The Cost of Waiting for Interest Rates to Rise

Asset Dedication White Paper Series November 2010

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Executive Summary

Today's interest rate environment presents financial advisors with a conundrum - do I stay on the sidelines and wait for rates to rise before re-allocating my clients' portfolios, or do I jump in now....what are the costs of waiting for rates to rise? We evaluate this question in the context of income-matching portfolios constructed with individual bonds. Income-matching portfolios consist of a series of individual bonds held to maturity whose redemptions and coupon payments provide cash flows that precisely match a client's target income stream. We will compare the income-matching strategy to investing in short duration bond funds, holding cash or buying a CD to show it is better for investors to buy now than wait for rates to rise.

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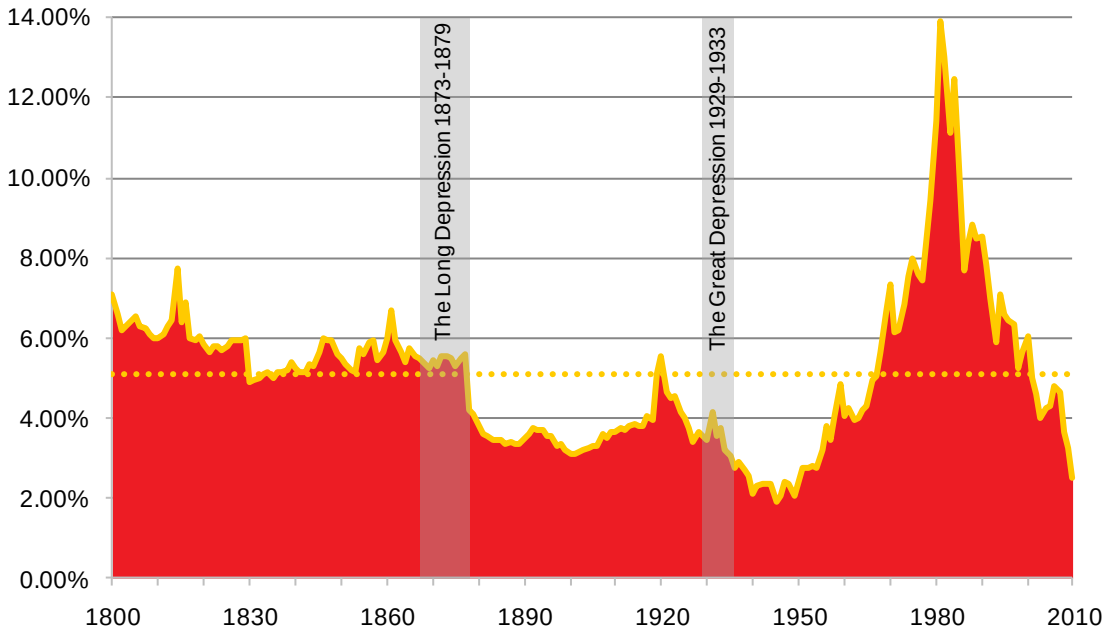
Introduction

Given the current interest environment, the challenge for investors is finding a bond strategy that will work in either a period of rising rates or a prolonged period of low rates, similar to Japan over the last 20 years. This paper first expose the weaknesses of bond funds relative to individual bonds in periods of rising interest rates. Then we present the concept of income-matching using individual bonds as a superior alternative to the total return approach of bond funds whether rates rise or stay flat. Finally, for an investor two years from retirement, we demonstrate the advantage of buying an income-matching portfolio now rather than waiting for rates to rise in short duration bond funds, cash or a 2-year CD.

Economists in the Wall Street Journal's Economic Forecast Survey are among the many who predict rising interest rates in 2011.[1] These predictions are based on the observation that rates have been low recently, both in absolute terms and in relative terms. For example, the federal funds rate is close to zero and the yield on the 10-year Treasury has been below or near 3% compared to its long term average of 5.1%.

There is some question, however, about how quickly rates may rise if we examine the very long run. Figure 1 provides a historical perspective of 10-year Treasury bond yields back to 1800.[2] Two important periods of sustained low interest rates follow periods of severe economic turmoil. The Long Depression (1873-1879) and the Great Depression (1929-1933) both preceded periods of below average yields that lasted two decades or more as the economy struggled to recover. Therefore, we see that low rates by themselves do not necessarily prove that rates will rise immediately.

Figure 1
10-year Treasury Bond Yields, 1800-2009

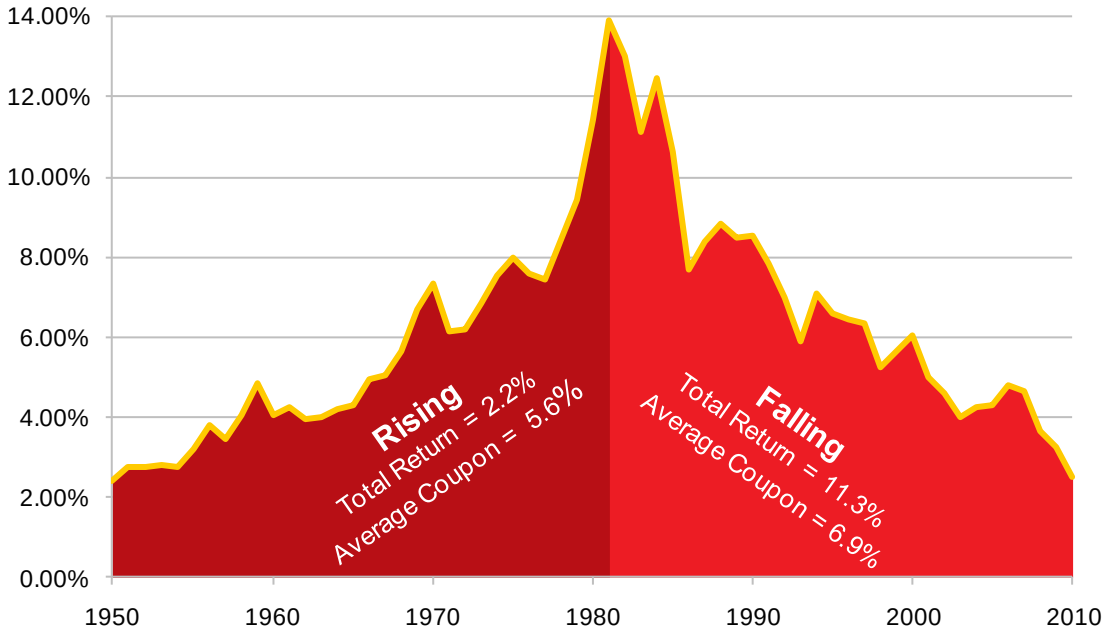


[1] Wall Street Journal Economic Forecast Survey, September 2010; 10-year Treasury bond yield.
[2] United States Treasury 10-year constant maturity yield 1962-2009, Global Financial Data 1800-1962.

Bond Funds in Rising and Falling Rates

There is an obvious interest rate spike in the post-war era that rose to a peak in the early 1980's. A closer view of rates since 1950 is shown in Figure 2. During 1980 to 1984 rates averaged over 12 percent, corresponding to Fed Chairman Paul Volcker's attempts to rein in inflation and President Ronald Reagan's deregulation of the financial services industry. This peak created two distinct periods of interest rates that were profoundly different; a sustained period of rising rates prior to 1981 and a sustained period of falling rates from 1981 until today. These two periods provide interesting insight into the structural differences between individual bonds and bond funds

Figure 2
10-year Treasury Bond Yields, 1950-2010[3]



In the 31-year period of rising rates from 1950 to the peak in 1981, total return for the 10-year Treasury index (used as a proxy for bond funds throughout this paper) averaged 2.2% even though the average coupon over the period was 5.6%.[4] If rates begin to rise again over the next few years, bond fund investors may experience the same disappointing total return. In a recent Wall Street Journal article, Jeremy Siegel and Jeremy Schwartz, noted:

> *"The last time interest rates on Treasury bonds were as low as they are today was in 1955. The subsequent 10-year annual return was 1.9 percent…"*[5]

On the other hand, when rates began to fall following the peak in 1981, the total return for the 10-year index averaged a spectacular 11.3% while the average coupon was 6.9%. In a period of falling rates, total return exceeds the average income for the portfolio. With a sustained

[3] United States Treasury 10-year constant maturity yield 1962-2009, Global Financial Data 1950-1962.
[4] The 10-year Treasury bond index is used as a proxy for bond funds throughout this paper.
[5] "The Great American Bond Bubble," Wall Street Journal, 8/18/2010.

tailwind, it is not surprising that 97 percent of taxable bond funds existing at the end of 2009 started after 1981.[6]

Bonds versus Bond Funds When Rates are Low

Investing in bonds in the current environment is challenging and highlights the unique advantage that individual bonds have over bond funds. First, it is important to understand the distinction between an individual bond and a bond fund. Individual bonds represent legal obligations to pay coupon interest and return principal at maturity. Coupon and principal payments are predictable when a bond is held to maturity. A bond fund, on the other hand, has no such legal obligation. Instead, a bond fund is a pooled portfolio of bonds but without the predictable characteristics offered by individual bonds.

Total return for a bond fund can be decomposed into two parts; *price return* and *income return* (see sidebar on this page). Price return is the appreciation or depreciation of the bonds, usually represented by net asset value (NAV) for a bond fund. Because bond prices are inversely related to yields, when interest rates rise bond prices fall. The fund's total return becomes the blend of negative price return and positive income return. If negative price return outweighs income return then total return is negative. This means that when interest rates are rising, total return for a bond fund will by definition be lower than the yield to maturity of the underlying bonds if they were simply held to maturity. A portfolio of individual bonds held to maturity, on the other hand, is unaffected by the intervening price loss and simply collects the coupon payments and principal when the bonds redeem.

Decomposing Bond Fund Total Return

Total return for a bond fund can be broken down into two components: ***price return*** *and* ***income return****.*

Price return *is the underlying value of the bonds in the portfolio if they were sold. Bond prices are inversely related to interest rates, so bond prices fall as rates rise and rise when rates fall.*

Income return *is the income received from the underlying bonds in the portfolio and is never negative. For portfolios with coupon paying bonds, income return is best measured by the 30-day annualized yield.*

The contrast in total return between the periods of rising rates and falling rates highlight the difference between bond funds and individual bonds. Individual bonds hold the advantage during periods of rising interest rates, but nearly 30 years of falling interest rates have masked the structural differences between individual bonds and bond funds. Since 1981, both individual bond holders and bond fund managers have been investing for total return, selling bonds before maturity. Because the price of a bond goes up as rates fall, the bond is worth more by selling it in the intervening period than by holding it to maturity.

Bond funds generally do not hold bonds to maturity. The average turnover rate for Intermediate and Short-Intermediate Government bond funds is 173%, meaning that the entire portfolio is traded almost two times per year.[7] The challenge is when rates are rising, because total return for a bond fund will always be lower than the yield to maturity on the underlying bonds and, as seen in Figure 3, can even be negative. Individual bonds, on the other hand, can be held to maturity, avoiding recognition of losses and achieving the yield to maturity as a minimum return.

[6] CRSP Survivor-Bias-Free US Mutual Fund Database.
[7] CRSP Survivor-Bias-Free US Mutual Fund Database 2000-2009.

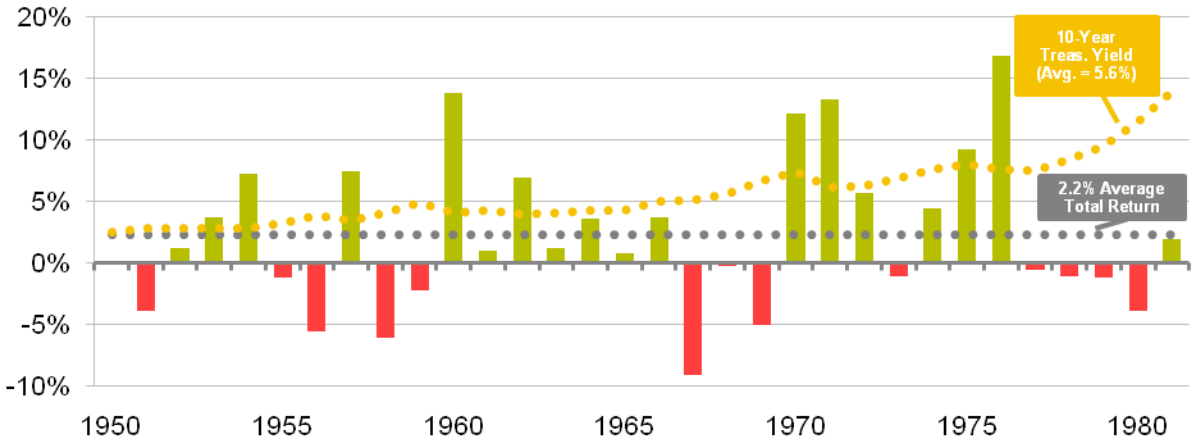
Table 1 shows the impact of rising, flat and falling interest rates environments on the total return of bond funds and individual bonds.

Table 1
Impact of Various Interest Rate Scenarios on Total Return

	Bond Funds	Individual Bonds
Falling Rates	Price Return ↑ Income Return ↓ Total Return > Income Return	Price Return ↑ Income Return ↓ Total Return > Income Return
Flat Rates	Price Return → Income Return → Total Return = Income Return	Price Return → Income Return → Total Return = Income Return
Rising Rates	Price Return ↓ Income Return ↑ Total Return < Income Return	Price Return → Income Return ↑ Total Return = Income Return

When rates rose from 1950 through the peak in 1981, they generated a dramatic negative impact on total return for bond funds. Figure 3 shows that average total return of 2.2% lags the average coupon yield of 5.6%, meaning the drop in price return averaged 3.4% per year. Also note the volatility of the annual returns.

Figure 3
10-year Treasury Bond Yield vs. Total Return 1950-1981[7]



[7] Stocks, Bonds, Bills, and Inflation Yearbook, Ibbotson Associates; United States Treasury 10-year constant maturity yield 1962-2010, Global Financial Data 1950-1962.

Catch-22 for Bond Funds

Bonds with longer maturities will experience a greater price loss when rates rise. A bond's "duration" is the average maturity of all of the payments – coupon interest plus redemption value (see sidebar page 6). Mathematically, it is the weighted average of the lengths of time until the bond's remaining payments are completed and quantifies the relationship between interest rates and bond prices. Duration is equivalent to the concept of "elasticity" used by economists to represent a measure of the sensitivity of bond prices to changes in interest rates. Funds holding bonds of short duration will fall less if rates rise than funds holding bonds with longer durations.

Therefore, conventional wisdom for bond fund investors is to purchase funds with shorter duration when rates are expected to rise in order to lessen the loss in the bonds' market value. But short durations mean giving up significantly higher returns that longer durations offer if rates stay flat over the next few years. In other words, investing in the short end of the yield curve means losing the higher returns offered on the longer end of the yield curve.

For example, if the US experiences a Japan-like prolonged flat interest rate environment, keeping fund duration short will create a significant opportunity cost for investors. Table 2 below shows the difference in yield among iShares Treasury Bond ETFs with different maturity ranges. If rates stay flat, investors buying short, represented by the 1-3 Year fund, are giving up nearly 200 basis points per year to the longer 7-10 Year fund. Over 10 years, the opportunity cost of staying short will be approximately $220 for every $1,000 invested.

Table 2
Comparing Bond Fund Duration and Yield[8]

Fund	Duration	30-Day Yield[9]
Barclays 1-3 Year Treasury Bond Fund	1.84	0.21%
Barclays 3-7 Year Treasury Bond Fund	4.50	1.04%
Barclays 7-10 Year Treasury Bond Fund	7.29	2.20%

Alternatively, if rates rise, the 7-10 Year fund will be subject to greater price loss because of the longer duration. For instance, a 1% rise in rates could cause an annual price loss of approximately 7.3% for the 7-10 Year fund as opposed to 1.8% for the 1-3 year. For a $1,000 investment, the estimated annual net loss for the 7-10 Year fund would be $50.90 compared to $16.30 for the 1-3 Year fund.

Since no one knows which way rates will move, investors need a strategy where they can shift out on the yield curve to take advantage of higher yields if rates stay flat while protecting the value of the cash flows if rates rise. Unfortunately for bond fund investors, they have to pick their poison. Either stay short so they don't get hurt as badly should rates rise and give up yield if rates stay flat, or extend the duration of the portfolio to achieve higher yield and risk greater losses if rates rise. In either case, bond funds expose investors to significant risks when compared to individual bonds.

[8] Data provided by iShares as of 11/9/2010.
[9] The 30-Day SEC Yield is a standardized calculation for comparing bond fund yields.

Income-Matching Bond Strategy

Income-matching is an individual bond strategy that can provide protection against both rising interest rates and the opportunity to achieve higher yields by moving out the yield curve. Investors approaching or in retirement can use individual bonds to create an income-matching portfolio that protects the portfolio cash flows that will replace their paychecks.

Expanding on the simple concept of a bond ladder, income-matching portfolios synchronize coupon and redemption payments to precisely match an investor's target income stream and immunize cash flows from falling bond prices caused by rising interest rates (see sidebar this page). Although the value of the portfolio is subject to intervening price fluctuation, the actual cash flows are predictable and protected.[10]

Bond funds cannot immunize cash flows because they turnover their portfolio instead of holding their bonds to maturity and thus realize losses when rates are rising. Bond fund investors seeking income from their portfolio must take systematic withdrawals from their portfolios in order to generate income. When rates rise and bond fund values fall, investors essentially reverse dollar-cost-average out of their portfolio, exacerbating low or negative total return. Only a portfolio of individual bonds, held to maturity, can protect cash flows from rising rates.

Bond Terminology Defined

Duration *measures the approximate percent change in a bond's value for a one percent change in yield, reflecting a bond's sensitivity to changing interest rates. A bond's price will change roughly by its duration for every 1% change in yield. For example, if interest rates rise 1%, a bond with 4-year duration will lose about 4% in value.*

Immunization *is an investment strategy used to protect bond investments from changes in interest rates by matching the timing of cash flows (coupon payments and redemptions) to an investor's income needs over a specified time horizon.* An *investor can immunize a bond portfolio by holding bonds to maturity, avoiding realized losses during the intervening periods and receiving a known specific rate of return (yield to maturity) regardless of what happens to interest rates.*

Most income-matching portfolios are established for only a portion of retirement. Investors typically maintain a standard stock/bond asset allocation (60/40 for example). However, the fixed income allocation serves a dual purpose. In addition to providing general stability/diversification, the portfolio also provides a predictable, protected cash flow stream over a specified period. The average portfolio time horizon is 10 years of income, although portfolios can be as short as 3 years and can extend beyond 30 years. The portfolio spends down principal each year and must be replenished from stocks and other growth oriented investments to extend the income horizon back out to the original. In what becomes a dynamic rebalancing process, when equity markets are up, stocks are sold to by bonds and extend the horizon. If equities are down, the income-matching portfolio is allowed to spend down a year to ride out bad markets rather than selling stocks at the wrong time to buy more bonds.

Investors approaching but not yet in retirement can defer cash flows to start in the future at their expected retirement date. For example, someone who plans to retire in 2 years and wants an 8-year income horizon could buy bonds maturing in 3 to 10 years. The first would mature at retirement and the others would mature in each of the successive years thereafter for the next 7 years. The time horizon can be extended through dynamic rebalancing as described above.

[10] Assumes investment grade bonds, such as CD.s, agencies, Tips, Treasuries, and/or Strips. For clients seeking munis, only AAA-rated issues would be used to minimize default risk.

Buy Now or Wait?

With interest rates near historical lows, many investors question whether now is a good time to implement an income-matching strategy or if it would be to their advantage to wait until rates are more attractive. If interest rates rise, prices of bonds will fall and the cost of building an income-matching portfolio would be cheaper. We examine three waiting strategies and will show that there is a low probability that any of the waiting strategies will be better than buying now.

We examine the cost of waiting for rates to rise from the perspective on an investor who is transitioning from work to retirement. Once retired, the investor's portfolio will need to generate predictable cash flows that replace his/her paycheck. The following scenario is the base of our analysis:

- Target retirement in 2 years (Jan. 2013)
- Target income stream starting at $100,000 in 2013 plus 3% inflation thereafter
- Cash flow horizon starting at retirement and continuing over the next 8 years (2013-2020)[10]

Listed below are four implementation strategies investors might consider when evaluating the timing decision if they believe rates will rise in between 2011 and 2013.

1. **Buy Now**. Invest in an income-matching portfolio today consisting of bonds with 3-year through 10-year maturities (maturities of 2013 through 2020 timed to deliver cash flows when the investor retires).
2. **Wait in Bond Funds**. Invest for total return in a bond fund for 2 years and purchase an income-matching portfolio in 2013 using 1- to 7-year bonds (maturing in 2014 through 2020). .
3. **Wait in Cash**. Invest in cash for 2 years, then purchase an income-matching portfolio in 2013 using 1- to 7-year bonds. These bonds will mature in 2014 through 2020. Sufficient cash will be set aside to fund 2013 income. **Wait in a CD**. Invest in a 2-year CD maturing in January, 2013, This CD will be held to maturity with the proceeds at redemption used to fund 2013 and buy the 1- to 7-year portfolio for 2014 to 2020.

We will examine each of these options in detail. Note that Strategies 2, 3, and 4 actually require successful market timing in order to pay off. The Wait in Bond Funds strategy proves to be mathematically impossible to pay off because the price loss of the portfolio caused by rising rates outstrips the increase in income return at current rates. The Wait in Cash and Wait in a CD strategies have very low probabilities of paying off for investors.

[10] Note that if the client were already in retirement, the decision would be nearly identical. They could set aside the cost of their entire horizon, covering their 2011 and 2012 expenses with cash and waiting to buy the bonds that would cover the remainder of the horizon (6 years if they planned an 8-year horizon, 8 years if they planned a 10-year horizon to 2020).

Strategy 1 - Buy Now:

For the base scenario described above where the investor is 2 years away from retirement, it costs $770,896 now to buy income-matching portfolio of 3- to 10-year bonds that calibrated to generate income starting in 2013 (Table 3).[11]

The investor is buying income in advance of retirement, shifting out the yield curve as shown by the dark blue arrow in Figure 4. Because the portfolio is immunized, extending the duration of the portfolio allows the investor to take advantage of higher yields further out on the curve while protecting the value of the cash flows. Also notice that the portfolio avoids the very low yields of the short part of the curve. This scenario will serve as the base for evaluating the other strategies.

Table 3

Buy Now Income-Matching Portfolio (Purchased in 2011, Deferred to Start in 2013)

Year	Issue	Maturity	YTM	Cost	Portfolio Cash Flows	Target Cash Flows
2013	CD DISCOVER BK	1/2/2013	1.2%	$64,439	$100,701	$100,000
2014	CD GOLDMAN SACHS BK	3/11/2014	2.0%	$98,801	$103,061	$103,000
2015	CD CAPITAL ONE BK	1/12/2015	2.1%	$113,382	$106,055	$106,090
2016	TENN VALLEY AUTH	1/15/2016	2.1%	$95,132	$109,630	$109,273
2017	FINANCING CORP	2/3/2017	2.5%	$93,471	$112,630	$112,551
2018	FINANCING CORP	2/3/2018	2.7%	$92,063	$115,630	$115,927
2019	RESOLUTION FDG	1/15/2019	2.8%	$92,140	$119,630	$119,405
2020	FED HOME LOAN BK	3/18/2020	3.1%	$121,470	$122,815	$122,987
		Total	**2.2%**	**$770,896**	**$890,152**	**$889,234**

To evaluate the waiting strategies, we need to establish a benchmark. The required income stream can be purchased now for $770,896. What will it cost in 2013? No one can know, but the cost of an identical 8-year income stream right now would be $820,088 (Table 4). The cost is higher because the investment has shifted back down the yield curve to buy bonds with 1- to 7-year maturities (Figure 4).

If we assume no change in the yield curve, then in 2013, the cost will be the same, $820,088. This means that, to make waiting worthwhile, either: 1) rates will have to rise enough to lower the cost of buying this income stream to $770, 896, a drop of $49,192 (6.0%); or 2) the $770,896 will have to earn $49,192 over the two years, which would require a return of 3.1 percent per year.

For the rising rates scenario, we must estimate how changes in interest rates change portfolio values. Economists call this elasticity, financial analysts call it duration. The duration of the $820,088 portfolio is 3.6 years. This means that a 1 percent rise in rates will cause the value of the portfolio to fall by 3.6 percent. Therefore, a decline of 6.0 percent will require a rise in rates of 1.68 percent to make waiting worthwhile.[12]

[11] Quotes based on prices in November, 2010

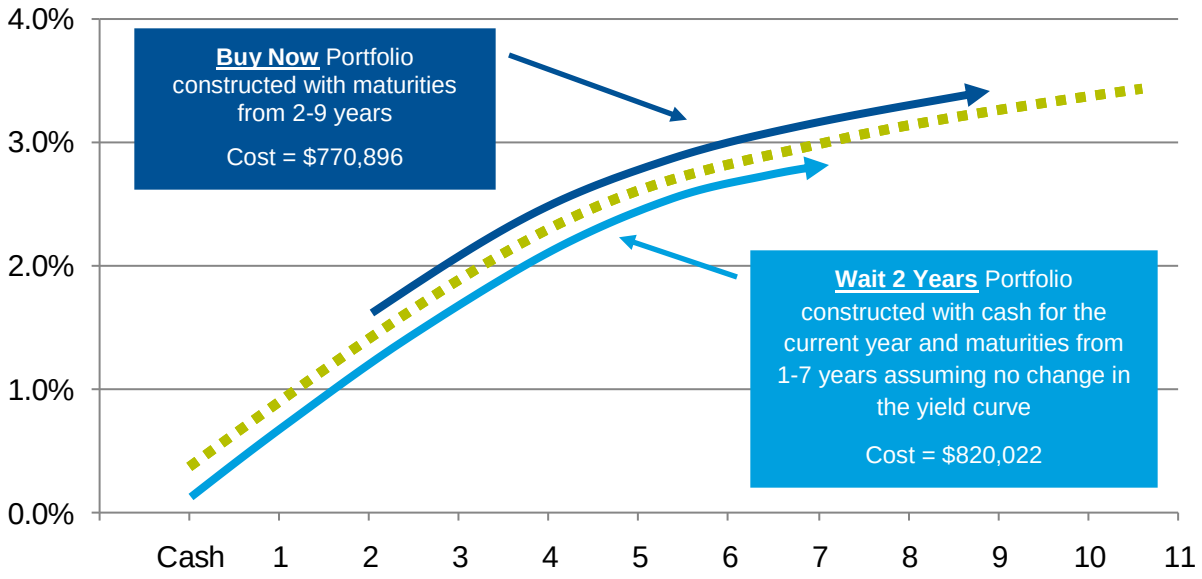
[12] The required rise is calculated from 6.0%/3.6 = 1.68% if rounding error is ignored.

Table 4
Wait 2 Years Income-Matching Portfolio (Purchased in 2013 to Start Immediately)

Year	Issue	Maturity	YTM	Cost	Portfolio Cash Flows	Target Cash Flows
2013	Cash	-	0.075%	$84,517	$100,000	$100,000
2014	CD GOLDMAN SACHS BK	3/11/2014	0.7%	$93,204	$102,974	$103,000
2015	CD CAPITAL ONE BK	1/12/2015	1.2%	$102,028	$105,632	$106,090
2016	TENN VALLEY AUTH	1/15/2016	2.0%	$108,362	$109,069	$109,273
2017	FINANCING CORP	2/3/2017	2.1%	$124,720	$112,668	$112,551
2018	FINANCING CORP	2/3/2018	2.1%	$104,107	$116,000	$115,927
2019	RESOLUTION FDG	1/15/2019	2.5%	$102,046	$119,000	$119,405
2020	FED HOME LOAN BK	3/18/2020	2.7%	$101,105	$123,000	$122,987
		Total	**1.7%**	**$820,088**	**$888,342**	**$889,234**

*Note – assumes no shift in yield curve and identical bonds with identical yields purchased two years later, so maturities would all be two years later than those shown. Cash assumed to be in a money market fund paying .15% per year. Half the funds would be in the account over the year on average, so .075% was used as the first year cash return.

Figure 4
Income-Matching Portfolios at Various Points on the Yield Curve



The reason why the *Buy Now* portfolio now is cheaper should be clear. The 3-year bond (maturing in 2014) in 2011 becomes the 1-year bond in 2013, the 4-year bond becomes the 2-year bond, etc. Assuming no change in the yield curve, the 3 year bond yields more than the 1-year bond and so on, making the overall cost to generate the income now lower than it will be in 2 years. Essentially, buying the portfolio now replaces cash and the 1-year bonds with 8- and 9-year bonds, therefore shifting the portfolio further out on the yield curve and buying the same cash flows at a greater discount (as shown in Figure 4). Note that the *Wait 2 Years* portfolio has cash in the first year because the portfolio needs to support income needs starting in 2013 and therefore needs to be liquid.

Strategy 2: Wait in Bond Funds

Whether rates rise or stay flat, the *Buy Now* strategy is superior to any bond fund strategy. In periods of rising interest rates, the relationship between yield and bond fund prices make it mathematically impossible for an investor to be better off waiting in a bond fund so long as the duration greater than the yield. When the duration is greater than the yield, the price loss caused by rising rates will by definition be greater than the increased yield. Thus, as a bond funds yield begins, its price will fall by a greater amount. One step forward, two steps back.

Additionally, if rates stay flat, bond funds would need to yield 3.1% annually to overcome the $49,000 advantage of the *Buy Now* strategy. As can be seen in Table 2, if rates do not change, then none of the bond funds will earn the requisite 3.1 percent needed to make waiting worthwhile. In the current rate environment, investors would either need to extend the duration of their funds and/or take on credit risk in order to achieve the required yield. If they take on extended duration in a bond fund, investors face even bigger losses if rates end up rising. Credit risk exposes investors to losses regardless of changes in interest rates. In either case, investors increase their uncertainty.

The following analysis reveals the challenges faced by short to intermediate duration bond funds. Short duration funds are less hurt by rising rates, but fall even further short if rates stay flat.

Short Duration Bond Fund

As the earlier analysis showed, a 1-3 year bond fund such as the Barclay's fund with duration of 1.84 years would actually lose 1.84% of its value if rates rise by 1%. If rates rose steadily by 1.68% over two years, it value would drop 3.1%, or 1.55% each year (see Table 5). Its income would be higher but even if it sold all of its current bonds (which are paying .21 percent) at the start of each year and replaced them with new bonds paying 1.05% (.21% + .84%) in Year 1, it would still lose .50% the first year. It would gain .34% the second year (assuming the yield curve remained stable the second year). That means that if the $770,896 were invested in a 1-3 year bond fund, it would end up at $769,710, slightly below where it started at $770,873 by the end of two years.

Therefore, no matter how fast rates rise, the short duration fund comes up short because the fund will lose slightly more than the price of the *Wait 2 Years* portfolio falls. Of the bond fund strategies, the short duration fund comes closest to the other 2 waiting strategies that have small probabilities of paying off. If rates did not rise, of course, then the fund would earn its .21% yield, well below the 3.1% needed for $770.896 to grow to $820.088. Thus, in either a rising rate case or in flat rate case, the *Buy Now* strategy is better than the *Wait in Short Duration Bond Funds* strategy.

Table 5
Effect of a 1.24 percent Rise in Rates Over Two Years
1-3 Year Bond Fund - Duration = 1.84, 30-Day SEC Yield = .21%

	Change in Value	Income Return	Total Return	End of Year Value
Year 1	-1.55%	1.05%	-0.50%	$767,067
Year 2	-1.55%	1.89%	0.34%	$769,710

Short/Intermediate Duration Bond Fund

What if a longer duration bond fund were used to wait? The analysis suggests that the results are even worse. As Table 6 shows, if a 3-7 year bond fund had a duration of 4.5 years, its value would drop by 4.5% for each 1% rise in rates. For a 1.68 percent rise in rates, the fund would drop 7.6% in value. The Barclay's 3-7 year fund was earning only 1.04%, so even a rise of 1.68% is not enough to overcome the decline in value. The portfolio would actually be worth only $748,168 at the end of two years. Buying now would be a better strategy.

Table 6
Effect of a 1.24 percent Rise in Rates Over Two Years
3-7 Year Bond Fund - Duration = 4.5, 30-Day SEC Yield = 1.04%

	Change in Value	Income Return	Total Return	End of Year Value
Year 1	-3.79%	1.88%	-1.91%	$756,211
Year 2	-3.79%	2.72%	-1.06%	$748,168

Intermediate Duration Bond Fund

As the duration of the bond fund extends out further, the picture gets even worse. Drawing again from the Barclay fund example, their 7-10 year Treasury fund has a duration of 7.9 years and an income of 2.20%. The required 1.68% rise in rates over two years would result in a 12.3% drop in value, which would overwhelm the increase in income due to higher rates. Table 7 shows that the value after two years would be only $710,527, a significant loss.

Table 7
Effect of a 1.68 percent Rise in Rates Over Two Years
7-10 Year Bond Fund - Duration = 7.29, 30-Day SEC Yield = 2.20%

	Change in Value	Income Return	Total Return	End of Year Value
Year 1	-6.13%	3.04%	-3.09%	$726,891
Year 2	-6.13%	3.88%	-2.25%	$710,527

Thus, the strategy of waiting in bond funds is likely to be a losing strategy because, if rates stay flat, the funds cannot grow fast enough to overcome the effect of sliding back to a lower portion of the yield curve. On the other hand, if rates rise, they will cause the value of the fund to fall by more than any boost from the increased income might earn. This is truly a Catch-22 of the "new normal" where an environment of low rates undermines the chances of success for traditional responses to rising rates.

Strategy 3 – Wait in Cash:

In order to make it worthwhile to wait in cash, the future cost of the portfolio will need to drop by enough to overcome the initial $49,192 difference. That is, rates will have to rise by enough to cause the future cost to be less than the current cost of the deferred portfolio, $770,896. This slightly overstates the decrease needed because the cash will earn a small return. We will assume money market yields of 15 basis points (.15% per year) over the next two years. This means that the $770,896 will grow to $773,211. That is, the cost the 1- to 7-year bonds in the portfolio in 2013 will have to fall to $773,211(a drop of 5.7 percent) to make the *Wait in Cash* strategy work.

Thus, for a portfolio with duration of 3.6 years to fall this much will require a rise in rates of at least 1.24 percent over the next two years. This much of a rise represents a 71.0 percent in relative terms over the current rate of 1.7 percent. How often have rates risen this fast?

Table 8 shows the results for several spans. If we assume that the probability is equivalent to the historical frequency of occurrence, then even from 1947 to 1981 (the fastest and most prolonged rise since 1800), the rise was rapid enough only about 27.8 percent of the time in absolute terms, 5.2 percent of the time in relative terms.[13] The probability is less for the relative rise because an absolute gain of 1.24% is more likely when rates are high than when they are low.

The primary conclusion to be drawn from Table 8 is that investors are better off to *Buy Now* than to *Wait in Cash*. The odds of successfully timing interest rates are too low to be a good bet. And if rates do not rise, waiting in cash will come up significantly short.

Table 8
Frequency Required Rate Rises
Over Different Historical Periods for Waiting in Cash

Period	Years	Absolute Increase	Relative Increase
Entire span	1927-2009	16.9%	4.7%
Post-War	1947-2009	21.8%	2.9%
Rising Rates	1947-1981	27.8%	5.2%
Recent	1990-2009	11.5%	0.0%

Strategy 4: Wait in a 2-year CD

Strategy 3 is identical to Strategy 2 except a 2-year CD is purchased and held to maturity. As of this writing, a 2-year CD is yielding about 1.2%, low by historical standards but nearly eight times more than the money market return used in Strategy 2. Once the CD matures, the proceeds ($789,977) would be used to provide cash for the first year and purchase an income-matching portfolio for the following 7 years.

Following the same analysis as Strategy 2, the required absolute rise in rates over two years becomes .81 percent, a relative rise to 46.1 percent. Table 9 shows that the probabilities increase correspondingly for all time periods analyzed. The probabilities still lie below the 40 percent level, meaning that even with a 1.2 percent return investors as better off to *Buy Now* than to *Wait in a 2-Year CD*. Again, if rates do not rise, the *Wait in a 2-Year* CD strategy will not grow sufficiently to pay off.

[13] Data for historical yield curves derived from Federal Reserve database: http://www.federalreserve.gov/releases/h15/data.htm ; and Global Financial Data

Table 9

Frequency of Required Rate Rises
Over Different Historical Periods for Waiting in CD

Period	Years	Absolute Increase	Relative Increase
Entire span	1927-2009	26.6%	14.8%
Post-War	1947-2009	31.0%	13.3%
Rising Rates	1947-1981	38.9%	18.3%
Recent	1990-2009	18.9%	0.0%

Conclusion

Initially it may have seemed counterintuitive that investors are better off buying a portfolio of individual bonds in the current low interest rate environment rather than waiting for rates to rise. As it turns out, the probabilities that any of the waiting strategies will pay off for investors are low. In fact, for bond fund investors, current metrics make it mathematically impossible for waiting to be advantageous if the duration of their fund is greater than the yield. Table 10 summarizes the probabilities that rates will rise enough in absolute terms (1.24 percent) to make waiting to buy a 1- to 8-year income matching portfolio a better strategy than buying a 3- to 10-year portfolio now. None of these probabilities rise above 50 percent. Even the best of the waiting strategies, buying a CD and holding it to maturity, still has less than a 40 percent chance of beating the *Buy Now* strategy.

Table 10

Probability That Rates Will Rise Fast Enough in **Absolute** Terms

Strategy	1927-2009	1947-2009	1947-1981	1990-2009
Wait in Funds	0.0%	0.0%	0.0%	0.0%
Wait in Cash	16.9%	21.8%	27.8%	11.5%
Wait in CD	26.6%	31.0%	38.9%	18.9%

Table 11 demonstrates the same conclusion based on relative rises in rates. Relative rise may be a better indicator since the probability of a 1 percent rise when rates are at 10 percent is more likely than when rates are at 2 percent. All probabilities are much lower, revealing that the decision to wait is even more challenging.

Table 11

Probability That Rates Will Rise Enough in **Relative** Terms

Strategy	1927-2009	1947-2009	1947-1981	1990-2009
Wait in Funds	0.0%	0.0%	0.0%	0.0%
Wait in Cash	4.7%	2.9%	5.2%	0.0%
Wait in CD	14.8%	13.3%	18.3%	0.0%

The bottom line of this empirical analysis is that investors who try to play the waiting game for interest rates to rise are gambling on market timing that has a very low chance of paying off. It may well be that rates will rise in the future. But that is not enough. Rates must rise by a sufficient amount to make waiting worthwhile because any waiting strategy will require buying bonds with shorter maturities if the retirement date is fixed. That means the overall rise will have to offset the lower rates that shorter maturities traditionally earn. Historically, the odds of this happening vary depending on which historical period is examined, but in all cases, even during 1947-1981 (when rates were rising faster and higher than at any time since 1800), there is less than a 40 percent probability that even the best waiting would be a better than buying now.

These results confirm what many advisors already know: market timing is a dangerous sport for fixed income as well as for equities.