Now Is *Always* the Best Time to Buy Bonds

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Executive Summary

- Bonds are part of a diversified market portfolio and should be held to some degree by all investors.
- But many investors are hesitant to buy bonds when interest rates are low, fearing that when rates rise they will forgo future income or face capital losses.
- The pure expectations theory states that the current yield curve is an unbiased predictor of future interest rates. In this case, we show that the total return from buying bonds now exactly equals the return expected from buying bonds later.
- The liquidity premium theory states that the current yield curve includes not just expectations of future interest but also an additional return called the liquidity premium. In this case, we show that postponing investment in bonds reduces total return because the investor fails to receive the available liquidity premium.
- This paper elucidates that there is no penalty for investing in bonds even in a rising-rate environment.

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Investors are reluctant to buy bonds in a low-rate environment—that is, when interest rates are low by historical standards. This reluctance is probably due to the belief that an increase in interest rates after buying bonds would lead to a decline in bond prices. This decline would reflect the loss of higher coupon interest that could have been received over the life of the bond by waiting to buy the bonds until after the increase in interest rates. Therefore, investors are tempted to defer bond purchases until after an increase in interest rates. This perspective suggests that investors feel that the increase in future coupon interest received, or avoiding a decline in bond prices, more than outweighs the interest forgone while waiting for rates to increase.

Just such a situation existed recently with the overnight inter-bank Federal Funds rate, which is widely accepted as the Federal Reserve's primary tool for influencing economic activity and other interest rates, at a 46-year low. As recently as March 2004, the Federal Reserve reported, "With inflation quite low and resource use slack, the Committee believes that it can be patient in removing its policy accommodation." The expected increase in the Federal Funds rate was the result of a series of well-communicated and choreographed moves by the Federal Reserve. In May 2004, the Federal Reserve reported, "At this juncture, with inflation low and resource use slack, the Committee believes that policy accommodation can be removed at a pace that is likely to be measured." In June 2004, in announcing an increase in the Federal Funds rate from 1 percent to 1.25 percent, the Federal Reserve reported, "With underlying inflation still expected to be relatively low, the Committee believes that policy accommodation can be removed at a pace that is likely to be measured. Nonetheless, the Committee will respond to changes in economic prospects as needed to fulfill its obligation to maintain price stability." Although the Federal Reserve again raised the Federal Funds rate to 1.5 percent in August 2004, 1.75 percent in September 2004, 2 percent in November 2004, and 2.25 percent in December 2004, 2.5 percent in February 2005, 2.75 percent in March 2005, and 3 percent in May 2005, monetary policy continues to be accommodative and interest rates continue to be low by historic standards.

An investor has two basic alternative investment choices for temporarily idle funds while waiting for rates to increase: short-term money market instruments or risky investments in long-term assets such as stock. An investor who desires to maintain a particular asset allocation and portfolio-risk level would need to choose the

first alternative—investing in short-term money market instruments, since the second alternative changes portfolio-risk characteristics.

This paper reasserts the obvious but often forgotten conclusion that if one accepts the pure-expectations hypothesis, the yield from an *m* period investment rolled over into an n period investment is equivalent to the yield from a *k* period (where $k = m + n$) investment. In this case, we demonstrate that investing short term now and buying bonds later is equivalent to buying bonds now. There is no advantage to waiting. If one accepts the alternative liquidity premium (biased-expectations) hypothesis, we demonstrate that investing short term now and buying bonds later is inferior to buying bonds now. Thus, an investor who desires to hold bonds as part of a portfolio should buy bonds now, regardless of the current level of interest rates.

Bonds Have a Place in Investor Portfolios

The historic long-term return from stock investments has been higher than returns obtained from bond investments, and an investor who considers expected return as the only investment criterion may choose not to hold any bonds at all in the portfolio. On the other hand, bond prices are less volatile than stock prices, and since the returns on bonds are less than perfectly correlated with the returns on stocks, capital market portfolio theory suggests that bonds offer risk-averse investors the opportunity to generate a steady income stream and provide stability to their portfolio by diversifying across asset classes. Traditionally, financial advisors have suggested that somewhere between 30 and 50 percent of a portfolio's risky assets should consist of bonds in order to arrive at the lowest level of risk for a given expected return. In the portfolio context, now is always the right time to own bonds, because bonds will always be part of the market portfolio.

Despite the theoretical soundness of the portfolio approach to investing, which dictates that investors should diversify their portfolio across all asset classes to arrive at an optimal risk-return trade-off, many investors compartmentalize their investment decisions. They view bonds as suitable for certain people and for certain purposes and at certain times. Bonds are often categorized as "fixed-income securities" because investors believe that bonds offer relative safety of principal and timely coupon interest payments—features that make bonds especially attractive to older investors. While the attraction of the opportunity to "lock in" high periodic interest payments is apparent to most, there is a fairly widespread fear of committing to a future of dismally low interest payments while interest rates are temporarily low. Low interest rates appear to be a problem both in the *accumulation* phase (saving for future consumption) and in the *distribution* phase (consuming the accumulated savings). An investor in the accumulation phase may be uneasy about buying a long-term bond paying a low rate of interest. This discomfort is aggravated by the fear that interest rates may rise after the purchase. This implies that the investor will accumulate less than they would have had they waited. An investor in the distribution phase may be uneasy about buying a long-term bond paying a low rate of interest, which may not meet the investor's consumption needs. This discomfort is aggravated by the fear that bond prices would decrease when interest rates increased, causing the investor to finance current consumption by selling bonds at a loss. In either phase, the uncertainty faced by investors stands in stark juxtaposition to the fixed nature of a bond's payments.

'Fixed-Income' Investments Can Be Risky

While diversification and income constitute the principal reasons to invest in bonds, bond investors also should be aware of the risks associated with bond investments. A bond issuer may face a deteriorating ability to make timely interest and principal payments (credit risk), which may result in a decrease in the prices of bonds issued by that entity. While all corporate bonds suffer some measure of credit risk, the problem is particularly pronounced for noninvestment-grade high-yield or junk bonds. An investor generally can attain an acceptable level of credit risk while investing in corporate bonds diversified across issuers, sectors, and maturities, or by investing in default-risk-free bonds issued by the U.S. Treasury.

A second type of risk is the effect of changes in interest rates (interest rate risk), which consists of two parts—

price risk and reinvestment risk. An increase in interest rates will reduce the price at which the bonds can be sold in the secondary market (price risk). Price risk can be mitigated by ensuring that the bond is matched to the investor's planning horizon. A decrease in interest rates will reduce reinvestment return and reduce the investor's holding period return (reinvestment risk). Reinvestment risk can be mitigated by investing in zero-coupon bonds, thus eliminating concerns about reinvesting periodic coupon payments at the then prevailing rate. An investor also can generally attain an acceptable level of interest rate risk while investing in coupon bonds since price risk and reinvestment risk work in opposite directions, mitigating interest rate risk and immunizing the bond portfolio from interest rate changes.

Bond prices and yields may also be subject to various other risks, and it is possible for a "fixed-income" bond investment to lose value.

How Do Bonds React to Interest Rate Changes?

As *Journal* readers know, there is in general a negative relationship between bond prices and interest rates, but all bonds do not react equally to changes in interest rates. For example, junk bonds are likely to respond more to changes in the issuing company's operating and credit characteristics than to changes in interest rates. Further, when interest rates rise, prices of long-term bonds are expected to fall more than prices of short-term bonds, and prices of bonds that have low coupon payments are expected to fall more than prices of bonds with higher coupon payments. Rising interest rates are not necessarily bad for current investors who do not intend to sell their bonds in the secondary market immediately after the rise in interest rates, but intend to hold them to the target maturity. That's because rising interest rates increase the reinvestment value of the bond's coupon payments. Rising interest rates may not be bad for investors considering new bond investments either, because, as we demonstrate later, the cost of waiting for interest rates to increase may outweigh the benefit.

What Are the Different Bond Investment Strategies?

Bond investment strategies generally seek to reduce the risk associated with interest-rate fluctuations by tailoring the maturity of bonds held in a portfolio. The most popular strategy involves laddering the maturities of bonds within the portfolio. For example, an investor might invest in bonds that mature after two, four, six, eight, and ten years. When the first bond in the sequence matures (and the last bond now has a remaining maturity of eight years) it is reinvested for ten years, thus recreating the same portfolio.

A second strategy involves buying both short and long maturity bonds to create a "barbell" portfolio. For example, an investor might buy bonds with a two-year and ten-year maturity. When the first bond matures, the investor has the option of reconsidering investment options based on interest rate conditions existing at that time. This strategy allows the investor to obtain the benefit of higher coupon interest payments on the long-term bond while retaining the flexibility to reinvest the maturity proceeds of the short-term bond.

Finally, the "bullet" structure is used by investors who seek to create a bond portfolio to finance a defined future financial need. Although this portfolio may have several bonds, all these bonds have the same maturity date, which coincides with the defined financing need.

Duration matching is a sophisticated approach to immunizing the bond portfolio from interest-rate risk. Duration is a measure of the price change caused by changes in interest rate. This approach recognizes that cash flows (coupon payments or serial repayment of principal) may be received before final maturity and suggests that investors should match their desired holding period to the duration of the bond. Then, any decrease (increase) in the price of the bond at the end of their desired holding period would be offset by the higher (lower) reinvestment return on the intermediate cash flows.[1]

Bond funds with various stated objectives (for example, a junk bond fund, municipal bond fund, or intermediate-

term bond fund) are available to investors unable to manage a portfolio of individual bonds. Bond funds provide professional management, liquidity, and instant diversification with a fairly low initial investment, but may not be suitable for investors who seek a defined cash-flow pattern. The perpetual nature of most mutual funds also results in higher interest-rate risk for bond fund investors. If an investor buys a fund that has a duration of ten years and which is consistent with the investor's initial investment horizon, the fund likely will still have duration of ten years next year (as this will be consistent with its charter as a long-term fund), while the investor's desired holding period is down to nine years. Thus, unless the investor actively manages the bond fund investment, the bond fund will expose the investor to additional interest-rate risk over buying individual bonds. Active management of the bond fund by the investor, and active management of bonds in the bond fund by the fund manager, may also trigger unexpected taxable events. Thus, many financial planners may recommend investment in individual bonds rather than bond funds.

Spot (Current) Rates and Forward (Expected) Rates

We have previously discussed the role of bonds as part of an investor's portfolio, the manner in which these investments are generally made, and some of the risks associated with bond investments. We now consider the case of an investor who has a defined investment horizon and desires to hold bonds in the portfolio. We will demonstrate that the investor should buy bonds now, regardless of the current level of interest rates. Specifically, we consider the two leading theories of the term structure (the pure expectations model and the liquidity premium model), and demonstrate that if the pure expectations theory holds, there is no penalty for investing now, regardless of interest rates rising (or falling) in the future. Furthermore, we demonstrate that if the liquidity premium theory holds, postponing investment in bonds reduces the total return because the investor fails to receive the available liquidity premium.

The yield curve is the relationship between time to maturity and yield to maturity on bonds that are similar in all respects except time to maturity. Economists have developed theories to explain the observed shape of the yield curve, and to forecast future interest rates. Interestingly, these theories predict that future interest rates are determined by the current shape of the yield curve. While both the pure expectations and the liquidity premium theories hold that an upward sloping yield curve predicts increased future interest rates, they differ in the magnitude of increase predicted.

The pure expectations theory seeks to explain the relation between short-term and long-term interest rates. The theory assumes that the marginal investor is indifferent between holding a long-term bond and a series of short-term bonds, and postulates that the shape of the term structure (the yield to maturity on bonds that are similar in all respects except time to maturity) is caused by expectations of forward rates (short-term interest rates expected in the future). Thus,

$$(1 + Y_{0,3})^3 = (1 + Y_{0,1})^1 \times (1 + F_{1,2})^1 \times (1 + F_{2,3})^1 \qquad (1)$$

where $Y_{0,3}$ is the current yield to maturity on three-year maturity bonds, $Y_{0,1}$ is the current yield to maturity on one-year maturity bonds, $F_{1,2}$ is the yield expected one year from now on one-year maturity bonds, and $F_{2,3}$ is the yield expected two years from now on one-year maturity bonds.

Long-term bonds have greater interest-rate risk than short-term bonds. Risk-sensitive bond investors will therefore seek a premium for investments in long-term bonds. This premium for surrendering liquidity—the liquidity premium—is an increasing function of maturity, and causes the term structure to be more upward sloping than dictated by the pure expectations hypothesis. Thus,

$$(1 + Y_{0,3})^3 = (1 + Y_{0,1})^1 \times (1 + F_{1,2} + L_2)^1 \times (1 + F_{2,3} + L_3)^1 \quad (2)$$

where L_2 is the liquidity premium on two-year maturity bonds and L_3 is the liquidity premium on three-year maturity bonds. Note that the expectations hypothesis is a special case of the liquidity premium hypothesis when $L_3 = L_2 = 0$.

Support for the pure expectations theory is provided by Froot (1989), who found that the yield curve for long-maturity bonds moves with changes in expected forward rates. Prior observation indicates that the term structure has a bias toward positive slope, which suggests the validity of the liquidity premium hypothesis. Fama and French (1989) and Kiely, Kolari, and Rose (1995) find that a liquidity premium does exist, though it varies over time and does not increase uniformly with maturity. Although available evidence is not sufficiently persuasive to establish any one theory as being totally correct in explaining the term structure (Kidwell et al. 2003, p.139), they do contribute to our understanding of the term structure of interest rates. Since the empirical evidence is mixed on which of the two competing hypotheses better fits the observed data, we present two examples—one consistent with the pure expectations theory and the other consistent with the liquidity premium theory.

The Cost of Waiting for Interest Rates to Rise

Consider, for example, the case of an investor who desires to hold bonds intended to finance an expenditure expected at the end of ten years. For simplicity, we assume that the investor has two choices for the accumulation phase. The investor can buy the ten-year bond now, or the investor can wait for interest rates to increase and then buy the nine-year bond at the end of one year. We also assume that after the bond has been bought, it will be held until the target maturity date and will not be actively traded.

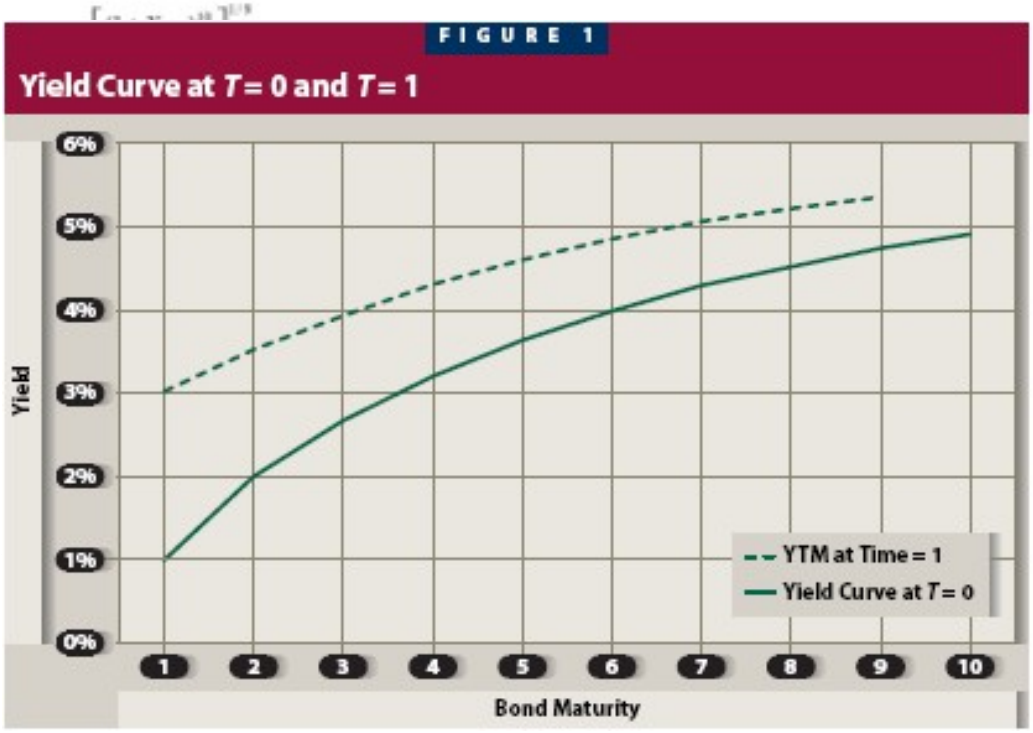
For illustrative purposes, we assume that the term structure at $T = 0$ is defined by the rates presented in column A of Table 1. Table 1 shows that a ten-year bond bought at $T = 0$ and held to maturity will yield the bond investor 4.916052 percent, while a one-year bond bought at $T = 0$ will yield 1 percent. This hypothetical term structure was created to portray an interest rate environment with one-year rates starting at a low $Y_{0,1} = 1$ percent at $T = 0$, and expected to rise to $F_{1,2} = 3$ percent at $T = 1$ and $F_{2,3} = 4$ percent at $T = 2$, and so on.

TABLE 1

Forward Rates Implied by the Pure Expectations Theory

	A	B	D	E
	Your Yield if You Buy Bonds NOW	Forward Rate	Expected YTM Next Year	Your Yield if You Buy Bonds LATER
Bonds Maturing at	YTM at $T=0$	$F_{T-1,T}$	Expected YTM at $T=1$	Combined
$T=1$	1			1
$T=2$	1.995098	3	3	1.995098
$T=3$	2.659067	4	3.498792	2.659067
$T=4$	3.190165	4.8	3.930723	3.190165
$T=5$	3.628394	5.4	4.296111	3.628394
$T=6$	3.987208	5.8	4.595169	3.987208
$T=7$	4.286440	6.1	4.844484	4.286440
$T=8$	4.536034	6.3	5.051188	4.536034
$T=9$	4.741518	6.4	5.218850	4.741518
$T=10$	4.916052	6.5	5.360435	4.916052

Consider the case of a bond investor who initially invests at $T = 0$ in a one-year maturity bond yielding 1 percent and then rolls over the maturity proceeds to invest in a nine-year maturity bond. While the yield expected at $T = 0$ on one-year bonds can be observed directly, the yield expected at $T = 1$ on nine-year bonds is not directly observable. We can, however, use the term structure to make inferences of the forward rate (the bond market consensus of interest rates expected to prevail in the future). Thus, if bonds maturing in ten years ($Y_{0,10}$) have a yield of 4.916052 percent and bonds maturing in one year ($Y_{0,1}$) have a yield of 1 percent, then bond market consensus expected yield on nine-year maturity bonds one year from now ($F_{1,10}$) can be obtained as



ed in column D of Table 1. Note that ercent at $T = 0$ to $F_{1,10} = 5.360435$ $_{10} = 4.916052$ percent) at $T = 0$. But he maturity proceeds rolled over in a ly the same as the yield that the 0. A visual representation of the e scenario) is presented in Figure 1.[2]

One of the criticisms of the pure expectations theory is its assertion that forward rates exclusively represent expected future rates and that the term structure represents the bond market consensus of future short-term rates. But it may be necessary to compensate bond investors for the additional risks associated with holding longer-term bonds. Thus, the yields observed at $T = 0$ may include a "liquidity premium." We therefore consider the effect of a liquidity premium of 0.2 percent a year on the yield available to our hypothetical bond investor.

As before, we assume that the term structure at $T = 0$ is defined by the rates presented in column A of Table 2. Using the formula $(1 + 0.04916052)^{10} = (1 + 0.04741518)^{9}(1 + F_{9,10} + 0.002)$, we obtain the liquidity premium adjusted $F_{9,10} = 6.3\%$. We can now use equation (1) and the series of forward rates presented in column C of Table 2 to derive the term structure expected at $T = 1$. The term structure expected at $T = 1$ is presented in column D. Note that the combined yield to a bond investor who invests in a one-year maturity bond yielding 1 percent and then rolls over the maturity proceeds into a nine-year bond yielding 5.160423 percent is 4.736783 percent, which is lower than the yield of 4.916052 percent, which could have been obtained by investing in bonds at $T = 0$.

TABLE 2

Forward Rates Implied by the Liquidity Premium Theory

	A	B	C	D	E
	Your Yield if You Buy Bonds NOW		Fwd. Rate Adj. for Liquid. Prem.	Expected YTM Next Year	Your Yield if You Buy Bonds LATER
Bonds Maturing at	YTM at $T=0$	$F_{T-1,T}$	Adjusted F	Expected YTM at $T=1$	Combined
$T=1$	1				
$T=2$	1.995098	3	2.8	2.8	1.896025
$T=3$	2.659067	4	3.8	3.298790	2.526771
$T=4$	3.190165	4.8	4.6	3.730718	3.041194
$T=5$	3.628394	5.4	5.2	4.096103	3.469382
$T=6$	3.987208	5.8	5.6	4.395159	3.821476
$T=7$	4.286440	6.1	5.9	4.644473	4.115891
$T=8$	4.536034	6.3	6.1	4.851176	4.361861
$T=9$	4.741518	6.4	6.2	5.018838	4.564518
$T=10$	4.916052	6.5	6.3	5.160423	4.736783

This hypothetical example demonstrates that if the investor has a defined investment horizon, wishes to hold bonds, and believes there is a liquidity premium, then waiting to invest in the bond is a mistake because the investor loses some of the liquidity premium that would be available in a longer-term bond. In other words, now is *always* the best time to buy bonds.

Summary

Bonds are part of the market portfolio and probably should be held to some degree by all investors. Many investors are hesitant to buy bonds when interest rates are low, fearing that when rates rise they will forgo future income or face substantial capital losses. This paper discusses various bond investment strategies and risks and examines the specter of bond investments in a rising-rate scenario. We consider the hypothetical case of an investor with a defined investment horizon who wishes to hold bonds, and demonstrate that if the pure expectations hypothesis holds, there is no penalty for investing now, regardless of rates rising or falling in the future. Furthermore, if the liquidity premium theory holds, then postponing investment in bonds reduces wealth because the investor fails to receive the available liquidity premium.

The results presented here are predicated on the assumption that the bond market anticipates changes in interest rates and incorporates such expectations in bond prices and yields. As a consequence, financial planners would better serve their clients by helping them define their investment time frame and helping them understand the role of bonds in their portfolio, and discouraging speculation on the direction and magnitude of interest rate changes.

Endnotes

1. The duration of any coupon bond is less than its maturity. Although a bond with a duration of ten years will experience a 10 percent price decline for a 1 percent increase in yield to maturity, the coupons that are received can be reinvested at a higher yield to maturity than originally anticipated. The higher reinvestment income is expected to offset the initial price drop at the end of the ten-year duration. See Heck, Zivney, and Modani (1995) for a discussion of measuring bond duration and the impact of interest rates on bond prices.
2. While the level and slope of the yield curve used in the paper are arbitrary, the conclusions are robust to specification. Note that our example is general in that it uses a non-parallel shift in the yield curve.

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