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# CRS Report for Congress

# Federal Debt Management: An Overview of Concepts and Policy Options

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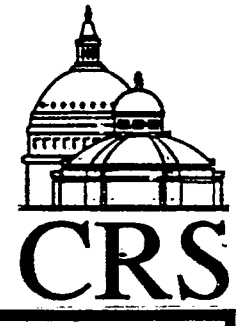


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# Federal Debt Management:
# An Overview of Concepts and Policy Options


## Summary

In February 1993, the Clinton Administration implemented a policy of shortening the maturity of Treasury borrowing in order to save on interest costs. In May 1996, the Treasury began selling debt with a longer average maturity. This change in the composition of debt issuance has contributed to the stabilization of the average length of marketable interest-bearing debt. These changes in policy have generated congressional interest in federal debt management in general and the possible economic implications of the Clinton Administrations's actions. This report provides a broad overview of Treasury debt management and examines changes in debt sales implemented by the Clinton Administration.

Federal debt management, narrowly defined, concerns Treasury's decisions about sales of Treasury bills, notes and bonds which affect the term structure of the privately-held interest-bearing federal debt. The term structure of interest rates relates the average yield to maturity of a particular type of debt instrument (such as U.S. Treasury securities) to its time (such as years) to maturity. Financial economists have different theories concerning the causes of the term structure of interest rates and the changes in the term structure over the business cycle. The four primary theories are the expectations theory, the risk averse theory, the segmented market theory, and the preferred habitat theory.

The Treasury must float debt maturities (securities) which are salable if the Federal Government is to continue to operate. Subject to this mandatory objective, the Treasury has discretion in pursuing three secondary objectives: economic stabilization, minimum interest cost, and neutrality. The pursuit of one of these secondary objectives may adversely affect another objective. Furthermore, these different objectives depend on different theories of the term structure of interest rates. Beginning in fiscal year 1975, the Treasury decided to pursue a policy of neutral debt management while attempting to increase the average length to maturity of the marketable Treasury debt. According to this policy of neutral debt management, the Treasury spread its borrowing needs widely across the maturity spectrum and sold debt issues on a regular and predictable schedule.

In February 1993, the Clinton Administration directed the Treasury to issue fewer long-term securities and more short-term securities in order to save on interest costs. In May 1996, the Treasury changed the composition of debt sales which partially neutralized the shortening of the debt. The budget savings, forecast by OMB from February 1993 through May 1996, were substantially overstated because interest rates over most of this period exceeded those forecast by OMB. Since short-term interest rates are usually lower than long-term interest rates, a lower average length to maturity may reduce interest costs in the long run. But, the lower the average length to maturity of the debt, the more frequently the Treasury must refinance the debt, and consequently, yearly interest costs will be more volatile and uncertain.

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In February 1993, the Clinton Administration implemented a policy of shortening the maturity of Treasury borrowing in order to save on interest costs. In May 1996, the Treasury began selling debt with a longer average maturity. This change in the composition of debt issuance has contributed to the stabilization of the average length of privately-held marketable interest-bearing public debt. These changes in policy have generated congressional interest in federal debt management in general and the possible economic impact of the Clinton Administration's actions.[1]

This report provides a broad overview of Treasury debt management and examines changes in debt sales implemented by the Clinton Administration. It covers the following six topics: the concept of federal debt management, the concept of the term structure of interest rates, theories of the term structure of interest rates, policy objectives, debt management (1945-1992), and Clinton Administration changes.

The Treasury sells securities on capital markets to finance budget deficits and to refinance its maturing debt. The magnitude of Treasury sales of its securities can vary substantially from year to year.

## Concept of Federal Debt Management

In a broad sense, federal debt management encompasses policies which affect the maturity composition of the privately-held interest-bearing federal debt and determine the characteristics of federal debt instruments. The U.S. Treasury decides the maturities of new marketable debt. This marketable debt consists of bills which mature in one year or less, notes which mature in from two to ten years, and bonds which mature in more than ten years.[2] The Treasury also sells savings bonds, but these are not marketable. Furthermore, the Treasury conducts advance refundings; that is, it offers holders of a particular outstanding debt issue the option of exchanging that debt issue for a new debt issue with a longer maturity.

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[1] This report will be updated as issues develop and new legislation is introduced. For the most current information about pending legislation, please consult the Legislative Information System (LIS) at http://www.congress.gov.

[2] Treasury bills are sold on a discount basis; that is, an investor earns the difference between the purchase price and the redemption value. Treasury notes and bonds pay semi-annual coupons (interest). The initial sales price of a Treasury note or bond may be above or below the redemption value, hence, in addition to interest payments, an investor may have an acquisition discount or premium.

The Federal Reserve System (Fed) also can affect the maturity composition of federal debt through open market operations. The Fed purchases Treasury securities in order to expand the money supply, and conversely, sells Treasury securities in order to contract the money supply. Obviously, the maturities of the securities which the Fed decides to buy (or sell) affects the maturity composition of the Federal debt held by the rest of the public.[3] Through open market operations, the Fed has the capacity to partially offset Treasury debt management decisions. But the Fed coordinates its open market operations with Treasury debt management policies. Thus, the Treasury usually plays the dominant role in determining the maturity structure of federal debt held by the investing public.

Finally, the broad concept of debt management includes Treasury's ability to add or change the characteristics of its debt issues. Examples of these characteristics include the length of maturity, call features, conversion features, variable rate features, and indexation for changes in the price level. The Treasury has issued securities with new maturities, discontinued some maturities, and included or deleted call features from different security issues.[4] The Treasury sells savings bonds with variable rates, but these are not marketable.[5] In January 1997, the Treasury began issuing marketable securities indexed to changes in the price level.[6]

Unless specified otherwise, in this report debt management is narrowly defined as Treasury decisions about debt sales which affect the maturity composition of privately-held interest bearing federal debt. This report focuses on marketable Treasury debt. Unless specified otherwise, monetary policy is assumed to be held constant.

The Treasury's changes in the maturity composition of the federal debt are important because of their possible effects on the term structure of interest rates and the interest costs on the national debt. A change in the term structure of interest rates on marketable Treasury securities (all else held constant) will cause a parallel change in the term structure of private marketable debt because Treasury securities and private securities of the same maturity are highly substitutable.

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[3] The Treasury excludes Fed holdings of Treasury securities in its calculation of the average length to maturity of the privately-held marketable Treasury debt. Hence, the Fed purchase (or sale) of a particular maturity (such as bills) on financial markets would change the composition of the non-Fed privately-held marketable Treasury debt and thus change the average length to maturity.

[4] A call feature gives the Treasury the option of redeeming a particular security issue before its date of maturity.

[5] For an overview of U.S. variable rate savings bonds, see: U.S. Library of Congress. Congressional Research Service. *Savings Bonds with Variable Rates: Background, Characteristics, and Evaluation.* Report No. 97-605 E, by James M. Bickley. Washington, June 11, 1997. 14 p.

[6] For information about the price-indexed Treasury securities, see: U.S. Library of Congress. Congressional Research Service. *Treasury Inflation-Protection Securities: a Fact Sheet.* Report No. 97-216 E, by James M. Bickley. Washington, June 25, 1997. 2 p. and *Treasury Inflation-Protection Securities: Description, goals, and Policy Issues.* Report No. 97-134 E, by James M. Bickley. Washington, January 22, 1997. 15 p.

# Concept of the Term Structure of Interest Rates

The term structure of interest rates relates the average yield of a particular type of debt instrument (such as U.S. Treasury securities) to its time (such as years) to maturity. The *average yield to maturity* of a security is calculated based on annual interest payments and the difference between the current market value of the security and its maturity value (or face value). Since it takes into account the gain or loss that will occur at maturity, the average yield to maturity differs from the coupon yield and the current yield. The *coupon yield* is the yield stated on the face of the security. The coupon yield is not affected by any difference between the cost of a security and its maturity value (or face value). The coupon yield is useful in indicating the dollar amount of interest paid each year. The *current yield* of a security is simply the dollar amount of interest divided by the current market price of the security.[7]

The distinction between the concepts of coupon yield, current yield, and average yield to maturity can be illustrated by a simple example. Assume an individual purchases for $950 a bond with a 10-year maturity and a redemption value (or face value) of $1,000. The bond pays interest of $60 a year. The nominal yield per year would equal $60/$1,000 or 6 percent. The current yield per year would equal $60/$950 or 6.32 percent.[8] The average yield to maturity would be 6.70 percent. The average yield to maturity is the average return on a security from the present date to the date of final maturity which is calculated based on all future interest payments and any capital gain or loss at final maturity. In this example, the average yield to maturity of 6.70 percent was calculated by using $950 for P (present value) and solving for i in the general formula for calculating the present value of an interest-income security which is explained in the second example in appendix A.

The term structure is the relationship of average yields to maturity to times to maturity of debt instruments. Each maturity class of securities, such as 3 years to maturity, 5 years to maturity, etc., has an average yield to maturity, and the term structure shows how they relate to one another. For example, a Treasury note with 3 years to maturity could have an average yield to maturity of 4.0 percent, a Treasury note with 5 years to maturity could have an average yield to maturity of 5.0 percent, and a Treasury note with 10 years to maturity could have an average yield to maturity of 6.0 percent. The term structure of interest rates is often depicted on a chart by measuring the average yield to maturity on the vertical (or Y) axis and time of maturity on the horizontal (or X) axis. The term structure is drawn for debt instruments outstanding at a given point in time.

# Theories of the Term Structure of Interest Rates

Financial economists have different theories concerning the causes of the term structure of interest rates and the changes in the term structure over the business

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[7] Chandler, Lester V. and Stephen M. Goldfeld. *The Economics of Money and Banking*. Seventh Edition. New York, Harper & Row, 1977. p. 58-59.

[8] Ibid., p. 59.

cycle.[9] The four primary theories are the expectations theory, the risk aversion theory, the segmented market theory, and the preferred habitat theory.

Currently, the prevailing theory among economists is the preferred habitat theory which is a combination of the first three theories. According to the preferred habitat theory, the primary determinant of the term structure of interest rates is expectations about interest rates.

## Expectations Theories

The expectations theory was the initial theory explaining the term structure of interest rates. Most financial economists believe that the primary determinant of the term structure of interest rates is interest rate expectations. There are two basis expectations theories for the term structure: the pure expectations theory and the error-learning theory.

### Pure Expectations Theory.[10]

A model based on the pure expectations theory has the following four assumptions:

1. All securities are riskless with respect to the payment of both interest and principal. Moreover, the theory abstracts from tax considerations, call features, differing coupons and other such "imperfections."

2. Investors hold with complete confidence a set of uniform expectations concerning all future short-term rates of interest, and their forecasts are accurate.

3. There are no transactions' costs, and consequently, switches among securities of different maturities are unimpeded.

4. The behavior of all market participants is motivated by no objective other than profit maximization, thus ensuring full use of every opportunity for profitable arbitrage among different maturities.[11]

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[9] These theories assume that monetary policy is constant. But, if the Fed instituted a tighter (easier) monetary policy then the term structure curve would shift up (down).

[10] Professor Irving Fisher developed the relationship between short-term and long-term rates of interest under conditions of perfect certainty which was used by Professor J. R. Hicks in formulating the initial pure expectations theory in 1939. The variation of the pure expectation model discussed in the section is based on the following source: Lutz, Friedrich A. The Structure of Interest Rates. *Quarterly Journal of Economics*, vol. 55, 1940-1941. p. 36-63.

[11] Malkiel, Burton Gordon. *The Term Structure of Interest Rates*. Princeton, Princeton University Press, 1966. p. 18.

These assumptions mean that all maturities are perfect substitutes for each other. Each investor seeks to maximize the yield on a given security over a given holding period. The dollar yield on a security for any given holding period equals the coupon interest received plus the capital gain (or minus the capital loss). The average yield to maturity equals the coupon interest received plus the capital gain (or minus the capital loss) divided by the purchase price of the security. Because securities of different maturities are perfect substitutes, for a given holding period, an investor may purchase a security with a maturity equal to the length of the holding period, a series of shorter-term securities with a combined maturity equal to the holding period, or a security with a longer maturity than the holding period which can be sold at the end of the holding period. Furthermore, an investor may purchase any combination of different maturities.

In equilibrium, due to arbitrage, any combination of maturities should have the same average yield to maturity for any holding period. For example, an investor would be indifferent between purchasing a series of 90-day Treasury bills (and reinvesting the principal and interest) and purchasing a 30-year Treasury bond (and reinvesting the interest). As a simplified case, assume the 30-year bond is sold at par.[12] Hence, the average yield to maturity on the 30-year bond would be *approximately* equal to the arithmetic average of the yields on a series of 90-day Treasury bills over the 30-year period.[13]

Under the pure expectations theory, different expectations by investors of short-term interest rates would result in term structure curves with different shapes. In equilibrium, for a given sequence of expected Treasury bill rates, there would be a unique term structure of interest rates. Since the long-term yield is an average of current and expected short-term yields, the long-term yield can never fluctuate as widely as the short-term yield.[14]

In figure 1, four hypothetical term structure curves are depicted that correspond to different expectations by investors of short-term interest rates. If investors expect future short-term interest rates to be constant then the term structure curve would be flat as shown by curve AA. If investors expect future short-term interest rates to rise then the term structure would be upwards sloping as shown by curve BB. If investors expect future Treasury bill rates to decline over time then the term structure curve would be downward sloping as indicated by curve CC.

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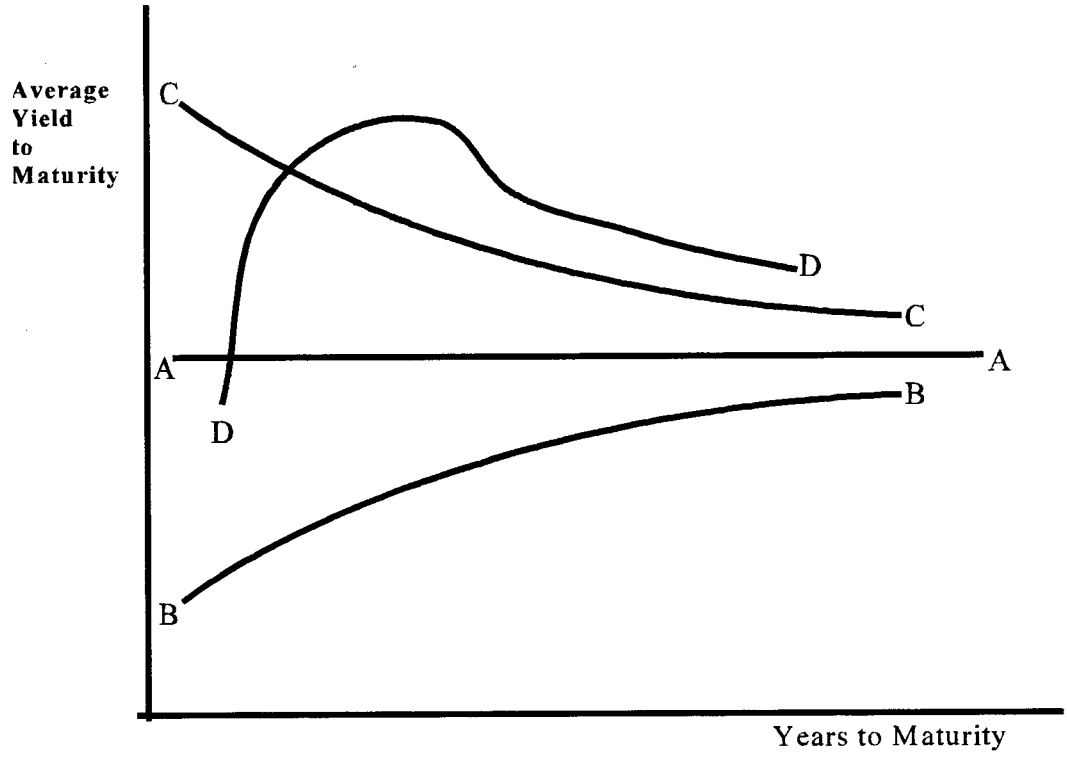
[12] The par value is the redemption value if the security is held to maturity.

[13] These average yields to maturity are *approximately* equal because their calculations do not consider compounding.

[14] Masera, R. S. *The Term Structure of Interest Rates*. Oxford, the Clarendon Press, Oxford, 1972. p. 14.

**Figure 1. Hypothetical Terms Structures of Interest Rates**




Source: Adapted by CRS from Masera, p. 7.

Investors could expect that Treasury bill rates would vary over time. For example, investors could expect Treasury bill rates to rise and then decline. These expectations could result in a humped term structure curve such as curve DD.

The applicability of the pure expectations theory was criticized because of its underlying assumptions. Some critics argued "that investors are simply not capable of predicting interest rates for periods far into the future.[15]" Early empirical studies tested the correspondence between expected short-term rates and the later actually observed short-term rates. These tests were mostly negative in their results.[16] Furthermore, according to the pure expectations theory, short-term rates should always fluctuate more than long-term rates. But Treasury bond rates sometimes have changed more than Treasury bill rates. For example, during the period of January 1, 1994, through May 15, 1994, the 30-day Treasury bill rate often changed on a daily or weekly basis by less than the 30-year bond rate.[17]

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[15] Malkiel, p. 23.

[16] Ibid., p. 28-29.

[17] Board of Governors of the Federal Reserve System. *Federal Reserve Statistical*

(continued...)

But Professor David Meiselman correctly argued "that expectations need not be realized in order for them to determine the rate structure in the manner asserted by the theory..."[18] In other words, investors purchase securities based on their expectations of yields by maturity rather than actual yields by maturity.

**Error-Learning Theory.**

Professor Meiselman formulated an error-learning theory which allowed unexpected changes in interest rates to cause revisions of future interest rate expectations. For example, if actual short-term rates turn out to be higher than expected short-term rates then "the market will systematically revise upwards expectations concerning short-term rates in the future."[19] Since long-term rates are averages of present and future short-term rates, the entire term structure would rise.[20]

Professor Meiselman maintained that his empirical tests supported his error-learning theory. But critics disputed the accuracy of his data and his econometric procedures. Empirical tests by other economists using more recent data failed to support Meiselman's theory.[21]

## Risk Averse Theory[22]

Some critics argue that the expectations theories are incorrect because they first assume that all securities are riskless. These critics maintain that securities contain risk and that most investors are risk averse. The prevailing view of financial economists is that with time, risk increases but at a decreasing rate.[23] Hence, investors must receive a risk premium for purchasing securities with longer maturities, but the amount of this risk premium increases more slowly than does the length of the time to maturity.

**Types of Risk.**

There are four major types of risk but these types of risk tend to be interrelated. All of these types of risk tend to increase with the length of the forecasting period. These types of risk are default risk, interest rate risk, inflation risk, and political risk.

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[17] (...continued)
*Releases–Selected Interest Rates*, January 1, 1994–May 15, 1994.

[18] Malkiel, p. 35.

[19] Ibid., p. 30.

[20] Ibid., p. 31.

[21] Ibid., p. 34-35.

[22] Most financial economists only discuss interest-rate risk and refer to this theory as the liquidity preference theory. This author has broadened the theory to cover four types of risk.

[23] For most securities, all four types of risk, described in the following pages, would increase at a decreasing rate. But U.S. Treasury securities usually are assumed free of default risk.

***Default Risk.***

Default risk is the probability that all promised payments of interest and repayments of principal will not be fully paid (or paid at all). U.S. Treasury securities are often said to be free of default risk, but this may not be the perception of every investor, so this risk could play some role.[24]

***Interest Rate Risk.***

An unexpected rise in interest rates causes the market value of fixed income securities (including Treasury securities) to decline. For a given unexpected rise in the interest rate, the decline in the market value of the security increases as the length of time to maturity rises. Conversely, an unexpected decline in interest rates causes a rise in the market value of fixed income securities and this rise increases with the length of time to maturity. Thus, a buyer of fixed income securities assumes the risk that his interest rate forecast may be too low and the magnitude of this risk increases as the time to maturity increases.[25]

***Inflation Risk.***

A change in the expectation of future inflation tends to drive up interest rates and thus lower the market value of fixed income securities. Investors seek a "real" rate of return on their principal. They deduct the expected change in the cost-of-living from the nominal rate of return to determine the "real" rate of return. An increase in the expectation of future inflation causes investors to demand a higher nominal interest rate, particularly on long-term securities. The longer the period of forecasting, all other things being equal, the more difficult it is to accurately forecast the rate of inflation.

***Political Risk.***

New government rules, regulations, laws, and court decisions or changes in existing ones may adversely affect the market value of securities, including Treasury securities. For example, higher marginal tax rates on interest income may encourage investors to shift funds into tax-free municipals or growth stocks which are expected to earn more lightly taxed capital gains.

Although actual default by the U.S. Treasury is almost unthinkable, there may have been a fear that the Federal Government would monetize more of the debt and thus cause unexpected inflation which would, in turn, lower the "real" value of the national debt and interest payments.

Professors Alessandro Missale and Olivier Jean Blanchard found that during the period 1960 through 1989, three OECD nations had debt-to-GDP ratios which rose more than 100 percent. These three nations were Ireland, Italy, and Belgium. As

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[24] The Junkification of American T-Bonds. *The Economist*, vol. 311, no. 7,604; May 27, 1989. p. 77-78.

[25] For examples of interest rate risk, see appendix A.

their debt-to-GDP ratios rose further and further above some threshold (debt of 40 to 50 percent of GDP), these countries reduced the average maturity of their publicly held debt. The authors provide a tentative explanation that as the debt-to-GDP ratio rose investors became more fearful that their governments had a greater incentive to inflate away the real value of their national debts. Investors were increasingly reluctant to purchase government securities of longer maturities. Hence, in order to sell debt, these governments had to sell shorter maturities, and consequently, the average maturity of outstanding debt declined.[26]

Political risk is more pronounced for private debt instruments. For example, more stringent pollution controls required by the Environmental Protection Agency could adversely affect the value of a particular corporation's bonds.

**Empirical Studies.**

Most financial economists believe that most investors are risk averse. Usually the term structure of interest rates is upwards sloping which is consistent with the risk averse theory. But, if risk aversion were the sole explanatory factor for the term structure and risk is always monotonically related to time then the term structure curve would *always* be upwards sloping, which it is *not*. Hence, most financial economists believe that risk aversion explains only part of the shape of the term structure curve.

## Segmented Market Theory

Some critics of the expectations theory argue that it is incorrect because of its assumptions that all debt instruments are perfect substitutes and that there are no transactions' costs. These critics maintain that the loan market is segmented into compartments according to maturities. The leading proponent of this segmented market theory is Professor J. M. Culbertson, who in 1957 totally rejected the expectations theory. He contends that the supply and demand in markets for specific maturities determine their respective interest rates. According to Culbertson:

> There are a variety of impediments to mobility of funds in debt markets: legal restrictions on some types of borrowing and on debt holdings of institutional investors, desire of investors for portfolio diversification, customary investment standards applied to financial institutions, lags in establishment or revision of financial institutions, specialization of investors on technical grounds, impediments to geographical movement of funds in cases requiring judgment or administrative activity, etc.[27]

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[26] Missale, Alessandro and Olivier Jean Blanchard. The Debt Burden and Debt Maturity. *The American Economic Review*, vol. 84, no. 1, March 1994. p. 309-319.

[27] Culbertson, J. M. The Term Structure of Interest Rates. *The Quarterly Journal of Economics*, vol. 71, no. 4, November 1957. p. 503.

He states that "lenders as much as borrowers generally insist upon a maturity that is related to the purpose of borrowing."[28] A business prefers to borrow long-term in order to construct a plant.[29] Life insurance companies invest funds from the sales of annuities in long-term securities in order to minimize risk. Pension funds also prefer to invest in long-term securities in order to match debt maturities with projected payouts. Hence, life insurance companies and pension funds have limited needs for liquidity. But commercial banks must maintain a more liquid position because of possible sudden large withdrawals by depositors. Government regulations concerning asset holding reflect these differences in liquidity requirements.[30]

Professor Culbertson correctly argues that the expectations theory and the segmented market theory have different implications for the feasibility of using debt management as a policy instrument. If the expectations theory is valid then a change in the composition of Treasury debt sales would be neutralized by portfolio changes of investors and the term structure of interest rates would be unchanged. This occurs in the expectations theory because debt instruments of all different maturities are perfect substitutes. In contrast, the segmented market theory assumes that debt instruments of different maturities are not perfect substitutes. Hence, the segmented market theory suggests that changes in Treasury debt sales can affect the supply of debt in different markets, and consequently, the term structure of interest rates.[31] Professor Culbertson writes that:

> If used actively in a coordinated manner, monetary and debt management policies can play an essential role in dealing with both inflationary and deflationary problems, by enforcing an appropriate behavior on interest rates, through their impact upon conditions in debt markets, and through their influence upon the liquidity position of the economy.[32]

Professor Culbertson did not present a specific testable model, but instead he presented concepts based on extensive anecdotal evidence. Furthermore, data limitations made any possible econometric testing difficult. Consequently, there has not been quality econometric testing which has either supported or rejected the segmented market theory.[33]

## Preferred Habitat Theory

Professors Franco Modigliani and Richard Sutch (M-S) argued that the expectations theory, the risk averse theory, and the segmented market theory have merits and shortcomings. Consequently, M-S advocated the blending of these three

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[28] Ibid., p. 494.

[29] Ibid.

[30] Malkiel, p. 26-27.

[31] Culbertson, p. 487-488.

[32] Ibid., p. 517.

[33] Masera, p. 30-31.

theories into a preferred habitat theory.[34] They described their preferred habitat theory as:

> basically an adaptation of the expectational theory of the structure of interest rates under certainty to a world in which (1) future rates are in fact uncertain; (2) transactors, both final wealth holders and final borrowers, have definite preferences as to the length of time they want to keep their funds invested or for which they require financing (that is, they have a preferred maturity habitat); and (3) types of transactors generally exhibit risk aversion, and hence, other things equal, would prefer to match maturities in their portfolios to their habitat so as to be sure of the return or cost. In addition to final transactors, the model also recognizes the existence of arbitragers, or intermediaries, prepared simultaneously to borrow and lend in different maturities when the differences in expected returns provide sufficient inducement to compensate for the risk involved in the operation.[35]

According to M-S, investors have some preferred portfolio of maturities, but they can be induced to alter their portfolios if their returns from changing are sufficiently high.

Modigliani and Sutch conducted extensive empirical analyses using their model. They examined the relationship between the yield on AAA-rated corporate bonds and the rate on commercial paper. They concluded that:

> The expectation model can account remarkably well for the relation between short- and long-term rates in the United States. Furthermore, the prevailing expectations of long-term rates involve a blending of extrapolation of very recent changes and regression toward a long-term normal level.
>
> There is no evidence that the maturity structure of the federal debt, or changes in this structure, exert a significant, lasting or transient influence on the relation between the two rates.[36]

Modigliani and Sutch's model and empirical results were harshly criticized by some economists. Professor Neil Wallace argued that the M-S analysis has serious

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[34] Their model is an adaption of a model constructed by F. De Leeuw. For a presentation of this model, see: De Leeuw, F. A Model of Financial Behavior. Chapter 13 in J. Duesenberry, G. Fromm, L. Klein, and E. Kuh (eds.). *The Brookings Quarterly Econometric Model of the United States*. Chicago, Rand McNally, 1965. p. 494-503.

[35] Modigliani, Franco and Richard Sutch. Debt Management and the Term Structure of Interest Rates: An Empirical Analysis of Recent Experience. *The Journal of Political Economy*, vol. 75, no. 4, part 2 supplement, August 1967. p. 569.

[36] Modigliani, Franco and Richard Sutch. Innovations in Interest Rate Policy. *The American Economic Review*, vol. 56, no. 2, May 1966. p. 196.

data problems and econometric shortcomings.[37] Professor Reuben A. Kessel believes that M-S should have employed more sophisticated econometric techniques. He also argues that the M-S model is more of a market segmentation model than an expectations model.[38]

Probably the prevailing view of financial economists is that some variation of the preferred habitat model best explains the term structure of interest rates. But the relative importance of expectations, risk aversion, and segmented markets is disputed among financial economists, which makes the formulation of debt management policy controversial.[39]

# Policy Objectives

## Borrow Funds (Necessary Objective)

The Treasury must float debt maturities which are salable if the Federal Government is to continue to operate. Currently, the U.S. Treasury is experiencing no difficulty in selling any maturity, but a change in debt marketing practices conceivably might create problems for the salability of debt–at least in the short run. Subject to this necessary objective, the Treasury has discretion in pursuing three secondary objectives.

## Alternative Secondary Objectives

The pursuit of one of these secondary objectives may adversely affect another secondary objective. Furthermore, these different objectives depend on different theories of the term structure of interest rates.

**Economic Stabilization.**

Supporters of the economic stabilization objective maintain that the term structure of interest rates is explained primarily by the segmented market theory. They argue that debt management should be used to lessen macroeconomic fluctuations.

For instance, during a recession, the Treasury should lower the average maturity of the national debt by issuing fewer long-term securities and more short-term securities. This reduced supply of long-term securities would raise their price, and consequently, the long-term rate of interest would fall. On the other hand, the increased supply of short-term securities would lower their price and increase the short-term rate of interest. Since the long-term rate of interest has a more

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[37] Wallace, Neil. Comment. *The Journal of Political Economy*, vol. 75, no. 4, part 2 supplement, August 1967. p. 590-592.

[38] Kessel, Reuben A. Comment. *The Journal of Political Economy*, vol. 75, no. 4, part 2, supplement, August 1967. p. 592-593.

[39] Appendix B presents some selective debt management views since 1980.

pronounced effect on investment than does the short-term rate of interest, total investment would increase which would cause a multiple expansion of gross domestic product.

Conversely, according to this view, during a boom, the Treasury should raise the average maturity of the debt by issuing more long-term securities and fewer short-term securities. This policy would raise the long-term rate of interest, lower investment, and reduce the rate of inflation.

Some critics of countercyclical debt management argue that it would reduce the stability of financial markets by causing uncertainty and direct competition with the private sector for long-term funds during boom periods. Furthermore, opponents charge that the countercyclical policy would raise interest costs on the national debt because the Treasury would sell more long-term securities when interest rates are high and fewer long-term securities when interest rates are low. Other critics who support the expectations theory argue that Treasury debt management cannot alter the term structure of interest rates, and consequently, cannot be used as a countercyclical tool.

**Minimum Interest Cost.**

Some financial economists recommend that the Treasury should attempt to minimize interest costs on the national debt, which would require that the Treasury have some ability to forecast interest rates. Under this policy, the Treasury should issue more long-term securities and fewer short-term securities when interest rates are perceived to be low, often during recessions, in order to lock in low interest costs. Conversely, when interest rates are perceived to be high, often during booms, the Treasury should sell more short-term securities and fewer long-term securities, and thus, reduce the level of future obligations to pay high interest rates on securities.

Critics argue that it is difficult for the Treasury to forecast interest rates. Furthermore, to the degree that the financial markets are segmented, this policy of minimizing interest costs usually would be procyclical since interest rates are typically "low" during recessions but "high" during booms.

**Neutrality.**

Proponents of a neutrality policy for debt management argue that the Treasury should borrow funds across the entire maturity structure with regularly scheduled sales. They assert that the Treasury should attempt to make debt sales as predictable as possible in order to minimize uncertainty in financial markets and consequently reduce interest costs. Hence, the Treasury should not alter the composition of debt sales because of changes in the business cycle or changes in interest rate forecasts.

A brief presentation of the history of debt management from 1945 through 1992 will provide a better understanding of the pursuit of debt management objectives and a background to evaluate recent debt management changes implemented by the Clinton Administration. Previous sections of this report have largely discussed Treasury debt management without considering policies of the Federal Reserve System, but this brief historical overview of debt management demonstrates their interrelationship.

# Debt Management (1945-1992)

From 1945 through March 1951, the Federal Reserve System continued its policy of *pegging interest rates* which it had begun in March 1942.[40] This policy initially imposed ceilings on different interest rates ranging from 3/8 of one percent on 90-day Treasury bills to 2 ½ percent on 25-year Treasury bonds.[41] The Federal Reserve purchased without limitation all Treasury securities at prices which ensured that their average yields to maturity did not rise above the pegs. Under this pegging policy, the Fed abandoned control over the money supply. The structure of the interest pegs was also the term structure of privately-held marketable Treasury debt. As long as private investors were confident that the Fed would continue to peg rates, they preferred to hold longer term securities because of their higher interest yields.[42] Hence, from 1945 through March 1951, the average length to maturity of the privately-held marketable Treasury debt was high, as shown in **Figure 2** on the next page. These computations of the average length to maturity exclude Treasury securities in Government accounts and in Federal Reserve banks.[43]

In 1950, a conflict between the Fed and the Treasury over pegging was discussed publicly. The Fed wanted to discontinue pegging interest rates in order to be free to conduct an anti-inflationary monetary policy. The Treasury wanted pegging of rates to continue in order to lessen interest costs on the national debt and to maintain stable financial markets.[44] On March 4, 1951, the Treasury and the Fed jointly announced *the accord*, an agreement ending the pegging of interest rates. The Fed gradually pursued an active monetary policy while assisting in maintaining orderly markets for Treasury issues.[45] As shown in **Figure 2**, after the accord, the average maturity of privately-held marketable Treasury debt declined.

After the accord, the Fed was concerned about the stability and strength of the Government securities market; consequently a subcommittee of the Federal Open Market Committee was assigned the duty of studying this market. This subcommittee found that the Government securities market lacked "depth, breadth, and resiliency."[46]

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[40] Luckett, Dudley G. *Money and Banking*. New York, McGraw-Hill, 1976. p. 555.

[41] Chandler and Goldfeld, p. 555-556.

[42] Ibid., p. 556.

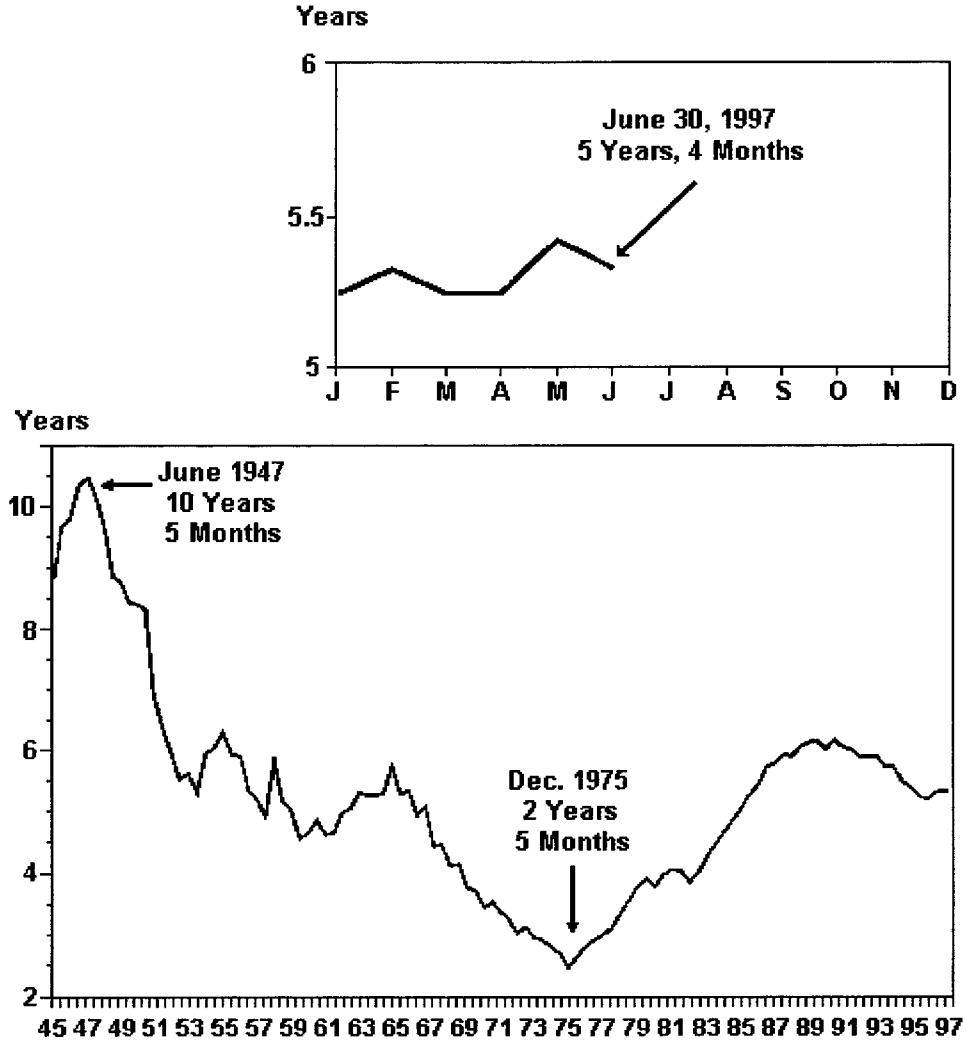
[43] U.S. Department of the Treasury. *Treasury Bulletin*, June 1994. p. 30.

[44] Chandler and Goldfeld, p. 560-561.

[45] Ibid., p. 564.

[46] Luckett, p. 564-565.

**Figure 2** Average Length of Privately Held Marketable Debt




Source: *Treasury Bulletin*, September 1997. p. 25.

Hence, this subcommittee recommended that the Fed conduct open-market operations by buying and selling only Treasury bills. In 1953, the Fed adopted this *bills only* policy which it continued through 1961.[47] As shown in **Figure 2**, the average maturity of the privately-held marketable Treasury debt fluctuated during this period of *bills only*.

In the late 1950s, the Fed became concerned about the large persistent balance-of-payments deficits. Because of the recession in 1960, the Fed also was concerned about the slow rate of growth of the U.S. economy. In 1961, the Fed decided that the

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[47] Ibid., p. 565.

appropriate policy was to raise short-term interest rates and simultaneously reduce long-term rates. The Fed believed that a rise in the short-term interest rate would attract short-term capital to the United States and thus reduce the U.S. balance-of-payments deficit. The Fed also believed that a reduction in long-term interest rates would raise investment, and consequently, increase economic growth. From 1961 through 1965, the Federal Reserve with the assistance of the Treasury implemented this policy which was called *operation twist*. The Fed simultaneously bought long-term Treasury securities and sold Treasury bills. The Treasury altered the composition of its debt sales by raising the proportion of debt sold which consisted of bills.[48] Hence, the average length to maturity of the privately-held marketable Treasury debt rose from 1961 through 1965 as shown in **Figure 2**.

Modigliani and Sutch found that during operation twist that "the spread between rates on long-term Government bonds and the bills rate declined from 150 base points down to 35 base points."[49] But, they maintained that "...the spread typically tends to close in a period of recovery and rising short-term rates..."[50] They concluded that operation twist only slightly reduced the spread between long-term and short-term rates.[51] But other economists have argued that it is difficult to assess the effects of operation twist because of its limited scale.[52]

> Federal Reserve swaps of shorts for longs were small, as were its net purchases of longer maturities. Moreover, the Treasury offset these operations to some extent by issuing longer-term securities.[53]

Nevertheless, the prevailing view of financial economists was that operation twist was a disappointment. Hence, support for using debt management as a countercyclical tool diminished.

Beginning in 1965, high long-term interest rates prevented the Treasury from issuing bonds because Congress had forbidden the Treasury from issuing bonds with a rate of return more than 4.25 percent.[54] Consequently, the average yield to maturity of the privately-held marketable Treasury debt began declining sharply, as shown in **Figure 2**.

The Treasury was concerned about this rapid decrease in average maturity. In 1967, the Treasury requested and received congressional permission to raise the

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[48] Luckett, p. 566-568.

[49] Modigliani and Sutch, p. 79.

[50] Ibid.

[51] Ibid., p. 116.

[52] Chandler and Goldfeld, p. 581.

[53] Ibid.

[54] Stigum, Marcia. *The Money Market*. Homewood, Illinois, Dow Jones-Irwin, 1990. p. 319.

maximum maturity on notes from five years to seven years.[55] There was no congressional ceiling on the rate of return on Treasury notes. In March 1971, Congress enacted a limited exception to the 4.25 percent ceiling on Treasury bonds.[56] In 1973, the Treasury obtained congressional permission for an increase in the maximum maturity on notes from seven years to ten years.[57] Despite these changes, the average length to maturity of Treasury debt continued to decline as shown in **Figure 2**.

From 1966 through 1974, the Treasury issued debt "on a sort of *ad hoc* basis."[58] The Treasury did not announce in advance its plans for sales. Thus, potential buyers were faced with uncertainty about which Treasury securities would be issued.

Beginning in fiscal year 1975, the Treasury was faced with the difficulty of financing persistently high budgetary deficits. The Treasury was concerned about the stability of financial markets. The Treasury decided to pursue a policy of neutral debt management while attempting to lengthen the average length to maturity of the privately-held marketable Treasury debt. According to this policy of neutral debt management, the Treasury spread the Treasury's borrowing needs widely across the maturity spectrum. The Treasury had a regular and predictable schedule of debt issues. The Treasury did not vary the composition of its debt issues based on interest rate forecasts. This policy minimized investor uncertainty. In 1975, the Treasury started a program of *regularization of debt issuance* with the scheduled cycle of sales of 2-year, 4-year, and 5-year notes.[59] The Congress expanded the quantity of Treasury bonds that could be sold without being subject to the 4.25 percent interest rate ceiling. On November 10, 1988, the interest rate ceiling of Treasury bonds was repealed.[60] From December 1975 until February 1992, the average length to maturity of the privately-held marketable federal debt gradually increased as shown in **Figure 2**.

## Clinton Administration Changes

In its 1993 budget, the Clinton Administration announced a change in federal debt management. The Treasury would issue less long-term debt and more short-term debt. The Clinton Administration maintained that shortening the debt maturity would reduce interest costs because short-term securities usually have a lower interest rate than long-term securities.[61] In early 1993, the Treasury reduced the quarterly auction

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[55] Ibid., p. 320.

[56] U.S. Department of the Treasury. *Treasury Bulletin*, June 1994. p. 30.

[57] Stigum, p. 321.

[58] Ibid., p. 323-324.

[59] Ibid., p. 323.

[60] U.S. Department of the Treasury. *Treasury Bulletin*, June 1994. p. 30.

[61] Sill, D. Keith. Managing the Public Debt. *Business Review*, Federal Reserve Bank of

(continued...)

of 30-year bonds from $10 billion to $9.25 billion.[62] On May 5, 1993, the Treasury announced a reduction in the sale of 30-year bonds from quarterly sales of $9.25 billion or $37 billion annually to semiannual sales of $11 billion or $22 billion annually.[63] The Treasury also announced the discontinuation of the issuance of 7-year notes which had been amounting to about $40 billion per year.[64] The Treasury replaced these 7-year notes with additional sales of bills and 2-year and 3-year notes.[65]

It is not clear whether the Administration considered possible effects on the term structure of interest rates. Ms. Deborah Danker, the Assistant Secretary of Domestic Finance, stated that the Treasury was "not attempting to manipulate the yield curve or drive down long-term rates."[66] Mr. Frank Newman, Undersecretary, said that by borrowing less at longer maturities, the Treasury was not trying to reduce long-term market rates.[67] But, if that happened, he reportedly said, it "would not break my heart."[68] There is some anecdotal evidence that, at least in the short-run, the debt management changes caused rates of interest on 30-year Treasury bonds to decline.[69] In the 1993 budget, the Office of Management and Budget forecast savings of $16 billion over fiscal years 1994 through 1998 because of this new policy of issuing shorter debt.[70]

These changes in the composition of Treasury debt issues were criticized by many financial analysts. They argued that OMB forecast interest rate levels that could be too low, and consequently, savings in interest costs could be overstated. After the Treasury announced the changes in the composition of its debt sales, two major American corporations, Walt Disney and Coca-Cola, sold bond issues with maturities of 100 years.[71] Furthermore, at least a half dozen corporations issued 50-year bonds,

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[61] (...continued)
Philadelphia, July/August 1994. p. 3.

[62] U.S. Congressional Budget Office. *Federal Debt and Interest Costs*. Washington, U.S. Govt. Print. Off., May 1993. p. 67.

[63] Ibid., p. 70.

[64] Ibid.

[65] Ibid.

[66] Davies, Stephen A. Long Bond Sales Will Be Slashed By Nearly Half In Treasury Plan. *The Bond Buyer*, vol. 304, no. 29,146; May 6, 1993. p. 4.

[67] Wessel, David. Savings from Treasury Borrowings Won't Meet Projections, Official Says. *The Wall Street Journal*, vol. 221, no. 99, May 21, 1993. p. A2.

[68] Ibid.

[69] Lauricella and Thomas T. Vogel, Jr. Many Treasury Prices Rise on More Speculation About Possible Changes in U.S. Borrowing Mix. *The Wall Street Journal*, April 18, 1993. p. C17.

[70] Ibid.

[71] Lauricella, Thomas D. and Constance Mitchell. Coca-Cola Joints Disney at the Very Long End With the Sale of $150 Million of 100-Year Bonds. *The Wall Street Journal*, vol. 222, no. 16, July 23, 1993. p. C15.

and many other corporations increased the average length of their long-term debt.[72] Unlike OMB and CBO, these corporations apparently judged that long-term rates were low and decided to lock-in existing long-term rates. These corporations likely had a different forecast of interest rates than OMB and CBO.

In May 1996, the Treasury began selling debt with a longer average maturity.[73] This change in the composition of debt issuance has contributed to the stabilization of the average length of the marketable interest-bearing debt.

On January 29, 1997, the U.S. Treasury began issuing inflation-protection (price-indexed) securities which were 10-year notes.[74] The Treasury issued 5-year inflation-protection notes in July 1997 and plans to issue 30-year inflation-protection bonds in 1998. By the end of 1998, the Treasury plans to establish a regular schedule of offerings of 5-year, 10-year, and 30-year inflation-protection securities.[75] The Treasury does not include inflation-protection securities in its calculation of the average length of privately-held marketable debt.[76]

The decline in the size of the deficit for fiscal years 1995, 1996, and 1997 caused a reduction in the rate of growth of the national debt, and consequently, a decrease in the rate of growth of the volume of debt issuance. This decrease combined with the May 1996 decision to sell debt with a longer average maturity and the issuance of inflation-protection securities stabilized the average length of marketable interest-bearing public debt. The debt management changes of the Clinton Administration implemented in February 1993 would have eventually shortened the average length of maturity of the Treasury from five years and eleven months in February 1993 to approximately four and one-half years.[77] Since January 1995, this average length of debt has been approximately five years and four months.[78]

The budget savings forecast by OMB from February 1993 through May 1, 1996 were substantially overstated because interest rates over most of this period exceeded

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[72] Sloan, Allan. Unlike Uncle Sam, Disney Sees Nothing Goofy in Long-Term Bonds. *The Washington Post*, July 27, 1993. p. D3.

[73] U.S. Department of the Treasury. *Treasury News*, May 1, 1996. p. 1-3.

[74] U.S. Library of Congress. Congressional Research Service. *Treasury Inflation-Protection Securities: Description, Goals, and Policy Issues.* CRS Report 97-134 E, by James M. Bickley. Washington, January 22, 1997. p. 1.

[75] U.S. Library of Congress. Congressional Research Service. *Treasury Inflation-Protection Securities: a Fact Sheet.* CRS Report 97-216 E, by James M. Bickley. Washington, June 25, 1997. p. 1.

[76] U.S. Department of the Treasury. *Treasury Bulletin*, September 1997. p. 22.

[77] Powell, Jerome H. More Vulnerable to Inflation. *The Wall Street Journal*, vol. 221, no. 98, May 20, 1993. p. A16.

[78] U.S. Department of the Treasury. *Treasury Bulletin*, March 1996, p. 27 and September 1997, p. 22.

those forecast by OMB.[79] OMB's forecast of budget savings after May 1, 1996 are not relevant because of policy changes in debt management.

Since short-term rates are usually lower than long-term rates, a lower average length of maturity that occurred between February 1993 and January 1995 may reduce interest costs in the long run. But, as the average length of maturity of the debt declines, the Treasury must refinance the debt more frequently, and consequently, yearly interest costs will be more volatile and uncertain.

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[79] For OMB's interest rate forecasts, see: U.S. Congressional Budget Office. *An Analysis of the President's February Budgetary Proposals*. Washington, U.S. Govt. Print. Off., March 1993. p. II-2.

# Appendix A. Examples of Interest Rate Risk[80]

The purposes of this appendix are to provide examples of interest rate risk and to demonstrate that interest rate risk increases as the time to maturity increases. The present capital value of an income producing asset is calculated by a process called capitalization, which involves discounting the expected flow of money receipts. A dollar received in the future is worth less than a dollar today because the dollar today can be immediately invested and earn interest compounded over time. An investor generally would not buy a security unless the yield on the purchase price is as high as that available on other comparable securities. These concepts are demonstrated by the following examples of three different maturities: 1-year, 10-year, and perpetuity.

*First*, assume a potential investor is offered a 1-year security which promises to pay $1,060 in one year. The general formula for simple discount is shown by the following equation:

$$P = A/(1+i)$$

where P is the present value, A is the dollar amount receivable at the end of the interest period, and i is the rate of interest for that period stated in hundredths. In this example, if the prevailing market yield is 6 percent per year, that is, i = 0.06, then the investor would be willing to pay $1,000, as shown in the following calculation:

$$P = \$1,060/(1+0.06) = \$1,060/(1.06) = \$1,000$$

If the prevailing market yield had been 8 percent then the investor would have paid only $981.48, which was calculated as follows:

$$P = A/(1+i) = \$1,060/(1+0.08) = \$981.48$$

If an investor purchases the 1-year security when the going market yield is 6 percent and the going market yield rises immediately to 8 percent then the market value of the 1-year security would decline from $1,000 to $981.48. This decline of $18.52 is 1.852 percent of the initial purchase price of $1,000.

If the prevailing market yield had been 4 percent then the investor would have paid $1,019.23, which was calculated as follows:

$$P = A/(1+i) = \$1,060/(1+0.04) = \$1,019.23$$

If an investor purchases the 1-year security when the going market yield is 6 percent and then the going market yield immediately declines to 4 percent then the market value of the 1-year security would rise from $1,000 to $1,019.23. This rise is $19.23 or 1.923 percent of the initial purchase price.

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[80] This appendix is based closely on the following source: Chandler and Goldfeld, p. 59-64.

*Second*, assume a potential investor is offered a 10-year security that promises to pay $60 at the end of each year for ten years plus $1,000 at the end of the tenth year. In addition, assume that the market rate of interest is 6 percent.

The general formula for calculating the present value of an interest-income security is the following:

$$P = A_1/(1+i) + A_2/(1+i)^2 + A_3/(1+i)^3 + \ldots + A_n/(1+i)^n + F/(1+i)^n$$

where P is the present value of the security, the A's are the dollar amounts of interest received at the ends of each interest period, F is the amount of principal repayment, i is the rate of interest at which the amounts are discounted, and n is the number of interest periods.

Hence, the present value of this 10-year security would equal $1,000, which was calculated as follows:

$$P = \$60/(1+0.06) + \$60/(1+0.06)^2 + \$60/(1+0.06)^3 + \ldots + \$60/(1+0.06)^{10} + \$1,000/(1+0.06)^{10} = \$1,000$$

If an investor purchases the 10-year security when the interest rate is 6 percent and then the interest rate immediately rises to 8 percent, then the market value of the security would fall from $1,000 to $865.80, which was calculated by using 0.08 for i in the formula. This decline of $134.20 is 13.42 percent of the initial purchase price of $1,000.

If an investor purchases the 10-year security when the interest rate is 6 percent and then the interest rate immediately declines to 4 percent then the market value of the security would rise from $1,000 to $1,162.22, which was calculated by using 0.04 for i in the formula. This increase of $162.22 is 16.222 percent of the initial purchase price.

*Third*, assume that a potential investor is offered a security that pays $60 per year in perpetuity. The formula for calculating the present value of a perpetuity is the following:

$$P = A/i$$

where P is the present value of the security, A is the dollar amount of interest received at the ends of each interest period, and i is the rate of discount. Thus, in this example, the present value of the security would be $1,000 which was calculated as follows:

$$P = A/i = \$60/0.06 = \$1,000$$

If an investor purchases this perpetuity when the interest rate is 6 percent and then the interest rate rises to 8 percent then the market value of the security would fall from $1,000 to $750 ($60/0.08). This decline of $250 is 25 percent of the initial purchase price of $1,000.

Conversely, if an investor purchases this perpetuity when the interest rate is 6 percent and then the interest rate declines to 4 percent then the market value of the security would rise from $1,000 to $1,500 ($60/0.04). This rise of $500 in the value of the security would equal 50 percent of the initial purchase price.

**Table A1** summarizes these three examples. These examples demonstrate that, for a given change in the interest rate, the present value of an outstanding security would vary more as the term to maturity increases, all other things being equal.

**Table A1. Example of Present Values**

| | Present value if discounted at | | |
|---|---|---|---|
| Description of debt | 6% | 4% | 8% |
| An obligation to pay $1,060 at the end of the year | $1,000.00 | $1,019.23 | 941.48 |
| An obligation to pay $60 annually for ten years and $1,000 at the end of ten years | 1,000.00 | 1,162.22 | 865.80 |
| An obligation to pay $60 a year in perpetuity | 1,000.00 | 1,500.00 | 750.00 |

Source: Chandler and Goldfeld, p. 63.

# Appendix B: Selective Debt Management Views Since 1980

Debt management has been affected by rapid changes in technology, regulations, and legislation. Consequently, financial economists have had difficulty isolating the macroeconomic effects (if any) of debt management from the macroeconomic effects of monetary and fiscal policy. The differing views of financial economists expressed in this appendix indicate possible limitations of using debt management as a policy tool.

In 1981 and 1982, Professor Benjamin M. Friedman studied the effects of U.S. debt management policy. He concluded that:

> a shift from long- to short-term government debt lowers yields on long-term assets (and raises their prices), raises yields on short-term assets, and in the short run stimulates output and spending. Moreover, the stimulus to spending is disproportionately concentrated in fixed investment, so that debt management actions shortening the maturity of the government debt not only increase the economy's output but also shifts the composition of output toward increased capital formation.[81]

For the mid-1970s, Friedman made specific estimates of the macroeconomic effects of a $1 billion shift from long-term Treasury debt to short-term Treasury debt.[82] But, an attempt by William G. Dewald, Jerry G. Thursby, and Richard G. Anderson to replicate Friedman's results was unsuccessful because of the size and complexity of his model.[83] According to Dewald, et al., Friedman "admitted astonishment that anyone would attempt to convert the Harvard-MPS-TROLL system [his model] to another computer and use it for replication."[84]

In 1988, Manuel H. Johnson, Vice Chairman of the Board of Governors of the Federal Reserve System, maintained that the term structure of interest rates was explained by the pure expectations theory. He argued that interest rate expectations were determined, in part, by expectations of future inflation. Hence, he suggested

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[81] Friedman, Benjamin M. Debt Management Policy, Interest Rates, and Economic Activity. National Bureau of Economic Research, Working Paper no. 830, Cambridge, Mass., December 1981. p. 27.

[82] Friedman, Benjamin M. The Treasury Threatens Corporate Balance Sheets. *Harvard Business Review*, September/October 1982. p. 22.

[83] Dewald, et al. attempted to replicate Friedman's model which was presented in the following source: Friedman, Benjamin. Federal Reserve Policy, Interest Rate Volatility, and the U.S. Capital Raising Mechanism. *Journal of Money, Credit and Banking*, vol. 14, November 1982. p. 721-745.

[84] Dewald, William G., Jerry G. Thursby, and Richard G. Anderson. Replication in Empirical Economics: The Journal of Money, Credit and Banking Project. *The American Economic Review*, vol. 76, no. 4, September 1986. p. 597.

that the term structure of interest rates be considered as one indicator of monetary policy.[85] But, Jeffrey C. Fuhrer found that the term structure of interest rates did not provide "an economically important and statistically reliable signal of inflation or real activity."[86]

On April 25, 1994, Professor Rudiger W. Dornbush recommended that the Fed raise the Federal funds rate and the discount rate in order to keep the economy from overheating. He also recommended that the U.S. Treasury simultaneously use debt management policy to reduce the yield on 10-year Treasury bonds in order to prevent an asset-market crash.[87] Obviously, Professor Dornbush believes in either the segmented market theory or the preferred habitat theory of the term structure of interest rates.

In summary, financial economists differ in their views concerning the term structure of interest rates and the effectiveness of debt management as a policy tool.

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[85] Johnson, Manuel H. Current Prospectives on Monetary Policy. *Cato Journal*, vol. 8, no. 2, fall 1988. p. 257.

[86] Fuhrer, Jeffrey C. Commodity Prices, the Term Structure of Interest Rates, and Exchange Rates: Useful Indicators for Monetary Policy? Federal Reserve Bank of Boston. *New England Economic Review*. November/December 1993. p. 31.

[87] Dornbush, Rudiger M. Needed: A One-Two Punch from the Fed and Treasury. *Business Week*, no. 3,368; April 25, 1994. p. 22.

# Selected Bibliography

Board of Governors of the Federal Reserve System. Federal Reserve statistical releases-selected interest rates, January 1, 1994-May 15, 1994.

Chandler, Lester V. and Stephen M. Goldfeld. The economics of money and banking. Seventh edition, New York, Harper & Row, 1977. 630 p.

Culbertson, J. M. The term structure of interest rates. The quarterly journal of economics, vol. 121, no. 4, November 1957. p. 485-517.

Davies, Stephen A. Long bond sales will be slashed by nearly half in Treasury plan. The bond buyer, vol. 304, no. 29,146; May 6, 1993. p. 4.

De Leeuw, F. A model of financial behavior. Chapter 13 in J. Duesenberry, G. Fromm, L. Kline, and E. Kuh (eds.), The Brookings quarterly econometric model of the United States, Chicago, Rand McNally, 1965. p. 494-503.

Dewald, William G., Jerry G. Thursby, and Richard G. Anderson. Replication in empirical economics: the journal of money, credit and banking project. The American economic review, vol. 76, no. 4, September 1986. p. 587-603.

Dornbush, Rudiger M. Needed: a one-two punch from the Fed and Treasury. Business week, no. 3,368; April 25, 1994. p. 22.

Friedman, Benjamin M. Debt management policy, interest rates, and economic activity. National Bureau of Economic Research, working paper no. 830, Cambridge, Mass., December 1981. 36 p.

—— Federal Reserve policy, interest rate volatility, and the U.S. capital raising mechanism. Journal of money, credit and banking, vol. 14, November 1982. p. 721-745.

—— The Treasury threatens corporate balance sheets. Harvard business review, September/October 1982. p. 20-22.

Fuhrer, Jeffrey C. Commodity prices, the term structure of interest rates, and exchange rates: useful indicators for monetary policy? Federal Reserve Bank of Boston. New England economic review. November/December 1993. p. 18-32.

Johnson, Manuel H. Current perspectives on monetary policy. Cato journal, vol. 8, no. 2, fall 1988. p. 253-260.

The junkification of American T-bonds. The Economist, vol. 311, no. 7,604, May 27, 1989. p. 77-78.

Kessel, Reuben A. Comment. The Journal of political economy, vol. 75, no. 4, part 2, supplement, August 1967. p. 592-595.

Lauricella, Thomas D. and Constance Mitchell. Coca-Cola joints Disney at the very long end with the sale of $150 million of 100-year bonds. The Wall Street journal, vol. 222, no. 16, July 23, 1993. p. C15.

Lauricella, Thomas D. and Thomas T. Vogel, Jr. Many Treasury prices rise on more speculation about possible changes in U.S. borrowing mix. The Wall Street journal, April 18, 1993. p. C17.

Luckett, Dudley G. Money and banking. New York, McGraw-Hill, 1976. 585 p.

Lutz, Friedrich A. The structure of interest rates. Quarterly journal of economics, vol. 55, 1940-1941. p. 36-63.

Malkiel, Burton Gordon. The term structure of interest rates. Princeton, Princeton University press, 1966. 271 p.

Masera, R. S. The term structure of interest rates. Oxford, the Clarendon press, 1972. 211 p.

Missale, Alessandro and Olivier Jean Blanchard. The debt burden and debt maturity. The American economic review, vol. 84, no. 1, March 1994. p. 309-319.

Modigliani, Franco and Richard Sutch. Debt management and the term structure of interest rates: an empirical analysis of recent experience. The Journal of political economy, vol. 75, no. 4, part 2 supplement, August 1967. p. 569-595.

—— Innovations in interest rate policy. The American economic review, vol. 56, no. 2, May 1966. p. 178-197.

Powell, Jerome H. More vulnerable to inflation. The Wall Street journal, vol. 221, no. 98, May 20, 1993. p. A16.

Sloan, Allan. Unlike Uncle Sam, Disney sees nothing goofy in long-term bonds. The Washington post, July 27, 1993. p. D3.

Stigum, Marcia. The money market. Homewood, Illinois, Dow-Irwin, 1990. 1,252 p.

Sill, D. Keith. Managing the public debt. Business review, Federal Reserve Bank of Philadelphia, July/August 1994: 3-13.

U.S. Congressional Budget Office. An analysis of the President's February budgetary proposals. Washington, U.S. Govt. Print. Off., March 1993. 58 p.

—— Federal debt and interest costs. Washington, May 1993. 104 p.

U.S. Library of Congress. Congressional Research Service. Savings bonds with variable rates: background, characteristics, and evaluation. Report no. 97-605 E, by James M. Bickley. Washington, June 11, 1997. 14 p.

—— Treasury inflation-protection securities: a fact sheet. Report no. 97-216 E, by James M. Bickley. Washington, June 25, 1997. 2 p.

—— Treasury inflation-protection securities: description, goals, and policy issues. Report no. 97-134 E, by James M. Bickley. Washington, January 22, 1997. 15 p.

U.S. Treasury. Treasury bulletin. June 1994, 135 p.; March 1996, 143 p.; and September 1997, 123 p.

—— Treasury news, May 1, 1996. 7 p.

Wallace, Neil. Comment. The Journal of political economy, vol. 75, no. 4, part 2, supplement, August 1967. p. 590-592.

Wessel, David. Savings from Treasury borrowings won't meet projections, official says. The Wall Street journal, vol. 221, no. 99, May 21, 1993. p. A2.