



## ETF VOLATILITY ANALYSIS IN THE HIGH-YIELD BOND MARKET

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With approximately \$53 billion under management, high-yield exchange-traded funds (“ETFs”) represent close to 2.95% of the entire \$1.8 trillion high-yield corporate bond universe (source: Bloomberg). There is no question that ETFs are one of the greatest trading innovations of recent times. However, in the less liquid high-yield corporate bond

market, open-end mutual funds have historically provided lower volatility without any sacrifice in return.

This piece is intended to illustrate some important characteristics of ETFs and mutual funds in the high-yield corporate bond market.

### VOLATILITY

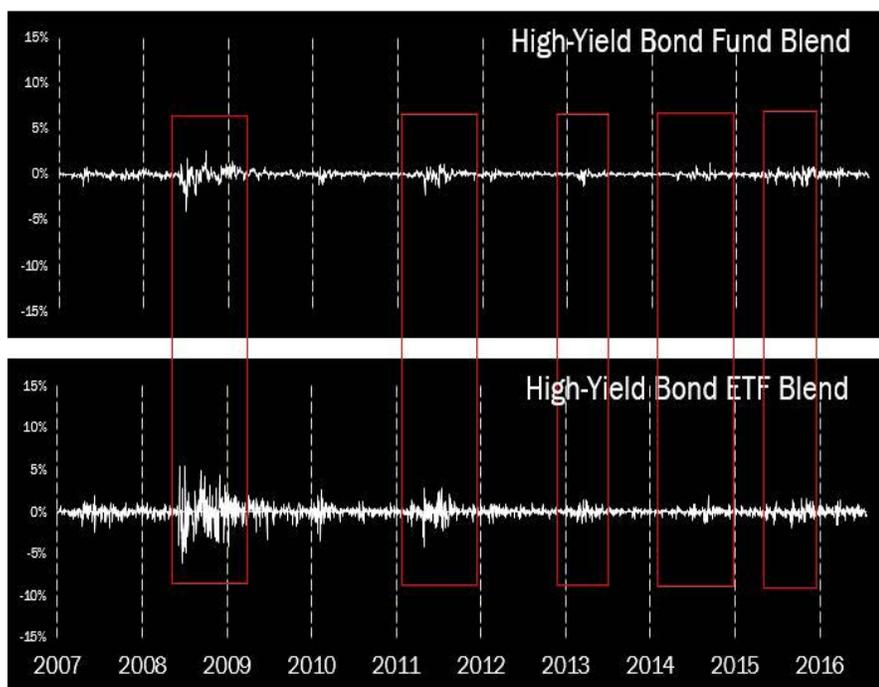
Unlike stocks, bonds do not trade on an exchange. Additionally, high-yield bonds are not traded as frequently as more liquid bonds such as U.S. Treasuries. The illiquidity of the high-yield market has historically reduced the probability that any one security will trade in a given day. Nevertheless, when a less liquid asset like a high-yield bond is wrapped inside a mutual fund, the mutual fund must assign a daily price to each of its holdings in order to calculate its net asset value (“NAV”). This may encourage the pricing of a security that hasn’t traded to approximate

its most recent price or to reflect the overall trend of high-yield prices on a given day.

Mutual funds offer liquidity on a daily basis at the closing NAV. Mutual funds reserve the right to modify or reject the exchange privilege at any time. Conversely, ETFs trade like stocks throughout the day, with pricing determined by the market, subject to a bid/ask spread that can fluctuate significantly on any given day.

**FIGURE 1: Day-to-Day Price Volatility of High-Yield Bond Mutual Fund Blend vs. High-Yield Bond ETF Blend.**

Dates: 1/1/07 - 10/31/16



The chart to the left plots the daily price-only percentage return (does not include dividends) between a high-yield bond mutual fund blend and a high-yield bond ETF blend. The lower volatility occurred in the price of the high-yield bond mutual fund blend, by far. We believe this lower volatility leads to a more accurate quantitative approach.

Sources: Fastrack, Zephyr, Morningstar, Redwood. For illustration purposes only. Dates from January 1, 2007 through October 31, 2016. Inception date is due to ETFs creation in that time period. The high-yield bond ETF blend is comprised of the two largest ETFs with high-yield corporate bond objectives (they represent approximately \$27.9 billion of the high-yield bond ETF market). The high-yield bond mutual fund blend represents a blend of 14 open-ended mutual funds, which were a result of the following objective criteria: Inception date prior to 1/1/1988; Total Assets of funds as of 10/31/16 as supplied by Morningstar greater than \$1B; all searchable funds categorized in Morningstar as “Taxable High Yield Bond”; and available data. Past performance is not a guarantee of future results. Please see disclosures at the end for additional information.

**FIGURE 2: 50-Day Historical Volatility of High-Yield Bond ETF Blend vs. High-Yield Bond Mutual Fund Blend.**

Dates: 10/31/10 - 10/31/16

Includes 2011 U.S. Credit Downgrade, 2013 Taper Tantrum, and Recent 75% Decline in Oil



The chart to the left illustrates the higher volatility of a high-yield bond ETF blend (in orange) vs. a high-yield bond mutual fund blend (in white). Using the 50-day historical volatility, the ETF blend exhibits significantly higher volatility than the open-ended mutual fund blend throughout the period shown, with as much as 2x volatility during heightened times of market angst.

Sources: Bloomberg, Zephyr, Morningstar, Redwood. For illustration purposes only. Dates from October 31, 2010 through October 31, 2016. The high-yield bond ETF blend is comprised of the two largest ETFs with high-yield corporate bond objectives (they represent approximately \$27.9 billion of the high-yield bond ETF market). The high-yield bond mutual fund blend represents a blend of 14 open-ended mutual funds, which were a result of the following objective criteria: Inception date prior to 1/1/1988; Total Assets of funds as of 10/31/16 as supplied by Morningstar greater than \$1B; all searchable funds categorized in Morningstar as "Taxable High Yield Bond"; and available data. Past performance is not a guarantee of future results. Please see disclosures at the end for additional information.

**FIGURE 3: Pricing Tables of High-Yield Bond ETF Blend vs. High-Yield Bond Mutual Fund Blend During Period of Heightened Volatility.**

Dates: 2008 Credit Crisis (9/26/08 - 10/10/08)

The two charts below display daily closing prices of high-yield bond ETFs compared to high-yield bond mutual funds during a period of heightened volatility in the Credit Crisis of 2008.

The higher daily volatility of high-yield bond ETFs can become even more significant during times of extreme market volatility.

High-Yield Bond ETF Blend				
.HYETFBL Index		90 Export to Excel		Historical Price with % Chg
High Yield ETF Blend	High	148.5900	on	12/31/07
Range	Low	90.9000	on	11/20/08
Market	Average	130.0464		
View	Net Chg	-40.1900		-27.11%
Date	Last Price	Net Change	% Change	
Fr 10/10/08	96.8950	-9.7551	-9.15%	
Th 10/09/08	106.6501	-1.4849	-1.37%	
We 10/08/08	108.1350	-5.0850	-4.49%	
Tu 10/07/08	113.2200	-3.0000	-2.58%	
Mo 10/06/08	116.2200	-3.7150	-3.10%	
Fr 10/03/08	119.9350	-1.1750	-0.97%	
Th 10/02/08	121.1100	-2.7780	-2.24%	
We 10/01/08	123.8880	+2.7880	+2.30%	
Tu 09/30/08	121.1000	+3.6500	+3.11%	
Mo 09/29/08	117.4500	-8.7000	-6.90%	
Fr 09/26/08	126.1500	-4.900	-0.39%	

Source: Bloomberg, Zephyr, Morningstar, Redwood. Returns shown are price-only. Dates from September 26, 2008 through October 10, 2008. Returns shown are price-only. For illustration purposes only. The high-yield bond ETF blend is comprised of the two largest ETFs with high-yield corporate bond objectives (they represent approximately \$27.9 billion of the high-yield bond ETF market). Past performance is not a guarantee of future results. Please see disclosures at the end for additional information.

High-Yield Bond Mutual Fund Blend				
.HYBLEND U Index		90 Export to Excel		Historical Price with % Chg
High Yield Corporate Bond Blen	High	78.0300	on	12/31/07
Range	Low	47.6300	on	12/15/08
Market	Average	68.8903		
View	Net Chg	-26.8900		-34.46%
Date	Last Price	Net Change	% Change	
Fr 10/10/08	57.1300	-2.4300	-4.08%	
Th 10/09/08	59.5600	-1.2700	-2.09%	
We 10/08/08	60.8300	-1.0500	-1.70%	
Tu 10/07/08	61.8800	-.7100	-1.13%	
Mo 10/06/08	62.5900	-1.3300	-2.08%	
Fr 10/03/08	63.9200	-.4500	-0.70%	
Th 10/02/08	64.3700	-1.4000	-2.13%	
We 10/01/08	65.7700	-.5400	-0.81%	
Tu 09/30/08	66.3100	-.4600	-0.69%	
Mo 09/29/08	66.7700	-1.0000	-1.48%	
Fr 09/26/08	67.7700	-.7300	-1.07%	

Source: Bloomberg, Zephyr, Morningstar, Redwood. Returns shown are price-only. Dates from September 26, 2008 through October 10, 2008. For illustration purposes only. The high-yield bond mutual fund blend represents a blend of 14 open-ended mutual funds, which were a result of the following objective criteria: Inception date prior to 1/1/1988; Total Assets of funds as of 10/31/16 as supplied by Morningstar greater than \$1B; all searchable funds categorized in Morningstar as "Taxable High Yield Bond"; and available data. Past performance is not a guarantee of future results. Please see disclosures at the end for additional information.

## ADDITIONAL FACTORS TO CONSIDER

Additional factors to consider when comparing ETFs and mutual funds in the high-yield asset class are as follows:

### 1. Non-Active Management

The largest high-yield bond ETFs are passively managed funds. The high-yield corporate bond asset class is one where an active portfolio manager can add value in three ways:

First, rather than searching for prospective profits, many active managers emphasize goals that are focused on preventing losses. As Howard Marks from Oaktree Capital says, "If you avoid the losers, the winners will take care of themselves."

Second, finding bonds of companies whose fundamentals are likely to improve can result in an upgrade in rating and an increase in bond value.

Third, after buying each bond, a skillful manager keeps close track of the issuing company, with the ability to sell a bond from the fund if signs of deterioration occurs or if in the best interest of the fund.

### 2. Dividends

ETF dividends are paid in cash. Reinvesting the dividends can have transaction charges depending on the custodian. Pricing for ETFs are valued by the market and supply/demand factors. Open-end mutual funds can have dividends automatically reinvested with no transaction charges.

### 3. Tracking Error of ETFs

ETF returns don't necessarily track the underlying index in the short-term. The variance between the ETF and its underlying index has historically increased in heightened periods of volatility (e.g. the period beginning with the Lehman bankruptcy in 2008). Some of the causes for this variance may include:

- The potential of high-yield bond ETFs not maintaining the same position sizes in individual securities. It may be difficult for high-yield bond ETFs to encompass enough liquid bonds to track the index because supply/liquidity in those bond issues may be limited.
- There can be "on the run" bonds which trade better than similar credits in the same industry with strong fundamentals that are not as actively traded.
- Because bonds are not traded on an exchange, pricing for the less liquid name may be impacted.

### 4. Fees

ETFs are typically significantly cheaper than open-end mutual funds. However, this is not the case in the high-yield bond market. When allocating to equities, many investors utilize an ETF like the SPDR S&P 500 ETF Trust ("SPY") due to its lower cost (9 basis points annually), and the efficiency and liquidity of large-cap equities. In the high-yield space, the largest ETFs, iShares iBoxx \$ High Yield Corporate Bond ETF ("HYG") and SPDR Barclays High Yield Bond ETF ("JNK"), have annual expense ratios of 50 basis points and 40 basis points, respectively. Large, institutional share class, open-end mutual funds annual expense ratios typically range from 50-80 basis points, on average.

### 5. Execution Risk

In addition to increased day-to-day volatility tracked by closing prices, high-yield bond ETFs also have increased intraday execution risk. ETFs, unlike mutual funds, trade on an exchange and their execution pricing is subject to a bid/ask market. This adds an additional element of risk when trying to buy and sell shares at one price. This may be especially challenging when attempting to execute a large sell as prices are declining or a large buy as prices are increasing. Figures 4 and 5 on the following page and Figure 6 on page 5 detail intraday trading risks of high-yield bond ETFs.

**FIGURE 4: Execution Risk of High-Yield Bond ETFs.**  
**Dates: 9/2/08-2/28/09**



If an HYG trade was entered on September 29, 2008, the execution price would have varied from \$76 to \$86.23.

Sources: Bloomberg, Yahoo Finance. Dates from September 2, 2008 through February 28, 2009. For illustration purposes only. Returns shown are price-only. High-yield bond ETF is represented using iShares iBoxx High-Yield Corporate Bond ETF (HYG) and was selected due to its large size and familiarity with the investment public. This illustration has no intention of discussing the merits of HYG. HYG is not a past or current holding in Redwood's strategies. Past performance is not a guarantee of future results. Please see disclosures at the end for additional information.

**FIGURE 5: Execution Risk of High-Yield Bond ETFs.**  
**Dates: 2/28/11-9/30/11**



Intraday volatility has historically been higher during times of higher selling pressure.

Sources: Bloomberg, Yahoo Finance. Dates from February 28, 2011 through September 30, 2011. For illustration purposes only. Returns shown are price-only. High-yield bond ETF is represented using iShares iBoxx High-Yield Corporate Bond ETF (HYG) and was selected due to its large size and familiarity with the investment public. This illustration has no intention of discussing the merits of HYG. HYG is not a past or current holding in Redwood's strategies. Past performance is not a guarantee of future results. Please see disclosures at the end for additional information.

**FIGURE 6: Execution Risk of High-Yield Bond ETFs.**  
Date: 8/24/15



August 24, 2015 was an especially volatile day in the overall markets. If a market order for HYG was placed in the morning, the execution price may have been 2% lower than the day's average trading price.

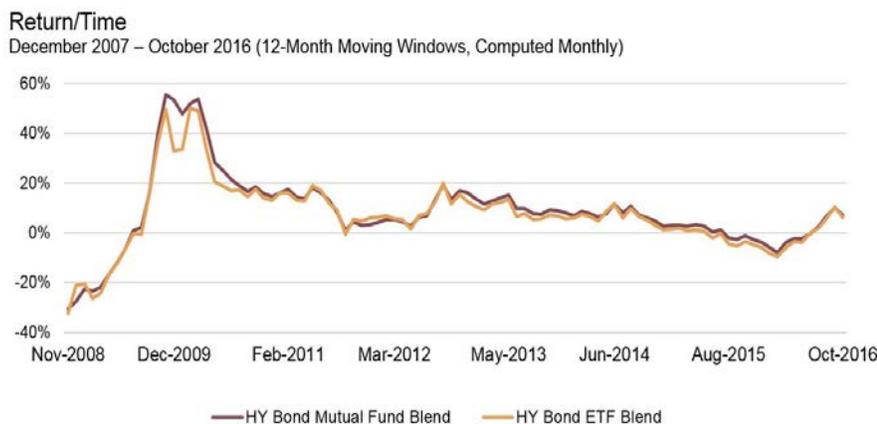
Sources: Bloomberg, Yahoo Finance. For illustration purposes only. Data is for August 24, 2015. High-yield bond ETF is represented using iShares iBoxx High-Yield Corporate Bond ETF (HYG) and was selected due to its large size and familiarity with the investment public. This illustration has no intention of discussing the merits of HYG. HYG is not a past or current holding in Redwood's strategies. Past performance is not a guarantee of future results. Please see disclosures at the end for additional information.

**PERFORMANCE**

The chart and table below illustrate the similarity in total-return between high-yield bond ETFs and high-yield bond mutual funds. As an investor, the goal should be to get from Point A to Point B with the lowest amount of risk.

As the volatility charts on the previous pages illustrate, an investor in the high-yield bond ETF blend was exposed to greater volatility. As you can see in the figure below, for that additional volatility there was not an additional reward (lower ETF returns in all time periods).

**FIGURE 7: Returns of High-Yield Bond Mutual Fund Blend vs. High-Yield Bond ETF Blend.**  
Dates: 12/1/07-10/31/16



Lower returns for the high-yield bond ETF blend with added daily volatility, intraday volatility and other risk factors discussed.

Source: Zephyr, Morningstar, Redwood. For illustration purposes only. Returns shown are total-return. Returns are calculated using 12-month moving windows, utilizing monthly data. Dates from December 1, 2007 through October 31, 2016. Start date is based on available data. The high-yield bond ETF blend is comprised of the two largest ETFs with high-yield corporate bond objectives (they represent approximately \$27.9 billion of the high-yield bond ETF market). The high-yield bond mutual fund blend represents a blend of 14 open-ended mutual funds, which were a result of the following objective criteria: Inception date prior to 1/1/1988; Total Assets of funds as of 10/31/16 as supplied by Morningstar greater than \$1B; all searchable funds categorized in Morningstar as "Taxable High Yield Bond"; and available data. \*YTD stands for year-to-date and is through October 31, 2016. Past performance is not a guarantee of future results. Please see disclosures at the end for additional information.

	YTD*	1 Year	3 Years	5 Years	7 Years	Analysis Period
High-Yield Bond Mutual Fund Blend	11.85%	7.04%	3.86%	6.79%	8.03%	6.99%
High-Yield Bond ETF Blend	11.73%	6.16%	2.51%	5.21%	6.94%	5.42%

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**Risks in Mutual Funds and ETFs:**

Investing in bond mutual funds and ETFs carries some risks including: credit risk, which is the risk that the issuers of the bonds owned by a fund may default (fail to pay the debt that they owe on the bonds that they have issued), prepayment risk, which is the risk that the issuers of the bonds owned by a fund will prepay them at a time when interest rates have declined, and interest rate risk, which is the risk that the market value of the bonds owned by a fund will fluctuate as interest rates go up and down. High-yield bonds generally have higher default risk than other types of bonds.

**Definitions:**

**High-Yield Corporate Bond:** A bond that typically seeks high levels of current income by investing in lower credit quality fixed income securities with varying maturities. High yield throughout this piece always refers to high-yield corporate bond.

**ETF:** An exchange-traded fund (ETF) is an investment fund traded on stock exchanges, much like stocks. An ETF holds assets such as stocks, commodities, or bonds, and trades close to its net asset value over the course of the trading day. Most ETFs track an index, such as a stock index or bond index.

**Open-End Mutual Fund:** A type of mutual fund that does not have restrictions on the amount of shares the fund will issue. If demand is high enough, the fund will continue to issue shares no matter how many investors there are. Open-end funds also buy back shares when investors wish to sell.

**Volatility:** A statistical measure of the dispersion of returns for a given security or market index. Volatility can either be measured by using the standard deviation or variance between returns from that same security or market index. Commonly, the higher the volatility, the riskier the security.

**Net Asset Value:** Net asset value (NAV) is value per share of a mutual fund on a specific date or time.

**Liquidity:** The degree to which an asset or security can be quickly bought or sold in the market without affecting the asset's price.

**Bid/Ask Spread:** A bid-ask spread is the amount by which the ask price exceeds the bid price for an asset in the market. The bid-ask spread is essentially the difference between the highest price that a buyer is willing to pay for an asset and the lowest price that a seller is willing to accept to sell it.

**Basis Point:** A unit that is equal to 1/100th of 1%, and is used to denote the change in a financial instrument. For example 100 basis points = 1%.

**Taper-Tantrum:** Widely used to define how the markets reacted to the comments by Federal Reserve Chairman, Ben Bernanke in the middle of 2013 that the fed might slow down, or taper, the rate of bond purchases, which is part of its quantitative easing (economic stimulus) program. As a result, certain treasury rates spiked and volatility increased for a period of time.

**Indices and Funds:**

**Blends:** An equally weighted composite of multiple funds rebalanced monthly. Funds are available upon request.

**SPDR S&P 500 ETF (SPY):** A basket of 500 stocks that are considered to be widely held. The investment seeks to provide investment results that, before expenses, generally correspond to the price and yield performance of the S&P 500 Index.

**S&P 500 Index:** An index of 500 stocks chosen for market size, liquidity and industry grouping, among other factors. As the name suggests, the S&P 500 consists of 500 companies from a diverse range of industries. An investor cannot invest in an index.

**iShares iBoxx\$ High Yield Corporate Bond ETF (HYG):** An exchange-traded fund that seeks to correspond to the price and yield of the Markit iBoxx USD Liquid High Index. The fund generally invests at least 90% of its assets in the securities of the underlying index and in investments that provide substantially similar exposure to the securities in the index.

**SPDR Barclays High Yield Bond ETF (JNK):** An exchange-traded fund that seeks investment results that correspond to the price and yield of the Barclays High Yield Very Liquid Bond Index.

Unless otherwise noted, index returns reflect the reinvestment of income dividends and capital gains, if any, but do not reflect fees, brokerage commissions or other expenses of investing. Investors can not make direct investments into any index.

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