

Strategic Treasury Debt Management in Public Policy

Campbell R. Harvey
Duke University

The Treasury should supplement its bond offerings with adjustable-rate coupon bonds. The adjustable coupon would be linked to the six-month Treasury bill auction yield. Given the different magnitude of adjustable and fixed mortgage rates, the interest servicing costs would be dramatically lower for the floating-coupon bonds. This idea is already a proven winner in the corporate bond market where close to 30 percent of new Eurobond offerings in the last 10 years have been adjustable-rate bonds. In addition to reducing servicing costs, the strategy will relieve some of the burden on the long-maturity fixed-coupon bonds. Reducing the supply of the fixed-coupon bonds should increase prices and decrease long-term yields. Reduction in long-term interest rates enhances spending, construction and capital expenditures. Most importantly, these bonds help enforce a low inflation policy.

Today's adjustable-rate mortgages are much cheaper than their fixed-rate counterparts—more than 2 percent cheaper. With today's interest rate environment, it makes sense for the Treasury to consider issuing some adjustable-rate (or floating-rate) bonds. The interest cost of these bonds is sharply lower than fixed-rate coupon bonds. In addition to reducing the cost of servicing the government's debt, this policy should reduce long-term interest rates.

Indeed, this idea has been proven to be a winner in the corporate world. In the Eurobond market, there is a large supply (over \$100 billion) of floating-rate corporate bonds. The coupon adjusts according to a formula that is based on interest rates on certificates of deposit (in U.S. dollars) in London banks. Investment banks also earn profits by purchasing U.S. Treasuries and transforming them into floating-rate bonds. The Treasury could easily bypass the middleperson and issue their own floating-rate bonds.

The overwhelming economic goal is to sustain current job creation and economic growth without sparking inflation. While considerable previous attention has focused on lowering short-term rates, most of the economic kick comes from long-term rates. Capital investment, most consumer credit and mortgage rates are closely linked to long-term rates—not

short-term rates. Any plan that reduces long-term rates should increase investment, spending, housing starts and employment. Indeed, over the past year we have seen large changes in both the short and long-term interest rates. Short-term rates have risen from 30-year lows of near 3 percent to a current 4.48 percent (3-month Treasury bill, July 25, 1994). Long-term rates have risen from rates below 6 percent to a current 7.53 percent (30-year Treasury bond, July 25, 1994).

It is not just the changes in the rates that are interesting—one must also consider the spread between the long and the short rates. For the past three years, there has been a difference of more than 3 percent between long-term interest rates and short-term rates. The size and persistence of this huge spread is virtually unprecedented over the past 35 years.

Why are long-term interest rates so much higher than short-term rates? There are a number of forces that affect long-term interest rates. Two of the most important forces are the supply of bonds and the market expectations of long-term inflation. First, consider the supply of bonds. One way to lower long-term rates is to reduce the immense burden of long-term bonds in the market. As the supply is reduced, bond prices rise and interest rates fall. With other factors remaining constant, a reduction in the deficit will lessen the pressure on the long-term bond market and reduce rates. Another option is to shorten the maturity structure of the bond offerings (i.e., offer more short-term debt and less long-term debt). This acts to decrease long-term rates and increase short-term rates.

There is another possibility. In testimony to the House Ways and Means Committee, Harvey (1993a) advocated the use of floating-rate bonds to finance part of the government debt. Currently, the Treasury is issuing 30-year bonds with an effective yield of about 7.5 percent. If the Treasury issued a 30-year floating-rate bond (with a coupon rate that changes as short-term interest rates change), they could save at least 250 basis points (2.5 percent) in interest servicing costs in the first year.¹ With an estimated \$1.25 trillion of debt coming to the market in the next 12 months,² the direct interest savings would be impressive if some floating-rate debt was issued—perhaps \$5 billion a year.

The introduction of floating-rate bonds will diminish the supply of the long-term fixed-rate bonds and hence long-term interest rates should decrease. Lower rates reduce the interest servicing cost of new long-term, fixed-rate debt. In addition, lower long-term rates provide an environment which encourages capital investment, spending and construction.

VALUING FLOATING-RATE BONDS

The floating coupon should be determined by the weighted average of the 26-week Treasury bill auction yields over the previous six months. Given that this market is extremely liquid with \$721.2 billion in Treasury bills outstanding at the end of the first quarter of 1994, it is unlikely that any one investor could manipulate the coupon rate. The weighting ensures that smaller auctions receive a lesser weight in determining the coupon rate.

There are a number of reasons why many investors are attracted to variable-rate investments. First, they act as a natural hedge. In general, there is a negative correlation between interest rate levels and economic activity. High interest rates are often associated with recessions. However, with a floating-rate investment, the payout rate increases in the high-rate environment. That is, you receive larger cash flows when you most need the cash. This is the definition of a hedge.

Second, they are market-value neutral. This is particularly important for corporations. With fixed-rate bonds, increases in interest rates drive down bond prices. For example, consider a bond with an 8 percent coupon with 20 years to maturity when the going interest rate is 8 percent. This bond would be trading at par value (issue amount or face value equals the market price). If rates move up by 1 percent, investors would lose 7 percent of the bond's value; the price would drop from \$100 to \$93.

The price of the fixed-rate bond falls because the coupon cash flow is not as attractive when rates rise. That is, new 9 percent coupon bonds in this example would be priced at par (\$100). The 8 percent coupon bonds must fall in value to prevent arbitrage.

Using this intuition, one can see why the floating-rate bond is market-value neutral. If market interest rates are 8 percent, a bond paying an 8 percent coupon will be valued at par. If market interest rates are 9 percent, the 9 percent coupon bond will be valued at par. Hence, a bond whose coupon is reset by the market interest rate should always be valued at or near par.

Many corporations must closely monitor the value of their investment assets. It is common to initiate transactions in the derivatives markets to hedge the value of the fixed-coupon bond portfolio. Popular forms of the hedges involve futures, options and swap transactions. However, owning the floating-rate bond ensures that the asset value remains constant in volatile rate environments. There is no reason to hedge a float-

ing-rate bond and the investor saves the costs associated with hedging.

THE MARKET FOR FLOATING-RATE BONDS

As mentioned earlier, many corporations already use the Eurobond market to issue floating-rate bonds. Hence, investors already have the opportunity to directly purchase floating-rate bonds. Is there still a market for floating-rate Treasury bonds? The answer is yes for two reasons: risk avoidance and transaction costs.

First, consider risk avoidance. Obviously, there is a difference between the risk of a corporate bond and the risk of a government bond. This risk can translate into substantial price volatility. Many investors learned this lesson the hard way in early 1987. Consider the price history of three Eurobond issues from 1985 through May of 1987. The issuers—Barclay's, Midland Bank and Standard Chartered—were all based in London. Each Eurobond used the same semi-annual coupon reset scheme. The coupon was fixed to the six-month London Interbank Offer Rate (LIBOR) plus 25 basis points.

From January 1985 through December 1986, all three of these bonds traded near par (\$99-\$101 range). During this period, the LIBOR rate fluctuated from 10 percent (March 1985) to 6 percent (December 1986). Although interest rates were very volatile, the floating-rate bond price was very stable. For example, when the LIBOR rates rose from 8.5 percent to 10 percent between February and March 1985, the bond prices remained stable. This is exactly the type of behavior which is implied by the above discussion on the valuation of floating-rate bonds.

From December 1986 through April 1987, something different happened. When the LIBOR rate rose slightly, from 6 percent to 6.5 percent, bond prices plummeted. Barclay's bond dropped from \$100 to \$95. The other two bonds fared worse. The Midland Bank bond fell to \$88; Standard Chartered's dropped to \$84. This price volatility was not induced by the change in the LIBOR rate; it was induced by changes in investors' perceptions of the creditworthiness of the financial institutions issuing the bonds.³

This example demonstrates an important disadvantage of purchasing corporate floating-rate notes. While these bonds are reasonably immune to fluctuations in interest rates, the investor bears the price volatility induced by changes in creditworthiness. Importantly, investors could avoid this price volatility if the Treasury directly placed floating-rate bonds.

The advantage concerns transaction costs. Technically, an investor could construct a floating-rate bond based on a Treasury security today. The investor purchases the coupon bond and then initiates a swap transaction with an investment bank. The investor agrees to turn over the coupon payments to the investment bank and, in return, receives a floating payment which might be tied to the Treasury bill rate. There is little credit risk here because the swap transaction can be insured. The combination of the coupon Treasury and the swap replicates the payoffs of the floating-rate bond.

There are at least four disadvantages to this type of arrangement: size, residual credit risk, liquidity and transaction costs. Most swap transactions are large, making it difficult for ordinary investors to access this market. The residual credit risk can be insured—but for a fee. The coupon bond and the swap may be more difficult to sell compared with other highly liquid bonds. Finally, there are direct transaction costs associated with initiating the swap. All of these factors are avoided with a floating-rate Treasury bond.

THE REAL BOND ALTERNATIVE

One alternative to the floating-rate mechanism is a bond that is indexed to the inflation rate. These so-called “real” bonds have been initiated in a number of countries, most notably the United Kingdom.

Consider the advantages and disadvantages of the real bond relative to the floating-rate bond.⁴ The main advantage of the real bond is that it separates real interest rate risk and risk from inflation. The nominal interest rate has three components: the expected real interest rate, the expected inflation rate and a risk premium which is related to the correlation between real rates and inflation.⁵ The coupon on the real bond is reset depending on the level of inflation. This strategy locks in a constant real return if the bond is held to maturity. As a result, it provides an ideal hedge for inflation.

However, there are some disadvantages. One obvious question surrounds what is the appropriate inflation rate. Is it one of the genre of the consumer price index, the producer price index or the gross domestic product deflator? In addition, there are many subcategories of each of these price indices. Indeed, each investor faces a different inflation rate depending on individual consumption patterns.

The most likely choice for the inflation index is the widely quoted consumer price index, which is heavily weighted to-

wards food purchases. Unfortunately, the inflation rate is imprecisely measured and usually five weeks stale when it is released. As a result, many people know the numbers before the official release date. In addition, the index numbers are subject to revision and seasonal adjustment.⁶ Finally, the items that we include in the consumer's basket could change over time.

The final disadvantage of the real bond is that it is not market-value neutral. Unlike the floating-rate bond, the real bond could be subject to large price swings. There are two reasons for this: fluctuations in the real interest rate and changes in the risk premium. For example, if the bond was designed to produce a 2 percent real return (coupon set 2 percent above the consumer price index) and the real interest rate in the economy rose to 3 percent, the bond price would fall. Real interest rates move with the business cycle.⁷ Hence, the real bond has business-cycle risk. Similarly, the real interest rate might remain constant at 2 percent and the risk premium could increase. That is, the nominal interest rate might be 8 percent with the real bond paying 6 percent (4 percent inflation and 2 percent real rate). The difference is the risk premium. As a result, the price of the real bond will fall.

Resetting the coupon based on the Treasury bill auction bypasses the inflation-related difficulties. It creates a bond which has real qualities. As inflation increases so too will short-term interest rates; hence the coupon rises on the floating-rate bond. It is well established that inflation and nominal interest rates are strongly correlated.⁸ As a result, investors can use the floating-rate bond as a hedge against inflation. Unlike the real bond, the inflationary hedge is imperfect. However, given the very high correlation between interest rates and inflation, the hedge is very effective. In addition, the information on the coupon reset is easily calculated and readily available to all investors.

INFLATION POLICY, MARKET EXPECTATIONS AND INTEREST RATES

Expected inflation rates is the most important factor in determining both the levels and variation in interest rates. That is, it is more likely that changes in inflation expectations induce interest rate changes than shifts in either the expected real interest rate or the risk premium. The current yield curve (the difference between long-term rates and short-term rates) strongly suggests that investors expect increased inflation in the future.

The fact that the Treasury is offering 30-year bonds at 7.5 percent when Treasury bills are yielding only 4.5 percent suggests that the Treasury agrees with the market. They also believe that inflation will increase in the future. If the Treasury expects that inflation is going to be lower in the long term, then it does not make sense to finance at 7.5 percent. If the Treasury believes that the market is attaching an unreasonably high inflation expectation to the long-term bonds, then they should pursue a strategy of shorter-maturity financing—or floating-rate bonds.

Adopting a policy of floating-rate bonds or shortening the maturity structure sends a strong signal to the market that investors' long-term inflation expectations are too high. It is likely that initiating this policy would cause the market to revise its long-term inflation expectations and reduce long-term interest rates.

There is another important aspect of the floating-rate and shorter maturity financing: It provides an incentive for the government to be consistent in its anti-inflationary policy since deviation will be very costly. Higher inflation immediately raises short-term rates; consequently, the Treasury must pay more in financing costs. Investors like these types of policies since there are strong built-in incentives to keep inflation under control. These are the types of policies that cause investors to revise their expectations of long-term inflation downward, thereby reducing long-term interest rates.

Of course, inflation could also be affected by external shocks such as the oil price shocks in the early and late 1970s. In these scenarios, the interest servicing cost of the debt rises as a result of the shock. However, it is not clear how to quantify the role of these shocks in inflationary expectations. That is, by definition, an economic shock is unanticipated. As a result, the expected inflation which forms part of the nominal interest rate is most linked to the inflationary aspects of certain monetary policies.

Finally, it is an automatic stabilizing policy. During the last five recessions, the yield curve has been positively sloping (short-term rates lower than long-term rates). The interest servicing cost on floating-rate debt is cheapest exactly when the government needs extra funds for stimulative expenditures.

FLOATING-RATE BONDS VS. SHORTENING THE MATURITY

The floating-rate bond offers a number of advantages over a strategy of shortening the maturity structure of the government debt. The shortening of maturities is often referred to as

an "Operation Twist" strategy which was originally followed by the Federal Reserve Bank in 1961. To pursue this strategy, the Fed purchased long-term bonds and sold short-maturity securities. This reduced the supply of the long-term bonds and thereby raised their prices. Higher prices for the long-term bonds meant lower yields. The opposite happened with the short-term securities.

Operation Twist was designed to twist the yield curve. The objectives were to decrease long-term rates, to support the dollar and to provide the conditions for accelerated economic growth. Of course, if the Federal Reserve mounted the same strategy today, it would surely fail. With more than \$4 trillion in Treasury debt outstanding,⁹ the Federal Reserve is not a large enough player in the market to substantially impact the yield curve. However, it is possible that the Treasury could successfully initiate a modern-day Operation Twist.

Managing the maturity structure will have a significant effect on the shape of the yield curve. In the summer of 1992, when long-term rates were more than 4 percent above short-term rates, Harvey (1992) suggested that the Treasury consider a shift in the maturity structure. By decreasing the reliance on (but not eliminating) the long-term bonds and replacing them with short-term bonds, Harvey estimated that the Treasury could save approximately \$5 billion in interest servicing costs per year.¹⁰

There are substantial downsides to Operation Twist. A shortening of the maturity structure will likely increase short-term rates. An increased supply of shorter maturity debt will drive prices down and yields upward. Another important disadvantage is that the Treasury must continually go to the market. If a 30-year bond is replaced with 90-day bills, the Treasury must issue those bills 120 times. The Treasury bears the cost of going to the market each time. In addition, the investor must bear the transaction costs of rolling over the Treasury bills.

With floating-rate bonds, you are not replacing long-term bonds with Treasury bills. The amount of Treasury bills could remain constant. However, some of the current Treasury bill investors might be drawn to the floating-rate bonds, providing some mild upward pressure on short-term rates.

FLOATING-RATE DEBT, MATURITY STRUCTURE AND THE YIELD CURVE

Both the shortening of the maturity structure and the issuance of floating-rate bonds should have similar effects with

respect to reducing the supply of long-term debt. It has been argued that the floating-rate strategy has a number of advantages over the maturity shifting strategy—the most obvious being the transaction costs saved in avoiding the continual rollover of Treasury bills. To assess the potential implications of these strategies, it is useful to analyze past experience.

Figures 1 and 2 depict the historical maturity structure of the federal debt. Figure 1 presents the average maturity of privately held marketable government debt. This is calculated by weighing the remaining maturity by the amount held by private investors. The computations exclude debt held in government accounts and by the Federal Reserve Bank.

Average maturity declines from a high of 10 years and 5 months in June 1947 to 2 years and 5 months in December 1975. The reason for this decline was the congressionally mandated ceiling on coupon payments of 4.25 percent that was strictly enforced until March 1971. The exceptions to the ceiling became more commonplace until the ceiling was repealed on November 10, 1988. Hence, much of the decline since World War II is due to the fact that the Treasury could not issue bonds at competitive rates. This gradually changed and, by 1989, the average maturity reached 6 years. However, since 1989 there has been little change in the average maturity. There has been a slight decrease recently to 5 years and 8 months (March 1994 reported in the June 1994 Treasury Bulletin).

However, much has happened to the interest rate structure since 1989. In the summer of 1989, the yield curve was inverted (short-term rates exceeded long-term rates). By 1991, the yield curve was positively sloped. In 1992, long-term rates exceeded short-term rates by 400 basis points. Yet, there was little response by the Treasury to the interest rate environment. On average in 1992, there were \$634 billion in Treasury bills outstanding. The supply of bills increased to \$658 billion by 1993 (an increase of 4 percent). On average in 1992, there were \$462 billion in Treasury bonds outstanding. By 1993, the amount had increased to \$497 (an increase of 8 percent). This is shown in Figure 2. One would think that the Treasury would have been more active in capitalizing the historically unprecedented gap between short-term and long-term interest rates. These results are also surprising given that President Clinton's platform explicitly mentioned shortening the maturity of the federal debt. In addition, there were numerous announcements by the Treasury that smaller amounts of longer-term debt would be tendered.

FIGURE 1

Average Time to Maturity of Marketable Federal Debt
1946-March 1994

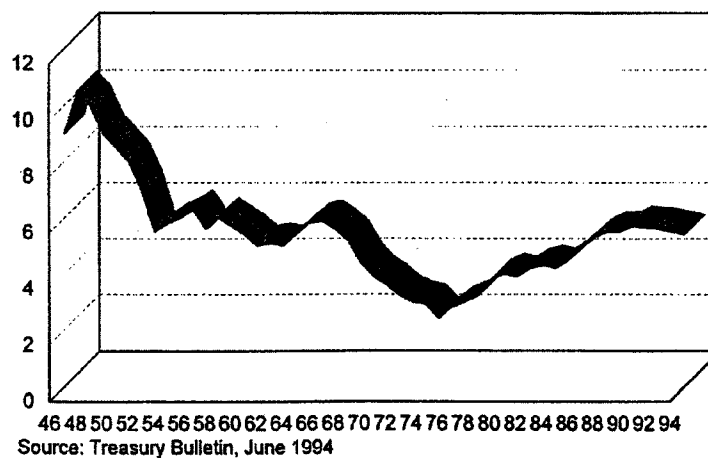
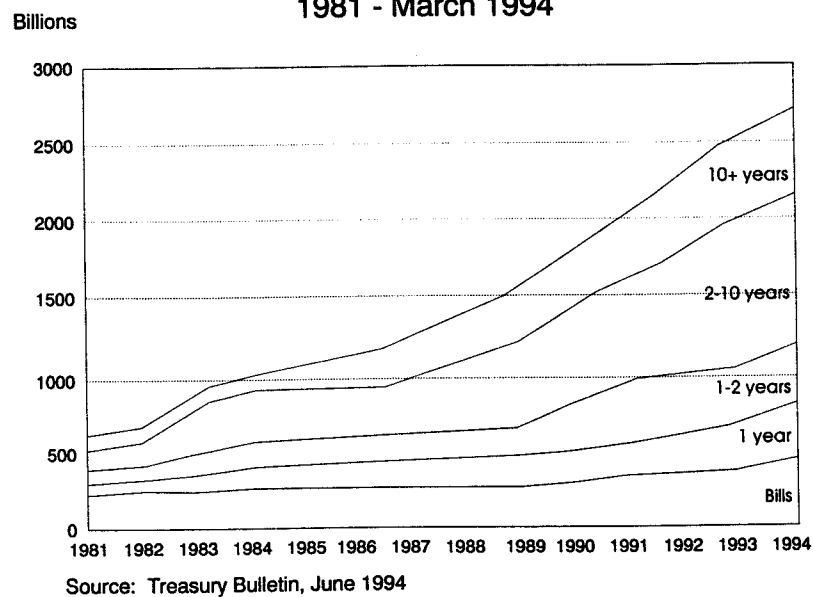


FIGURE 2

Maturity Structure of Marketable Federal Debt
1981 - March 1994



There is some weak evidence that points to increased emphasis on Treasury bills. From March 1993 to March 1994 (the most recent reporting month), the Treasury bill supply increased from \$660 billion to \$721 billion (an increase of 9 percent). Over the same period, Treasury notes increased from \$1,652 billion to \$1,802 billion (an increase of 9 percent) and Treasury bonds increased from \$480 billion to \$504 billion (an increase of 5 percent). While it is easy to change the stock of Treasury bills since the maximum maturity is 12 months, it is relatively more difficult to change the stock of Treasury bonds. That is, even if no Treasury bonds were issued, the effect on the stock of Treasury bonds would be modest given that \$480 billion in Treasury bonds existed in March 1993.

An analysis of the links between the stock of Treasury bills, notes and bonds, and the yield curve is presented below. The slope of the yield curve is regressed on ratios of short-term and long-term stocks of debt. The yield curve is measured by the difference between either the 10-year bond yield and the 90-day Treasury bill yield or the 5-year bond yield and the 90-day Treasury bill rate.

$$(\text{Yield10yr}-\text{Yield3mo})_t = b_0 + b_1(\text{Tbill stock}/\text{Tnote} + \text{Tbond stock})_t + \text{error}_t$$

$$(\text{Yield5yr}-\text{Yield3mo})_t = b_0 + b_1(\text{Tbill stock}/\text{Tnote} + \text{Tbond stock})_t + \text{error}_t$$

The regressions are estimated using monthly data from 1970 through March 1994. The start date reflects the beginning of the changes that allowed the Treasury to issue longer-term debt at market rates. The slope coefficient in the first regression is -2.35 indicating that if the ratio of Treasury bills to debt instruments increased from 0.30 to 0.40, the difference between long-term rates and short-term rates would decrease by approximately one quarter of 1 percent. That is, the long-term bond yields become relatively lower than the short-term bond yields. When estimated using the five-year bond as the long-term interest rate, the coefficient drops to -1.47. However, in both of the regression equations, the slope coefficients are more than three standard errors from zero.¹¹

This exercise suggests that supply of debt has an effect on the term structure of interest rates. Hence, both strategies of shortening the maturity structure and issuing floating-rate bonds should decrease the difference between long-term and short-term interest rates.

CONCLUSIONS

The changes in the Treasury's financing strategy proposed in this paper should lead to a reduction in long-term interest rates. The introduction of floating-rate coupon bonds will re-

duce the burden placed on the long-term fixed coupon bonds and hence reduce the long-term rates. Given that much of consumer spending, construction and capital expenditures are linked to long-term interest rates, changes in the Treasury's financing strategy will have a stimulative effect on economic growth. In addition, the strategy reduces the government's interest servicing costs.

Perhaps the most important aspect of the floating-rate bond strategy is the inflation signal it sends the market. The issuance of floating-rate debt is consistent with a policy of sustained low inflation. Any temptation to reflate will be costly because the interest servicing costs rise. In contrast, with fixed-rate bonds both the interest-servicing costs and the value of the outstanding government debt can be reduced by a policy of higher inflation. So in this respect, floating-rate debt is policy-consistent. Initiating the floating-rate strategy will send a strong signal to market participants that the government expects low long-term inflation. This will work to reduce long-term interest rates.¹²

ENDNOTES

¹ Also see the analysis in Giordano and Youngdahl (1993).

² Based on March 1994 data, \$909 billion of the \$2,683 billion (30 percent) marketable interest-bearing debt matures in the next 12 months. There is \$1,529 billion of nonmarketable debt (which includes U.S. savings bonds, foreign series, government account series, state and local government series, and domestic series) of which I estimate \$150 billion will come due in the next 12 months. Finally, the federal deficit is estimated to be \$200 billion over this period. Hence, \$1,250 billion of new financing is necessary.

³ For a more detailed analysis of this episode, see Grobel (1987).

⁴ See discussion in Sargent (1994) on indexed bonds.

⁵ See the analysis in Harvey (1988) and references therein.

⁶ An analysis of seasonally adjusted data and discussion of the problems with using seasonally adjusted data is found in Ferson and Harvey (1992).

⁷ See Harvey (1988, 1989, 1991a,b,c, 1993b, 1994) as well as Harvey, Kaul and Kirby (1992).

⁸ Fama and Schwert (1977) and Fama and Gibbons (1984) analyze the relation between inflation and nominal interest rates.

⁹ In March 1994, there was \$4.572 trillion in interest bearing public debt. \$3.042 trillion is classified as marketable and \$1.529 trillion as nonmarketable. \$4.491 trillion of this debt is subject to the statutory limitation (statutory debt limit is \$4.9 trillion).

¹⁰ See Harvey (1992) for details and discussion in Kalish (1992), Stock (1992) and CNBC (1992). Independently, the Democratic Study Group (1993) estimated similar savings of \$5.3 billion per year.

¹¹The regressions were also estimated with a correction for serial correlation of the residuals and in first difference form. The results were broadly similar.

¹²As a postscript, the Department of the Treasury announced on February 3, 1994 that they were going to investigate the feasibility of issuing some floating-rate debt.

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