

High Yield ETF Behavior in Stressed Markets

Introduction

The recent growth in credit exchange traded funds (“ETFs”) – and high yield ETFs in particular – has fostered a great deal of speculation among investors as to how these products function relative to other high yield instruments and relative to the underlying high yield market. In particular, there has been focus on the potential behavior of high yield ETFs in periods of high volatility and market stress.

In this paper we provide an overview of the US high yield (“HY”) market and HY ETFs in the context of that market. We then review high level ETF mechanics and behavioral attributes. From there, we discuss the following claims commonly made with respect to HY ETFs:

- ▶ HY ETFs are “forced buyers” and “forced sellers” of individual bonds, and therefore create “technicals” in the price behavior of the bonds that they track.
- ▶ Accordingly, HY ETFs (unlike actively managed HY vehicles), can create a powerful negative feedback loop in a stressed market as ETFs will liquidate holdings indiscriminately (i.e., without regard to price).
- ▶ In an extremely dislocated market, Authorized Participants (“APs”), who now find themselves operating in a much more regulated and capital constrained environment, may step away from the ETFs, allowing their market prices to unhinge and deviate significantly from “fair value”.

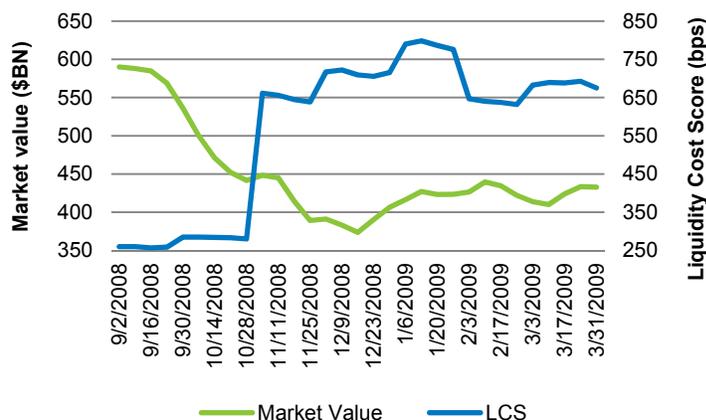
Lastly, we will develop a conceptual framework to explain the behavior of HYG, the iShares iBoxx \$ High Yield Corporate Bond Fund, relative to other HY exposure vehicles. HYG is used as a proxy for HY ETFs as a group, though the management of these products can vary significantly by provider.

Overview of the US High Yield Market

The market for US speculative grade debt (securities rated below BBB-/Baa3) is approximately \$1 trillion in market capitalization, based on the Barclays US Corporate High Yield Index. In an era of financial repression and low yields, HY as an asset class has garnered a great deal of interest with mutual fund and ETF flows totaling \$37.8 billion in the first nine months of 2012. The average spread to US Treasuries as of September 2012 of this asset class (as defined by the same index) is approximately 550 bps. While HY securities generally offer attractive yields relative to less risky asset classes, this incremental yield comes at a cost in terms of outright credit risk (risk of default) and, as importantly, discontinuous liquidity. HY debt can often trade at several points in bid/offer spread and these spreads can widen sharply when liquidity becomes impaired and flows become more asymmetric in dislocated markets. Figure 1 illustrates how the Liquidity Cost Score (“LCS”), which is a proxy for bid/ask spreads provided by Barclays, behaved during the peak of the financial crisis

(September 2008 through March 2009). The chart illustrates how liquidity in the over-the-counter (“OTC”) high yield market can deteriorate in a pronounced dislocation.

Figure 1: Market Value of Barclays High Yield Index vs. Liquidity Cost Score



Source: Barclays

It is worth providing some context with respect to the size and trading volume of fixed income ETFs relative to other HY instruments. At roughly \$33 billion in assets under management, the 15 HY fixed income ETFs currently in existence are roughly 1/10th the size of the \$300+ billion in HY mutual fund assets in the market (including both high yield bonds and bank loans) and a little over 3% of the broad \$1 trillion OTC HY bond market as a whole. Approximately 90% of the \$33 billion in HY ETF assets resides in HYG (\$17.2 billion as of 9/30/12) and the SPDR Barclays Capital High Yield Bond ETF, JNK (\$12.4 billion as of 9/30/12). The combined average daily volume of HYG and JNK is currently around \$500 million. By comparison, these volumes are about 10% of the estimated underlying OTC HY daily volume of \$4-5 billion as measured by TRACE¹.

A Review of ETF Mechanics and Behavioral Attributes

Fixed income ETFs such as HYG are expected to trade at a premium to net asset value (“NAV”) under most market conditions. The NAV of the fund is calculated using bid-side bond prices, while the shares on the exchange trade at both the bid and the offer. When investor demand for a HY ETF is strong, an Authorized Participant (“AP”)² may source individual HY bonds from the secondary market and use those bonds to create new shares of the ETF. The bonds that the AP will seek to acquire are determined by the “creation basket”, a list of bonds posted by the ETF provider to the market place.

¹ Sources: BlackRock, Bloomberg, Morningstar and Barclays as of 9/30/12

² In this paper, the term AP refers to broker-dealers and market makers who engage in ETF creation/redemption activity

A Review of ETF Mechanics and Behavioral Attributes (continued)

The basket is generally a representative sample of the fund adjusted for the liquidity and actionability of the underlying market. When the AP sources the basket in order to create new ETF shares, they pass the cost of sourcing the underlying bonds to the ETF buyer. Unlike a traditional pooled structure such as a mutual fund, in which the portfolio manager receives cash from an investor and purchases bonds on the open market, the ETF basket is delivered “in-kind” for new shares (i.e., an exchange for physical transaction) at the closing NAV (note however that some ETF providers may occasionally or more frequently employ a cash create process in which cash is received from investors and subsequently used to purchase bonds directly by the fund). As bonds are generally purchased at prices in excess of the bid, the market price of the ETF will generally trade at a premium to NAV, all else equal. The opposite situation occurs with a redemption of shares. APs will bid ETF shares only at a level equal to or less than where they believe that they will be able to liquidate the bond portfolio obtained (the “redemption basket”), typically on the bid side of the market. In a redemption scenario, the ETF should trade at or below NAV, all else equal. It is therefore the relationship of the ETF market price relative to the actionable value of the basket that determines creation/redemption activity. The in-kind creation/redemption mechanism has the effect of externalizing the transaction costs of fund activity to the exchange market price, thus insulating existing investors from the activity of new investors.

The market price for HYG, and any other ETF, is therefore primarily a function of the bid/offer spread of the underlying market, the strength of ETF demand on the exchange and the level of execution risk borne by the APⁱ. For the 3 year period 9/30/2009 - 9/30/2012, the premium on HYG averaged 66 basis points, according to Bloomberg. Over the same time period, the bid/offer spread on high yields bonds as measured by the Barclays' Liquidity Cost Score, averaged 190 bps.

This framework captures the normal pricing dynamics of HYG and the underlying high yield market. At times, the market price of HYG relative to NAV can deviate from the value suggested by the above framework. These larger than expected movements of HYG's price away from its NAV can be generally attributed to two forces. First, during periods of underlying market illiquidity, it can be more challenging for APs to create and redeem fund shares. This increased friction in the creation/redemption process can result in larger than expected premiums or discounts to NAV. Second, on average, roughly 10% of the bonds in the HY market transact every trading dayⁱⁱ. As a result, many of the bond prices comprising an index will be based upon estimates of value, rather than actionable trades, especially during volatile and dislocated markets. During such periods, ETFs may serve as price discovery vehicles, reflecting new price information rapidly and generally moving in-line with the portion of the high yield market that is in fact trading. The less liquid portions of the high yield bond market are slower to reflect new information (as they trade less frequently) and thus lag the movements observed in HY ETFs and more liquid HY bonds. This phenomenon results, for example, in HYG's market price tending to lead its benchmark value and NAV, which can result in the appearance of abnormally large premiums or discounts to fund NAV during more volatile markets.

HY ETF Interaction with the OTC HY Bond Market

A number of recent publications have suggested that HY ETFs create “technical” in the underlying bonds that they trackⁱⁱⁱ. The term “ETF bond” has been coined as a result. The general claim is that, because the ETF tracks a target index, it is a “forced buyer” or a “forced seller” of the bonds listed in the index and the creation/redemption baskets by extension. Accordingly, the portfolio managers (“PMs”) who are managing the funds and the APs who are assembling the baskets are viewed as price insensitive as they acquire/dispose of bonds to rebalance to the index (in the case of PMs) or acquire/dispose of bonds in order to create or redeem shares (in the case of APs).

This argument ignores two important concepts. First, most bond indices are not investable at the limit. Therefore, bond ETF PMs tend to sample, rather than fully replicate the target index, trading off tracking error vs. illiquidity and trading costs. The sampling protocol means that portfolio managers need not be forced into acquiring index additions or removing index deletions within a specified time frame if the fund is sufficiently sampled to begin with (i.e., other bonds may adequately map to the risk factors of the bonds entering or leaving the index, obviating the need to take action on those specific CUSIPS). Indeed, prospectus guidelines generally allow for an out of index tolerance between the ETF and the target benchmark in recognition of the imperfect investability of the underlying indices.

Second, the price of the creation/redemption basket is constrained by the market price at which ETF shares can be executed. For example, an AP is not willing to pay an unlimited amount for a bond that is listed in the creation basket because they will ultimately be constrained by market forces as to how high of a price at which they can offer the corresponding ETF share on exchange. Simply put, if the price of the creation basket is above the market price of the ETF, there is unlikely to be a creation of new ETF shares as the AP would incur a loss on such a transaction (the sourcing cost of the bonds would exceed the price at which shares could be liquidated on exchange). This dynamic may limit the appeal of anticipatory behavior, such as non-AP market participants attempting to buy up bonds that are listed in the creation basket in the hopes that they will be able to subsequently sell them to APs seeking to create new ETF shares at elevated levels. Such behavior may ultimately result in a creation or redemption not occurring, leaving the non-AP market participant exposed. That a fixed income ETF and its underlying bonds trade in different markets likely limits the ability of the ETF market price to deviate significantly and persistently from the value of the underlying holdings and vice versa.

Importantly, passive ETFs tend to be more diversified than actively managed products, thus limiting the impact of creation/redemption activity on individual positions. In the case of HYG, share creations/redemptions are ultimately spread out over hundreds of positions. While it is true that on a given day the creation/redemption baskets may be narrower than the fund itself due to underlying market liquidity constraints, over time the baskets are rotated and the fund takes in or removes an increasingly broad set of line items on a cumulative basis. As HYG holds in excess of 600 line items (across more than 250 issuer complexes), a significant number of creations/redemptions would likely result in a large number of positions being added to / removed from the fund in order to preserve the fund's tracking profile. As an example, an examination of holdings data reveals that, from 12/31/11 through 9/30/12, HYG took in \$5.7 billion in

HY ETF Interaction with the OTC HY Bond Market (continued)

new assets (approximately \$6.5 billion face amount), represented by 315 positions in the fund with an average face value of \$21 million. It is important to note that these securities were added to the fund over the course of 115 days of primary market activity (i.e., creation/redemption activity) as well as fund rebalancing activity and spread over 654 net creation units (each unit represents 100,000 shares or approximately 10 million face amount)³. Additionally, the combined net new AUM of \$11 billion of all HY ETFs year to date represented only about 2-3 days' worth of HY trading activity as measured by TRACE. Given the size of the overall high yield market and the volumes traded OTC on a given day (\$1 trillion and \$4 to \$5 billion, respectively), it is unlikely that HYG's accumulation of bonds would have a consistently meaningful impact on the market.

Indeed, the only formal empirical study to date^{iv} on HYG and its interaction with the underlying HY market found that, thus far, there does not appear to be any statistically significant evidence of impact imposed by HYG on the bonds that it tracks. This study found that the behavior (as measured by the beta) of the bonds that HYG tracks relative to the overall HY market was nearly identical in the period before HYG existed (pre-2007) and in the period after HYG existed. More liquid bonds are generally more volatile in price as frequent trading results in more rapid price adjustments to new market information. Less liquid segments of the market are comparably less volatile. As HYG tracks a benchmark that represents the more liquid segment of the HY market, it is expected that HYG would exhibit a higher beta and more price volatility than the broad HY market which includes both liquid and illiquid segments. The relative performance and volatility differences of liquid and illiquid securities is a phenomenon that has always existed in the high yield market and across a range of other asset classes, and pre-dates the introduction of ETFs.

Will HY ETFs Accelerate a Downturn in HY?

Another concern of HY market participants is that the presence of HY ETFs will act as an "accelerant" in a pronounced risk off induced down trade in the overall HY market. Again, the belief is that ETFs will be forced sellers of bonds, driving the HY market lower in a negative feedback loop. It is important to ground this discussion with the observation that a HY ETF is a high yield exposure vehicle, similar to an open-end mutual fund and to individual bonds, as well as to OTC derivative contracts such as total return swaps and credit default swaps. Any liquidity dislocation that occurs in the HY bond market is going to impact all HY investors to varying degrees, regardless of the means by which they obtain that exposure.

Contrary to perception, ETFs are not forced sellers of securities when investors sell shares. HY ETFs trade in a second medium away from the OTC bond market – the exchange – and creations or redemptions are typically implemented through the in-kind exchange of bonds for shares described earlier, but only when the relationship between the market price of the fund and the basket dictates. When a traditional pooled vehicle receives a redemption order, it may fund the redemption in one of two possible ways: (i) by using cash on hand in the fund; or (ii) by liquidating positions in order to raise cash. In a pronounced selloff, such a vehicle is likely to exhaust cash on hand relatively quickly and subsequently be forced to liquidate

HY holdings in order to fund additional redemptions. In a truly impaired OTC high yield market, this behavior may very well pressure the underlying market further, particularly as more liquid positions are sold off and less liquid or more concentrated positions are put out for bid. As discussed previously, active pooled vehicles typically have greater holdings concentration than passive index-based vehicles as security selection is one source of alpha generation.

What differs between a HY ETF such as HYG and a comparable HY pooled fund are the ability of the ETF to trade in a second venue (the exchange) and the in-kind creation/redemption mechanism. The transparency and efficiency of the exchange allows for the market price of the ETF to move to a clearing level much more rapidly than the underlying cash bond market under impaired liquidity conditions. This attribute may result in larger optical premiums or discounts to NAV in volatile markets as the ETF will tend to re-price rapidly while the underlying OTC market may struggle as trading becomes asymmetric or impaired.

In a falling market, a HY ETF should rapidly re-price to a discount to NAV as index values will likely lag given the relative lack of liquidity in the OTC market. The size of this discount and whether or not bonds are ultimately exchanged for shares will be a function of the size of liquidity disparity in the underlying market at that time. As an ETF's market price moves lower, APs are able to compare that market price with the price of the redemption basket (i.e., where they believe that they could liquidate the bonds should they elect to exchange shares for bonds). In a deteriorating HY market, the ETF price could drop significantly as APs realize that they will be attempting to liquidate redemption basket bonds in an impaired market. It is important to note, however, that this price action should not be dissimilar from how APs would mark bonds on a bid list received from a non-ETF client such as a mutual fund or hedge fund in the same market.

The ETF price would likely move lower until either APs gain confidence with regard to their ability to trade the underlying bond basket, or until other investors decide that the price level at which the HY ETF is trading represents an attractive entry point. In the latter case, the transactions will occur on the exchange rather than in the underlying bond market. Only when APs develop greater certainty with respect to their ability to trade the underlying bonds will a share redemption occur. A redemption may ultimately result in bonds trading in the market, assuming that APs will want to liquidate the resulting positions as soon as possible. Unlike a traditional pooled vehicle, the exchange essentially provides a buffer between the immediate selling pressure experienced by the ETF and the OTC bond market. Furthermore, any eventual redemption – assuming that it is in-kind – should shield remaining fund investors from the trading costs associated with liquidating the bond positions, though ETF investors will still realize mark-to-market volatility through the behavior of the market price. In other pooled structures, however, investors who elect to remain invested face the possibility of having a mark-to-market loss converted to a realized loss. In such a structure, redeeming investors will be paid NAV while positions liquidated to fund those redemptions may potentially trade at levels below NAV, particularly in highly volatile and dislocated markets.

3 Source: BlackRock, Bloomberg as of 9/30/12

Will HY ETFs Accelerate a Downturn in HY? (continued)

Accordingly, a pronounced selloff in the high yield markets may impact longer term ETF investors (i.e., investors who elect not to sell during such an event) to a lesser extent than longer term investors in other pooled vehicles such as mutual funds or collective trust funds.

A Changing OTC Market & Potential Impacts on HY ETFs

One frequently asked question is how HYG might perform in the next down credit cycle given changes in OTC market structure. An important difference between today's OTC market and the OTC market pre-financial crisis is that APs are much more constrained in their ability to inventory bonds on balance sheet (see Figure 2) due to more stringent capital rules (Basel III) and the implications of the Volker Rule/Dodd Frank on warehousing activity. Increased capital requirements raise the hurdle rate for inventory while the strictest interpretation of the Volker Rule would severely limit the ability to inventory bonds as large inventory positions may be construed as serving a proprietary function. In theory, this could result in larger premiums and discounts than what would have been observed in pre-crisis market cycles as APs would only agree to a share creation or redemption if there was a high degree of confidence in the value of and ability to transact in the underlying bond inventory. At the limit, if the HY market is completely impaired, there can be no actionable creation or redemption and the exchange would ultimately determine the value of the ETF's portfolio. In such an environment, the observed ETF price action would likely be similar to that observed in closed end funds.

Figure 2: Broker-Dealer Bond Inventory 2007 – 2012

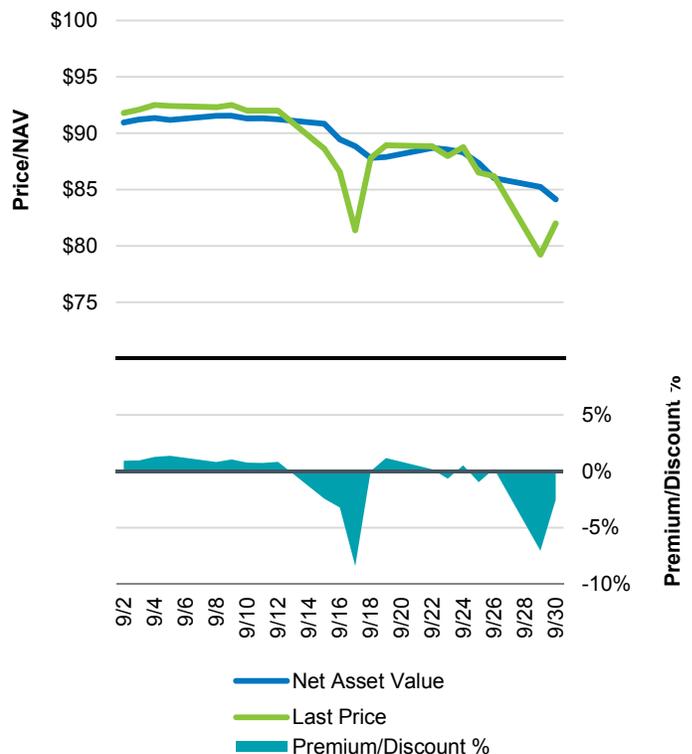


Source: Bloomberg as of 9/30/2012

In this absence of a functioning OTC bond market, does this mean that the price of a HY ETF will fall uninterrupted? September 2008 provides for an interesting test case. The OTC credit markets were severely impaired during this period as trading volumes collapsed and bid/offer spreads widened sharply. During this time, OTC liquidity was severely constrained and therefore share redemption was challenging. While the market price of HYG certainly fell to a sharp discount relative to its NAV (see Figure 3), it ultimately found a clearing level despite the increased friction in executing an arbitrage trade vs. the underlying OTC market. In other words, at a

certain price level, buyers did in fact emerge and take the other side of the trade. Volumes in HYG went from an average daily volume ("ADV") of \$7 million in August to a peak ADV of nearly \$34 million during September.⁴ Despite conditions in the underlying OTC market, investors were still able to trade this bond portfolio at an actionable market price on the exchange.

Figure 3: HYG Premium/Discount September 2008



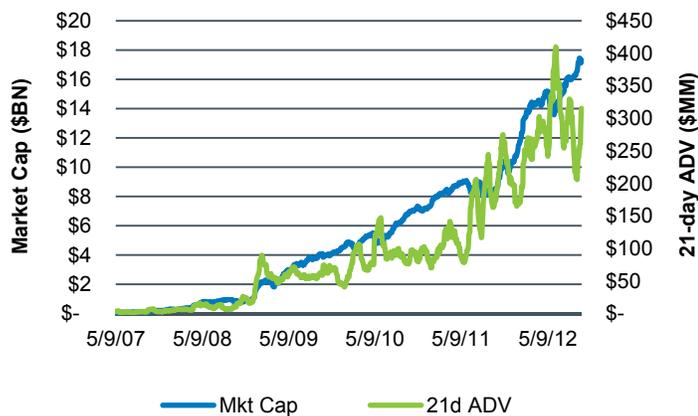
Source: Bloomberg

Please note that past performance does not guarantee future results. For standardized iShares Fund performance, please see Appendix

One relevant concern is that HYG was much smaller in AUM at that time (about \$1 billion compared with \$17 billion today). However, liquidity, as defined by average daily volume ("ADV") on exchange, has kept pace with AUM growth (see Figure 4). HYG now trades over \$300 million per day on average (nearly 50x the ADV observed in August 2008) and recently traded almost \$1 billion in a single day (HYG dollar volume touched \$943 million on 5/31/12)⁵. Interestingly, in each notable market dislocation (e.g., the Lehman bankruptcy in September 2008 and the US Treasury downgrade in August 2011), HYG ADVs have tended to increase, which can contrast with the underlying HY market. Another common concern surrounds concentration in the ETF investor base. In particular, a view is held that ETFs are mostly "retail" and are therefore subject to highly asymmetric flows (assuming that retail investors behave in a homogenous manner). However, the ETF investor base has diversified in the years following the financial crisis, as institutional usage continues to grow⁶.

⁴ Sources: BlackRock, Bloomberg

⁵ Source: BlackRock, Bloomberg. ADV cited is daily average in the month of September 2012

Figure 4: HYG \$ADV vs. Market Capitalization

Source: Bloomberg as of 9/30/2012

Regardless of the way in which HY bonds are held, a sharp negative shift in investor sentiment will likely result in an increased supply of HY bonds in search of a clearing level. This is the case whether investors seek to sell individual HY bonds, whether a mutual fund or hedge fund seeks to sell portfolio holdings in order to fund redemptions, or whether APs seek to liquidate bond inventory as a result of HY ETF redemptions. All HY exposure vehicles face the same underlying HY market. However, as observed above, only the ETF provides an additional medium for trading and liquidity. In a more extreme scenario in which APs are severely constrained in their ability to position bonds in order to facilitate liquidity, ETFs may continue to trade on exchange at a clearing level while the same underlying exposures may not be actionable in the OTC market. Ultimately, the ETF market price on exchange simply reflects conditions in the underlying OTC bond market under both normal and stressed market situations.

Conceptual Framework for HY ETF Trading Behavior

Nonetheless, the market price action of HYG under stressed market conditions may cause concern among investors who will correctly observe that index values and NAVs are not falling as quickly as the price of HYG due to impaired trading in the underlying OTC market. Given the increasing prominence of HYG and other HY ETFs, can we develop a framework to ascertain the potential behavior of HYG under highly stressed market conditions?

As the HY ETF market has only been in existence since 2007, the 2008/2009 financial crisis and the less dramatic 2011 post US Treasury downgrade selloff are the only meaningful examples of stressed markets that we have seen thus far. During September 2008, HYG fell to a maximum discount of 8.4% and JNK fell to a maximum discount of 4.3%. In August 2011, these numbers were 3.7% and 3.5%, respectively. However, we can examine other similar instruments, and by observing how HYG behaved relative to those instruments since inception, we may postulate how it might behave in future cycles. HY ETFs are instruments which trade in a continuous two sided market on exchange and therefore re-price very rapidly. Two other instruments, each of which share one, but not both of these attributes are:

- ▶ **HY CDX:** CDX is generally the most liquid instrument in the high yield market, as liquidity is provided by a large number of broker-dealers and trades of \$100 million or more can be readily executed. As a swap contract, CDX is traded over the counter and participants in the market have varying degrees of price transparency and differing levels of access to liquidity.
- ▶ **HY Closed End Funds (“CEFs”):** Closed end funds have varying levels of liquidity. CEF liquidity is generally a function of demand for the fund, the supply of shares of the fund outstanding, and the perceived valuation of the underlying portfolio relative to where the shares are trading. CEFs do trade on an exchange and available liquidity is readily visible.

Despite recent dislocations and concerns around liquidity, CDX remains the most liquid exposure vehicle for credit. While often diverging from the underlying cash bond market (i.e., the cash/CDS basis), CDX does re-price rapidly due to its high level of liquidity. HY Closed End Funds, while not nearly as liquid as HY ETFs and especially CDX, do trade on exchange. CEFs have a fixed number of shares outstanding and are often levered. Accordingly, they will often trade at large premiums or discounts to NAVs depending on market volatility and supply/demand conditions. Because HY index ETFs are unlevered and ultimately have the ability to increase or decrease shares outstanding in response to market forces, it is reasonable to assume that they should experience less severe premiums or discounts than comparable CEFs. As noted previously, many fixed income securities do not trade every day, particularly in markets such as municipals and high yield. Bond index values (and NAVs) are based on a mix of actual execution prices for securities which did trade on a given day and estimates of value (typically based on some form of matrix pricing methodology) for those securities which did not. In periods of volatility and market dislocation, trading volumes may recede further and index values and NAVs may therefore react more slowly to sudden shifts in market sentiment (as a greater percentage of security values are based on estimates rather than actual trades).

Conceptually, a HY ETF's price behavior should lie somewhere between an identical open end index mutual fund (which trades only at NAV) and an identical HY CEF. Since perfect stand-alone comparables to HYG in mutual fund and CEF space do not exist, we selected the Barclays High Yield index as a proxy for a broad HY index mutual fund and HYT, the BlackRock Corporate High Yield Fund VI, a CEF, for the CEF comparable. We include CDX to show the relative volatility of an instrument that, like HYG, quickly absorbs new market information. Figures 5 and 6 depict the market price of the on-the-run 5yr HY CDX contract, the market value of the Barclays HY index, the market price of HYG, and the market price of HYT during September 2008 and August 2011. The option adjusted spread (OAS) of the Barclays High Yield index is superimposed to provide context. As these charts illustrate, HYG's price appeared to lead the index, but generally resided between the index and the CEF during these periods of market stress. The CDX contract exhibited significant dislocation relative to the cash market in 2008, but behaved much more in context with the ETF and CEF in 2011. These charts illustrate that the HYG, HYT and CDX generally re-price more rapidly than the high yield index (though the CDX basis dislocation was evident in 2008).

Figure 5: September 2008

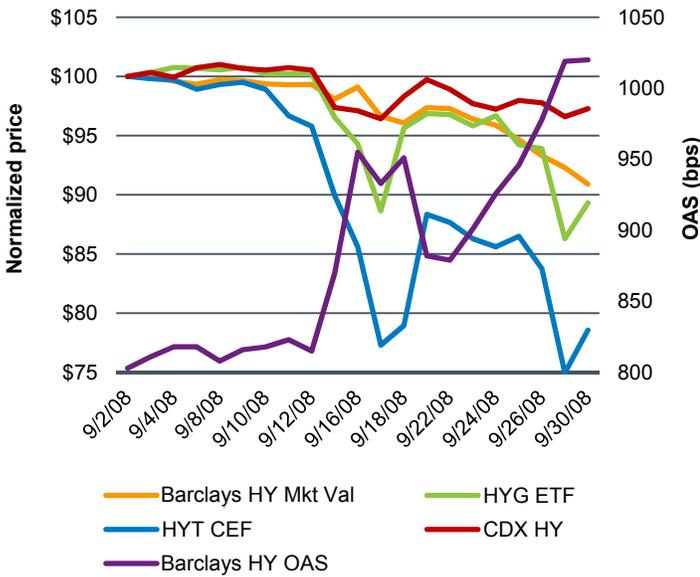
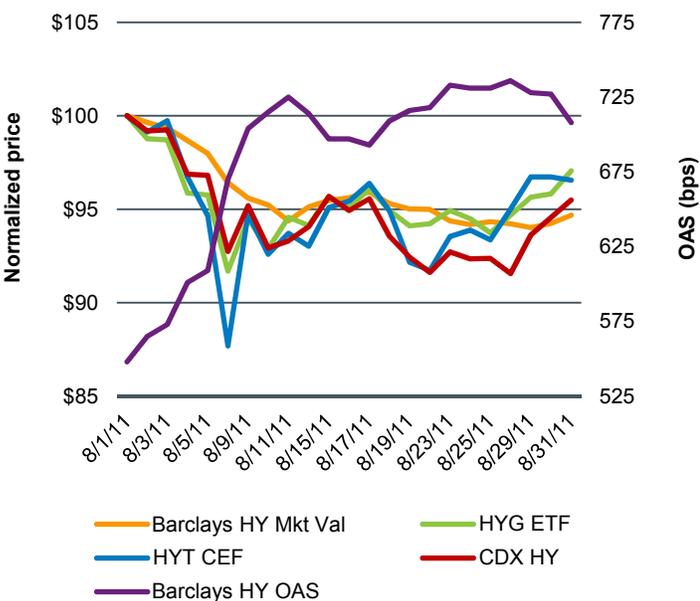


Figure 6: August 2011



Index performance is for illustrative purposes only and do not represent actual iShares Fund performance. Index performance does not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Past performance does not guarantee future results. For standardized performance for HYG and HYT, please see Appendix

Empirical Analysis of HYG Price Behavior

We have now outlined the basic elements of a conceptual model of HYG price behavior, which is that HYG should trade in context with other HY market exposure vehicles such as HY indices, CEFs and CDX. The regression below shows the

relative impact of the price returns of these exposures on the market price returns of HYG from April 12, 2007 to September 30, 2012:

- ▶ **HYG_ret_t**: Coincident Price return on HYG
- ▶ **Index_ret_t**: Coincident market value return on the Barclays US HY Index
- ▶ **CEF_ret_t**: Coincident Price return of CEF (ticker HYT)
- ▶ **CDX_ret_t**: Coincident Price return of the on-the-run 5yr CDX.HY contract

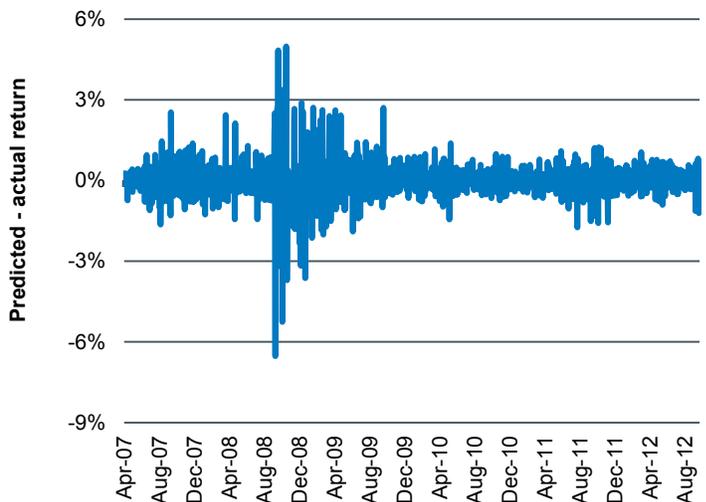
Price Return Model: Summary Statistics

Adj R-square	0.5181
Standard error	0.0072

	Coefficient	t-Stat
Index_ret _t	0.309	7.9
CEF_ret _t	0.250	18.8
CDX_ret _t	0.405	13.8

As evidenced by the Adjusted R-square measure, this model explains 52% of the variation in HYG market price return behavior and all of the variables are statistically significant (particularly CEF and CDX returns). The interpretation of this model is that roughly 31% of the index price return, 25% of the CEF price return, and 40% of the CDX price return on a given day are reflected in that day's price return for HYG. Unfortunately, as Figure 7 depicts, this model does not perform as well from a predictive standpoint during the 2008 crisis (not surprising given that 48% of the variation is unexplained by the model), but performs better during the post UST downgrade period of August through October 2011.

Figure 7: Actual vs. Predicted HYG Price Returns



Source: BlackRock, Bloomberg, JP Morgan, Barclays

We may also try to more directly model HYG premium/discount behavior by examining the behavior of CEF premium/discount moves and CDX price moves:

- ▶ **ΔHYG_P/D:** Coincident change in HYG premium/discount level
- ▶ **ΔCEF_P/D:** Coincident change in CEF premium/discount level (ticker HYT)
- ▶ **CDX_ret_t:** Coincident Price return of the on-the-run 5yr CDX.HY contract

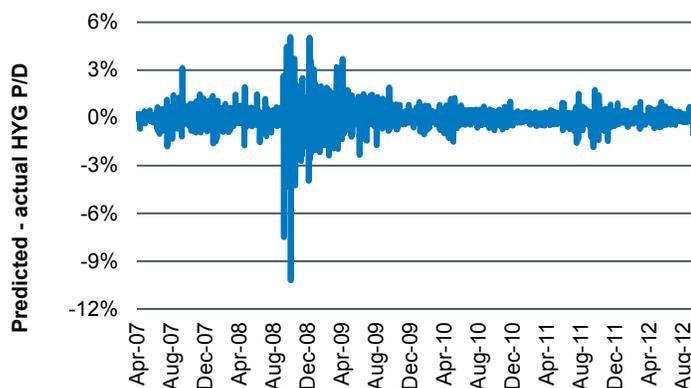
Premium/Discount Change Model: Summary Statistics

Adj R-square	0.3638
Standard error	0.0080

	Coefficient	t-Stat
ΔCEF_P/D	0.286	18.2
CDX_ret _t	0.352	11.6

As evidenced by the Adjusted R-square measure, this model explains 36% of the variation in HYG premium/discount behavior and all of the variables are statistically significant. The interpretation of this model is that roughly 29% of the change in CEF premium/discount and 35% of the CDX price return on a given day are reflected in that day's change in HYG's premium/discount. This model does a poor job from a predictive standpoint during the 2008 crisis but improves somewhat during the post UST downgrade period of August through October 2011. (See Figure 8).

Figure 8: Actual vs. Predicted Changes in HYG Premium/Discount



Source: BlackRock, Bloomberg, JP Morgan, Barclays

Rather than serve as predictive models, these constructs validate the prior conceptual framework that the behavior of HYG either from a price return or premium/discount perspective is in the context of other market exposure vehicles such as CDX and CEFs (as evidenced by the statistical significance of these variables relative to HYG). And while these models tend to under-predict the severity of movements in HYG during periods

of more elevated market volatility, we cannot conclude that HYG behaved out of context with other exposure vehicles during these periods. As hypothesized, HYG's behavior was bracketed by the behavior of broader indices, CDX and the designated CEF.

Conclusion

The explosive growth of bond ETFs, and HY ETFs in particular, has raised questions as to the ultimate impact that these products could have on the underlying OTC HY market. Concerns are focused on three main themes: (i) do HY ETFs create distortions in the behavior of the bonds tracked by the funds; (ii) do HY ETFs create the potential for an acceleration effect in a down HY market; and (iii) will HY ETFs dislocate in an irrational or unexplainable manner during a pronounced HY market selloff in which OTC liquidity becomes impaired, particularly given the increasing capital and liquidity constraints faced by broker-dealers and APs.

The first and second points are inter-related and we note that many claims surrounding the interaction between ETFs and the underlying market are based on a less than complete understanding of the mechanics of ETFs. First, bond market indices in general and credit indices in particular are not perfectly investable due to liquidity constraints and are therefore sampled and not fully replicated by ETFs. Accordingly, ETFs are not forced buyers or sellers based upon index composition changes or fund flows (due to the degrees of freedom inherent in sampling). Second, unlike a traditional open end structure in which subscriptions or redemptions drive trades in the underlying bond market, whether bonds enter or leave an ETF through a creation or redemption (and ultimately trade in the bond market) is driven by arbitrage relationships between the value of OTC constituents and the ETF market price. On many days, HY exposure changes hands on exchange through the ETF while never resulting in OTC market activity. Third, ETFs are relatively diverse and fund inflows/outflows are ultimately spread among large numbers of positions. Finally, HY ETFs are still relatively small in terms of assets under management and OTC trading activity (driven by creation/redemption activity) relative to the overall HY market. Recent empirical research suggests that, thus far, there does not appear to be a statistically significant impact of creation/redemption activity by HYG on the bonds that it tracks. While HYG tracks a more liquid subset of the HY market (which is traded by a large cross section of investors away from ETFs), the empirical evidence suggests that this market, with respect to the broader HY market, has been unaffected by the advent of ETFs.

During recent periods of dislocation (e.g., September 2008 and August 2011), HYG behaved in context with other HY exposure vehicles and market indicators, such as CDX, closed-end funds, and HY cash indices despite liquidity impairment in the underlying OTC bond market. Unlike other HY exposure vehicles, the bonds underlying HYG effectively trade in two markets – the exchange and the OTC market. These markets are kept in sync through the creation/redemption mechanism and the ability of market participants to trade HYG vs. other correlated exposures. The exchange effectively serves as a buffer between trading in the ETF and the OTC market. Although HYG is much larger today than it was in September 2008, liquidity on exchange has kept pace. HYG's absolute size is likely less important than its size relative to the level of exchange liquidity, which has remained relatively stable at around 2% of AUM.

Conclusion (continued)

On the third point we note that, even in the event that the OTC market is severely impaired, exchange level trading may still provide a market clearing mechanism in which investors could transfer risk and ascertain value in the underlying bond portfolio through the ETF structure.

While we cannot completely anticipate the nature and underlying drivers of a future pronounced dislocation in the HY market, we believe that ultimately HYG will behave in a manner that appropriately reflects conditions in the underlying market while still permitting investors to trade HY exposure through the exchange. The majority of the criticism levied at HYG and other fixed income ETFs seems to stem from an incomplete understanding of ETF mechanics and behavior, and is largely unsupported by empirical evidence thus far. As more investors come to understand fixed income ETFs and their role in and relationship with the rest of the fixed income market, we anticipate that many of these misconceptions will be alleviated and that the acceptance and use of ETFs as an exposure vehicle and risk management tool will continue to expand.

References

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Standardized Fund Performance as of 9/30/2012

Fund name	Fund inception date	30-Day SEC Yield (as of 09/30/12)	1-yr	5-yr	10-yr	Since inception
iShares iBoxx \$ High Yield Corporate Bond Fund (HYG)	4/4/2007	5.45%				
Fund NAV Total Return			19.05%	6.85%	--	6.51%
Fund Market Price Total Return			19.75%	6.31%	--	6.45%
Index Total Return			19.34%	7.48%	--	6.99%
BlackRock Corporate High Yield Fund VI, Inc (HYT)	5/30/03	N/A				
Fund NAV Total Return			23.64%	8.63%	--	9.86%
Fund Market Price Total Return			35.78%	12.45%	--	9.97%

The performance quoted represents past performance and does not guarantee future results. Investment return and principal value of an investment will fluctuate so that an investor's shares, when sold or redeemed, may be worth more or less than the original cost. Current performance may be lower or higher than the performance quoted. Performance data current to the most recent month end may be obtained by calling toll-free 1-800-iShares (1-800-474-2737) or by visiting www.iShares.com.

Shares of funds are bought and sold at market price (not NAV) and are not individually redeemed from the Fund. Brokerage commissions will reduce returns. Market returns are based upon the midpoint of the bid/ask spread at 4:00 p.m. eastern time (when NAV is normally determined for most funds) and do not represent the returns you would receive if you traded shares at other times.

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Investing involves risk, including possible loss of principal. Bonds and bond funds will decrease in value as interest rates rise and are subject to credit risk, which refers to the possibility that the debt issuers may not be able to make principal and interest payments or may have their debt downgraded by ratings agencies. High yield securities may be more volatile, be subject to greater levels of credit or default risk, and may be less liquid and more difficult to sell at an advantageous time or price to value than higher-rated securities of similar maturity.

Information on SPDR Barclays High Yield Bond ETF, HY CDX and BlackRock Corporate High Yield Fund VI is provided strictly for illustrative purposes and should not be deemed an offer to sell or a solicitation of an offer to buy shares of any funds or security other than the iShares Funds, that are described in this material. Bond ratings referenced are measured on a scale that generally ranges from AAA (S&P highest) or Aaa (Moody's highest) to D (S&P lowest) or C (Moody's lowest). **Index returns are for illustrative purposes only and do not represent actual iShares Fund performance. Index performance returns do not reflect any management fees, transaction costs or expenses. Indexes are unmanaged and one cannot invest directly in an index. Past performance does not guarantee future results.**

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