reach unless several more rounds of deficit-cutting measures occur.[1]

The Growth of Federal Interest Costs

As a consequence of such large and continued borrowing, interest paid to the public today accounts for about one of every seven dollars

1. Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1994-1998* (January 1993), Box 6-1.

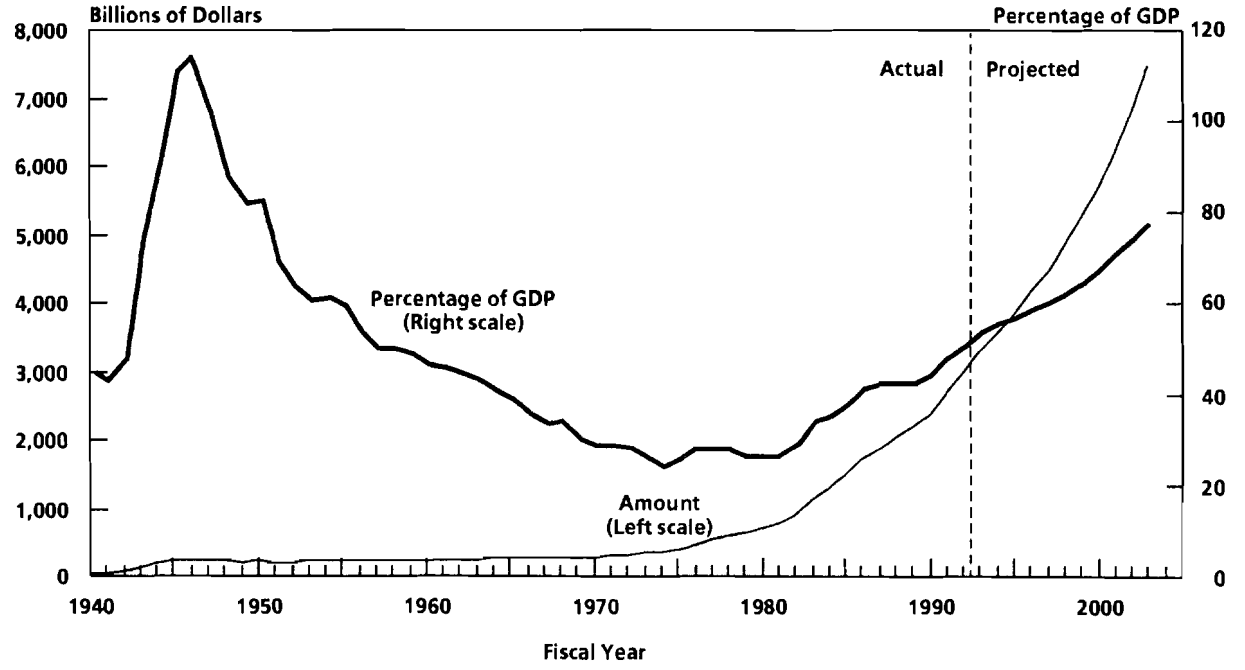
spent by the government. These interest expenditures have roughly tracked the debt's growth. Of course, the two do not march in lockstep: interest payments depend not just on the debt but on the prevailing level of interest rates as well. And since the Treasury borrows about three-fourths of the debt in medium- and long-term securities (chiefly with maturities of 2 to 10 years, with some bonds as long as 30 years), the rate it pays on the debt is a hybrid of current and past market interest rates. The government also collects some interest income, which offsets a small portion of its borrowing costs.

Net interest outlays ballooned from $53 billion in 1980 to $184 billion in 1990 (see Figure 2). Remarkably, they barely grew at all in the next two years, rising just $15 billion (to $199 billion) in 1992 in the face of almost $600 billion in net borrowing--a testimonial to the powerful budgetary effects of falling interest rates. Interest rates on short-term Treasury bills plunged to less than 3 percent in mid-1992, but CBO expects them to climb as the economy strengthens. In contrast, rates on medium- and long-term securities have fallen much less dramatically and are expected to remain little changed from today's levels. Thus, CBO projects that net interest costs will reach $211 billion in 1994 and $293 billion in 1998--and will top $400 billion soon after the turn of the century if taxing and spending policies remain unchanged.

How President Clinton's Proposals Would Affect Interest and Debt

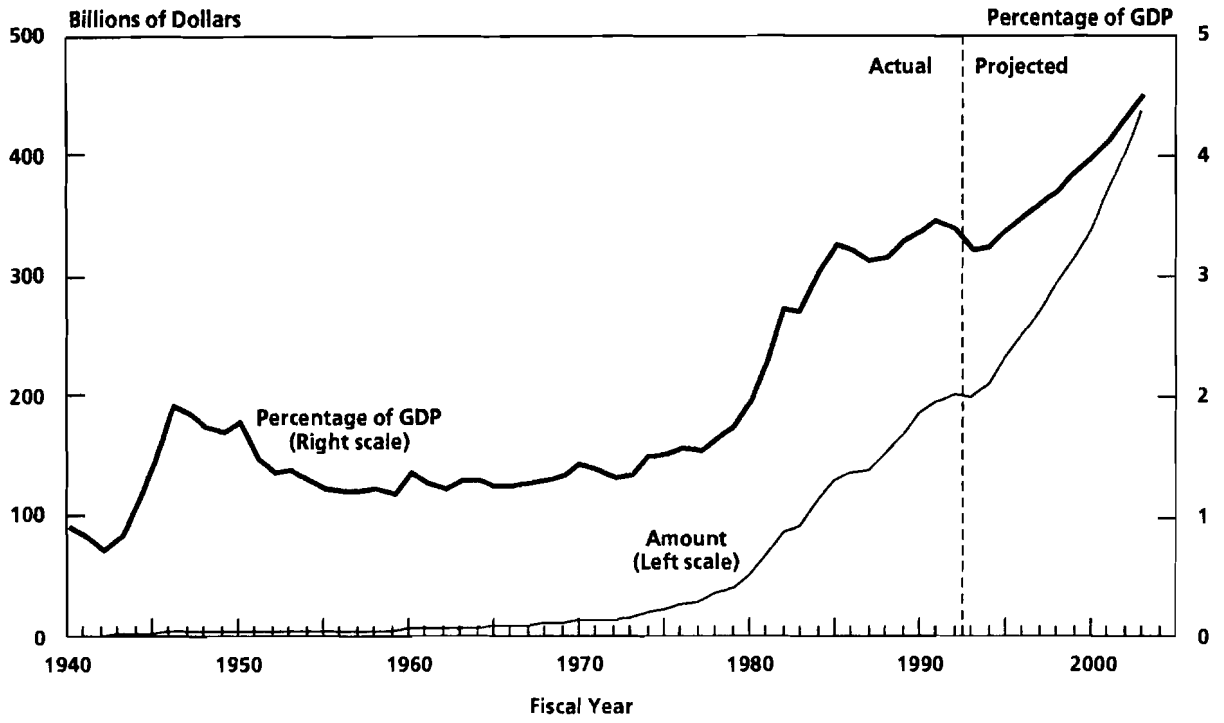
Of course, CBO's baseline projections are not a prediction of budget outcomes. Rather, they are intended to illustrate the consequences of unchanged policies. And they serve as a benchmark for policymakers who are wres-

Figure 1.
Debt Held by the Public



SOURCES: Office of Management and Budget for 1940-1992; Congressional Budget Office projections, 1993-2003.

Figure 2.
Net Interest Outlays



SOURCES: Office of Management and Budget for 1940-1992; Congressional Budget Office projections, 1993-2003.

tling with proposed changes in the government's spending and tax policies.

In February 1993, President Clinton submitted a package of proposed changes in budgetary policies. The package contained stimulus and investment proposals, which would increase the deficit, as well as deficit-cutting measures. The Congress is still weighing and reshaping the package and will probably continue to do so until this autumn.

According to CBO, the President's proposals would curtail but not arrest the growth of debt and interest costs.[2] By the end of 1998, the debt would mount to $4.5 trillion, but would nevertheless be $300 billion smaller than under unchanged policies. Interest costs in that year would be about $17 billion smaller than in CBO's baseline as a result of lower deficits.

The President's budget also claimed savings as a result of shortening the maturity of debt securities. But at that time, the Treasury could not state which particular securities it proposed to curtail or increase. Not until May did the Treasury flesh out its new financing strategy, permitting CBO to conclude that the switch will probably save another $2 billion or so in interest costs in 1998.

What Drives Federal Debt and Interest Costs?

In many of its other reports on the budget, CBO has sketched some of the economic implications of large federal deficits and debt. The aim of this study, more modestly, is sim-

2. Congressional Budget Office, "An Analysis of the President's February Budgetary Proposals," CBO Paper (March 1993).

ply to describe what drives federal debt and interest costs. Even as the debt grows, information about its makeup, its dynamics, and its sensitivity are seldom found in one convenient place. Furthermore, budget and economic documents feature a bewildering variety of figures on debt and interest that may easily mislead analysts into picking inappropriate numbers for their purpose.

Federal Borrowing from the Public

The federal deficit is overwhelmingly financed by the auction of securities--Treasury bills, notes, and bonds--in the credit markets. Chapter 2 discusses the mix of the Treasury's marketable financing (a mix that has historically been tilted toward medium- and long-term securities), highlights the volume of new financing and refinancing, and points out the seasonal fluctuations in borrowing. About 10 percent of the federal debt is in the form of nonmarketable securities, which comprise the familiar savings bonds along with more obscure instruments designed especially for state and local governments or foreign governments. A few other agencies of the federal government besides the Treasury Department occasionally get into the borrowing act by issuing their own securities or more esoteric forms of debt, practices that are generically known as agency borrowing.

Borrowing is a means of financing the deficit--a simple concept that nevertheless eludes many people. Borrowing is not a revenue, and the repayment of debt is not an outlay. The reason is obvious: investors lend the government their money temporarily and voluntarily. Unlike income taxes or other revenues, borrowing will have to be repaid eventually, even though the government usually pays it off simply by selling a new security. And when a debt security matures, the repayment is not an outlay like, say, benefit payments or defense purchases; rather, in a reversal of the original transaction, the government simply returns investors' money to them. (What do get reflected in federal outlays are interest payments, which compensate investors for the use of their money in the meantime.)

As long as the government runs a deficit, it will have to borrow; not until it runs a surplus can it whittle away at the debt. In the parlance of budget analysts, borrowing is a *means of financing* the deficit, and debt repayment is a *use* of the surplus. Enthusiasts who claim that the government could "reduce the deficit" by "selling bonds" (sometimes designed to appeal to buyers' patriotism or other public-spirited motives) often exhibit their confusion over these fundamental distinctions.

Annual federal borrowing is invariably close to but never exactly matches the total deficit, the gap between federal revenues and outlays. This mismatch is easily explained by various means of financing other than borrowing--factors such as a buildup (or drawdown) of cash balances, changes in checks outstanding or in interest accrued but not yet paid, and so forth. These factors can be important over short periods but fade into insignificance over longer ones; ultimately, the primary determinant of the government's borrowing is the deficit.

Trust Funds and the Federal Debt

Although debt sold to finance deficits is the chief concern of economists and participants in financial markets, another type of debt--debt issued to trust funds--confuses many analysts. Federal trust funds, of which the largest is Social Security, hold Treasury securities that are specially designed for them. These holdings totaled $1 trillion at the end of 1992, which--added to the $3 trillion in debt held by the public--suggests a total federal debt of $4 trillion. But this calculation falls into the classic trap of adding apples and oranges; the resulting figure, known as the gross federal debt, combines debt that the government owes to outside creditors with debt held by the government itself.

In the federal budget, trust funds serve purely a bookkeeping function. Despite references to the trust fund "surplus," these funds are not generally self-supporting. Issuing debt to federal trust funds and making the associated interest payments are internal transactions that do not flow through the credit markets (see Chapter 3).

Some proposals have been made to invest federal trust funds in other assets, such as corporate stocks and bonds or socially worthwhile projects. Such investments are extremely unlikely to foster economic growth as long as the core problem--the government's overall deficit and its resulting appetite for credit--remains. Such proposals, however, would enmesh the government in picking and choosing private investments in which to place public funds.

Debt Subject to Limit

The Congress has long placed a cap on the Treasury's issuance of debt, covering both securities sold to the public for cash and the special securities issued to federal trust funds. Lawmakers have had to hike this limit nearly two dozen times in the past decade. By itself, this cap is an ineffective way to restrict Treasury borrowing; the key decisions about revenues and spending are made elsewhere in the budget process, and federal deficits and borrowing merely follow from them. Chapter 4 discusses debt subject to limit and tells how the Treasury has coped when it faced interruptions in its borrowing authority.

Other Interest

Clearly, the federal government's interest costs are driven mainly by the costs of servicing the Treasury's large and growing debt. But the budget's outlays for net interest also reflect other interest, which dampens the totals to the tune of about $15 billion a year. This category is dominated by interest income, mainly interest on loans made by the government. This often-overlooked part of the budget is covered in Chapter 5.

Estimating Spending on Net Interest

To estimate net interest spending, CBO uses a versatile model that integrates assumptions about future deficits, interest rates, and the mix and seasonality of borrowing. The model is used to develop CBO's detailed baseline projections of financing and interest costs, which are based on the continuation of current taxing and spending policy and on CBO's assumptions about future economic performance (see Chapter 6).

Interest outlays, and hence the federal deficit, are highly sensitive to several key assumptions. The debt is so big, for example, that an error of just 1 percentage point in CBO's forecast of future interest rates, which are notoriously hard to predict, would boost interest outlays by $12 billion in 1994 and $43 billion in 1998.

Federal deficits, which substantially determine borrowing, are the other key determinant of future interest costs. A difference of just $10 billion a year in future revenues or noninterest spending--a tiny error, since both figures exceed $1 trillion--would change interest costs by $300 million in the first year and by $3 billion in the fifth year. But this sensitivity, in fact, contains a cheerful implication. A program to trim the deficit through spending cuts or tax increases would likewise lead to substantial interest savings--a fact well known to policymakers crafting deficit reduction packages.

Managing the Debt

More subtly, interest costs are also sensitive to the mix of securities sold by the Treasury. Questions about debt management have recently sparked lively debate (see Chapter 7). The Treasury does not control the federal deficit, but it does decide what kinds of securities to sell. The Treasury relies almost wholly on ordinary marketable securities to finance the deficit and does the bulk of this financing in the medium- and long-term markets.

Could the Treasury save money, or could other economic goals be served, under alternative debt management strategies? This study addresses two particular options. One is to rely more heavily on short-term debt such as Treasury bills and diminish reliance on long-term debt such as bonds. Such strategies would probably save money, although they would make the budget even more sensitive to fluctuations in interest rates.

The second option is to issue indexed bonds, securities whose principal and interest costs are explicitly linked to inflation. If investors dislike risk, the government could save a small amount of money by offering such securities. In return, the government would shoulder the risk of unexpected inflation, and interest outlays would automatically rise or fall accordingly.

The budgetary implications of indexed bonds are unpredictable. Most economists who favor them, in fact, base their endorsement not on a budgetary bonus but on other grounds. They argue that such bonds would enhance equity between borrowers and lenders, serve admirably as a vehicle for retirement savings, and provide useful information about market expectations to those who make economic policy.

Chapter Two

Federal Borrowing from the Public

Simply stated, two factors drive federal interest payments to the public: the size of the debt and the level of interest rates. Federal debt, though, is not uniform in its characteristics; it encompasses a multitude of financial instruments that are sold to raise cash. The various types of securities offered differ in some key features, such as their maturity, their method of sale, and their buyers.

The cost of borrowing also fluctuates because the Treasury is constantly in the market selling its securities. Market interest rates for many different maturities, therefore, are a vital determinant of interest costs.

The government's net borrowing (that is, the new cash it must raise, over and above the amount required to pay off maturing securities) is almost wholly determined by the federal deficit. Other factors are of minor importance.

Components of Federal Debt

The Treasury Department issues two types of securities to the public: marketable and nonmarketable. Marketable securities--bills,

Table 1.
Calendar of Treasury Issues of Marketable Debt

Type of Issue	Issues per Year	Timing	Auction Size (Billions of dollars)[a]
Bills			
Three-month	52	Weekly on Thursdays	11.60
Six-month	52	Weekly on Thursdays	11.60
One-year	13	Every Fourth Thursday	14.25
Cash management	Variable	As Needed to Bridge Low Cash Balances	b
Notes			
Two-year	12	End of Each Month	15.25
Three-year	4	Midquarter Refunding	15.50
Five-year	12	End of Each Month	11.50
Seven-year[c]	4	Early in First Month of Quarter	9.75
Ten-year	4	Midquarter Refunding	10.75
Bonds (30-year)[d]	4	Midquarter Refunding	9.25

SOURCE: Congressional Budget Office based on information from the Department of the Treasury.

NOTE: This calendar reflects the Treasury's debt management practices of the past few years. Actual calendars may differ because of such factors as the timing of weekends and holidays, interruptions in the debt ceiling, and variations in Treasury cash balances. Auctions are generally conducted three to ten days before issue dates.

a. Reflects auction sizes prevailing in January and February 1993.

b. Varies depending on cash needs.

c. In May 1993, the Treasury announced that it would eliminate the seven-year note.

d. In May 1993, the Treasury announced that it would henceforth sell 30-year bonds just twice a year.

notes, and bonds--are auctioned at regular intervals during the year and account for almost 90 percent of all Treasury debt held by the public. Nonmarketable issues, such as savings bonds and state and local government series, are not sold at auction and cannot be traded in the secondary market.

Marketable Securities

Marketable securities are composed of bills (original maturity of one year or less), notes (original maturity of two to ten years), and bonds (original maturity of more than ten years). Bills are offered on a discount basis--that is, the purchaser pays a certain price for the security and receives a larger amount (the face value) at maturity. In contrast, notes and bonds are coupon securities; the purchaser receives semiannual interest payments and gets back the principal at maturity.

The Treasury Department schedules auctions of marketable securities according to anticipated cash needs. It auctions three- and six-month bills weekly and one-year bills every four weeks. Cash management bills, issued to cover temporary shortfalls, are auctioned irregularly. Auctions of notes and bonds follow a complex schedule, with a large package of longer-term issues auctioned in the middle of each quarter; other notes are issued either monthly or quarterly. Once announced, securities are actively traded in the secondary market both before and after actual issue.

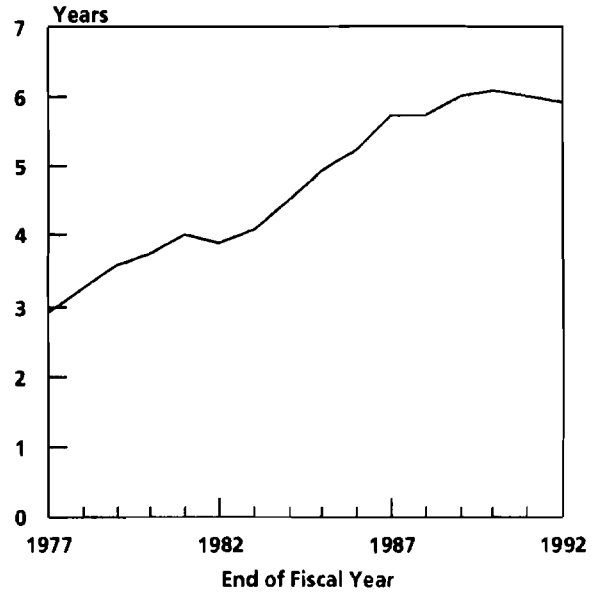
Table 2.
Interest-Bearing Marketable Public Debt

End of Fiscal Year	Bills (Face value)		Notes		Bonds		Total
	Billions of Dollars	Percentage of Total	Billions of Dollars	Percentage of Total	Billions of Dollars	Percentage of Total	(Billions of dollars)[a]
			Actual				
1977	156	35	242	54	46	10	444
1978	161	33	268	55	56	12	485
1979	161	32	274	54	71	14	507
1980	200	34	311	52	84	14	595
1981	223	33	364	53	96	14	683
1982	278	34	443	54	104	13	824
1983	341	33	558	54	126	12	1,024
1984	357	30	662	56	158	13	1,177
1985	384	28	776	57	200	15	1,360
1986	411	27	897	58	242	16	1,549
1987	378	23	1,005	61	278	17	1,661
1988	398	22	1,090	61	300	17	1,788
1989	407	22	1,133	60	338	18	1,878
1990	482	23	1,218	59	377	18	2,078
1991	565	24	1,388	58	423	18	2,376
1992	634	24	1,566	59	462	17	2,662
			Projected				
1993	709	24	1,717	59	495	17	2,921
1994	786	25	1,873	59	526	17	3,185
1995	862	25	2,029	59	557	16	3,448
1996	940	25	2,187	59	593	16	3,720
1997	1,028	26	2,367	59	630	16	4,025
1998	1,129	26	2,571	59	667	15	4,367

SOURCES: Department of the Treasury for historical data, 1977-1992; Congressional Budget Office for projections, 1993-1998.

a. Excludes securities the Federal Financing Bank issued to Civil Service Retirement (not currently traded in the market).

Figure 3.
Average Length of Marketable Public Debt at End of Fiscal Year



SOURCE: Congressional Budget Office based on data from the Department of the Treasury.

Table 1 on page 7 summarizes a typical calendar for Treasury issues of marketable debt.

Outstanding marketable securities totaled almost $2.7 trillion at the end of fiscal year 1992. Notes account for almost three-fifths of this total ($1.6 trillion); the rest is allocated among bills ($0.6 trillion) and bonds ($0.5 trillion).

Historically, notes have been the dominant source of Treasury financing, accounting for more than 50 percent of all marketable debt for each of the past 16 years (see Table 2). The share of marketable securities in notes has increased from 54 percent in 1977 to 59 percent in 1992. In contrast, the share in bills has decreased from 35 percent to 24 percent over the same period. The Congressional Budget Office's baseline projections assume that these shares change little over the 1993-1998 period.

Average Maturity. Through 1989, Treasury bills gradually slipped as a share of marketable debt, and the average length of marketable interest-bearing securities rose. The Treasury Department calculates the average remaining maturity of the debt--that is, the amount of time until securities come up for refinancing. This average length climbed from under three years in 1977 to a little over six years in 1990 (see Figure 3). Over the last two years, though, average length has diminished slightly. From a high of six years and one month at the end of 1990, average maturity has inched down to five years and eleven months at the end of 1992.

This average, however, is skewed by the presence of some very long term bonds maturing up to 30 years from now (although around 20 percent of bonds, as Box 1 shows, are call-

Box 1.
Callable Bonds

Common Treasury practice before 1985 involved issuing callable bonds--bonds that can be redeemed before maturity at the Treasury's discretion. Although no callable bonds have been issued for the past eight years, $99 billion, or more than 20 percent of all outstanding bonds, still falls into this category. The earliest that these bonds can be called is five years before final maturity; the Treasury can redeem the securities anytime after that call date.

The Treasury exercises its call privileges when it can refinance debt at lower rates. Although it recently called around $1 billion of debt redeemable in May 1993, callable bonds are not very consequential during the next five years: only about $11 billion worth of bonds are eligible for early redemption, and their associated interest rates average around 8 percent. Many of the bonds issued in the late 1970s and early 1980s, though, carry interest rates above 10 percent.

Future interest rates will determine whether the bonds are worth calling. If five-year interest rates--currently hovering at a little over 5 percent--remain relatively low, refinancing nearly $100 billion in callable bonds would present an opportunity for substantial savings in outlays. Of course, there is no guarantee that interest rates will remain at low levels when the bulk of the call dates occur after the year 2000.

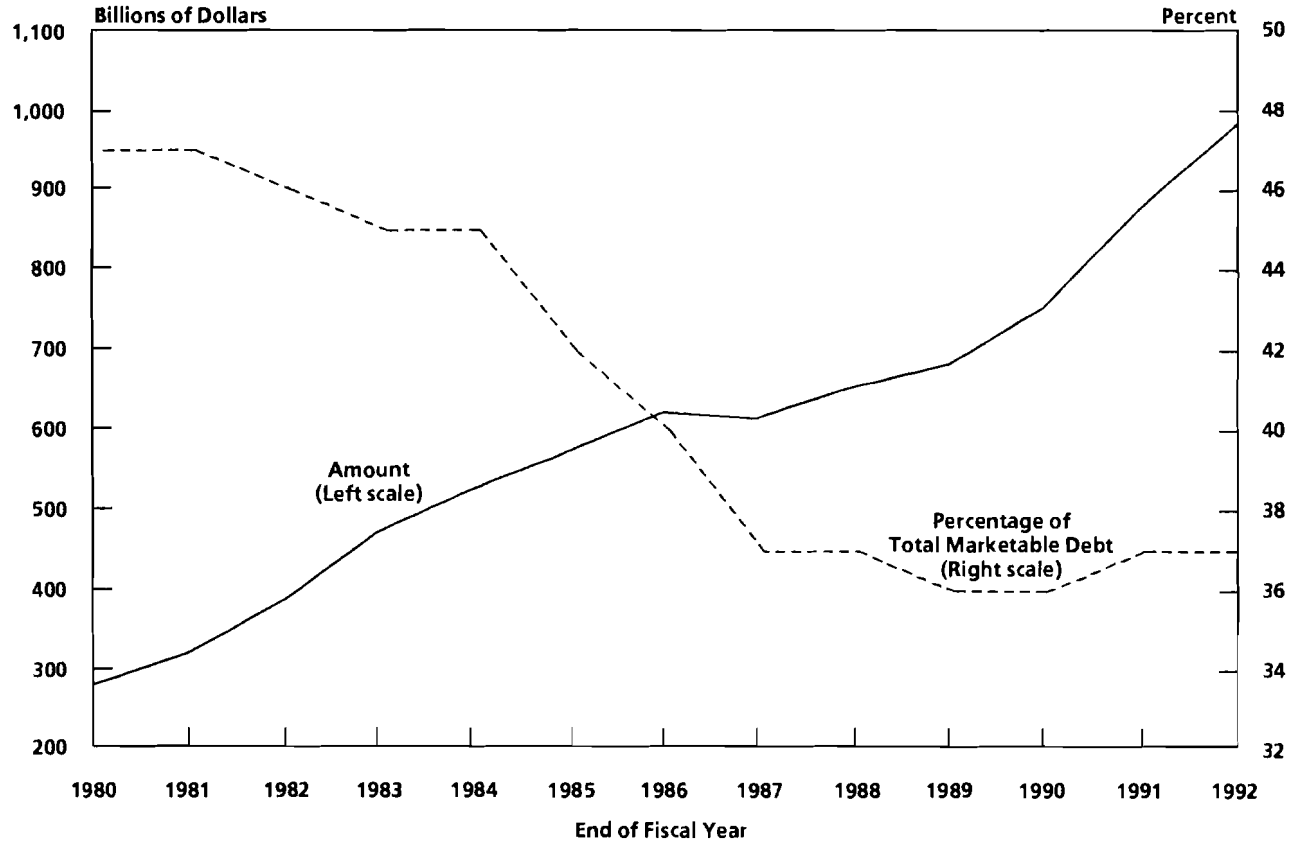
able and could be redeemed early). Thus, looking at the amount of debt maturing within the next year is another method of assessing the distribution of marketable securities and the speed of refinancing (see Figure 4). In 1980, almost half of all debt was due to mature within the next year. By 1992, that figure had diminished to 37 percent. For better or worse, this policy of gradually stretching the debt's maturity has mitigated the budget's sensitivity to interest rates.

Seasonality of Treasury Borrowing. Federal borrowing has a pronounced seasonal pattern, even though this pattern is sometimes obscured by changes in fiscal policy, fluctuations in economic conditions, and swings in volatile categories of spending such as deposit insurance. The typical seasonal pattern of government financing can also be distorted if the Congress fails to approve a higher debt ceiling sufficiently in advance to avoid disrupting Treasury auctions.

The government typically borrows heavily in all but the third fiscal quarter, in which the April income tax deadline falls. Cash balances have generally been reduced during the first two fiscal quarters and rebuilt with the influx of tax revenues during the third fiscal quarter (see Table 3).

The seasonality of borrowing is more pronounced for Treasury bills than for notes and bonds (see Figure 5). Because bills are issued so frequently, the Treasury can easily adjust

Figure 4.
Marketable Debt Due for Refinancing in Following Year



SOURCE: Congressional Budget Office based on data from the Department of the Treasury.

Table 3.
Deficits and Means of Financing, by Quarter (In billions of dollars)

Fiscal Year/ Quarter	Deficit	Means of Financing		
		Net Borrowing	Cash Reduction or Increase (−)	Other
1988				
First	82	61	14	7
Second	37	41	−1	−3
Third	a	19	−17	−2
Fourth	36	41	−5	−1
Total	155	162	−8	1
1989				
First	69	54	11	4
Second	61	35	19	6
Third	−23[b]	11	−29	−5
Fourth	47	39	3	4
Total	152	139	3	10
1990				
First[c]	71	60	14	−4
Second[c]	80	60	8	12
Third	12	37	−16	−9
Fourth	58	63	−6	a
Total	221	221	1	a
1991				
First	86	87	8	−9
Second	66	52	a	14
Third	26	43	−12	−6
Fourth	91	95	2	−6
Total	270	278	−1	−7
1992				
First	84	90	−7	1
Second	116	83	29	4
Third	28	62	−27	−7
Fourth	62	76	−12	−1
Total	290	311	−17	−3

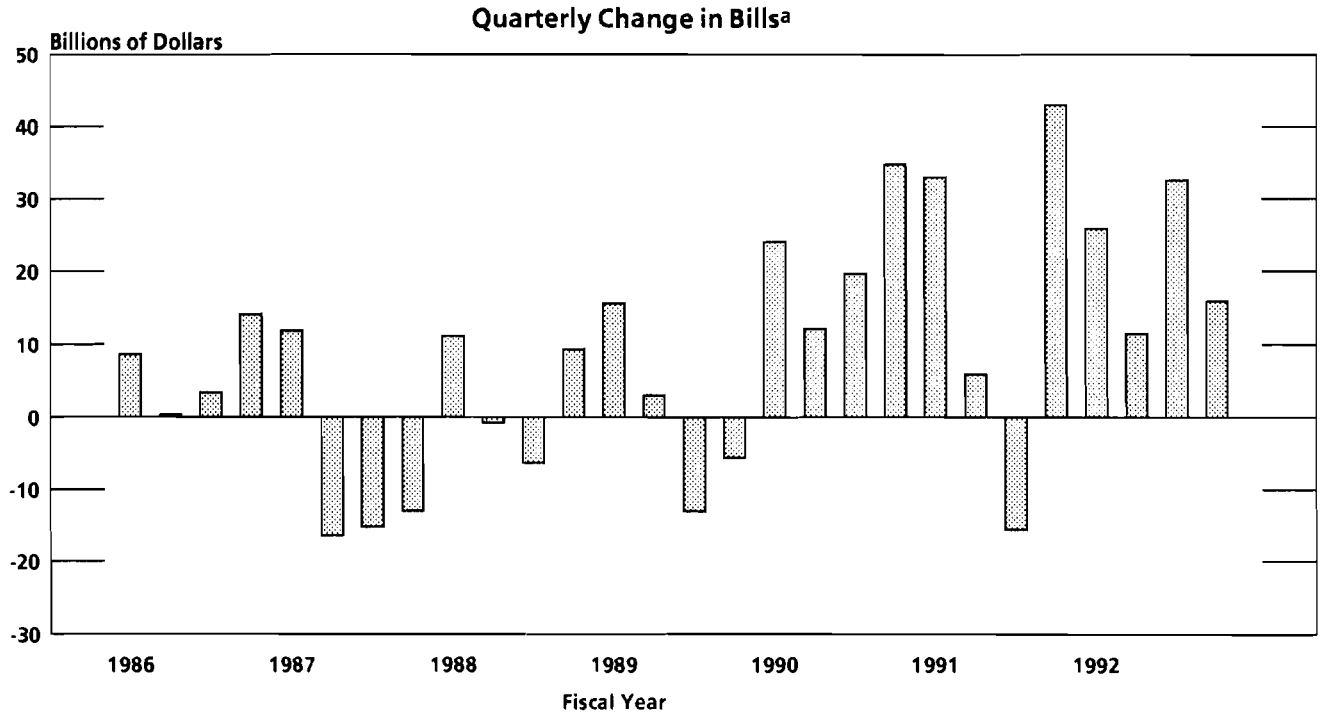
SOURCE: Congressional Budget Office based on data from the Department of the Treasury.

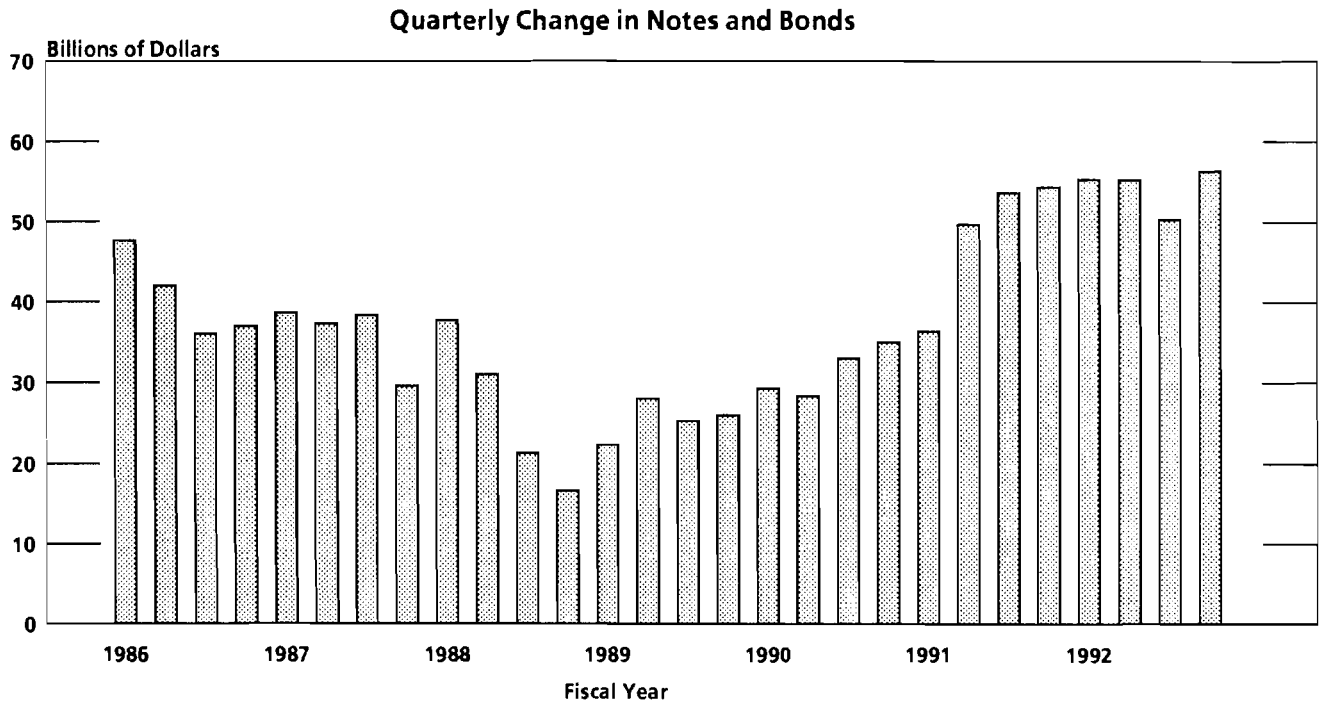
a. Less than $500 million.

b. Surplus.

c. Adjusted for issuance of Tennessee Valley Authority debt and simultaneous purchase of Treasury securities.

Figure 5.
Quarterly Change in Bills, Notes, and Bonds





SOURCE: Congressional Budget Office based on data from the Department of the Treasury.

a. Regular (three-month, six-month, and one-year bills) only; excludes cash management bills.

them whenever seasonal or other factors (such as fluctuations in spending related to savings and loan institutions) so require.

Net financing of bills varies greatly from quarter to quarter, as Figure 5 shows. Excluding cash management bills (CMBs), net quarterly issuance of bills during the past six years has ranged between a net payoff of nearly $20 billion and net issuance of $40 billion. And CMBs--which are almost always sold during periods when the deficit is seasonally high and are scheduled to mature soon after a major tax deadline such as April 15--often reinforce this pattern. The seasonal assumptions that the Congressional Budget Office uses are essentially based on historical averages, with adjustment for the apparent path of borrowing in the current year.

Notes and bonds, in contrast, maintain a generally stable financing pattern. As Figure 5 demonstrates, medium- and long-term issues deviate little from one quarter to the next, although they obviously wax and wane in accordance with longer-run trends in the deficit.

Nonmarketable Securities

The large deficits of the 1980s and early 1990s were financed mostly by marketable securities; nonmarketable securities, therefore, now

Table 4.
Outstanding Marketable and Nonmarketable Public Debt

End of Fiscal Year	Marketable (Face value)[a] Billions of Dollars	Marketable (Face value)[a] Percentage of Total	Nonmarketable[b] Billions of Dollars	Nonmarketable[b] Percentage of Total	Total Public Issues (Billions of dollars)
		Actual			
1977	444	80	114	20	558
1978	485	79	129	21	614
1979	507	79	136	21	643
1980	595	83	122	17	717
1981	683	86	112	14	795
1982	824	89	106	11	930
1983	1,024	90	117	10	1,141
1984	1,177	91	123	10	1,299
1985	1,360	90	147	10	1,507
1986	1,549	89	192	11	1,742
1987	1,661	88	231	12	1,893
1988	1,788	87	258	13	2,046
1989	1,878	87	278	13	2,156
1990	2,078	88	292	12	2,370
1991	2,376	89	301	11	2,677
1992	2,662	89	316	11	2,978
		Projected			
1993	2,921	90	336	10	3,257
1994	3,185	90	359	10	3,543
1995	3,448	90	380	10	3,828
1996	3,720	90	399	10	4,119
1997	4,025	91	418	9	4,443
1998	4,367	91	436	9	4,803

SOURCES: Department of the Treasury for historical data, 1977-1992; Congressional Budget Office for projections, 1993-1998.

a. Excludes securities the Federal Financing Bank issued to Civil Service Retirement.

b. Composed mostly of savings bonds and state and local government series. Zero-coupon bonds are reported at current value (computed by CBO).

account for a decreasing share of debt issued to the public. In 1992, nonmarketable debt accounted for around 11 percent of all public issues, down from 21 percent in 1979 (see Table 4). Most of the nonmarketable debt is in savings bonds and state and local government series, with a much smaller portion in dollar-denominated foreign series, foreign and domestic zero-coupon bonds, and other issues.

Savings Bonds. Savings bonds originated in 1935 but became popular during World War II, when they were used to help finance the war effort. Formerly purchased out of a sense of patriotism, as a gift, or by small savers on the payroll deduction plan, savings bonds have also recently served as an investment for people looking for higher yields than banks offer on certificates of deposit.

The dominant type of savings bond is the EE series, successor to the E series. These bonds are discount securities and are purchased at one-half of their face value in denominations ranging from $50 to $10,000. No more than $15,000 worth (issue price) can be purchased in the name of any one person in a calendar year.

Since November 1982, series EE bonds have been pegged to market rates with a minimum guarantee. Under this market-based system, purchasers were originally guaranteed a minimum return of 7.5 percent if they held their bonds for five years, but they got 85 percent of the average five-year Treasury rate over the holding period if that rate was higher. The 7.5 percent guarantee proved too generous, though, and in late 1986 the Treasury shaved it to 6 percent. With the decline in interest rates in 1992 and early 1993, the Treasury lowered the guarantee again (effective March 1, 1993), this time to the statutory minimum of 4 percent.

Purchasing a bond one month after a change in the guaranteed minimum rate can make a substantial difference in the future value of the bond. For example, a bond purchased for $100 in February 1993 would earn 6 percent annually (the guaranteed rate) and would be worth $134.40 five years later. However, a bond purchased in March--with a 4 percent guarantee--would earn a market-based rate of 5.3 percent, according to CBO's economic assumptions, and would therefore be worth only $129.70 in five years. This dollar difference would be magnified for bonds of large denomination, which were particularly popular among over-the-counter buyers in late 1992 and early 1993.

The maturity period of a savings bond is whatever it takes for the bond to double (approximately) in value. New series EE bonds mature in 18 years. The maturity period, though, is not necessarily very important to investors. More critical is the five-year threshold that they must pass to qualify for market-based treatment.

Older savings bonds earn interest under a bewildering variety of regimes. This complexity arises because the Treasury kept tinkering with the features of savings bonds in an effort to keep them attractive. Bonds sold before November 1982 are now in an extended maturity period--that is, they have passed their original maturity, but the Treasury has simply extended them for 10-year stretches. (Generally, the Treasury has extended the maturity until about the 40-year mark, at which point the bonds cease to earn interest.) Once the bond passes into extended maturity, it is treated as if it were newly issued, earning either the guaranteed minimum rate or 85 percent of the average five-year Treasury note rate, whichever is larger.

A smaller category of bonds is the H and HH series; these bonds are current interest (rather than discount) securities. The Treasury mails interest payments to H/HH bondholders every six months instead of tacking interest onto the bond's redemption value as for an E or EE bond. Currently, HH bonds are sold only in exchange for a maturing E or EE bond. The H/HH bonds simply earn a fixed interest rate (7.5, 6.0, or 4.0 percent, depending on when they were issued or passed into extended maturity).

Since the end of 1982, when the Treasury adopted the market-based system, bond holdings have risen gradually. At the end of fiscal year 1992, outstanding savings bonds totaled approximately $148 billion (see Table 5). Series E/EE bonds accounted for around $138 billion of the total, with H/HH bonds making up the rest.

Sales of savings bonds picked up dramatically in mid-1992 because of the decline in short- and medium-term interest rates. With five-year certificates of deposit returning an average of 5.3 percent in December 1992, the guaranteed minimum of 6 percent on savings bonds was attractive. In addition, savings bonds are exempt from state and local taxes, and federal taxes are deferred until redemption. In light of these advantages, it is not surprising that monthly sales had topped $2 billion. In fact, sales were higher in late 1992 and early 1993 than over any other period in the past 10 years--even surpassing sales at the end of 1986, just before the guaranteed minimum was lowered and investors rushed to lock in the higher rate (see Figure 6). The CBO baseline assumes that strong sales of savings bonds will continue, because it was constructed before the guarantee was changed; however, reducing the guarantee will certainly dampen monthly sales.

Table 5.
Outstanding Nonmarketable Interest-Bearing Debt Issued to the Public (In billions of dollars)

End of Fiscal Year	Savings Bonds	State and Local Government Series	Foreign Series	Zero-Coupon Bonds (Current value)		Other[a]	Total
				Foreign	Domestic		
			Actual				
1977	75.4	11.5	21.8	0	0	5.3	114.0
1978	79.8	24.2	21.7	0	0	2.8	128.5
1979	80.4	24.6	28.1	0	0	2.8	136.0
1980	72.7	23.6	25.2	0	0	0.5	122.0
1981	68.0	23.2	20.5	0	0	0.5	112.2
1982	67.3	23.6	14.6	0	0	0.5	106.0
1983	70.0	35.1	11.5	0	0	0.5	117.1
1984	72.8	41.4	8.8	0	0	0.5	123.5
1985	77.0	62.8	6.6	0	0	0.5	146.9
1986	85.6	102.4	4.1	0	0	0.4	192.5
1987	97.0	129.0	4.4	0	0	0.4	230.8
1988	106.2	147.6	3.8	0.5	0	0.4	258.5
1989	114.0	158.6	4.3	0.6	0	0.4	277.9
1990	122.2	161.2	3.3	3.6	1.5	0.4	292.1
1991	133.5	158.1	1.6	4.7	2.6	0.4	301.0
1992	148.3	157.6	2.1	4.4	2.8	0.4	315.6
			Projected				
1993	173.2	152.7	2.1	5.0	3.1	n.a.	336.0
1994	195.6	152.2	2.1	5.5	3.3	n.a.	358.6
1995	215.8	152.1	2.1	6.1	3.6	n.a.	379.7
1996	234.2	152.6	2.1	6.6	3.9	n.a.	399.3
1997	251.2	153.3	2.1	7.2	4.2	n.a.	418.0
1998	266.9	154.4	2.1	8.0	4.5	n.a.	435.8

SOURCES: Department of the Treasury for historical data, 1977-1992; Congressional Budget Office for projections, 1993-1998, and current value of zero-coupon bonds.

NOTE: n.a. = not applicable.

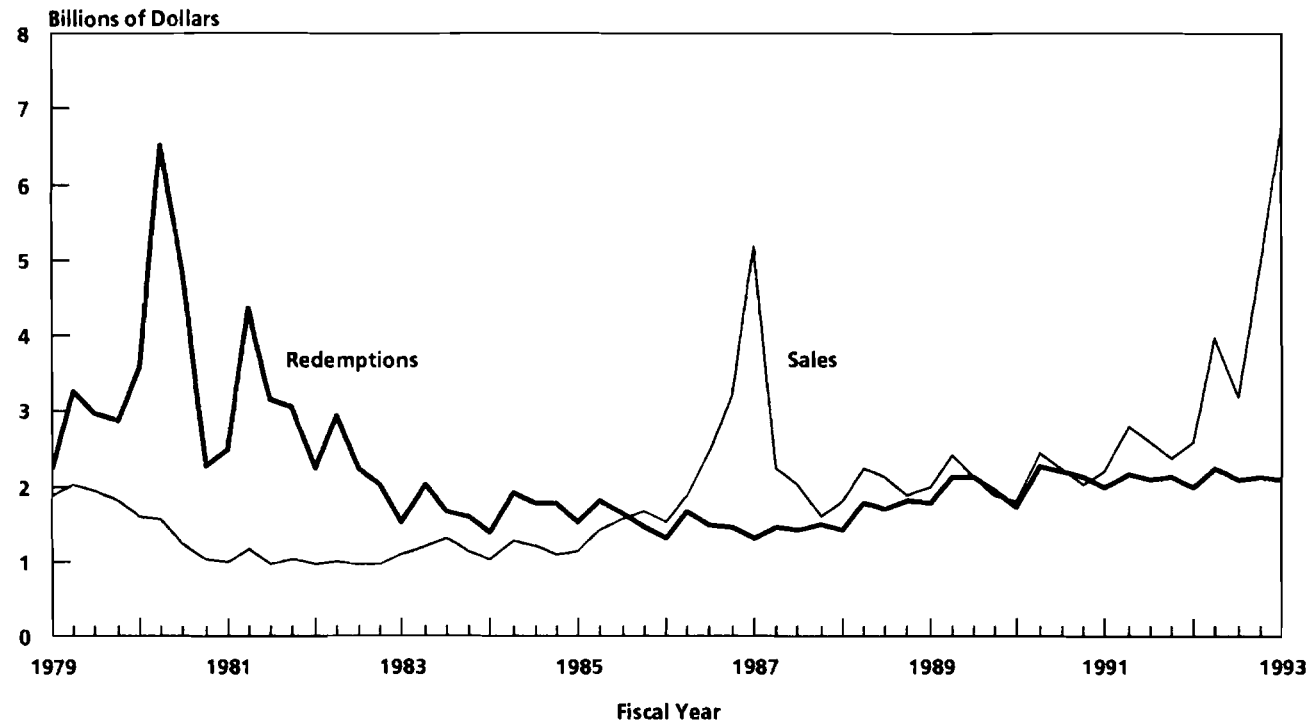
a. Includes depositary bonds, Rural Electrification Administration bonds, retirement plan bonds, investment series, savings notes, and Federal Reserve special certificates for fiscal year 1977.

State and Local Government Series (SLGs). These securities are issued to state and local governments as part of the Treasury's regulation of the tax-exemption privilege. States and municipalities can issue tax-exempt debt, which carries interest rates below taxable instruments such as marketable Treasury securities or corporate bonds. In the absence of rules to the contrary, issuers have a clear incentive to borrow at tax-exempt rates and reinvest the funds at taxable rates, thereby clearing easy profits. To bar this abuse--which is known as tax arbitrage--federal law lets state and local governments borrow only for legitimate public purposes (to build a project, for example, or to refund an older, callable bond). And if the funds are idle for any extended period--for example, before construction begins--issuers invest in SLGs to avoid violating the arbitrage ban. SLGs carry a maximum interest rate of one-eighth of a percentage point below comparable marketable Treasury securities.

Outstanding SLGs soared during the 1980s, ending the decade at $161 billion, compared with $24 billion at the end of 1980. The rules governing investment of bond revenues were steadily tightened by several tax acts during the decade, limiting state and local investment options and thereby fueling the issuance of SLGs. The volume of tax-exempt debt also grew, both for project financing and, as interest rates fell, for advance refunding operations. In an advance refunding, a state or local government sells bonds whose proceeds will pay off a previously issued callable bond at the first opportunity. Until the call date, the proceeds are usually held in SLGs. Sellers initiating advance refundings are guessing that interest rates will not drop much further before the call date and are assuming that now is the opportune time to lock in a new rate.

Foreign Series. Foreign series securities, issued to foreign governments and denominated in dollars, are a diminishing portion of federal

Figure 6.
Quarterly Sales and Redemptions of Savings Bonds



SOURCE: Congressional Budget Office based on data from the Department of the Treasury.

debt. These securities are sold to official institutions that have acquired dollars through their foreign exchange operations (for example, by purchasing dollars to avoid unwanted appreciation of their own currencies).

Debt in the foreign series reached its peak in 1979, when more than $28 billion existed in this category. Some of the debt was held by private European investors and denominated in foreign currencies (since the dollar was weak), but these special securities had all matured by July 1983. Since then, foreign series debt has dwindled to today's level of approximately $2 billion outstanding.

Foreign Zero-Coupon Bonds. In the late 1980s, innovative plans to ease the debt burdens of Latin American countries were crafted by the Treasury Department in conjunction with the debtor nations. The outcome of these negotiations is known as the Brady plan, named after guidelines developed by former Treasury Secretary Nicholas Brady. The key objective of the Brady plan was to get U.S. banks to write down part of a country's debt and stretch out the maturity of the remainder while receiving a nearly ironclad guarantee (in the form of collateralized Treasury securities) that the remaining debt would be repaid.

The original Brady plan in 1988 envisioned exchanging around $20 billion in debt owed by Mexico to U.S. banks for $10 billion in new Mexican government bonds. Mexico would collateralize these new loans with the purchase of $10 billion face value (purchase price of around $2 billion) of Treasury securities due to mature in 20 years.

The Brady plan for Mexico did not work out as planned. The face value of debt exchanged in 1988 was lower than hoped, less debt was forgiven, and fewer zero-coupon securities were issued by the Treasury ($2.6 billion face value for a $0.5 billion purchase price). However, a second offering, in March 1990, sold $30 billion ($3 billion purchase price) in zero-coupon bonds maturing in 2019 to serve as collateral for Mexico's debt.

The success of Mexico's debt reduction efforts encouraged Venezuela to request collateralization through zero-coupon bonds issued directly by the Treasury. In December 1990, the Treasury issued to Venezuela $7.3 billion ($0.7 billion purchase price) in zero-coupon bonds that will mature in 2020.

Of course, Mexico and other sovereign governments could have bought Treasury zero-coupon securities in the secondary markets. Most holders of zero-coupon bonds obtain them from private firms that have bought ordinary Treasury securities, "stripped" them into their separate interest and principal components, and sold the pieces separately. But the credit markets could not be certain of the size and timing of Mexico and Venezuela's purchases. Therefore, the Treasury simply issued the securities directly in return for cash.

When reporting debt held by the public, the Treasury counts the current value of these zero-coupon bonds rather than their face value. Some zero-coupon bonds are simply amortized at a constant rate until they reach maturity. Those that can be redeemed early, however, are valued using a discount rate equal to the market yield on securities of comparable maturity. This "marking to market" enables the Treasury to determine its actual liability (using a present-value calculation) at a particular point in time. In other words, if Mexico and Venezuela were to redeem all of their zero-coupon bonds, today's payment would be far below face value.

Thus far, a total of $40 billion in zero-coupon bonds has been issued to Mexico and Venezuela. As of the end of December 1992, around $5.5 billion had been redeemed by exercising clauses in the original contracts or through renegotiation, leaving $34.5 billion in foreign zeros remaining. The current market value of the remaining bonds is around $4.4 billion. The amount of outstanding foreign zeros is likely to change in the near future--either reduced through further redemptions or increased by additional zero-coupon issues for other Latin American countries. In fact, in January 1993, the Treasury announced that it

had agreed to sell an $18.5 billion zero-coupon bond to Argentina as part of a comprehensive debt reduction agreement with commercial banks.

Foreign series bills and foreign zero-coupon bonds account for only 1 percent of all foreign-held debt. As the relatively small amount of debt issued directly to foreign governments in the form of foreign series and zero-coupon bonds implies, most foreign buyers simply purchase Treasury securities in the marketplace. Box 2 discusses the implications of foreign investment in Treasury securities.

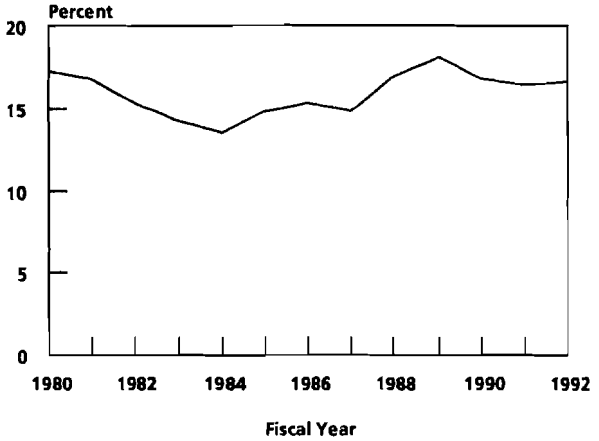
Box 2. Foreign-Held Federal Debt

Since the early 1980s, the federal government has inundated capital markets with new debt issues. Debt held by the public has more than quadrupled over the past 12 years, rising from $709 billion at the end of 1980 to $3 trillion at the end of 1992. This rapidly escalating public debt, combined with low levels of domestic saving and the continuing strong investment needs of the private sector, propped up interest rates, thereby attracting foreign investors to the Treasury securities market.

Foreign holdings of federal debt jumped from $122 billion in 1980 to $498 billion in 1992. However, the perception that foreigners were dominating the market does not hold up. As the figure below demonstrates, the percentage of foreign-held debt was virtually the same in 1992 as it was in 1980.

Nevertheless, many people express concern about the size of foreign investment and what it means for the United States. Two major worries preoccupy economists and participants in financial markets. First, large-scale foreign investment creates the possibility of increased volatility in capital markets. Some people believe that foreign investors could seriously disrupt the economy if they started withdrawing their investments because of an economic crisis or as part of a coordinated political action. U.S. interest rates would then rise sharply, and inflation would increase as the prices of imported goods reflected a fall in the dollar's value.

Foreign Holdings of Federal Debt as a Percentage of Debt Held by the Public



SOURCE: Congressional Budget Office based on data from the Department of the Treasury.

Thus far, these fears have proved ill-founded. The void in the Treasury market left by some departing foreign buyers--primarily Japan--has been filled by increased demand from U.S. investors and other cash-rich countries. Japan, which in 1988 held more than twice as much U.S. Treasury debt as the second-largest foreign holder, has since been a net seller. In 1991, Japan reduced its holdings of federal debt by $17.6 billion; however, Spain, Switzerland, and Taiwan more than made up for Japan's sales by purchasing $26.5 billion in Treasury securities during the year. Taiwan, especially, which has accumulated $80 billion in foreign reserves through its exports of machinery, textiles, computer chips, and other electronic products, has recently become a major player in the Treasury market.[1]

The table lists the top foreign holders of federal debt as of September 30, 1991 (the most recent year for which data are available). This information, though, must be used with caution. Because of the nature of the Treasury's data, the numbers in the table should be viewed as approximate. The Treasury's sur-

1. "Taiwan Now Is Big Buyer of Treasurys," *Wall Street Journal*, July 13, 1992, p. C17.

Domestic Zero-Coupon Bonds. Similar to the foreign zero-coupon bonds described above is the $30 billion (face amount) in domestic zeros issued to the Resolution Funding Corporation (REFCORP). A government-sponsored enterprise, REFCORP was created in 1989 solely to borrow money to help resolve the savings and loan crisis. Because REFCORP is technically private, the money that it turned over to the Resolution Trust Corporation was counted as a collection, thereby offsetting the spending that it financed and understating actual outlays on deposit insurance. CBO disagreed with this classification of REFCORP,

veys and estimates indicate only where the purchase or sale originated, not necessarily where the actual owner resides, making inaccuracies and errors in the data unavoidable.

Foreign Holdings of U.S. Treasury Securities as of September 30, 1991

Country	Holdings (Billions of dollars)	Percentage of Total
United Kingdom	53.4	12.0
Japan	49.8	11.2
Germany	47.0	10.6
Spain	30.7	6.9
Switzerland	28.9	6.5
Taiwan	26.9	6.1
Other	206.8	46.6
Total	443.4	100.0

SOURCE: Congressional Budget Office based on data from the Department of the Treasury.

The second major concern is that payments to foreigners on their U.S. investments imposes a burden on economic growth. As the Congressional Budget Office stated in its January 1989 report:

> Strong capital inflows cannot be relied on indefinitely: continuation at recent rates would require that an ever-increasing share of U.S. domestic income be devoted to servicing foreign debt . . . . Even if continued foreign inflows could be relied on, however, they would be of relatively little economic benefit for Americans, because the income from foreign investment, after U.S. taxes are paid, returns abroad as interest and dividend payments to the original investors.[2]

Of course, even if interest and dividend payments are repatriated, the United States benefits from jobs created domestically and the income they produce.

Servicing the current level of foreign investment in federal debt is a relatively minor portion of total federal expenditures. Interest paid to foreign holders of U.S. Treasury securities in 1992 was about $39 billion--equivalent to approximately 0.7 percent of gross domestic product and 2.8 percent of federal outlays. However, foreign holdings of federal debt are only about one-fifth of all foreign-owned assets in the United States, and foreign purchases of federal securities are normally only a moderate part of the total capital inflow from abroad. Total inflows of foreign capital--not inflows into a particular sector such as Treasury securities--are what is economically important.

Since the late 1980s, the United States' net international investment position has been negative; that is, over the past few years, the United States has been a net debtor (the cumulative amount of foreign-owned assets in the United States has been larger than the amount of U.S. investments abroad). Despite its status as a net debtor, the United States maintains a small positive balance in net investment income. According to the Department of Commerce, receipts of income on U.S. assets abroad outstripped payments of income on foreign assets in this country by $12 billion in fiscal year 1992. However, the United States' declining net international investment position implies that future interest, dividend, and profit outflows could drain an increasing share of gross domestic product and detract from the United States' living standards.

2. Congressional Budget Office, *The Economic and Budget Outlook: 1990-1994* (January 1989), pp. 85-86.

of REFCORP, noting in the January 1990 *Economic and Budget Outlook: Fiscal Years 1991-1995* that the budgetary treatment that had been adopted was inappropriate.

REFCORP's debt legally lacked the full faith and credit of the U.S. government; however, the government made the bonds more attractive to investors by explicitly guaranteeing the interest on REFCORP bonds and collateralizing the principal with zero-coupon Treasury securities. In a practice known as defeasance, these bonds were purchased from the Treasury and held in escrow to back REFCORP's own borrowing; they carry 30- or 40-year maturities. The size of this debt probably will not change until the first issue reaches maturity in October 2019.

Like the foreign zeros, REFCORP zero-coupons are reflected in debt held by the public at their current value ($2.8 billion at the end of 1992) rather than at their face value. For a fuller description of how this and other measurement problems can distort published figures on the federal debt, see Appendix A.

Ownership of Federal Debt

A variety of investors purchase Treasury securities. Since federal debt is considered to be practically free of risk, it is an attractive investment for those seeking a secure place for their money.

State and local governments are the largest holders of federal securities, owning almost 18 percent of outstanding debt (see Table 6). State and local retirement funds account for about one-third of these holdings, with the remaining two-thirds fairly evenly divided between state and local government series and purchases in the open market.

Other major holders of federal debt are foreign investors (see Box 2), individuals, commercial banks, and insurance companies. Banks, especially, have recently been active investors in the Treasury securities market. The Federal Deposit Insurance Corporation reports that banks are making money in a period of slack demand for loans by investing depositors' money in government bonds, which guarantees them a profit with little risk. With the spread between the rates that banks pay on deposits and the rates that they earn on investments in government securities widening, commercial banks increased their holdings of bonds by more than 25 percent from the end of 1991 to the end of 1992.

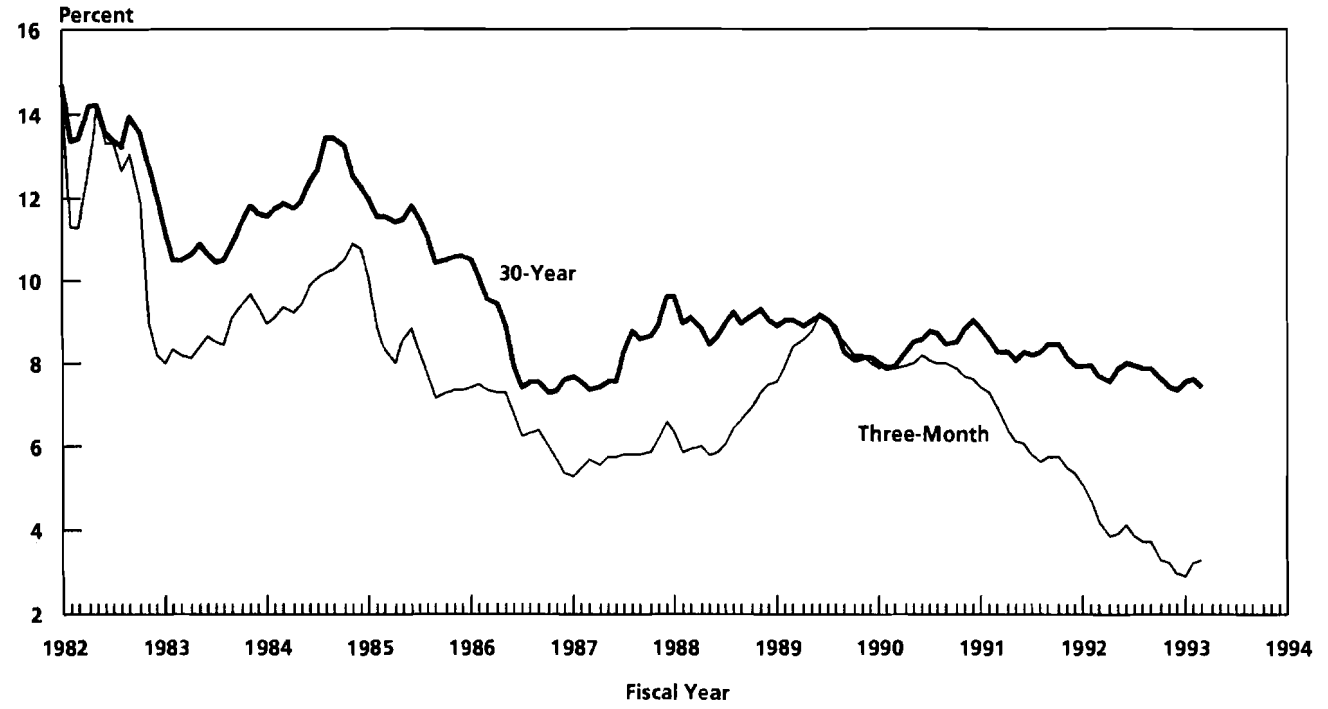
Table 6.
Ownership of Public Debt Securities, Fiscal Year 1992

Owner	Share
State and Local Governments	17.7
Foreign (Government and private)	16.6
Federal Reserve System	9.9
Individuals	9.4
Commercial Banks	9.0
Private Pensions	7.2
Insurance Companies	6.2
Corporations	6.0
Mutual Funds	4.8
Money Market Funds	2.6
Other	10.5
Total	100.0

SOURCE: Congressional Budget Office based on data from the Department of the Treasury and the Federal Reserve Board.

Another large owner of federal debt is the Federal Reserve System. The Federal Reserve is an independent, quasi-governmental agency responsible for the conduct of monetary policy. As such, one tool at its disposal is an open-market operation--that is, buying and selling Treasury securities in the marketplace. When the Federal Reserve wants to increase the money supply, it makes a purchase in the Treasury securities market, thereby injecting dollars into the economy. Conversely, contracting the money supply requires that it sell some of its Treasury holdings. The Federal Reserve, therefore, maintains a stock of Treasury holdings (around 10 percent of outstanding public debt) to conduct its open-market policies. It collects interest on its holdings

Figure 7.
Long- and Short-Term Interest Rates, by Month



SOURCE: Congressional Budget Office based on data from the Federal Reserve Board.

NOTE: Three-month Treasury bill rates are calculated on a bond-equivalent basis.

and--after retaining enough to cover its own operating expenses--returns the rest (about $15 billion to $20 billion a year) to the Treasury. This deposit appears on the revenue side of the budget. Many analysts, in fact, simply treat it as an offset to the government's total interest expense.

Interest Rates

The Treasury borrows in the credit markets at prevailing interest rates for maturities from three months to 30 years. Over the past 10 years, new borrowing rates on both short- and long-term marketable securities have fallen dramatically (see Figure 7). Short-term rates--represented by three-month Treasury bills--have plummeted from 15.5 percent (expressed on a bond-equivalent basis) at the end of fiscal year 1981 to 3.0 percent at the end of 1992.[1] Long-term rates--represented by 30-year Treasury bonds--have also dropped, albeit by a smaller margin.

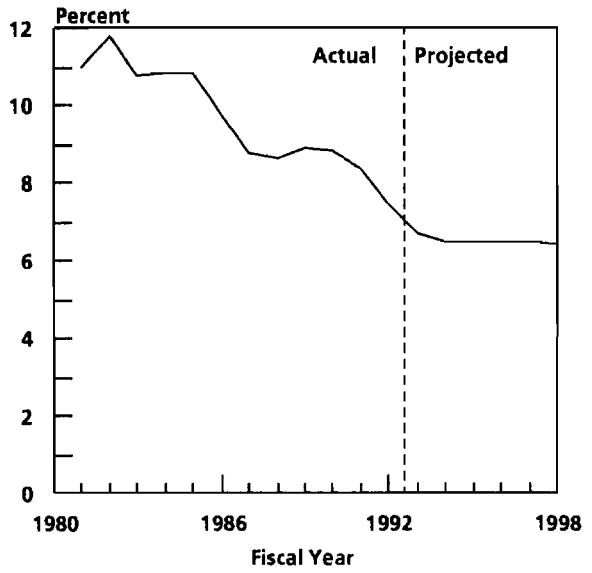
The spread between short- and long-term rates has widened recently (see Figure 7). In the summer of 1992, the gap between yields on three-month Treasury bills (as measured on a bond-equivalent basis) and 30-year Treasury bonds soared to 4 percentage points--around twice as much as the average monthly yield gap over the past 10 years of 2 percentage points. In fact, in the last six months of 1992, the spread between short-term and long-term rates was wider than at any time since World War II.

1. Comparing interest rates on discount securities (that is, bills) to coupon securities (notes and bonds) requires that they be expressed in similar terms. Bond-equivalent yields on bills are computed on the sale price rather than the face value and are higher than the yield expressed on a discount basis.

Average Interest Rate

One interest rate that is surprisingly difficult to locate is an average effective rate for all marketable debt. CBO's calculations show that the average rate on all outstanding marketable debt has declined from almost 12 percent in fiscal year 1982 to 7.5 percent in 1992 (see Figure 8). Projections of this average rate show it leveling off by 1998 at around 6.5 percent.

Figure 8.
Average Interest Rate on Outstanding Marketable Debt



SOURCE: Congressional Budget Office based on data from the Department of the Treasury.

The relatively sharp overall decline observed in 1992 and 1993 stems largely from the rapid decrease in short-term interest rates during these years. Replacing high-yielding notes from the 1980s with notes at today's lower interest rates should keep the average interest rate low even as short-term rates rise after 1993.

Do Deficits Affect Interest Rates?

Historically, yields on long-term bonds have almost always been higher than yields on short-term securities to compensate investors for the financial risks associated with owning a security for a longer period. The gap between short-term and long-term rates reached record size in late 1992, however, before narrowing slightly. As Figure 7 showed, the gap basically widened because short-term interest rates plunged but long-term rates did not.

Part of this pattern is cyclical--demand for credit diminished during the recent recession which, in conjunction with easing by the Federal Reserve Board, reduced short-term rates. But long-term rates, which are less directly affected by the Federal Reserve's actions, remain persistently high for reasons that may range from nagging fears of an increase in inflation to apprehensions about a decline in purchases by foreign investors. The market's chief concern, though, appears to be the large borrowing requirements of the federal government.

Most economists adhere to the traditional view that increasing deficits cause real long-term interest rates to rise. Interest rates, which represent the price of credit, are determined by supply and demand. Theoretically, enlarging the deficit increases the demand for credit relative to the supply and, consequently, increases interest rates.

A contrary view, known as Ricardian equivalence, argues that deficits do not raise interest rates. According to this theory, deficits today must be paid off by higher taxes in the future; therefore, people will increase their current saving to be able to pay the higher taxes that they expect to be levied during their own--or even their descendants'--lifetime. (Ricardian equivalence presumes that people take the welfare of future generations fully into account.) In this case, the effect of higher deficits will be substantially offset by individual saving behavior, thereby maintaining the balance of supply and demand in the credit markets and leaving interest rates unaffected. However, higher deficits during the 1980s have been associated with less personal saving, casting doubts about the usefulness of

Ricardian equivalence in explaining the relationship between deficits and interest rates.[2]

Studies of the relationship between the federal deficit and interest rates have disagreed; however, many of these studies use data that incorporate few of the high deficit years in the 1980s. Other problems abound. For example, changes in deficits occur for a variety of reasons, only one of which is a change in policy. Deficits tend to increase during cyclical downturns, often coinciding with a fall in interest rates. Also, monetary policy can cloud the effects of deficits on interest rates. For these reasons, it is difficult to separate out the effect of the deficit on interest rates from that of other economic variables. Researchers have also struggled to disentangle the effects of anticipated versus unanticipated current deficits, again without agreement.

CBO has surveyed many studies that statistically tested whether deficits affect interest rates.[3] Although the results were too dispersed to be decisive, several studies reported a positive relationship between expected future deficits and long-term interest rates. In other words, these studies concluded that if deficits are expected to rise, long-term rates can be expected to rise. Effects on short-term rates were less detectable. This pattern is plausible for several reasons:

- The business cycle has a larger effect on short-term than on long-term rates.
- Short-term instruments from foreign countries may be closer substitutes for one another than international long-term securities.
- Monetary policy, which can have a substantial effect in the near term, may offset the effect of deficits on short-term rates.
- Deficits may exacerbate inflationary expectations, thereby boosting long-term rates.

Deficits and the Need to Borrow

Federal deficits are the primary reason for borrowing from the public. The total deficit is the measure most commonly used by the press and public; it covers all federal government revenues and outlays, including Social Security and the Postal Service (which are off-budget).

In most years, Treasury borrowing closely parallels the total deficit (see Table 7). A number of factors broadly labeled "other means of financing" also affect the government's need to borrow from the public. These factors include reductions (or increases) in the government's cash balances, changes in checks outstanding, changes in accrued interest costs included in budget outlays but not yet paid, and other changes. Although these elements can be important in the short run, they generally have little, if any, effect on borrowing in the long run. Reductions in cash balances, for example, soon reach a limit, and the balances themselves result from previous borrowing. Other means of financing would balloon, however, if President Clinton's proposal to convert guaranteed student loans to a direct loan program were enacted (see Box 3).

A few government agencies other than the Treasury issue their own debt, whether conventional securities sold in the market (such as Tennessee Valley Authority bonds) or

2. For a review of recent trends in national saving, see Congressional Budget Office, *Assessing the Decline in the National Saving Rate* (April 1993).

3. Congressional Budget Office, "Deficits and Interest Rates: Theoretical Issues and Empirical Evidence," CBO Staff Working Paper (January 1989).

promissory notes (such as those issued by the now-defunct Federal Savings and Loan Insurance Corporation, also known as FSLIC). The Treasury weighs such activity in determining its own borrowing. Agency issues reduce the amount of borrowing that the Treasury must do. Conversely, when agency debt, such as the FSLIC notes, must be paid off, Treasury borrowing increases.

Through 1987, the amount of financing done by individual agencies was negligible. In 1988 and 1989, however, FSLIC borrowed almost $18 billion, most of which has been paid off. The Tennessee Valley Authority has been the other large borrower, with $16 billion in securities outstanding at the end of fiscal year 1992.

Table 7.
Deficits and Means of Financing (In billions of dollars)

	Actual						Projected					
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Deficit	150	155	152	221	270	290	302	287	284	290	322	360
Borrowing												
Agency	a	8	13	7	-15	2	2	1	1	1	1	1
Treasury	152	154	126	214	293	309	282	290	288	295	327	365
Total	152	162	139	221	278	311	283	290	288	296	328	365
Other Means of Financing												
Change in cash balances	5	8	-3	-1	1	17	-19	0	0	0	0	0
Change in interest accrued but not paid	-2	-2	-7	-3	3	-2	-4	-4	-3	-3	-3	-4
Seigniorage	a	a	-1	-1	a	a	-1	-1	-1	-1	-1	-1
Deposit funds	2	1	-1	1	a	2	0	1	0	0	0	0
Credit reform financing accounts[b]	n.a.	n.a.	n.a.	n.a.	n.a.	2	3	4	6	7	8	8
Other	-2	1	-2	3	4	2	2	2	2	2	2	2
Total	2	7	-13	a	8	21	-18	4	4	6	6	6
Memorandum:												
Debt Held by the Public, End of Year	1,888	2,050	2,189	2,410	2,688	2,999	3,282	3,572	3,861	4,157	4,484	4,850

SOURCE: Congressional Budget Office based on data from the Department of the Treasury for 1987-1992; CBO projections for 1993-1998.

NOTES: Details on means of financing are shown indicating the direction of their effect on borrowing. Thus, an increase in cash (an asset) raises borrowing requirements. An increase in checks outstanding (a liability) diminishes borrowing requirements and is shown with a negative sign.

n.a. = not applicable.

a. Less than $500 million.

b. Effective in fiscal year 1992.

Box 3.
How Switching to Direct Student Loans Could Affect Federal Debt

Both historically and in the Congressional Budget Office's (CBO's) baseline projections, the link between federal deficits and borrowing (and, hence, debt) is a tight one. On average, annual borrowing differs from the deficit by only a few billion dollars a year, and the differences (which are generically labeled "other means of financing") are dominated by such easily understandable factors as changes in the Treasury's cash balance. But this handy rule of thumb would no longer apply if one of the Clinton Administration's proposals, to convert the current Federal Family Education Loan program (better known as guaranteed student loans) to a direct lending program, were adopted.

At present, loans are extended to postsecondary students or their parents by financial institutions. The federal government guarantees the repayment of interest and principal to the institutions. In most cases, the government pays the entire interest cost while the student is in school, and may pay a portion of the interest even after the student leaves school. (The current program also involves state guarantee agencies, which monitor both lenders and schools, as well as a large secondary market for student loans that are sold by the original lender.) The Clinton Administration proposes that the federal government simply lend the money directly to students. The proposal would take effect in earnest in mid-1996, supplanting a small pilot program that is already in operation.

How could a proposal to lend roughly $25 billion a year directly to students possibly fail to increase the deficit? Under the credit reform provisions of the Budget Enforcement Act of 1990, lending programs are now reflected in the budget on a subsidy basis, not a cash basis. That is, federal outlays now reflect only the expected lifetime cost to the government of the loan or guarantee, recorded when the loan is made. Credit reform addressed biases that were inherent in cash-based accounting and that skewed budget decisionmaking. A focus on near-term cash flows made direct loans look costly (because the government disbursed money that was not repaid until years later) but made guarantees look cheap (because the government did not have to recognize defaults until they occurred, typically long past the five-year horizon used in setting budget policy).

On a subsidy basis, the proposed switch to direct loans for students is estimated to reduce the deficit slightly. By cutting the financial institutions (which are guaranteed a rate of return about 3 percentage points above that on Treasury bills) out of the picture, and offering loans directly to students under the same conditions now available, the government could save money, according to proponents. Critics argue that the potentially large costs of administering the loans--or of hiring private contractors to do so--are ill-addressed in such analyses.[1]

Perversely, even though it would reduce the deficit modestly, the proposal would add significantly to Treasury borrowing. Obviously, the Treasury would have to borrow the entire amount of the loan in order to relend it to students. Thus, debt held by the public would climb by much more than the deficit suggests, especially in the new program's early years before significant repayments began to pour in, helping to mitigate the Treasury's borrowing requirements.

In March 1993, CBO estimated that the Clinton Administration's proposals would, in aggregate, reduce the deficit by a total of $355 billion over the 1993-1998 period--the combined effect of hundreds of spending and tax proposals.[2] Yet debt held by the public--at $4,549 billion in 1998--is only $301 billion smaller than in the CBO baseline ($4,850 billion). The difference of $54 billion represents the net impact of switching to a direct loan program, and would be recorded in the so-called financing accounts that are administered by the Treasury but that lie outside official budgetary totals.

The proposed shift to a direct loan program leaves the net indebtedness of the government fundamentally unchanged. The Treasury would borrow money and lend it to students at a competitive rate; the true costs, which stem from the interest-free period while students are in school and from future defaults, are appropriately reflected in the deficit. But old habits die hard. Budget documents and the budget process--most crucially, the necessity for raising the federal debt ceiling--often focus simply on the amount of Treasury debt outstanding, because there is no ready way to tally up the government's interest-earning assets, such as direct loans to students.

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1. A proposal similar to that of the Clinton Administration, and other options for reducing costs of the student loan program, are examined in Congressional Budget Office, *Reducing the Deficit: Spending and Revenue Options* (February 1993).

2. Congressional Budget Office, "An Analysis of the President's February Budgetary Proposals," CBO Paper (March 1993).

Chapter Three

Trust Funds and the Gross Federal Debt

Throughout this report, the Congressional Budget Office emphasizes *federal debt owed to the public*--that is, to individuals, institutions, and other buyers outside government and to the Federal Reserve System. This emphasis mirrors the focus of economists and participants in financial markets. Debt held by the public, after all, depicts the cumulative amount that the government has borrowed over the years to finance its deficits, chiefly by auctioning securities in the open market. Participants in the credit market keenly watch upcoming auctions of Treasury securities and weigh them against the supply and demand for funds from other sectors such as corporations, households, and foreign investors. Interest on these securities goes to people outside government and currently claims about one of every seven dollars in the budget.

But despite its importance, debt held by the public is not the most familiar measure of federal debt. That distinction belongs to a much less useful figure: the *gross federal debt*.

The difference between the two measures is simply *debt held by government accounts*, primarily federal trust funds. At the end of 1992, the gross federal debt was almost exactly $4 trillion--$3 trillion in debt issued to the public (see Chapter 2) and another $1 trillion in debt held by the government's own funds. Table 8 lists the major trust funds and other government accounts that held this $1 trillion in securities in 1992, and traces the growth in such holdings over the past decade.

What exactly is the distinction between federal trust funds and "other government accounts"? It is often arbitrary. Trust funds are simply those that were so labeled in legislation. Thus, for example, the Environmental Protection Agency's Hazardous Substance Superfund is a trust fund, but an analogous fund administered by the Department of Energy, the Nuclear Waste Fund, is not. Similar incongruities arose in the funds operated by the federal government's deposit insurance agencies: until mid-1989, the Federal Deposit Insurance Corporation Fund (for commercial banks) was classified as a trust fund, but the analogous Federal Savings and Loan Insurance Corporation Fund (for savings and loan institutions) was not. Legislation in 1989 revamped the deposit insurance funds and reformed government regulation of the industry. None of the successor funds was labeled a trust fund, and hence all are now in the cluster known as "other government accounts."

For individual funds, the balances shown in Table 8 represent the cumulative total of earmarked income over spending since their inception, which in many cases was decades ago. And from the funds' standpoint, interest earned on these balances is an important source of income: interest received by trust funds totaled $78 billion in 1992.

Investments by trust funds and other government accounts are handled within the Treasury, and the purchases and sales, with very rare exceptions, do not flow through the credit markets. Similarly, interest on these securities is simply an intragovernmental transfer: it is paid by one part of the government to another part and adds nothing to the deficit. Thus, financial market participants--if they think about trust fund holdings at all--view them, accurately enough, as a bookkeeping entry, an intragovernmental IOU.

The Three Major Types of Trust Funds

Trust funds, as evidenced in Table 8, hold over 95 percent of the debt that is issued to government accounts. But the trust fund label itself is arguably broad and misleading. The label fuels the notion that these federal programs are like private trust funds--a pool of assets managed for the exclusive benefit of recipients and whose terms and conditions cannot be changed without serious legal consequences. No large federal trust fund meets this description, because policymakers regularly review all of these programs for their affordability and their responsiveness to national needs.

Nearly all of the 150-plus federal trust funds (of which only a dozen or so are big) can readily be classified into one of three distinct categories: programs funded by user charges, federal employees' retirement programs, and social insurance programs.

Table 8.
Government Account Holdings of Federal Debt at End of Fiscal Year (In billions of dollars)

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Trust Funds											
Social Security[a]	19	31	32	37	45	66	104	157	215	269	319
Medicare[b]	27	20	26	32	48	57	72	95	110	126	139
Civil Service Retirement	96	110	112	127	154	177	195	215	236	259	284
Military Retirement	0	0	0	12	21	31	41	53	65	76	88
Unemployment Insurance	10	8	12	17	21	28	36	45	51	48	35
Highway	9	9	11	12	11	13	13	16	17	19	21
Airport and Airway	4	5	6	7	9	10	11	13	14	15	15
Railroad Retirement	1	c	3	4	6	7	8	9	9	10	12
Federal Deposit Insurance Corporation[d]	13	14	14	16	16	17	16	d	d	d	d
Other	17	19	21	23	24	27	30	34	39	43	46
Subtotal	195	217	237	287	356	431	527	637	755	864	960
Other Government Accounts											
Deposit Insurance Funds[d]	5	6	7	7	6	2	3	19	11	9	9
Defense Cooperation Account[e]	0	0	0	0	0	0	0	0	0	8	2
Other[f]	17	17	20	24	22	24	20	23	30	30	34
Subtotal	22	23	27	31	28	26	23	41	41	47	44
Total											
Government Account Holdings	218	240	264	318	384	457	551	678	796	911	1,004

SOURCE: Congressional Budget Office based on information from the Department of the Treasury and the Office of Management and Budget.

a. Old-Age and Survivors Insurance and Disability Insurance.

b. Hospital Insurance (Medicare Part A) and Supplementary Medical Insurance (Part B).

c. Less than $500 million.

d. Until August 1989, the Federal Deposit Insurance Corporation Fund was classified as a trust fund. Its successor, the Bank Insurance Fund, is not a trust fund and is thus included in "other government accounts." Other deposit insurance funds include the Federal Savings and Loan Insurance Corporation (FSLIC) Fund and its successor, the FSLIC Resolution Fund; the Savings Association Insurance Fund; and the Credit Union Share Insurance Fund.

e. Contributions from allied nations for Operation Desert Storm were temporarily deposited into this account until drawn down by the Department of Defense.

f. Includes Treasury securities purchased in the open market by the Tennessee Valley Authority.

User-Financed Programs

Trust funds financed by user charges include those for highways and airports. The government levies specific user charges (such as gasoline taxes and taxes on airline passenger tickets) to build, repair, and operate infrastructure or provide other services. Temporary surpluses may build up in these funds if there are lags between taxes and spending.

Keeping track of user charges and payments justifies separate accounting. It demands, however, that costs be measured properly if "surpluses" in these accounts are to have any meaning. For example, the surpluses that built up in the Airport and Airway Trust Fund in the 1980s were deceptive: a CBO report showed that about half of the Federal Aviation Administration's spending for such purposes was not charged to the trust fund at all.[1] Similarly, many analysts argue that highway use involves numerous costs to the nation--such as environmental degradation, congestion and the associated loss of time and productivity, and dependence on imported oil--that, if charged to the Highway Trust Fund, would shrink or eliminate the apparent surplus in that fund.

Federal Staff Retirement Programs

Programs such as Civil Service Retirement and Military Retirement are akin to the pensions offered by private corporations or state and local governments to their employees. Future pensions are an important part of federal workers' compensation, and failing to charge agencies for such costs would lead them to seriously understate their personnel costs. Levying federal agencies and workers for these costs, and tracking these dollars separately, is meant to enhance rational decisions about pay, work-force levels, and benefits.

The analogy to private pensions, however, can be overstated. The government has less reason to fund its staff pensions by socking away assets than a private company. Unlike a private firm, the federal government certainly will not go out of business, nor--under current projections--will federal employee pensions ever shoot up in relation to gross domestic product.

Broad-Based Social Insurance Programs

Unlike the staff retirement programs just cited, Social Security and Medicare are nearly universal social insurance programs; they have no counterparts at either the private or the state and local government level. Furthermore, they are redistributive programs; although contributors build up a future entitlement to benefits by paying taxes, there is no direct link between taxes paid and benefits received. The Congress has regularly liberalized or pared back benefits in keeping with national economic and demographic conditions.

Of the three types of trust funds listed, this cluster is the most difficult to disentangle from the bigger picture of budgetary policy. Many analysts who focus narrowly on the gap between the funds' income and outgo overlook the sheer size of these flows in relation to the economy.

Where Trust Fund Holdings Come From: The Role of Earmarking

Over the years, policymakers have set aside particular taxes and other sources of income for programs that are labeled trust funds. In fact, about 40 percent of the government's tax collections are so earmarked. In contrast, many other vital government activities--de-

1. Congressional Budget Office, *The Status of the Airport and Airway Trust Fund* (December 1988).

fense, Medicaid, and interest, to name just a few--lack any such earmarked source of income.

Because trust funds' earmarked receipts exceed their spending, they run surpluses that are invested in Treasury securities. The total amount of debt held by government accounts grows in virtual lockstep with the trust fund surplus. Over the 10-year period ending in 1992, for example, the cumulative trust fund surplus was $794 billion (much of it, as explained below, from intragovernmental transfers), and the debt held by government accounts grew by $786 billion. The small difference between the two figures mainly reflected changes in debt held by the subset of government accounts that are not legally trust funds. And in isolated years, the growth in investments also diverged from the trust fund surplus when interruptions in the debt ceiling temporarily prevented the Treasury from fully investing trust fund balances--a barrier that quickly disappeared once the Congress enacted a new debt ceiling.

Where exactly does the trust fund surplus, which drives these funds' holdings of debt, come from? Trust funds collect income from two key sources--the public and intragovernmental transfers--and use it to finance their spending (see Table 9).

Table 9.
Receipts and Expenditures of Federal Trust Funds (By fiscal year, in billions of dollars)

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Receipts										
From the Public										
Social insurance taxes	209	239	265	284	303	334	359	380	396	414
Excise taxes[a]	11	15	17	17	18	19	21	20	24	24
Medicare premiums	4	5	6	6	7	9	12	12	12	13
Foreign military sales deposits	13	11	10	11	9	9	8	10	13	12
Other	1	2	2	1	2	2	3	2	3	3
Subtotal	239	272	299	318	338	374	403	424	448	466
From Intragovernmental Transactions										
Interest	17	20	26	31	35	42	52	62	71	78
Federal contributions to retirement funds	23	24	53	55	57	59	60	62	65	67
General fund payments to Medicare	19	18	19	18	21	26	32	34	35	39
Other	40	21	17	18	10	10	10	9	11	13
Subtotal	99	84	115	122	123	137	154	167	182	198
Total	338	356	414	440	461	511	557	590	631	663
Expenditures										
To the Public[b]	313	315	352	373	383	407	428	466	511	564
Intragovernmental	2	9	8	6	6	6	6	4	8	4
Total	315	323	360	379	388	413	434	470	519	567
Surplus										
Trust Fund Surplus	23	33	54	62	73	98	123	120	112	96

SOURCE: Congressional Budget Office based on information from the Office of Management and Budget.

a. Includes excise taxes that are dedicated to trust funds (chiefly the Highway and Airport and Airway trust funds). About one-half of excise taxes are so dedicated.

b. Includes benefit payments, federal administrative costs that are charged to certain trust funds, grants to state and local governments, and outlays of the Foreign Military Sales Trust Fund.

The first source--income collected directly from the public--consists of social insurance taxes, certain excise taxes (such as the gasoline taxes that support the Highway Trust Fund), plus various other charges (such as voluntary premiums from Medicare participants). These earmarked receipts from the public totaled $466 billion in 1992.

The second source of income, which totaled $198 billion in 1992, reflects transfers within the budget to trust funds from federal funds, the name given to any program that is not a trust fund. Examples of such transfers are payments by federal agencies into retirement funds on behalf of their own workers, a general fund payment that covers about three-quarters of the cost of Medicare's Supplementary Medical Insurance (SMI) program, and interest on trust fund balances. All of these transfers were instituted by law and occur for a deliberate reason. For example, the Congress requires that federal agencies pay retirement contributions on behalf of their employees because agency budgets would otherwise seriously understate personnel costs and possibly skew decisions on hiring; the general fund subsidy for SMI reflects the desire to keep monthly premiums affordable for elderly participants in the program. But it is obvious that transferring money from federal funds to trust funds does not change the total deficit or the government's borrowing needs by one penny. It does, however, subtly distort the composition of the budget by boosting the trust fund surplus and the so-called federal funds deficit by equal amounts.

Together, the two sources of trust fund income more than cover trust fund spending--for benefits, administrative expenses, and grants for purposes such as highways and airports. Trust fund spending exceeded $500 billion in 1992, about 40 percent of federal outlays. Hence, the trust funds run surpluses, which they invest in special Treasury securities.

Even this brief overview of trust funds' income and outgo leads inexorably to two conclusions. First, the flows into and out of trust funds are huge, buttressing the argument that no useful measure of the government's role in the economy can ignore such large flows. Thus, the often-heard argument that the federal funds deficit (the deficit excluding all trust funds) is the "real" deficit requires overlooking a vast amount of the government's activity and is hard to sustain. Second, trust funds depend heavily on intragovernmental transfers for their surpluses, belying the popular notion that these funds are self-supporting.

How Trust Funds Are Invested: The Treasury's Role

The Department of the Treasury has the lead responsibility for carrying out and reporting the government's cash and debt operations, and trust fund management is an integral part of this task.

The Link to Treasury Cash Management

On an average business day, the Treasury receives about $5 billion in nondebt deposits and processes about $6 billion in nondebt withdrawals. The former include personal and corporate income taxes, social insurance contributions, and other deposits; the latter, disbursements for benefit payments, grants, defense purchases, and many other purposes, whether handled by check or by electronic transfer. By centralizing cash management for the entire government, the Treasury can anticipate when the government's coffers will run low (or high) and can schedule its debt auctions accordingly.

Of course, many of the dollars flowing in and out on any day are trust fund dollars, so the task of managing the trust funds is a natural extension of the Treasury's job. When the Treasury determines that incoming deposits are earmarked for trust funds, it credits the

appropriate funds with Treasury securities. Similarly, when outgoing payments are charged to a trust fund, securities are redeemed--that is, subtracted from the fund. It is important to recognize that both credits and redemptions are paper transactions. There is no physical issuance or sale of securities, and the credit markets are oblivious to the transaction, though they are alert to the underlying flow of taxes or benefits that triggered the transaction in the first place.

In addition to monitoring taxes, benefit payments, and other transactions with the public, the Treasury also tracks intragovernmental transfers. When such transactions--for example, the big payments of interest to trust funds that occur every June 30 and December 31, or the large lump-sum payment to Civil Service Retirement that occurs every September 30--take place, the Treasury credits (or debits) the trust funds accordingly. Finally, the Treasury calculates the government's gross debt--reflecting the trust funds' investments as well as borrowing from the public--and alerts the Congress if the debt is approaching its statutory limit (see Chapter 4).

Specific Investment Practices of Trust Funds

All major trust funds invest in special, nonmarketable Treasury securities known as the government account series. The Treasury handles the investments by a book-entry system, simply crediting purchases without physically issuing securities. All funds can redeem their investments at any time to pay benefits or other authorized spending. From the Treasury's standpoint, the redemption coincides with a payment to the public and thus drains cash balances, which must then be replenished by a tax inflow or sale of a marketable security.

Particular characteristics of trust fund investments--chiefly their interest rates and risk of price fluctuation--differ slightly for the major funds, mainly because of statutory language and the date of the funds' establishment.

Social Security, Medicare, Civil Service Retirement, and Railroad Retirement. These funds invest in special securities that are immune to fluctuations in asset prices; that is, these funds can always redeem their securities at par, or face amount, regardless of whether similar securities in the credit markets have risen or fallen in price. By statute, their interest rates are pegged to the average market yield on medium- and long-term Treasury securities--namely those not due or callable for at least four years (three years for Railroad Retirement). The average yield is calculated by observing trading activity in the secondary market, where tens of billions of dollars of outstanding Treasury securities change hands every day. This single interest rate applies regardless of the actual maturity--short, medium, or long--of the trust funds' investment; the funds receive the same interest rate whether they are investing the funds overnight or for 15 years, typically their longest maturity.

Unemployment Insurance, Highway, and Airport and Airway. Interest rates paid to the unemployment, highway, and airport and airway funds are pegged to the average coupon rate (not market yield) on federal debt of all maturities. This average coupon rate is a relatively slow-moving index that averages debt sold many years ago and debt sold more recently, all reflected at its original interest rate. In general, this rule hurts the trust funds modestly when market interest rates are high but benefits them when market rates are low. The rate does not closely track the government's current cost of borrowing except by accident. Maturities of securities held by the unemployment, highway, and airport and airway funds do not exceed one year.

Military Retirement. Although Military Retirement is a federal program of long standing, the Military Retirement Fund itself was not created until the mid-1980s, much later than the other major funds. Its investment rules also differ.

The Military Retirement Fund invests in so-called market-based special issues. Though not marketable, such securities precisely mimic the performance of an actual marketable issue. The fund's managers select particular issues and maturities; in turn, the managers accept the risk of price fluctuation, determined by whatever is happening to corresponding issues in the market. (As previously noted, Social Security and other big funds can always redeem their securities at par, regardless of price fluctuations in credit markets.) In practice, the Military Retirement Fund's managers are instructed to choose maturities wisely and avoid the need for premature redemptions. By their choice of securities, the fund's managers have sometimes picked up as much as an extra one-half of one percentage point compared with the rate assigned to Social Security or other large funds for contemporaneous purchases.

Other Funds. The funds already named hold more than 90 percent of all debt issued to government accounts. Most funds that were not listed invest in market-based special issues like those held by Military Retirement. Their fund managers, or the Department of the Treasury on their behalf, select special securities whose subsequent performance is pegged to the market.

In sum, all major trust funds invest in special, nonmarketable securities that earn a competitive rate of return. Because their specific investment practices vary, however, there is room for simplifying these practices and eliminating dissimilarities. Legislation would be required to bring about greater simplicity and uniformity.

What If Trust Funds Were Invested Somewhere Else?

Many proposals have been made to invest federal government trust funds in other types of securities such as corporate stocks and bonds, real estate, or socially beneficial projects. Most such proposals concern Social Security, simply because it is the biggest trust fund and its taxing and benefit provisions directly concern nearly the whole population.[2]

Using the temporary excess of Social Security revenues or other trust fund income to help fund general government programs, and crediting the fund in return with securities, is a perfectly appropriate practice. This point was made by the first Advisory Council on Social Security in its 1938 report. The council stated:

> The United States Treasury uses the moneys realized from the issuance of these special securities [to] the old-age reserve account in the same manner as it does moneys realized from the sale of other Government securities. As long as the budget is not balanced, the net result is to reduce the amounts which the Government has to borrow from banks, insurance companies, and other private parties . . . . [T]he present provisions regarding the investment of the moneys in the old-age reserve account do not involve any misuse of these moneys or endanger the safety of these funds.

Several other advisory councils reached the same conclusion.

What about oft-heard proposals to invest the trust funds in other financial assets such as corporate stocks and bonds or mortgages? Clearly, investing trust funds in private investments could have no significant impact on the government's overall balance sheet. If the Treasury were cut off from access to trust fund moneys, it would have to sell more securities (bills, notes, and bonds) in the credit markets.

2. For a more detailed discussion of the issues in this section, see the testimony of Paul N. Van de Water, Chief of the Projections Unit, Congressional Budget Office, before the Advisory Council on Social Security, March 8, 1990.

At the same time, federal trust funds would accumulate more financial assets. Net federal indebtedness--liabilities minus assets--would be little different than under the current arrangement. Conversely, private investors would have to buy more Treasury debt than under current arrangements but would face a shrunken supply of the assets purchased by the trust funds. The upshot would be a rearrangement of public and private portfolios, perhaps accompanied by a small change in the relative returns on various financial instruments.

How would such a policy affect the deficit and the economy? Of course, most proponents presume that the government would earn a slightly higher rate of return by investing in non-Treasury debt.[3] The Social Security trust funds, in isolation, would probably collect greater investment income; that is, the Social Security surplus would be modestly bigger. It is less clear what would happen to the overall government deficit. Even a fairly small response of interest rates--that is, an increase in Treasury borrowing costs as the government must sell even more debt--might constrict or eliminate any budgetary savings from this strategy.

Even so, advocates press, wouldn't future Social Security benefits, or other government programs, be less burdensome to future taxpayers if the return on trust fund assets could be boosted? The answer is no, and hinges on the proposal's limited potential to affect economic growth. Social Security benefits are paid to retired and disabled workers and survivors based on the benefit formulas and eligibility rules set in law. These benefits are a transfer of resources from one group to another and represent a claim on the economy's total production, or gross domestic product, when they come due. Only by raising total national saving and thus spurring extra growth in GDP could the proposal contribute to diminishing the relative burdens of Social Security--that is, the share of future resources devoted to supporting the elderly. But as just argued, it is not very plausible that a mere change in trust fund investment strategies would accomplish that: a government policy of borrowing $53 billion more, the amount of 1993's expected Social Security surplus, while simultaneously acquiring $53 billion of private assets has no obvious effect on total investment. The tough truth is that the government could better contribute to greater investment and hence to economic growth by reducing spending or raising taxes, not by reshuffling how trust fund dollars are invested.

Last but not least, investing trust funds in non-Treasury securities has two serious drawbacks. First, trust fund earnings would be subject to a much greater element of risk because stock and bond markets are volatile. Second, investing directly in private securities would greatly increase the government's role in allocating resources within the private sector. The Congress could become embroiled in questions of whether the trust funds should be invested in companies that do business in South Africa, pollute the environment, or engage in disputed labor-relations practices, or in industries that are having an especially tough time facing foreign competition. The exact implications for the allocation of resources and future economic growth are uncertain, but are worrisome to many economists who question whether the government should substitute its judgments for those of the marketplace.

3. Another camp suggests that the trust funds be invested in assets earning a low rate of return--state and local securities to fund infrastructure spending, for example, or social programs such as education that are thought to benefit the country even though their measurable financial payoff is small. Most economists, though, would reply that such spending should be evaluated independently on its merits. If the federal government wants to encourage such spending, these economists argue, it should do so explicitly; there is no reason to link it to the investment policies of federal trust funds.

Conclusion

To summarize, trust fund holdings of federal debt and the associated interest earnings generate great confusion. From the vantage point

of a particular fund's administrators, the fund's holdings represent assets, and interest is an important source of income. Policy analysts scrutinizing individual trust funds view their balances as one key indicator (among many) of solvency. The specter of exhausting balances frequently leads to legislative action to stabilize a program; conversely, large and growing balances may lead to pressures for greater spending or tax cuts.

From the standpoint of the government as a whole and of economic analysis, however, trust fund balances are not meaningful. Trust fund investments and balances primarily serve a bookkeeping role, responding to legislative mandates that the flows into and out of particular programs be tracked separately. And these balances are unrelated to the government's operations in the credit markets. Thus, the gross federal debt, which lumps together internal trust fund holdings and securities actually sold to outsiders, is not a useful measure of what the government currently owes.

Chapter Four

Debt Subject to Limit

The Congress has traditionally placed a lid on the amount of debt the Treasury can issue. Before World War I, the Congress generally had to approve each separate issuance. Since passage of the Second Liberty Bond Act in 1917, the limit has gradually evolved into an overall dollar ceiling on debt. The ceiling typically gives the Treasury fairly unfettered authority to issue debt for a year or even more before seeking an increase, but very short-term ceilings (which grant the Treasury permission to issue debt only for a few months or even days) are hardly rare.

The Treasury is now operating under a temporary debt ceiling of $4,370 billion, enacted in early April. When that measure expires on September 30, 1993, the statutory limit will revert to its permanent level of $4,145 billion--adopted in November 1990 after that fall's budget summit negotiations--until it is hiked again.

What the Debt Limit Covers

The debt limit applies to nearly all gross debt of the federal government. Thus, it covers both debt issued to the public (bills, notes, and bonds, and nonmarketable securities such as savings bonds, described in Chapter 2) and also the special securities issued to trust funds and other government accounts (see Chapter 3). The growth of trust fund holdings essentially answers the commonly asked question of why the debt subject to limit climbs by so much more than the government's deficit.

Debt Subject to Limit Versus Gross Debt

Debt subject to limit strongly resembles the gross debt, and the few small differences between the two result mainly from statutory anomalies. Debt subject to limit applies only to the so-called public debt, that is, securities issued by the Treasury. With rare exceptions, it does not apply to debt issued by other federal agencies, which the Treasury does not control and which generally lacks the full faith and credit of the U.S. government. Nor does the overall statutory limit apply to debt issued by the Federal Financing Bank (FFB), an arm of the Treasury created in 1973 and authorized to issue up to $15 billion of its own debt. (This authority remained virtually unused until the Treasury turned to it during a prolonged interruption in the debt ceiling in 1985, as chronicled below.)

At the end of 1992, gross federal debt totaled $4,003 billion, whereas the debt subject to limit was $30 billion lower at $3,973 billion. FFB debt accounted for $15 billion of the gap, and debt issued by agencies other than the Treasury (chiefly the Tennessee Valley Authority and the Federal Savings and Loan Insurance Corporation Fund) for $18 billion. These amounts were partly offset by other, minor differences that totaled $3 billion.

Growth in Debt Subject to Limit

Together, the deficit and the trust fund surplus easily explain most of the growth in debt subject to limit (see Table 10). The deficit largely determines what the Treasury must borrow in credit markets. The trust fund surplus drives the issuance of debt to federal government accounts.

A residual category ("other changes") is volatile, but has averaged close to zero. It reflects heavy issuance (as in 1989) or redemption (as in 1991) of agency debt that was not subject to limit; big investments by government accounts (such as the Defense Cooperation Account, the repository for allied nations' contributions to Operation Desert Storm) that are not trust funds; and so forth. It also reflects various means of financing--such as the buildup or drawdown of cash balances--that can cause Treasury borrowing to diverge from the government's deficit. But as explained in Chapter 2, these other means of financing are, by their very nature, limited in scope.

In its baseline projections, the Congressional Budget Office estimates that debt subject to limit will climb to nearly $6.5 trillion by 1998 (see Table 10). Deficits account for about three-fourths and trust fund surpluses for about one-fourth of its growth in the 1993-1998 period.

How Debt Subject to Limit Is Measured

The limit on federal debt generally applies to the face value of federal debt. Face value ordinarily reflects the cash that the Treasury received for a security and the amount it must repay at maturity. However, special rules of measurement apply to securities that are sold at a discount (or, less commonly, at a premium).

Savings bonds, a discount security, have long been counted in debt subject to limit at their current redemption value. In 1989, the Congress adopted analogous treatment for other discounted securities, chiefly Treasury bills and zero-coupon bonds. Holders of these securities collect no income at all from them until maturity, when they receive a face amount that reflects the initial purchase price plus all accrued interest. If maturity is far in the future, the face amount of these securities greatly exaggerates their current worth. Hence, such securities are now included in the debt subject to limit at their purchase price

Table 10.
Baseline Projections of Debt Subject to Limit (By fiscal year, in billions of dollars)

	Actual				Projected					
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Debt Subject to Limit, Start of Year	2,587	2,830	3,161	3,569	3,973	4,353	4,745	5,144	5,556	5,999
Changes										
Deficit	152	221	270	290	302	287	284	290	322	360
Trust fund surplus	123	120	112	96	102	102	108	113	113	111
Other changes	-33	-10	27	17	-23	4	6	9	9	8
Total	243	331	408	403	380	392	398	412	444	479
Debt Subject to Limit, End of Year	2,830	3,161	3,569	3,973	4,353	4,745	5,144	5,556	5,999	6,478

SOURCE: Congressional Budget Office based on data from the Office of Management and Budget for 1989-1992; CBO's March 1993 baseline projections for 1993-1998.

NOTE: The current statutory ceiling is $4,370 billion, expiring on September 30, 1993.

when they are first sold, and then at gradually greater amounts until they mature. The 1989 change removed a major obstacle to the Treasury's issuance of zero-coupon securities, and since then, the Treasury has issued large volumes to the Resolution Funding Corporation and to foreign countries in conjunction with debt-rescheduling agreements (see Chapter 2).

How the Treasury Copes With Interruptions in the Debt Limit

Lawmakers have enacted two dozen increases in the statutory debt ceiling since 1982. Individual increases have lasted anywhere from three days to two years. If the debt ceiling is approaching, and if legislative action appears uncertain, the Treasury must devise ways to cope with the resulting interruption in its debt issuance.

The Treasury's options are influenced by whether it is operating under a permanent or temporary debt ceiling. Permanent ceilings (such as the $4,145 billion adopted after the 1990 budget summit) do not expire, but the dollar amount eventually becomes inadequate. Under a permanent ceiling, the Treasury can issue debt so long as it does not violate the dollar limit; even if it is right at the ceiling, it can refinance maturing securities or take other actions that do not, on balance, raise the debt.

In stark contrast, a temporary ceiling expires on a given date. The Treasury's authority to issue debt abruptly ceases, unless (implausibly) it can somehow get the debt down beneath its permanent ceiling. Debt that was issued before the expiration date need not be paid off immediately, because it was perfectly legal when it was issued. But the Treasury can issue no new debt, not even to refinance maturing securities; instead, it must pay them off with cash. This requirement--combined with other drains on the Treasury's funds--brings matters to a head fast.

Demands on the Treasury's Cash

How quickly the cash situation becomes critical when the debt ceiling is reached depends on two factors: the Treasury's starting cash balance, and the size and timing of upcoming cash drains.

The Treasury views a cash balance of about $5 billion as a bare-bones minimum. Typical balances are much higher. Treasury cash balances, which are held at the Federal Reserve and in interest-earning accounts at commercial banks throughout the country, averaged $25 billion over the 1988-1992 period and have briefly been much higher--as much as $60 billion--when swollen by tax receipts or by borrowing.

With federal deficits in the range of $300 billion a year, a crude estimate is that the Treasury's cash balance, whatever its level, will hemorrhage by $1 billion a day in the absence of any borrowing. But a closer look reveals distinct peaks and valleys in the Treasury's need for cash, associated with the seasonal and daily patterns of payments and receipts. Recognizing these patterns enables debt-watchers to guess how long an interruption in the debt ceiling is likely to last.

Outflows of Cash. Two large drains on the Treasury--cash benefit payments and cash interest payments--are especially lumpy. Nearly all cash benefit payments for Social Security and other retirement and disability programs go out between the first and third of the month. Sometimes they are accelerated by a day or more if the normal payment date falls on a weekend or holiday. Currently, these programs drain the Treasury's cash by about $34 billion in the first week of the month.

Cash interest payments to owners of Treasury notes and bonds take place on fixed dates.

In this particular case, budget accounting and cash accounting diverge. The budget follows universally accepted rules of accounting by treating interest costs on an accrual basis; all bonds and notes, for example, pay interest at six-month intervals, so the Treasury routinely includes one-sixth of the upcoming interest payment in its published totals for outlays and the deficit in intervening months. But the actual cash payments to investors do not occur until those coupon dates. The biggest spikes--swallowing more than $22 billion on just one day--occur in midquarter, on February 15 and August 15 and then again on May 15 and November 15. Smaller spikes (of $4 billion to $5 billion or so) occur on other semiannual cycles, mostly at the end of each month: January 31 and July 31, February 28 and August 31, and so forth.

Other cash withdrawals for purposes as varied as federal employees' pay, defense contracts, grants to states and localities, and Medicare are much less lumpy and average about $4 billion to $6 billion per day. Tax refunds, which are highly seasonal, swell cash needs during the March-May period. Since 1989, heavy outlays for deposit insurance to deal with insolvent savings and loan institutions and banks have added an element of unpredictability to cash needs.

Finally, if the Treasury faces the expiration of a temporary debt ceiling, it will have to pay off the principal amounts of maturing debt according to a fixed calendar. Three- and six-month Treasury bills of about $23 billion mature every Thursday, one-year bills of about $14 billion every fourth Thursday, and notes and bonds according to their own schedule (with about $30 billion maturing in an average month).

Inflows of Cash. As it enters a borrowing drought, the Treasury must predict how long its cash will hold out in the face of these demands. If it is barred from borrowing, it can count only on taxes and miscellaneous deposits (for example, loan repayments and fees) to replenish its balances.

Withheld income and employment taxes are the backbone of the Treasury's deposits, accounting for over half of all non-debt-related deposits. Withheld taxes flow in fairly smoothly to the tune of about $3 billion a day, with some clustering that is linked to the pay cycles of private-sector employers. In contrast, corporate income taxes and nonwithheld individual income taxes are concentrated around just a few deadline dates, most notably April 15. Given today's large budget deficits, however, the Treasury can rarely count on such inflows to cover its cash drains for very long.

The Treasury's Tactics

Since 1982, the Treasury has faced two dozen interruptions in the debt ceiling. Each interruption was unique, especially in its legislative setting. Lawmakers took advantage of three interruptions to force major reforms in the budget process: the Balanced Budget and Emergency Deficit Control Act of 1985 (better known as Gramm-Rudman), its successor in 1987, and the Budget Enforcement Act following the budget summit of 1990. The last episode, remarkably, witnessed seven increases in the debt ceiling in a four-month period as the Congress and the Bush Administration wrestled with an ambitious package to reduce the deficit. Many other such links were attempted but failed. The reverse also occurs: the debt ceiling's path may be smoothed by the passage of other legislation. Two instances were the increases in the debt limit in the wake of the Social Security rescue package of 1983 and the savings and loan package of 1989. Many increases were driven by the Congress's recess or adjournment calendar.

Though each setting was unique, the Treasury has resorted to several tactics at least once to cope with interruptions in the debt ceiling (see Table 11).

Suspending Sales of Nonmarketable Debt. Suspending the sales of savings bonds, state and local government series, and other non-

Table 11.
Recent Increases in the Debt Limit

Enactment Date[a]	Amount of Limit (Billions of dollars)	Expiration Date	Treasury Actions at Close[b,c]
Sept. 30, 1982	1,290.2	Sept. 30, 1983	Deteriorated budget outlook necessitated action well before expiration. Increase enacted May 1983 as a consequence of Social Security rescue package.
May 26, 1983	1,389.0	Permanent	Beginning late October 1983, delayed auctions; underinvested trust funds.
Nov. 21, 1983	1,490.0	Permanent	Beginning late April 1984, trimmed auctions; underinvested Social Security.
May 25, 1984	1,520.0	Permanent	Beginning late June 1984, trimmed auctions; underinvested Social Security.
July 6, 1984	1,573.0	Permanent	Delayed auctions (beginning late September 1984); underinvested trust funds (beginning early September); cash situation not critical.
Oct. 13, 1984	1,823.8	Permanent	Prolonged interruption associated with debate over Balanced Budget and Emergency Deficit Control Act (commonly known as Gramm-Rudman). Underinvested trust funds beginning early September 1985; cut late-September auctions, worsening cash situation; issued debt through FFB in October; actively disinvested trust funds in order to pay benefits in early November.
Nov. 14, 1985	1,903.8	Dec. 6, 1985	More or less timely increase.
Dec. 12, 1985	2,078.7	Permanent	Used FFB temporarily to credit Social Security and preserve regular auctions August 1-15, 1986; otherwise timely.
Aug. 21, 1986	2,111.0	Permanent	Used FFB authority; underinvested trust funds beginning September 30, 1986; delayed or cut auctions beginning late September; cash situation not critical.
Oct. 21, 1986	2,300.0	May 15, 1987	Timely increase at expiration.
May 15, 1987	2,320.0	July 17, 1987	Postponed some auctions beginning July 20, 1987; cash situation not critical.
July 30, 1987	2,320.0	Aug. 6, 1987	Postponed auctions normally held in early August but settling on August 15, 1987 (midquarter refunding).
Aug. 10, 1987	2,352.0	Sept. 23, 1987	Part of Balanced Budget and Emergency Deficit Control Reaffirmation Act (commonly known as Gramm-Rudman II) package. Rescheduled auctions normally held September 21-24, 1987; otherwise timely.
Sept. 29, 1987	2,800.0	Permanent	More or less timely increase associated with savings and loan bill.
Aug. 7, 1989	2,870.0	Oct. 31, 1989	Boosted auction sizes and accelerated settlements to build up cash balances in late October.
Nov. 8, 1989	3,122.7	Permanent	More or less timely increase before Congressional recess.
Aug. 9, 1990	3,195.0	Oct. 2, 1990	Very short term increase associated with 1990 budget summit's conclusion.
Sept. 30, 1990	3,195.0	Oct. 6, 1990	Very short term increase as 1990 budget summit agreement underwent modifications.
Oct. 9, 1990	3,195.0	Oct. 19, 1990	Borrowed up to limit on October 19 while awaiting next increase.
Oct. 19, 1990	3,195.0	Oct. 24, 1990	Delayed several auctions normally held October 18-22, 1990, but settling after scheduled expiration of ceiling.
Oct. 25, 1990	3,195.0	Oct. 27, 1990	Compressed auctions and settlements into the period between October 25 and 27, 1990.
Oct. 28, 1990	3,230.0	Nov. 5, 1990	Temporary limit until reconciliation bill (including Budget Enforcement Act) was signed.
Nov. 5, 1990	4,145.0	Permanent	Postponed several auctions pending last-minute increase before Congressional recess.
April 6, 1993	4,370.0	Sept. 30, 1993	Not yet expired.

SOURCE: Congressional Budget Office based on information from the Department of the Treasury and various news items.
NOTE: FFB = Federal Financing Bank.

a. Date signed into law, typically one to seven days after passage by the Congress.

b. Actions listed do not include suspension of sales of savings bonds and state and local government series, which are more or less routine responses to an interruption in the debt ceiling (especially after expiration of a temporary ceiling).

c. From 1983 through 1990, the Social Security trust funds enjoyed a special arrangement under which they were credited on the first of the month with all revenues expected during that month. If fully invested, this credit caused the debt subject to limit to spike between $15 billion and $20 billion. On occasion, when constrained by the debt limit, the Treasury credited the trust funds as required but was unable to invest the resulting balances fully.

marketable debt for the duration of the interruption is a more or less routine response, and it is mandatory when the expiration of a temporary ceiling bars the Treasury from issuing any debt.

Trimming or Delaying Auctions of Marketable Securities. This tactic is commonly used. If the Treasury is unsure whether it can legally issue bills, notes, and bonds on the settlement date, it will not auction them. When the Congress eventually enacts a new debt ceiling, the Treasury will then patch the resulting holes in its regular issuance calendar.[1]

Underinvestment of Government Trust Funds. This practice has proved unavoidable on many occasions. In many cases, the Treasury could not invest trust fund receipts fully when it was up against the debt limit. Of course, the trust funds were properly credited, but they simply held large amounts of so-called uninvested balances.

Social Security often triggered such a dilemma for the Treasury in the mid- and late 1980s because of an unusual statutory provision. Under a 1983 law, the two Social Security funds (Old-Age and Survivors Insurance and Disability Insurance) were credited on the first day of the month with all receipts expected during the month. Beginning on the third day of the month, the funds would then be debited for that month's benefit payments. This provision caused a temporary jump in debt subject to limit of $15 billion to $20 billion for just a few days early in the month; if fettered by a debt ceiling, the Treasury could not credit the funds with securities. This unusual arrangement was repealed in 1990, and Social Security's investment pattern is now much smoother. Other funds often affected by the constraints of the debt ceiling were Civil Service Retirement and Military Retirement.

Only once did underinvestment of trust funds go a step further: in November 1985, the Treasury actually redeemed trust fund securities a few days early to create room under the debt ceiling to auction regular, marketable securities. The money raised in these auctions permitted the payment of benefits to Social Security recipients, otherwise imperiled by the Treasury's razor-thin cash balances. In recent years, the Congress has routinely voted to replenish any trust funds that lost interest income as the result of an interruption in the debt ceiling.

Two other tactics have been used only in very narrow circumstances that are not especially common.

Beefing Up the Sales of Marketable Securities to Build Cash Balances. The Treasury has done this on a few occasions, notably in the fall of 1989 and the fall of 1990. Perversely, this tactic is the exact opposite of the usual response--that of delaying or trimming auctions. It is useful only under very specific conditions. If the Treasury faces the expiration of a temporary ceiling on a certain date--but if plenty of room is left under the dollar ceiling--it can, within reason, borrow extra money before the deadline in order to build a cash buffer. This hoard can then be used to pay benefits, interest and principal on debt, and all the other ongoing requirements of the government.

Issuance of Federal Financing Bank Debt. The Treasury used this tactic for the first time during the late-1985 interruption, by far the most prolonged interruption during the past decade. The FFB has $15 billion in borrowing authority that is not subject to the debt limit. In a complicated maneuver, the Treasury took this unused amount and exchanged it for government account series held by the Civil Service Retirement trust fund, creating room under the debt ceiling for the sale of marketable securities. Although $15 billion is not a huge amount on the Treasury's financing scale, it lasted for a few crucial weeks and has been more or less continuously outstanding ever

1. For example, in September and October 1987, the Treasury had to delay issuing its regular weekly bills by 11 days. Thus, when it finally issued them, they carried maturities of 80 and 171 days (instead of the usual 91 and 182 days). Other examples abound.

since. No other significant sources of borrowing lie outside the debt limit.

Several other tactics are sometimes talked about but have never been used or proved necessary. Sales of gold from the government's stockpile, which is worth more than $80 billion at today's market prices, have been rejected. Some analysts presume the Treasury would order the banking system to honor some checks but not others; the Treasury points out that it lacks any legal authority to rank government spending. Similarly, some people assume the Federal Reserve System would simply cover the government's overdrafts until a new debt ceiling was passed, but the Federal Reserve lacks any legal authority to do that.

Why Have a Debt Limit?

The debt limit is a periodic source of anxiety to financial markets. The government has never defaulted on its principal and interest payments, nor has it failed to honor its other checks. But it has skated close to the edge. Even a temporary default--that is, a few days' delay in the government's ability to pay back its debt holders--could have serious repercussions in the financial markets, including a permanent increase in federal borrowing costs relative to yields on other securities as investors realize Treasury instruments are not immune to default, a temporary rise in the overall level of U.S. interest rates relative to foreign rates, and a temporary decline in the value of the dollar.

Many analysts view the statutory limit on federal debt as archaic. Through its regular budget process, the Congress already has ample opportunity to vote on overall revenues, outlays, and deficits (an opportunity that did not exist before the Congressional Budget and Impoundment Control Act of 1974). Voting separately on the debt is ineffective as a means of controlling deficits, because the decisions that necessitate borrowing are made elsewhere. By the time the debt ceiling comes up for a vote, it is too late to balk at paying the government's bills without incurring drastic consequences. In recent years, the debt limit has served mainly as a vehicle for other budgetary and unrelated legislation.

Even if a justification exists for a separate ceiling on federal debt, many analysts argue that it should not apply to trust fund holdings. Instead, they maintain, the debt ceiling should focus on debt held by the public--that is, the amount borrowed to finance deficits. Such borrowing is the chief concern of economists, participants in financial markets, and others who worry about the federal government's demands on credit markets. The President's Commission on Budget Concepts in 1967 refined the measurement of debt held by the public and urged that the statutory limit on federal debt be revised accordingly. Several recent proposals that are otherwise quite dissimilar have included such a change in the measurement of debt subject to limit. Examples are a budget reform package submitted by Congressman Rostenkowski in 1990, a reform package introduced by then-Congressman Panetta in 1992 (and its successor, introduced by Congressman Penny in 1993), and the balanced budget amendment advocated by Congressman Stenholm in 1992 and 1993.

Chapter Five

Other Interest

Although the government's net interest costs are dominated by interest on Treasury borrowing (as discussed in Chapter 2), the government also pays and collects interest related to a variety of other activities. A separate subfunction of the budget, known as "other interest," reflects these flows.

Outlays for other interest are estimated at negative $13 billion in 1993 and are expected to total negative $10 billion in 1998 (see Table 12). The largest components of this category are interest income of the government (hence the negative sign), partially offset by certain interest payments the government makes to individuals, businesses, or government entities. The biggest pieces making up this total are discussed further below.

The projected shrinkage in other interest continues a recent trend. Other interest totaled only negative $10 billion in 1980 and ballooned to negative $23 billion in 1985 and 1986. It has diminished slowly but steadily since then. The shrinkage chiefly reflects two developments. First, interest rates are sharply down from the levels of the early and mid-1980s. Second, the volume of direct government lending (which generates interest income for the government) has diminished for reasons as varied as weaker demand, tighter standards, and new budget accounting rules enacted in 1985 that have curbed the attractiveness of such loans. Other interest would fall even more sharply in the 1993-1998 period except that the borrowing needs of the Resolution Trust Corporation (RTC)--the agency charged with cleaning up the thrift industry--and the Bank Insurance Fund (BIF) continue to boost the totals.

By far the largest component of other interest is interest received from the Federal Financing Bank, a federal agency created in 1973 to consolidate the financing needs of other federal agencies. Although FFB handles the RTC and BIF borrowing mentioned above, the overall amount of interest FFB receives is expected to shrink gradually. Beginning in 1992 as a result of credit reform, agencies that previously financed their credit programs through FFB no longer used it as a financing source.

Also a result of credit reform, two new accounts appeared in other interest--interest paid to loan guarantee financing accounts and interest received from direct loan financing accounts. In contrast to FFB's interest income, these new accounts are both relatively small but are expected to grow.

Other relatively large components of other interest are intragovernmental interest, interest on deposits in tax and loan accounts, and interest on unemployment insurance loans to states, all representing interest income of the government; and payments to the Resolution Funding Corporation and interest on Internal Revenue Service (IRS) refunds, both representing interest payments made by the government.

FFB Interest and the Withering Away of the FFB

The Federal Financing Bank is a relatively obscure federal agency created to reduce federal borrowing costs by assisting with and coordinating agency borrowing. Agencies, government corporations, and government-sponsored enterprises that now have authority to borrow from FFB formerly borrowed directly from the credit markets to finance their operations or credit activity. The resulting proliferation of relatively small, illiquid issues carried higher interest rates than ordinary Treasury securities.

FFB can borrow at a lower cost than the individual entities because it borrows directly from the Treasury. Policymakers originally anticipated that FFB would issue its own debt, limited by the Congress to $15 billion. The bank's managers soon decided, however, that it was much more straightforward for the Treasury itself to issue regular public debt and for FFB to borrow from the Treasury. FFB has since taken advantage of a provision allowing unlimited borrowing from the Treasury. The bank charges the agencies its own cost of borrowing from the Treasury plus one-eighth of one percentage point.

FFB Holdings

As of September 30, 1992, the FFB portfolio totaled $164 billion, composed of the borrow-

Table 12.
Other Interest (By fiscal year, in billions of dollars)

	1993	1994	1995	1996	1997	1998
Interest Received from Federal Financing Bank						
From Bank Insurance Fund	-0.3	-0.2	-0.2	-0.1	a	0
From Resolution Trust Corporation	-2.2	-2.0	-2.1	-2.2	-1.9	-1.5
Other	-9.9	-9.3	-8.4	-7.4	-6.5	-5.8
Subtotal	-12.5	-11.5	-10.7	-9.7	-8.4	-7.3
Interest to and from Credit Reform Financing Accounts						
Paid to loan guarantee financing accounts	0.2	0.5	0.6	0.7	0.6	0.6
Received from direct loan financing accounts	-0.4	-0.9	-1.4	-1.9	-2.4	-2.9
Subtotal	-0.2	-0.4	-0.8	-1.2	-1.7	-2.3
Intragovernmental Interest	-2.8	-2.4	-2.3	-2.3	-2.4	-2.4
Interest on Tax and Loan Accounts	-0.5	-0.6	-0.7	-0.8	-0.8	-0.8
Interest on Unemployment Insurance Loans	-0.1	-0.2	-0.2	-0.3	-0.4	-0.4
Other Interest Receipts	-1.7	-2.1	-1.8	-1.8	-1.7	-1.6
Interest to Resolution Funding Corporation	2.3	2.3	2.3	2.3	2.3	2.3
Interest on Tax Refunds	2.4	2.2	2.2	2.4	2.7	2.9
Total	-13.1	-12.7	-11.9	-11.4	-10.5	-9.6

SOURCE: Congressional Budget Office's March 1993 baseline projections.

NOTE: Negative numbers represent interest income of the government; positive numbers represent interest expenses of the government.

a. Less than $50 million.

ings of 27 government entities. The portfolio consists of three types of holdings:

- Agency debt, which represents borrowings by agencies authorized to borrow directly from FFB to fund their operations ($81 billion as of September 30, 1992);
- Agency assets, which are pools of loans formerly sold to FFB, mostly by the Farmers Home Administration ($48 billion); and
- Government-guaranteed direct loans, which were loans FFB disbursed to private borrowers under the authorized guarantee of a federal agency ($35 billion).

Table 13 shows the FFB portfolio as of September 30, 1992. It also shows the portfolio at the end of fiscal years 1989 and 1986 for comparison.

Direct Loans Held by FFB. Although very few agencies still borrow from FFB, the heavy borrowing requirements of RTC and BIF have increased the bank's portfolio of agency debt in the short run. Mostly because of these two large borrowers, agency debt currently represents half of FFB's holdings.

Some of the funds spent by RTC and BIF are expected to be recouped through the sale of assets from failed institutions. Termed working capital, these funds do not increase the long-run borrowing of the government. RTC and BIF borrow from FFB exclusively for working capital needs. Their insurance losses, in contrast, are not expected to be recovered; such losses do not qualify for FFB financing. The precise split between working capital and losses will not be known, of course, until the last asset is sold. In the meantime, the Congressional Budget Office estimates that scheduled interest receipts from these two borrowers will slowly decline from 1993's figure of $2.3 billion.

The Tennessee Valley Authority (TVA) and the U.S. Postal Service also have authority to borrow directly from FFB. The Export-Import Bank is gradually paying off past borrowings but is no longer using its authority to borrow directly from FFB.

Agency Assets Purchased by FFB. Before the enactment in 1985 of the Balanced Budget and Emergency Deficit Control Act (commonly known as Gramm-Rudman), FFB's operations were considered off-budget; its transactions did not appear in the unified budget totals. Agencies, particularly the Farmers Home Administration (FmHA), took advantage of this status by packaging their loan portfolios and selling the packages to FFB. The agencies got a cash infusion from the sale, and the loans were shifted out of the budget totals.

This tactic accounted for much of the growth in the FFB's portfolio of agency assets before 1985. Gramm-Rudman placed the FFB's activities on-budget, thus reducing the bank's attractiveness. These days, FFB activity with agency assets is largely repayments, particularly of the aforementioned Farmer's Home Administration loans. FmHA loans account for $43 billion of the $48 billion in the bank's holdings of agency assets as of September 30, 1992, followed by $5 billion in Rural Electrification Administration loan assets.

FFB Lending Guaranteed by Agencies. The Federal Financing Bank disburses loans directly to private borrowers under an agency's guarantee. About $35 billion in outstanding loans existed on September 30, 1992, with the Rural Electrification Administration (REA) accounting for over half of this total. At the beginning of 1992, the only agencies that still used FFB as a funding source for guaranteed loans were TVA, REA, and the General Services Administration.

Beginning in 1992, many agencies that previously financed their credit programs through FFB no longer used it as a financing source. The Federal Credit Reform Act of 1990 required the Treasury to lend to agencies to finance direct loan and loan guarantee programs. As a result, agencies with credit pro-

Table 13.
Holdings of the Federal Financing Bank (End of fiscal year, in millions of dollars)

	End of 1986	End of 1989	End of 1992
Direct Loans Held by the Bank			
Export-Import Bank	14,268	10,984	7,693
Bank Insurance Fund	0	0	10,160
National Credit Union Administration	104	111	0
Resolution Trust Corporation	0	0	46,536
Tennessee Valley Authority	15,077	17,467	7,175
U.S. Postal Service	2,854	6,195	9,903
U.S. Railway Association	74	0	0
Subtotal	32,378	34,757	81,467
Agency Assets Held by the Bank			
Farmers Home Administration	65,374	53,311	42,979
Department of Health and Human Services			
Health Maintenance Organization Loan Fund	102	75	55
Medical Facilities Loan Fund	108	88	64
Overseas Private Investment Corporation	1	0	0
Rural Electrification Administration	4,241	4,183	4,599
Small Business Administration	26	12	4
Subtotal	69,852	57,668	47,702
Bank Lending Guaranteed by Government Agencies			
Defense Security Assistance Agency	18,797	10,189	4,344
Student Loan Marketing Association	4,970	4,910	4,820
Assistance to Rhode Island	0	0	125
Department of Housing and Urban Development			
Community Development Block Grants	300	283	174
New communities	32	0	0
Public housing notes	2,114	1,995	1,853
General Services Administration	403	378	777
Department of the Interior			
Guam Power Authority	34	31	27
Virgin Islands	28	26	24
NASA Space Communications Co.	888	995	0
Navy Ship Lease Financing	1,749	1,721	1,576
Defense Production Act	9	0	0
Rural Electrification Administration	21,460	19,275	18,143
Small Business Administration			
Small Business Investment Co.	967	555	143
State/Local Development Co.	816	799	634
Tennessee Valley Authority (Seven States Energy Corp.)	1,840	2,295	2,417
Department of Transportation, Railroad Rehabilitation and Improvement	61	37	19
Washington Metropolitan Area Transit Administration	177	177	177
Subtotal	54,641	43,667	35,254
Total			
All Holdings	156,871	136,092	164,422

SOURCE: Congressional Budget Office based on data from the Department of the Treasury.

NOTE: NASA = National Aeronautics and Space Administration.

grams are borrowing from the Treasury as needed, and current activity related to FFB's government-guaranteed loan portfolio is almost wholly repayments on loans made before 1992.

The Withering Away of the FFB

In addition to FFB's shift to on-budget status in 1985, several other factors have contributed to the shrinkage of its portfolio and the consequent decline in interest the government receives from FFB.

The gradual decline in interest rates since 1980 and 1981 has caused the FFB's portfolio to shrink. From 1985 to 1988, many FFB borrowers wanted to prepay loans obtained in the beginning of the decade, when interest rates were much higher. Loans carrying a book value of $13.3 billion were prepaid (usually with a prepayment premium or penalty attached) between October 1985 and December 1988. In addition, as an inducement to certain FFB borrowers to prepay, the Congress passed legislation to allow REA and foreign military sales borrowers to prepay their FFB loans without prepayment premiums.

Outright sales of loan assets (as opposed to prepayments) have further reduced the portfolio. In 1987, the Reagan Administration introduced a program to sell federal loan assets, particularly assets from the Rural Housing Insurance Fund and the Rural Development Insurance Fund. In addition, a 1991 program to forgive loans for foreign military sales reduced the FFB portfolio by about $4.5 billion.

As mentioned earlier, credit reform effectively cut off most of FFB's financing of new lending programs in 1992. With few exceptions, all federal government loans made in 1992 and beyond are subject to the new credit budgeting and accounting procedures passed as part of the Federal Credit Reform Act. Credit reform is discussed in a later section.

FFB Debt Issuance and the Debt Ceiling

As mentioned above, FFB was created to consolidate the borrowings of agencies that otherwise might go to the credit markets with their own securities. At the time, policymakers thought that FFB might sell its own bonds and gave the bank authority to sell up to $15 billion worth. In late 1985, during a prolonged crisis with the debt ceiling, that authority came into play. Because that amount would be exempt from the statutory ceiling on regular Treasury debt, the Treasury issued $15 billion worth of FFB securities to the Civil Service Retirement (CSR) trust fund, replacing regular trust fund holdings and thus opening up some breathing room under the debt limit (see Chapter 4).

The $15 billion in FFB securities has been more or less continuously held by the CSR trust fund ever since. Interest on it amounts to about $1.3 billion a year. FFB is quite indifferent as to whether it owes the interest to the Treasury or to the CSR trust fund. The $1.3 billion does not appear in the budget as an interest receipt with the rest of the interest FFB pays to the Treasury. Rather, it appears as an interest receipt of the CSR trust fund in another part of the budget, mildly distorting the allocation of net interest outlays.

Estimating FFB Interest

The Congressional Budget Office projects interest from FFB by first estimating future lending and repayments. As noted, RTC and BIF are the only agencies currently engaged in large-scale borrowing from FFB. CBO projects this borrowing in tandem with its overall projections of spending for deposit insurance, and calculates the resulting interest payments using its assumptions about future Treasury bill rates. Other agencies' transactions with FFB consist overwhelmingly of debt repayments, and CBO estimates that interest received from FFB will gradually fade as these

repayments are received and the FFB portfolio shrinks.

Interest to and from the Credit Reform Financing Accounts

The Federal Credit Reform Act of 1990 transformed the budgetary treatment of federal credit programs to address long-standing biases stemming from the old cash-based accounting for these programs. These biases generally led the budget to understate the cost of guarantee programs and exaggerate the costs of direct loan programs, at least in the short run. A direct loan was recorded in the budget as a cash outlay in full when it was disbursed, even though repayments were expected. In contrast, a guaranteed loan disbursed by a private lender was recorded in the budget only when cash outlays were made on default. (In fact, if the federal government collected a fee when the guarantee was issued, a collection was recorded instead of an outlay, even though future resources were irrevocably committed.)

The key reform involved expressing credit costs in the budget as subsidies rather than as cash flows. Now, when the government makes or guarantees a loan, the budget reflects the expected long-term loss (or, occasionally, gain) on the transaction. This subsidy is the discounted present value of all future cash flows: generally, disbursements and repayments in the case of direct loans; and fees, defaults, and recoveries in the case of guarantees.

Credit reform, then, removes the cash flows from the budget totals and replaces them with estimated subsidies. But the cash flows remain a part of the government's finances and influence the Treasury's borrowing requirements. Credit reform places the cash flows "below the line," that is, as a means of financing the deficit. To do this, the Treasury established a set of financing accounts outside the regular budget totals. Interest paid to and from these financing accounts, however, remains a part of the budget totals and will be a growing component of the subfunction for other interest.

Direct loan programs disburse money and await repayment and must cover their cash needs in the interim. They borrow this money from and pay interest to the Treasury. The subsidy appropriation they receive at the outset reduces the amount they need to borrow. In sum, a typical financing account for direct loans will pay interest to the Treasury, generating a negative outlay in the subfunction for other interest.

The financing accounts for loan guarantee programs, in contrast, will usually show positive outlays in other interest. Most guarantee programs enjoy favorable cash flows at the outset because they typically collect guarantee fees while any defaults still lie down the road. The subsidy appropriation is another immediate source of income to the guarantee financing account, as is the interest earned on all balances held in the account. In sum, a loan guarantee financing account will usually, in the short run, collect interest from the Treasury, generating a positive outlay in other interest.

Credit reform applies only to loans obligated beginning in fiscal year 1992, so the resulting interest flows will be paltry for the next few years. Even by 1998, CBO expects that the net interest receipts for direct loans and loan guarantees will be just a little more than $2 billion. CBO estimates interest by projecting the cumulative balances in the financing accounts--as determined by the subsidies transferred into these accounts along with the ordinary cash flows (disbursements, repayments, fees, and so forth) coursing through them.

Intragovernmental Interest Payments to the Treasury

The Congress allows certain government corporations and federal entities to borrow from the Treasury to finance part of their program costs. This borrowing authority is conferred either through permanent authorizing language or through budget appropriations. The Treasury and the individual agencies decide on the terms of the loan, taking into account the needs of the program being financed. The agency borrowings include both long- and short-term debt, with the interest rate varying by program.

Intragovernmental interest payments to the Treasury are a substantial cost for many federal agencies, especially the Commodity Credit Corporation, the Farmers Home Administration, the Department of Housing and Urban Developments's housing program for the elderly and handicapped, and the Bonneville Power Administration. These four account for $2.7 billion of the $2.8 billion in intragovernmental interest to be paid to the Treasury in 1993.

Intragovernmental interest payments to the Treasury are counted as an agency outlay in the appropriate budget function and as an offsetting receipt in the subfunction for other interest. Because the Treasury receipts offset outlays in individual programs, intragovernmental interest payments do not affect total outlays or the deficit.

Interest Earned on Deposits in Tax and Loan Accounts

The federal government, like individuals and corporations, must maintain a working balance to cover current expenditures. Because receipts never precisely match disbursements in timing and amount, total funds at the Treasury's disposal vary widely over short periods, especially around tax and financing dates. The Treasury Department holds its cash balances in two types of accounts--demand deposit balances at Federal Reserve Banks, and Treasury tax and loan accounts at commercial banks.

Commercial banks throughout the country that qualify as special depositories maintain tax and loan accounts for the Treasury that businesses can use to deposit taxes withheld from employee paychecks, corporate income taxes, and other recurring payments. In exchange for the short-term use of these funds, the commercial banks pay interest to the Treasury at the federal funds rate minus one-quarter of one percentage point.

Balances in the tax and loan accounts are highly volatile. For 1992, they ranged from a low of $6 billion to a high of $37 billion and averaged $20 billion. The interest the Treasury receives varies accordingly. Interest received by the Treasury is projected to rise gradually from 1993 through 1998 (from $0.5 billion to $0.8 billion) based on a projected average balance of $19.8 billion in all years and a gradually increasing federal funds rate.

Interest Received from Unemployment Insurance Loans to States

This once dormant account is seeing renewed activity as a result of the recent recession. States that deplete their unemployment insurance trust funds may receive advances from the federal government to meet their obligations. After a one-year grace period, states must pay interest on these borrowings. This provision was enacted as part of the Omnibus

Budget Reconciliation Act of 1981; before then, states could borrow interest-free from the federal government.

Interest paid by the states on the advances necessitated by the 1981-1982 recession peaked at $323 million in 1986, then disappeared by 1990 as loans were paid off. Interest began trickling in again in 1991 in the wake of the most recent recession. Based on Department of Labor projections of advances and repayments, and on CBO projections for interest rates the Unemployment Trust Fund earns on its Treasury securities, interest received is expected to increase steadily through 1996 and then begin to decline as the current advances are repaid.

Payment to the Resolution Funding Corporation

Like interest on IRS refunds mentioned next, and in contrast to most items in the subfunction other interest, this payment to holders of bonds issued by the Resolution Funding Corporation represents an interest cost of the federal government. REFCORP is an off-budget, government-sponsored enterprise set up to provide initial funding for the Resolution Trust Corporation.

The Bush Administration originally urged that the entire cost of the savings and loan crisis, which it then optimistically pegged at $50 billion, be financed with REFCORP bonds. Ultimately, a compromise allowed for $30 billion worth of authority to issue REFCORP bonds. The bonds bore 30- and 40-year maturities and were sold for 26 to 40 basis points (that is, 0.26 to 0.40 percentage points) above comparable Treasury rates; the average interest rate on the $30 billion in bonds was 8.7 percent. The Treasury's interest payments will remain constant at $2.3 billion per year (with another $300 million contributed by the savings and loan industry) through 2019 and will then decline.

Interest Paid on IRS Refunds

The Treasury pays interest on individual, corporate, and excise tax refunds that are paid more than 45 days after the filing date. Interest on IRS refunds has recently cost $2 billion to $3 billion a year and is dominated by interest on amended and audited income tax returns.

Corporate and individual taxpayers can file an amended return for a previous year; if a refund is due, the IRS calculates interest from the initial filing date (for example, beginning April 15, 1991, for a 1990 tax return). Interest on corporate refunds is generally the largest category because corporations may carry back their tax liabilities by amending returns from prior years. Many audited returns result in a refund to the taxpayer, and interest is likewise calculated from the initial filing date. Amended and audited returns accounted for 15 percent and 50 percent, respectively, of interest paid by the IRS in 1990 through 1992.

In both cases, the payment of interest is justified because the Treasury had use of money that was later found to belong to the taxpayer. The interest rate used is defined in statute as the federal short-term rate plus 2 percentage points.

Chapter Six

Simulations with the CBO Interest Model

To project future interest costs, the Congressional Budget Office employs a versatile model that integrates three key sets of assumptions--the size of projected deficits, the levels of future interest rates, and the mix of Treasury financing. The model receives its heaviest workout twice a year, when CBO issues its baseline projections (budget projections that assume a continuation of current taxing and spending policy). Inevitably, some of the assumptions that go into the baseline will not be borne out. Deficits may differ from CBO's projections, either because of policymakers' decisions or for economic and technical reasons; interest rates may diverge from CBO's assumptions; or the Treasury may opt for a different mix of financing. The sensitivity of the interest projections to any of these key assumptions, though, can be easily demonstrated using the same model.

The CBO Model

CBO's interest model is designed to produce budget estimates under a variety of assumptions about economic and fiscal policy. Basically, the model starts with data detailing the present composition of federal debt, as published in the Treasury Department's *Monthly Statement of the Public Debt*. The model then projects changes in the debt for up to six years by rolling over (refinancing) the current debt as it matures, and adding new debt as determined by deficit and borrowing assumptions.

Rolling over the debt is a fairly simple process. The model ascertains when current securities mature; at that time, it reissues them, assigning the securities the same length as they initially had (that is, a three-month bill is reissued as a three-month bill) along with a new interest rate determined by CBO's economic assumptions.

Adding new debt is more complicated. The key factor determining new borrowing is the total federal deficit, the gap between spending and revenues. The deficit, however, always differs slightly from actual borrowing because of other means of financing (for example, cash reduction, interest accrued but not paid, and other factors described in Chapter 2); CBO makes explicit assumptions about these factors. Also, some borrowing may take the form of agency debt, in lieu of Treasury debt.

Once total Treasury borrowing has been estimated--by taking the deficit, minus other means of financing, minus debt issued by agencies--it must be assigned a mix (among types of Treasury securities) and seasonality (because borrowing is not spread evenly over the 12 months of each year). CBO assumes that the Treasury will fully accommodate future demand for nonmarketable securities such as savings bonds and state and local government series, but that the bulk of the financing task will continue to be met by marketable securities (bills, notes, and bonds). The model incorporates all of these assumptions to project new debt issuance. This new debt is assigned a maturity and an interest rate and is henceforth treated in the model in exactly the same way as existing debt.

Table 14.
Baseline Projections of Net Interest (By fiscal year, in billions of dollars)

	Actual 1992	Projected 1993	1994	1995	1996	1997	1998
Interest on the Public Debt (Gross interest)							
Public issues							
Marketable securities	188	186	197	216	233	251	270
Other[a]	24	21	22	23	24	25	27
Subtotal	212	207	219	239	257	276	297
Special issues (Government account series)	81	89	90	94	99	105	110
Total	292	296	309	333	356	381	407
Interest Received by Trust Funds	-78	-84	-86	-90	-94	-100	-105
Other Interest[b]	-15	-13	-13	-12	-11	-10	-10
Net Interest	199	199	211	231	251	271	293

SOURCE: Congressional Budget Office.

NOTE: Minus sign denotes offsetting receipt.

a. Primarily interest on savings bonds, state and local government issues, Thrift Savings Plan, and foreign and domestic zero-coupon bonds.

b. Primarily interest income from the Federal Financing Bank and from other sources.

The CBO interest model also projects the interest earned by trust funds and other government accounts (see Chapter 3). CBO explicitly projects the surpluses of major trust funds by weighing their income (from payroll taxes, excise taxes, intragovernmental transfers, and so forth) and their spending. Adding these future investments to the funds' current balances, in conjunction with interest rates drawn from CBO's economic forecast, affords a projection of interest income. Unlike interest on public issues such as Treasury bills and notes, this interest remains in the government's coffers; because it is both paid and received by the government, it does not contribute to the deficit.

Baseline Projections of Interest and Debt

CBO's March 1993 projections indicate that net interest payments will rise from an estimated $199 billion in 1993 to $293 billion in 1998, a 47 percent jump (see Table 14). Net interest is already the third largest category of spending, behind Social Security and defense; if current trends continue, it may well overtake the defense budget in the mid-1990s.[1]

Interest paid on public issues is expected to cost around $207 billion in 1993; interest on special issues (paid to government accounts) adds another $89 billion. In the budget, these two dissimilar payments, totaling $296 billion in 1993, are lumped together and labeled interest on the public debt. Interest on the public debt is occasionally referred to as gross interest.

Recent declines in interest rates, particularly on short-term issues, helped keep interest costs from ballooning in 1992 even in the face of heavy borrowing, and continue to re-

1. Congressional Budget Office, "An Analysis of the President's February Budgetary Proposals," CBO Paper (March 1993), Appendix A.

strain interest payments in 1993. However, persistently large deficits and gradually rising interest rates are forecast to cause interest on the public debt to climb to $407 billion by 1998.

Part of this growth reflects the continued issuance of debt to trust funds that are running surpluses. Such issuance boosts gross interest but is offset by interest received by trust funds, which CBO projects will increase from $84 billion in 1993 to $105 billion in 1998. Other interest receipts (more fully discussed in Chapter 5) also counter interest costs to the tune of $10 billion to $13 billion per year.

Underlying these interest projections are debt figures driven by CBO's deficit estimates (see Table 15). The Treasury is expected to borrow $282 billion to cover the 1993 deficit, after minor contributions from agency debt and other means of financing. Deficits, and hence borrowing, subside slightly after 1993 as the economic recovery continues, and as caps on discretionary spending (a legacy of 1990's budget summit agreement) limit outlays through 1995. But the deficit then resumes its climb and reaches $360 billion by 1998.

Such large deficits lead to a rapidly rising level of debt held by the public. From almost $3 trillion at the end of 1992, the amount of debt held by the public will climb to $4.8 trillion in 1998. As a percentage of gross domestic product, debt increases from 53 percent in 1993 to 62 percent in 1998. (See Box 4 for projections of interest and debt through 2003.)

Although debt held by the public is the measure most useful for economic analysis, many people are quicker to recognize the gross fed-

Table 15.
Baseline Projections of Federal Debt (By fiscal year, in billions of dollars)

	Actual	Projected					
	1992	1993	1994	1995	1996	1997	1998
Debt Held by the Public, Start of Year	2,688	2,999	3,282	3,572	3,861	4,157	4,484
Deficit							
Financed by borrowing							
Treasury debt	310	282	290	288	295	327	365
Agency debt	1	2	1	1	1	1	1
Subtotal	311	283	290	288	296	328	365
Financed by other means	-21	18	-4	-4	-6	-6	-6
Total	290	302	287	284	290	322	360
Debt Held by the Public, End of Year	2,999	3,282	3,572	3,861	4,157	4,484	4,850
Debt Held by Government Accounts	1,004	1,103	1,205	1,316	1,433	1,549	1,663
Gross Federal Debt, End of Year	4,003	4,385	4,778	5,177	5,589	6,034	6,513
Memorandum:							
Debt Held by the Public as a Percentage of GDP	51.1	53.2	54.9	56.3	57.7	59.4	61.6

SOURCE: Congressional Budget Office.

eral debt, a larger number that incorporates holdings of the Social Security and other government accounts. These accounts, as noted in Chapter 3, held slightly more than $1 trillion in federal debt at the end of 1992. CBO estimates that such holdings will rise to $1.7 trillion by 1998, chiefly because of continued surpluses in Social Security and federal employees' retirement plans. Gross federal debt, then, is expected to rise from $4 trillion in 1992 to $6.5 trillion in 1998.

Box 4.
The Outlook for Interest and Debt Through 2003

If current budgetary policies remain unchanged, the Congressional Budget Office (CBO) projects that large deficits will persist over the next five years. The size of these deficits is expected to decline slightly through 1995 as the Budget Enforcement Act remains in effect. However, starting in 1996, annual deficits begin to climb again, reaching $360 billion in 1998. What implications, then, do current policies have for interest payments and the accumulation of debt over a longer time frame?

To answer this question, CBO has prepared a version of its budget projections through 2003--a full five years beyond the usual baseline horizon. Of course, these projections are not nearly as detailed as CBO's full-fledged baseline. Rather, they try to gauge the apparent trends in broad clusters of the budget. Consistent with this general approach, CBO does not use its full-fledged model to project interest costs a decade ahead. Churning individual securities every month for an 11-year period would clearly be overkill; instead, CBO uses a streamlined, annual version of its model.

Under current taxing and spending policies, the deficit would top $650 billion in 2003--more than twice today's level. With deficits accumulating at such a rapid clip, debt held by the public would reach nearly $7.5 trillion 10 years from now (see table). From this year's level of 53 percent, debt held by the public as a percentage of gross domestic product (GDP) would rise to 77 percent in 2003.

Correspondingly, interest payments would also rise dramatically. Net interest in 2003 would total $436 billion, or 4.5 percent of GDP. Net interest would be more than double this year's level--about as big as outlays for Medicare and second only to Social Security payments as the largest single item in the budget.

The Outlook Through 2003 (By fiscal year, in billions of dollars)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
					In Billions of Dollars						
Deficit	302	287	284	290	322	360	406	456	515	580	655
Debt Held by the Public	3,282	3,572	3,861	4,157	4,484	4,850	5,261	5,723	6,244	6,830	7,490
Net Interest	199	211	231	251	271	293	314	339	368	400	436
					As a Percentage of GDP						
Deficit	4.9	4.4	4.1	4.0	4.3	4.6	5.0	5.3	5.8	6.3	6.8
Debt Held by the Public	53.2	54.9	56.3	57.7	59.4	61.6	64.2	67.0	70.1	73.6	77.4
Net Interest	3.2	3.2	3.4	3.5	3.6	3.7	3.8	4.0	4.1	4.3	4.5

SOURCE: Congressional Budget Office, "An Analysis of the President's February Budgetary Proposals," CBO Paper (March 1993), Appendix A.

Table 16.
Baseline Interest Rate Assumptions for Selected Maturities (By fiscal year, in percent)

Type of Issue	1993	1994	1995	1996	1997	1998
			New Borrowing			
Three-Month Treasury Bills[a]	3.1	3.5	4.2	4.7	4.8	4.9
Five-Year Treasury Notes	6.1	6.2	6.2	6.2	6.3	6.2
Thirty-Year Treasury Bonds	7.3	6.9	6.9	6.8	6.8	6.7
			All Outstanding Marketable Debt			
Average Interest Rate on All Marketable Debt	6.7	6.5	6.5	6.5	6.5	6.4

SOURCE: Congressional Budget Office.

a. Bank-discount basis.

Alternative Scenarios

CBO's model has been tested often and found to produce good estimates of interest costs (see Appendix B). And it is versatile enough to project net interest outlays for many alternative scenarios. Common requests usually involve demonstrating how the budget outlook would differ if interest rates or deficits deviated from CBO's baseline path. Today's low short-term rates have also prompted questions about the Treasury's mix of debt maturities.

Higher Interest Rates

CBO's baseline projections of interest costs assume that average interest rates on outstanding marketable debt will decline from 6.7 percent in 1993 to around 6.4 percent in 1998 (see Table 16). Short-term rates on new borrowing are expected to rise to 4.9 percent as the economy picks up over the next few years, but long-term rates should remain relatively stable.

Interest rates, however, are a notorious source of uncertainty in budget projections. Higher (or lower) rates on government securities affect interest costs on huge volumes of new borrowing and on debt that is refinanced. CBO estimates that if interest rates for all Treasury securities were 1 percentage point higher than the baseline beginning in July 1993, outlays (and therefore the deficit) would be approximately $12 billion higher in 1994 and $43 billion greater in 1998 (see Table 17).[2]

Higher interest rates boost interest costs both directly and indirectly. The direct effects of higher interest rates on net interest outlays stem from higher costs on the amounts of new borrowing and refinancing that are already projected in the baseline. Indirect effects (also termed debt-service effects) result from the additional borrowing needed to cover greater interest costs. CBO further partitions the costs into those attributable to higher short-term (Treasury bill) and medium- and long-term (Treasury note and bond) interest rates.

The increase in outlays stemming from a rise in short-term interest rates would be minimal for the few months remaining in fiscal year 1993. By 1998, though, the increase of 1 percentage point in short-term rates

2. The scenario for higher interest rates presented here varies slightly from the analogous rule of thumb discussed in Appendix C, "How the Economy Affects the Budget," in CBO's *The Economic and Budget Outlook: Fiscal Years 1994-1998* (January 1993). Interest rates in this report are adjusted upward beginning in July 1993, whereas those in the earlier report were adjusted beginning in January 1993.

Table 17.
Change in Interest Costs Resulting from an Increase of One Percentage Point in Interest Rates Beginning in July 1993 (By fiscal year, in billions of dollars)

Source of Change	1993	1994	1995	1996	1997	1998
All Maturities						
Caused Directly by Higher Interest Rates						
Refinancing of existing debt	0.5	8.8	13.3	15.8	17.9	19.8
New borrowing	a	3.1	6.3	9.5	12.6	16.1
Other interest	-0.1	-0.3	-0.3	-0.1	0.2	0.4
Subtotal	0.4	11.6	19.3	25.1	30.7	36.3
Caused by Resulting Increase in Deficit (Debt service)	a	0.4	1.3	2.7	4.6	6.9
Total	0.4	11.9	20.6	27.8	35.3	43.2
Short-Term Rates (Bills)						
Caused Directly by Higher Short-Term Interest Rates						
Refinancing of existing debt	0.5	6.0	6.7	6.7	6.7	6.7
New borrowing	0.1	1.1	1.9	2.7	3.6	4.6
Other interest	-0.1	-0.1	a	0.1	0.1	0.1
Subtotal	0.5	7.0	8.7	9.6	10.4	11.4
Caused by Resulting Increase in Deficit (Debt service)	a	0.2	0.7	1.3	2.0	2.8
Total	0.5	7.3	9.4	10.9	12.4	14.2
Medium- and Long-Term Rates (Notes and bonds)						
Caused Directly by Higher Medium- and Long-Term Interest Rates						
Refinancing of existing debt	0.1	2.8	6.6	9.1	11.2	13.1
New borrowing	a	2.0	4.3	6.7	9.0	11.5
Other interest	-0.1	-0.2	-0.3	-0.2	0.1	0.2
Subtotal	a	4.5	10.6	15.6	20.3	24.9
Caused by Resulting Increase in Deficit (Debt service)	a	0.1	0.6	1.4	2.6	4.1
Total	a	4.7	11.2	17.0	22.9	29.0

SOURCE: Congressional Budget Office.

a. Less than $50 million.

would generate a $14 billion increase in outlays. Approximately $11 billion of the 1998 total stems from direct effects, and $3 billion from the resulting increase in deficits. Of the direct effects, the extra cost of simply refinancing today's $680 billion in outstanding Treasury bills would amount to $7 billion per year.

An increase of 1 percentage point in medium- and long-term (maturity longer than one year) rates would ultimately have an even bigger effect. Initial effects would be negligible, but by 1998 interest costs would be $29 billion higher than the baseline. Included in this figure is $4 billion in further debt-service costs caused by the increase in deficits over the 1993-1998 period.

Clearly, in the first year the budget is more sensitive to short-term than to longer-term interest rates. Within a given year, all bills outstanding will have to be refinanced at least once, if not four times; therefore, all short-term issues will feel the full brunt of higher rates almost immediately. Notes and bonds, however, mature more slowly and thereby take time to build greater refinancing costs.

Specifically, unlike bills, only around one-fifth of notes and hardly any bonds will be up for refinancing within one year. Looking solely at 1994, then, a rise of 1 percentage point in interest rates would lift refinancing costs for medium- and long-term issues by $2.8 billion compared with an extra $6 billion for bills. Over five years, though, two-thirds of the $2.2 trillion currently outstanding in notes and bonds will mature at least once. Refinancing these longer-term issues would add an extra $13.1 billion to the baseline in 1998, whereas refinancing bills would add $6.7 billion in that year.

Greater interest costs on new borrowing (in response to an increase of 1 percentage point in interest rates) are largely attributable to medium- and long-term issues. Since notes and bonds account for approximately 75 percent of marketable issues, their additional borrowing costs would reasonably be expected to be three times those of bills, given an equal rate increase. As expected, by 1998, extra costs on new borrowing would add $4.6 billion for short-term issues and $11.5 billion for issues of longer maturities (see Table 17).

Other interest is not greatly affected, on balance, by fluctuations in interest rates. As Chapter 5 detailed, Federal Financing Bank receipts dominate this category. The FFB holds mostly long-term debt and extends relatively few new loans; rate fluctuations, therefore, have little impact on the interest paid on its stock of debt.[3] Furthermore, because other interest includes both interest payments (such as interest on tax refunds) and interest income (such as interest on Treasury cash balances), changes in interest rates often have roughly offsetting effects. All told, higher interest rates would lead to only marginally larger receipts of other interest than in the March 1993 baseline.

This interest rate simulation does not take into account the effect of higher rates on a few other interest-sensitive programs such as guaranteed student loans. It also assumes that gross domestic product, inflation, and other economic variables remain on their baseline paths--leaving revenues and noninterest outlays unchanged. In fact, all economic variables are uncertain and affect one another. But as this simulation shows, the size and rate of growth of the debt are so large that even a relatively small forecasting error of 1 percentage point in interest rates alone has enormous annual and cumulative budgetary implications.

Higher Deficits

Because the deficit substantially determines the federal government's borrowing needs, any change in the deficit--regardless of its source--affects projections of interest costs.

3. The FFB currently lends substantial amounts to two deposit insurance agencies--the Resolution Trust Corporation and the Bank Insurance Fund--for their working capital. An increase in interest rates would affect the interest these agencies pay to the FFB, but that effect is entirely intrabudgetary.

Such a change might stem from policymakers' decisions, from changes in the economy, or from any of the technical factors that affect federal tax receipts and spending. To illustrate the effect of higher deficits on interest costs, CBO simulated both a single, one-time $10 billion increase in the deficit and annual $10 billion increases in 1994 through 1998 (see Table 18).

A $10 billion decrease in revenues or a $10 billion increase in noninterest spending in 1994 would boost interest costs above the baseline by $0.3 billion. Intuitively, this result is easy to explain; with market interest rates for medium-term Treasury notes around 6 percent, and with an average dollar borrowed around midyear, a half-year's interest on $10 billion is approximately $300 million. The total increase in the 1994 deficit would be $10.3 billion. The higher level of debt outstanding would raise interest costs in each subsequent year as well, by amounts growing from $0.6 billion in 1995 to $0.7 billion in 1998.

A deficit that was $10 billion higher in each year from 1994 through 1998 would have the same effect in 1994 as in the first illustration. By the end of 1998, though, the additional debt would cumulate to $58 billion, causing interest outlays to be $3 billion higher.

Reductions in the federal government's borrowing have the opposite effects of those shown in Table 18. A $10 billion increase in revenues or decrease in noninterest spending in each year, for example, would lower interest outlays by $0.3 billion in 1994 and $3 billion in 1998--exactly the reverse of the illustration. The effects of the compounding of interest are so dramatic that most deficit reduc-

Table 18.
Changes in Deficit, Interest Costs, and Debt Resulting from $10 Billion in Extra Borrowing (By fiscal year, in billions of dollars)

	1994	1995	1996	1997	1998
$10 Billion in Extra Borrowing in 1994 Only					
Change in Deficit					
Caused directly by lower revenues or higher noninterest spending	10.0	0	0	0	0
Caused by higher interest costs (Debt service)	0.3	0.6	0.6	0.7	0.7
Total	10.3	0.6	0.6	0.7	0.7
Change in Debt, End of Year	10.3	10.9	11.5	12.2	12.9
$10 Billion in Extra Borrowing in 1994 Through 1998					
Change in Deficit					
Caused directly by lower revenues or higher noninterest spending	10.0	10.0	10.0	10.0	10.0
Caused by higher interest costs (Debt service)	0.3	0.9	1.6	2.3	3.0
Total	10.3	10.9	11.6	12.3	13.0
Change in Debt, End of Year	10.3	21.2	32.7	45.0	58.0

SOURCE: Congressional Budget Office.

tion packages include substantial interest savings that would result from the suggested spending reductions or revenue increases.

A Change in Financing Mix: Shifting from Medium- and Long-Term Financing to Bills

The Treasury's choice of a marketable financing mix also affects interest costs. For more than a decade, the Treasury has sought to maintain a steady financing pattern--emphasizing notes and bonds--which it believes promotes a smoothly functioning market. In addition, borrowing at longer maturities enables the Treasury to determine future interest costs with greater certainty. But the recent, record gap between short- and long-term interest rates spurred both the Congress and the President to actively debate whether the Treasury ought to save money by replacing long-term debt with less expensive short-term debt.

Shift Long-Term Financing to Bills. CBO's baseline assumes that the Treasury sells $37 billion of bonds each year, continuing the auction size that prevailed in early 1993. But what if the Treasury stopped selling bonds and raised the extra money in bills? Such estimates contain a wrinkle; bills are discount securities, and their face value exceeds the amount of cash raised. To raise an extra $37 billion per year in cash, the Treasury must auction a slightly greater face amount of bills ($39 billion, more or less, depending on interest rates). CBO's simulations incorporate this complexity.

Table 19.
Change in Interest Costs Resulting from a Shift from Bonds to Bills
(By fiscal year, in billions of dollars)

	1994	1995	1996	1997	1998
Shift from Bonds to Bills					
Caused Directly by Shift in Financing					
Bills	0.7	2.5	4.6	6.7	8.8
Bonds	-1.3	-3.8	-6.4	-8.9	-11.4
Subtotal	-0.5	-1.4	-1.8	-2.1	-2.5
Caused by Resulting Decrease in Deficit (Debt service)	a	-0.1	-0.2	-0.3	-0.5
Total	-0.6	-1.4	-1.9	-2.4	-3.0
Shift from Bonds to Bills Along with an Increase in Short-Term Interest Rates of 5 Basis Points					
Caused Directly by Shift in Financing					
Bills	1.0	2.9	5.1	7.3	9.5
Bonds	-1.3	-3.8	-6.4	-8.9	-11.4
Subtotal	-0.3	-0.9	-1.2	-1.6	-1.9
Caused by Resulting Decrease in Deficit (Debt service)	a	a	-0.1	-0.2	-0.3
Total	-0.3	-0.9	-1.4	-1.8	-2.2

SOURCE: Congressional Budget Office.

NOTE: The simulations assume a complete cessation of bond sales, with the necessary funds instead borrowed in bills.

a. Less than $50 million.

If the Treasury were to stop selling bonds altogether starting in 1994 and replace them with short-term bills, and if CBO's assumptions about interest rates proved correct, borrowing at lower rates would save $0.6 billion in the first year, growing to $3 billion in 1998 (see Table 19 on page 61). By the end of 1998, around $185 billion would have been hypothetically switched from bonds to bills, with almost 2 percentage points separating the financing costs on the two instruments in that year.

This estimate assumes no feedback effects on interest rates. Some analysts argue, though, that the increased supply of Treasury bills could push short-term rates higher than they otherwise would be. As discussed in Chapter 7, economic research suggests that short-term rates would probably rise no more than a few basis points, if at all, as a result of such a switch in financing mix. But even a small response would shrink (though almost certainly not eliminate) the budgetary savings because of the huge amount of Treasury bills already outstanding that would almost immediately be hit by the higher rates.

As an example, Table 19 also shows the effect of the identical policy (switching from bonds to bills) but with a corresponding jump in short-term interest rates of 5 basis points. The feedback effect of 5 basis points was arbitrarily chosen for purposes of illustration. The same analysts who think such an effect would occur also believe that long-term rates would drop slightly; however, the Treasury would not benefit directly from such a drop if it were no longer selling long-term bonds. Under this scenario, savings from borrowing more short-term securities would be $0.3 billion smaller in 1994 and $0.8 billion smaller in 1998 than they would have been with no increase in bill rates.

Shift Both Medium- and Long-Term Financing to Bills. Few debt management proposals would eliminate bond sales completely, as in the previous example. However, in early 1993, many analysts began eyeing a cutback in both medium- and long-term financing. After all, rates on medium-term notes also exceed rates on Treasury bills, and notes account for even more dollars of borrowing than bonds. In May, the Treasury confirmed that it would move in that direction.

Table 20.
Change in Interest Costs Resulting from a Shift from Bonds and Notes to Bills (By fiscal year, in billions of dollars)

	1994	1995	1996	1997	1998
Caused Directly by Shift in Financing					
Bills	0.7	2.1	3.7	5.5	7.4
Notes	-0.7	-1.5	-2.4	-3.5	-4.7
Bonds	-0.5	-1.5	-2.5	-3.6	-4.6
Subtotal	-0.5	-1.0	-1.3	-1.6	-2.0
Caused by Resulting Decrease in Deficit (Debt service)	a	-0.1	-0.1	-0.2	-0.4
Total	-0.5	-1.1	-1.4	-1.8	-2.4

SOURCE: Congressional Budget Office.

NOTE: The simulation assumes a cutback to $22 billion per year in bond financing and the elimination of seven-year notes, with the necessary funds instead borrowed in bills and in two- and three-year notes.

a. Less than $50 million.

The Treasury announced that it would begin selling 30-year bonds just twice a year instead of quarterly. At least initially, the total volume of bond sales would be about $11 billion at each auction, or $22 billion a year (versus $37 billion a year in CBO's baseline projections). The Treasury also stated that it would no longer sell seven-year notes, which had been contributing almost $10 billion each quarter to its coffers. The seven-year note had never been quite as popular, when measured by the volume of bids it attracted, as the five- and ten-year notes.

In sum, then, the change announced by the Treasury would chop roughly $15 billion in annual bond financing and $40 billion in seven-year note financing. The extra cash would be raised in relatively short-term markets: in Treasury bills and in two- and three-year Treasury notes.

CBO judges that the Treasury's policy shift would directly trim interest costs by about $500 million in 1994 and by $2 billion in 1998 (see Table 20). And once again, the policy would also cut interest costs indirectly; by reducing the amount of deficits to be financed, the switch would pare debt-service costs by an extra $0.4 billion in 1998.

Traditionally, the future mix of Treasury securities was viewed as one of the many technical assumptions that CBO and the Office of Management and Budget had to devise in order to do their multiyear budget projections. But the issue's prominence in early 1993 shone a spotlight onto the question of debt management. Thus, some of the goals and trade-offs that the Treasury faces in setting a debt management policy are the subject of the next chapter.

Chapter Seven

Alternative Debt Management Policies

Net interest expenditures now make up about one-seventh of the budget and about 3.5 percent of gross domestic product, both more than twice their levels of two decades ago. The obvious question is whether the Treasury could pay less. Of course, two of the three fundamental factors fueling federal interest costs lie outside the Treasury's control. The first--the federal deficit--is determined by the taxing and spending decisions of policymakers, and by the economic and other uncontrollable factors that influence government cash flows. The second--interest rates--is determined by the interplay of market forces and fiscal and monetary policies. Only the third--the types of securities offered and their method of sale--affords any latitude to the Treasury, and it is the weakest of the three factors.

Could interest costs be pared, or could other macroeconomic goals be served, if the Treasury followed alternative debt management policies? Changes in regulation and auction procedures, important though they are to the operation of the Treasury market, have relatively little potential to affect future interest costs. More consequential from a budgetary standpoint are two widely debated proposals. One is to change the mix of conventional financing by borrowing less in long-term securities and commensurately more in short-term securities (which ordinarily carry lower interest rates). Another is to issue indexed bonds, securities whose principal and interest are explicitly linked to inflation. In this chapter, the Congressional Budget Office illustrates the budgetary consequences and summarizes major arguments for and against these proposals; as is CBO's practice, it makes no recommendations.

Recent Reforms in the Treasury Market

The Treasury has long sold bills, notes, and bonds in sealed-bid, multiple-price auctions. Competitive buyers get bids to Federal Reserve branches at midday, and results are tallied and announced later that same afternoon. Under the traditional multiple-price regime, successful bidders pay the price they bid--which might be higher or lower than others pay. High bidders suffer the "winner's curse": by bidding a high price (a low interest rate), they lose money on resale. Low bidders face a different fear: they might get few or no securities. Typically, the Treasury gets $2 to $4 of bids for each dollar of securities to be auctioned, and the spread between the lowest and highest successful bids is quite small (generally 1 to 3 basis points). Auctioned securities flow into a huge and liquid secondary market.

The auction process underwent changes after scandals erupted in late 1991. Bidders were barred from seeking more than 35 percent of the auction, a response to a few dealers' predatory tactics. More brokers and dealers, not just the 40 or so primary dealers and depository institutions, can now bid on their cus-

tomers' behalf. The ceiling on noncompetitive awards, popular with small investors who simply agree to accept the average price resulting from the auction, has been hiked. Market surveillance is tighter, and the Treasury has announced that it may flood the market with extra securities if it detects "squeezes" (attempts to corner the supply and dictate the price of particular securities). Separately, the Congress is still weighing proposals to beef up reporting and disclosure requirements in the Treasury marketplace.[1]

A few economists have long panned the traditional multiple-price auction. Paradoxically, they argue that price discrimination costs the Treasury money. Although the Treasury seemingly saves on interest costs by paying only what the buyers bid, economists think that advantage is more than offset by narrowed participation and bid-shading (that is, buyers' tendency to bid less than they might actually be willing to pay). In short, the Treasury would be better off awarding the entire auction at a single price in a so-called Dutch auction. After long consideration, the Treasury in the summer of 1992 began a year-long test of the single-price method on its monthly sales of two-year and five-year notes. A more radical proposal calls for conducting auctions in several rounds, during which bidders would view the action on their computerized screens. Financial markets are skeptical of this proposal, which in any event would have to await fuller automation of the auction process.[2]

Important though such developments are to the smooth workings and the integrity of the Treasury market, their budgetary effects are small: proponents' estimates of the effects of changing the auction process, for example, cluster around three-quarters of a basis point. With gross issuance of about $1.7 trillion a year (including short-term bills that are outstanding for only a fraction of a year), hypothetical savings on one year's issues would be about $100 million. Since these proposals would not materially affect CBO's view of the budget outlook or its projections of interest costs, they are not a focus of this chapter.

1. Department of the Treasury, Securities and Exchange Commission, and Board of Governors of the Federal Reserve System, *Joint Report on the Government Securities Market* (January 1992).

2. See Vincent Reinhart, "An Analysis of Potential Treasury Auction Techniques," *Federal Reserve Bulletin* (June 1992); and V.V. Chari and Robert J. Weber, "How the U.S. Treasury Should Auction Its Debt," *Quarterly Review*, Federal Reserve Bank of Minneapolis (Fall 1992). For a general discussion of auction methods, see Congressional Budget Office, *Auctioning Radio Spectrum Licenses* (March 1992).

Changing the Mix of Financing

Marketable securities--bills, notes, and bonds sold at auction--are the lion's share of federal debt, accounting for about 90 percent of debt held by the public. Bills have a maturity of one year or less; notes from two to ten years; and bonds are currently sold only with 30-year maturities. The mix of marketable securities sold by the Treasury has recently become a topic of lively debate.

Recent Debt Management and Its Rationales

For more than a decade, the Treasury tried to stretch the maturity of the debt. In 1981, bills were one-third of the marketable debt; 10 years later, they were down to one-fourth (see Table 2 in Chapter 2). Treasury bonds' share of marketable debt grew modestly over the same period, from 14 percent to 18 percent, aided by the repeal of a separate ceiling that limited the Treasury's authority to issue bonds. Treasury notes' share of the total also crept up, from 53 percent to 58 percent over the period; even within this category, there was a modest shift from shorter (two- to five-year) to longer (five- to ten-year) notes.

CBO's March 1993 baseline projections assumed that the Treasury would do nearly 30 percent of its net marketable borrowing in

short-term Treasury bills in the 1993-1998 period, modestly increasing these securities' share of the debt. In the CBO baseline, notes would continue to account for nearly 60 percent of net marketable borrowing. The rest of marketable borrowing is in the form of bonds.

These baseline assumptions already incorporated a modest, two-stage cutback in bond auctions. In early 1992, the Treasury pared its 30-year bond auction from about $12 billion each quarter to about $10 billion; in early 1993, it cut the quarterly bond auction further, to $9.25 billion. The Treasury also stated that it was conducting a comprehensive review of its marketable borrowing mix.

The Treasury has long preferred to follow a very predictable financing strategy to avoid shocking the markets. Its calendar of upcoming auctions (as listed in Table 1 in Chapter 2) is well known, and the size of issues is usually relatively easy to guess. This predictability affords dealers the information they need to manage their inventory and permits other borrowers to schedule their sales around the Treasury's.[3]

No one seriously disputes this emphasis on regularity and predictability. But these advantages, of course, do not dictate a particular mix of financing. The Treasury has in fact spread its auctions across the maturity spectrum, but has generally emphasized medium- and long-term debt because that limits the refinancing volume. At the extreme, for example, financing the entire debt in three-month bills (which no one seriously proposes) would involve rolling over all debt several times a year--jacking up auction sizes enormously and making budget outlays more volatile. Even now, the Treasury auctions about $1.7 trillion worth of securities a year on a gross basis to raise net cash of about $300 billion; the remainder simply refinances maturing debt.

Huge as these figures are, the Treasury's strategy has kept the refinancing task from spiraling. At the start of the decade, almost half of the marketable debt came up for refinancing in the next year; now, the ratio is just a bit more than one-third (see Figure 4 in Chapter 2).

Such a predilection for medium- and long-term debt is hardly unusual among debtors. Many borrowers, whether they are individuals, businesses, or sovereign countries, prefer to borrow for longer maturities so that they know their future costs--even if they must pay a higher interest rate to do so. (In fact, ultracautious borrowers try to match the maturities of their assets and liabilities--for example, by issuing short-term debt to borrow against their accounts receivable but selling long-term bonds to finance a factory or major equipment.) Medium- and long-term borrowing obviously reduces borrowers' sensitivity to interest rate fluctuations.

For sovereign countries, a medium- and long-term tilt minimizes the risk that a confidence crisis will set in just as a major principal payment comes due. A confidence crisis is an abrupt change in expectations about political or economic developments, rattling the financial markets; practically speaking, it may prevent a debtor from issuing debt except at very high interest rates or with a guarantee of payment in some other, stronger currency. Many other countries have experienced such crises.[4] The United States has never faced such a test in modern times and routinely rolls over its

3. A brief history of Treasury debt management in the past few decades, and especially the regularization of debt issuance that picked up steam in the 1970s as the debt grew, is found in Marcia Stigum, *The Money Market*, 3rd ed. (Homewood, Ill.: Dow Jones-Irwin, 1990).

4. Francesco Giavazzi and Marco Pagano, "Confidence Crises and Public Debt Management," in Rudiger Dornbusch and Mario Draghi, *Public Debt Management: Theory and History* (Cambridge, England: Cambridge University Press, 1990); Alberto Alesina and others, "Default Risk on Government Debt in OECD Countries," *Economic Policy: A European Forum* (Cambridge University Press, October 1992).

   A vivid example of a confidence crisis is the Latin American debt crisis in the early 1980s, when debtor countries could not pay off maturing bank loans. Ultimately, stretching out the maturity of these countries' remaining debt became a key element of the so-called Brady plan; other ingredients were outright forgiveness of part of the debt and structural reform of the borrowers' economies.

debt without a hitch. But the United States has not previously faced a steadily growing debt-to-GDP ratio during peacetime, a condition that feeds unease among investors and could fuel a confidence crisis.[5]

Under the venerable rule of "if it ain't broke, don't fix it," many people saw no reason to tinker with recent debt management. The Bush Administration's debt managers pointed out that the Treasury has smoothly financed huge deficits; they argued that it does not rely excessively on any particular maturity.[6] This argument was echoed as recently as February 1993 by a committee of the Public Securities Association that advises the Treasury on debt management.[7]

Nevertheless, several economists, economic journalists, and policymakers have urged the Treasury to move more of its financing into short-term securities. They claim one or both of the following advantages: cost savings and promotion of macroeconomic goals. The first is plausible, the second questionable.

Cost Savings: Projections and Pitfalls

Advocates of shorter debt management observe that short-term rates are typically well below medium- and long-term rates and hence are a cheaper method of financing. Historically, an average spread between three-month Treasury bills (on a bond-equivalent basis) and 10-year or 30-year Treasury securities is between 1 and 2 percentage points (see Table 21). The spreads between short- and medium-term rates are generally somewhat narrower. Economists refer to the relationship among interest rates of various maturities as the yield curve. How this curve is plotted, and prevailing theories about its shape, are outlined in Box 5.

Table 21.
Average Spreads of Selected Medium- and Long-Term Interest Rates over Three-Month Treasury Bill Rate (In percentage points)

Period	5-Year	10-Year	30-Year
	Actual		
1971-1975	0.9	1.0	a
1976-1980	0.6	0.8	a
1981-1985	1.6	1.7	1.6
1986-1990	1.1	1.4	1.5
1991-1992	2.3	2.9	3.4
January-March 1993	2.5	3.3	4.1
	Projected		
1998 (CBO baseline assumption)	1.2	1.4	1.7

SOURCE: Federal Reserve Board for historical data; Congressional Budget Office projection.

NOTE: In calculating spreads, three-month Treasury bills are expressed on a bond-equivalent basis.

a. Rates for 30-year bonds are not available before 1977.

The gap between short- and long-term interest rates has been unusually wide recently--typical of a sluggish economy, weak money demand, and Federal Reserve easing--and is expected to narrow. Specifically, it is expected to shrink as short-term rates climb from today's levels, even as longer-term rates change little. The continued existence of a gap between short- and longer-term interest rates is one of the linchpins underlying projected savings from widely debated changes in debt management.

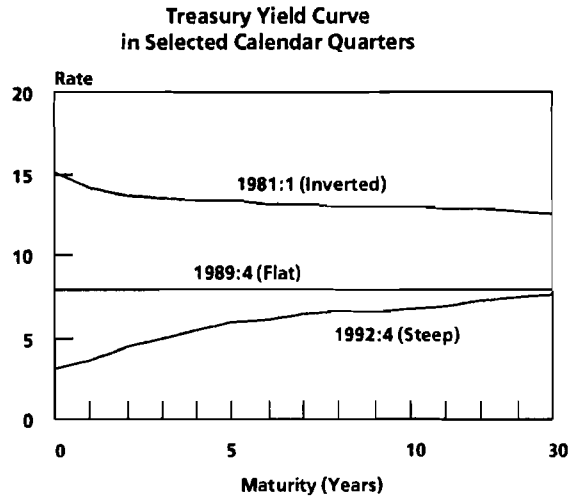
5. In unpublished remarks at a conference held at the Philadelphia Federal Reserve Bank in November 1992, two financial market economists (Robert Giordano of Goldman Sachs and Alan Lerner of Bankers Trust) argued that today's fiscal policies make this a foolish time to shift to shorter-term debt. A country's resistance to confidence crises, Giordano argued, is enhanced by two factors: a low debt-to-GDP ratio, and an emphasis on longer maturities. Since the U.S. lacks the first, it should preserve the second. Both analysts would be more sympathetic to short-term debt management or analogous proposals (such as indexed bonds) if the United States first moved to get its deficit under control.

6. From an interview conducted by Paul Starobin with Jerome H. Powell, Assistant Secretary of the Treasury for Domestic Finance, originally printed in *Government Executive* (April 1992) and excerpted in *Treasury Bulletin* (June 1992).

7. Minutes of the February 3, 1993, meeting of the Treasury Borrowing Advisory Committee of the Public Securities Association.

Box 5.
The Yield Curve

Outstanding Treasury securities mature anywhere from within a few days to 30 years. Medium- and long-term securities usually carry higher interest rates than short-term securities. For securities of a uniform type such as Treasury debt, AAA-rated corporate debt, or high-grade municipal debt, the relationship between maturity and interest rates is known as the yield curve (see the figure below).



Data on the yield curve always depict interest rates on Treasury bills on a bond-equivalent basis in order to permit comparisons with so-called coupon securities (notes and bonds). Unlike the latter, Treasury bills are a discount security; investors do not get an interest check, but at maturity they pocket a payment that exceeds their purchase price. For example, the buyer of a one-year Treasury bill might pay about $97 for a security with a face value of $100; the bank-discount rate is then 3 percent, or $3 as a fraction of $100. But this discount rate understates the return because the investor is earning $3 not on $100 but on $97. The investment return is 3.14 percent; the bond-equivalent return, which permits comparison with a bond that (unlike a bill) pays semiannual interest that can be reinvested, is 3.11 percent.[1]

Published data on the yield curve are based on activity in the secondary market, not on the results of Treasury auctions. The reason is simple: the Treasury auctions debt only on selected dates, but the financial markets trade existing issues constantly. For example, transactions among the large dealers that report to the New York Federal Reserve Bank total about $100 billion every business day.

When medium- and long-term rates exceed short-term rates, the yield curve is dubbed upward sloping or positively sloped. The yield curve usually slopes up; since 1951, such a shape has prevailed about two-thirds of the time. Sometimes, as in late 1992, when a tepid economy and Federal Reserve policy joined to hold down short-term rates, the slope is very steep. But a flat yield curve, in which rates for different maturities barely differ from one another (as in late 1989), or even an inverted or negatively sloped yield curve, in which short-term rates are higher than long-term rates (as in early 1981), can occur.

Economists and financial analysts have long sought satisfactory explanations for both the overall level of interest rates and the yield curve's shape. Early explanations posited that a medium- or long-term rate should equal an expected stream of future short-term rates. (For example, a one-year interest rate should be a geometric mean of a series of four three-month rates.) In its barest form, this *pure expectations hypothesis* seemed inadequate, especially since it did not explain the usual upward slope of the yield curve. Over time, this hypothesis was embellished to include risk premiums for longer-term securities. Investors in medium- and long-term debt, scholars argued, face the risk of unexpected inflation, fluctuations in real interest rates, and perhaps default; they must be compensated for these risks. Early efforts to explain the yield curve's slope in this fashion were called the *liquidity preference theory*.

Yet another view, the *market segmentation theory*, posits that the markets for short-, medium-, and long-term debt all have distinct players and that these securities are not very close substitutes for one another. In this view, there is no such thing as a normal shape for the yield curve. A modern, blended approach--the *preferred habitat theory*--acknowledges that all of the factors just named have some influence. In particular, it accepts that investors may have definite tastes for certain types of instruments but can be tempted into others if relative returns change sufficiently.

The preferred habitat theory is probably the prevailing one among economists today and draws some support from empirical studies. Such studies, though, are handicapped by unobservable variables and by the difficulty of specifying discriminating tests. Thus, they have failed to provide ironclad support for any of the theories and have yet to aid greatly in the development of macroeconomic forecasting models.

1. More detailed explanations of the relationships between bank-discount, investment, and bond-equivalent rates can be found in finance textbooks. There are complicated formulas for translating discount rates into bond-equivalent rates, but most market participants simply use conversion tables.

Projected Savings. What are the prospective savings from switching to shorter maturities? Several examples were previously presented in Chapter 6. In an extreme example, the Treasury could stop selling bonds, which currently contribute about $37 billion each year to its coffers, and raise the money instead in short-term Treasury bills. If CBO's baseline forecast of interest rates holds true, the savings from such a move might total $0.6 billion in 1994 and climb to $3 billion in 1998 (see Table 19 in Chapter 6).

Alternatively, the Treasury might continue its bond auctions, perhaps at a shrunken size, to maintain the bond's traditional benchmark role in the credit markets while sharply cutting sales of medium-term securities. As already noted, for the past decade the Treasury has raised about 60 percent of its net borrowing with two- to ten-year notes. Savings predicated on slashing this share were included in the Clinton Administration's February 1993 budget projections and in the budget resolution in March 1993, though all involved were careful to defer to the Treasury's traditional autonomy in the area of debt management. In May, the Treasury announced that it would in fact curtail its auctions of long-term bonds and stop selling seven-year notes (see Box 6).

Such savings must be put in perspective. Even savings of $4.9 billion in 1998, for example--the amount cited in the Clinton Administration's original budget--would represent less than 2 percent of that year's interest costs or deficit under current projections, and a tiny fraction of gross domestic product.

Retrospective Savings and Their Pitfalls. It is no coincidence that the drumbeat for shorter-term debt management grew louder in 1991, as short-term interest rates plunged. Advocates of such a strategy often cite retrospective analyses, which assume that such a shift on the Treasury's part had been in place in past years. But readers must keep in mind that such analyses yield sharply different conclusions depending on the period selected. In particular, some focus on too short or unrepre-

Box 6.
The Debt Management Debate in 1993

In early 1993, changing the mix of Treasury financing was explicitly included in deficit reduction packages crafted by the Administration and by the Congress.

In February 1993, the Clinton Administration cited savings from shortening the maturity of debt securities in its proposed budget.[1] The Administration showed savings of $1.6 billion in 1994, $4.9 billion in 1998, and about $16 billion over the 1994-1998 period. In March, these savings were incorporated into the budget resolution adopted by the Congress.

The Office of Management and Budget (OMB) did not identify a specific mix of financing, but announced that the Treasury was studying the issue. Many analysts quickly figured out that achieving the proposed savings would require shifting roughly $90 billion every year (about $20 billion from long-term bonds and $70 billion from medium-term notes) into short-term bills, which typically carry the lowest interest rates of any Treasury securities.

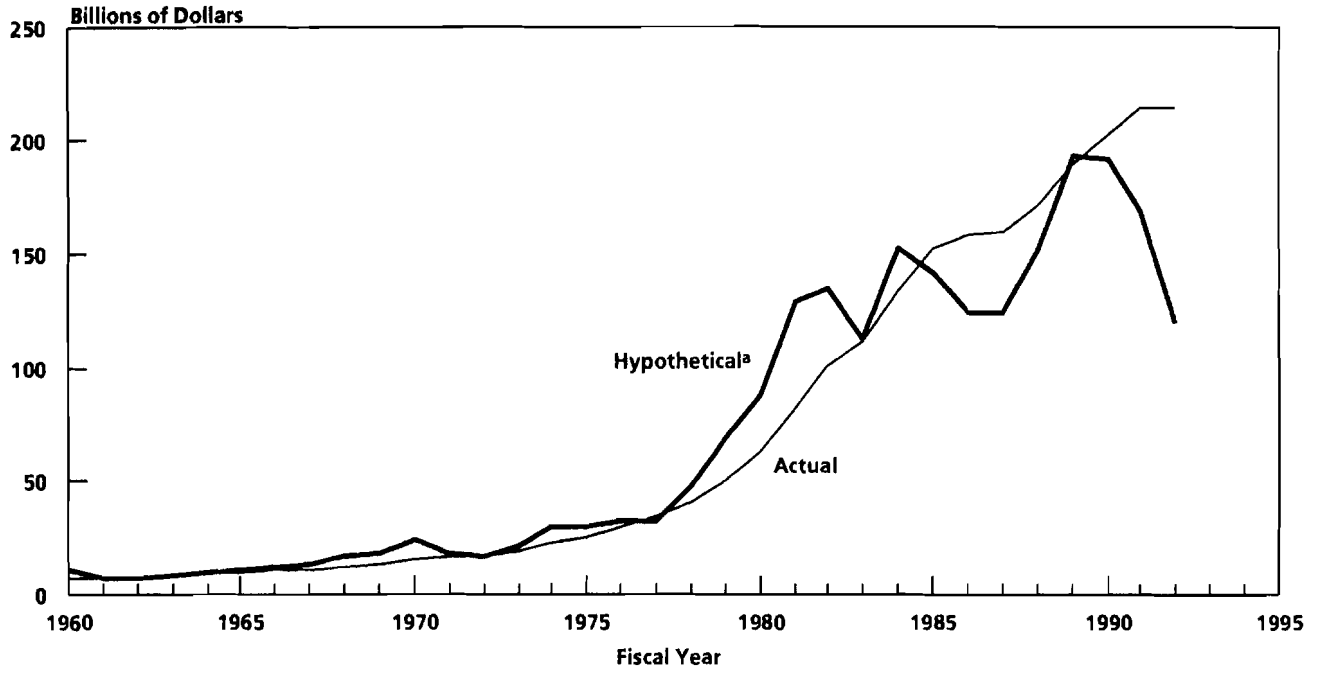
On May 5, the Treasury announced the results of its review. The debt managers will cut back the sale of 30-year bonds from four times a year to twice a year. The quarterly auctions had last stood at $9.25 billion (or $37 billion at an annual rate) and, at least at the outset, the Treasury will sell $11 billion of bonds semiannually (or $22 billion at an annual rate). Thus, the cutback in bonds is roughly $15 billion a year. The Treasury will also stop issuing seven-year notes. These notes had been contributing almost $10 billion per quarter to its coffers, or about $40 billion a year. The extra funds would be raised in short-term markets--namely, in Treasury bills and in two- and three-year notes, which typically carry interest rates slightly higher than those on bills.

In sum, the Treasury's action appears to move about $55 billion a year from longer- to shorter-term maturities. If the necessary funds are raised about equally in bills and short-term notes, the Congressional Budget Office (CBO) estimates that this action could save about $500 million in interest costs in 1994 and $2 billion in 1998. Total savings in interest costs over the 1994-1998 period would be $6.4 billion, or $7.3 billion if the additional debt-service savings are included.

CBO estimates smaller savings from the policy switch than does OMB. The chief reason is that CBO had already incorporated in its baseline estimates the interim cutback in bond sales (to $37 billion a year) that the Treasury announced last February. OMB, in contrast, had assumed larger and growing bond sales--making the change announced on May 5 proportionately bigger from its standpoint.

1. Office of Management and Budget, *A Vision of Change for America* (February 17, 1993).

Figure 9.
Hypothetical and Actual Interest Payments on Debt Held by the Public



SOURCE: Congressional Budget Office.

a. Payments assuming exclusive reliance on one-year maturities.

sentative a period to justify drawing solid conclusions.

A favorite period that some analysts focus on spans the years from 1980 to the present. In the 1980s, the Treasury sold long-term bonds totaling more than $300 billion, at rates that soared as high as 15.8 percent and averaged 10 percent. If the Treasury had borrowed the same money in short-term bills, critics lament, the rate on this debt today would be 3 percent, and annual savings would top $20 billion. But since interest rates declined more or less steadily throughout the decade, this type of calculation could hardly fail to demonstrate huge savings. Unless such circumstances virtually repeat themselves, such analyses do not afford a guide to future savings.

Retrospective studies spanning several decades pick up more movements--both up and down--in interest rates. But they still suffer from the limitation that past debt cannot compare with today's in size. A retrospective study conducted by Robert Giordano, a financial market economist, examined a fairly long period (1973 through 1991) and depicted modest savings.[8] Giordano opposes greater reliance on short-term debt management. According to his study, eliminating bond sales and financing the same money in six-month bills over this period would have cost money in some years, saved money in others, and on average reduced interest costs by $2.6 billion a year (or by about $48 billion over the two-decade period). Interest rates rose sharply during the first half of this period and fell in the second. (Thus, it cost a lot of money in the early 1980s to pay Treasury bill rates on the bonds that, hypothetically, would not have been sold in the previous decade--offsetting some later savings.) Because of lower deficits,

8. Robert Giordano, "The Misguided Movement to Abandon Treasury Bond Sales," *Financial Market Perspectives* (Goldman Sachs Economic Research, December 1991).

too, the average bond sale during this period was only about half of today's size. These calculations serve as a useful reminder that actual savings (or costs) from switching debt management tactics would depend both on the volume of financing and the actual path of interest rates.

In an admittedly fanciful exercise, CBO has estimated what the government would have paid had it financed the entire debt in one-year maturities for the past three decades. Such a strategy would have taken interest costs on a roller-coaster ride (see Figure 9 on previous page). CBO estimates that such a strategy would have saved about $50 billion over the 1960-1992 period, or just 2 percent of total interest costs. The choice of an ending date is crucial; of the $50 billion total savings, $95 billion occurred in 1992 alone, when short-term interest rates tumbled. Truncating the analysis just one year earlier would obviously have led to a different conclusion--namely, that such a policy would have cost roughly $45 billion extra in 1960 through 1991.[9] As Figure 9 suggests, the government's strategy for financing the debt has in fact done a reasonable job of smoothing interest payments over a long period of turbulent interest rates.

The Uncertainty of Future Savings. As the illustration just presented implies, a shift to short-term financing would raise the budget's sensitivity to interest rates and contains no ironclad guarantee of savings. Somewhat like a home buyer contemplating a fixed-rate versus an adjustable-rate mortgage, the Treasury knows that its choice might later, in hindsight, look misguided.

Can such risks be quantified? To do its budget projections, CBO picks a single path for such key variables as interest rates, gross domestic product, and others. But CBO is regularly asked about the uncertainty of its estimates--that is, the reasonable range of outcomes if the economy does not perform as expected.

CBO and other economists sometimes answer such questions by running multiple simulations of the economy's future performance and analyzing the range of results. Such techniques are commonly dubbed Monte Carlo or bootstrap simulations. This approach is adapted here to analyze the effects of a hypothetical change in debt management policy on interest costs.

CBO performed a total of 1,000 simulations covering 10 years (see Appendix C). Key economic variables that affect the federal budget, notably real growth and inflation as well as short- and long-term interest rates, were subjected to random shocks. The shocks themselves, both large and small, were drawn from history, shuffled, and applied to future periods. The result was a rich variety of hypothetical paths for the economy. In the simulations, interest rates fluctuate--climbing in some years, falling in others, and generally (except for short periods) exhibiting a normally shaped yield curve, with long-term rates exceeding short-term rates. In a small fraction of cases, however, interest rates spiral or fall precipitously for the entire decade, or the yield curve is inverted for long periods.

For each economic scenario, CBO forecast interest costs two ways. The first assumed that the Treasury continues to sell about $40 billion worth of bonds a year.[10] The second assumed that bond sales cease and the extra money is raised in short-term bills. This single scenario hardly encompasses the menu of debt-shortening options recently under discussion, but it lucidly illustrates the savings

9. Although--unlike the other studies cited here--it is not strictly retrospective, an analysis by the House Democratic Study Group (DSG) is subject to the same reservation, namely, its focus on a very limited time period. The DSG estimated huge savings for the government if it conducted all its gross borrowing in three-month Treasury bills for the period between August 1991 and July 1993. The period analyzed is so short, and the spread between short- and long-term rates temporarily so wide, that the conclusion is predetermined. See Democratic Study Group, *Can One Policy Produce Both Budget Savings and Economic Stimulus?* (January 14, 1993).

10. The simulations were developed before the Treasury trimmed its bond sales to about $37 billion a year. This cutback makes no substantive difference to the results.

and trade-offs at stake. The distribution of savings--that is, the number of cases in which expected savings, or costs, fell within a narrow dollar band--is presented in Table 22 and illustrated in Figure 10.

The results buttress the commonsense notion that a shift to shorter debt management would probably save money, though the average savings would be modest. Visually, the likelihood that the switch would save money is evidenced by the fact that, in Figure 10, most of each curve lies to the left of zero. In the fifth year, the shift to shorter debt management saved money in 94 percent of cases; in the tenth year, in 88 percent of cases. Only in a small fraction of cases (depicted as the area to the right of zero in Figure 10) does the hypothetical change in policy cost more than would current debt management.

The expected savings grow larger as the government continues to borrow and subject more debt to the new regime. In the 1,000 cases, average savings amount to $0.7 billion in the first year, about $4 billion in the fifth, and $9 billion in the tenth--strikingly similar to estimates presented in Chapter 6, which simply assumed CBO's baseline interest rates.

Significantly different outcomes, though, cannot be ruled out. The curve depicting the expected savings flattens over time, revealing that there is a wider range of savings or costs. The flattening of the curve means that there is less clustering of savings around a central point. More cases are located farther away from the average result, signifying greater uncertainty about future savings.

On average, for example, the hypothetical elimination of bond sales is expected to save about $4 billion in the fifth year. But there is a 6 percent chance that it would cost, not save, money. And there is a 1 percent chance that the policy would save $10 billion or more, the extreme left of the distribution. Similarly, in the tenth year, there is a 5 percent chance that the hypothetical switch would save $20 billion or more, even though the expected saving is just $9 billion.

Table 22.
Distribution of Bootstrap Results in Fifth and Tenth Year (In number of cases)

	Year 5	Year 10
Shape of Yield Curve[a]		
Steep	714	655
Flat	182	222
Inverted	104	123
Total cases	1,000	1,000
Annual Interest Saving (-) or Cost (Billions of dollars)		
-25.1 to -30	0	0
-20.1 to -25	0	45
-15.1 to -20	0	140
-10.1 to -15	11	266
-5.1 to -10	401	257
-0.1 to -5	530	167
0 to 4.0	58	84
5 to 9.9	0	32
10 to 14.9	0	8
15 to 19.9	0	1
Total cases	1,000	1,000
Mean Saving	-4.4	-8.7
Median Saving	-4.5	-9.2
Cumulative Saving (-) or Cost (Billions of dollars)		
-100.1 to -110	0	3
-90.1 to -100	0	14
-80.1 to -90	0	44
-70.1 to -80	0	106
-60.1 to -70	0	150
-50.1 to -60	0	173
-40.1 to -50	0	142
-30.1 to -40	0	143
-20.1 to -30	71	99
-10.1 to -20	636	66
-0.1 to -10	283	28
0 to 9.9	10	14
10 to 19.9	0	11
20 to 29.9	0	7
Total cases	1,000	1,000
Mean Saving	-12.4	-45.8
Median Saving	-12.8	-49.5

SOURCE: Congressional Budget Office.

NOTE: The total number of simulations was 1,000. All figures, except the mean and median, represent the number of cases falling within a particular interval.

a. Yield curves were arbitrarily classified depending on the ratio of the rate on Treasury bonds to the rate on short-term Treasury bills: "steep" denotes a ratio of 1.1 or greater; "flat" a ratio between 1 and 1.1; and "inverted" a ratio of less than 1.

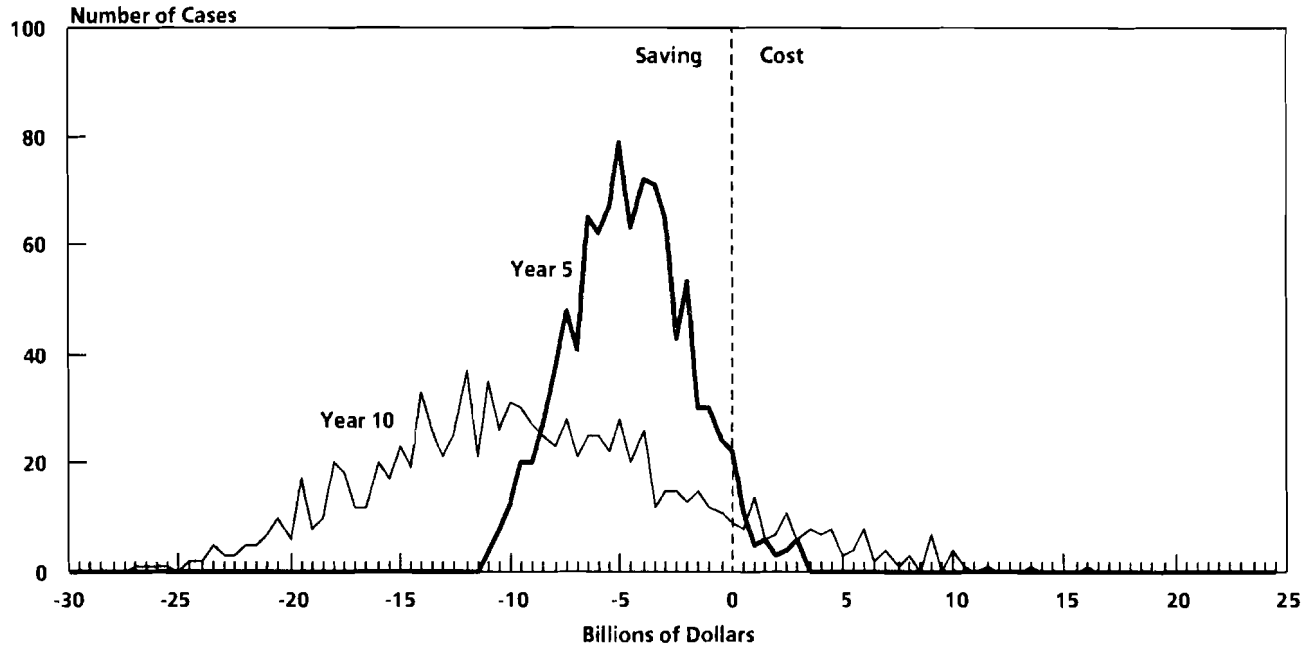
Of course, some other studies of alternative debt management were criticized for their authors' focus on a very short period (sometimes a single year) rather than a longer period. What then are the total savings that are likely over a multiyear period, not just in a single year? According to the booststrap simulations, the cumulative savings over a five-year period are expected to be about $12 billion; over a ten-year span, about $46 billion (see Table 22). Large though these figures appear, they represent roughly 1 percent to 2 percent of the amount that the government is expected to pay in interest over the same periods. And there is a tiny chance that the policy could cost, rather than save, money over an entire five- or ten-year period.

The Trade-off: Greater Volatility. Expected savings would be accompanied by greater volatility of interest costs. Such volatility could be beneficial or hurtful in particular years, depending on the future course of interest rates. But it would be layered on top of the volatility that already exists because so much of the debt is financed or refinanced each year.

CBO estimates, for example, that if short-term interest rates shot up (or down) by 2 percentage points in 1998, interest costs on Treasury bills would be affected by $16 billion in that year alone. Two percentage points is only slightly greater than the absolute movement in short-term rates, whether up or down, that typically occurred from one year to the next over the past two decades. In contrast, if the Treasury eliminated bond sales and raised the same money in bills over the 1994-1998 period, a larger stock of short-term debt would be continuously rolled over and hence exposed to such swings. In that case, CBO estimates that interest costs would be affected by $18 billion, not $16 billion, in 1998 alone.

Given the size and composition of the government's debt, it is far-fetched to think that the Treasury can or should lock in its future

Figure 10.
Distribution of Interest Saving (-) or Cost in Years 5 and 10 as a Result of Shifting from Bonds to Bills



SOURCE: Congressional Budget Office.

NOTE: The total number of cases is 1,000.

interest costs to its advantage; at best, it can smooth them. In sum, the key argument in favor of a shift to shorter maturities is that it would probably save money, at the price of even greater sensitivity to interest rates. And the actual savings, or costs, will be wholly determined by two unknowns: future interest rates and future deficits.

Are Fluctuations Harmful? Some analysts and policymakers might balk at adding further, even modestly, to the uncertainty of federal interest payments and deficits. Short-term debt management would tend to link federal interest payments more closely to the business cycle, dampening the automatic stabilization properties of the budget. Although the correlation is far from perfect, interest rates typically fall during recessions and rise during booms. This cyclical pattern is especially characteristic of short-term rates such as those on Treasury bills. Thus, the government's debt-service costs (and personal interest income) would tend to drop during recessions and rise during upswings. Newspaper stories have recently quoted investors, mainly retirees, who complain bitterly that their interest income has plummeted in the wake of steep declines in interest rates that have occurred since 1990, even as the economy stalled. Conversely, interest costs climbed steadily in 1987 through 1989, a period of stronger economic growth and rising short-term interest rates.

Retirees' complaints notwithstanding, economists generally believe that interest income is less likely to go toward consumption than, say, income from wages and salaries or transfer payments. Investors correctly view part of their interest income as compensation for the erosion of their wealth by inflation, the argument goes, and they are likely to save rather than consume that component.[11] Such cyclical considerations, though not pursued here, may nevertheless interest researchers.

Apart from this modest contribution to the ups and downs of the business cycle, there is no clear economic reason to be concerned about greater volatility of interest payments. But there may be political costs. The press and policymakers are often troubled by large revisions in projections of the budget deficit. These revisions stem largely from economic factors outside policymakers' control and outside the ability of experts to forecast. A switch to short-term debt management would make deficit projections even more changeable.

Such swings could be more than just troubling if policymakers returned to fixed deficit targets--like those that prevailed in 1986 through 1990 under the Balanced Budget and Emergency Deficit Control Act and its successor--or even adopted a balanced budget amendment to the Constitution. In that case, volatile outlays for net interest could easily whipsaw the funds that are left over for other programs, vastly complicate the work of legislators and program managers, and possibly encourage greater political pressure on the Federal Reserve to keep short-term interest rates down.[12]

Macroeconomic Goals: Would Interest Rates Respond?

Besides the budgetary savings, some advocates claim that shifting the mix of Treasury financing would have salutary economic effects. Specifically, they argue that such a move would reduce long-term interest rates, spurring private investment. As a corollary, short-term rates would rise. The jury is out as to whether these effects would actually occur. The thrust of recent research, though, counsels skepticism.

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11. As explained in Chapter 2, some economists (led by Robert Barro) argue that recipients are particularly likely to save interest payments from the federal government. According to this view, which is termed "Ricardian equivalence," recipients save such income in order to mitigate the future tax burden on themselves and their descendents. Relatively few economists, though, are convinced that consumers behave in such a hyper-rational fashion.

12. For a general discussion of the disadvantages of fixed deficit targets, see Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1994-1998* (January 1993), Chapter 6.

The Theoretical Question. The key question in this debate revolves not around the deficit's size but its specific mix of financing. That is, the debate here is not whether the amount of the Treasury's borrowing affects the overall level of interest rates; most mainstream economists believe that it does, although empirical studies have not validated this view as conclusively as its adherents might hope. Rather, the crucial question is whether the mix of a given volume of Treasury financing significantly affects relative interest rates.

Economists are far from unanimous on this point. Some believe that buyers have strong preferences only for certain types of securities, but others maintain that buyers switch fairly smoothly among competing instruments. If investors shift smoothly, then the spreads between the rates of return on alternative instruments need to change little, if at all, to induce investors to buy whatever mix of securities is offered.

The pronouncements by researchers on this issue correspond closely to their views of what determines interest rates (see Box 5 on the yield curve). Economists who argue that relative rates of return would shift noticeably in response to a change in the mix of financing subscribe to the *segmented markets theory*. This school holds that investors have strong preferences only for certain maturities, and that a shift in Treasury financing mix (such as the cessation of bond sales) could have powerful effects on long-term interest rates as buyers jostle for the diminished supply. In its strongest version, though, the segmented markets theory appears to be a minority view among economists.

A much milder version, the *preferred habitat theory*, is probably the leading one among researchers today. This school's adherents weave several strands of alternative theories to conclude that long-term interest rates have several determinants: chiefly expectations of future short-term rates, risk and liquidity premiums, and investors' preferences for particular maturities or habitats. The last factor is typically believed to be relatively weak, especially since modern financial markets are populated by intermediaries who are willing to borrow at one maturity, invest at another, and earn a profit by doing so. There is no reason for debt management practices to alter the stronger, more fundamental factors that affect relative interest rates. The implication is that very small changes in interest rate spreads are sufficient to entice investors out of their preferred habitats when the mix of offerings changes. And even this small effect may be transitory.

Empirical Results. Ironically, the preferred habitat theory was initially developed by researchers looking for evidence that changes in Treasury debt management affected relative interest rates. In the early 1960s, the Treasury and the Federal Reserve tried to influence interest rates in what came to be called "Operation Twist." They sought to raise short-term interest rates (to support the dollar) while lowering long-term ones (to spur the economy). Economists who reviewed the experiment--notably, Modigliani and Sutch, who had fully expected to find evidence of its success--generally concluded it had little or no impact.[13] But some doubted whether Operation Twist was in fact carried out vigorously. In any case, financial markets have grown enormously in size and complexity in the last three decades.

What does more recent empirical research show? At the forefront of economists claiming that a change in Treasury debt management would significantly change relative interest rates is Benjamin Friedman of Harvard University. Building on his own previous work and that by Vance Roley, Friedman has simu-

13. Franco Modigliani and Richard Sutch, "Innovations in Interest Rate Policy," *American Economic Association Papers and Proceedings* (May 1966); and Modigliani and Sutch, "Debt Management and the Term Structure of Interest Rates: An Empirical Analysis of Recent Experience," *Journal of Political Economy*, Supplement (August 1967). Other changes occurring at the same time--notably, successive liberalizations in Regulation Q, which limited the rate commercial banks could pay on saving deposits, and the development of negotiable certificates of deposit--were difficult to control for.

lated what might have happened had the Treasury trimmed its bond sales in the mid-1970s by $250 million per quarter--roughly equivalent, in today's terms, to cutting bond issuance in half. His results suggest that this action would have sharply lowered the Treasury bond rate, reduced corporate bond rates (though by somewhat less than the Treasury rate), and nudged short-term rates upward.[14] If, as Friedman argues, the corporate bond rate is a key factor determining private investment, economic activity would expand.

But other researchers directly or indirectly challenge many of Friedman's premises. On one front, many economists hesitate to accept such dramatic conclusions based on large, complex forecasting models without substantial independent corroboration. Illustrating the hurdles faced by other researchers, an effort by three economists to replicate the macroeconomic model that Friedman relies on was unsuccessful.[15]

But even if Friedman's results were valid for the mid-1970s, it is not clear that they would apply today. Friedman used a macroeconomic model that predated extensive financial deregulation and a huge expansion in financial markets. And Roley's earlier work, on which Friedman built, showed somewhat different effects on interest rates of simulated changes in Treasury debt management during three time periods, calling into question whether blanket conclusions about such effects are reliable.[16]

Finally, researchers who doubt the segmented markets theory come up with wholly different empirical results. Bosworth, Carron, and Rhyne vigorously argue that movements in relative interest rates in response to supply shifts are small and transitory.[17] They show that the same data for the 1960-1982 period, paradoxically, can seemingly provide support for either strong or weak market segmentation, and they argue that the finding for strong segmentation is statistically flawed. Frankel finds that movements in relative rates of return in response to supply shifts over the 1954-1980 period were tiny.[18] Summarizing his results, Frankel concludes that such movements, even when statistically significant (that is, different from zero), are hardly economically significant. On another but related tack, researchers have found that when the size of Treasury auctions deviates from expectations, the market response is tiny even when measurable--in the neighborhood of 2 basis points or less.[19]

Ironically, intuitive support for this last camp comes from the sheer size of today's debt. As big as the Treasury's auctions are, each adds a small trickle to a huge sea of debt that is already outstanding and actively traded. The overall composition of the debt thus changes slowly. For example, CBO's baseline assumes the continuation of current debt man-

14. Jonas Agell, Mats Persson, and Benjamin M. Friedman, *Does Debt Management Matter?* Part 2, "Debt Management Policy, Interest Rates, and Economic Activity" (Oxford: Clarendon Press, 1992); and Benjamin M. Friedman, "The Treasury Threatens Corporate Balance Sheets," *Harvard Business Review* (September/October 1982).

15. William Dewald, Jerry G. Thursby, and Richard G. Anderson, "Replication in Empirical Economics: The *Journal of Money, Credit and Banking* Project," *American Economic Review* (September 1986).

16. V. Vance Roley, "The Effect of Federal Debt-Management Policy on Corporate Bond and Equity Yields," *Quarterly Journal of Economics* (November 1982). Specifically, Roley simulated changes in debt management policy in three periods: in the first quarters of 1960, 1966, and 1971. The size and sometimes even the sign of the hypothetical effects on interest rates differed. This pattern does not necessarily imply that the model is wrong; it presumably occurs because of changes in other, exogenous variables (for example, the cash flows available to Roley's 11 categories of investors). Projecting these variables reliably, though, would be a daunting and perhaps impossible task.

17. Barry Bosworth, Andrew Carron, and Elizabeth Rhyne, *The Economics of Federal Credit Programs* (Washington, D.C.: Brookings Institution, 1987), Appendix A.

18. Jeffrey A. Frankel, "Portfolio Crowding Out, Empirically Estimated," *Quarterly Journal of Economics Supplement*, vol. 100 (1985).

19. David C. Schirm, Richard G. Sheehan, and Michael G. Ferri, "Financial Market Responses to Treasury Debt Announcements," *Journal of Money, Credit and Banking* (August 1989); and David P. Simon, "Treasury Debt Management and Bond Yields: Evidence from Treasury Auction Size Announcement Surprises" (unpublished draft, February 1993).

agement, including the sale of bonds; by 1998, short-term Treasury bills would constitute about 26 percent of the marketable debt and bonds about 15 percent. Even stopping bond sales and making up the entire amount in bills would alter these shares only to 30 percent and 11 percent, respectively. And this change would appear even more insignificant when weighed against the large supplies of corporate and other debt outstanding; at present, Treasury debt makes up one-fifth of all debt outstanding in the credit market.

In sum, there seems to be little firm ground for expecting that a change in the Treasury's financing mix would have striking effects on interest rates. Such conclusions disappoint those who believe that, by changing its debt management policy, the Treasury could dramatically change the interest rates that private investors face.

But by the same token, the general insensitivity of interest rates to changes in the Treasury's mix allays other worries. Traditionally, opponents of a move to shorter-term financing have argued that short-term rates would climb as a result, limiting or even erasing the apparent budgetary savings. They also argue that the harm done to private borrowers (such as issuers of commercial paper, homeowners with adjustable-rate mortgages, and so forth) in the short-term market would dwarf the benefits to long-term borrowers. But if interest rates do not respond to changes in the Treasury's financing mix, none of these worries is very troubling.

Indexed Bonds

Another oft-heard proposal for managing the debt is for the Treasury to sell indexed bonds, also referred to as purchasing-power bonds. Indexed bonds are designed to protect investors explicitly against the erosion of interest and principal resulting from inflation.

When buying a conventional (fixed-rate) bond, investors must judge how much of the interest rate simply compensates them for future inflation. Whatever is left is their real return. The consequences of guessing wrong can be severe, especially for longer-term securities. Indexed bonds would relieve investors of the task of guessing future inflation. Instead, holders would receive a straightforward promise that interest and principal on the bond would remain constant in real terms--that is, that they would climb (or, rarely, fall) in step with some barometer such as the consumer price index.

How are indexed bonds thought to save money? Clearly, if inflation turns out to be lower than expected, the government will pay less in interest. But this argument is a two-edged sword: the government will pay more interest if inflation surpasses expectations. Thus, a sophisticated argument in favor of indexed bonds as a regular tool of debt management hardly hinges on the notion that government is smarter than investors at predicting inflation.

Instead, the key argument that indexed bonds could reduce interest costs is that investors demand a risk premium from the issuer to compensate them for future, unanticipated inflation. If the government made securities less risky, this premium would dwindle, and budgetary savings would result.

Most advocates of indexed bonds, in fact, favor them not so much because of budgetary savings as on macroeconomic grounds. These bonds, they argue, would promote economic equity, serve as a tailor-made investment for retirement savings, and provide valuable information to policymakers seeking to take the pulse of the economy. These economic arguments are discussed in a later section.

Current Debt Management

The Treasury has authority to issue indexed bonds, but has never done so. The Treasury has traditionally been skeptical about potential demand for these bonds, arguing that risk-averse investors can simply buy short-term

Treasury bills and keep rolling them over. By doing so, they will earn a fairly low real return but take comfort from the fact that short-term Treasury bill rates generally move up (or down) with inflation. Investors can also buy up to $15,000 worth of savings bonds every year; as long as they are held for five years, the return on these bonds will float up and down with market rates--another ad hoc way of compensating holders for inflation. The Treasury also points to some unresolved practical problems, such as the choice of a price index, the auction procedure, the tax treatment of the bonds, and so forth, some of which are discussed below.

The Argument for Savings: Interest Rates and Risk Premiums

Conventional securities bearing fixed interest rates are the bread and butter of the Treasury's financing. Nominal interest rates are traditionally viewed as having three components: a *real interest rate* (the return on a riskless asset in an inflation-free world), *expected inflation* (representing the expected erosion of principal), and a *risk premium*.[20] The risk premium compensates investors for several kinds of risk: default (unheard-of for Treasury securities), unexpected inflation, and fluctuations in the market prices of securities.

The Theoretical Question. Obviously, economists would like to know how big the risk premium is. But the components of nominal interest rates are unobservable, and economists can only guess at their rough shares.

In March 1993, for example, the long-term Treasury bond yielded 6.8 percent. CBO expects inflation, as measured by the consumer price index, to continue at about 2.7 percent a year; surveys of other economists indicated they were slightly less sanguine, as average responses were about 3½ percent.[21] Subtracting expected inflation from the nominal rate still leaves about 3½ percent to 4 percent to be apportioned between the real interest rate and the risk premium--an unknown allocation.

Economists, though, would generally argue that the real interest rate is the overwhelming share of this 3½ percent to 4 percent, and the inflation risk premium (which is just one component of the total risk premium) relatively small. Because inflation has fallen so dramatically over the past decade, and because most investors expect that inflation will continue to be subdued, the risk premium may be quite low. Ammunition for this view is provided by the market for the indexed bonds sold in Britain (which, like other British government bonds, are nicknamed gilts for their gilt-edged appearance); these bonds are currently trading at a real interest rate of about 3½ percent. Nevertheless, a major stumbling block to researchers is that the risk premium is not only unobservable, but is unlikely to be constant over time or for all maturities.

Empirical Estimates. Empirical estimates of the inflation risk premium are scarce and divergent. Some researchers hypothesize that the risk premium ought to be related to the standard deviation--a measure of variance, or dispersion--of expectations of future inflation.[22] If market participants are virtually unanimous in their expectation of inflation, after all, the risk premium is tiny; it takes uncertainty about future trends to create such a

20. Strictly speaking, the nominal interest rate is not the sum of these three components but their product. If n is the nominal interest rate, r is the real interest rate, i is expected inflation, and p is the risk premium, then

$$n = [(1+r) \times (1+i) \times (1+p)] - 1$$

Practically speaking, the result of this calculation is not very different from simply summing the three components unless nominal rates top 10 percent or so.

21. In the *Blue Chip* survey published on March 10, 1993, respondents' average expectation of inflation for the 1994-1998 period was about 3½ percent.

22. This measure could be flawed; there could be little dispersion in a sample's forecast of inflation, even if every member of the sample individually is extremely uncertain.

premium. And some believe that investors demand bigger premiums in periods of high inflation than in times of low inflation, perhaps because they recognize that, in such an environment, the actions of policymakers are less predictable.[23] Researchers' work is hampered by the paucity of useful survey measures about the prospects for near-term inflation, and the complete absence of such measures for periods spanning a decade or more--maturities typically proposed for indexed bonds.

Several economists have tackled the measurement of risk premiums. In research limited to short-term bills with maturities of up to six months, Fama found that risk premiums climbed systematically even for such short maturities and ascribed this pattern almost wholly to uncertainty about inflation.[24] Barnea and colleagues found strong evidence that the dispersion in inflation forecasts, based on surveys of professional economists, helped to explain short-term interest rates.[25] If their results held today, for example, the uncertainty about inflation expressed by forecasters in a recent *Blue Chip* survey might be contributing an extra 40 basis points, or 0.4 percentage points, to interest rates on one-year Treasury bills.[26]

Several researchers have gauged total risk premiums on longer-term instruments, but inflation is not the sole source of risk. Bodie and others found that risk premiums on long-term bonds skyrocketed relative to those on short-term bills--climbing from 53 basis points in September 1979 to 420 basis points in late 1981--then subsided to 285 basis points in 1983. They argued, however, that this period witnessed tremendous volatility in bond and stock markets, particularly in the wake of the Federal Reserve's shift in 1979 to a policy of targeting the money supply.[27] They implied that much of the extra risk premium came from uncertainty about future real returns rather than future inflation. The researchers calculated, in fact, that in the 1982-1983 period, investors would have allocated no more than $32 of a $10,000 portfolio to a hypothetical indexed instrument bearing a real rate slightly under that on Treasury bills--simply because, in this circumscribed period, short-term bills were a very good substitute.

But in a later paper, Bodie noted that the real return on Treasury bills fluctuates over longer periods, making bills unsuitable for investors who want to lock in a real rate of return--for, say, college costs or retirement.[28] Bodie also estimated what buyers might pay for explicit inflation insurance on a nominal bond. For the hypothetical instrument that somewhat resembled an indexed bond, and under the conditions that prevailed in 1988, such insurance translated into investors' willingness to accept a lower return of about 50 basis points.[29]

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23. Laurence Ball, "Why Does High Inflation Raise Inflation Uncertainty?" Working Paper No. 3224 (National Bureau of Economic Research, Cambridge, Mass., January 1990).

24. Eugene Fama, "Inflation Uncertainty and Expected Returns on Treasury Bills," *Journal of Political Economy* (June 1976).

25. Amir Barnea, Amihud Dotan, and Josef Lakonishok, "The Effect of Price Level Uncertainty on the Determination of Nominal Interest Rates: Some Empirical Evidence," *Southern Economic Journal* (October 1979). Researchers at the Federal Reserve Bank of Cleveland found that the professional economists polled in the Livingston survey--the data used by Barnea and his colleagues--produced less accurate inflation forecasts, on average, than household surveys or simple backward-looking models. See Michael F. Bryan and William T. Gavin, "Comparing Inflation Expectations of Households and Economists: Is a Little Knowledge a Dangerous Thing?" *Economic Review*, Federal Reserve Bank of Cleveland (1986, Quarter 3).

26. This estimate is based on the March 1993 *Blue Chip* survey of about 50 economists. The standard deviation of expected inflation for 1993 was 0.3 percentage points, and for 1994, 0.5 percentage points.

27. Zvi Bodie, Alex Kane, and Robert McDonald, "Risk and Required Returns on Debt and Equity," in Benjamin M. Friedman, *Financing Corporate Capital Formation* (Chicago: University of Chicago Press, 1986).

28. Zvi Bodie, "Inflation, Index-Linked Bonds, and Asset Allocation," Working Paper No. 2793 (National Bureau of Economic Research, Cambridge, Mass., December 1988).

29. Zvi Bodie, "Inflation Insurance," Working Paper No. 3009 (National Bureau of Economic Research, Cambridge, Mass., June 1989). At that time, long-term interest rates were about 9 percent; expected inflation about 6 percent; and the standard deviation of expected inflation

Several researchers of the British market for indexed bonds have assumed that the risk premium for inflation is so small as to be effectively zero.[30] Justifying this tack, Woodward pointed out that, if the risk premium was large, the resulting values for expected inflation (derived by a comparison with nominal bonds) were implausibly low.

The upshot is that measures of the risk premium are not firm enough to permit conclusive estimates of budgetary savings. It seems reasonable to think that the risk premium today is small and positive, but that it can vary over time. In the long run, most advocates of indexed bonds argue that the government would save money by capturing this risk premium. The Congressional budget process, though, generally focuses on short-term savings--no more than five years ahead. In the near term, the unobservable savings from lowering the risk premium are fairly likely to be drowned out by costs or savings from erroneous expectations of inflation, as illustrated below.

Budgetary Implications of Indexed Bonds

The budgetary implications of indexed bonds are best highlighted by describing their features and comparing them with conventional bonds that raise the same amount of money at the outset.

How Would the Bonds Work? When it sells an indexed bond, the government could promise investors a real interest rate of, say, 4 percent but make the inflation adjustment explicit. This design resembles the indexed gilts that have been sold in Britain for the past decade. Table 23 offers a streamlined example of how such an indexed bond that sold for $1,000 would work and contrasts it with a conventional bond for the same amount. For simplicity, the two bonds are assumed to carry a relatively short maturity of five years and to pay interest just once a year. Crucially, the illustration assumes that the risk premium is zero, which may not be very far from the truth and which makes the comparison with a conventional bond much easier.

The Initial Bond. The conventional bond (Case 1), which is assumed to carry an interest rate of 7 percent, costs a straightforward $70 per year in interest--whether measured on a cash or an accrual basis. At the end of five years, the government returns $1,000 to the investor.

The indexed bond is more complicated. Until maturity, the investor who has lent the government $1,000 collects only a real interest payment (assumed to be 4 percent), which is paid in cash. The inflation adjustment, in contrast, is tacked on to the principal of the bond. If inflation matches expectations (Case 2), the investor receives $1,159 at maturity--the initial $1,000 plus five years' worth of inflation adjustment at 3 percent a year.[31]

(a measure of uncertainty) about 3 percent. Bodie estimated that buyers would pay an extra $0.51 to insure a 20-year annuity, otherwise costing $8.86, against inflation in excess of 6 percent (the rate of inflation that he dubbed the deductible). In effect, then, the government could avoid interest amounting to 9 percent of $0.51--equivalent to saving slightly more than 50 basis points on the nominal $8.86 bond.

Bodie cautions against interpreting this calculation of a 50-basis-point saving literally as an inflation risk premium. The hypothetical bond is asymmetric--the buyer would get greater annuity payments if inflation rose above 6 percent, but would suffer no reduction in payments if inflation fell below 6 percent, making this a "heads-I-win, tails-you-lose" prospect.

30. James Wilcox, "Short-Term Movements of Long-Term Real Interest Rates: Evidence from the U.K. Indexed Bond Market," Working Paper No. 1543 (National Bureau of Economic Research, Cambridge, Mass., January 1985); and G. Thomas Woodward, "The Real Thing: A Dynamic Profile of the Term Structure of Real Interest Rates and Inflation Expectations in the United Kingdom, 1982-89," *Journal of Business*, Graduate School of Business, University of Chicago (July 1990).

31. Alternatively, the indexed bond could compensate the investor in cash each year for the erosion of principal, rather than in a single lump at maturity. This type of bond was discussed in a CBO Staff Memorandum, "The Budgetary Implications of Index Bonds" (January 1985). This design is less typical, and its budgetary implications do not differ in any key respect from the type of bond discussed in the text.

Table 23.
Comparison of Illustrative Conventional and Indexed Bonds (In dollars)

Year	Initial Bond			Extra Borrowing to Cover Cash Interest		Total		
	Principal (End of year)	Interest		Principal (End of of year)	Interest	Principal (End of year)	Interest	
		Accrual Basis	Cash Basis[a]				Accrual Basis	Cash Basis
Case 1: Conventional Bond (Interest Rate = 7 Percent)								
0	1,000	0	0	0	0	1,000	0	0
1	1,000	70	70	70	0	1,070	70	70
2	1,000	70	70	145	5	1,145	75	75
3	1,000	70	70	225	10	1,225	80	80
4	1,000	70	70	311	16	1,311	86	86
5	1,000	70	70	403	22	1,403	92	92
Total	1,000	350	350	403	53	1,403	403	403
Case 2: Indexed Bond, Inflation Meets Expectations (Real Rate = 4 Percent, Actual and Expected Inflation = 3 Percent)								
0	1,000	0	0	0	0	1,000	0	0
1	1,030	70	40	40	0	1,070	70	40
2	1,061	72	41	84	3	1,145	75	44
3	1,093	74	42	132	6	1,225	80	48
4	1,126	76	44	185	9	1,311	86	53
5	1,159	79	204	243	13	1,403	92	217
Total	1,159	372	372	243	31	1,403	403	403
Case 3: Indexed Bond, Inflation Exceeds Expectations (Real Rate = 4 Percent, Expected Inflation = 3 Percent, Actual Inflation = 4 Percent)								
0	1,000	0	0	0	0	1,000	0	0
1	1,040	80	40	40	0	1,080	80	40
2	1,082	83	42	85	3	1,166	86	45
3	1,125	87	43	135	7	1,260	93	50
4	1,170	90	45	191	11	1,360	101	56
5	1,217	94	263	253	15	1,469	109	279
Total	1,217	433	433	253	36	1,469	469	469

SOURCE: Congressional Budget Office.

NOTE: The illustrations make the following simplifying assumptions: the bond carries a five-year maturity (although actual maturity of indexed bonds would likely be up to 30 years); all activity (borrowing and payment of interest) takes place at the end of the year; extra financing to cover cash interest takes place in conventional (unindexed) securities; and the inflation risk premium embedded in nominal interest rates is zero.

a. For indexed bond, includes the adjustment to principal paid at maturity.

This simple example implies that the debt would be higher after five years if the government sold indexed debt--specifically, that the total debt would be $1,159 for the indexed bond versus $1,000 for a conventional bond. In that case, indexed bonds would certainly be unappealing for the government. But that is not so, for the analysis is incomplete. So far, it has overlooked an important fact: the government must also borrow to pay the cash interest on each bond.

Extra Borrowing to Cover Cash Interest. In the case of the conventional bond, the second round of borrowing--necessary to cover interest payments--totals $70 in the first year and then climbs as a result of compounding. The indexed bond requires less borrowing to cover cash interest; the investor accepts more of the return in a different form, via the adjustment at maturity.

Total. For both the conventional and the indexed bond, then, the total debt at the end of the fifth year is $1,403. This result is intuitively appealing. If investors' expectations about inflation are right and the risk premium is close to zero, the government faces the same implications for interest and debt whether it issues conventional or indexed securities.

These first two examples assume that investors correctly anticipate inflation. But what if their expectations about inflation are wrong? Case 3 illustrates what happens if inflation jumps unexpectedly to 4 percent a year, a percentage point above expectations. In that case, the purchaser of an indexed bond gets more interest every year than in the previous example, plus a bigger adjustment at maturity. At the end of five years, the investor gets back $1,217: the initial $1,000 plus five years' inflation adjustment at 4 percent a year. And the total debt (including the extra borrowing to cover interest) is $1,469. A contrasting case, in which inflation falls unexpectedly (to, say, 2 percent a year) is not illustrated, but clearly would show less interest and less debt.

This final illustration hints at why the near-term budgetary effects of indexed bonds are unpredictable. A percentage-point error in expected inflation is hardly unusual. A tally of inflation surveys conducted over the past decade shows that, for a two-year horizon, economists overestimated inflation by an average of 0.9 percentage points, with an average absolute error of 1.1 percentage points.[32] Unless the inflation risk premium is fairly large, its magnitude is likely to be dwarfed, over short periods, by either savings or costs from movements in inflation that investors had not anticipated.

How Would Interest on Indexed Bonds Be Treated in the Budget? Both of the indexed bonds in this example return more at maturity than the simple, $1,000 conventional bond. How is this extra amount--$159 and $217 in Cases 2 and 3, respectively--treated in the budget?

Following long-established accrual accounting rules, the Treasury would recognize such costs as they accrue even though they are not yet due and payable. This rule was not purposely invented for indexed bonds, but has long applied to many types of Treasury and private securities. There are already several securities--notably Treasury bills, savings bonds, and zero-coupon bonds--for which the Treasury does not pay cash interest directly but instead adds to the value of the principal; these additions are treated on an accrual basis in the budget. Private companies and financial institutions likewise treat interest costs and income on an accrual, not a cash, basis.

Thus, following accrual accounting rules, the Treasury would accrue $70 worth of interest in the first year on the indexed bond illustrated in Case 2 even though only $40 is paid by check to the investor. Growing amounts are posted in later years. These accruals are

32. This statement covers *Blue Chip* surveys of economic forecasters published in January of each year, 1982 through 1991. The average cited in the text allows positive errors to offset negative errors and can be interpreted as a measure of bias. The average absolute error captures the magnitude of error, regardless of sign, and can be interpreted as a measure of uncertainty. The relatively small number of surveys examined precludes precise interpretation.

part of net interest and count toward the budget deficit. Likewise, in recognition of the fact that the bond is worth more than when it was issued, they are added to the amount of debt outstanding.

These illustrations refute the occasional, naive claim that the government could wipe out much of its interest costs by issuing indexed debt for, say, 4 percent instead of conventional debt at 7 percent. Such statements imply that investors are unable to compare competing instruments with different characteristics. But that is implausible; investors clearly would not accept an expected return on an indexed bond that is substantially lower than the return on a conventional bond. Although the timing of cash payments differs sharply for the two instruments, both the government and investors correctly focus on when interest is earned or accrued, not when it is paid in cash.

Economic Benefits of Indexed Bonds

Most knowledgeable advocates of indexed bonds, in fact, do not base their arguments on a quick budgetary bonus. They recognize that these savings or costs are unpredictable and focus instead on any of several economic benefits.

- Indexed bonds would make it impossible for the government to inflate away the real value of its debt, or at least the portion that is indexed. Thus, those unfortunate investors who bought Treasury bonds at 4 percent in 1963 would not have been burned. This argument is especially compelling to those who believe that, with the debt-to-GDP ratio climbing steadily under the current outlook, the inflation route will become more and more tempting.

  A traditional retort is that issuing indexed debt would disarm an anti-inflation constituency, namely bondholders, and would amount to throwing in the towel on inflation. Similar arguments have historically been leveled against other proposals to index wages or benefit payments. True enough, several nations with very high inflation rates (notably Israel and some Latin American countries) rely heavily on indexed debt, or on debt denominated in some other, stronger currency--an ad hoc way of safeguarding investors' real return. But a closer parallel to the United States might be Britain, which for a decade has had highly efficient conventional and indexed bond markets operating in tandem.

- By the same token, indexed bonds prevent windfalls to investors if inflation falls below expectations. Thus, the investors who bought the 15.8 percent Treasury bonds of 1981 would not be enjoying such handsome gains. Taken together, this and the previous argument emphasize that indexed bonds are simply a contract that reshuffles risks and rewards between borrower and lender, and arguably enhances equity.

- Indexed bonds could improve the allocation of resources in the economy if they reduce the amount of time and effort that investors devote to nonproductive hedging and increase the willingness of investors to hold financial assets instead of, say, real estate or precious metals.[33]

- Indexed bonds could provide helpful signals to assist the conduct of monetary policy. At present, the Federal Reserve cannot tell whether an increase in interest rates reflects fears of higher inflation or a jump in the real interest rate. This uncertainty hampers it in judging whether monetary policy is too tight, too accommodating, or just about right as it aims to hit its targets for inflation and economic

33. See Ephraim Kleiman, "Benefits and Burdens of Indexed Debt: Some Lessons from Israel's Experience," in Kenneth J. Arrow and Michael J. Boskin, eds., *The Economics of Public Debt* (New York: St. Martin's Press, 1988) for a recounting of the efficiency gains that Kleiman believes such bonds have brought to Israel.

growth. Indexed bonds, if widely available and freely traded, would help the Federal Reserve to monitor these expectations. Practical problems would nevertheless tarnish the quality of the information gleaned: for example, lags in indexing, use of imperfect inflation measures, possible instability of the risk premium, and tax complications would still mean that the "pure" real rate is not observable. Moreover, the Federal Reserve would still face many other uncertainties--notably about the usefulness of its monetary measures and the links between money and GDP.[34]

Except for the last virtue, it is not clear that indexed bonds would accomplish anything that could not be achieved by conventional debt management--namely, a policy that emphasized short- and medium-term securities. Attempts to inflate away the debt are unsuccessful when the debt is short-term. Market interest rates would respond quickly to the rise in inflation, and the Treasury would soon have to pay those higher rates when outstanding securities come up for refinancing.[35]

Few economists appear to oppose indexed bonds outright. At worst, even economists who doubt their appeal--because they think investors have other routes for hedging against inflation--seldom argue that indexed bonds would cause outright harm.[36] Much debate centers around practical issues.

Practical Considerations

Many unresolved issues surround the design and sale of indexed securities.

Availability and Method of Sale. First, the availability of the securities must be decided. Some advocates have in the past called for indexed bonds to be sold chiefly or solely for retirement-related purposes: to individuals for individual retirement accounts, to pension funds, and so forth.[37] Such narrow issuance virtually guarantees that budgetary effects, whether positive or negative, would be small. By limiting trading, it would also make the securities of little or no use to policymakers who seek to gauge real interest rates and inflation expectations; only large, parallel markets in both conventional and indexed securities would provide such information. The Treasury typically shies away from tailoring securities that can legally be held only by certain investors, pointing out that they generally involve fairly high administrative costs and tend to confuse the goals of borrowing money at minimum cost versus rewarding favored investors.

34. For two views within the Federal Reserve System itself, see the unequivocally enthusiastic article by Robert L. Hetzel, "Indexed Bonds as an Aid to Monetary Policy," *Annual Report of the Federal Reserve Bank of Richmond* (1991); and the statement of Alan Greenspan, Chairman of the Federal Reserve Board of Governors, before the Subcommittee on Commerce, Consumer, and Monetary Affairs of the House Committee on Government Operations, June 16, 1992, which expresses a more circumspect view of the bonds' value as a source of information and their desirability from the standpoint of debt management.

35. In "The Debt Burden and Debt Maturity," Working Paper No. 3944 (National Bureau of Economic Research, Cambridge, Mass., December 1991), Allessandro Missale and Olivier Blanchard described evidence that countries that relied primarily on short-term debt seem to have more anti-inflation credibility than others. The study did not include the United States, however, and the authors admitted that their finding might not apply to the United States.

36. One concern, though, is expressed in theoretical papers by Levhari and Liviatin and by Bohn. They point out that there is some nondiversifiable inflation risk in the economy--for example, from inflation that is caused by an external shock. If the government has sold indexed bonds, such an event will automatically transfer resources from taxpayers to bondholders. If taxes distort incentives, it might actually be preferable for the bondholders to absorb the loss. David Levhari and Nissan Liviatin, "Government Intermediation in the Indexed Bonds Market," *American Economic Review Papers and Proceedings* (May 1976); and Henning Bohn, "Why Do We Have Nominal Government Debt?" *Journal of Monetary Economics* (January 1988).

37. Robert J. Myers, *Indexation of Pension and Other Benefits* (Homewood, Ill.: Richard D. Irwin, Inc., 1978); Advisory Council on Social Security, *Social Security Financing and Benefits: Report of the 1979 Advisory Council* (1979); and Alicia Munnell and Joseph Grolnic, "Should the U.S. Government Issue Index Bonds?" *New England Economic Review* (September/October 1986).

Thus, if indexed bonds are to be offered, it seems preferable to sell them freely at auction just like conventional debt. The risk is that they might not prove to be very popular and hence could be a costly source of funds. Only experience would tell. Some economists argue vigorously that an experimental auction or two would not do the trick; only if the Treasury pledges to make large volumes available regularly would a lively market develop.

Choice of a Price Index. A second concern is the choice of a price index for adjusting the bonds' value. No inflation measure perfectly reflects the changes in purchasing power. It may not measure the goods and services that investors plan to consume; it may poorly reflect new items and quality improvements to existing ones; it may be reported with a lag; it may be prone to revision. Given these concerns, economists would generally favor the consumer price index--which is broad-based, available monthly, and subject to little revision. Other contenders include the gross domestic product deflator, the wholesale price index, and so forth. There seems little reason to issue indexed bonds linked to commodity prices such as gold or oil; these price movements do not correlate very well with overall inflation, and investors could simply buy either the commodities themselves or stock in companies that produce them.

Choice of Maturities. A third concern is closely related: the choice of maturity. Investors face much more risk from long-term than from near-term inflation. (Even if inflation zoomed unexpectedly, the holder of a three-month Treasury bill would suffer only a small loss before the security came up for rollover.) And the unavoidable lags in publishing an inflation index and adjusting the security accordingly are more troublesome for a short- than for a medium- or long-term security. Britain's indexed bonds, for example, are linked to the retail price index with an eight-month lag: two months to collect and publish the index, and six months so that the next coupon payment is fully known, a practice that facilitates trading. A few months' lag is trivial for a long-term security but virtually negates the whole aim of indexing for a short-term security. All of these considerations point to medium- and long-term debt as the natural candidates for indexing, though this choice would disappoint enthusiasts who favor massively parallel markets in conventional and indexed securities chiefly for the mountain of data that they would provide.

Tax Treatment. The tax treatment of indexed securities poses challenges. The United States levies taxes on nominal interest and nominal gains. An investor in a conventional bond earning, say, 7 percent pays income tax on all of this interest, even though some of it merely compensates for inflation. Likewise, an investor in a capital asset that appreciates 7 percent pays tax on this gain. For symmetry, an investor in indexed bonds would have to pay tax on both the real coupon and the appreciation resulting from inflation, even though the latter may not be collected in cash. (Similar rules apply to buyers of zero-coupon securities, which pay no cash interest.) This tax liability might deter demand for indexed securities except among tax-exempt buyers like pension funds. In Great Britain, indexed gilts were initially available solely to pension funds; their availability was expanded only when the capital gains tax on nominal bonds was first modified and later abolished. The U.S. tax code's focus on nominal income also precludes guaranteeing a real, after-tax return to investors in indexed bonds. Such thorny questions, though, are hardly unique to indexed bonds, but are just one aspect of the debate over how the tax system should treat both incomes and deductions (for interest payments, depreciation, and similar expenses) during inflationary periods.

Appendixes

Appendix A

Historical Data and Sources of Information on Interest and Debt

This appendix presents historical data on net interest and federal debt for 1940 through 1992. It also lists sources--and pitfalls--of data about the federal debt.

Historical Information

Table A-1 lists the components of net interest--gross interest, interest received by trust funds, and other interest--in dollars. It also displays net interest as a share of total budget outlays and as a percentage of gross domestic product (GDP) in each year.

Table A-2 shows four measures of federal debt: the gross debt, its two components (debt held by the public and debt held by government accounts), and debt subject to the statutory limit. It also depicts debt held by the public as a percentage of GDP.

All data are from the Office of Management and Budget (OMB) and are printed every year in the extensive historical tables published with the President's budget submission. In its own annual reports, which include a slimmer set of historical tables, the Congressional Budget Office (CBO) normally presents only a single series for interest and debt--namely, net interest costs and debt held by the public, because those are by far the most useful measures.

Sources of Data on Federal Debt

Detailed data on the federal debt are compiled by the Department of the Treasury. The Treasury publishes four reports commonly used by researchers: the *Monthly Statement of the Public Debt*, the *Treasury Bulletin*, the *Monthly Treasury Statement*, and the *Daily Treasury Statement*. Each of these reports has its uses and limitations, as explained below.

Monthly Statement of the Public Debt

The *Monthly Statement of the Public Debt* (MSPD) is the only detailed source of information about the particular securities that make up the federal debt. Every marketable security is listed with its issue date, maturity date, amount, and interest rate. The statement also provides a wealth of detail about nonmarketable securities, such as savings bonds. Because the CBO model for projecting interest requires detailed information about the composition and the maturity structure of the debt, the MSPD is an indispensable source.

Nevertheless, the MSPD has four major limitations that many users do not recognize:

- It focuses on the face amount of securities and thus exaggerates the current value of

securities that are sold at a discount, such as Treasury bills and zero-coupon bonds.

- It focuses on the type of debt rather than its ownership. In particular, it does not distinguish securities held by the public from those held by government accounts. As explained below, most of the so-called government account series are in fact held by government accounts, and most of the remaining securities by the public; but this correspondence is not perfect.

- The MSPD omits nearly all debt issued by federal agencies other than the Treasury.

- The MSPD focuses on interest-bearing debt. Of course, nearly all the debt is interest-bearing, the chief exception being a few billion dollars of savings bonds that are more than 40 years old. But the amount of matured debt often balloons on the MSPD's end-of-month "snapshot" date. Several tens of billions of dollars of securities mature on the last day of any month; if that day falls on a weekend (as happened, for example, on October 31, 1992), these securities briefly slip into the non-interest-bearing category until they are rolled over on the next business day. Hence, people using the MSPD must be aware of this

Table A-1.
Federal Interest Costs (By fiscal year, in billions of dollars)

	Gross Interest	Interest Received by Trust Funds		Other Interest	Net Interest	Net Interest as a Percentage of	
		On-Budget[a]	Off-Budget[b]			Total Budget Outlays	Gross Domestic Product
1940	1.0	-0.1	c	c	0.9	9.5	0.9
1941	1.1	-0.1	-0.1	c	0.9	6.9	0.8
1942	1.3	-0.1	-0.1	c	1.1	3.0	0.7
1943	1.8	-0.2	-0.1	c	1.5	1.9	0.9
1944	2.6	-0.2	-0.1	-0.1	2.2	2.4	1.1
1945	3.6	-0.3	-0.1	-0.1	3.1	3.4	1.5
1946	4.7	-0.4	-0.1	-0.1	4.1	7.4	1.9
1947	5.0	-0.5	-0.2	-0.1	4.2	12.2	1.9
1948	5.2	-0.6	-0.2	-0.1	4.3	14.6	1.8
1949	5.4	-0.6	-0.2	c	4.5	11.6	1.7
1950	5.7	-0.6	-0.3	c	4.8	11.3	1.8
1951	5.6	-0.6	-0.3	-0.1	4.7	10.2	1.5
1952	5.9	-0.7	-0.3	-0.2	4.7	6.9	1.4
1953	6.5	-0.7	-0.4	-0.3	5.2	6.8	1.4
1954	6.4	-0.8	-0.4	-0.4	4.8	6.8	1.3
1955	6.4	-0.7	-0.4	-0.3	4.9	7.1	1.3
1956	6.8	-0.7	-0.5	-0.5	5.1	7.2	1.2
1957	7.2	-0.8	-0.6	-0.6	5.4	7.0	1.2
1958	7.6	-0.8	-0.6	-0.7	5.6	6.8	1.3
1959	7.6	-0.7	-0.6	-0.5	5.8	6.3	1.2
1960	9.2	-0.8	-0.6	-0.9	6.9	7.5	1.4
1961	9.0	-0.8	-0.6	-0.8	6.7	6.9	1.3
1962	9.1	-0.8	-0.6	-0.8	6.9	6.5	1.2
1963	9.9	-0.9	-0.6	-0.7	7.7	7.0	1.3
1964	10.7	-1.0	-0.6	-0.9	8.2	6.9	1.3
1965	11.3	-1.1	-0.6	-1.0	8.6	7.3	1.3
1966	12.0	-1.3	-0.6	-0.7	9.4	7.0	1.3
1967	13.4	-1.5	-0.8	-0.8	10.3	6.5	1.3
1968	14.6	-1.7	-1.0	-0.8	11.1	6.2	1.3
1969	16.6	-2.0	-1.1	-0.8	12.7	6.9	1.4
1970	19.3	-2.4	-1.6	-1.0	14.4	7.3	1.5
1971	21.0	-2.8	-1.9	-1.4	14.8	7.1	1.4
1972	21.8	-3.0	-2.1	-1.3	15.5	6.7	1.3

category's potentially large size and its close link to the calendar's quirks.

Treasury Bulletin

The Treasury Bulletin, a quarterly publication of the Treasury Department, reproduces a great deal of information about federal debt from the MSPD. Thus, it shares some of that source document's limitations. The Bulletin, however, also contains useful tables about ownership of the federal debt by classes of investors (individuals, insurance companies, and so forth) and about the debt's average maturity, which do not appear in the MSPD.

Monthly Treasury Statement

The *Monthly Treasury Statement of the U.S. Government* (MTS) is the official monthly tally of the government's receipts and outlays. Buried in this document (in Table 6, "Means of Financing the Deficit or Disposition of the Surplus") is a statement of the government's borrowing and debt for the month and fiscal year to date. This table presents the correct

Table A-1.
Continued

	Gross Interest	Interest Received by Trust Funds		Other Interest	Net Interest	Net Interest as a Percentage of	
		On-Budget[a]	Off-Budget[b]			Total Budget Outlays	Gross Domestic Product
1973	24.2	-3.2	-2.3	-1.4	17.3	7.1	1.4
1974	29.3	-4.1	-2.5	-1.3	21.4	8.0	1.5
1975	32.7	-4.9	-2.8	-1.8	23.2	7.0	1.5
1976	37.1	-5.0	-2.8	-2.5	26.7	7.2	1.6
TQ	8.1	-0.2	-0.1	-0.9	6.9	7.2	1.6
1977	41.9	-5.5	-2.7	-3.9	29.9	7.3	1.6
1978	48.7	-6.1	-2.4	-4.7	35.5	7.7	1.6
1979	59.9	-7.7	-2.2	-7.3	42.6	8.5	1.8
1980	74.8	-9.7	-2.3	-10.2	52.5	8.9	2.0
1981	95.5	-11.5	-2.3	-13.0	68.8	10.1	2.3
1982	117.2	-14.0	-2.1	-16.1	85.0	11.4	2.7
1983	128.7	-15.3	-1.8	-21.7	89.8	11.1	2.7
1984	153.9	-17.0	-3.3	-22.4	111.1	13.0	3.0
1985	178.9	-21.8	-4.1	-23.4	129.5	13.7	3.3
1986	190.3	-26.6	-4.3	-23.3	136.0	13.7	3.2
1987	195.3	-29.6	-5.3	-21.7	138.7	13.8	3.1
1988	214.1	-34.4	-7.4	-20.4	151.8	14.3	3.2
1989	240.9	-40.5	-11.4	-19.8	169.3	14.8	3.3
1990	264.7	-46.3	-16.0	-18.2	184.2	14.7	3.4
1991	285.5	-50.4	-20.2	-20.3	194.5	14.7	3.5
1992	292.3	-54.2	-23.6	-15.1	199.4	14.4	3.4

SOURCE: Compiled by the Congressional Budget Office using data from Office of Management and Budget, *Budget Baselines, Historical Data, and Alternatives for the Future* (January 1993), Part 5, "Historical Tables," Tables 3.1 and 3.2.

NOTE: TQ = transition quarter (July through September 1976).

a. Primarily Civil Service Retirement, Military Retirement, Medicare, Unemployment Insurance, and the Highway and Airport and Airway trust funds.

b. Social Security.

c. Less than $50 million.

Table A-2.
Federal Debt (By fiscal year, in billions of dollars)

	Debt Held by the Public	Debt Held by Government Accounts	Total, Gross Debt	Debt Subject to Statutory Limit	Debt Held by the Public as a Percentage of GDP
1940	42.8	7.9	50.7	43.2	44.8
1941	48.2	9.3	57.5	49.5	42.9
1942	67.8	11.4	79.2	74.2	47.8
1943	127.8	14.9	142.6	140.5	72.8
1944	184.8	19.3	204.1	208.1	91.6
1945	235.2	24.9	260.1	268.7	110.9
1946	241.9	29.1	271.0	268.9	113.8
1947	224.3	32.8	257.1	255.8	100.6
1948	216.3	35.8	252.0	250.4	87.7
1949	214.3	38.3	252.6	251.0	81.6
1950	219.0	37.8	256.9	255.4	82.4
1951	214.3	41.0	255.3	253.3	68.4
1952	214.8	44.3	259.1	257.2	63.1
1953	218.4	47.6	266.0	264.2	60.0
1954	224.5	46.3	270.8	269.4	61.0
1955	226.6	47.8	274.4	272.3	58.9
1956	222.2	50.5	272.7	270.6	53.4
1957	219.3	52.9	272.3	269.1	50.0
1958	226.3	53.3	279.7	275.4	50.5
1959	234.7	52.8	287.5	282.4	48.9
1960	236.8	53.7	290.5	283.8	46.9
1961	238.4	54.3	292.6	286.3	46.1
1962	248.0	54.9	302.9	295.4	44.7
1963	254.0	56.3	310.3	302.9	43.5
1964	256.8	59.2	316.1	308.6	41.1
1965	260.8	61.5	322.3	314.1	38.9
1966	263.7	64.8	328.5	316.3	35.9
1967	266.6	73.8	340.4	323.1	33.6
1968	289.5	79.1	368.7	348.5	34.2
1969	278.1	87.7	365.8	356.1	30.0
1970	283.2	97.7	380.9	372.6	28.7
1971	303.0	105.1	408.2	398.7	28.8
1972	322.4	113.6	435.9	427.8	28.1
1973	340.9	125.4	466.3	458.3	26.8
1974	343.7	140.2	483.9	475.2	24.5
1975	394.7	147.2	541.9	534.2	26.1
1976	477.4	151.6	629.0	621.6	28.3
TQ	495.5	148.1	643.6	635.8	27.8
1977	549.1	157.3	706.4	700.0	28.6
1978	607.1	169.5	776.6	772.7	28.2
1979	639.8	189.2	828.9	827.6	26.3
1980	709.3	199.2	908.5	908.7	26.8
1981	784.8	209.5	994.3	998.8	26.5
1982	919.2	217.6	1,136.8	1,142.9	29.4
1983	1,131.0	240.1	1,371.2	1,378.0	34.1
1984	1,300.0	264.2	1,564.1	1,573.0	35.2
1985	1,499.4	317.6	1,817.0	1,823.8	37.8
1986	1,736.2	383.9	2,120.1	2,111.0	41.2
1987	1,888.1	457.4	2,345.6	2,336.0	42.4
1988	2,050.3	550.5	2,600.8	2,586.9	42.6
1989	2,189.3	678.2	2,867.5	2,829.8	42.3
1990	2,410.4	796.0	3,206.3	3,161.2	44.1
1991	2,687.9	911.1	3,599.0	3,569.3	47.7
1992	2,998.6	1,004.0	4,002.7	3,972.6	51.1

SOURCE: Compiled by the Congressional Budget Office using data from Office of Management and Budget, *Budget Baselines, Historical Data, and Alternatives for the Future* (January 1993), Part 5, "Historical Tables," Tables 7.1 and 7.2.
NOTE: TQ = transition quarter (July through September 1976).

aggregates for federal debt held by the public and by government accounts and clearly displays the various adjustments that are required to bridge from the MSPD's figures. The only genuine disadvantages of the MTS are that it lacks detail by type of security and that its table on federal debt is not very prominent.

The MTS's data on federal debt find their way into other sources. The data for September 30 are reproduced (sometimes with minor revisions) in OMB's budget documents. And the end-of-quarter figures for debt held by the public are available from the Federal Reserve Board's flow of funds accounts.

Daily Treasury Statement

The Treasury publishes a *Daily Treasury Statement* of its cash balances, deposits, withdrawals, and public debt transactions. This statement enables government officials and participants in the financial markets to monitor cash flows and compliance with the statutory limit on debt.

Bridging from the Public Debt to the Gross Debt and Its Components

The face amount of public debt by type of security and major category--marketable, nonmarketable, and non-interest-bearing--from the MSPD of September 30, 1992, is reproduced in Table A-3. The adjustments that are required to bridge from this figure ($4,065 billion) to the official budget totals are then displayed in Table A-4.

Public Debt Versus Gross Federal Debt

As suggested above, bridging from the face amount of public debt (as it appears in the MSPD) to the gross federal debt requires two major adjustments.

- Agency debt, which totaled $18 billion at the end of 1992, must be added. Most was issued by the Tennessee Valley Authority.

- An adjustment for premiums and discounts corrects the exaggeration that results when using the face amount of securities. Premiums were a mere $1 billion at the end of 1992. Discounts totaled $81 billion: $7 billion on Treasury bills, $12 billion on zero-coupon securities issued to the Pension Benefit Guaranty Corporation (a government account), and $62 billion on other securities (chiefly the zero-coupon bonds issued directly to Mexico, Venezuela, and the Resolution Funding Corporation, as discussed in Chapter 2).

The resulting gross federal debt was $4,003 billion.

Debt Held by Government Accounts

Debt held by government accounts totaled $1,004 billion on September 30, 1992--close to the $1,011 billion in government account series (GAS) displayed in the MSPD (see Table A-3). But several adjustments--both positive and negative--are required to bridge between the two (see Table A-4):

- The GAS includes the holdings of the federal employees' Thrift Savings Plan, the government's analogue to the tax-favored savings plans (dubbed 401(k) plans) offered by many private employers. Federal workers who want to save part of their salaries, with a graduated government match, can pick among several investments--including safe, liquid Treasury securities that are known as the G fund. The Treasury issues and redeems the G fund's securities just as it handles regular government accounts. But this money does not belong to the government; it belongs to

the participants. Thus, it belongs in debt held by the public--much as if a federal employee bought an ordinary Treasury bill or savings bond. The G fund totaled $12 billion at the end of 1992.

- The GAS states holdings at their face value. Thus, it exaggerates the value of zero-coupon debt held by government accounts, namely by the Pension Benefit Guaranty Corporation. Removing the discount on GAS subtracts $12 billion.

- A few government accounts hold non-GAS securities. One, the Civil Service Retirement trust fund, holds $15 billion in securities issued by the Treasury's Federal Financing Bank (FFB) during an interruption in the debt ceiling. The FFB securities are not subject to the statutory limit on debt, but are otherwise identical to GAS in every way. A second fund, the Tennessee Valley Authority (TVA) fund, has bought ordinary Treasury securities in the secondary market in the last few years in conjunction with its own independent sales of bonds. The TVA holdings of Treasury securities totaled $2 billion at the end of 1991. Other funds' holdings of non-GAS securities are minor.

Table A-3.
Face Amount of Outstanding Public Debt Securities as of September 30, 1992 (In billions of dollars)

Type of Issue	Amount
Interest-Bearing	
Marketable	
Bills	634.3
Notes	1,566.3
Bonds	461.8
Subtotal	2,662.5
Nonmarketable	
Government account series	1,011.0
Savings bonds	148.3
State and local government series	157.6
Foreign series	37.0
Domestic series[a]	30.0
Federal Financing Bank[b]	15.0
Other	0.4
Subtotal	1,399.3
Total	4,061.8
Non-Interest-Bearing	
Matured Debt	2.0
Other	0.8
Total	2.8
Total Public Debt	
Total Face Amount	4,064.6

SOURCE: Department of the Treasury, *Monthly Statement of the Public Debt* (September 30, 1992), Table 1.

a. Issued to the Resolution Funding Corporation.

b. Issued to the Civil Service Retirement trust fund in lieu of regular government account series.

Counting these adjustments, government accounts held $1,004 billion of the $4,003 billion in gross debt at the end of 1992.

Debt Held by the Public

Debt held by the public is simply what is left when government account holdings are removed from the gross federal debt. Thus, as shown in Table A-4, debt held by the public was $2,999 billion at the end of 1992. Obviously, it is dominated by marketable securities (bills, notes, and bonds), savings bonds, and the state and local government series. Discount securities, chiefly bills and the zero-coupon bonds issued to foreign governments and to the Resolution Funding Corporation, are counted at their current rather than their full face value.

Table A-4.
Relationship Between Public Debt and Gross Debt and Its Components as of September 30, 1992 (In billions of dollars)

	Amount
Gross Federal Debt	
Face Amount of Public Debt Securities	4,064.6
Adjustments	
Agency debt	18.3
Premiums on public debt securities	1.0
Discounts on public debt securities	
Bills	-6.7
Government account series	-12.4
Other	-62.0
Subtotal	-81.1
Other	-0.1
Total	-62.0
Gross Federal Debt	4,002.7
Debt Held by Government Accounts	
Face Amount of Government Account Series	1,011.0
Adjustments	
Thrift Savings Plan held by the public	-11.8
Discount on government account series issued to Pension Benefit Guaranty Corporation	-12.4
Federal Financing Bank securities held by Civil Service Retirement	15.0
Tennessee Valley Authority holdings	2.2
Other	a
Total	-7.0
Debt Held by Government Accounts	1,004.0
Debt Held by the Public	
Gross Federal Debt	4,002.7
Debt Held by Government Accounts	-1,004.0
Debt Held by the Public	2,998.6

SOURCE: Congressional Budget Office based on information from the Department of the Treasury and the Office of Management and Budget.

a. Less than $50 million.

Appendix B

Accuracy of the CBO Model for Projecting Interest on the Public Debt

Overall, the Congressional Budget Office's interest model, given the correct inputs, has proved to be quite accurate. A retrospective analysis of fiscal years 1987 through 1992 shows that the model virtually duplicated the total amount of interest actually paid on public issues over the six-year period. Most important, the model works very well for marketable securities (bills, notes, and bonds). Projections of interest costs on marketable securities, by far the largest component of the public debt, were within 0.2 percent of the actual amounts for the 1987-1992 period, and even this tiny error can be explained.

Method

As described in Chapter 6, the CBO interest model generally projects interest costs for six years using data about outstanding debt, projected borrowing needs, the mix and seasonality of financing, and future interest rates. To test the model, projected figures were replaced with actual levels for the major variables. The goal was to see how the model would perform when given accurate assumptions about deficits, the mix of financing, and interest rates.

Incorporating actual data for the test period required first retrieving a snapshot of bills, notes, bonds, and other securities outstanding at the end of September 1986 to serve as a starting point for fiscal year 1987.[1] Total annual financing by type of security for the subsequent fiscal years was inserted, and the model distributed this financing using typical seasonal patterns. Actual interest rates from the Treasury's auctions were applied to the computed amounts of new debt and completed the model's projections of interest costs. This effort did not include modeling the interest paid to trust funds and other government accounts, because these payments are intragovernmental and add nothing to total outlays or the deficit. That particular portion of the model has been previously tested and found to be reliable.

Results

Over the six-year period, the interest model projected interest payments of $1,130 billion--only $4 billion under the actual amount spent between 1987 and 1992 (see Table B-1). In percentage terms, the model came within 0.3 percent of actual interest payments on public issues. The largest discrepancy occurred in 1992 when the model underestimated interest on public issues by $2 billion out of a total of $212 billion.

1. The analysis of savings bonds began in December 1986, after a period of extraordinarily volatile sales that preceded the change in the guaranteed minimum rate.

Table B-1.
Comparison of the CBO Model's Projections for Interest Outlays with Actual Outlays (By fiscal year, in billions of dollars)

	1987	1988	1989	1990	1991	1992	Six-Year Total
Model's Results for Interest Outlays							
Bills	23.5	25.3	32.4	35.0	35.2	27.6	179.0
Notes	89.8	93.0	100.0	105.7	112.3	116.2	617.0
Bonds	26.8	29.3	32.0	35.2	38.9	42.3	204.4
Savings Bonds	6.8	8.4	8.0	8.3	10.0	9.0	50.5
SLGs	9.9	11.8	12.8	13.5	13.2	12.9	74.1
Other[a]	0.3	0.4	0.6	0.8	1.4	1.4	5.1
Total	157.0	168.1	185.8	198.6	211.1	209.5	1,130.1
Actual Interest Outlays							
Bills	23.6	25.2	32.7	34.9	35.2	28.1	179.7
Notes	89.9	93.6	99.4	105.9	112.3	117.3	618.3
Bonds	26.6	29.4	31.9	35.3	38.8	42.4	204.4
Savings Bonds	6.9	8.6	8.1	8.7	10.5	9.6	52.5
SLGs	9.9	11.9	12.8	13.4	13.1	12.9	74.0
Other[a]	0.3	0.4	0.6	0.8	1.5	1.4	5.1
Total	157.2	169.0	185.6	199.1	211.4	211.6	1,133.9
Difference (Model Minus Actual)							
Bills	-0.1	0.1	-0.3	0.1	-0.1	-0.5	-0.7
Notes	-0.1	-0.5	0.6	-0.2	b	-1.1	-1.3
Bonds	0.1	-0.1	0.1	-0.1	0.1	-0.1	0.1
Savings Bonds	b	-0.3	-0.1	-0.5	-0.5	-0.6	-2.0
SLGs	b	-0.1	b	0.1	0.1	b	0.1
Other[a]	b	b	b	b	b	0.1	b
Total	-0.1	-0.9	0.3	-0.5	-0.4	-2.1	-3.8
Percentage by Which Model Was Over or Under Actual							
Bills	-0.4	0.4	-0.9	0.4	-0.2	-1.7	-0.4
Notes	-0.1	-0.6	0.6	-0.2	c	-0.9	-0.2
Bonds	0.4	-0.3	0.3	-0.2	0.2	-0.2	c
Savings Bonds	-0.6	-3.2	-1.6	-5.2	-4.8	-5.9	-3.8
SLGs	-0.2	-1.2	0.2	0.9	0.8	0.1	0.1
Other[a]	-5.6	7.9	1.7	-5.3	-1.6	3.7	0.2
Total	-0.1	-0.5	0.1	-0.3	-0.2	-1.0	-0.3

SOURCE: Congressional Budget Office.

NOTE: SLGs = state and local government series.

a. Consists of foreign series bills, zero-coupon bonds issued to the Resolution Funding Corporation, foreign zero-coupon bonds, and the Thrift Savings Plan.

b. Less than $50 million.

c. Less than 0.05 percent.

Marketable Securities

With only one exception, the model projected interest on individual types of marketable debt within 1 percent of their true values in each year. All told, between 1987 and 1992, bonds were projected almost exactly. Notes were underestimated by 0.2 percent, and bills by 0.4 percent.

Although the results of CBO's interest model simulation are remarkably close to observed payments on marketable securities, even those minor differences can be explained. The errors are largely the result of deviation in the assumed seasonality of borrowing and a modified borrowing schedule.

Because borrowing does not occur evenly throughout the year, seasonality factors (separately specified for bills, notes, and bonds) are used in the model to distribute the total amount of estimated financing for each month. Deviation from the typical seasonal pattern encoded into the model would lead to earlier (or later) borrowing in the model than actually occurred and therefore higher (or lower) predicted interest payments.

Borrowing in notes and bonds is not very seasonal. Notes and bonds maintain a stable financing pattern, with each monthly and quarterly auction raising basically the same amount of cash. Because fluctuating financing needs are usually met through short-term issues, though, quarterly bill issues can vary a great deal from year to year. As Figure 5 demonstrated (see page 12), it is impossible to match accurately a set of general seasonality assumptions with what actually occurred.

Another reason that the model deviated somewhat from actual interest paid is that the Treasury's auction cycle for notes changed slightly during this period, and the relative sizes of various auctions shifted. For example, the Treasury has dropped the four-year note (formerly sold once each quarter) but stepped up the frequency of the five-year note (which used to be sold once a quarter but is now offered once a month). CBO did not try to control for every such fluctuation, so it is not surprising if the model produces modest errors in the composition of the debt over a six-year period.

Other Public Issues

Other public issues are harder to test than marketable securities. CBO does not attempt to project many of the seemingly random fluctuations in issues and redemptions because, unlike marketable securities, nonmarketable securities are not projected on an issue-by-issue basis but in broader, aggregate categories. Accordingly, the model performed somewhat less impressively on these issues than on marketable securities. Given their small share of the debt, though, the projections of other public issues are quite satisfactory.

The model assumes smooth patterns of sales and redemptions of savings bonds. CBO selected reasonable values for these variables that resembled average experience; however, actual debt issued during the 1987-1992 period did not follow a smooth trend (see Figure 6, page 16, which displays the volatility of savings bond sales over the past few years). The upshot is that interest on savings bonds was underestimated slightly.

For other nonmarketable securities, the model performed satisfactorily. Interest on state and local government series was generally projected within 1 percent of its actual value. Interest on other types of securities occasionally displayed large errors in percentage terms. However, those issues are such a minuscule portion of overall debt that calculation errors have almost no impact on total interest payments.

Appendix C

The Bootstrap Simulations

The bootstrap is a technique of statistical inference used to assess the uncertainty in estimates and projections by efficiently using all the information contained in a single data set.[1] In its most basic form, the method is used to approximate the sampling distribution of a test statistic--for example, the standard error of a sample average from a given set of data. When applied to an econometric model that contains several equations, the bootstrap can be used to assess the uncertainty associated with the parameters of each regression equation and with the forecasts generated by the model.

The basic concept is relatively simple. It involves resampling a data set many times and recomputing the appropriate test statistics each time. The bootstrap is especially valuable in small samples for which the exact distributions of the statistics are unknown. For this analysis, the Congressional Budget Office used the procedure to estimate the distribution of savings that might be expected to result from a shift to shorter-term securities for managing the debt.

The Bootstrap Projections of the Economy

The bootstrap simulations performed for the analysis in Chapter 7 entail a streamlined model of the entire economy rather than a narrow model in which only interest rates and federal interest costs are permitted to vary. The reason is straightforward: federal borrowing and interest costs depend on many other uncertain factors--including future gross domestic product, federal revenues and noninterest spending, and inflation--and not just on interest rates. These variables are often related to one another; for example, falling short-term interest rates often accompany tepid (or negative) economic growth. Thus, permitting these underlying determinants to vary is a way to capture more realistically the potential range of future interest costs.

For this exercise, CBO used a modified version of the neoclassical growth model it routinely uses to form its long-term projections. In the basic growth-accounting framework, the economy's future size is fundamentally determined by the labor force (itself dependent on population and on behavioral choices such as retirement decisions), the capital stock (largely dependent on saving), and total factor productivity (a measure that captures the contribution of both labor and capital).[2] CBO's usual model was then modified in two important ways:

- First, stochastic equations for several fundamental variables were added to the model. "Stochastic" indicates that the variable contains an element of randomness or chance, even if its fundamental be-

1. See D.D. Friedman and S.C. Peters, "Bootstrapping an Econometric Model: Some Empirical Results," *Journal of Business and Economic Statistics*, vol. 2, no. 2 (1984), and the references cited therein.

2. A general description of such models is found in Congressional Budget Office, *The Economic and Budget Outlook: Fiscal Years 1990-1994* (January 1989), Chapter III. More detailed descriptions may be found, for example, in Henry Aaron, Barry Bosworth, and Gary Burtless, *Can America Afford to Grow Old?* (Washington, D.C.: Brookings Institution, 1989), Chapter 4 and Appendix B, and in most intermediate macroeconomic textbooks.

havior and its links to other variables are well understood. Among such stochastic variables in the bootstrap are the consumer price index, employment, hours worked, the saving rate, and productivity in several sectors. The stochastic equations were estimated over three decades (the 1961-1991 period) using ordinary least squares (OLS) regressions, and a set of historical residuals, or error terms, was computed for each.

- Second, a richer set of equations describing the mechanics of federal interest payments was added. The basic version of CBO's long-run growth model includes only rudimentary equations for interest rates and federal interest costs. The version of the model tailored for this particular analysis, however, includes detailed equations for federal interest costs and for interest rates on government debt of several maturities. These equations are discussed in a later section.

The bootstrap approach entails adding shocks to the model's stochastic equations over the 10-year forecast period. Rather than being drawn from an arbitrary, unchanging distribution--say, one that is normal with a mean of zero--the shocks were proxied with the residuals, or error terms, drawn at random from the 30 years of historical data. Thus, each year's forecast for each stochastic variable consists of the value ordinarily predicted by its own equation, plus a randomly selected residual from the same equation plucked from the historical data.[3] This residual, or shock, can be positive or negative and will always be within the range of experience. Combined with the model's identities, this procedure yields a forecast for every variable in the model, with the uncertainty in the model's stochastic equations ultimately filtering through to virtually every variable.

The resampling aspect of the exercise is an ingenious way to incorporate the variability inherent in the estimates of the model's parameters in each of the forecasts. It involves using the historical data and the estimated structural relationships to "recreate" historical series for virtually every variable in the model. The series are developed by randomly shuffling the residuals for each stochastic variable over the sample period and then running the growth-accounting model over the same period. This process does not change the fundamental structure of the model--because it changes neither the historical values of the exogenous variables nor the model's identities--but instead pretends that history had, at random, turned out differently. Thus, it resequences the pattern of shocks to the stochastic variables and then calculates how these shocks would have affected the remaining variables. The next step is to reestimate (using OLS) each of the stochastic equations using the new data set and generate yet another set of residuals over the sample period.

Specifically, the simulations consist of 1,000 forecasts from the model, with each forecast containing a different set of shocks and hence reflecting the uncertainty inherent in the model's stochastic variables. Ideally, the data would be resampled before each iteration of the forecast, but the additional information gleaned would not be worth the extra time that would take. Instead, the data were resampled and the equations reestimated after every tenth iteration of the model, or 100 times in all. Thus, 10 forecasts were created using the original data set's residuals (chosen at random for each year in each forecast). Only then were the data resampled and a new set of residuals created; another 10 forecasts were created, the data resampled, and so forth.

The bootstrap simulations incorporate the same fundamental relationships that CBO includes in its usual projections of the economic and budget outlook over the medium term. However, CBO's basic model had to be modified slightly to make it more useful for project-

3. Note that the residuals that are applied to all of the stochastic variables in a given year in the forecast are all from the same randomly selected year in history.

ing interest costs and analyzing alternative debt management policies. Specifically, it was modified to include a more comprehensive set of interest rates and a more finely articulated equation for federal interest costs.

Interest Rates

The key interest rate in the bootstrap simulations is the rate on 10-year Treasury securities. The model treats the inflation-adjusted rate on 10-year notes as a function of such variables as the real return on physical assets, the ratio of debt held by the public to GDP, and the change (that is, any acceleration or deceleration) in the rate of inflation.

Next, the real rate on three-month Treasury bills is computed based on the level of the real 10-year note rate and a variable that measures the "unemployment gap" (the difference between the actual and the natural rate of unemployment). The unemployment gap is a business cycle indicator; as the economy falls further below its capacity level, the gap gets larger and larger. The estimated relationship between this variable and the Treasury bill rate is inverse: as the unemployment gap grows larger, the three-month bill rate tends to fall relative to the 10-year note rate.

Once the inflation-adjusted rates on three-month and 10-year Treasury securities are computed, their nominal levels equal the appropriate real rate plus a distributed lag on inflation (that is, a weighted average of the rate of inflation in the recent past). The nominal rates on three-year and five-year Treasury notes are then computed as a function of the nominal three-month bill rate and the unemployment gap. Finally, a composite rate on securities with maturities of more than 10 years (essentially, the 30-year bond rate) is computed based on the nominal rate on 10-year notes and the unemployment gap. The overall effect of these specifications is to maintain a yield curve that flattens as output approaches its capacity level and steepens as output falls further below capacity.

Interest Costs

To estimate federal interest costs in the bootstrap simulations, CBO relied on a simplified annual equation that mimics the continual financing and refinancing of federal debt. Despite its simplicity, the approach outlined below performs admirably over the sample period and closely resembles CBO's full-fledged baseline projections--with errors typically amounting to one-half of one percent of interest costs, or less. This simple approach would also be versatile enough to analyze debt management approaches other than the single policy--the complete cessation of bond sales--simulated in this report.

The existing debt is first partitioned into three broad classes: short (Treasury bills), long (Treasury bonds), and medium (all other debt, chiefly Treasury notes). Average interest rates for these three broad categories are drawn from the *Monthly Statement of the Public Debt*. Two factors then cause the size and composition of the debt to change:

- Debt is refinanced at market interest rates. Within a single year, short debt has a 100 percent chance of being rolled over; medium-term debt about a 20 percent chance; and long-term debt, for all practical purposes, a zero probability. Refinancing takes place about halfway through the year for medium-term debt, but much earlier for short-term debt, much of which has only a three-month maturity.

- New debt is added, also at market interest rates, in amounts that are proxied by the government's total deficit. This new borrowing, on average, takes place halfway through the year.

The specific identities and equations used in the model are described next.

Initial Variables (Data at End of Last Period)

These variables reflect the amount and characteristics of debt actually outstanding on any given starting date, or time period t:

$DEBT_t$ (debt held by the public)

$BILLS_t$ (face amount of Treasury bills outstanding)

$BONDS_t$ (Treasury bonds outstanding)

$MEDIUM_t$ (medium-term debt outstanding; a residual calculated as debt held by the public minus bills minus bonds)

$BILLRATE_t$ (weighted average effective rate on bills)

$BONDRATE_t$ (weighted average effective rate on bonds)

$MEDRATE_t$ (weighted average effective rate on medium-term debt, proxied by the rate on Treasury notes).

Variables Computed Within the Bootstrap Simulation

Several variables are computed internally as part of the economic forecast generated by the bootstrap simulations:

$RMGBS3NS_t$ (interest rate on new three-month bills, expressed on a bank-discount basis)

$NOTERATE_t$ (the interest rate on new medium-term notes, defined as a simple average of three-year and five-year rates)

$R10PLYR_t$ (the interest rate on debt with maturity greater than 10 years, here applied to 30-year bonds)

$BORROWING_t$ (new borrowing, proxied as the national income and product accounts, or NIPA, deficit adjusted by the projected difference between a NIPA- and a budget-basis deficit. BORROWING, in turn, is assigned a financing mix--NEWBILLS, NEWNOTES, and NEWBONDS)

$INTNETGF_t$ (federal government net interest costs, on a NIPA basis). This variable itself is the sum of interest income, which is unaffected by any debt management proposals, and interest on the debt, or INTCOST:

$$INTNETGF_t = \text{Interest income}_t + INTCOST_t$$

$$\begin{aligned} INTCOST_t = {} & [BILLS_{t-1}*(.25*BILLRATE_{t-1} + .75*RMGBS3NS_t) \\ & + NEWBILLS_t*RMGBS3NS_t/2] \\ & + .98*[(.80*MEDIUM_{t-1}*MEDRATE_{t-1}) \\ & + (.20*MEDIUM_{t-1}*(MEDRATE_{t-1} + NOTERATE_t)/2) \\ & + (NEWNOTES_t*NOTERATE_t/2) \\ & + (BONDS_{t-1}*BONDRATE_{t-1}) \\ & + (NEWBONDS_t*R10PLYR_t/2)] \end{aligned}$$

The end-of-year debt and the weighted average interest rates on its three classes were then recomputed before moving on to the next period.

In each of the 1,000 simulations, interest was computed in two ways--once assuming a continuation of current debt management, and once assuming a cessation of bond sales with the extra money financed in bills. That is, NEWBILLS and NEWBONDS differed in the two alternatives. The resulting distribution of the expected savings in the fifth and tenth years of the simulations were displayed in Table 22 and Figure 10 (on pages 73 and 74).