



Federal Debt Management: Concepts, Options, and Policies (1945-2008)

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Summary

This report provides a broad overview of Treasury debt management and examines changes in debt sales implemented by the Clinton and Bush Administrations. It covers the following seven 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), Clinton Administration policies, and Bush Administration policies.

The Treasury sells securities in 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. Congress does not directly affect debt management decisions. However, Congress oversees the operations of the Federal Reserve System, which cooperates with the Treasury in pursuing debt management objectives. Treasury officials have testified before congressional committees about federal debt management. The Government Accountability Office has written reports concerning federal debt management as requested by congressional committees.

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, minimization of interest costs, and neutrality (make debt sales as predictable as possible). 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 FY1975, 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.

The Clinton Administration shortened the debt maturity in order to reduce interest costs. This policy was controversial and was reversed as budget surpluses occurred. The Bush Administration also shortened the debt maturity in order to reduce interest costs, which has also been controversial.

This report will not be updated.

Contents

Concept of Federal Debt Management.....	1
Concept of the Term Structure of Interest Rates.....	2
Theories of the Term Structure of Interest Rates.....	3
Expectations Theories	4
Pure Expectations Theory	4
Error-Learning Theory	6
Consistency with Data	6
Risk Averse Theory	7
Types of Risk	7
Consistency with Data	8
Segmented Market Theory.....	9
Effectiveness of Debt Management	9
Consistency with Data	10
Preferred Habitat Theory.....	10
Consistency with Data	11
Prevailing View of Financial Economists.....	11
Policy Objectives.....	12
Borrow Funds (Necessary Objective)	12
Alternative Secondary Objectives.....	12
Economic Stabilization	12
Minimum Interest Cost	13
Neutrality	13
Debt Management (1945-1992)	13
Clinton Administration Policies	17
Bush Administration Policies	19

Figures

Figure 1. Hypothetical Term Structures of Interest Rates	5
Figure 2. Average Length of Privately Held Marketable Debt.....	14

Tables

Table A-1. Example of Present Values	23
Table A-2. Maturity Distribution of Marketable Interest-Bearing Public Debt Securities Held by Private Investors	23

Appendixes

Appendix. Examples of Interest Rate Risk.....	21
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Contacts

Author Contact Information 24

This report provides a broad overview of debt management by the Department of the Treasury (Treasury) and examines changes in debt sales implemented by the Clinton and Bush Administrations. It covers the following seven 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), Clinton Administration policies, and Bush Administration policies.

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. Congress does not directly affect debt management decisions. However, Congress oversees the operations of the Federal Reserve System, which cooperates with the Treasury in pursuing debt management objectives. Treasury officials have testified before congressional committees about federal debt management. The Government Accountability Office (GAO) has written reports concerning federal debt management as requested by congressional committees.¹

Concept of Federal Debt Management

In a broad sense, federal debt management encompasses policies that affect the maturity composition of the privately held, interest-bearing federal debt and determine the characteristics of federal debt instruments.² 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 2 to 10 years, and bonds which mature in more than 10 years.³ 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.

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 that the Fed decides to buy (or sell) affects the maturity composition of the Federal debt held by the rest of the public.⁴ Through open market operations, the Fed has the capacity to partially offset Treasury debt management decisions. But the Fed

¹ As examples, in September 1999, GAO published *Debt Management in a Period of Budget Surplus* in response to a request from the chairman of the Senate Budget Committee and the chairman of the House Ways and Means Committee; and in February 2001, GAO published *Debt Management Actions and Future Challenges* at the request of the chairman of the House Ways and Means Committee, the chairman of the Social Security Subcommittee of the House Ways and Means Committee, and the chairman of the Senate Budget Committee.

² Privately held, interest-bearing federal debt accounts for a part of federal debt. Much of the federal debt is held in federal trust funds—in other words, the federal government has issued IOUs to itself. For an overview of the federal debt, see CRS Report RL31590, *The Federal Government Debt: Its Size and Economic Significance*, by Brian W. Cashell.

³ 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.

⁴ 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.

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.⁵ The Treasury sells savings bonds with fixed rates and price-indexed rates, but these bonds are not marketable; that is, they cannot be resold on financial markets.⁶ In January 1997, the Treasury began issuing marketable securities indexed to changes in the price level.

Unless specified otherwise, in this report debt management is narrowly defined as Treasury decisions about debt sales that 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.

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 or nominal 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 coupon yield or nominal yield per year would equal \$60/\$1,000 or 6%. The current yield per year would equal \$60/\$950 or 6.32%.⁸ The average yield to maturity would be 6.70%.

⁵ A call feature gives the Treasury the option of redeeming a particular security issue before its date of maturity.

⁶ Current information about savings bonds is available at <http://www.treasurydirect.gov>, visited September 12, 2008.

⁷ Lester V. Chandler and Stephen M. Goldfeld, *The Economics of Money and Banking*, Seventh Edition (New York: Harper & Row, 1977), pp. 58-59.

⁸ *Ibid.*, p. 59.

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% 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 the **Appendix**.

The term structure is the relationship of average yields to maturity and time to maturity of debt instruments. Each maturity class of securities, such as three years to maturity, five 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 three years to maturity could have an average yield to maturity of 4.0%, a Treasury note with five years to maturity could have an average yield to maturity of 5.0%, and a Treasury note with 10 years to maturity could have an average yield to maturity of 6.0%. 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. This graph of the term structure is sometimes referred to as “the yield curve.” The term structure is drawn for debt instruments outstanding at a given point in time.⁹

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 cycle.¹⁰ 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.

The validity and policy value of any theory can be evaluated by determining how well a theory explains relevant data and predicts outcomes. The implications of each theory of the term structure of the interest rate can be compared with three real-world phenomena. First, the yield curve is usually upward sloping indicating that the yield rises as the length of maturity increase. For example, during the period 1950-2003, in 88% of the months, the yield curve was upward sloping.¹¹ Second, usually short-term, intermediate-term, and long-term yields rise or decline together.¹² Third, over business cycles, usually short-term and long-term interest rates move in a pro-cyclical fashion—rising during expansions and declining during recessions. Furthermore, short-term rates fluctuate more than long-term rates over business cycles.¹³

⁹ On a daily basis, the Treasury calculates rates for the yield curve for Treasury securities. These data are available at <http://www.treasury.gov/offices/domestic-finance/debt-management/interest-rate/>, visited September 12, 2008.

¹⁰ These theories assume that monetary policy is constant. However, if the Fed instituted a tighter (easier) monetary policy then the term structure curve would shift up (down).

¹¹ Lloyd B. Thomas, *Money, Banking, and Financial Markets* (Mason, Ohio: South-Western, 2006), p. 136.

¹² *Ibid.*, p. 137.

¹³ *Ibid.*, pp. 137-138.

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 basic expectations theories for the term structure: the pure expectations theory and the error-learning theory.

Pure Expectations Theory ¹⁴

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.¹⁵

These assumptions imply 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.¹⁶ Hence, the average yield to maturity on the 30-year bond would

¹⁴ 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: Friedrich A. Lutz, “The Structure of Interest Rates,” *Quarterly Journal of Economics*, vol. 55, 1940-1941, pp. 36-63.

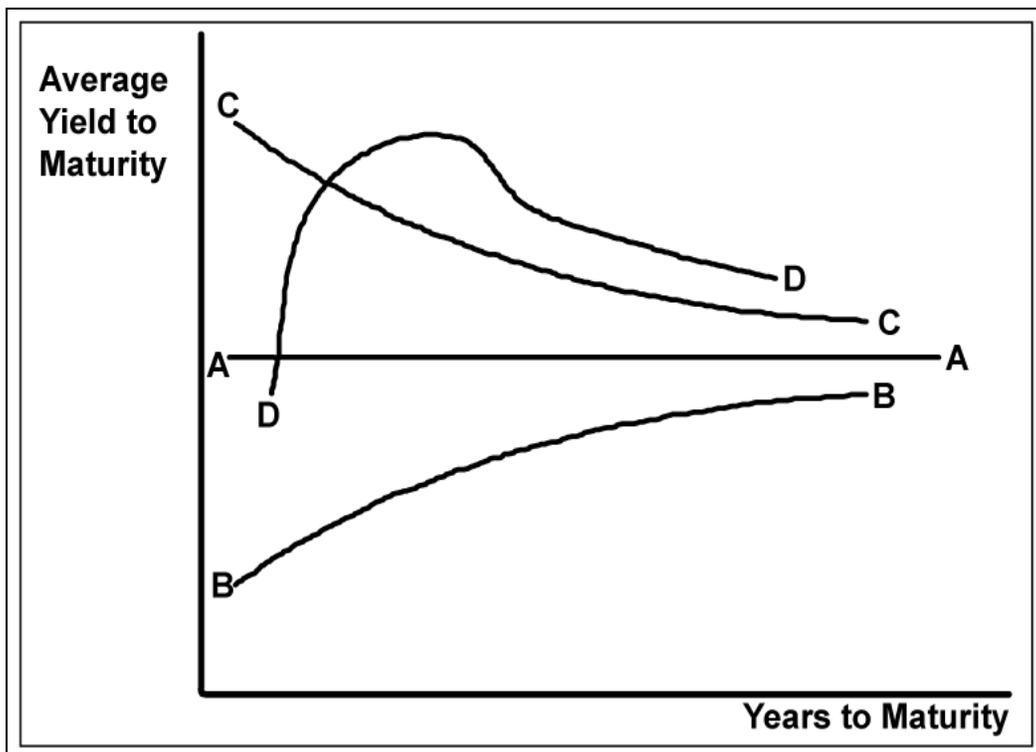
¹⁵ Burton Gordon Malkiel, *The Term Structure of Interest Rates* (Princeton: Princeton University Press, 1966), p. 18.

¹⁶ The par value is the redemption value if the security is held to maturity.

be *approximately* equal to the arithmetic average of the yields on a series of 90-day Treasury bills over the 30-year period.¹⁷

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.¹⁸ 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.

Figure 1. Hypothetical Term 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.

¹⁷ These average yields to maturity are *approximately* equal because their calculations do not consider compounding.

¹⁸ R. S. Masera, *The Term Structure of Interest Rates* (Oxford: the Clarendon Press, Oxford, 1972), p. 14.

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.”¹⁹ 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, which means that the theory is not supported by the evidence.²⁰

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...”²¹ In other words, investors purchase securities based on their expectations of yields to maturity rather than actual yields to 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.”²² Since long-term rates are averages of present and future short-term rates, the entire term structure would rise.²³

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.²⁴

Consistency with Data

The pure expectations theory indicates that the average yield spread over a period of years should be zero, which is inconsistent with the data showing average yields rising as the term to maturity increases.²⁵ The pure expectations theory assumes that various maturities are close substitutes for one another; consequently, this theory correctly predicts that the yield of various maturities will typically move in the same direction. 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. Finally, the pure expectations theory correctly predicts that interest rates on different maturities move in a pro-cyclical fashion over the business cycle.²⁶

¹⁹ Malkiel, p. 23.

²⁰ Ibid., p. 28-29.

²¹ Malkiel, p. 35.

²² Ibid., p. 30.

²³ Ibid., p. 31.

²⁴ Ibid., p. 34-35.

²⁵ Thomas, p. 137.

²⁶ Ibid., p. 139.

Risk Averse Theory²⁷

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.²⁸ 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. Thus, under the risk averse theory, the yield consists of the interest rate under the pure expectation theory plus a risk premium.

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.

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.²⁹

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.³⁰

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

²⁷ 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.

²⁸ 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.

²⁹ “The Junkification of American T-Bonds,” *The Economist*, vol. 311, no. 7,604; May 27, 1989, pp. 77-78.

³⁰ For examples of interest rate risk, see **Appendix**.

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.³¹ Some financial experts argue that approval of current proposals to provide extensive federal credit assistance to financial institutions may result in the monetizing of more federal debt and thus cause unexpected inflation.

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%. These three nations were Ireland, Italy, and Belgium. As their debt-to-GDP ratios rose further and further above some threshold (debt of 40% to 50% 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.³²

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. If the corporation’s output causes significant pollution then more stringent pollution controls would raise the production costs of the corporation, lower profits, and thus increase the probability that the corporation would default on its bonds.

Consistency with Data

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. The risk averse theory is consistent with yields of various maturities

³¹ For a current viewpoint on this issue, see Gerald P. O’Driscoll Jr., “Washington Is Quietly Repudiating Its Debts,” (Opinion), *The Wall Street Journal*, vol. 252, no. 45, August 22, 2008, p. A15.

³² Alessandro Missale and Olivier Jean Blanchard, “The Debt Burden and Debt Maturity,” *The American Economic Review*, vol. 84, no. 1, March 1994, pp. 309-319.

typically moving in the same direction.³³ The risk averse theory also is consistent with the yield curve exhibiting a regular cyclical pattern.³⁴

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 contended 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.³⁵

He stated that "lenders as much as borrowers generally insist upon a maturity that is related to the purpose of borrowing."³⁶ A business prefers to borrow long-term in order to construct a plant.³⁷ 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.³⁸

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.³⁹

Effectiveness of Debt Management

Professor Culbertson correctly argued 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

³³ Thomas, p. 137.

³⁴ Thomas, p. 138.

³⁵ J. M. Culbertson, "The Term Structure of Interest Rates," *The Quarterly Journal of Economics*, vol. 71, no. 4, November 1957, p. 503.

³⁶ *Ibid.*, p. 494.

³⁷ *Ibid.*

³⁸ Malkiel, pp. 26-27.

³⁹ Board of Governors of the Federal Reserve System, *Federal Reserve Statistical Releases—Selected Interest Rates*, January 1, 1994-May 15, 1994.

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.⁴⁰ 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.⁴¹

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.⁴²

Consistency with Data

The segmented market theory is based on institutional preferences for different maturities by lenders and borrowers and is consistent with the prevalence of upward sloping yield curves.⁴³ The segmented market theory is inconsistent with data that show yields of various maturities typically move in the same direction. Because financial markets for different maturities are distinct, a rise in the interest rate for one maturity should not affect the interest rate on other maturities. Finally, the segmented market theory offers a plausible explanation using institutional factors for the cyclical pattern of the term structure of interest rate. For example, during a recession, loan demand declines and banks put their excess funds into Treasury bills, which raises Treasury bill prices and lowers their yield.⁴⁴

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 theories into a preferred habitat theory.⁴⁵ 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

⁴⁰ Culbertson, pp. 487-488.

⁴¹ Ibid., p. 517.

⁴² Masera, pp. 30-31.

⁴³ Thomas, p. 137.

⁴⁴ Thomas, p. 139.

⁴⁵ Their model is an adaption of a model constructed by F. De Leeuw. For a presentation of this model, see F. De Leeuw, 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), pp. 494-503.

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.⁴⁶

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.⁴⁷

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 data problems and econometric shortcomings.⁴⁸ 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.⁴⁹

Consistency with Data

The preferred habitat theory is consistent with data indicating that usually the term structure of interest rates is upward sloping, yields of various maturities usually move in the same direction, and the yield curve exhibits a regular cyclical pattern.⁵⁰

Prevailing View of Financial Economists

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

⁴⁶ Franco Modigliani 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.

⁴⁷ Modigliani, Franco and Richard Sutch, "Innovations in Interest Rate Policy," *The American Economic Review*, vol. 56, no. 2, May 1966, p. 196.

⁴⁸ Neil Wallace, Comment, *The Journal of Political Economy*, vol. 75, no. 4, part 2 supplement, August 1967, pp. 590-592.

⁴⁹ Reuben A. Kessel, Comment, *The Journal of Political Economy*, vol. 75, no. 4, part 2, supplement, August 1967, pp. 592-593.

⁵⁰ Thomas, pp. 137-139.

expectations, risk aversion, and segmented markets is disputed among financial economists, which makes the formulation of debt management policy controversial.

Policy Objectives

Prior to the Administration of President Bill Clinton, the consensus of financial economists was that federal debt management had one necessary objective and three alternative secondary 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. Furthermore, a large increase in the volume of debt to finance might complicate the issuance of new debt. 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 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 examine debt management policies implemented by the Clinton Administration and the Bush 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)

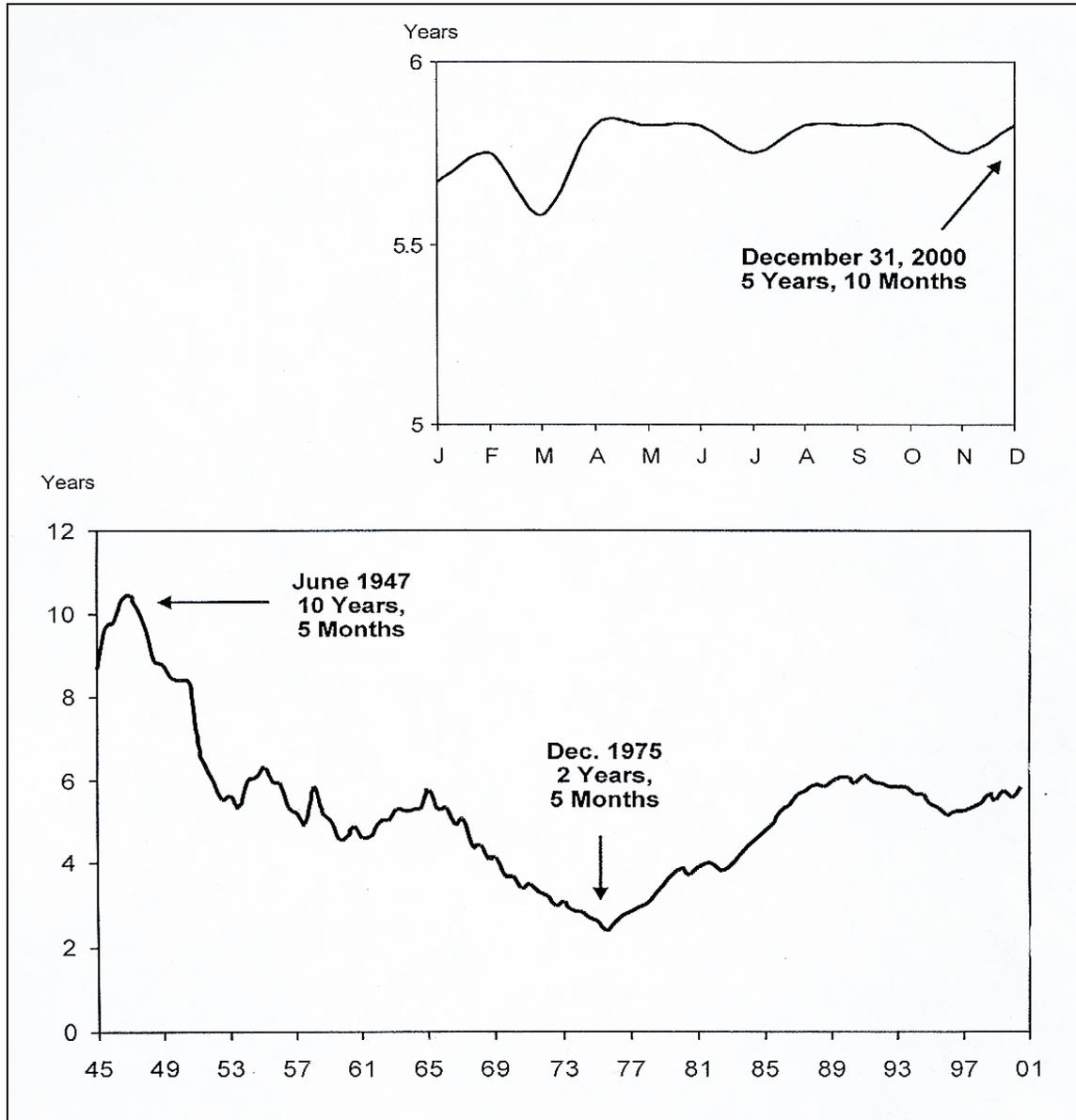
From 1945 through March 1951, the Federal Reserve System continued its policy of *pegging interest rates* which it had begun in March 1942.⁵¹ This policy initially imposed ceilings on different interest rates ranging from 3/8 of one percent on 90-day Treasury bills to 2 ½% on 25-year Treasury bonds.⁵² The Federal Reserve purchased without limitation all Treasury securities at those 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

⁵¹ Dudley G. Lockett, *Money and Banking* (New York, McGraw-Hill, 1976), p. 555.

⁵² Chandler and Goldfeld, pp. 555-556.

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.⁵³ 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**. These computations of the average length to maturity exclude Treasury securities in Government accounts and in Federal Reserve banks.⁵⁴

Figure 2. Average Length of Privately Held Marketable Debt



Source: *Treasury Bulletin*, March 2001, p. 29.

⁵³ *Ibid.*, p. 556.

⁵⁴ U.S. Department of the Treasury, *Treasury Bulletin*, June 1994, p. 30.

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.⁵⁵ 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.⁵⁶ 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.”⁵⁷ 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 1961.⁵⁸ 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 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.⁵⁹ 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.”⁶⁰ But, they maintained that “...the spread typically tends to close in a period of recovery and rising short-term rates...”⁶¹ They concluded that operation twist only slightly reduced the spread between long-term and short-term rates.⁶² But other economists have argued that it is difficult to assess the effects of operation twist because of its limited scale.⁶³

⁵⁵ Chandler and Goldfeld, pp. 560-561.

⁵⁶ Ibid., p. 564.

⁵⁷ Lockett, pp. 564-565.

⁵⁸ Ibid., p. 565.

⁵⁹ Lockett, pp. 566-568.

⁶⁰ Modigliani and Sutch, p. 79.

⁶¹ Ibid.

⁶² Ibid., p. 116.

⁶³ Chandler and Goldfeld, p. 581.

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.⁶⁴

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%.⁶⁵ 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 maximum maturity on notes from five years to seven years.⁶⁶ 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% ceiling on Treasury bonds.⁶⁷ In 1973, the Treasury obtained congressional permission for an increase in the maximum maturity on notes from seven years to ten years.⁶⁸ 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.”⁶⁹ 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 FY1975, 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.⁷⁰ 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.⁷¹ The Congress expanded the quantity of Treasury bonds that could be sold without being subject to the 4.25% interest rate ceiling. On November 10, 1988, the interest rate ceiling of Treasury bonds was repealed.⁷² From December 1975 until February 1992, the average length to

⁶⁴ Ibid.

⁶⁵ Marcia Stigum, *The Money Market* (Homewood, Ill., Dow Jones-Irwin, 1990), p. 319.

⁶⁶ Ibid., p. 320.

⁶⁷ U.S. Department of the Treasury, *Treasury Bulletin*, June 1994, p. 30.

⁶⁸ Stigum, p. 321.

⁶⁹ Ibid., pp. 323-324.

⁷⁰ For an analysis of this policy change, see Kenneth D. Garbade, “The Emergence of Regular and Predictable as a Treasury Debt Management Strategy,” *Economic Policy Review—Federal Reserve Bank of New York*, March 2007, 19 p.

⁷¹ Stigum, p. 323.

⁷² U.S. Department of the Treasury, *Treasury Bulletin*, June 1994, p. 30.

maturity of the privately held marketable federal debt gradually increased as shown in **Table A-2** and **Figure 2**.

Clinton Administration Policies

During the Clinton Administration, the Treasury pursued three main debt management goals: sound cash management—ensuring that Treasury cash balances are sufficient at all times, lowest cost financing for the taxpayers, and the promotion of efficient capital markets.⁷³ To achieve these goals, the Treasury was guided by five interrelated principles: (1) maintaining the “risk-free” status of Treasury securities, (2) maintaining consistency and predictability in issuing debt, (3) ensuring market liquidity, (4) financing across the yield curve, and (5) employing unitary financing (i.e., aggregating all of the U.S. Government’s financing needs and borrowing as one nation).⁷⁴

In its 1993 budget, the Clinton Administration announced a change in federal debt management.⁷⁵ 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.⁷⁶ In early 1993, the Treasury reduced the quarterly auction of 30-year bonds from \$10 billion to \$9.25 billion.⁷⁷ 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.⁷⁸ The Treasury also announced the discontinuation of the issuance of 7-year notes, which had been amounting to about \$40 billion per year.⁷⁹ The Treasury replaced these 7-year notes with additional sales of bills and 2-year and 3-year notes.⁸⁰

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.”⁸¹ Mr. Frank Newman, Undersecretary, said that by borrowing less at longer maturities, the Treasury was not trying to reduce long-term market rates.⁸² But, if that happened, he reportedly said, it “would not break my heart.”⁸³ There is some anecdotal evidence that, at least in the short-run, the

⁷³ Testimony of Gary Gensler, Assistant Secretary of Financial Markets, U.S. Department of the Treasury, House Committee on Ways and Means, Hearing on Managing the Public Debt in an Era of Surpluses, June 24, 1998, p. 1.

⁷⁴ *Ibid.*, pp. 1-2.

⁷⁵ During the Clinton Administration, changes in the average length of marketable interest-bearing debt securities held by private investors are shown in **Figure 2** and **Table A-2**.

⁷⁶ D. Keith Sill, “Managing the Public Debt,” *Business Review*, Federal Reserve Bank of Philadelphia, July/August 1994, p. 3.

⁷⁷ U.S. Congressional Budget Office, *Federal Debt and Interest Costs* (Washington, GPO, May 1993), p. 67.

⁷⁸ *Ibid.*, p. 70.

⁷⁹ *Ibid.*

⁸⁰ *Ibid.*

⁸¹ Stephen A. Davies, “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.

⁸² David Wessel, “Savings from Treasury Borrowings Won’t Meet Projections, Official Says,” *The Wall Street Journal*, vol. 221, no. 99, May 21, 1993, p. A2.

⁸³ *Ibid.*

debt management changes caused rates of interest on 30-year Treasury bonds to decline.⁸⁴ In the 1993 budget, the Office of Management and Budget forecasted savings of \$16 billion over fiscal years 1994 through 1998 because of this new policy of issuing shorter debt.⁸⁵ Actual savings were below estimates, but a specific amount has not been estimated.

These changes in the composition of Treasury debt issues were criticized by many financial analysts. They argued that OMB forecasted 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.⁸⁶ Furthermore, at least a half dozen corporations issued 50-year bonds, and many other corporations increased the average length of their long-term debt.⁸⁷ 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.⁸⁸ 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.⁸⁹ The Treasury issued 5-year inflation-protection notes in 1997 and 30-year inflation-protection bonds in 1998. By the end of 1998, the Treasury established a regular schedule of offerings of 5-year, 10-year, and 30-year inflation-protection securities.

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.⁹⁰

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 those forecast by

⁸⁴ 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.

⁸⁵ *Ibid.*

⁸⁶ Thomas D. Lauricella and Constance Mitchell, "Coca-Cola Joins 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.

⁸⁷ Allen Sloan, "Unlike Uncle Sam, Disney Sees Nothing Goofy in Long-Term Bonds," *The Washington Post*, July 27, 1993, p. D3.

⁸⁸ U.S. Department of the Treasury, *Treasury News*, May 1, 1996, pp. 1-3.

⁸⁹ CRS Report 97-134, *Treasury Inflation-Protection Securities: Description, Goals, and Policy Issues*, by James M. Bickley, p. 1. (This report is out-of-print and available from the author.)

⁹⁰ Jerome H. Powell, "More Vulnerable to Inflation," *The Wall Street Journal*, vol. 221, no. 98, May 20, 1993, p. A16.

OMB.⁹¹ OMB's forecast of budget savings after May 1, 1996 were 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 have reduced interest costs in the long run.⁹² 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.

Beginning with FY1998, the federal government began running budget surpluses; that is, the flow of revenue into the U.S. Treasury exceeded the outflow of expenditures. The Treasury lowered the amount of outstanding publicly held debt by reducing new debt issuance as existing federal debt issues matured. In addition, on March 9, 2000, the Treasury conducted its first buyback operation of outstanding Treasury securities before maturity.⁹³ For fiscal years 1998-2001, budget surpluses caused a decline in the level of publicly-held debt. Because fewer short-term securities were issued, the average length rose from five year and five months at the end of FY1997 to six years and one month at the end of FY2001.⁹⁴

Bush Administration Policies

For the Bush Administration, the stated debt management objective is the "lowest cost of financing over time."⁹⁵ The Treasury has four constraints in achieving this objective:

- Uncertainty: forecast errors, legislation, etc. all create uncertainty in deficit forecasts, debt limit problems.
- Size: Treasury is too large to behave opportunistically.
- Fluctuations in non-marketable debt: savings bonds, state and local government securities.
- Short-term balances: adequate cash balances to cover expenses.⁹⁶

The Treasury maintains that the goal of lowest cost over time implies a diversified debt portfolio that spread debt across maturities in order to reduce risk, diversity the investor base, improve cash management and facilitate regular and predictable issuance.⁹⁷ The Treasury argues that it should

⁹¹ For OMB's interest rate forecasts, see U.S. Congressional Budget Office, *An Analysis of the President's February Budgetary Proposals* (Washington, GPO, March 1993), p. II-2.

⁹² The actual effects on long term rates has not been estimated.

⁹³ For an analysis of paying down the federal debt, see CRS Report RS20302, *Paying Down the Federal Debt: A Discussion of Methods*, by James M. Bickley. For an examination of the buybacks of Treasury debt during 2000-2001, see Kenneth D. Garbade and Matthew Rutherford, *Buybacks in Treasury Cash and Debt Management*, Federal Reserve Bank of New York Staff Report no. 304, October 2007, 65 p.

⁹⁴ See **Table A-2** and **Figure 2**.

⁹⁵ Karthik Ramanathan, *Overview of U.S. Treasury Debt Management*, Office of Debt Management, U.S. Department of the Treasury, June 2008, p. 3. Available at <http://treas.gov/offices/domestic-finance/debt-management/>, visited August 26, 2008.

⁹⁶ *Ibid.*, p. 4.

⁹⁷ *Ibid.*, p. 6.

not interfere with price discovery, in other words, the price of a security should be determined through basic supply and demand factors related to the market.⁹⁸ The Treasury asserts that it is a regular and predictable market participant and not a market timer.⁹⁹

At the start of the Bush Administration in January 2001, the average length of market interest-bearing public debt held by private investors was five years and nine months.¹⁰⁰ During the two terms of the Bush Administration, this average length of debt declined and was four years and six months at the end of May 2008.¹⁰¹ Since short-term interest rates were below long-term rates, the shorting of the debt by the Bush Administration resulted in an immediate savings in interest costs. But, as the shorter is the average length of maturity of the debt, the more frequently the debt must be refinanced, and consequently, yearly interest costs will be more volatile and uncertain. During much of the Bush Administration, interest rates were relatively low in comparison to interest rates over the past 35 years. Hence, the Treasury may have failed to “lock in” low interest rates by limiting the sale on longer term securities.¹⁰²

The complexities of federal debt management are indicated in the following statement by James Clouse, then Acting Deputy Assistant Secretary for Federal Finance in 2006:

The pragmatic approach [to debt management] focuses largely on minimizing the cost of debt financing over time while also giving some weight to other factors such as variability in interest payment, the diversification of the investor base, operational risk, and flexibility. To some extent, the pragmatic approach is amenable to standard analysis of decision-making under uncertainty. For example, given the presence of a term premium in longer-term Treasury yields, a strict cost minimization criterion would probably favor—at the margin—shorter-term financing. On the other hand, yields on longer-term securities are less variable over time than short-term yields and longer-term securities can be employed to lessen rollover risks. An optimal debt portfolio might then involve some appropriate balancing of these considerations.

While a useful exercise, there is a fundamental difference between this standard sort of analysis and Treasury debt management in practice: the textbook exercise assumes that Treasury is a price-taker in financial markets, but in reality the strategies and tactics employed by Treasury debt managers can affect the market prices of Treasury securities. It is this interplay of market expectations and debt management policy that makes Treasury debt management more subtle and nuanced than a simple optimal cash management exercise.¹⁰³

⁹⁸ Ibid., p. 7.

⁹⁹ Ibid., p. 8.

¹⁰⁰ U.S. Department of the Treasury, *Treasury Bulletin*, June 2001, p. 27.

¹⁰¹ U.S. Department of the Treasury, *Treasury Bulletin*, September 2008, p. 25.

¹⁰² See **Table A-2** for data on the maturity distribution and average length of marketable interest-bearing public debt securities held by private investors.

¹⁰³ James Clouse, Acting Deputy Assistant Secretary for Federal Finance, U.S. Department of the Treasury, *Statement before the Information Management Network*, April 19, 2006, p. 3. He is currently employed at the Federal Reserve Board.

Appendix. Examples of Interest Rate Risk¹⁰⁴

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.

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.

¹⁰⁴ This appendix is based closely on the following source: Chandler and Goldfeld, pp. 59-64.

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

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

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:

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

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 A-1 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 A-1. Example of Present Values

Description of Debt	Present Value If Discounted at		
	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.

Table A-2. Maturity Distribution of Marketable Interest-Bearing Public Debt Securities Held by Private Investors

(millions of dollars)

Fiscal Year	Amount Outstanding, Privately Held	Maturity Class					Average Length ^a	
		Within 1 Year	1 to 5 Years	5 to 10 Years	10 to 20 Years	20 Years and Over	Years	Months
1969	156,008	69,311	50,182	18,078	6,097	12,337	4	2
1970	157,910	76,443	57,035	8,286	7,876	8,272	3	8
1971	161,863	74,803	58,557	14,503	6,357	7,645	3	6
1972	165,978	79,509	57,157	16,033	6,358	6,922	3	3
1973	167,869	84,041	54,139	16,385	8,741	4,564	3	1
1974	164,862	87,150	50,103	14,197	9,930	3,481	2	11
1975	210,382	115,677	65,852	15,385	8,857	4,611	2	8
1976	279,782	150,296	90,578	24,169	8,087	6,652	2	7
1977	326,674	161,329	113,319	33,067	8,428	10,531	2	11
1978	356,501	163,819	132,993	33,500	11,383	14,805	3	3
1979	380,530	181,883	127,574	32,279	18,489	20,304	3	7
1980	463,717	220,084	156,244	38,809	25,901	22,679	3	9
1981	549,863	256,187	182,237	48,743	32,569	30,127	4	0
1982	682,043	314,436	221,783	75,749	33,017	37,058	3	11
1983	862,631	379,579	294,955	99,174	40,826	48,097	4	1
1984	1,017,488	437,941	332,808	130,417	49,664	66,658	4	6
1985	1,185,675	472,661	402,766	159,383	62,853	88,012	4	11
1986	1,354,275	506,903	467,348	189,995	70,664	119,365	5	3
1987	1,445,366	483,582	526,746	209,160	72,862	153,016	5	9
1988	1,555,208	524,201	552,993	232,453	74,186	171,375	5	9
1989	1,654,660	546,751	578,333	247,428	80,616	201,532	6	0

Fiscal Year	Amount Outstanding, Privately Held	Maturity Class					Average Length ^a	
		Within 1 Year	1 to 5 Years	5 to 10 Years	10 to 20 Years	20 Years and Over	Years	Months
1990	1,841,903	626,297	630,144	267,573	82,713	235,176	6	1
1991	2,113,799	713,778	761,243	280,574	84,900	273,304	6	0
1992	2,363,802	808,705	866,329	295,921	84,706	308,141	5	11
1993	2,562,336	858,135	978,714	306,663	94,345	324,479	5	10
1994	2,719,861	877,932	1,128,322	289,998	88,208	335,401	5	8
1995	2,870,781	1,002,875	1,157,492	290,111	87,297	333,006	5	4
1996	3,011,185	1,058,558	1,212,258	306,643	111,360	322,366	5	3
1997	2,998,846	1,017,913	1,206,993	321,622	154,205	298,113	5	5
1998	2,856,637	940,572	1,105,175	319,331	157,347	334,212	5	10
1999	2,728,011	915,145	962,644	378,163	149,703	322,356	6	0
2000	2,469,152	858,903	791,540	355,382	167,082	296,246	6	2
2001	2,328,302	900,178	650,522	329,247	174,653	273,702	6	1
2002	2,492,821	939,986	802,032	311,176	203,816	235,811	5	6
2003	2,804,092	1,057,049	955,239	351,552	243,755	196,497	5	1
2004	3,145,244	1,127,850	1,150,979	414,728	243,036	208,652	4	11
2005	3,334,411	1,100,783	1,279,646	499,386	281,229	173,367	4	10
2006	3,496,359	1,140,553	1,295,589	589,748	290,733	179,736	4	11
2007	3,634,666	1,176,510	1,309,871	677,905	291,963	178,417	4	10
2008 (May)	4,162,323	1,618,739	1,329,756	718,171	333,602	162,056	4	6

Source: Adapted by CRS from Council of Economic Advisors, *Economic Report of the President*, Washington, GPO, 2008, p. 329; and U.S. Treasury, *Treasury Bulletin*, September 2008, p. 25.

Notes: Through FY1976, the fiscal year was on a July 1—June 30 basis; beginning with October 1976 (FY1977), the fiscal year is on an October 1—September 30 basis. 2008.

a. Treasury inflation-protected securities—notes, first offered in 1997, and bonds, first offered in 1998—are included in the average length calculation from 1997 forward.

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