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Unconstrained Bond Funds: A Closer Look

In the aftermath of the global financial crisis of 2007-2008, one noticeable trend in fixed income investment is the growth and popularity of unconstrained bond funds. These funds have generated strong interest in the investment community due to their unique mandate and the opaque nature of the investment strategies associated with them. Because they are not managed against a specific benchmark, unconstrained bond funds can also pose potential challenges for measuring and understanding their performance.

In this paper, we provide an overview of unconstrained bond funds, assess their past performance, and analyze the investment strategies associated with them.

Unconstrained bond funds can also pose potential challenges for measuring and understanding their performance.

EXECUTIVE SUMMARY

- An unconstrained bond fund can invest in a wide range of debt instruments in terms of sector, country, or currency, without duration constraints. It is not designed to track a specific benchmark, has less stringent or no limits on duration and sector exposure, and can use derivatives.
- We adopted the Morningstar fund category of "U.S. OE Nontraditional Bonds." Morningstar defines this category as containing funds "that pursue strategies divergent in one or more ways from conventional practice in the broader bond-fund universe." Within this fund category, we further excluded those funds with mandates in specific sectors or duration constraints to construct the sample data set. [1]
- Unconstrained bond funds have witnessed strong growth since the global financial crisis of 2007-2008. They have grown from 19 funds with assets under management (AUM) of USD 9 billion in 2008, to 122 funds with AUM of USD 140 billion as of November 2015.
- Unconstrained bond funds have collectively demonstrated strong correlation to global bonds and less return per unit of risk than core U.S. fixed income. However, they tend to have better downside protection.
- Traditional style analysis of unconstrained bond funds has shown persistently high levels of cash allocation since 2011. In recent years,

[1] Morningstar. The Morningstar Category Classifications. April 30, 2014.

funds have increased allocation to cash and emerging market bonds at the expense of U.S. bonds.

- Principal Component Analysis (PCA) on fund returns finds that three independent factors collectively explain 69% of the variation of fund returns, with each of them explaining 54%, 8%, and 7%, respectively. The regression of sector returns versus factor returns indicates that the first Principal Component (PC1) represents the systematic force that drives returns of spread products; e.g., U.S. high-yield and emerging market bonds.
- In recent years, the main investment strategy associated with this type of fund appears to be allocating to cash and spread products that have lower correlation to U.S. high-grade fixed income in order to reduce duration exposure. By doing so, the performance history of unconstrained bond funds exhibits lower correlation to core U.S. fixed income, with increasing correlation to the global fixed income market.

THE LANDSCAPE OF UNCONSTRAINED BOND FUNDS

The Economic Backdrop of a Surging Popularity

As the U.S. economy continues to recover and the Fed starts to increase interest rates, many market participants may be concerned about holding core fixed income products with high interest-rate risk in a rising-rate environment.

The global financial crisis of 2007-2008 and the economic recession that followed prompted unprecedented quantitative easing monetary policies across many countries. Not only were short-term interest rates lowered to either zero or negative territory, but quantitative easing was also adopted in places such as the U.S., the U.K., the eurozone, and Japan to flatten the yield curve and keep long-term interest rates low. As the U.S. economy continues to recover and the Fed starts to increase interest rates, many market participants may be concerned about holding core fixed income products with high interest-rate risk in a rising-rate environment. It is this market sentiment that has driven the surging popularity of unconstrained bond funds, which can offer wide latitude to fund managers on duration management and investment selection.

What Is an Unconstrained Bond Fund?

An unconstrained bond fund can invest in a wide range of debt instruments in terms of sector, country, or currency, without duration constraints. It is not designed to track a specific benchmark, has less stringent or no limits on duration exposure, and seeks total return from U.S. and non-U.S. fixed income products across sectors.

An unconstrained bond fund has the freedom to bet against bonds as well as to invest in them. It can directly express views on currencies, too. The potential appeal of an unconstrained bond fund lies in its flexibility of duration management and the broad investment universe, including U.S., non-U.S., developed, and emerging fixed income markets, as well as currencies. As unconstrained bond funds may broaden the opportunity sets available to fund managers, they may also present potential challenges for

market participants seeking to anticipate and measure performance. In this paper, we analyze data of unconstrained bond funds to assess historical performance, and more importantly, to gain an understanding of the investment strategies and styles associated with them.

Fund Data

We obtained monthly return data from Morningstar, Inc. for funds categorized as "U.S. OE Nontraditional Bonds." Morningstar defines this category as containing funds "that pursue strategies divergent in one or more ways from conventional practice in the broader bond-fund universe." In its definition, Morningstar further elaborates on including "absolute return portfolios" and "unconstrained portfolios" by self-description, along with those attempting to "minimize volatility by maintaining short or ultra-short duration portfolios." Within this fund category, we further excluded those funds with mandates in specific sectors or duration constraints to construct the sample data set.[2]

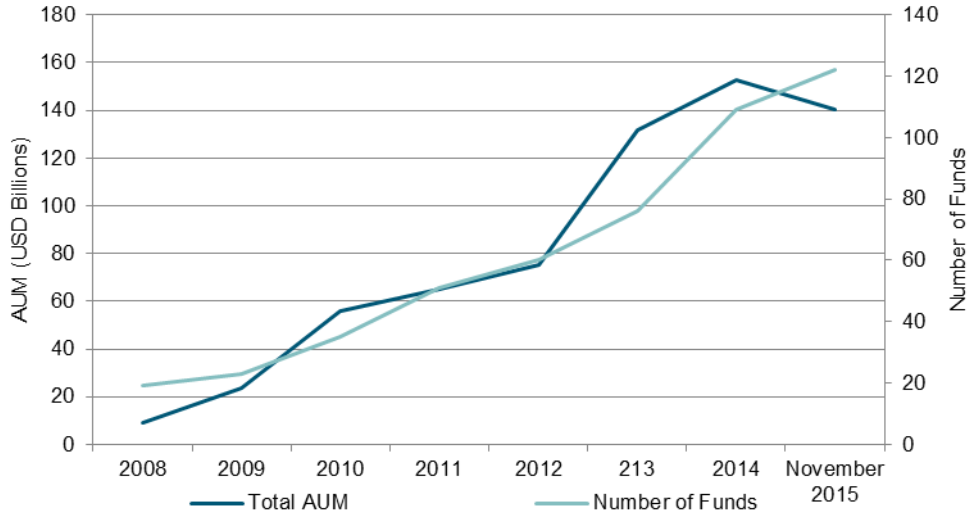
Growth of Unconstrained Bond Funds

It was not until after the global financial crisis of 2007-2008 that unconstrained bond funds started gaining traction among investors.

As of November 2015, there were 122 open-ended mutual funds with total AUM of USD 140 billion in our data set, in comparison with 19 funds with AUM of USD 9 billion as of the end of 2008 (see Exhibit 1). Even though the first fund started in 1969, it was not until after the global financial crisis of 2007-2008 that unconstrained bond funds started gaining traction among investors. As of November 2015, 34 of the 122 existing funds were incepted before the end of 2010, representing 78% of total AUM in this strategy. This is in comparison with 24 funds that were incepted before the end of 2009, representing 60% of total AUM (see Exhibit 2). To balance the need for a reasonably long performance history and to cover the universe that is representative of currently existing funds, we chose the analysis period of January 2011 to November 2015. We analyzed unconstrained bond funds using equal-weighted average monthly returns over the analysis period (the average fund).

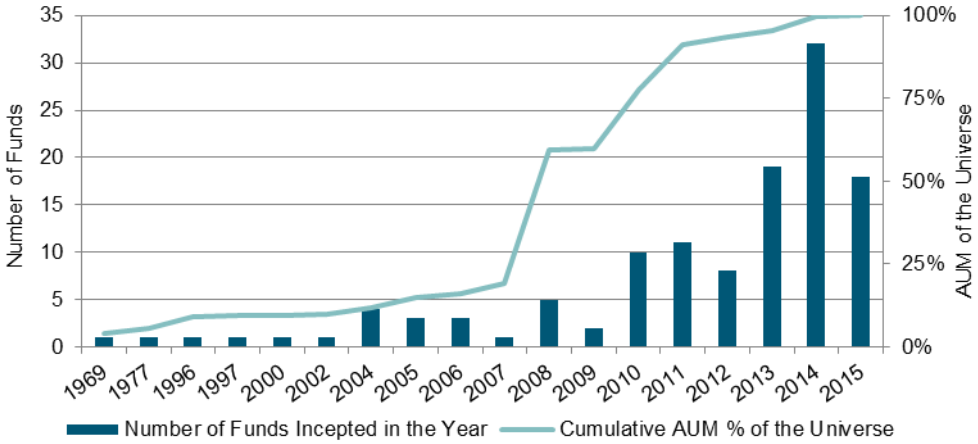
[2] Morningstar. The Morningstar Category Classifications. April 30, 2014.

Exhibit 1: Growth of Unconstrained Bond Funds



Source: Morningstar, S&P Dow Jones Indices LLC. Data as of November 2015. Chart is provided for illustrative purposes.

Exhibit 2: Unconstrained Bond Funds Universe



Source: Morningstar, S&P Dow Jones Indices LLC. Data as of November 2015. Chart is provided for illustrative purposes.

Most unconstrained bond funds claim to offer low correlation to core fixed income, attractive risk-adjusted returns, and active downside risk mitigation.

PERFORMANCE

Most unconstrained bond funds claim to offer the following potential benefits:

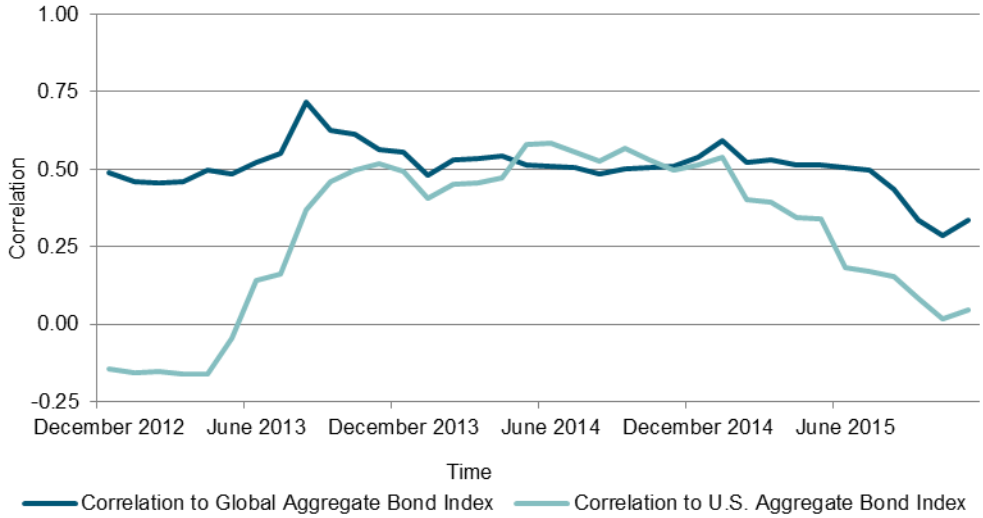
- Low correlation to core fixed income;
- Attractive risk-adjusted returns; and
- Actively managed downside risk mitigation.

We examined each of these claims for the average performance of unconstrained bond funds examined, and we also noted that fund performance varied among them. Performance history since 2011 shows that, on average, unconstrained bond funds:

- Exhibited varying correlation to U.S. fixed income but showed persistently high correlation to global fixed income;
- Tended to provide lower risk-adjusted returns than U.S. core fixed income; and
- Offered improved downside protection.

The correlation of unconstrained bond fund returns to the Barclays U.S. Aggregate Bond Index (the U.S. Aggregate Bond Index) varies a great deal over time, but correlation to the Barclays Global Aggregate Bond Index (the Global Aggregate Index)[3] tends to be persistently high. Exhibit 3 shows the rolling two-year correlation of the average monthly return of unconstrained bond funds to that of the U.S. and Global Aggregate Bond Indices. Though unconstrained bond funds do show periods of low, or at times negative, correlation to the U.S. Aggregate Bond Index, they also tend to demonstrate persistently high correlation of above 0.50 to the Global Aggregate Bond Index, though only until 2014.

Exhibit 3: Rolling Two-Year Correlation of Unconstrained Bond Funds to Core Fixed Income



Source: Morningstar, Barclays. Data from January 2011 to November 2015. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

On average, unconstrained bond funds delivered lower return and return per unit of volatility than the U.S. Aggregate Bond Index and higher return than the Global Aggregate Bond Index.

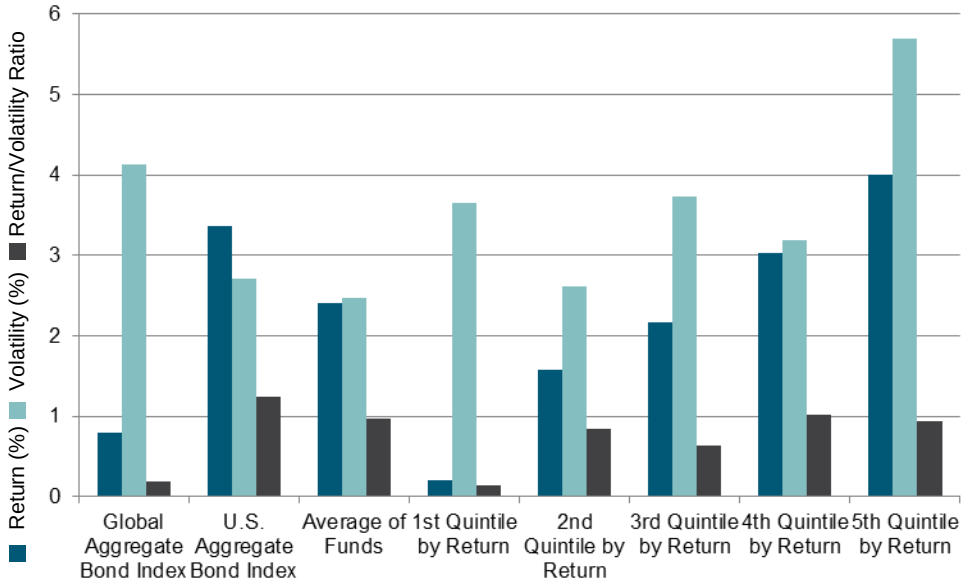
Lower Risk-Adjusted Returns Than the U.S. Aggregate Bond Index on Average

Exhibit 4 shows the risk/return profile of unconstrained bond funds versus the U.S. Aggregate Bond Index and the Global Aggregate Bond Index. On average, unconstrained bond funds delivered lower return and return per unit of risk than the U.S. Aggregate Bond Index and higher return and return per unit of risk than the Global Aggregate Bond Index. As average returns across funds tend to smooth out performance volatility due to the

[3] Bond Index data referenced throughout this research paper, including charts and tables, is derived from Barclays Bond Indices and reflects actual performance, not hypothetical historical performance, and was provided by Barclays and Morningstar.

imperfect correlation between these funds, we also charted the performance statistics for quintile portfolios by return for those 36 funds that had full performance data for our analysis period. Only one out of the five quintiles demonstrated a higher annualized return than the U.S. Aggregate Bond Index, and none outperformed the U.S. Aggregate Bond Index in terms of return per unit of volatility.

Exhibit 4: Risk/Return Profile of Unconstrained Bond Funds Versus Core Fixed Income Indices



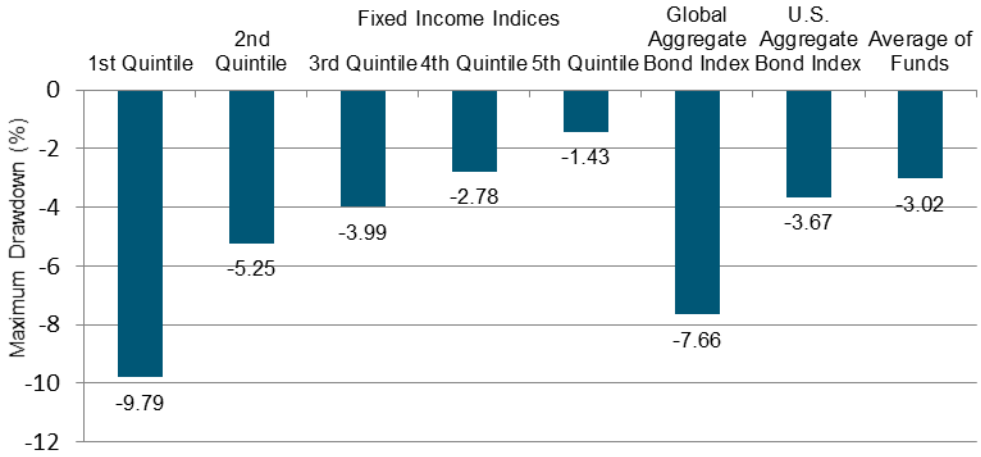
Source: Morningstar, Barclays. Data from January 2011 to November 2015. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

Improved Drawdown

On average, unconstrained bond funds experienced a maximum drawdown of 3.02%.

Exhibit 5 shows the maximum drawdown for unconstrained bond funds versus the core fixed income indices for the analysis period. On average, unconstrained bond funds experienced a maximum drawdown of 3.02%, which was better than the U.S. Aggregate Bond Index and Global Aggregate Bond Index, which had maximum drawdowns of 3.67% and 7.66%, respectively. We also calculated the average maximum drawdown for quintile portfolios for all constrained bond funds that existed during the analysis period. Exhibit 5 demonstrates the variance in maximum drawdown across all funds. On average, at least 60% of funds experienced worse maximum drawdown than the U.S. Aggregate Bond Index.

Exhibit 5: Average Maximum Drawdown by Quintile



Source: Morningstar, Barclays. Data from January 2011 to November 2015. Chart provided for illustrative purposes. Past performance is no guarantee of future results.

STYLE ANALYSIS OF UNCONSTRAINED BOND FUNDS

It is worthwhile to review the sector allocations of unconstrained bond funds to get a better understanding of the investment strategies associated with them and how they have performed historically.

Since unconstrained bond funds have a broad mandate to invest in fixed income and currency, it is worthwhile to review their sector allocations to get a better understanding of the investment strategies associated with them and how they have performed historically. We utilized a style analysis in which the average return across funds is regressed against that of a set of fixed income sectors for a rolling period of 24 months. The sectors included are: cash, U.S. Treasuries, U.S. government-related bonds, U.S. corporate investment-grade bonds, U.S. securitized products, U.S. corporate high-yield bonds, euro aggregate bonds, sterling aggregate bonds, Japanese aggregate bonds, emerging market U.S. dollar-denominated bonds, emerging market local currency government bonds, and the S&P 500®.

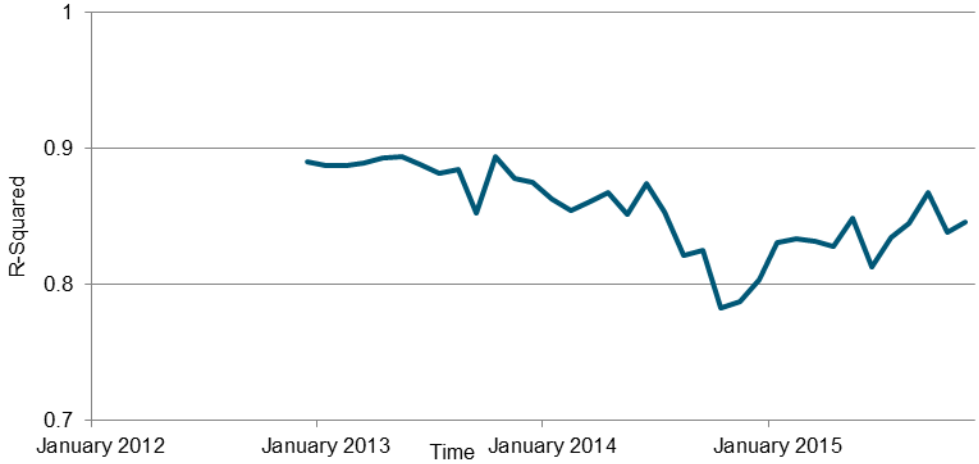
$$r_{avgFunds} = a + w_1 * r_{ust} + w_2 * r_{gov-related} + w_3 * r_{uscorpIG} + w_4 * r_{securitized} + w_5 * r_{HY} + w_6 * r_{EuroAgg} + w_7 * r_{GBPAgg} + w_8 * r_{JapanAgg} + w_9 * r_{EMUSD} + w_{10} * r_{EMLocalt} + w_{11} * r_{S\&P500}$$

$$s.t. \ \sum_{i=1}^{11} w_i = 1 \quad and$$

$$0 =< w_i <= 1 \ for \ all \ i$$

Exhibit 6 is a chart of R-squared for our style regression (modeled above). Over time, the style regression has R-squared greater than 0.70, and at times it gets close to 0.90. This shows that our sector selection tends to collectively explain fund returns well.

Exhibit 6: R-Squared for Style Analysis for Rolling Period of 24 Months

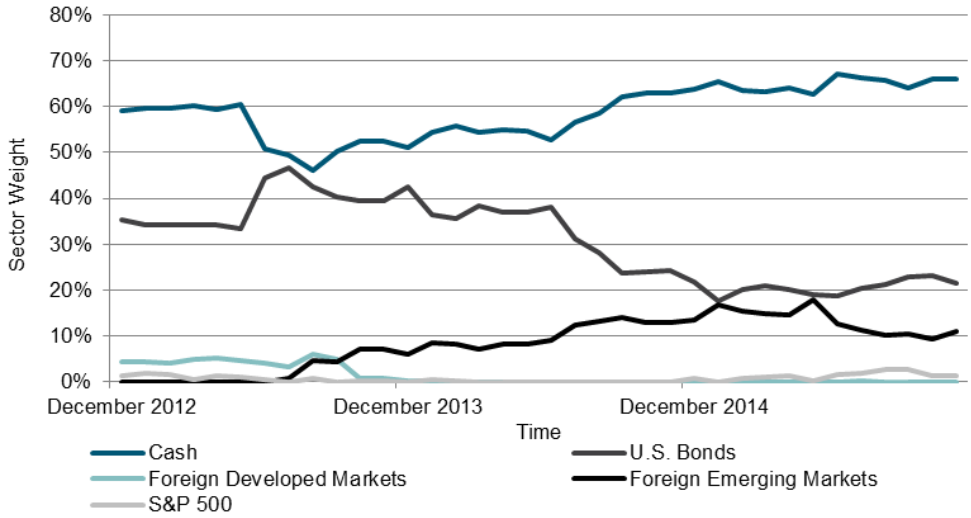


Source: Morningstar, Barclays. Data from January 2011 to November 2015. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

We aggregated the sector weights into the following groups: Cash, U.S. bonds, foreign bonds from developed countries (U.K., eurozone, and Japan), foreign bonds from emerging market countries, and U.S. equities (the S&P 500). Exhibit 7 shows that cash stayed at an elevated level, reflecting the bearish views on fixed income expressed by fund managers over the period examined. In recent years, many fund managers have increased their allocation to cash and emerging market bonds at the expense of U.S. bonds (see Exhibit 7). Among the regression categories, only U.S. high-yield bonds consistently showed statistically significant t-statistics for the entire analysis period, while emerging market U.S. dollar bonds and euro aggregate bonds only did so for a portion of the period studied. Therefore, we showed weights for these two sectors in Exhibit 8. Of note is that the combined weights of cash and U.S. high-yield bonds stayed above 69% for the entire analysis period, indicating the use of the strategy of picking up yield through high-yield bonds with little duration exposure (see Exhibit 9).

From 2011 to 2015, cash stayed at an elevated level, reflecting the bearish views on fixed income expressed by fund managers.

Exhibit 7: Sector Weights for Rolling Period of 24 Months

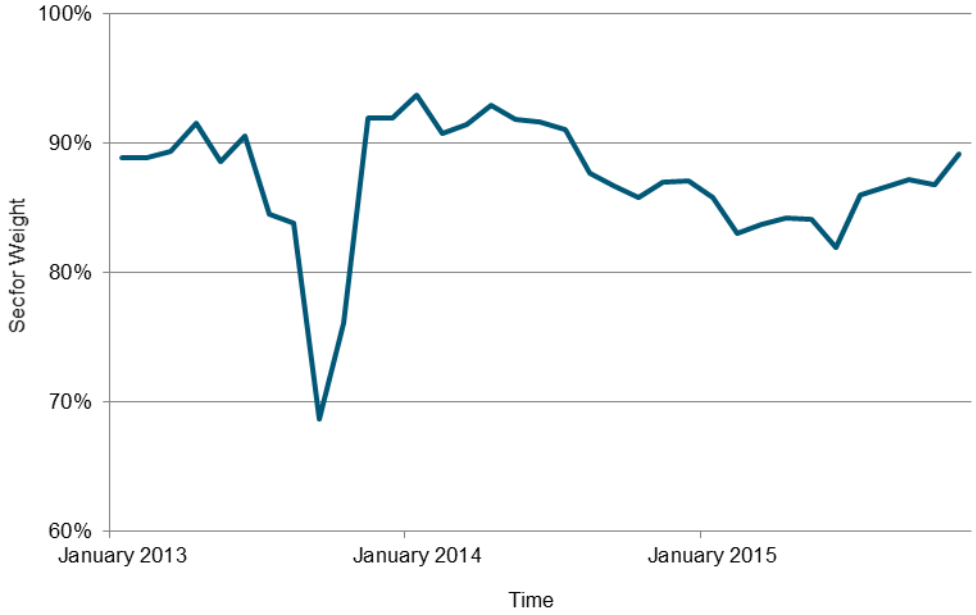


Source: Morningstar, Barclays, S&P Dow Jones Indices. Data from January 2011 to November 2015. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 8: Sector Weights if T-Statistics Are Significant for Rolling Period of 24 Months

Source: Morningstar, Barclays. Data from January 2011 to November 2015. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 9: Combined Sector Weight of Cash and U.S. High-Yield Bonds for Rolling Period of 24 Months



Source: Morningstar, Barclays. Data from January 2011 to November 2015. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

The first few PCs that explain the majority of variation in input variables can be viewed as the main factors that drive the movements of input variables.

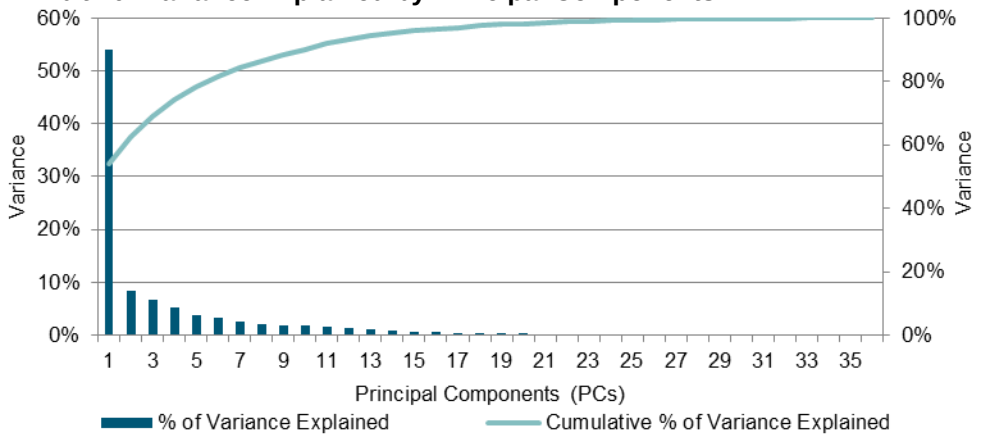
The fact that other sectors did not show statistically significant t-statistics exposes the constraints of using style analysis for a performance study. Return correlation among sectors poses challenges for obtaining stable coefficients in regression analysis, though collectively, the explanatory power of the regression is not negatively affected. This prompted us to employ principal component analysis (PCA) for this study.

PRINCIPAL COMPONENT ANALYSIS OF UNCONSTRAINED BOND FUNDS

PCA is a statistical analysis tool that uses a covariance matrix as input to transform correlated variables into uncorrelated variables, namely principal components (PC). Typically, PCs are ranked by the percentage of variance they explain for input variables. The first few PCs that explain the majority of variation in input variables can be viewed as the main factors that drive the movements of input variables.

We calculated the variance matrix for a monthly return series for the funds that reported monthly returns for our analysis period. There were 36 funds, and the variance matrix of their monthly return series served as the input for the PCA. The results showed that the top three PCs collectively explained 69% of return variations, with each of them explaining 54%, 8%, and 7%, respectively.

Exhibit 10: Variance Explained by Principal Components



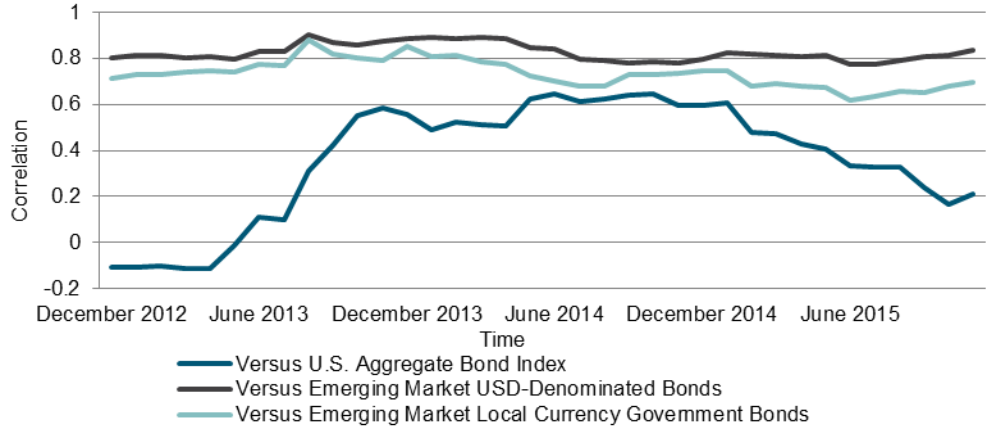
Source: Morningstar, Barclays, Matlab. Data from January 2011 to November 2015. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

PCs represent underlying factors that can drive asset returns, and they are independent of each other.

PCs are not observable variables. Instead, they represent underlying factors that can drive asset returns, and they are independent of each other. To understand what these underlying factors represent, we calculated the beta coeffecients and R-squared from linear regression of sector returns versus factor returns (see Exhibits 11, 12, and 13).

PC1, as the most important factor in explaining fund return (54% of variation), exhibits R-squared of 0.85, 0.61, and 0.48, with U.S. high-yield bonds, emerging market U.S. dollar bonds, and emerging market local government bonds, respectively. U.S. high-yield bonds present idyosyncratic credit risk and return and are less correlated to market direction, especially duration, than other sectors of U.S. fixed income. In fact, Exhibit 11 shows that, historically, it is more correlated to emerging market debt than the investment-grade level of U.S. fixed income (U.S. Aggregate Bond Index). Traditionally, U.S. fixed income investors have invested in these three sectors to gain spread return that has less correlation to the U.S. yield curve than other sectors.

Exhibit 11: Rolling Two-Year Correlation of U.S. High Yield Versus Other Sectors



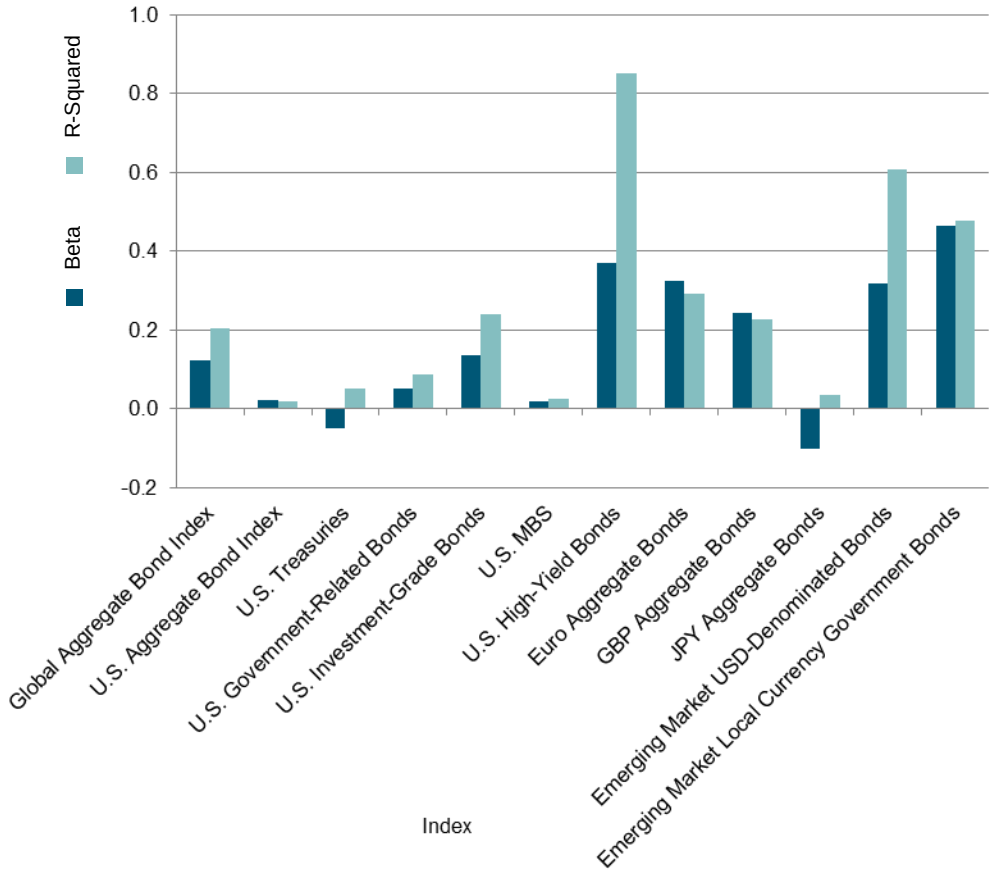
Source: Barclays. Data from January 2011 to November 2015. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

PC2 shows a high R-squared with U.S. Treasury, U.S. government-related, U.S. securitized, and U.S. investment-grade bonds. We labeled it as representing the market factor of U.S. high grade fixed income, as was also demonstrated by an R-squared of 0.73 in the regression of U.S. aggregate bonds versus PC2.

It is less obvious to interpret PC3, as it does not show a high R-squared with any particular sector.

PC1, as the most important factor in explaining fund return (54% of variation), exhibits R-squared of 0.85, 0.61, and 0.48, with U.S. high-yield bonds, emerging market U.S. dollar bonds, and emerging market local government bonds, respectively.

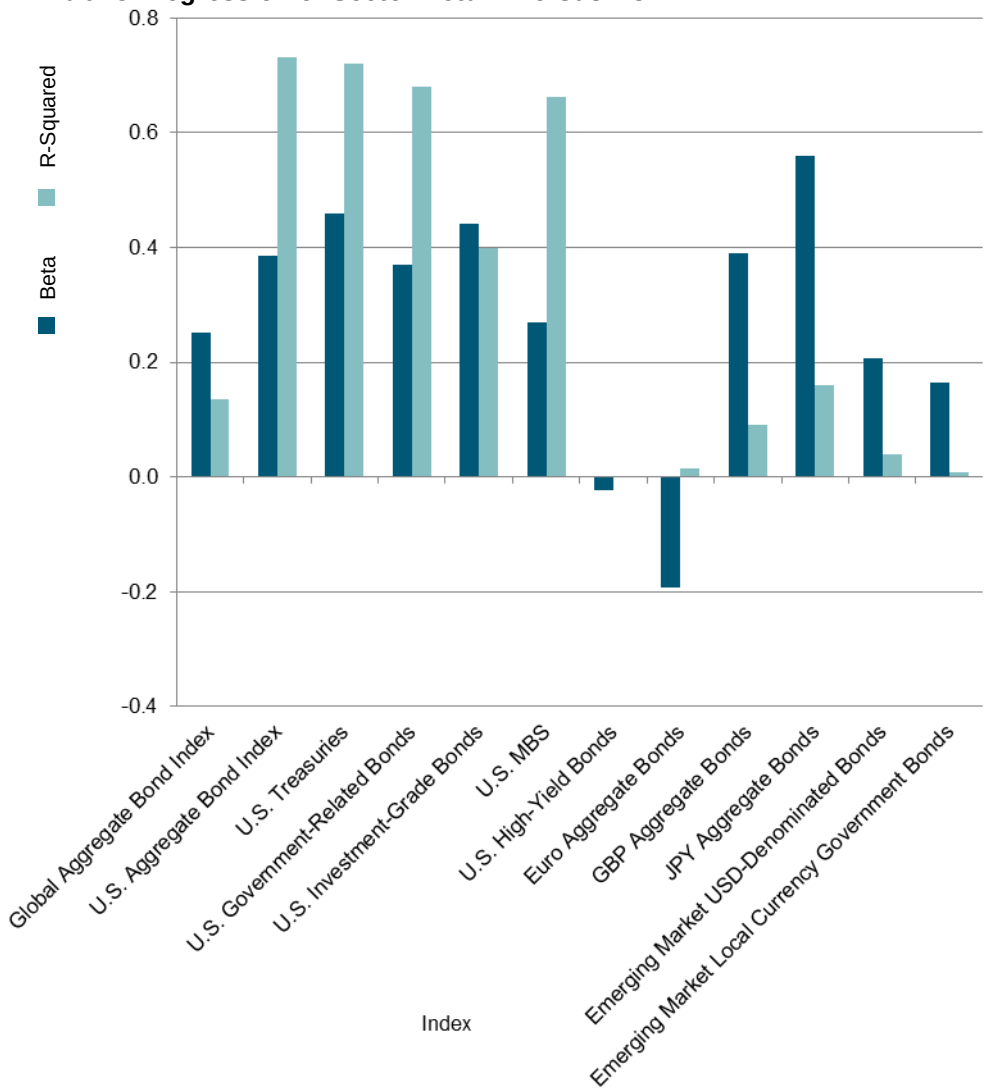
Exhibit 12: Regression of Sector Return Versus PC1



Source: Morningstar, Barclays, Matlab. Data from January 2011 to November 2015. All bond indices displayed reflect actual performance data from Barclays indices. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

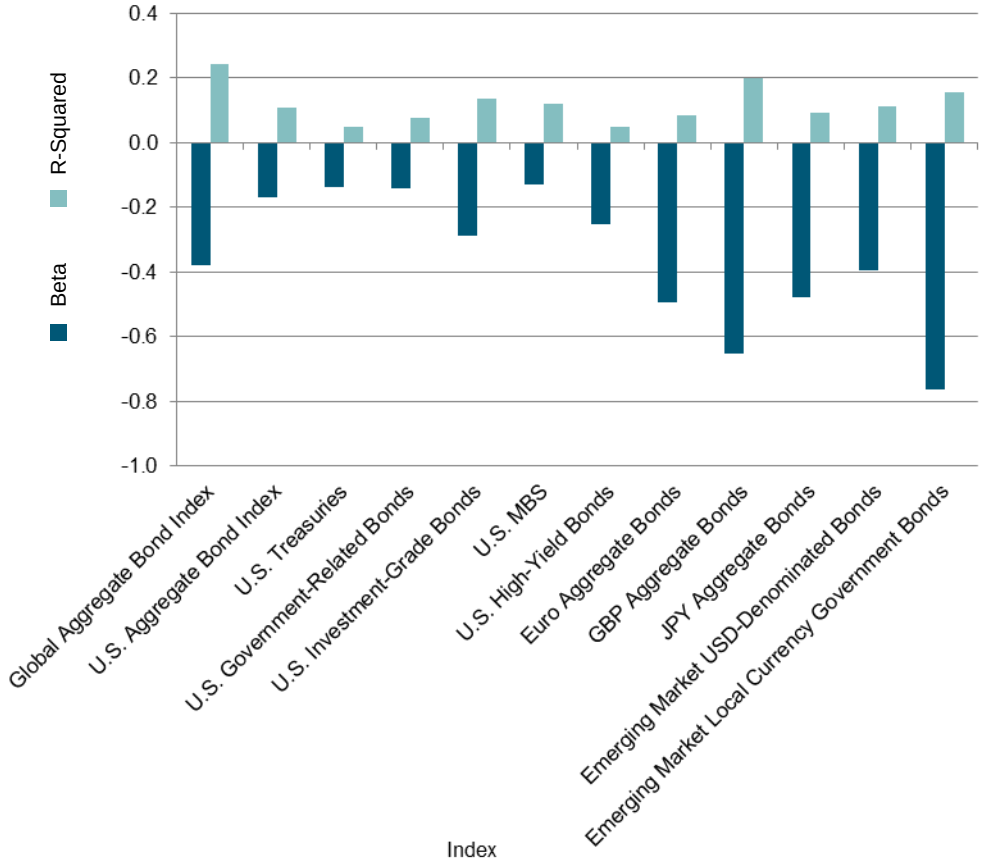
PC2 shows a high correlation with U.S. Treasury, U.S. government-related, U.S. securitized, and U.S. investment-grade bonds.

Exhibit 13: Regression of Sector Return Versus PC2



Source: Morningstar, Barclays, Matlab. Data from January 2011 to November 2015. All bond indices displayed reflect actual performance data from Barclays indices. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 14: Regression of Sector Return Versus PC3



Source: Morningstar, Barclays, Matlab. Data from January 2011 to November 2015. All bond indices displayed reflect actual performance data from Barclays indices. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

In recent years, the main investment strategy associated with this type of fund appears to be allocating to cash and spread products that have a lower correlation with U.S. high-grade fixed income in order to reduce duration exposure.

PCA provides a different angle to decipher the allocation strategy of unconstrained bond funds. As has been shown, it pinpoints one factor that explains more than one-half of the variation of fund return over our analysis period. Though the factor is not observable, regression analysis of fixed income sector return versus the factor indicates that it is the major factor that drives the performance of U.S. high-yield bonds and, to a lesser degree, emerging market bonds. We labeled this factor as a spread factor that is less correlated to U.S. high-grade fixed income.

CONCLUSION

We analyzed the performance data of unconstrained bond funds from January 2011 to November 2015 using style and principal component analysis. In recent years, the main investment strategy associated with this type of fund appears to be allocating to cash and spread products that have a lower correlation with U.S. high-grade fixed income in order to reduce duration exposure. By doing so, the performance history of unconstrained bond funds exhibited lower correlation to core U.S. fixed income, with higher correlation to the global fixed income market.

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PERFORMANCE DISCLOSURE

The S&P 500 was launched on March 4, 1957. All information presented prior to an index's Launch Date is hypothetical (back-tested), not actual performance. The back-test calculations are based on the same methodology that was in effect on the index Launch Date. Complete index methodology details are available at www.spdji.com.

S&P Dow Jones Indices defines various dates to assist our clients in providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the Index is set at a fixed value for calculation purposes. The Launch Date designates the date upon which the values of an index are first considered live: index values provided for any date or time period prior to the index's Launch Date are considered back-tested. S&P Dow Jones Indices defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company's public website or its datafeed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed "Date of introduction") is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index's public release date.

Past performance of the Index is not an indication of future results. Prospective application of the methodology used to construct the Index may not result in performance commensurate with the back-test returns shown. The back-test period does not necessarily correspond to the entire available history of the Index. Please refer to the methodology paper for the Index, available at www.spdji.com for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Another limitation of using back-tested information is that the back-tested calculation is generally prepared with the benefit of hindsight. Back-tested information reflects the application of the index methodology and selection of index constituents in hindsight. No hypothetical record can completely account for the impact of financial risk in actual trading. For example, there are numerous factors related to the equities, fixed income, or commodities markets in general which cannot be, and have not been accounted for in the preparation of the index information set forth, all of which can affect actual performance.

The Index returns shown do not represent the results of actual trading of investable assets/securities. S&P Dow Jones Indices LLC maintains the Index and calculates the Index levels and performance shown or discussed, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US $100,000 investment for a 12-month period (or US $10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US $1,650), the net return would be 8.35% (or US $8,350) for the year. Over a three year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US $5,375, and a cumulative net return of 27.2% (or US $27,200).

GENERAL DISCLAIMER