

Buying the Bond Markets

February 4, 2010

Introduction

In an article from December 2008¹, we reviewed the options available at that time for investing in the U.S. and foreign stock markets through index funds. In a preface to the article, we made the case for putting asset allocation or diversification before individual stock or mutual fund selection. We argued that since the market is efficient at recognizing good companies, it is difficult to discover a stock opportunity that the market has not already found. As a consequence it is impossible to beat the market, to find stocks that will perform better than the market overall.

With over 10,000 mutual funds, closed-end funds, and exchange-traded funds (ETF) registered in the United States as of year-end 2008² and with over 7,000 analyst estimates on the 500 companies that comprise the S&P 500 index, an investor must be bold to think that he or she knows something about a company that the market does not already know. How can an individual investor get an information advantage over so many professionals?

Readers of the *Asset Allocation Advisor* know, however, that we do not subscribe to the efficient market hypothesis, namely, that it is impossible to beat the market because it reflects all the best and most current information available. **It is possible to beat the market.** First, information is not a given, and some analysts and money managers may be better than others at recognizing meaningful trends amidst all the data. Second, markets are not governed by rational analysis of information. Non-rational beliefs—what Keynes called animal spirits—often drive market values, and some analysts may be better at recognizing or anticipating swings in market sentiments.

The problem with beating the market is not that it can't be done, the problem is that most who claim to have done so and even have the numbers to prove it have only been lucky. It takes a long series of better-than-market performance (longer than three or five years) to prove that a manager's performance is not just due to luck.

Investment geniuses exist, we just don't know how to find them without waiting for them to prove themselves with an extended track record, by which time it's too late to take advantage of their genius.

Our forlorn hope of finding reliable investment geniuses is one reason why we believe investors are better served seeking to maximize their returns through smart asset allocation rather than through security or manager/fund selection. Part of the genius of

¹ The article can be found at www.aametrics.com/feature_special.htm.

² See the 2009 Investment Company Fact Book published by the Investment Company Institute and available at www.icifactbook.org.

David Swenson's management of the Yale endowment has been in his team's skill at diversifying the portfolio. Likewise, we think investors should put their energies into choosing the right mix of asset classes to meet their risk and return objectives and then utilize low-cost index funds that aim to replicate the total return on the asset class.

We bring this same approach to investing in the bond market and believe that investors are generally better off buying into the various sectors of the bond market through the use of indexed funds rather than through the purchase of individual bonds or actively managed bond funds – with one notable exception.

Direct Investment Option for U.S. Treasuries

The exception is for investments in U.S. Treasuries. Since investors in Treasuries don't face the risk of Uncle Sam defaulting on the bills, notes, and bonds issued by the United States Treasury, investors don't need to rely on a diversified portfolio of securities across the asset class to manage the risk of default loss – as would be the case for corporate bonds. Investors in Treasuries still face interest rate risk, the risk that bonds will decline in value if rates increase; but with an allocation strategy that includes short-term, intermediate-term, and long-term Treasuries as separate asset classes, investors can manage interest rate risk by balancing the asset classes.

Investors can buy the Treasury asset classes directly by purchasing one, three, six, and twelve month Treasury bills for short-term Treasuries and two, three, five, and seven year notes for intermediate-term Treasuries. For long-term Treasuries, investors have the choice of ten year notes or thirty years bonds purchased directly from the Treasury or bonds with remaining terms of less than thirty years bought on the secondary market. Likewise, investors can buy inflation-indexed Treasuries to participate in the inflation-indexed asset class. Furthermore, since investors can buy Treasuries directly through a Treasury Direct account, investors can avoid fees and brokerage commissions altogether.

Avoiding fees is not the only advantage of buying Treasuries direct. A savvy investor can also tailor its investment strategy for each Treasury asset class to fit its outlook on interest rates. Depending on the likely course of interest rates over the next three to five years (our time horizon for asset allocation purposes), returns are likely to differ between a buy-and-hold strategy and a strategy where securities are bought and sold periodically. An investor buying individual securities can adopt whatever strategy is likely to produce superior returns. A fund indexed to an aggregate bond index will not give an investor this latitude.

On the other hand, investors may choose to utilize indexed funds for investments in Treasury asset classes specifically to avoid having to manage individual securities and having to formulate, implement, and monitor strategies for each Treasury asset class. From this perspective, the modest fees charged by indexed bond funds are worth the expense. In any case, we provide alternatives for each Treasury asset class in what follows.

Bond Market Indices

Before describing some of the alternatives for investing in bond asset classes, a word about bond indices is necessary so that investors understand the benchmarks that indexed funds are working to replicate.

The first bond indices were developed by Kuhn, Loeb in 1973 and became Lehman bond indices when Lehman Brothers acquired Kuhn, Loeb in 1977. Lehman continued to develop additional bond market indices as the bond market expanded and new debt instruments were developed. At the same time, other major broker-dealers such as J.P Morgan, Merrill Lynch, and Citigroup created indices. The Lehman indices, however, were widely regarded as the standard for the bond market. Barclays Capital acquired the bond indexing part of Lehman's business in September 2008 and changed the index names to Barclays Capital Indexes at the start of 2009. Information regarding Barclays Capital indices can be found at www.barcap.com/indices.

A typical bond market index is based on market prices for all of the bonds meeting specific criteria for inclusion in the particular indexed category. The total return version of the index adds the returns realized from interest payments to the returns realized from price changes. Interest payments are typically held in cash and reinvested at the end of each month. Inclusion criteria are set to capture as broad a portion of the market as possible. Ideally, the criteria are set to include all bonds outstanding in a particular category. Readers should note, however, that determining the entire market of all 3-7 year Treasuries is not as straightforward as determining the entire market of all stocks traded on the New York Stock Exchange, for example. Certain simplifying assumptions are employed to deal with bonds that have been stripped into interest-only and principal-only segments or are subject to principal repayments, such as in the case of mortgage-backed securities.

In spite of these difficulties, a bond market index gives an accurate – if not a perfectly precise – measure of the change in the value of the bonds in the market, and a total return index gives an accurate measure of the total return on the bonds. Unlike a stock market index, however, where it is possible, in most cases, to replicate the index by owning shares in each of the constituent companies in proportion to their share of the total market index, it is sometimes not feasible to replicate a bond index, since doing so would require owning some of all of the issues in the index, some of which may not be broadly traded.

The difficulty of matching a bond market index using a sampling strategy means that investors need to pay particular attention to the tracking error between a bond fund's performance and its target index. Although tracking error is also an issue for stock funds, since many stock index funds utilize a full replication strategy, tracking errors tend to be virtually nil. Such is not the case for bond index funds.

Investment Alternatives

The global bond market is approximately \$90 trillion in size, measured by the dollar equivalent value of outstanding debt and is split roughly 70%/30% between domestic bonds (in the local currency and market of the issuer) and international bonds (in one of several global currencies) respectively.

The U.S. bond market is the single largest segment of the global bond market and accounts for more than one-third of global debt issues. As of 30 September 2009, the U.S. bond market was approximately \$35 trillion in size based on the value of debt outstanding – not on market value. The following table shows the composition of the U.S. bond market according to the Securities Industry and Financial Markets Association.

Market Segment	Debt Outstanding (in \$ billions)
U.S. Treasuries (interest bearing marketable public debt only)	\$7,358
Federal Agency	2,824
Total Government (Treasury & Agency)	10,182
Municipal	2,714
Corporate Debt	6,856
Mortgage Related (including GNMA, FNMA, and FHLMC mortgage-backed securities and collateralized mortgage obligations; commercial mortgage-backed securities; and private label mortgaged-backed securities and collateralized mortgage-backed obligations)	9,214
Money Market (including commercial paper, bankers acceptances, and large time deposits)	3,194
Other Asset-backed (including auto, credit card, home equity, student loans and others)	2,484
Total	\$34,644

We include fourteen market sectors in our investment universe. These sectors cover most of the major segments of the U.S. bond market and selected sectors of the international bond market. They are

1. Short-term U.S. Treasuries
2. Intermediate-term U.S. Treasuries
3. Long-term U.S. Treasuries
4. U.S. inflation-indexed bonds or TIPS (Treasury inflation-protected securities)
5. Short-term Governments
6. Intermediate-term Governments
7. Long-term Governments
8. Short-term investment-grade corporate bonds

9. Intermediate-term investment-grade corporate bonds
10. Long-term investment-grade corporate bonds
11. High-yield corporate bonds
12. Mortgage-backed securities
13. Foreign sovereign debt
14. Foreign inflation-protected debt

The chart on the last page of this report shows selected investment options for these sectors as well as options for funds tracking aggregate bond indices. In almost all cases, the options listed are for low-cost index mutual funds or exchange-traded funds (ETFs).

Readers take note that the inclusion of a mutual fund or ETF in this report should not be construed as a recommendation to buy the fund. Investors should read the prospectus for any fund or ETF before buying and should consult with their financial advisor to insure that the fund is appropriate for their portfolio in view of their risk and return objectives and constraints. The funds reported here are a representative selection of those available. Other funds with similar characteristics to those listed may be available. In addition, other funds with different characteristics from those listed may be more suitable to a particular investor's needs and circumstances.

The U.S. Treasury Market

The first four categories are all sectors of the U.S. Treasury market and can be purchased directly from the Treasury through a Treasury-Direct account. For investors who do not want to manage their own portfolio of Treasuries, many options are available.

One word of caution before looking at the options for buying the Treasury markets: investors should be careful to distinguish between Treasury funds, government funds, and broader aggregate bond funds when looking to invest in Treasuries. Some funds allow investments in securities that are not, strictly speaking, Treasury securities but securities of other government agencies. Although the securities of other government agencies (such as debt issued by the Federal Home Loan Bank, the Federal Farm Credit Bank, and the Tennessee Valley Authority among others) carry the full faith and credit of the United States, they are not direct obligations of the U.S. Treasury. Typically they are issued at rates somewhat higher than comparable Treasuries and, for this reason, are utilized by the funds to provide a

yield enhancement relative to a fund strictly restricted to Treasury securities. Likewise, investors may come across other bond funds that invest primarily in government debt obligations (both Treasury and agency) but have the latitude to invest in investment grade corporate bonds or other corporate debt securities. Still other funds, including some index funds, invest across the full range of Treasury, agency, corporate and mortgage-backed bonds and seek to meet (in the case of index funds) or to exceed (in the case of actively managed funds) the return on aggregate bond indices that include more than one sector. Investors should distinguish among these funds and avoid comparisons among them as they are not comparable. From our perspective, aggregate bond funds that mix Treasury or government and corporate bonds should be avoided, as they mix asset classes and make the process of optimizing portfolio allocations and managing target allocations more difficult. Better to make separate investments in each bond sector.

1. Short-term U.S. Treasuries

State Street Global Advisors (SSGA) offers access to the shortest term Treasury securities through its SPDR Barclays Capital 1-3 Month T-Bill exchange-traded fund (symbol BIL). This ETF seeks to match the hypothetical return on the Barclays Capital 1-3 Month U.S. Treasury Bill Index. Expenses on the fund are less than 0.14%. From the fund's inception in November 2007 through year-end 2009, it has returned 1.70% on an annualized basis compared to 1.73% for the index. It follows a full replication strategy. Investors should note that with 1-3 month Treasury bills now returning less than 0.10%, returns on this fund are currently negative. Investors who need to hold a position in this cash-equivalent sector would be better advised right now to purchase the securities through a Treasury direct account and avoid the very modest expense fee on the fund, provided that they do not need the immediate access to their funds that this ETF provides.

BlackRock Fund Advisors offers two iShares ETFs that provide investors with access to broader segments of the short-term U.S. Treasury market. The first is Barclays Short Treasury Bond Fund (symbol SHV), which attempts to produce investment results corresponding to the Barclays Capital U.S. Short Treasury Bond Index. The index measures the performance of the segment of the U.S. Treasury market made of up Treasuries with remaining maturities of between 1 and 12 months. Expenses on the fund are 0.15%, and since its inception in January 2007, fund returns have been 0.11% less than the index on an annualized basis.

The second EFT is the iShares Barclays 1-3 Year Treasury Bond Fund (symbol SHY), which seeks to produce returns comparable to the Barclays Capital U.S. 1-3 Year Treasury Bond Index. As indicated by its name, this index tracks a longer segment of the short-term Treasury market. Expenses on the fund are 0.15%. From its inception in July 2002 to mid-January 2010, it has produced a return 0.12% below the index return on an annualized basis.

A search for low-cost, no-load, short-term government bond funds on Morningstar will return more than 160 different funds. Eliminating the listings of funds offered in multiple classes reduces the list to less than 60. Screening for indexed funds reduces the choices to one, the Fidelity Spartan Short-term Treasury Bond Index Fund (FSBIX). This fund, with an expense ratio of 0.20%, seeks to match the returns on the Barclays Capital U.S. 1-5 Year Treasury Index. Although the fund is listed as a short-term fund, since its benchmark is a 1-5 year index, some might consider it a hybrid short-term/intermediate-term fund.

Vanguard's Short-term Treasury Fund (symbol VFISX for investor shares) is an alternative to Fidelity's FSBIX fund. Although Vanguard's VFISX is not an index fund, it offers a low-cost, no-load alternative. The fund strategy calls for at least 80% of its assets to be invested in Treasury securities with a dollar-weighted average maturity of 1 to 3 years. Expenses are 0.22% for the investor class.

2. Intermediate-term Treasuries

State Street Global Advisors offers the SPDR Barclays Capital Intermediate Term Treasury ETF (symbol ITE) that seeks to track Barclays Intermediate U.S. Treasury Index. Expenses on the fund are 0.13%. The benchmark includes all publicly issued U.S. Treasuries with remaining maturities equal to or greater than 1 year and less than 10 years. The fund follows a full replication strategy.

BlackRock offers two ETFs that track narrower intermediate-term Treasury indices than the 1-10 year index tracked by the SPDR Barclays Capital Intermediate Term Treasury ETF.

The iShares Barclays 3-7 Year Treasury Bond Fund (symbol IEI) seeks to track the Barclays Capital 3-7 Year Treasury Bond Index. Expenses on the fund are 0.15%. The fund's annualized return since its inception in January 2007 has been within 0.14% of the index. The fund uses a representative sampling approach to

track the index and does not necessarily hold all of the securities in the index.

The iShares Barclays 7-10 Year Treasury Bond Fund (symbol IEF) seeks to track the Barclays Capital 7-10 Year Treasury Bond Index. Expenses on the fund are 0.15%. The fund's annualized return since its inception in July 2002 has been within 0.02% of the index. Like the 3-7 Year Fund, this fund uses a representative sampling approach to track the index and does not necessarily hold all of the securities in the index.

Fidelity offers the Spartan Intermediate Treasury Bond Index Fund (symbol FIBIX for investor class shares). This fund aims at replicating the return on the Barclays Capital U.S. 5-10 Year Treasury Bond Index. Expenses are 0.20% for investor class shares. The fund may use statistical sampling techniques to replicate index returns. Since the fund's inception in December 2005 through 31 August 2009, the average annualized return on investor shares has been within 0.27% of the index.

Vanguard's Intermediate-Term Treasury fund (symbol VFITX for investor shares) is not an index fund, but its no load and low cost (expenses of 0.25% for investor shares, less for others) make it a viable alternative to an index fund. It invests at least 80% of assets in Treasury securities and aims at a weighted average maturity between 5 and 10 years. For the three, five and ten year periods ending 31 December 2009, it produced returns within 0.11% of the Barclays Capital U.S. 5-10 Year Treasury Index.

3. Long-term Treasuries

State Street Global Advisors offers the SPDR Barclays Capital Long Term Treasury ETF (symbol TLO) that seeks to track Barclays Capital Long U.S. Treasury Index. Expenses on the fund are 0.135%. The index includes all publicly issued U.S. Treasuries with remaining maturities of 10 or more years. The fund follows a full replication strategy. Since the

fund's inception in May 2007, annualized returns have been within 0.15% of the index.

BlackRock offers two long-term Treasury ETFs. The iShares Barclays 10-20 Year Treasury Bond Fund ETF (symbol TLH) seeks to track the Barclays 10-20 Year Treasury Bond Index. Expenses are 0.15%. Since the fund's inception in January 2007, annualized returns have been virtually identical with index returns. The fund uses a representative sampling approach to replicate index returns.

The iShares Barclays 20+ Treasury Bond Fund EFT (symbol TLT) seeks to track Barclays Capital U.S. 20+ Year Treasury Bond Index. Fund expenses are 0.15%. The fund uses a representative sampling approach to replicate index returns. Since the fund's inception in July 2002, annualized returns have been within 0.08% of the index.

Fidelity offers the Spartan Long-Term Treasury Bond Index Fund (symbol FLBIX for investor class shares). This fund aims at replicating the return on the Barclays Capital U.S. Long Treasury Index. Expenses are 0.20% for investor class shares. The fund may use statistical sampling techniques to replicate index returns. Since the fund's inception in December 2005 through 31 August 2009, the average annualized return on investor shares has been within 0.26% of the index.

Vanguard does not currently offer a traditional long-term Treasury index fund. It does offer a no-load, low-cost fund, the Vanguard Long-Term Treasury Fund (symbol VUSTX for investor shares) which is a viable alternative to an index fund due to its low cost. This fund invests at least 80% of its assets in Treasury securities with an average maturity of 15 to 30 years. Expenses on the fund are 0.25% for investor class shares and 0.12% for admiral class shares, which require a minimum \$100,000 investment. For the three, five, and ten years ending 31 December 2009, returns on investor class shares of the fund have been within 0.26% of the Barclays Capital U. S. Long Treasury Index. For the year ended 31 December 2009,

the return was 0.87% in excess of the benchmark index.

Vanguard also offers a non-traditional long-Treasury index fund that attempts to track the Barclays Capital index for zero-coupon Treasury securities – the Barclays Capital U.S. Treasury STRIPS 20-30 Year Equal Par Index. The Vanguard Extended Duration Treasury Fund is available in both an ETF form (symbol EDV) and a mutual fund form for institutional investors (symbols VEDTX and VEDIX). Expenses on the fund are 0.14% for the ETF, and 0.11% and 0.08% for the institutional share classes.

The underlying securities in the index are Treasury securities that have been stripped into separate interest and principal payments with each component traded separately. Investors buying the stripped security buy a single future payment equivalent to the purchase of a zero-coupon bond. The Treasury STRIPS (Separate Trading of Registered Interest and Principal of Securities) in the index have long-dated maturities, and since they make no interim payments, the duration on the STRIPS is as long as the maturity, making them very rate sensitive. As of 31 December 2009, the fund's average duration was 25.9 years. From the fund's inception in December 2007 through year-end 2009, ETF returns have been within 0.04% of the index on a net asset value basis, and within 0.11% of the index on a market price basis. (See the end note on differences between ETF shares and mutual fund shares for an explanation of the difference between returns on a net asset value basis and a market price basis.)

Other Treasury funds

Two other funds deserve mention. The first is the Columbia U.S. Treasury Index Fund (symbol IUTIX). This is one of the Columbia family of funds, part of Bank of America. Rather than targeting one of the former Lehman (now Barclays Capital) indices, this fund aims to replicate the return on the Citigroup Bond U.S. Treasury Index. Since the index includes all Treasuries with remaining maturities of more

than one year and principal outstanding of more than \$25 million, it is a broad index not targeted to a particular term segment. Expenses on the fund are 0.30%.

The second fund is a PowerShares ETF offered by Invesco. The PowerShares 1-30 Laddered Treasury Portfolio ETF (symbol PLW) is based on the Ryan/Mergent 1-30 Year Treasury Laddered Index. This index measures the return on the U.S. Treasury yield curve as realized by a portfolio of 30 equally weighted positions in Treasury Bonds scheduled to mature in annual sequence over 30 years. From October 2007 through December 2009, the fund returned 6.39% on a net asset value basis before expenses compared to a return of 6.74% for the index. The fund generally follows a full replication strategy. Fund expenses are 0.25%.

4. U.S. Inflation-indexed bonds or TIPS

Treasury-inflation protected securities (TIPS) are a special sector of the U.S. Treasury market not typically included in indices that track the U.S. Treasury market or the broader U.S. Government market. TIPS are Treasury debt securities whose principal and interest are both effectively inflation indexed. They are sold at auction with investors bidding on the rate of interest they wish to receive on the security. The rate on the security – typically between 1% and 3% – is paid on the principal, which is adjusted in value each month according to changes in the consumer price index for all urban consumers. The investor receives an interest payment stream and a final principal payment, therefore, both of which automatically take inflation or deflation into account. However, investors cannot receive less than the original principal thus providing a hedge against deflation.

A number of funds provide access to this sector including, but not limited to, the following.

State Street Global Advisors offer the SPDR Barclays Capital TIPS ETF (symbol IPE). This exchange traded fund seeks to track the Barclays Capital U.S. Government Inflation-Linked Bond

Index, which tracks all publicly issued U.S. inflation-indexed bonds that have at least one year remaining to maturity and an issue size of at least \$500 million. The fund follows a full replication strategy. Expenses on the fund are 0.185%.

BlackRock offers its iShares Barclays TIPS ETF (symbol TIP). This ETF seeks to track the Barclays Capital U.S. Treasury Inflation Protected Securities Index. ETF expenses are 0.20%. Since the fund's inception in December 2003, annualized fund returns have been within 0.16% of index returns. The fund follows a representative sampling approach to replicate index returns.

Vanguard offers a mutual fund of inflation-protected securities (symbol VIPSX for the investor class). Although this fund is not an index fund, it is a no-load, low-cost fund. Expenses for investor class shares are 0.25%. Although the fund began in June 2000, since the Barclays Capital U.S. Treasury Inflation Protected Securities Index is more recent, comparable performance data is not available for the life of the fund. However, for the five years ended 31 December 2009, annualized returns on the fund for investor shares were within 0.27% of the index.

Several other firms offer no-load, low cost inflation-protected bond funds including Dimensional Fund Advisors (DFA Inflation-Protected Securities Portfolio (I), symbol DPISX) and Legg Mason (Western Asset Inflation Indexed Plus Bond Portfolio, symbol WAIIX). The Western Asset fund is only available to institutional clients and requires a minimum \$1 million investment. Fund expenses are 0.25%. The DFA fund is also not generally available to small investors but only to institutional clients, clients of registered financial advisors, clients of financial institutions, and certain other investors. Fund expenses on the DFA fund are 0.15%.

5. Short-term governments

As noted above, government funds are those that include both Treasury securities and securities of federal agencies, the debt of which is guaranteed by the U.S. Although agency debt is highly liquid, Treasury securities are even more liquid, the result of which is that agency debt typically carries yields that are marginally higher than comparable Treasuries. Although the number of actively managed funds providing access to the Government market is relatively large, the number of indexed funds and ETFs is very limited. Vanguard is the only company the *Advisor* is aware of that provides indexed funds across the entire maturity spectrum of the Government bond market. Their offerings and some selected low-cost, no-load funds are described in what follows.

The Vanguard Short-Term Government Bond Index Fund is a relatively new fund, and part of a family of bond sector funds that Vanguard launched in November 2009. It is available in both a mutual fund form (symbol VSBSX and VSBIX for signal and institutional shares respectively) and an ETF form (symbol VGSH). The expense ratio for ETF and signal shares is 0.15%, and 0.09% for institutional shares. The fund attempts to track the performance of the Barclays Capital U.S. 1-3 Year Government Float-adjusted Bond Index, which includes both Treasury and agency issues, along with dollar denominated foreign issues guaranteed by the U.S. The fund uses a sampling strategy to replicate the index performance. The mutual fund shares are effectively available only to institutional clients at present, although individuals may have access to them through an employee benefit plan.

Dimensional Fund Advisors Five-Year Government Portfolio (I) Fund (symbol DFFGX) is not an index fund, but its no load and low cost (expenses of 0.23%) make it a viable alternative to an index fund. The fund invests at least 80% of its assets in U.S. Treasury and Agency obligations that mature within five years. Investors should note that Dimensional Funds Advisors funds are not generally available

to small investors but only to institutional clients, clients of registered financial advisors, clients of financial institutions, and certain other investors.

6. Intermediate-term governments

The Vanguard Intermediate-Term Government Bond Index Fund is another in the family of bond sector funds launched by Vanguard in November 2009. Like the short-term fund, this fund is available in both a mutual fund form (symbol VSIGX and VIIGX for signal and institutional shares respectively) and an ETF form (symbol VGIT). The fund uses a passively managed index sampling approach in seeking to provide returns that track the performance of the Barclays Capital U.S. 3-10 Year Government Bond Index. Expense ratios are 0.15% for both the ETF and the signal shares and 0.09% for institutional shares. Like the mutual fund shares of the Vanguard Short-Term Government Index fund, mutual fund shares of this fund are available only to institutional clients at present.

Dimensional Fund Advisors offers an Intermediate Government Fixed Income Portfolio (I) fund (symbol DFIGX). Although not an index fund, this is a low-cost, no-load fund with the objective “to closely match the composition of its benchmark, the Barclays Capital U.S. Government Bond Index.” It maintains a weighted average maturity of three to ten years. Expenses on the fund are 0.13%. Fund returns have exceeded index returns for the one year, three years and five years ending 31 December 2009. Access to this fund, as for other DFA funds, may be limited to institutional investors.

Federated’s Total Return Government Bond Fund (symbol FTRGX for institutional shares) also deserves mention. This relatively low-cost highly-rated fund has consistently matched or exceeded its benchmark, the Barclays Capital Government Index. However, the fund is not a pure Government bond fund as it also includes mortgage-backed bonds in its holdings. Since mortgage-backed bonds have risk characteristics peculiar to them and significantly different from

traditional coupon bonds, the fund is a hybrid of two different asset classes. Investors utilizing it should be aware of the mix of asset classes.

7. Long-term government bond funds

The Vanguard Long-Term Government Bond Index fund (symbol VLGSX and VLGIX for signal and institutional shares respectively) or ETF (symbol VGLT) is another member of the Vanguard’s family of bond sector funds launched in November 2009. This fund uses a passively managed index sampling approach in seeking to provide returns that track the performance of the Barclays Capital U.S. Long Government Bond Index. Expense ratios are 0.15% for both the ETF and the signal shares and 0.09% for institutional shares. The mutual fund shares are effectively available only to institutional clients at present.

Other government bond funds

Investors who are looking to invest in just the debt securities of U.S. government agencies (in other words, excluding direct Treasury debt), can do so with the iShares Barclays Agency Bond Fund ETF (symbol AGZ). This ETF seeks to replicate the hypothetical returns on the Barclays Capital U.S. Agency Bond Index. The ETF is relatively new with an inception date of 5 November 2008. Fund expenses are 0.20%, and since inception, the returns on the fund have exceeded index returns by 0.31%. The fund uses a representative sampling strategy to replicate index returns.

Corporate bonds

Corporate bonds are the third largest sector of the U.S. bond market after Government bonds and mortgage-related bonds. Although more than 1,000 bond mutual funds exist today, the number of index funds dedicated exclusively to the corporate bond sector is but a hand-full. Many funds concentrate on corporate debt but have the latitude to invest in other sectors and usually do so. Other bond index funds exist, but like the vast majority of actively managed funds which use a Barclays Capital Aggregate Bond

Index as a benchmark, the other index funds are usually pegged to an aggregate bond market index. These indices, in their various forms, are not pure asset class indices as they track the aggregate bond market and mix Treasuries, agencies, corporate bonds, and mortgage-related bonds at a minimum. Such funds are not useful for the investor or portfolio manager trying to optimize the allocation of his portfolio and then manage that allocation, as the shifting allocations in the aggregate bond funds make tracking and rebalancing the portfolio a challenge. The descriptions that follow cover only six index funds. Were it not for new corporate bond sector index funds started by Vanguard and State Street Global Advisors within the last three months, no term-specific corporate bond index fund would be available.

Corporate bond funds fall into two general classes, investment grade and below investment grade, or high-yield. We provide information on index funds for both the investment grade sector and the high-yield sector. In either case, investors could choose to hold individual bonds rather than participate in a pool. Holding individual bonds, however, substantially raises the risk of credit defaults and requires that investors continuously monitor the financial condition of the issuing firms. Although the risk may appear to be manageable for investment grade bonds, one only need be reminded that Enron was investment grade shortly before it declared bankruptcy. In the case of high-yield bonds, owning a diversified pool of bonds significantly reduces the default risk of owning individual issues.

8. Short-term, investment-grade corporate bonds

The Vanguard Short-Term Corporate Bond Index fund is one of the new family of bond sector funds launched by Vanguard in November 2009. It and its intermediate-term and long-term siblings are the only pure term-specific corporate bond index funds known to the *Advisor*. The fund is available in two categories of mutual fund shares (symbol VSTBX for institutional shares, VSCSX for

signal shares) and an ETF (symbol VCSG). The fund seeks to track the performance of the Barclays Capital U.S. 1-5 Year Corporate Bond Index, which is a subset of the Barclays Capital U.S. Aggregate Float Adjusted Bond Index. Expenses are 0.15% for the ETF and signal shares and 0.09% for institutional shares. Mutual fund share purchases do have a purchase fee of 0.25%. The fund employs a sampling strategy in its attempt to match the hypothetical returns on the index. Investors should not confuse this fund with the Vanguard Short-Term Investment Grade Fund, which is an aggregate bond fund benchmarked to an aggregate bond index.

State Street Global Advisors launched the SPDR Barclays Capital Short Term Corporate bond ETF (symbol SCPB) in December 2009. This ETF seeks to track the performance of the Barclays Capital U.S. 1-3 Year Corporate Bond Index. Expenses are 0.125%. The fund employs a sampling strategy in attempting to match index returns.

9. Intermediate-term, investment-grade corporate bonds

The Vanguard Intermediate-Term Corporate Bond Index fund (symbol VICSX for signal shares, VICBX for institutional shares, and VCIT for ETF shares) seeks to track the performance of the Barclays Capital U.S. 5-10 Year Corporate Bond Index. Expenses are 0.15% for the ETF and signal shares and 0.09% for institutional shares. Mutual fund share purchases require a purchase fee of 0.50%. The fund employs a sampling strategy in its attempt to match the hypothetical returns on the index. This fund should not be confused with the Vanguard Intermediate-Term Investment Grade Fund, which is an aggregate bond fund.

10. Long-term, investment-grade corporate bonds

Vanguard Long-Term Corporate Bond Index fund (symbol VLTCX for signal shares, VLCIX for institutional shares, and VCLT for ETF shares) seeks to track the performance of the

Barclays Capital U.S. Long Corporate Bond Index. Expenses are 0.15% for the ETF and signal shares and 0.09% for institutional shares. Mutual fund share purchases require a purchase fee of 1.00%. The fund employs a sampling strategy in its attempt to match the hypothetical returns on the index. This fund should not be confused with the Vanguard Long-Term Investment Grade Fund, which is an aggregate bond fund.

Other Corporate bond funds

In addition to the maturity-specific funds listed below, investors can also access the investment-grade corporate bond market with the following index fund that is not term-specific.

The iShares iBoxx \$ Investment Grade Corporate Bond Fund (symbol LQD) seeks to track the performance of the iBoxx \$ Liquid Investment Grade Index. This index measures the performance of 600 highly liquid, U.S. dollar-denominated investment grade corporate bonds. Fund expenses are 0.15%. Since the fund's inception in July 2002, the average annualized return on the fund has been within 0.30% of the index return. The fund uses a representative sampling strategy to match index returns.

11. High-yield corporate bonds

High-yield bonds are bonds rated below investment grade. They are sometimes referred to as junk bonds. The universe of high-yield bonds is comprised of bonds issued by companies with less than an investment grade rating at time of issue and bonds that were originally investment grade but have been downgraded (also known as "fallen angels"). Academic studies have shown that the yield premium on these bonds is generally more than sufficient to pay for their higher default risk, although the default experience appears to be highly dependent on the state of the economy. The following ETFs and mutual funds provide access to this segment of the corporate bond market.

State Street Global Advisors offers the SPDR Barclays Capital High Yield Bond ETF (symbol JNK). This ETF attempts to replicate the hypothetical returns on the Barclays Capital High Yield Very Liquid Index. This index represents a subset of the entire U.S. high-yield sector, namely, those issues with no more than three years of remaining maturity and with at least \$600 million outstanding. The SSGA ETF was started in November 2007. It uses a sampling strategy to replicate the index performance. Due to the extraordinary turmoil in the high-yield market during the peak of the financial crisis in the last quarter of 2008 and the fund's sampling strategy, fund performance deviated significantly below the index performance. Annualized returns from inception to 31 December 2009 were more than 5.00% less than the index returns. ETF expenses are 0.40%.

BlackRock's iShares iBoxx \$ High Yield Corporate Bond Fund ETF (symbol HYG) seeks to replicate the hypothetical returns on the iBoxx \$ Liquid High Yield Index. The index is produced by International Index Company Limited and is an index of U.S. dollar-denominated, high-yield corporate bonds for sale in the United States and meeting the inclusion rules of the index provider. As of 30 June 2009, the index had 281 constituent bonds. The ETF uses a representative sampling technique in its attempt to replicate index performance. ETF expenses are 0.50%. Annualized returns on the ETF from inception in April 2007 to 31 December 2009 were 0.32% below the index on a market return basis and 0.70% on a fund return basis.

Invesco offers the PowerShares High Yield Corporate Bond Portfolio ETF (symbol PHB). This ETF seeks to replicate the hypothetical returns on the Wachovia High Yield Bond Index. Securities in the index are all SEC registered, dollar-denominated issues selected by Wachovia Capital Markets, LLC according to a defined set of criteria set by Wachovia. Expenses on the ETF are 0.50%. From the fund's inception in November 2007 to 31 December 2009, the fund has underperformed

by index by approximately 4.5%. The fund generally follows a full replication strategy, although it may use a sampling strategy. The divergence of fund returns from the index indicates that the fund was not following a full replication strategy initially.

The lowest cost alternative for investing in the high-yield sector is a Vanguard fund, the Vanguard High-Yield Corporate Fund (VWEHX for investor shares). Fund expenses are 0.32% for investor shares and 0.18% for admiral shares (requiring a minimum \$100,000 investment), although a redemption fee of 1.0% is imposed on shares held for less than one year. This fund is not an indexed fund and attempts to reduce default risk by emphasizing higher credit quality. It also holds a small position (3% of assets) in Treasuries to manage liquidity. The average annual return on investor shares for the three, five and ten years ending on 31 December 2009, has been 2.23%, 2.02% and 1.64% less than the return on the Barclays Capital U.S. Corporate High Yield Bond Index respectively.

12. Mortgage-backed bonds

With securities totaling more the \$9 trillion in outstanding principal, the mortgage-related sector of the U.S. bond market is the second largest sector after the Government sector (Treasury and Agency). Mortgage-related securities come in a wide variety from pools of fixed-rate loans packaged and sold as traditional pass-through mortgage-backed securities (MBSs) by GNMA, FNMA, and FHLMC to the more esoteric private label engineered securities (such as collateralized mortgage obligations) some of which are backed by subprime loans. Fixed-rate agency (GNMA, FNMA, FHLMC) MBSs make up more than half of the outstanding principal in this sector, and the following funds provide access to this traditional and relatively safe part of the mortgage market.

Investors should be aware that mortgage-backed bonds are significantly different from Treasury and corporate bonds if for no other reason than that the cash flow on mortgage-backed bonds includes repayment of principal. Compared to a

Treasury bond with regular interest payments and a final principal payment, the cash flow on mortgage-backed bonds is variable and can be unpredictable, since many factors affect the payment behavior of mortgage holders. Even though the payment of principal and interest is guaranteed with agency MBSs, their complex pattern of cash flows and the resulting valuation uncertainty generally result in market prices that yield a return premium over Treasury securities of a comparable duration.

Investors should also note that MBS funds are often regarded as intermediate-term investments because the cash flow on the securities shortens the weighted average time for the repayment of principal and interest. We report the investment options in the table at the end of this report under the all maturity column. The average maturity and duration on MBSs, however can be much shorter than the conventional 30 year mortgage. The average maturity on the Barclays Capital U.S. GNMA Index was 6.3 years as of 31 December 2009, and its average duration was 3.8 years.

State Street Global Advisors' SPDR Barclays Capital Mortgage Backed Bond ETF is an index fund that attempts to replicate the hypothetical returns on the Barclays Capital U.S. MBS Index. The index covers agency pass-through MBSs of fixed-rate mortgages and hybrid adjustable-rate mortgages during their initial fixed-rate period. Nearly two-thirds of the underlying loans in the index are conventional thirty-year, fixed-rate loans, with the remainder being shorter term loans. ETF operating expenses are 0.20%. The fund follows a sampling strategy in its attempt to replicate index returns. The fund was established in January 2009. Through 31 December 2009, fund returns were within 0.29% of the hypothetical index returns.

The iShares Barclays MBS Bond Fund (symbol MBB) is another alternative that targets the hypothetical returns on the Barclays Capital U.S. MBS Index. This is a somewhat older fund than the SPDR fund. It was started in March 2007. Fund expenses are 0.34%. From inception to 30 January 2010, the average annualized return on

the fund has been 0.66% less than the hypothetical index return. The fund uses a representative sampling strategy in its attempt to replicate index returns.

Vanguard offers two no-load, low-cost funds that provide access to the mortgage-backed bond market. The first is another of the family of bond sector index funds Vanguard launched in November 2009. The Vanguard Mortgage-Backed Securities Index is an index fund that seeks to track the hypothetical return on the Barclays Capital U.S. MBS Index. The fund is available in both an ETF form (symbol VMBS) and in two classes of mutual fund shares (symbols VMBSX and VMBIX for signal and institutional shares respectively). The minimum investment amounts for the mutual fund shares effectively restrict these shares to institutional investors. Individual investors, however, can invest through the ETF. Expenses on the fund are 0.15% for the ETF and signal class shares and 0.09% for the institutional class shares. The fund uses a sampling technique to match index returns.

Vanguard also offers a fund restricted to GNMA MBSs. The Vanguard GNMA fund (symbol VFIIX for investor share class) is a well established fund started in 1980. Although it is not an index fund, its low cost makes it a viable alternative to an index fund. Expenses are 0.23% for investor shares and 0.13% for admiral shares, which require a minimum \$100,000 investment. Average annual fund returns for the one year, three years, five years, and ten years ending 31 December 2009 were within 0.24% of the Barclays Capital U.S. GNMA Bond Index.

13. Foreign sovereign bonds

Foreign sovereign bonds give investors exposure to the credit risk associated with foreign government debt as well as to the dynamics of foreign interest rates. Investors may also get exposure to foreign currencies depending on whether the particular fund includes non-dollar denominated bonds and whether the fund hedges currency risk. The following funds cover a

range of foreign sovereign debt – including emerging market debt.

Two different ETFs provide access to short-term international sovereign bonds. The SPDR Barclays Capital Short Term International Treasury Bond ETF (symbol BWZ) is a fund that seeks to replicate the hypothetical return on the Barclays Capital 1-3 Year Global Treasury ex-U.S. Capped Index. The index measures the performance of short-term, fixed-rate local currency sovereign debt of investment-grade countries other than the United States. Fund expenses are 0.35%. From the fund's inception in January 2009 through 31 December 2009, the annualized return on the fund on a net asset value basis has been within 0.63% of the hypothetical index return. On a market value basis, the fund return exceeded the index return by 0.05%. The fund follows a sampling strategy. As of 31 December 2009, the largest positions in the fund were, in declining order, in the sovereign debt of Japan, Germany, Italy, the United Kingdom, Spain, France, South Korea, Canada, Netherlands, and Greece. The fund does not appear to hedge currency risk.

iShares S&P/Citigroup 1-3 Year International Treasury Bond Fund (symbol ISHG) is an ETF that also provides access to short-term international sovereign bonds. The index measures the performance of developed market local currency sovereign bonds with remaining maturities of more than one year and less than or equal to three years. Fund expenses are 0.35%. From the fund's inception in January 2009 through 31 December 2009, the annualized return on the fund on a net asset value basis has been within 0.65% of the hypothetical index return. The fund uses a representative sampling strategy in its attempt to match index performance. As of 31 December 2009 the largest holdings of the fund were, in declining order, in the sovereign debt of Japan, Germany, Italy, France, the United Kingdom, Canada, Greece, Belgium and Spain. The fund does not appear to hedge currency risk.

Exposure to the broader maturity spectrum of foreign sovereign debt is provided by the following funds.

The SPDR Barclays Capital International Treasury Bond ETF (symbol BWX) seeks to replicate the return performance of the Barclays Capital Global Treasury Ex-U.S. Capped Index. The index tracks the fixed-rate local currency sovereign debt of investment grade countries other than the United States. Issues must have a remaining maturity of at least one year to be included in the index. Expenses on the fund are 0.50%. From the fund's inception in October 2007 to 31 December 2009, the average annualized return on the fund has been approximately 1.2% below the hypothetical index return. The fund follows a sampling strategy. As of 31 December 2009, the largest positions in the fund were, in declining order, in the sovereign debt of Japan, Italy, Germany, Belgium, the United Kingdom, France, Spain, Canada, the Netherlands, Greece, Austria, and Poland. The fund does not appear to hedge currency risk.

iShares S&P/Citigroup International Treasury Bond Fund (symbol IGOV) is an ETF that seeks to replicate the return performance of the S&P/Citigroup International Treasury Bond Index. The index measures the performance of developed market local currency sovereign bonds with remaining maturities of more than one year. Fund expenses are 0.35%. From the fund's inception in January 2009 through 31 December 2009, the annualized return on the fund on a net asset value basis has been within 0.81% of the hypothetical index return. The fund uses a representative sampling strategy in its attempt to match index performance. As of 31 December 2009 the largest holdings of the fund were, in declining order, in the sovereign debt of Japan, Germany, Italy, France, Canada, Spain, Belgium, the United Kingdom, and the Netherlands. The fund does not appear to hedge currency risk.

The following funds provide access to emerging market sovereign debt.

iShares JPMorgan USD Emerging Market Bond Fund (symbol EMB) seeks to replicate the return performance of the JPMorgan EMBI Global Core Index. The index tracks the return performance of actively traded, U.S. dollar denominated debt issued by emerging market countries. Debt issues must have a face amount of \$1 billion or more, have at least two years until maturity, and meet other criteria in terms of trading and clearing. As of 31 May 2009, twenty-seven (27) countries were included in the index. As of 29 January 2010, approximately half of the issues were below investment grade. Expenses on the iShares ETF are 0.60%. The fund uses a representative sampling strategy in its attempt to match index returns. From the fund's inception in December 2007 through 31 December 2009, the average annualized return on the fund has been within 0.76% of the hypothetical index return. Since the fund invests in U.S. dollar denominated debt, currency hedging is moot.

PowerShares Emerging Markets Sovereign Debt Portfolio (symbol PCY) seeks to match the return on the DB Emerging Market USD Liquid Balanced Index. The index measures the returns on a hypothetical portfolio of U.S. dollar denominated government bonds issued by emerging market countries. Debt issues must have more than three years to maturity and have an outstanding float of at least \$500 million. Zero to three securities are selected from each country by Deutsche Bank Securities Inc. for inclusion in the index. More than twenty countries are represented in the index. ETF operating expenses are 0.50%. The fund generally utilizes a full replication strategy in attempting to match the index return. From the fund's inception in October 2007 to 31 December 2009, the average annualized return on the fund on a net asset value basis was 1.45% below the hypothetical index return. As for the iShares emerging market fund, since this fund invests only in U.S. dollar-denominated issues, currency hedging is moot.

14. International Inflation-protected bonds

Unlike foreign sovereign debt funds that provide exposure to traditional coupon bonds, international inflation-protected bond funds provide exposure to the international equivalent of U.S. TIPS. In fact, inflation-protected securities were being issued by foreign governments well before the U.S. Treasury started issuing them in 1997. Britain began issuing inflation-linked bonds in 1981. Inflation-indexed debt has been issued by more than a dozen countries including both major developed countries and emerging market countries. As of 2008, the world wide market for inflation-indexed bonds had a value of approximately \$1.5 trillion, including the U.S. portion at approximately \$500 billion.

As of January 2010, the *Advisor* was aware of only one indexed fund that tracked the international inflation-indexed bond market. This is State Street Global Advisors' SPDR DB International Government Inflation-Protected Bond ETF (WIP). This ETF seeks to provide returns comparable to the Deutsche Bank Global Government ex-US Inflation-Linked Bond Capped Index. The index measures the total

return on the inflation-linked government debt securities of Australia, Brazil, Canada, Chile, France, Germany, Greece, Israel, Italy, Japan, Mexico, Poland, South Africa, South Korea, Sweden, Turkey, Uruguay, and the United Kingdom. Securities included in the index must meet certain minimum size requirements and have a remaining maturity of at least one year.

The fund is passively managed and uses a sampling approach to replicate index returns. Expenses on the fund are 0.50%. Since the fund's inception in March of 2008 through year-end 2009, annualized returns on the fund have been 0.82% below the index on a net asset value basis and 0.72% below on a market value basis.

Aggregate Bond Funds

We do not recommend the use of aggregate bond funds, as the funds mix asset classes and make tracking and managing target asset allocations more challenging. The chart at the end of this report lists a number of index mutual funds and ETFs that attempt to replicate the hypothetical return performance of an aggregate bond index. They are provided without description.

A Final Note on ETFs versus mutual funds

Investors and portfolio managers may get the impression from this report that mutual funds and exchange traded funds are just two sides of the same coin and are essentially interchangeable. This impression can be reinforced by some mutual fund companies that provide funds in both a conventional mutual fund form and an ETF. The two are not identical, however, and investors should be aware of the differences between the two.

The first and most obvious difference is that investing in a mutual fund typically involves opening an account with the mutual fund company. Some firms will allow an investor access to another firm's mutual funds, but this is by no means a universal practice. Investing in an ETF, by contrast just requires the execution of a purchase order through a brokerage account. Investors will pay brokerage commissions on the transaction. Acquisition of the ETF shares will likely involve a transaction fee, therefore, whereas acquisition of the mutual fund shares will not.

The second major difference is that ETF shares can carry a market price that diverges from the net asset value of the shares. An investor selling his or her ETF shares, therefore, might realize a different return from an investor redeeming an identical number of mutual fund shares.

Conversely, an investor acquiring shares might pay a different amount before commissions for ETF shares than mutual fund shares.

The difference between the market value of ETF shares and their net asset value stems from the mechanism employed by fund companies to issue and redeem ETF shares. ETF shares are issued and redeemed in blocks known as creation units. Creation units vary in size from 10,000 to 600,000 shares. ETF shares are created when a market maker or large institutional investor provides the underlying securities that make up the shares in a creation unit. If the market price of the ETF shares exceeds the net asset value of the securities that constitute the fund, it makes sense for the market maker to buy the underlying securities, form a creation unit, and sell the ETF shares. Conversely, if the price of the ETF shares falls below the net asset value of the underlying securities, it makes sense for the market maker to buy enough ETF shares to constitute a creation unit and then redeem the ETF shares by trading them for the constituent securities and selling them. The arbitrage opportunities prevent the market value of the ETF from varying widely from the net asset value of the ETF, but the mechanism does result in variations over time between the market price of ETF shares and their net asset value. This variation also accounts for the difference in returns on a net asset value basis and a market price basis.

Albert J. Brenner, CFA

Selected Investment Options for Bond Market Sectors
Company and ticker symbol by Bond Sector and Term

	Short-term	Intermediate-term	Long-term	All maturities
Treasuries	SPDR BIL (1-3 month), iShares SHV (1-12 month), iShares SHY (1-3 year), Vanguard VFISX (1-3 year), Fidelity FSBIX (1-5 year)	SPDR ITE (1-10 year) iShares IEI (3-7 year) iShares IEF (7-10 year) Vanguard VFITX (5-10 year) Fidelity FIBIX	SPDR TLO (> 10 years) iShares TLH (10-20 year) iShares TLT (20+ year) Vanguard VUSTX (15-30 year) Fidelity FLBIX Vanguard EDV	Columbia IUTIX Power Shares PLW
Inflation-protected Treasuries (TIPS)				SPDR IPE iShares TIP Vanguard VIPSX
Government (Treasury ex-TIPS & Agency)	Vanguard VGSH (1-3 year) Dimensional Fund Advisors DFIGX (1-5 year) Wisdom Tree USY Power Shares PLK	Vanguard VGIT Dimensional Fund Advisors (DFIGX)	Vanguard VGLT	iShares AGZ
Corporate (investment grade)	SPDR SCPB (1-3 year) Vanguard VCSH (1-5 year)	Vanguard VCIT (5-10 year)	Vanguard VCLT (> 10 year)	SPDR LAG iShares LQD iShares CFT
High-yield (below investment-grade corporate)	SPDR JNK			iShares HYG PowerShares PHB Vanguard VWEHX
Mortgage-backed				iShares MBB SPDR MBG Vanguard VMBSX or VMBS (all agency) Vanguard VFIIX (GNMA only)
Foreign Sovereign	iShares ISHG SPDR BWZ			iShares IGOV (intl treasury) iShares EMB (emerging mkt) SPDR BWX
International inflation protected				SPDR WIP
Aggregate	iShares CSJ (1-3 year) Vanguard VBISX or BSV Vanguard VFSTX	SPDR ITR, iShares CIU, iShares GVI Vanguard VBIIIX or BIV Vanguard VBMFX or BND Vanguard VFICX	SPDR LWC iShares CLY, iShares GLI Vanguard VBLTX or BLV Vanguard VWESX	SPDR LAG iShares CFT, iShares ACG iShares GBF