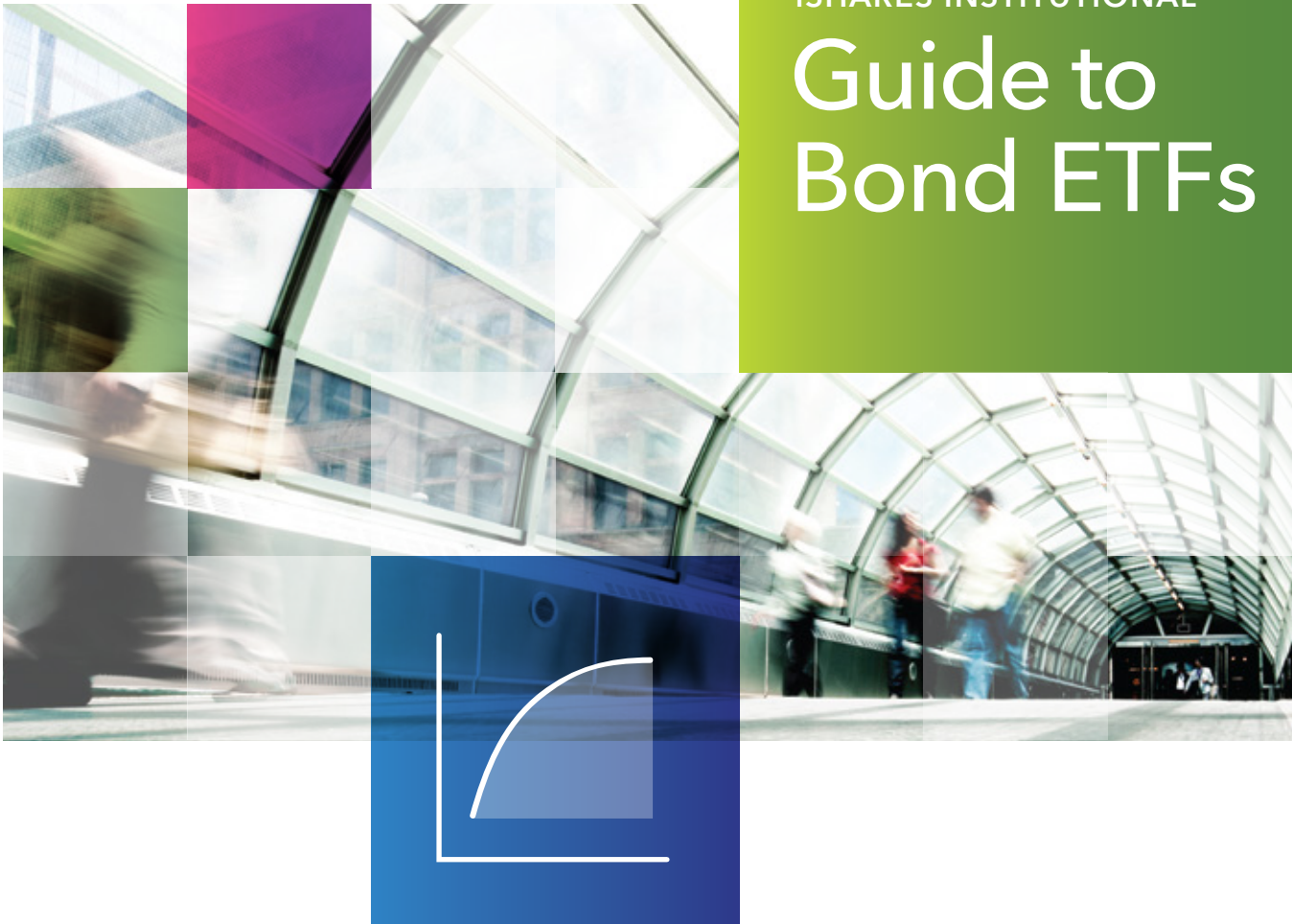


iShares®
by BLACKROCK®

iSHARES INSTITUTIONAL

Guide to Bond ETFs



iShares Client Services

Powered by the collective intelligence of BlackRock

The iShares Client Services platform harnesses the power of BlackRock's resources and technology to facilitate every aspect of the iShares experience.



Researching ETFs and
building portfolios

BlackRock
Investment
Institute

Backed by
Aladdin®
technology

800+

iShares ETFs
globally



Minimizing the cost
of trading ETFs

1,800+

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professionals



Managing portfolios
in changing markets

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Guide to Bond ETFs

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Markets on demand

Today, technological advances are rapidly transforming finance. Old operating models are being rethought and modernized. We see this disruption occurring within the fixed income industry, and it could not come soon enough. After all, investors can no longer rely exclusively on the old bond trading model to meet all their liquidity needs. Seismic regulatory shifts have reduced large banks' balance sheets, constraining their ability to hold inventory and support market liquidity. As a result, it has become harder and more costly for investors to source bonds and to quickly adjust their portfolios.

The old model no longer works.

Fortunately, bond ETFs allow investors to access bonds without having to rely on bank intermediation. With an ETF, large portfolios of bonds are packaged, standardized and made tradeable via a single security on an equity exchange. Through the ETF, investors can gain liquid, low-cost bond exposure without the structural challenges of the over-the-counter ("OTC") market.

Bond ETFs offer the markets on demand, providing diversified access to broad and narrow exposures in a single trade. Simple, fast and efficient, ETFs can act as investment building blocks to augment existing portfolios or build highly customized strategies from the ground up.

**Bond
ETF
market**

\$501_b

U.S. bond ETF
industry AUM¹

315

Number of bond
ETFs industry-wide¹

70%

iShares share of
ETF industry
trading volume²

1. Source: BlackRock Global Business Intelligence, Bloomberg, as of 6/30/17.

2. Source: Bloomberg, as of 6/30/17. "iShares share of ETF industry trading volume" based on total trading volume in U.S.-listed bond ETFs for trailing 12-month period.

Institutional investors are increasingly recognizing the benefits of bond ETFs. In the three years since we first published this guide, a diverse set of asset managers, insurers and pensions have adopted ETFs for the first time. Even active bond buyers are supplementing portfolios of individual issues with bond ETFs in order to quickly capitalize on investment opportunities.

Going forward, we believe the simplicity and efficiency of ETFs will lead every type of fixed income investor to consider bond ETFs. *The Guide to Bond ETFs* is designed to offer the tools and resources necessary for institutions to integrate ETFs into their investment strategies.

“ *Simply put, bond ETFs offer markets on demand.* **”**

Stephen Cohen

Global Head of BlackRock's Fixed Income Beta Business

33%

10-year annualized
growth rate in bond
ETF assets¹

32%

10-year annualized
growth rate in bond
ETF trading volume²

23^x

Asset growth of
5 largest credit
ETFs since 2008³

93^x

Trading volume growth
of 5 largest credit ETFs
since 2008³

3. Source: Bloomberg, as of 6/30/17.

Bond ETFs: The basics

Bond ETFs are typically 1940 Act funds consisting of a portfolio of bonds that are traded intra-day on an exchange, like an equity security. iShares bond ETFs are generally fully funded, unlevered vehicles that hold cash bonds.

Most bond ETFs seek to track indexes that follow specific segments of the bond market, such as government, investment grade corporate, high yield corporate or emerging market bonds.

Rather than trading individual bonds in the over-the-counter ("OTC") market, investors can access these exposures by purchasing a bond ETF on an exchange. Doing so may lower the cost of trading while providing real-time pricing information.

Institutional investors use bond ETFs as core long-term investment holdings, as tools for tactical exposures and as liquidity instruments that can help improve access to markets or act as substitutes/complements to credit derivatives.

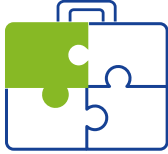
Bond ETFs provide the trading benefits of equities and the diversified exposure of a bond portfolio.

Bond ETF features



Exchange listed
like an equity

Diversified like a
portfolio of bonds



Bond ETFs

Primary uses



Long-term core
investments



Tactical
exposures



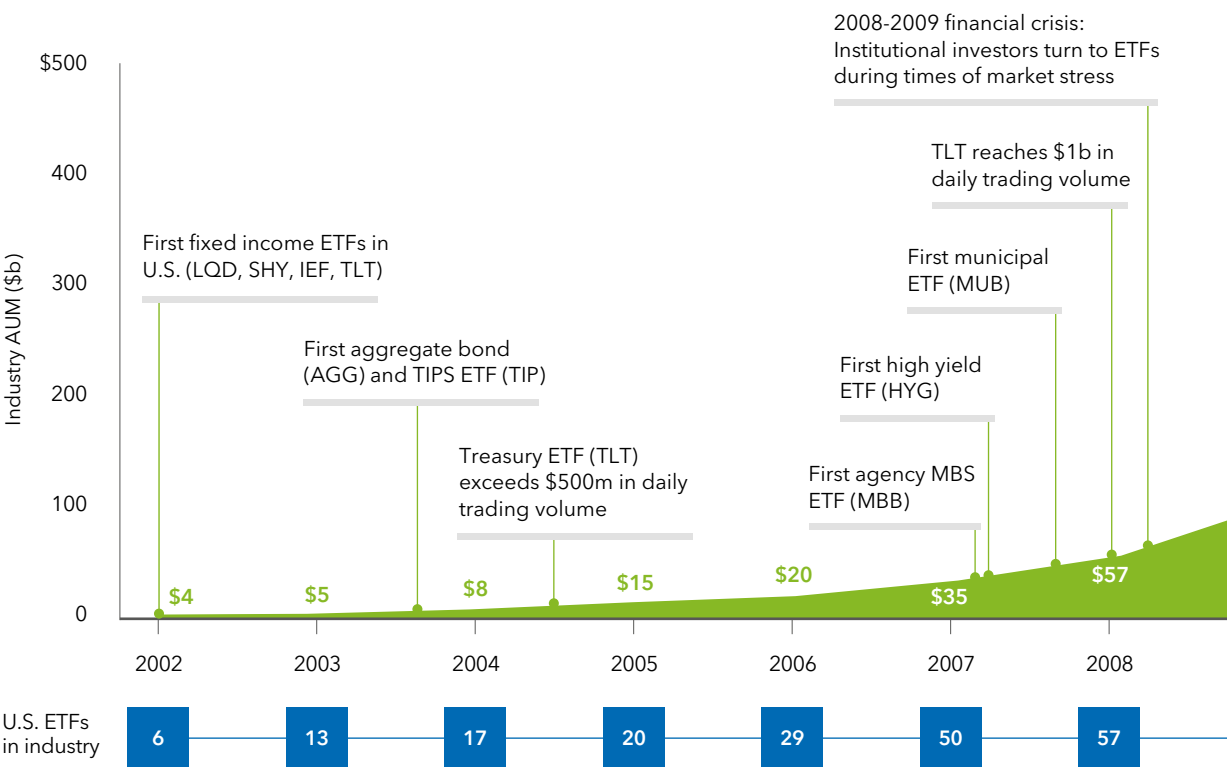
Liquidity
instruments

The evolution of bond ETFs

Following their introduction in 2002, bond ETFs were primarily used by individual investors and wealth management firms as a way to access bond markets that were often inaccessible to smaller investors. This was reflected in the relatively low trading volumes and fund sizes of the bond ETF industry prior to 2008.

As bond markets became entangled with the financial crisis of 2008-2009, the opaque trading environment in OTC markets prompted institutional investors to look for alternative methods to gain fixed income exposure. They found a potential solution in ETFs.

U.S. bond ETF AUM and iShares ETF milestones¹

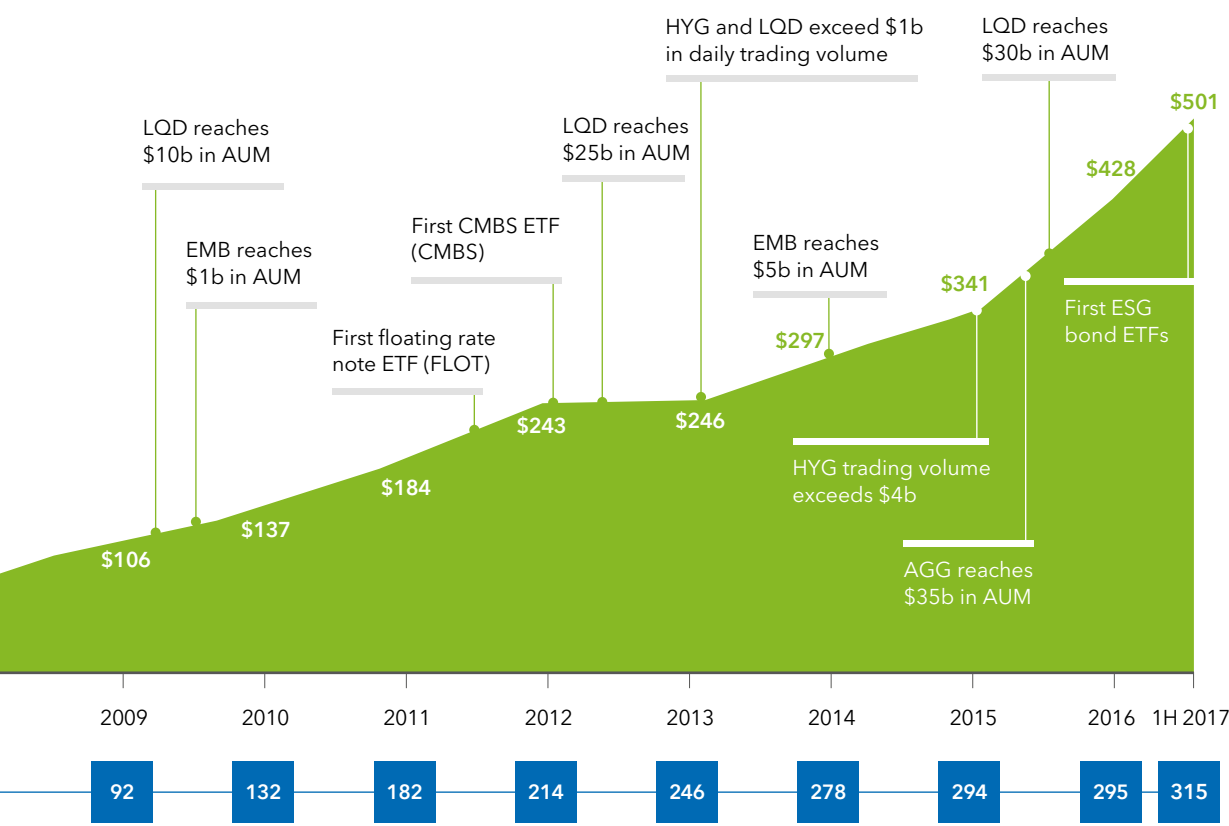


1. Source: BlackRock Global Business Intelligence, Bloomberg, as of 6/30/17.

Assets have climbed approximately **779%** since the end of 2008 to over **\$501** billion as investor adoption has increased and usage has broadened.

In the past several years, there has been a continued increase in the adoption of bond ETFs by institutional investors, driven by growth in fund size, deepening liquidity and a widening breadth of new exposures.

Today, a wide cross section of investors—including asset managers, insurance companies, pension funds, foundations and endowments—are pioneering new investment approaches using ETFs to gain fixed income exposure.



Still in the early stages of expansion, the U.S. bond ETF market represents approximately **1%** of the **\$50** trillion U.S. fixed income market.

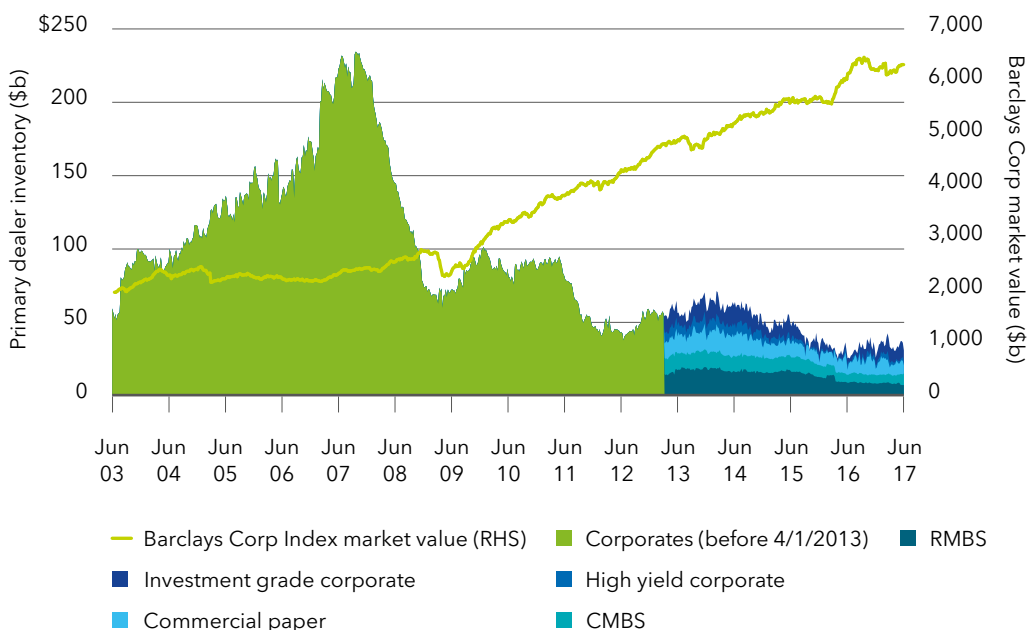
A need for solutions to bond market liquidity challenges

Investors face a number of liquidity challenges in the corporate bond market. Liquidity, measured by both trading volumes and average trade size, has been declining since 2007.¹

At the same time, the 2008 financial crisis and subsequent reforms such as the Volcker Rule and Basel III Accord have led to a reduction in the amount of capital that banks, brokers and other traditional liquidity providers commit to support secondary bond trading. This further reduced the tradable supply of bonds, impacting investors' ability to buy and sell specific issues.

In addition, the OTC corporate bond market is highly fragmented—dozens or even hundreds of unique securities are issued by the same entity. This fragmentation dilutes security-level liquidity as investors are forced to grapple with a myriad of bonds from a given issuer with different coupon levels, seniority, call features and maturity dates.

Falling bond inventory at broker dealers²



1. Source: FINRA TRACE, Bank of International Settlements, *Fixed Income Market Liquidity*, as of 1/31/17.

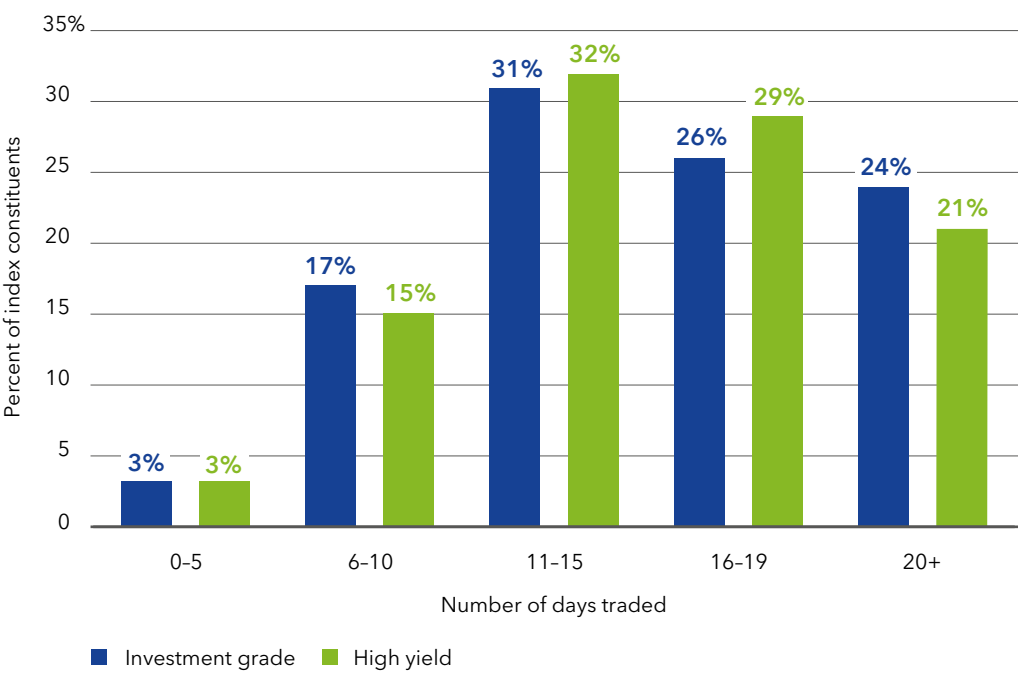
2. Source: Federal Reserve Bank of NY, Barclays, as of 6/30/17.

As a result, many bonds face discontinuous liquidity, where some individual securities trade infrequently, or not at all, during a given month. Finding actionable bids and offers in volatile markets can be difficult, especially when less than one-third of large corporate bonds trade daily.

To mitigate these challenges, many institutional investors are turning to bond ETFs as simpler solutions to access fixed income markets.

Most large corporate and high yield bonds do not trade daily

Frequency of bond trades: 2016 monthly average



Source: BlackRock, Markit iBoxx, FINRA TRACE. Data from 1/1/16–12/31/16 for the Markit iBoxx \$ Liquid Investment Grade Index. There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.

Institutions are adapting to the changing market environment

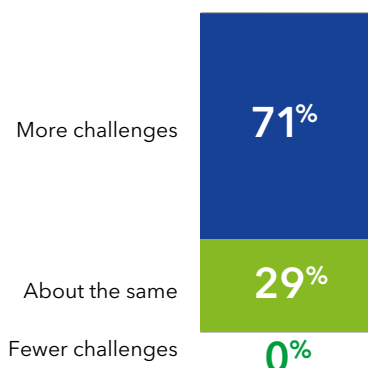
In 2016, Greenwich Associates conducted a study of institutional fixed income investors to determine if the liquidity changes in the fixed income markets were affecting their investment processes and what role bond ETFs were playing in their portfolios.

Greenwich interviewed 104 U.S.-based investors representing over \$10.3 trillion in assets, including pensions, foundations, endowments, asset managers, insurers and registered investment advisors.

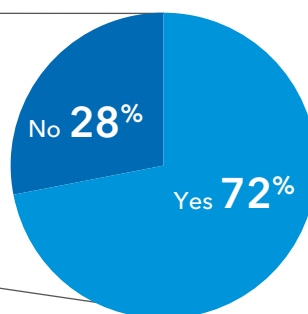
The study found that over 70% of institutions reported that trading challenges have forced them to adjust their portfolio management process and consider bond ETFs.

Investors face increased challenges trading bonds

Have you faced challenges in trading, liquidity or sourcing securities in fixed income markets?¹



Have the challenges affected your investment process?²



 GREENWICH ASSOCIATES

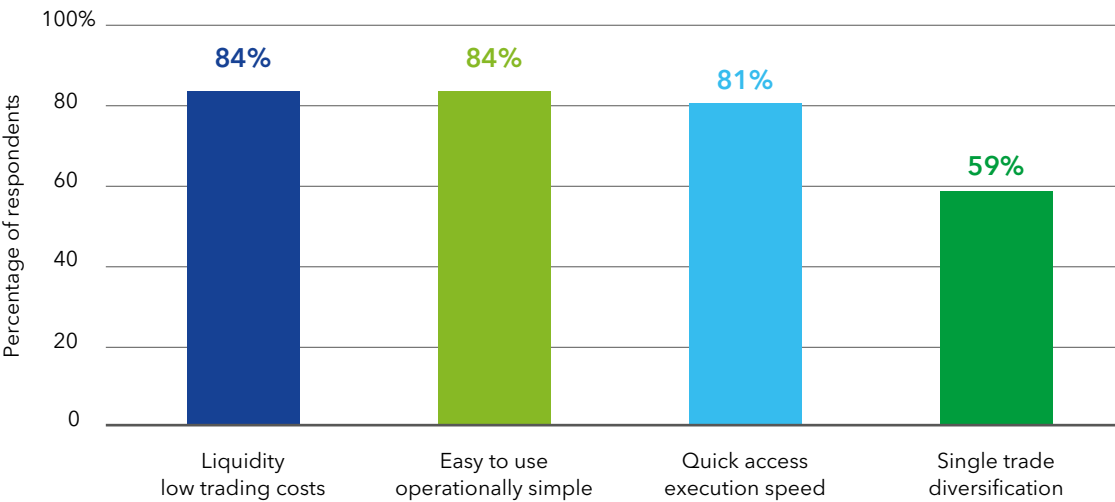
1. Based on 70 respondents in 2016.

2. Based on 46 respondents in 2016.

Source: Greenwich Associates 2016 U.S. Bond ETF Study: *Institutional Investors Embrace Bond ETFs*.

Some of the highlights of the study's findings included:

Top reasons institutions use bond ETFs



Increasing institutional adoption

68%
of bond ETF users have
increased ETF usage
in the last 3 years

1 in 3
investors plan to increase
their use of ETFs in the
coming 12 months

88%
of investors considered
replacing derivatives
with ETFs

Bond ETF trading experience

1 in 3
institutions have
executed trades larger
than \$50 million

95%
of ETF users were
satisfied with their
experience

99%
would execute a large
size trade again

Source: Greenwich Associates 2016 U.S. Bond ETF Study: *Institutional Investors Embrace Bond ETFs*.



CHAPTER

1

Benefits of Bond ETFs

Benefits of bond ETFs

ETFs offer a unique combination of potential benefits that investors can use to their advantage when building and managing an investment strategy.

While there are a multitude of applications, the potential benefits of bond ETFs can be distilled into four key attributes:



LIQUIDITY

ETFs may offer an additional source of liquidity for fixed income investors



FLEXIBILITY

ETFs enable a variety of broad and targeted exposures



COST EFFECTIVENESS

ETFs may provide significant transaction cost savings



EFFICIENCY

ETFs help overcome challenges in the OTC market

Liquidity

ETFs may offer an additional source of liquidity for fixed income investors

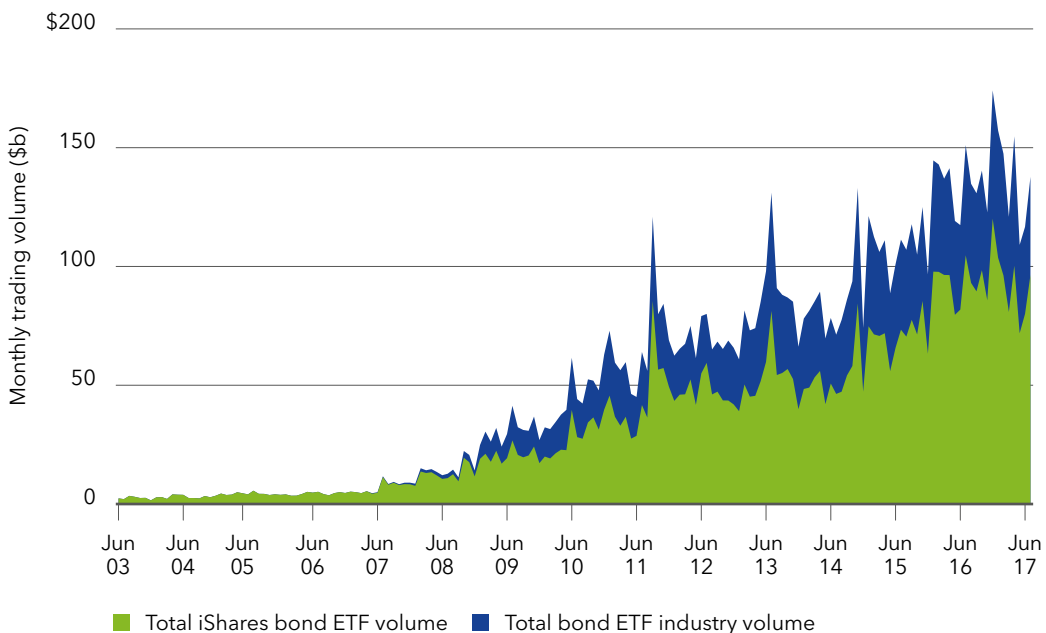
The growth of the bond ETF market has helped create a new source of liquidity for investors, above and beyond what can be accessed in the OTC market. Bond ETFs provide an additional trading venue—the exchange—where shares can be transferred among investors without sourcing securities from the OTC bond market.

An equity exchange connects buyers and sellers of an ETF without the need for an intermediary, such as a bank, to extend its own capital to facilitate trading.

In this way, bond ETF trading is independent from the cash bond market, and can act as an additional layer of liquidity for investors seeking bond exposure.

Today, trading in bond ETFs averages over \$150 billion a month, or approximately \$7 billion per day. iShares ETFs represent over 70% of total bond ETF industry trading volume.¹

ETFs have created an incremental source of bond liquidity



Source: BlackRock, Bloomberg, as of 6/30/17. For U.S.-listed ETFs only.

There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.

¹. Source: Bloomberg, as of 6/30/17. For U.S.-listed bond ETFs only.

Flexibility

ETFs enable a variety of broad and targeted exposures

ETFs allow investors to gain broad market exposure in a single trade or create highly customized solutions by targeting specific fixed income sectors.

Investors may quickly increase or decrease exposures to target sectors more precisely and efficiently through ETFs than they could otherwise accomplish using the OTC bond or derivative markets.

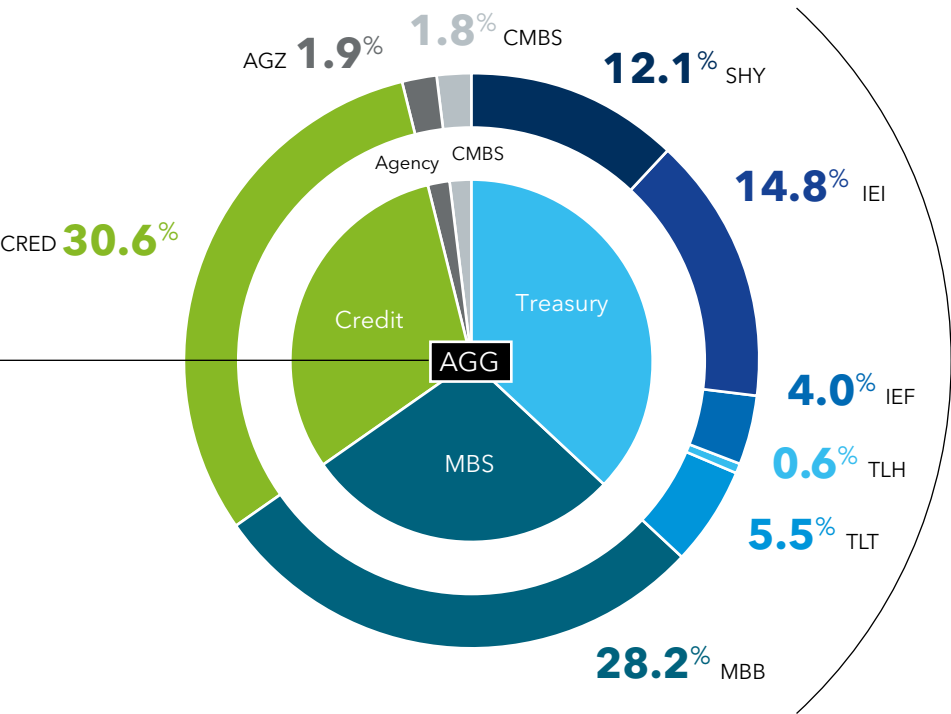
Bond ETFs offer exposure to nearly all sectors of the market including government, investment grade corporate, high yield corporate and emerging market bonds to help investors build customized solutions.

Investors of all sizes are using bond ETFs to gain access to diversified fixed income sectors.

Disaggregating the Bloomberg Barclays U.S. Aggregate Bond Index with ETFs

BROAD EXPOSURE

Build a portfolio in a single trade with iShares Core U.S. Aggregate Bond ETF (AGG)



TARGETED EXPOSURE

Create a customized portfolio with iShares ETFs that seek to track the individual components of the Bloomberg Barclays U.S. Aggregate Index. Holding the underlying components allows for tactical portfolio tilts.

- | | |
|--|---------------------------------------|
| ■ iShares 1-3 Year Treasury Bond ETF (SHY) | ■ iShares MBS ETF (MBB) |
| ■ iShares 3-7 Year Treasury Bond ETF (IEI) | ■ iShares U.S. Credit Bond ETF (CRED) |
| ■ iShares 7-10 Year Treasury Bond ETF (IEF) | ■ iShares Agency Bond ETF (AGZ) |
| ■ iShares 10-20 Year Treasury Bond ETF (TLH) | ■ iShares CMBS ETF (CMBS) |
| ■ iShares 20+ Year Treasury Bond ETF (TLT) | |

Source: Barclays, BlackRock, as of 6/30/17. This information should not be relied upon as research, investment advice or a recommendation regarding the Funds or any security in particular. This information is strictly for illustrative and educational purposes and is subject to change. This information does not represent the actual current, past or future holdings or portfolio of any BlackRock client.

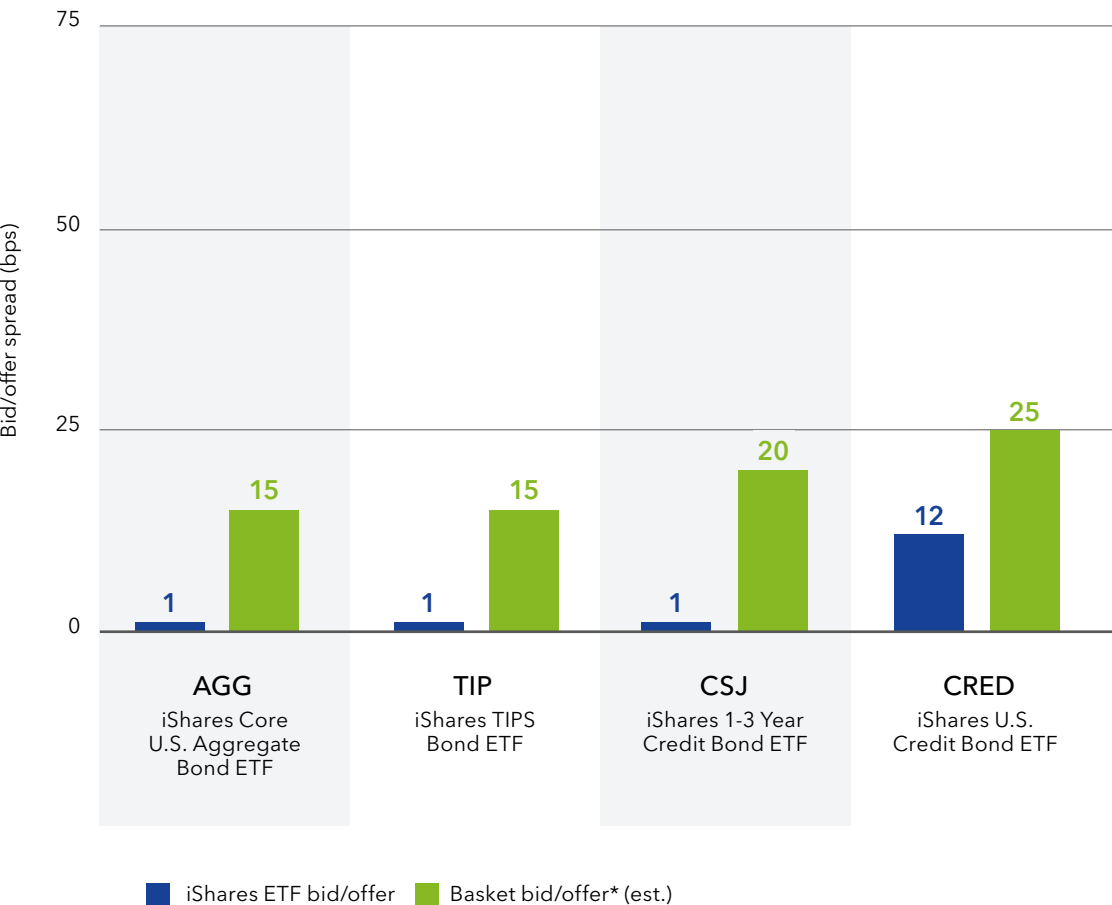
Cost-effectiveness

ETFs may provide significant transaction cost savings

iShares ETFs generally offer price improvement over buying an equivalent basket of cash bonds. ETFs bundle hundreds of bonds into a single exchange-listed security, which often makes them less expensive than transacting in the OTC market.

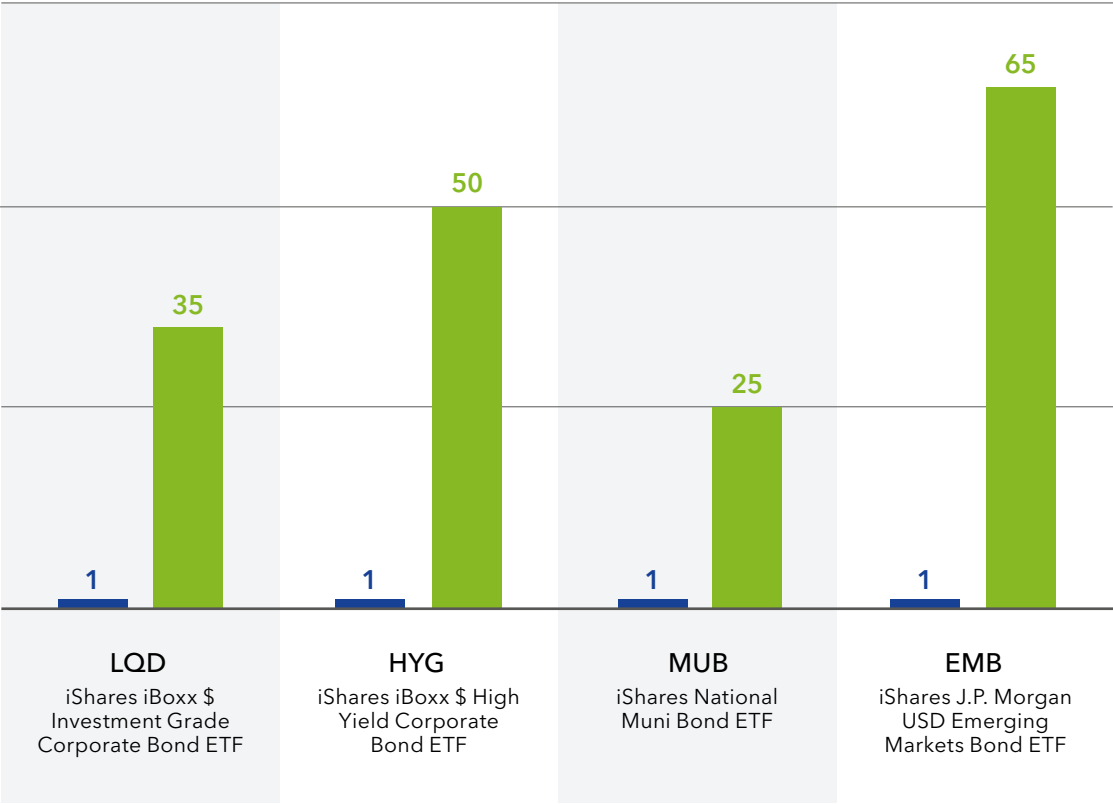
As illustrated below, the bid/offer spread for a variety of different bond ETFs is tighter than that of their underlying bond baskets.

ETFs may offer the potential for tighter trading spreads



For example, **iShares iBoxx \$ Investment Grade Corporate Bond ETF (LQD)** is 35 times more efficient to trade (1 bp versus 35 bps) than sourcing the underlying bonds that make up the ETF.

An ETF’s trade-cost advantage becomes more pronounced in less liquid sectors, such as high yield credit or emerging market debt. For investors seeking to add beta exposure to their portfolio, it may be more efficient to use an ETF rather than sourcing large baskets of bonds.



* Basket bid/offer spread refers to the underlying securities of the respective fund and is estimated by iShares portfolio managers. For illustrative purposes only.
Source: BlackRock, Bloomberg, Barclays, NYSE Arca, as of 6/30/17. There can be no assurance that an active trading market for shares of an ETF will develop or be maintained. Buying and selling shares of ETFs will result in brokerage commissions.

Efficiency

ETFs help overcome challenges in the OTC market

Investors face a number of challenges when seeking to trade bonds in the OTC market. First, it can be difficult to determine best execution. An investor can solicit market bids or offers from a selection of dealers, but has no way of knowing whether they executed at the best available price in the market.

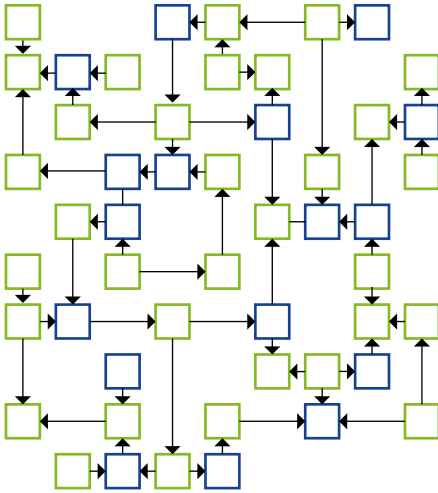
Second, OTC bond markets generally provide either the bid or offer price for a transaction, making it difficult to directly observe trading spreads.

Finally, lower dealer inventories and the fragmented nature of the bond market can make sourcing specific issues operationally intensive and time consuming.

ETF trading today offers a vision of the future state of the bond market with low-cost, transparent, electronic trading.

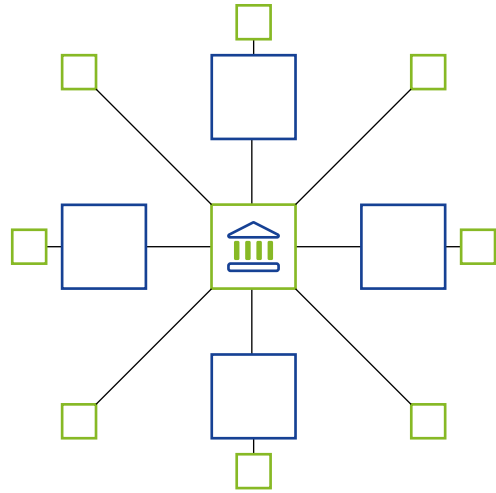
OTC bond markets

Fragmented marketplace



Exchange markets

Centralized marketplace



Exchange



Broker-dealer



Investor



For illustrative purposes only.

In contrast to bonds, bond ETFs are easily traded on centralized equity exchanges, such as the New York Stock Exchange. Trading bond ETFs does not always trigger any trading of the underlying bonds. Because they are exchange traded, bond ETFs provide potential cost savings and easier trading relative to buying individual bonds in the OTC market.

Furthermore, bond ETFs bring price transparency to bond trading. Through the exchange, investors can easily see execution prices of bond ETFs throughout the trading day. Unlike the OTC bond market, on-exchange trading provides a high level of visibility into trading volumes, two-sided market levels (both bid and offer) and transaction costs. It also offers investors more control over trade execution by allowing them to execute limit, stop-loss and short orders.



CHAPTER

2

ETF Pricing and Trading Mechanics

ETF creation/redemption process

The supply and demand balance of bond ETF shares is controlled by a unique mechanism called the creation/redemption process.

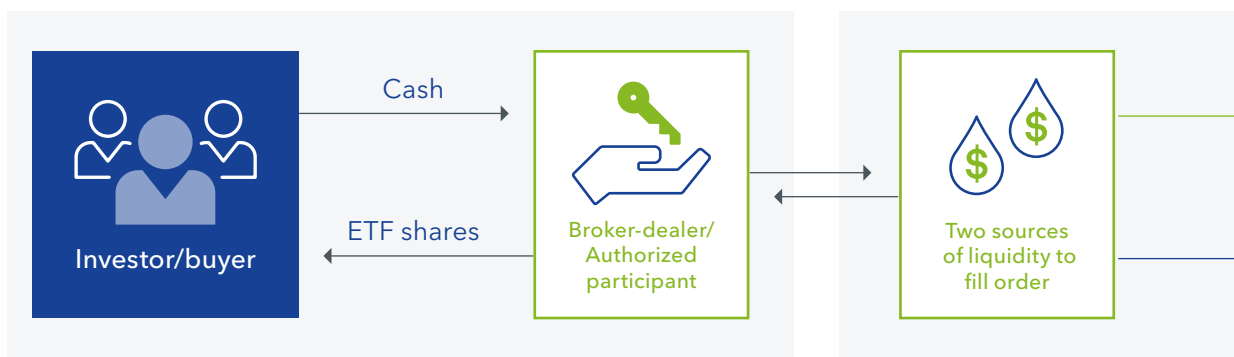
The creation/redemption process is run by Authorized Participants (“APs”). Each bond ETF has one or more APs, which are broker-dealers who create or redeem shares of the ETF. APs play an important role in the inventory management of ETFs, and generally work with both investors and ETF providers to help maintain liquidity in the market.

In particular, when demand for a bond ETF’s shares exceeds supply, an AP may purchase the underlying bonds in the OTC market and deliver these securities in-kind to BlackRock, which will then create new ETF shares. The AP will then deliver the shares to fill outstanding client orders.

ETFs have two sources of liquidity

Investor experience

Behind the scenes



Investor purchases a bond ETF listed on an exchange

For illustrative purposes only.

Shares of the iShares Funds may be bought and sold throughout the day on the exchange through any brokerage account. Shares are not individually redeemable from the Fund, however, shares may be redeemed directly from a Fund by Authorized Participants, in very large creation/redemption units. There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.

If there is an oversupply of ETF shares in the market, the opposite can happen. In this case, the AP redeems shares of the ETF for the underlying securities with BlackRock which helps bring supply and demand of the ETF back into balance.

It is important to note that the ETF creation/redemption process is all done behind the scenes by the AP. To an investor, the transaction is similar to buying a stock.



Behind the scenes, an AP can fill or partially fill the order with:

- 1** Existing ETF liquidity on the exchange market, resulting in no creation activity, and/or
- 2** Gathering the bonds that make up the ETF in the OTC bond market and transferring them in-kind to BlackRock, thereby creating new ETF shares that are then delivered to the AP.

Bond ETF creation/ redemption frequency

The creation/redemption process of an ETF differs from that of a mutual fund. When buying shares of a mutual fund, a purchase order must be managed directly with the fund company to issue new shares. In this manner, a buy or sell always results in creating or redeeming shares.

In contrast, the majority of ETF trades do not involve creating or redeeming shares. Because most ETF shares trade on an exchange, independent from the activities of the issuing fund company, large trades do not always involve the creation/redemption process.

Broker-dealers and other ETF liquidity providers typically source shares from the exchange or from their own inventory before initiating the creation/redemption process to fill the order.

The depth of the on-exchange liquidity of an ETF can be measured by the “on-exchange to OTC market ratio,” which represents the dollar value of the ETF shares traded on the exchange divided by the dollar value of the flows into and out of the ETF.

Historically, for highly liquid bond ETFs such as the **iShares iBoxx \$ Investment Grade Corporate Bond ETF (LQD)** and the **iShares iBoxx \$ High Yield Corporate Bond ETF (HYG)**, approximately 5 to 8 shares have traded on the equity exchange for every one share that was created or redeemed.

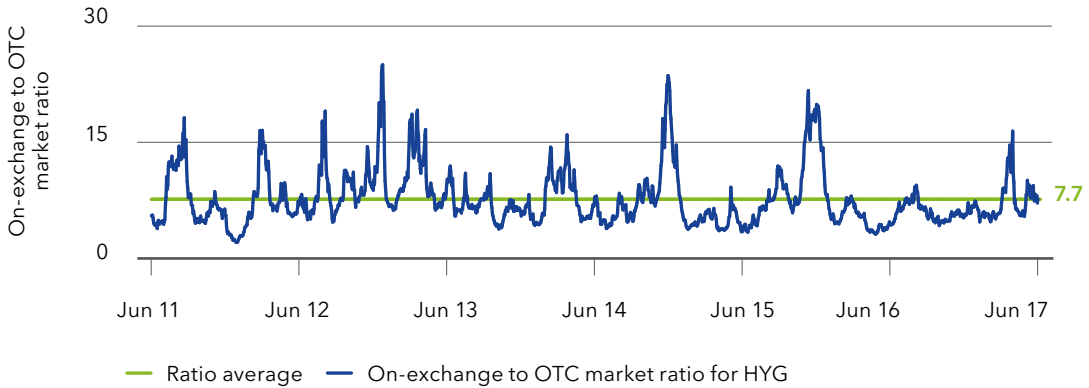
The on-exchange trading of ETFs makes the funds less dependent on having to constantly source or liquidate bonds in OTC markets in order to execute a trade. As a result, the trading activity in bond ETFs has a limited impact on the OTC market. This makes it possible to transfer risk exposures using an ETF via an equity exchange even when the underlying OTC market is less liquid.

Indexed to

iBoxx[®]
by markit[®]

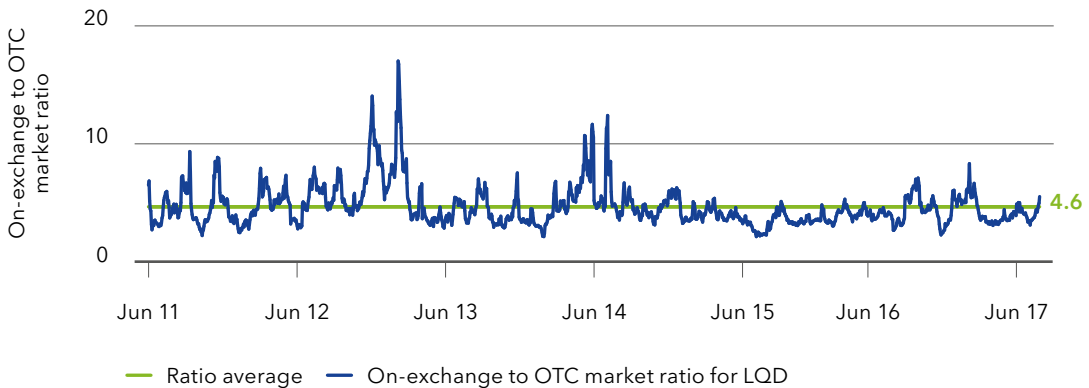
The majority of ETF trading occurs on exchange—independent of the OTC bond market

On-exchange to OTC market ratio for HYG



On average, approximately 8 shares of HYG traded on exchange for every one share that was created using the OTC bond market.

On-exchange to OTC market ratio for LQD



On average, approximately 5 shares of LQD traded on exchange for every one share that was created using the OTC bond market.

Source: Bloomberg, as of 6/30/17.

Understanding bond ETF price behavior

The price at which an ETF trades is primarily a function of the value of the underlying securities in the portfolio. It is also influenced by market flows, liquidity and market volatility.

The net asset value ("NAV") of an ETF is equal to the total fund assets divided by the total shares outstanding. When an ETF trades at a price above the NAV, it is said to be trading at a premium; when the ETF is trading below the NAV, it is said to be trading at a discount.

The NAV of a bond ETF is calculated using the bid-side prices for the underlying bonds in the ETF as of close of the bond market. The market price of the ETF will generally fluctuate between the bid and offer price of the underlying bonds as the ETF trades throughout the day. Under most market conditions, a bond ETF will trade at a premium to (above) this bid-side NAV to reflect a market clearing price for the fund.

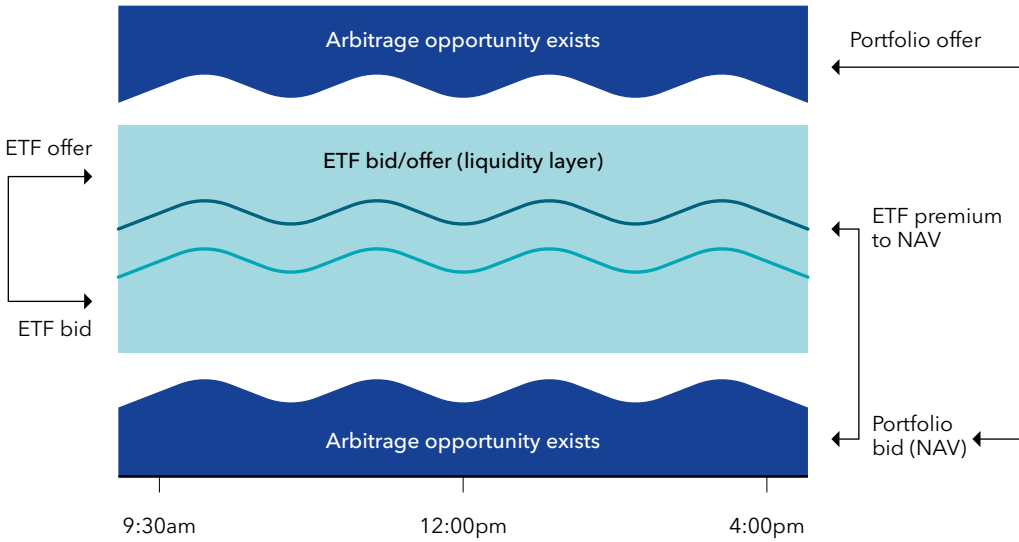
Over the long term, the relationship of an ETF's market price and NAV is guided by arbitrage opportunities between the ETF and its underlying portfolio. During periods of strong demand for an ETF, the price is bid up in the market. If the ETF price is sufficiently higher than the value of the underlying securities held within the ETF, an arbitrage opportunity may exist.

APs could purchase the underlying fixed income securities, deliver them to the ETF provider in exchange for new ETF shares (create new shares) and then sell the newly created ETF shares in the market for a small profit. By buying the ETF's underlying bonds and selling the ETF's shares, the AP helps push the ETF's price down closer to its NAV.

Conversely, if the ETF is trading significantly lower than its underlying portfolio, the opposite can happen. In this scenario, an AP could buy the ETF and exchange it for the underlying bonds (redeem shares) and then sell the bonds in the market for a small profit. By buying the ETF's shares and selling its underlying bonds, the AP helps push the ETF's price up closer to its NAV.

Although market makers will generally take advantage of differences between the NAV and the trading price of iShares Fund shares through arbitrage opportunities, there is no guarantee that they will do so.

ETF bids and offers are anchored to NAV due to arbitrage opportunities



For illustrative purposes only.

The price discovery properties of ETFs

Bond ETFs provide investors with a valuable new tool for understanding and measuring movements in the OTC bond market. Bond market price discovery creates challenges for investors of all sizes. Because the ETF structure brings portfolios of previously OTC-traded instruments onto an exchange, investors can now more readily observe the impact of new information on fixed income markets.

ETF prices can diverge from both the ETF NAV and the value of bond market indexes. These divergences are partially driven by differences in how value is determined in each market.

Net asset values and index levels are based on the value of individual bonds, some of which reflect actual transactions, and others that represent estimates of value at the end of the trading day. In contrast, bond ETF prices represent an actual execution at a market clearing level agreed upon by a buyer and a seller intra-day.

While arbitrage opportunities cause ETF market prices and NAV/index values to converge over time, ETF prices can actually lead NAV and index values, especially during brief periods of elevated market volatility. The presence of the creation/redemption mechanism, along with exchange liquidity, results in price information being reflected more immediately in ETF prices than in index level prices from the prior trading day.

Price discovery is an important feature of ETFs and has potentially powerful implications for investors.

Key implications of ETF price discovery



An apparent dislocation between ETF price and NAV (in the form of a premium or discount) may not be the result of mispricing, but of actual price discovery on the part of the ETF.



The ETF may capture any value changes in investor sentiment more quickly and, therefore, serve as a guide to price evolution in the OTC market. For more opaque fixed income sectors, true market price discovery and volatility may be observable for the first time in the form of bond ETF price movements.



Real-time ETF pricing data makes it possible for investors to capture relative value opportunities between ETFs and the OTC bond market or comparable derivative instruments.

Bond ETF distributions

For ETF investors, the coupon payments received from individual bonds are passed through to fund holders through regular distributions. However, receiving distributions from a bond ETF differs from the experience of receiving coupon payments from an individual bond.

Distribution of interest earned

A bond ETF distributes income in a similar way to bond mutual funds—the fund passes through earned income, rather than actual coupons, to its investors. Earned income reflects the yield at which the fund acquires each security.

Since bonds are typically purchased at a higher or lower price than they were issued, their yields are often different than their stated coupon rate. When an ETF acquires a bond, it may have a 5% coupon, but the current yield may be 3% due to where the bond is currently trading. That 3% is passed through to the fund's investors in the distribution payment.

Frequency of distribution

Most bond ETFs distribute interest on a monthly basis.

As a '40 Act fund, a bond ETF is required to distribute all interest and capital gains to investors on at least an annual basis.

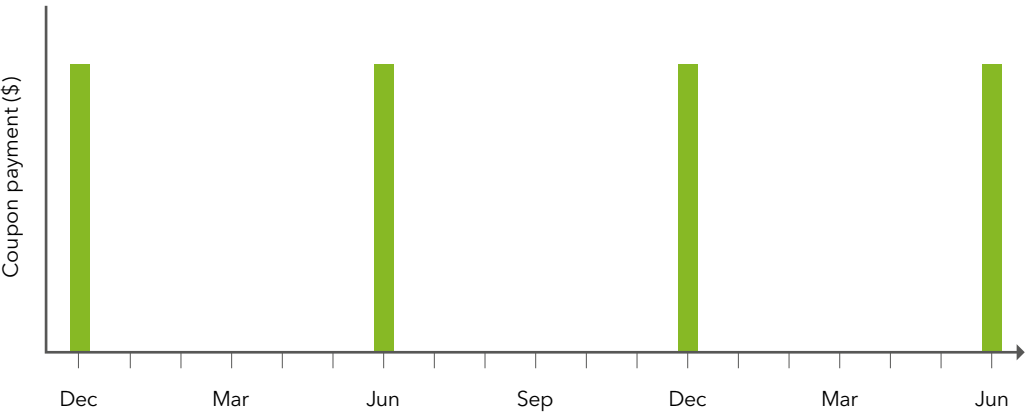
Calculating distribution amount

Generally, an ETF accrues interest on a daily basis from the bonds it holds. Near the beginning of each month there is a record date, and anyone that holds the fund on that date is entitled to receive the next income distribution payment. That income distribution payment reflects the income earned by the fund, less the management fee, since the prior distribution was made. Each of the fund's investors then receives a payment based upon the number of shares that they hold.

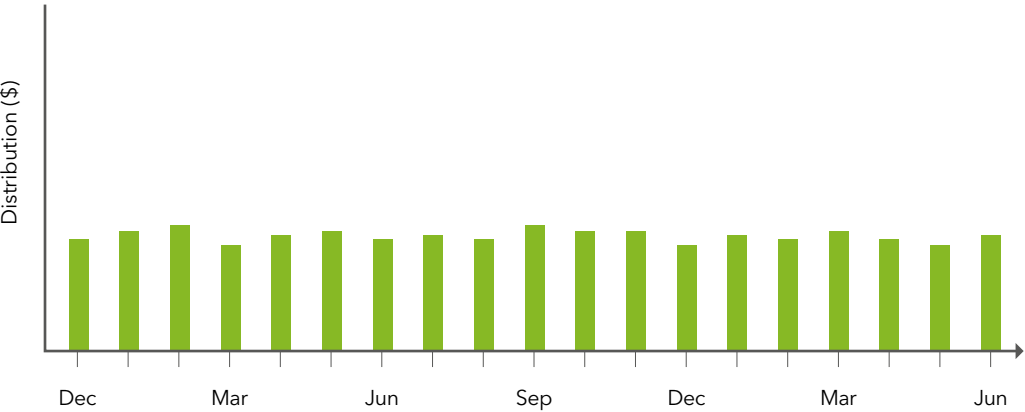
When an ETF distributes interest, each share receives the same amount of income (e.g. 10 cents/share) and the fund's NAV decreases by the amount of the distribution.

Hypothetical bond coupon payment vs. bond ETF distribution

Individual bond, semi-annual coupon



Bond ETF, monthly distribution



For illustrative purposes only.
There is no guarantee that any fund will pay distributions.



CHAPTER

3

iShares Bond ETF Portfolio Management Process

Constructing and managing an ETF

In most instances, the primary goal of an ETF is to track the fund's designated benchmark.

A common misconception is that all ETFs are managed by simply holding each security in the respective benchmark index. In reality, holding every security in the benchmark is inefficient in less liquid, OTC bond markets. To solve this issue, many bond ETFs employ some form of optimization or sampling. This approach seeks to create a portfolio that balances the marginal contribution to tracking error with the transaction costs associated with rebalancing and managing an ETF.

In the sampling process, each index is first divided into groups of bonds—which are called cells—with specific attributes such as maturity, credit quality or sector. Next, representative bonds from each cell are selected to balance liquidity, transaction costs and overall portfolio tax efficiency to construct the ETF.

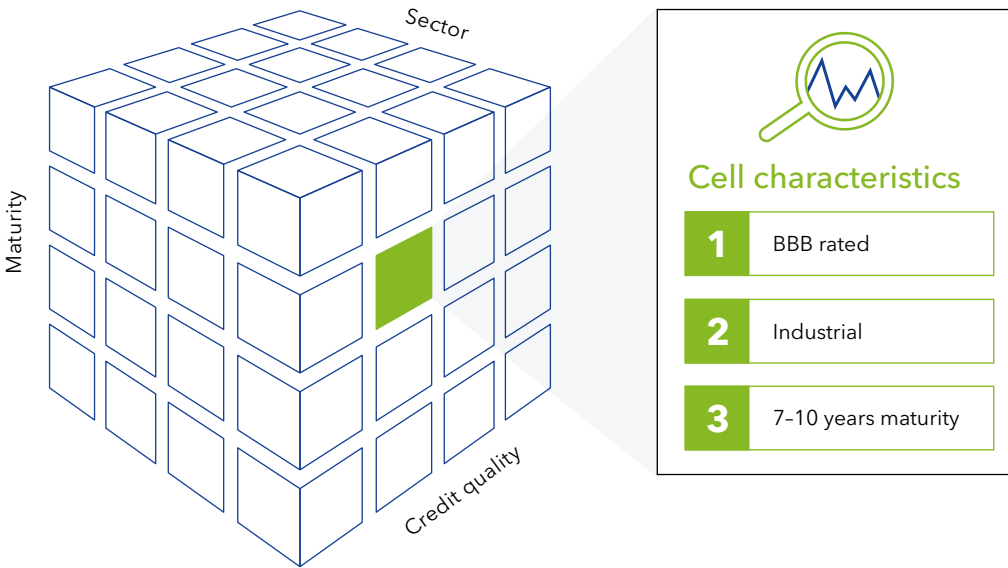
Once the ETF is built, it must be managed to track its designated index on an ongoing basis. Most bond indexes are rebalanced monthly to take into account the cash flows inherent in fixed income securities and any bonds that enter or exit the index.

Bond indexes are rebalanced monthly to account for:

- New issuance
- Maturities
- Bonds no longer in the maturity range of the index
- Calls or refinancing
- Coupon payments
- Defaults, downgrades or upgrades

When rebalancing an ETF, portfolio managers receive the upcoming index composition from the index provider a few days prior to month-end, allowing them to adjust portfolios to match the new index weights. Since the portfolios are sampled, the funds are not forced sellers or buyers of securities during the rebalancing process. Rather, the portfolio managers have discretion as to which bonds to include in the funds.

ETFs are sampled portfolios of an index



For illustrative purposes only.

The diagram above demonstrates how stratified sampling of a bond ETF is conducted in order to track a broader market index.

For example, the **iShares Core U.S. Aggregate Bond ETF (AGG)** seeks to track the Bloomberg Barclays U.S. Aggregate Bond Index, which includes about 9,000 bonds from multiple sectors of the market (U.S. Treasury, Agencies, MBS, CMBS and ABS). While AGG only holds approximately 60% of the bonds in the benchmark, tracking error relative to its index has been only a few basis points over the past five years.¹

¹. Source: BlackRock, as of 6/30/17.

Past performance does not guarantee future results.

Bond defaults in ETFs

Investors may question how an ETF is managed when bonds default over the course of a credit cycle.

Most bond ETFs are managed to track a specific index. Based on published rules, the index will remove a defaulted bond at month-end using the end-of-day bid-side price. An ETF portfolio manager may liquidate the defaulted security to limit tracking error with the index while seeking best execution.

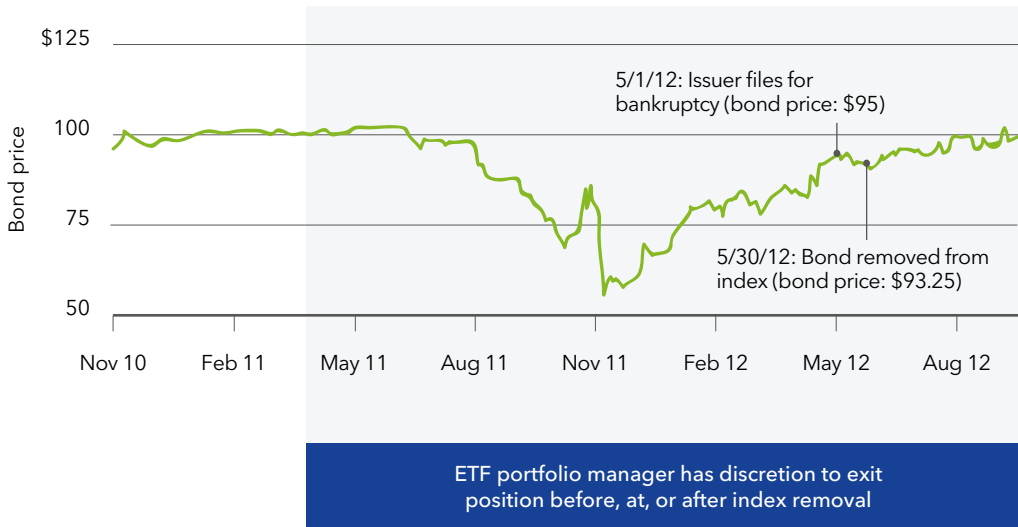
However, it is important to note that the fund is not a forced seller at the time of the security's removal from the index. An ETF's prospectus provides for a specified out-of-index allowance which can prevent front-running behavior by market participants ahead of an acquisition or liquidation.

Due to this provision, an ETF portfolio manager has discretion over when to sell the bond even if it is removed from the benchmark index. The portfolio manager has flexibility to sell the bond in advance of the index removal, at month-end or after month-end. This discretion allows an ETF portfolio manager to seek the most advantageous exit point for the defaulted bond, while balancing the need to track the index.

Due to these liquidation provisions, an ETF portfolio manager will consider the bond's liquidity, price volatility and size of the position in determining when to exit the position in the event of a pending default.

ETFs are not forced sellers when bonds default

Hypothetical bond price during bankruptcy announcement and index removal



For illustrative purposes only.



CHAPTER

4

Bond ETFs as Liquidity Solutions

Bond ETFs as liquidity solutions

ETFs enable buyers and sellers to access new sources of bond exposure through an alternate path—the equity exchange.

There are approximately 315 bond ETFs available to U.S. investors. While there is a plethora of choices, only a select set of bond ETFs offer the deep liquidity, ample fund size and established track records necessary to be used by the largest institutional investors.

In the following section we will focus on two of the largest and longest tenured corporate bond ETFs in the market that seek to track indexes that offer broad coverage to the investment grade and high yield universe of U.S. corporate bonds.

LQD and HYG are two of the largest and most liquid bond ETFs. As they have grown, they have come to represent a sizeable proportion (4%–15%) of the total trading activity of bond markets.¹

These two funds demonstrate how ETFs have become an increasingly viable liquidity solution for many traditional fixed income investors.

Investment grade corporate	LQD	iShares iBoxx \$ Investment Grade Corporate Bond ETF Index: Markit iBoxx USD Liquid Investment Grade Index
High yield corporate	HYG	iShares iBoxx \$ High Yield Corporate Bond ETF Index: Markit iBoxx USD Liquid High Yield Index

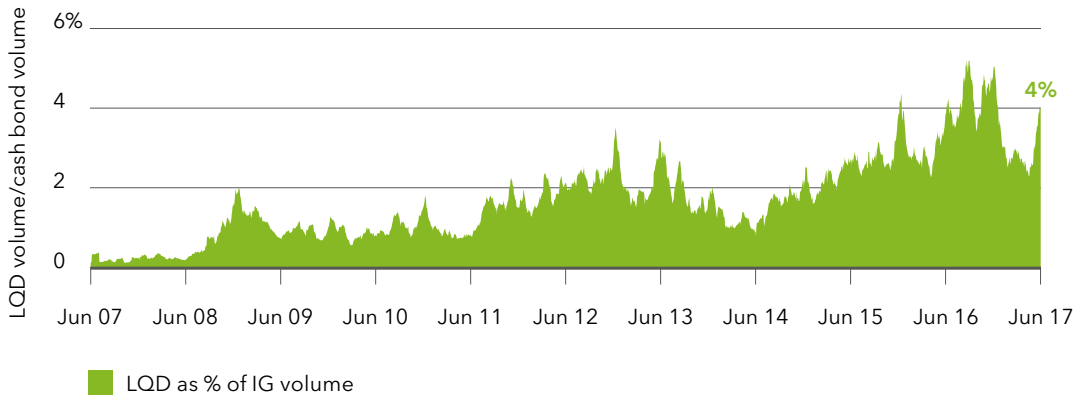
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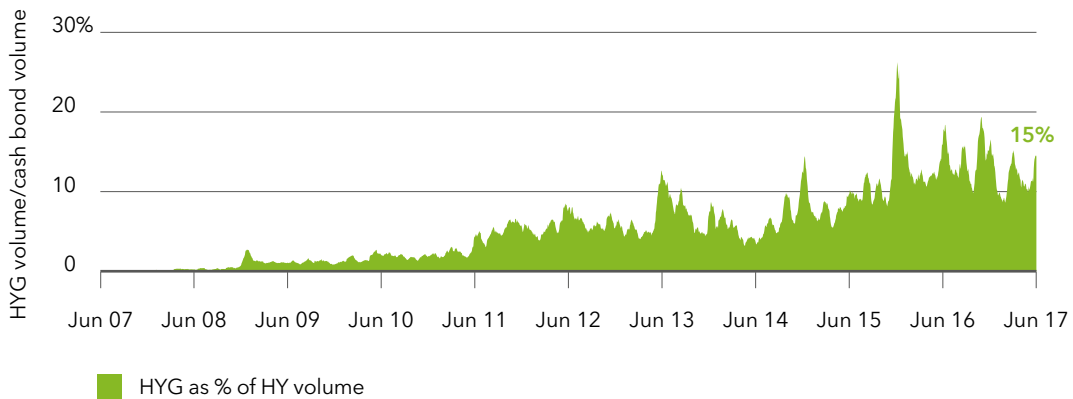
1. Source: BlackRock, Bloomberg, from 6/30/07 to 6/30/17.
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Credit ETFs represent a growing portion of total trading activity relative to the cash bond market

LQD volume as a percent of investment grade bond volume



HYG volume as a percent of high yield bond volume



Source: BlackRock, Bloomberg, as of 6/30/17.

Rolling 20-day average shown for each. Cash bonds are measured by FINRA TRACE Market Breadth High Yield and Investment Grade Bond Dollar Volume Indexes and ETF volume is ADV.

Institutional investors are driving the increased velocity of the largest ETFs

Despite expanded credit issuance, asset growth has outpaced liquidity in the bond market over the last several years, causing investors to look for alternative vehicles.

Consequently, the volumes of some of the largest bond ETFs appear to be part of a virtuous cycle driven by liquidity-challenged investors. As ETF trading volumes grow, they can accommodate ever larger trades, which in turn precipitates even deeper levels of liquidity for the ETF.

The rapid growth in trading liquidity versus fund assets of both the **iShares iBoxx \$ Investment Grade Corporate Bond ETF (LQD)** and the **iShares iBoxx \$ High Yield Corporate Bond ETF (HYG)** implies that a population of traders is driving the increased velocity of these funds.

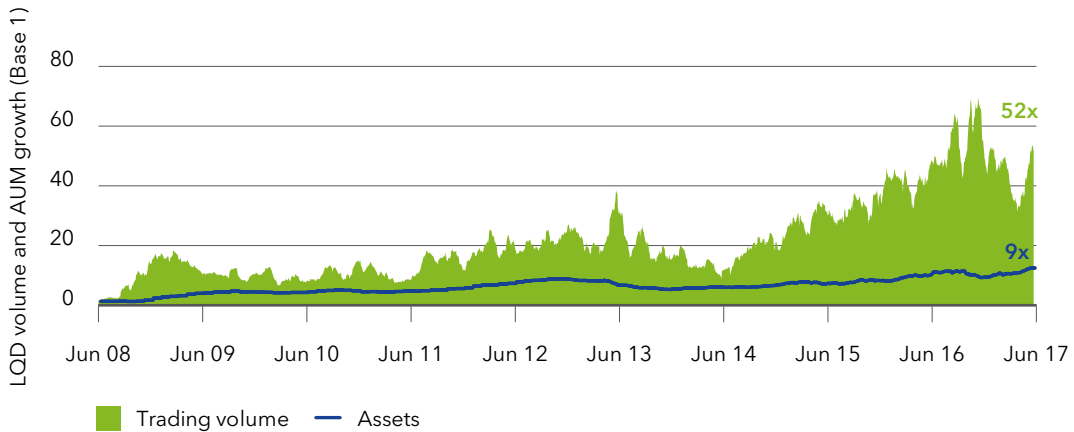
For example, since 2008:¹

- LQD has grown 52x in liquidity versus 9x in assets.
- HYG has grown 148x in liquidity versus 23x in assets.

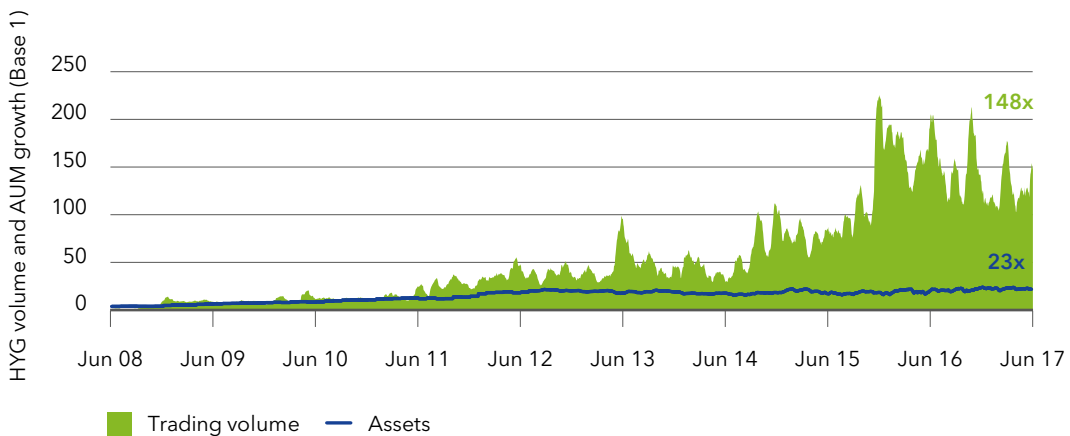
¹. Source: Bloomberg, data from 12/31/07 to 6/30/17.

Robust liquidity growth in ETFs has been driven by investors looking for trading alternatives

LQD ADV growth versus fund asset growth



HYG ADV growth versus fund asset growth



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Source: Bloomberg, data from 6/30/08 to 6/30/17. Monthly ADV and fund assets normalized at a base of 1. There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.

Higher frequency of large trade sizes in ETFs

The liquidity challenges in cash bond markets have led some investors to experience more price impact, particularly for larger transactions. Some have adapted by breaking trades into smaller pieces.

The opposite appears to be true for corporate bond ETFs. As institutional investors adopt ETFs in their portfolios, large trades—defined as single trades greater than \$10 million—are becoming more frequent.

For example, the trade sizes of the **iShares iBoxx \$ Investment Grade Corporate Bond ETF (LQD)** and the **iShares iBoxx \$ High Yield Corporate Bond ETF (HYG)** demonstrate an uptick in the frequency of large institutional trades as a portion of their total trading activity.

In 2010, large trades accounted for 6% of LQD's and 3% of HYG's total trading volume. Today, trades of this size have steadily climbed to more than 15% of trading activity for both LQD and HYG.¹

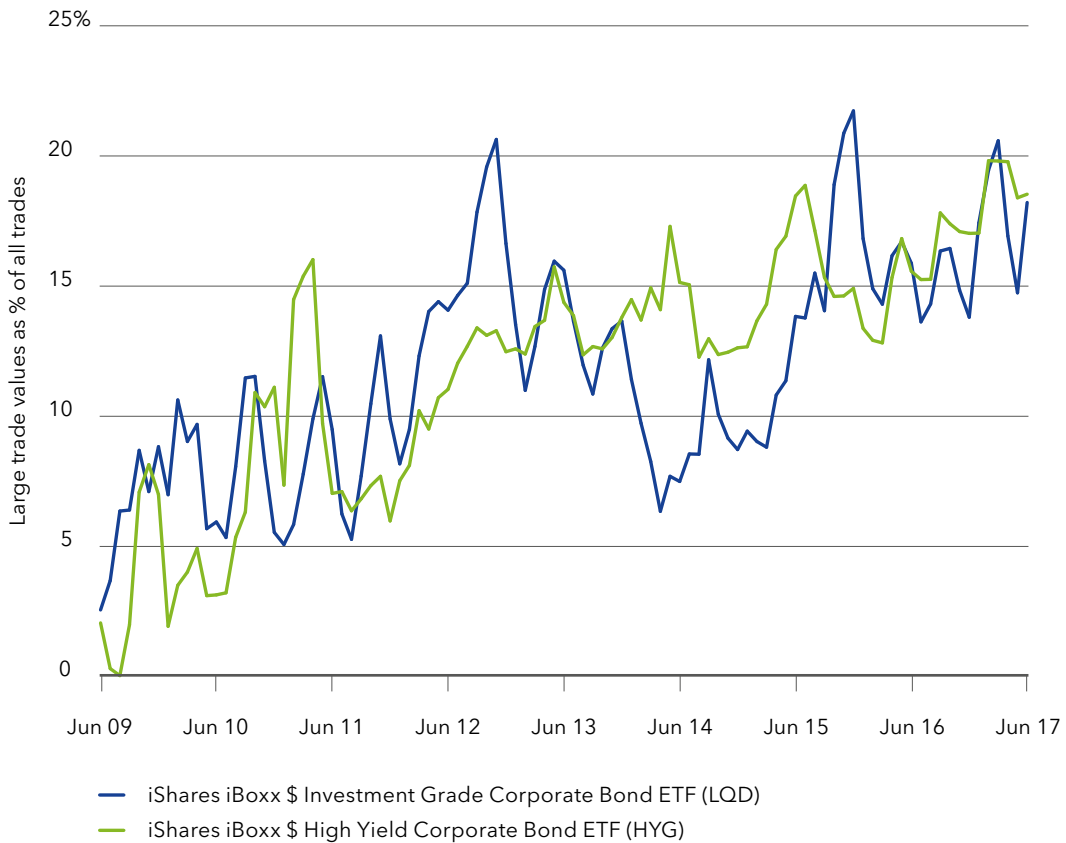
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¹. Source: BlackRock, Bloomberg, as of 6/30/17.

Large bond ETF trades are becoming more common

Single trades over \$10m as a percentage of total trades



Source: BlackRock, Bloomberg, as of 6/30/17. Graphs shows the total value of single trades over \$10m as a percentage of total dollar trading volume for the previous three months.

There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.

ETFs have weathered multiple periods of market stress

Bond ETFs have endured multiple stressed markets including the 2008 financial crisis, European sovereign debt crisis, U.S. Treasury downgrade, taper tantrum, oil sell-off of 2014 and high yield bond sell-off and fund closures in late 2015. During times of stress, fewer corporate bonds tend to trade OTC, while bond ETFs often see increased trading volumes.

Even in the most illiquid sectors such as high yield, bond ETFs have maintained active trading markets even when bond trading declines.

Using the **iShares iBoxx \$ High Yield Corporate Bond ETF (HYG)** as an example, historical data has shown that when bond market risk heightened and volumes declined, ETF volumes actually rose, with only a slight uptick in creation/redemption activity.

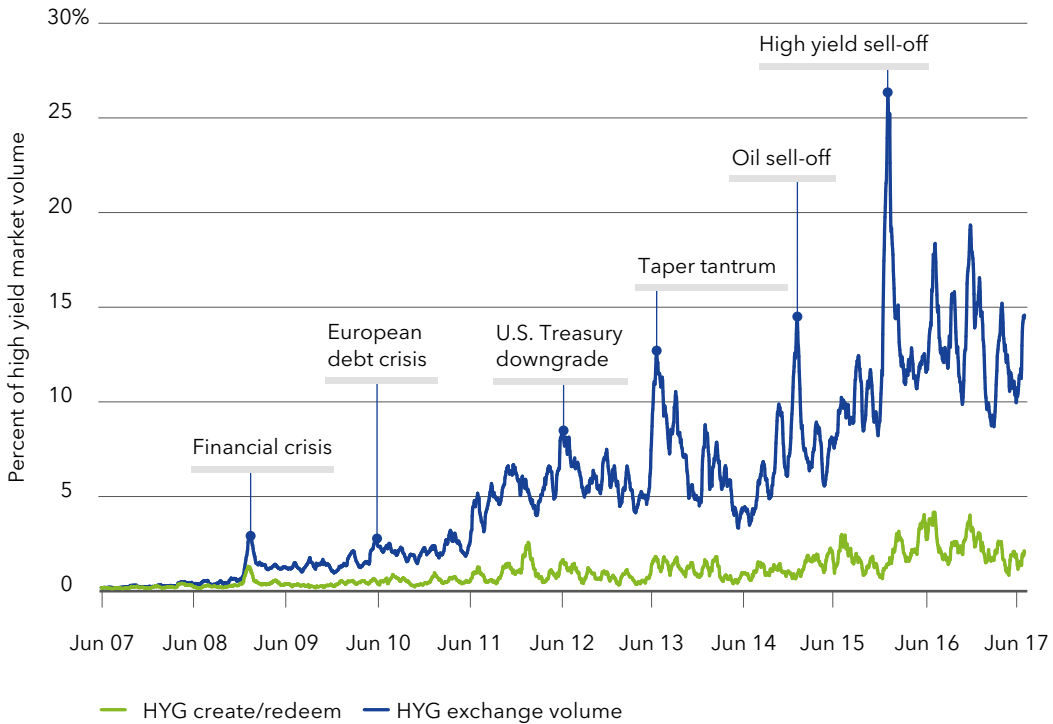
In each of these scenarios, as available liquidity in the underlying bond market plummeted, ETFs gave investors a second market—the stock exchange—where they could transact and act on valuable information about market pricing and movements.

Source: BlackRock, Bloomberg.

There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.

ETF trading spikes during times of market stress

HYG create/redeem and exchange volume as a percent of high yield volume



Source: BlackRock, Bloomberg.

There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.



CHAPTER

5

Bond ETFs and Credit Derivatives

Exploring credit access vehicles

Institutional investors who receive large inflows of cash are faced with access, liquidity and timing issues related to their investments. Delays in full allocation may create yield drag and tracking error. In addition, institutions may need to hedge credit positions as they attempt to shift allocations or alter risk profiles.

In addition to cash bonds, investors may gain credit exposure through a variety of means, including credit default swap indexes (CDX), index total return swaps (TRS) and corporate bond ETFs such as the **iShares iBoxx \$ Investment Grade Corporate Bond ETF (LQD)** and the **iShares iBoxx \$ High Yield Corporate Bond ETF (HYG)**.

Each of these credit access vehicles offers unique attributes, giving investors choice and flexibility in their investment approach.

An investor's preference for one approach over another is a function of the following considerations:

- Cash versus synthetic exposure
- Interest rate versus credit spread composition
- Leverage and liquidity requirements
- Direction (long versus short)
- Holding period
- Operational, accounting and regulatory considerations
- Relative cost of each vehicle



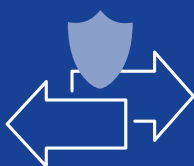
Corporate
bond ETFs

- Exchange traded bond portfolios are generally designed to track market indexes
- Exposure to both interest rate risk and credit risk
- Can offer tighter trading spreads than buying comparable bundles of cash bonds



Index total return
swaps (TRS)

- OTC swap products designed to pay the total return on specified credit indexes
- Generally lower levels of liquidity and higher transaction costs (strike premiums and bid/offer spreads) relative to CDX and ETFs



Credit default
swap indexes (CDX)

- Derivative contracts designed to target credit spreads
- Most liquid and actively traded credit products
- Potential for significant differences in performance versus cash bonds for sustained periods of time

Comparing corporate bond ETFs and credit derivatives

Index total return swaps

Investors use corporate bond ETFs and index total return swaps (TRS) on Markit iBoxx indexes to seek long or short exposure to investment grade or high yield corporate bonds.

Corporate bond ETFs are portfolios of bonds that trade on-exchange and track a specified benchmark, while iBoxx TRS are synthetic, unfunded derivative index products. An investor's preference for one product over the other will be a function of their desired leverage, the direction of the exposure (long versus short), holding period, on-demand liquidity requirements, operational constraints and the relative cost and attractiveness of each vehicle in given market conditions.

Investors who do not require leverage should evaluate the relative cost and liquidity of corporate bond ETFs versus TRS. Larger corporate bond ETFs may offer ample on-exchange liquidity, while TRS liquidity varies depending on participating counterparties and risk appetites. Market impacts for larger trades in more liquid corporate bond ETFs can be 5-10 bps or less, whereas TRS-quoted bid/offer spreads are typically 40-50 bps at initiation.¹

TRS are OTC bilateral contracts, which expose investors to the credit risk of the dealer counterparty. This risk may be mitigated through the use of margin/collateral requirements. With ETFs, counterparty risk is negligible and there are no collateral requirements.

The historical performance of ETFs and TRS has typically been similar over time.¹

¹. Source: Markit iBoxx, BlackRock, participating TRS counterparties. Based on analysis conducted between 12/31/12 and 12/31/14. For further information please refer to the BlackRock whitepaper titled *Comparing Credit ETFs and Credit Index Total Return Swaps*.

Credit default swap indexes

Credit default swap indexes (CDX) are unfunded derivative index products that allow investors to access levered investment grade and high yield credit spreads across standardized tenors. CDX contracts are highly liquid, but trade at a basis to cash bonds and do not provide exposure to interest rates. Their index construction is typically equally weighted and limited to a subset of issuers compared to the broader cash market.

Credit default swap indexes provide investors the ability to obtain long or short exposure to credit spreads synthetically. The standardization and fungibility of CDX has led them to become the most liquid credit exposure vehicles in the market.

Alternatively, corporate bond ETFs allow investors to obtain bond exposure in a fully-funded, exchange traded structure.

An investor's vehicle preference is a function of their leverage and liquidity requirements, preferred composition of interest rate versus credit spread exposure and operational/accounting considerations. Investors who can trade derivatives may prefer the inherent leverage provided by unfunded CDX. Conversely, investors who employ fully-funded strategies may prefer ETFs.

Performance differences (adjusted for interest rate exposure) between corporate bond ETFs and CDX are often driven by changes in the basis between the cash and synthetic credit markets.

Credit product comparison overview

	Corporate bond ETFs
Mechanics	<ul style="list-style-type: none"> ETFs hold a basket of cash bonds designed to track a reference index and trade on an exchange Reference index and ETFs typically rebalance monthly—no investor action required Investor may have long or short exposure ETFs pay out income earned by fund in periodic distributions
Interest rate exposure	Yes
Cash/CDS basis	No
Constituents	LQD: > 1,500 HYG: > 1,000
Index rebalancing	Monthly
Ability to lend	Yes
Ability to trade options	Yes
Liquidity	LQD ADV ¹ : \$634m HYG ADV ¹ : \$1,125m ETFs can access liquidity of underlying bonds
Transaction costs	Bid/offer spread, commissions, expense ratio
Funding/leverage	Fully funded
Collateral	No collateral requirements
Operational risk	Exchange
Documentation	No documentation requirements
Counterparty risk	Exchange traded
Benefits	Liquid, inexpensive execution to gain diversified cash bond exposure
Considerations	<ul style="list-style-type: none"> Large trades may need to be tactically managed and may have market impact ETF tracking error to index Expense ratio and equity commissions may add to total costs

Index total return swaps (TRS)	Credit default swap indexes (CDX)
<ul style="list-style-type: none"> • Dealer counterparty pays/receives total return of index on specified notional value • Investor receives/pays LIBOR x notional value over specified term • Swap must be rolled by investor periodically to maintain exposure • Total return based on an initial index strike vs. final index level 	<ul style="list-style-type: none"> • Consists of reference basket of equally weighted single-name CDS (100 for HY; 125 for IG) • Dealer counterparty pays/receives quarterly premium on specified notional vs. contingent payments based on specified credit events • Investor may have long or short exposure
Yes	No
No	Yes
IG: > 1,500 HY: > 1,000	IG: 125 HY: 100
Monthly	Semi-annually
No	No
No	Yes
Data not reported	IG ¹ : \$8.3b HY ¹ : \$4.0b
Bid/offer spread, index strike vs. actual index level	Bid/offer spread, roll costs
Synthetic/unfunded	Synthetic/unfunded
Collateral requirements	Exchange collateral requirements
Payments, settlements, documentation	Exchange cleared
International Swaps and Derivatives Association (ISDA), Credit Support Annex (CSA) and trade confirmations	Cleared Derivatives Execution Agreements (CDEA)
Bilateral counterparty risk	Exchange cleared
Diversified cash bond exposure; leverage	Liquid basket of CDS exposures
<ul style="list-style-type: none"> • Higher transaction costs • Contracts must be rolled • Inconsistent liquidity 	<ul style="list-style-type: none"> • Can potentially have sustained periods of significant tracking error vs. bonds • Contracts must be rolled

Source: BlackRock, Bloomberg, JPMorgan, as of 6/30/17.

1. 20-Day average daily volume as of 6/30/17.



CHAPTER

6

Structural Developments in the Bond ETF Market

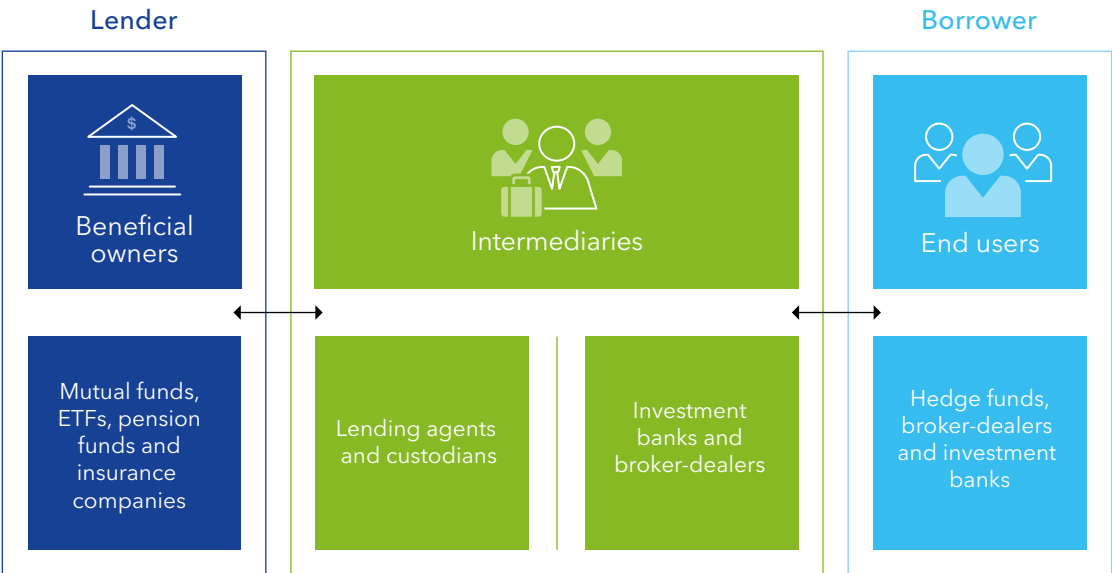
Lending bond ETF shares can help generate incremental return

Securities lending is a well-established practice in which an investor who owns a security ("lender") temporarily loans the security to a borrower in exchange for a fee. An increasing number of investors are turning to securities lending as a source of potential incremental return.

Bond ETFs typically lend a portion of their underlying bonds, according to the fund's investment guidelines, to help offset expenses and improve tracking for the fund. Investors can lend the ETF shares to potentially generate incremental return.

The operational ease and efficiency of using ETFs as hedging vehicles has led to the development of an active ETF lending market for certain funds. As a result, holders of ETFs may wish to consider lending ETFs to seek incremental yield.

Securities lending in practice



How easy is ETF lending to set up?

Once the decision has been made to lend, setup is straightforward. All major custodians have a platform to lend securities and make the client experience as seamless as possible.

The lending agent typically manages all operational aspects of securities lending transactions. Once established in a lending program, the process is very low touch for beneficial owners.

Can I sell my ETF shares when they are out on loan?

Yes—securities may be sold at any time. A borrower has a legal and contractual obligation to return securities in good time for settlement.

What is my next step?

Contact your iShares relationship manager and ask for a consultation, which includes current opportunities to lend ETFs and guidance on establishing a lending program.



Contact the dedicated iShares institutional team at **1-800-743-9285**

There is no guarantee that there will be borrower demand for shares of the iShares Funds, or that securities lending will generate any level of income. ETF share lending revenue is not an element of fund performance and share lending is not a service provided by iShares ETFs or BlackRock Fund Advisors ("BFA"), the funds' investment manager.

Evaluating bond ETF lending opportunities

Gross ETF share lending yields¹ for a selection of highly liquid bond ETFs are presented below. The return earned by a lender consists of the ETF share lending plus the return generated from investing the borrower's cash collateral. Both components of the return may be subject to a split with the investor's lending agent.

The table below outlines the extra yield an investor could potentially generate by lending shares of the ETF.

Select iShares lending opportunities

ETF name	Ticker	Share lending gross trailing	
		3-month yield (bps) ²	12-month yield (bps) ²
iShares 20+ Year Treasury Bond ETF	TLT	17.3	26.7
iShares iBoxx \$ Investment Grade Corporate Bond ETF	LQD	3.0	2.9
iShares iBoxx \$ High Yield Corporate Bond ETF	HYG	112.4	75.0
iShares J.P. Morgan USD Emerging Markets Bond ETF	EMB	3.4	13.0

1. Lending yields are reported on an annualized basis and are based on the lendable supply in the United States. The yield is calculated as the gross lending spread multiplied by the utilization rate. The gross lending spread is the difference between the negotiated lending rebate rate and the Fed Open Rate. Any additional returns from cash collateral management are not reflected in the gross lending spread.

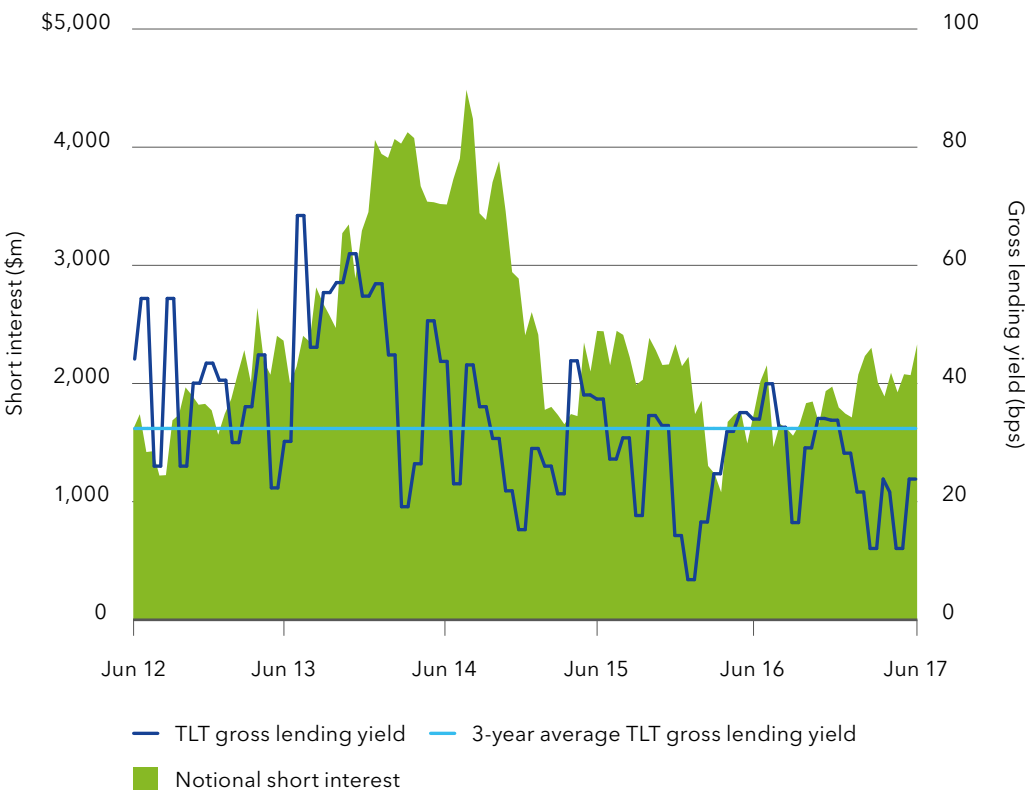
2. Source: BlackRock, Markit - Securities Finance. Share lending yield is derived from an aggregate of all outstanding loans of the ETF, based on the trailing months ended 6/30/17. The Share Lending Revenue excludes the yield the client would have earned on its cash collateral. Securities lending is subject to a split with the lending agent, which is not reflected here and would have reduced yield results. Actual revenue splits and cash reinvestment vehicles are negotiated between each lender and lending agent, and may vary. The analysis does not reflect transaction costs, including commissions and impact/spread, which would be incurred on the purchase and sale of the ETF.

"Share Lending Revenue" is not an element of fund performance and Share Lending is not a service provided by iShares ETFs or BlackRock Fund Advisors ("BFA"), the funds' investment advisor. There is no guarantee that there will be borrower demand for shares of the iShares Funds, or that securities lending will generate any level of income. **Past performance is not a guarantee of future results.**

Using the **iShares 20+ Year Treasury Bond ETF (TLT)** as an example, the following graph shows TLT’s shares out on loan to meet borrower demand—commonly known as short interest—and the incremental gross yield generated by ETF share lending.

An investor could have potentially generated approximately 32 bps in annualized yield over the previous 3-year period by lending shares of TLT.³

ETF share lending can be a source of incremental yield³



3. Source: BlackRock, Markit – Securities Finance. Before split with lending agent and excluding collateral reinvestment yield. Lending yield is derived from an aggregate of all outstanding loans of the ETF, annualized based on 12 months ended 6/30/17. The analysis does not reflect transaction costs, including commissions and impact/spread, which would be incurred on the purchase and sale of the ETF. There is no guarantee that there will be borrower demand for shares of the iShares ETFs, or that securities lending will generate any level of income. ETF share lending revenue is not an element of fund performance and share lending is not a service provided by iShares ETFs or BlackRock Fund Advisors, the funds’ investment manager and an affiliate of BlackRock Investments LLC.

Bond ETF options market

A bond ETF option represents an option on an entire portfolio of bonds as opposed to a single bond or swap.

Listed options now trade on many bond ETFs. Options on bond ETFs provide investors an alternative means to obtain contingent exposure to various sectors including Treasuries, investment grade credit, high yield credit and emerging market debt.

The listed options market for U.S. bond ETFs has nearly tripled over the past 3 years and reached an all time high of \$45 billion in 2016.

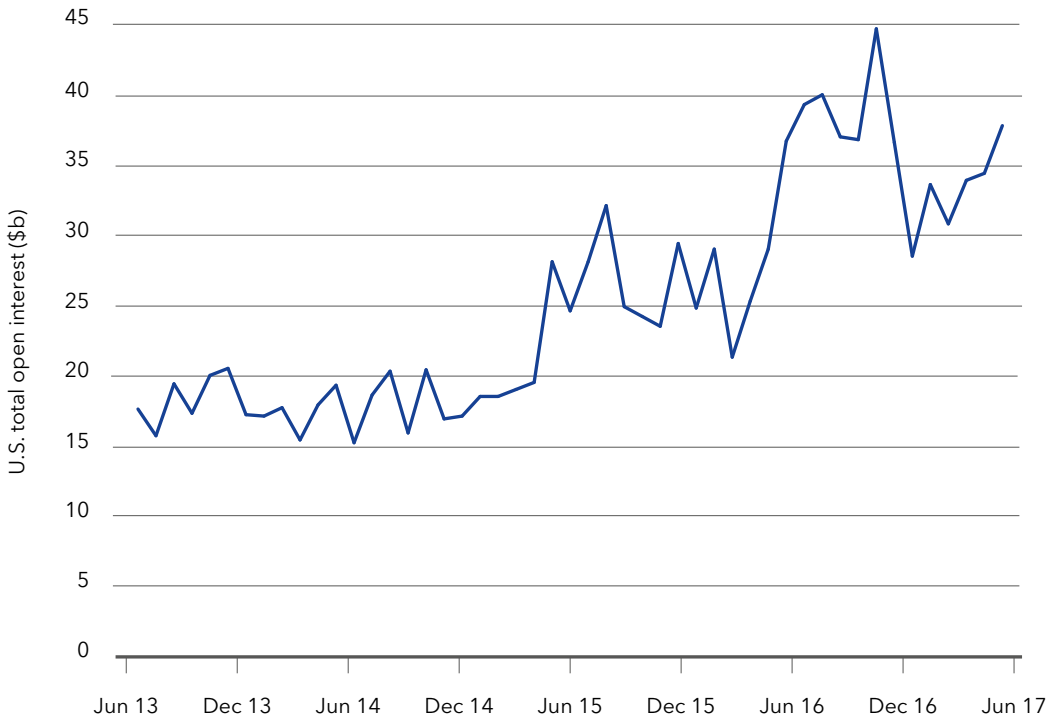
As option liquidity increases, investors are using bond ETF options to:

- Access leveraged exposure to a broad or specific segment of the market
- Express directional views on spreads widening/tightening
- Employ a yield enhancement strategy through covered calls
- Seek portfolio protection through buying puts

Options involve risk and are not suitable for all investors. Prior to buying or selling an option, a person must receive a copy of "Characteristics and Risks of Standardized Options." Copies of this document may be obtained from your broker, from any exchange on which options are traded or by contacting The Options Clearing Corporation, One North Wacker Dr., Suite 500, Chicago, IL 60606 (1-888-678-4667). The document contains information on options issued by The Options Clearing Corporation. The document discusses exchange-traded options issued by The Options Clearing Corporation and is intended for educational purposes. No statement in the document should be construed as a recommendation to buy or sell a security or to provide investment advice. If you need further information, please feel free to call the Options Industry Council Helpline. They will be able to provide you with balanced options education and tools to assist you with your iShares options questions and trading. The Options Industry Council Helpline phone number is 1-888-Options (1-888-678-4667) and its website is www.888options.com.

iShares ETFs may directly or indirectly benefit from increased usage of options on iShares ETFs as reference assets for derivative-based strategies.

Total U.S. bond ETF options open interest



Source: BlackRock, Bloomberg as of 6/30/17. Options on iShares ETFs are issued by the Options Clearing Corporation, which is not affiliated with BlackRock. BlackRock does not offer or issue options on iShares ETFs, nor is this a service provided by BlackRock. There is no guarantee that options will be available for any particular ETF.

ETFs as collateral

Clients who utilize unfunded instruments within their investment portfolios are typically required to post collateral on an ongoing basis to futures clearing venues (for futures contracts) or investment banks (for OTC swap transactions).

Important market standards are now in place to assist clients in using ETFs as collateral.

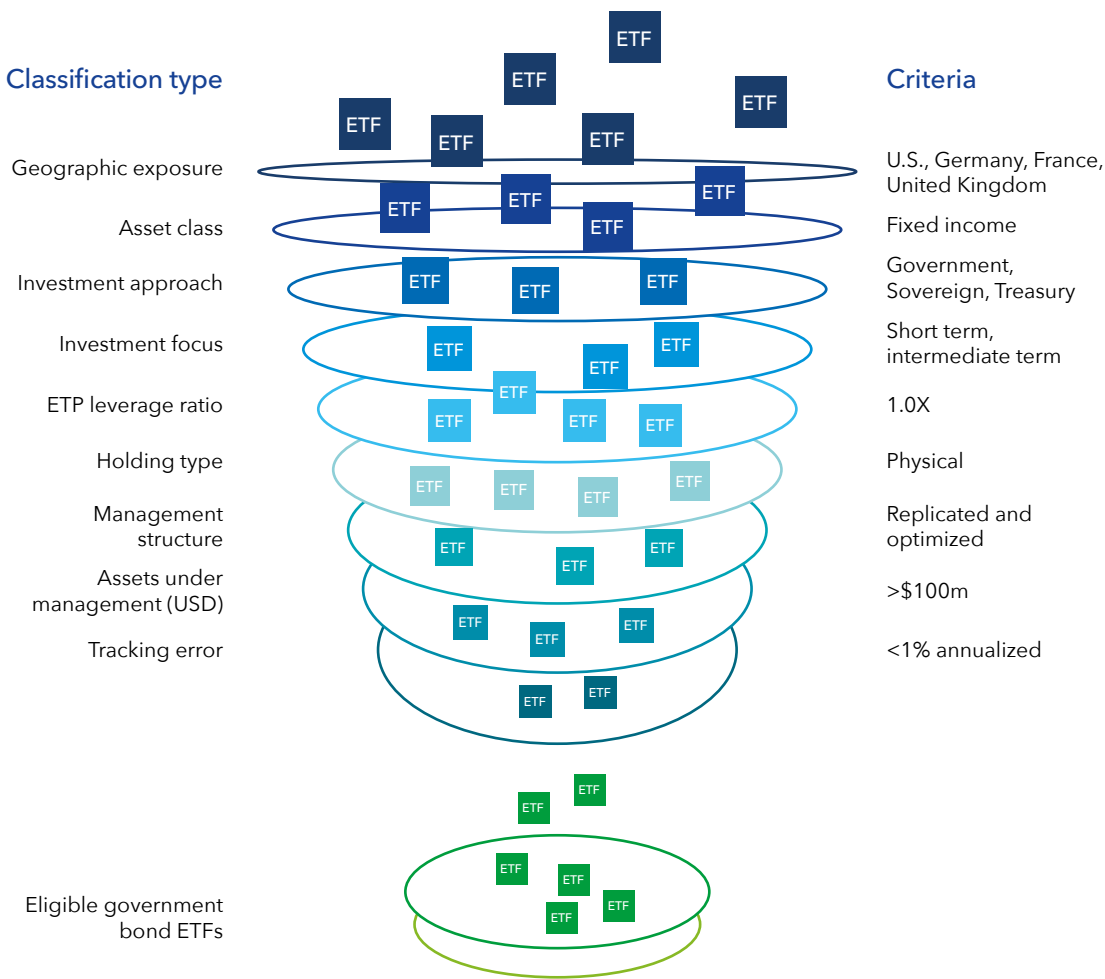
The historical challenge for ETFs has been the broad classification of the product and the inability to systematically assess the risk characterization of the asset. This made ETFs particularly onerous for risk departments to evaluate when updating counterparty collateral schedules and difficult to use by collateral managers.

In response to this challenge, Markit launched a government bond ETF Collateral Classification Filter. Risk departments can use this filter to simplify the process of identifying acceptable collateral. They need only to evaluate and approve the filter criteria to classify all current ETF constituents.



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Markit government bond ETF Collateral Classification Filter



For illustrative purposes only. Source: IHS Markit Ltd.

Standardizing ETF metrics:

Aggregated cash flow approach

Historically, calculating intra-day risk metrics for bond ETFs has required that all underlying holdings be priced at a single point in time. The illiquidity of individual bonds makes this task quite difficult, thereby making intra-day analytics troublesome.

As a solution to the difficulty of pricing bonds on a real-time basis, using an aggregated cash flow (ACF) approach based on T-1 holdings allows market participants to analyze fixed income ETFs intra-day without having to price each individual bond on a real-time basis.

The ACF approach was introduced to allow fixed income investors to more clearly evaluate the dynamic between a number of risk metrics of an ETF such as price, yield and spread.

The approach works on the simple principle that the price of a bond is the present value of cash flows. An ETF is simply the aggregation of those cash flows.

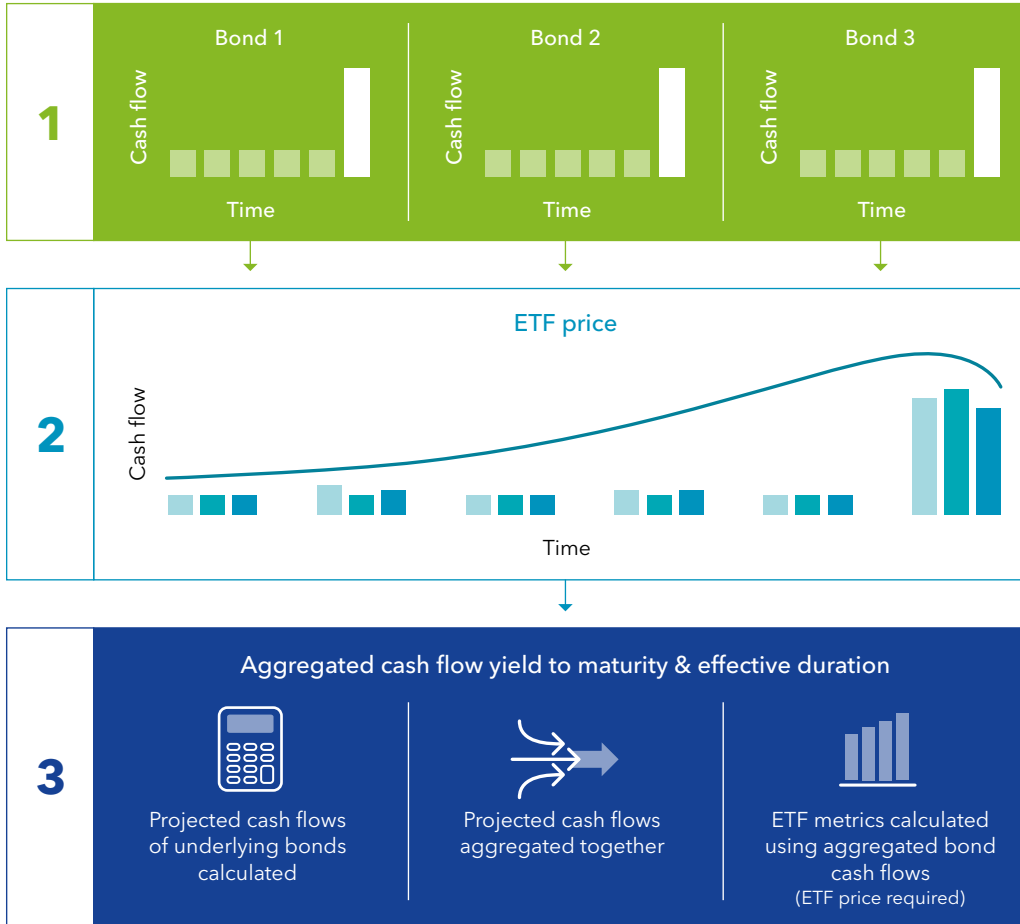
Adoption of the ACF approach as a market standard:

- Establishes a common bond ETF trading language aligned to the underlying exposure
- Enhances the ability to conduct analysis between ETFs and other fixed income instruments
- Enables consistent intra-day analytics across multiple platforms

Metrics based on the ACF approach are available on a number of analytics platforms including Bloomberg, Tradeweb and BlackRock's Aladdin® platform.

Aggregated cash flow approach

Bond ETF underlying holdings



For illustrative purposes only.



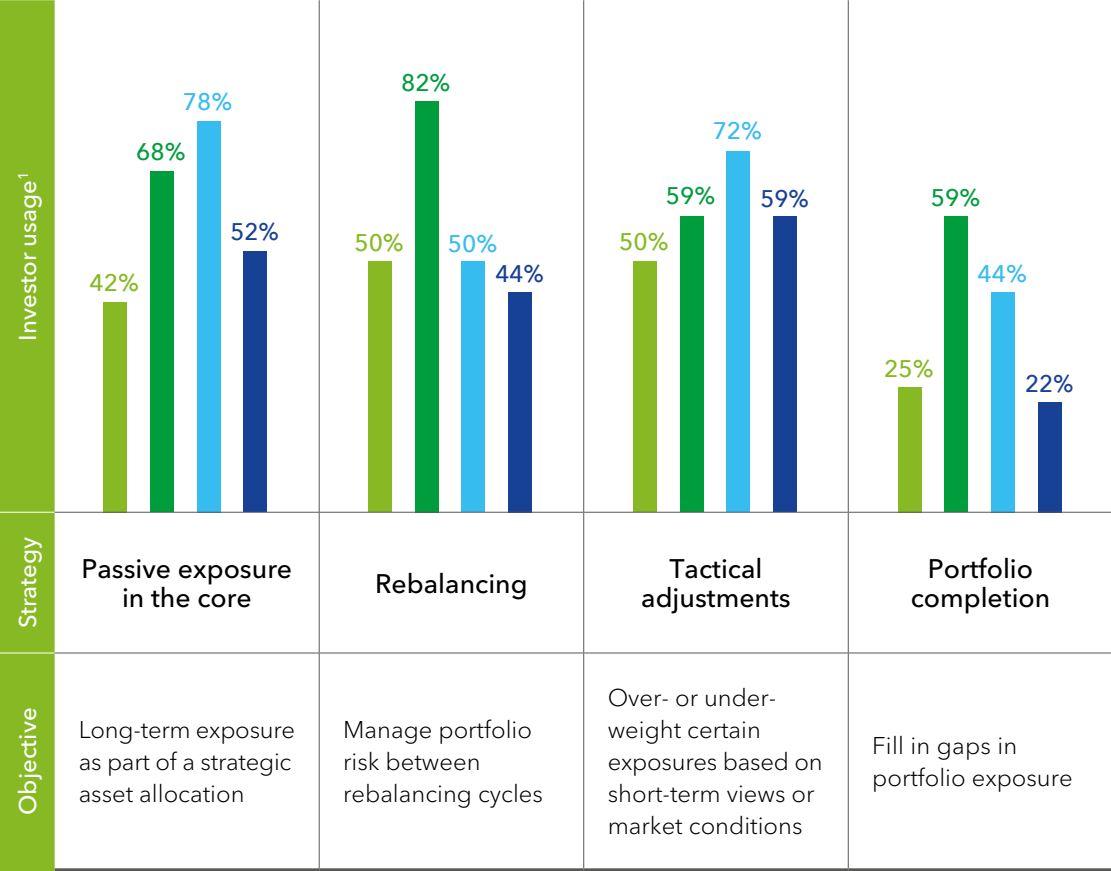
CHAPTER

7

Common Institutional ETF Applications

Common institutional ETF applications

Recent Greenwich Associates research indicates that institutional use of bond ETFs spans both strategic and tactical objectives.



■ Institutional funds
 ■ RIAs
 ■ Investment managers
 ■ Insurers

The information shown in the “Common Institutional ETF Applications” section is for illustrative purposes only. This is not meant as a guarantee of any future result or experience. This information should not be relied upon as research, investment advice or a recommendation regarding iShares ETFs or any security in particular. There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.

Many institutional investors are incorporating bond ETFs into the portfolio construction and management process alongside other instruments such as cash bonds and credit derivatives.



1. Based on responses from 97 U.S.-based institutional investors who use bond ETFs.

Source: Greenwich Associates 2016 U.S. Bond ETF Study: *Institutional Investors Embrace Bond ETFs*.

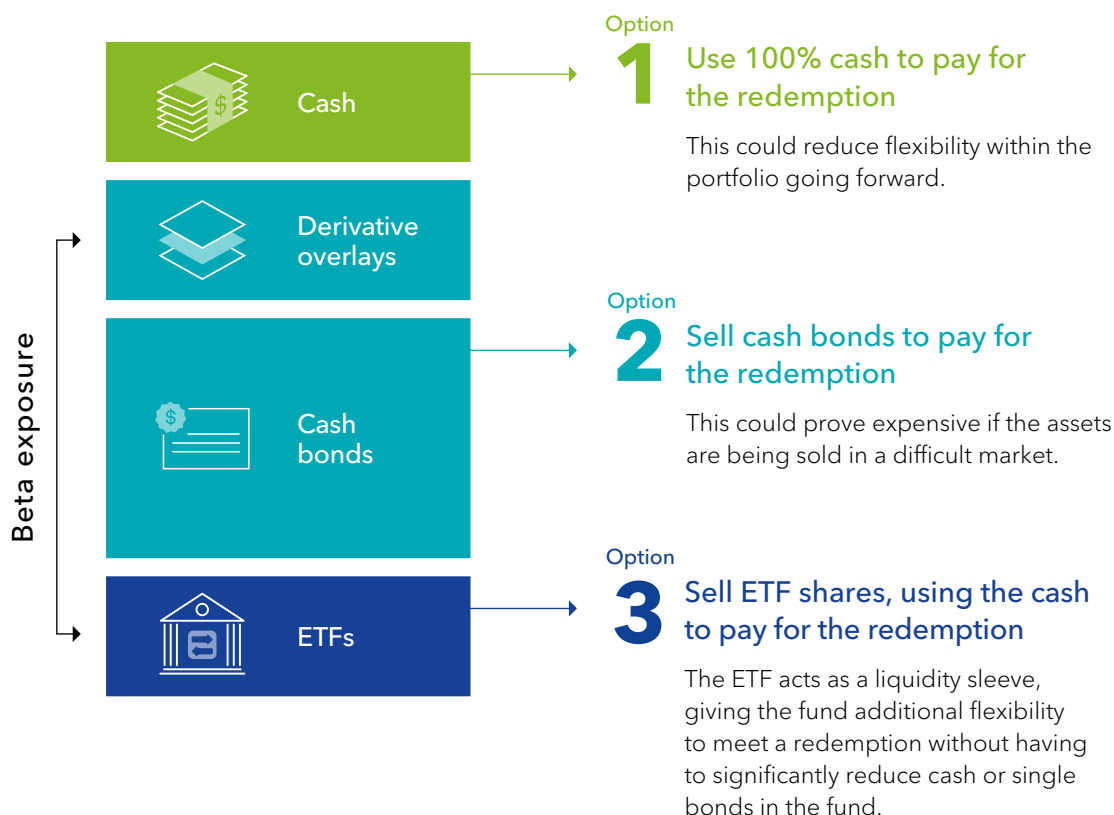
Cash and liquidity management

Cash flows into and out of a portfolio can disrupt performance. Challenges may arise when assets need to be liquidated during difficult market conditions to meet a withdrawal. Conversely, large cash inflows may sometimes result in excess cash positions when managers face delays in sourcing bonds.

ETFs can be added to portfolios to provide an additional liquidity layer, acting as a buffer to help manage inflows and outflows, while providing a way to manage portfolio beta.

Larger ETFs with more liquid secondary markets may have substantially narrower bid/offer spreads than those of the underlying assets. Using these ETFs as vehicles to manage cash flows and/or tactically adjust portfolio beta can provide potentially significant execution cost savings.

Portfolio funding options to fulfill a large redemption



For illustrative purposes only.

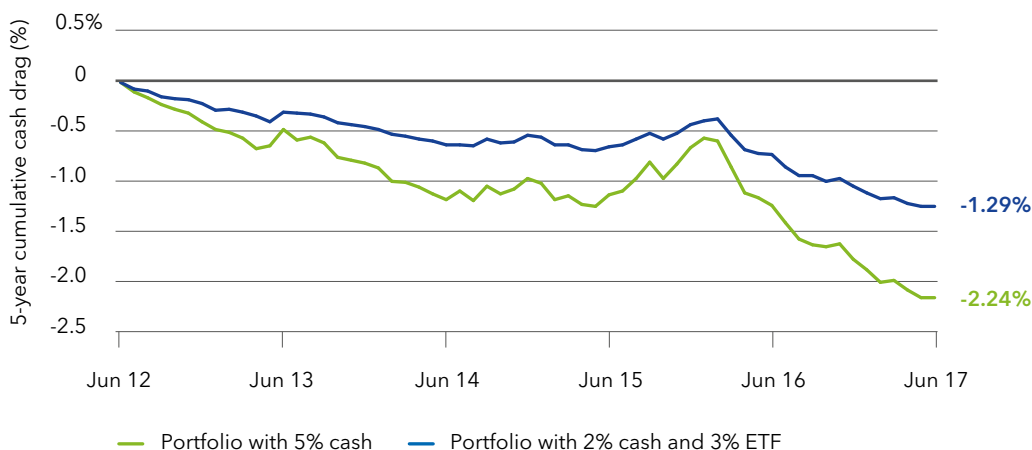
Minimize cash drag with an ETF liquidity sleeve

An ETF can be used as a flexible tool to balance the need to meet subscriptions and redemptions while also limiting the effects of cash drag. In this example, a high yield asset manager generates a 5-year cumulative return that lags the strategy benchmark. After analyzing the portfolio's performance, he finds that a 5% average cash allocation resulted in a cumulative 2.2% drag on performance.

The manager can potentially reduce the impact of cash drag by allocating 3% to a high yield corporate bond ETF and only 2% to cash. This solution would have reduced cash drag during the prior 5-year period to only 1.3%, inclusive of transaction costs.

Managing the portfolio's cash allocation more effectively could have potentially made the difference between outperforming and underperforming the strategy benchmark.

Seek to reduce the effect of cash drag with an ETF



Source: Morningstar, BlackRock, as of 6/30/17. For illustrative purposes only. Not indicative of any actual portfolio or asset allocation model. "Portfolio with 5% cash" assumes a hypothetical allocation of 95% to BAML High Yield Master II Index and 5% invested in a money market fund, rebalanced monthly. No additional transaction costs are assumed. "Portfolio with 2% cash & 3% ETF" assumes allocation of 95% to BAML High Yield Master II Index, 2% invested in a money market fund and 3% invested in Markit iBoxx USD Liquid High Yield Index, rebalanced monthly, and assumes 2 bps of round-trip transaction costs for the Markit iBoxx USD Liquid High Yield Index investment per month.

Past performance does not guarantee future results. There can be no assurance that an active trading market for shares of an ETF will develop or be maintained. For illustrative purposes only; this information is not meant as a guarantee of any future results or experience. 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.** Case study shown for illustrative purposes only. This is not meant as a guarantee of any future result or experience. This information should not be relied upon as research, investment advice or a recommendation regarding the iShares Funds or any security in particular.

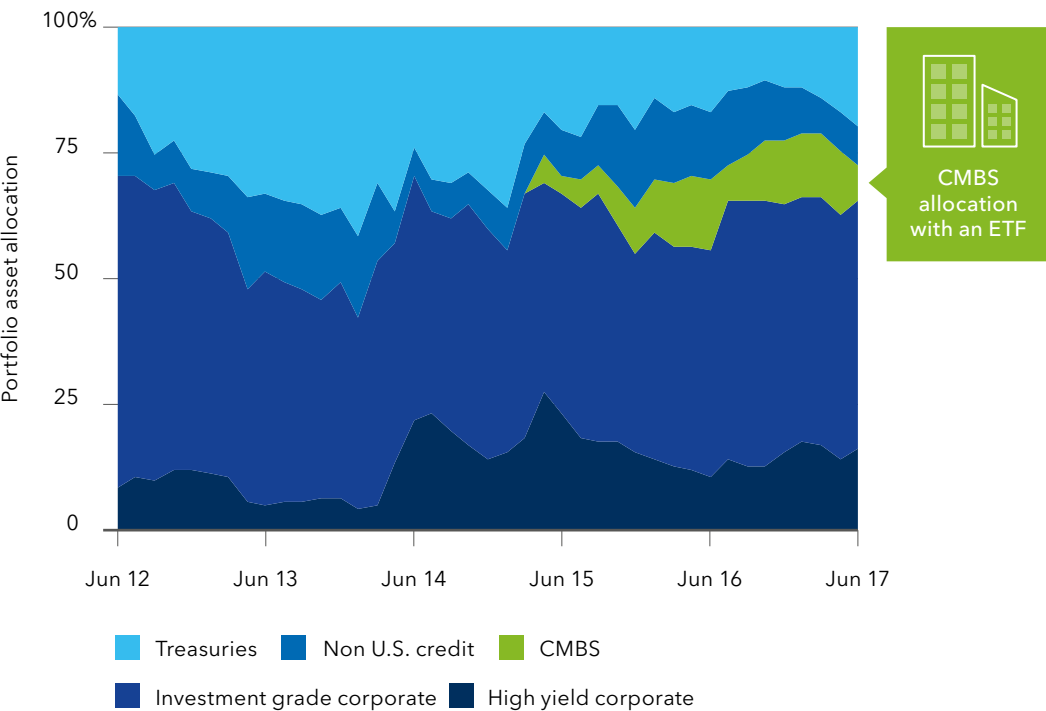
Portfolio construction tools

Constructing a diversified bond portfolio, accessing niche sectors with limited trading resources or investing a significant inflow of cash into an existing portfolio efficiently may present challenges.

ETFs can be held while the portfolio is being completed to quickly gain efficient and diversified beta exposure.

Smaller portfolios, where achieving diversified exposure to various fixed income sectors may not be practical, might also benefit from using ETFs to help complete a portfolio asset allocation.

ETFs can be used for portfolio completion



For illustrative purposes only.

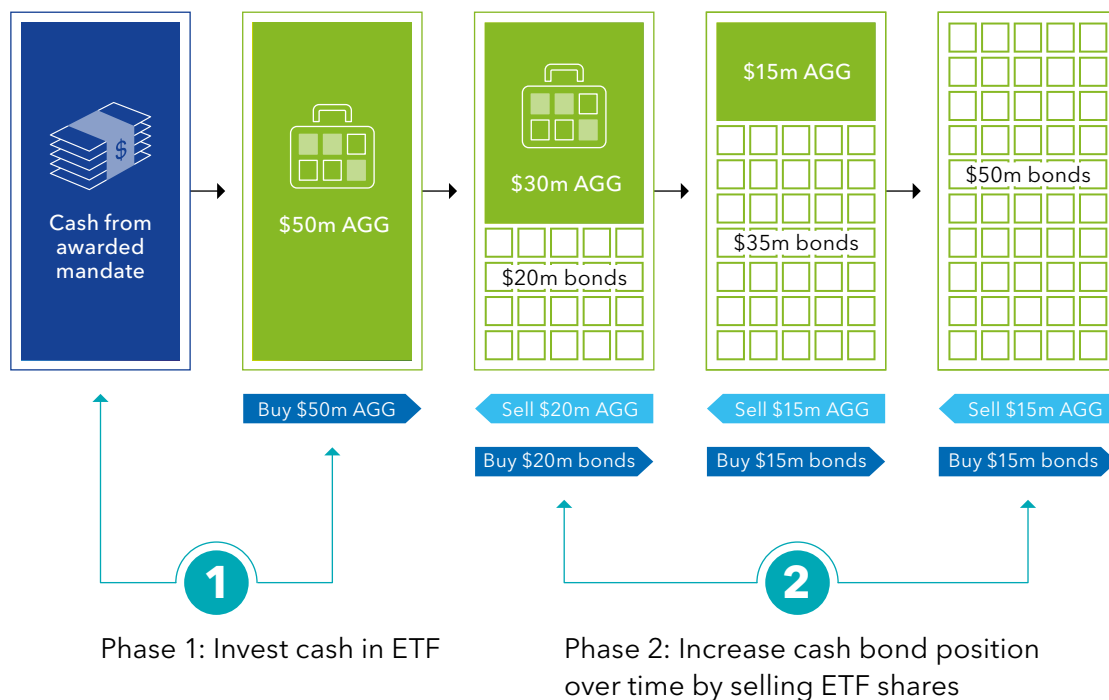
Interim beta while building a portfolio

A fixed income asset manager is awarded a mandate funded with a combination of securities and cash from a client. Given the large cash allocation, the manager wants to quickly invest the assets to gain market exposure.

In a single trade, the manager could invest \$50 million of cash into a liquid bond ETF, such as the **iShares Core U.S. Aggregate Bond ETF (AGG)**. AGG seeks to track the Bloomberg Barclays U.S. Aggregate Bond Index and provides exposure to over 5,000 bonds representing broad exposure to the U.S. investment grade bond market.

As the manager carefully selects securities to build the portfolio, the position in AGG can be trimmed pro rata to fund the purchase of individual bonds until the entire portfolio is fully invested.

Quickly gain exposure with an ETF while building a desired portfolio position



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Tactical adjustments

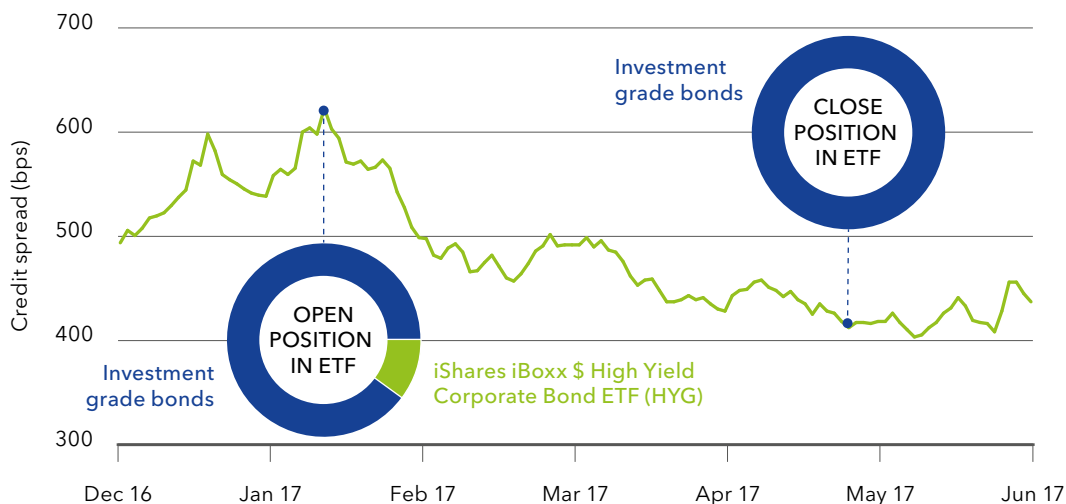
ETFs are frequently used as tactical adjustment tools, allowing investors to potentially capitalize on changes in market sentiment.

Key benefits include the ability to gain market exposure in a timely, cost-effective and efficient manner, particularly in parts of the fixed income market that can be more difficult to access.

The use of ETFs as beta access vehicles serves a valuable purpose, especially where investors have limited in-house trading or research capabilities within a given asset class or region. ETFs provide the ability to express a broad-based market beta view without taking idiosyncratic, issuer-specific risks.

In this illustration, an investment grade manager takes a tactical view on high yield corporate bonds by opening a position in the **iShares iBboxx \$ High Yield Corporate Bond ETF (HYG)** when credit spreads are wide. The manager closes the position when they tighten.

Trade credit spreads with an ETF



Indexed to

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Source: Bloomberg, as of 6/30/17. Case study shown for illustrative purposes only. This is not meant as a guarantee of any future result or experience. This information should not be relied upon as research, investment advice or a recommendation regarding the iShares Funds or any security in particular. Markit[®] and iBboxx[®] are trademarks of IHS Markit Ltd. and its affiliates.

Trading a bond ETF on spread

An investor expects credit spreads to widen to 200 bps in the short-term, but tighten over the long-term. In the following example, she uses the **iShares iBoxx \$ Investment Grade Corporate Bond ETF (LQD)** to express this view.

On a given day, LQD closed at a market price of \$123.26, which corresponded to a credit spread over the 10-year U.S. Treasury of 189 bps. With an entry target of 200 bps, she wants to know the corresponding ETF market price.

Using the Bloomberg Yield and Spread Analysis (YAS) function, she inputs 200 bps into the "Spread" field and determines that the corresponding ETF market price would be \$122.07.

An investor intending to express a view on credit spreads tightening could use LQD as a trade vehicle and implement a limit order at \$122.07.

Enter all values and hit <GO>			
LQD US Equity		Yield and Spread Analysis	
ISHARES IBOXX IN (EJ0090054)		Risk	
Spread	200.00 bps	vs 10y T 1 % 05/15/26	Duration
Price	122.07	100-22+ 15:58:20	Modified Duration
Yield	3.547	1.547045 S/A	Risk
Settle 08/12/16		Consensus Yld 6.6	Convexity
Yields & Spreads based on ACF calculation		DV 01 on 100M	10,999
Spread	Yield Calculations	YV 0.01	0.00091
(1) G-Spr	190.5	Street Convention	3.547
(2) I-Spr	200.7	Equiv 1 % /Yr	3.578
Basis	-129.5	Net Ind Yld	3.142
Security Info		Benchmark Risk	9.065
Holdings in Portfolio (08/08/16)		Risk Hedge	12,133 M
Portfolio Value (MM) (08/08/16)		Invoice	
Avg Bond Price of Portfolio (08/08/16)		Shares	100,000
Weighted Avg Mty (01/08/29)		Principal	12,207,193.01
		Total (USD)	12,207,193.01

For illustrative purposes only. Source: Bloomberg.

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Trading tools

Bond ETFs are gaining increased traction as trading tools alongside cash bonds and index derivatives.

Portfolio managers are finding multiple uses for ETFs in their portfolios:



Access liquid beta during periods of low liquidity



Provide potential cost savings relative to index derivatives



Express relative value views



Hedge cash bond portfolios

Relative value trading an ETF and index CDS

An investor is interested in understanding the relative value between the CDX.IG.10yr contract and the **iShares iBoxx \$ Investment Grade Corporate Bond ETF (LQD)**.

Both products have similar spread duration. Using the convention, the investor could determine the spread to the USD swap curve for LQD, which would allow him to make a more direct comparison to the premium on the CDX contract (which is essentially a spread to the USD swap curve).

While the spread levels are on different scales (LQD is at a spread of 178 bps to 10-year swaps while CDX.IG.10yr is trading at a 113 bp premium), the investor has been monitoring the relationship over the past several weeks and believes that LQD is now more attractive than CDX.IG.10yr.

The investor could therefore buy LQD (either hedged or unhedged vs. swaps) and buy protection on the CDX.IG.10yr contract with a view that the relationship would revert.



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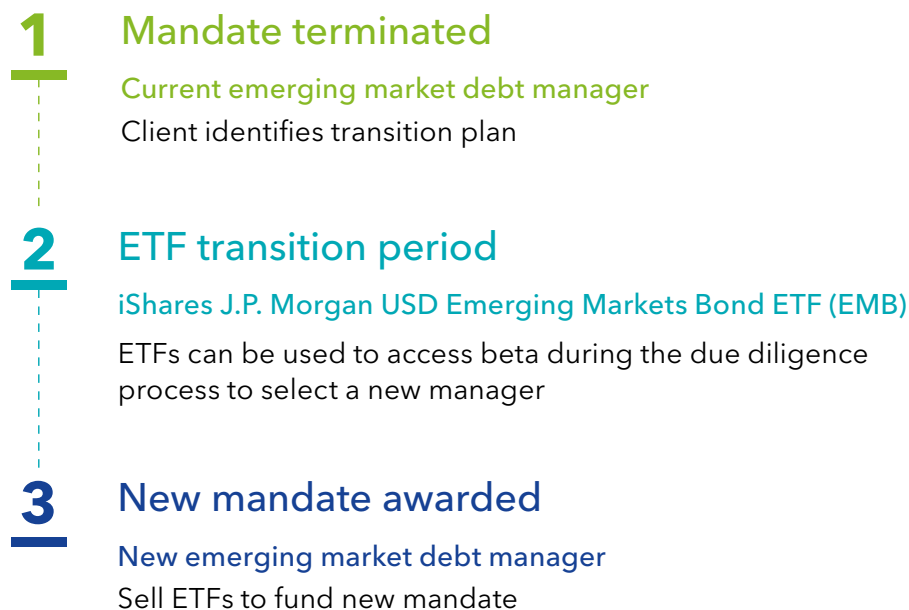
Transition management

As part of a portfolio transition, investors may use ETFs as a cost-effective way to obtain transparent beta exposure.

This enables investors to maintain market exposure while conducting manager due diligence or undertaking a search process.

Investors also benefit from the secondary market liquidity of the ETF holdings in the interim. Ultimately, they may seek to redeem in-kind, thereby saving transaction costs as they move from the ETF to holding the underlying cash bonds.

Maintain liquid beta exposure while searching for new managers



For illustrative purposes only.

Shares of the iShares Funds may be bought and sold throughout the day on the exchange through any brokerage account. Shares are not individually redeemable from the Fund; however, shares may be redeemed directly from a Fund by Authorized Participants in very large creation/redemption units. There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.

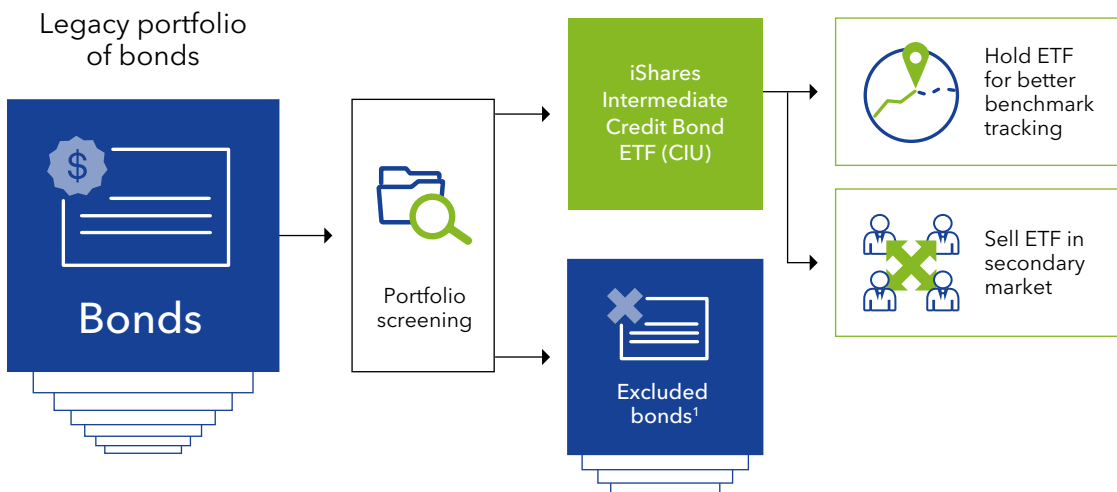
Customized transition solutions

An investor holding a portfolio of legacy bonds can use ETFs to efficiently execute a manager transition by converting existing holdings into ETF shares. BlackRock's proprietary transition management tool can help investors through this process.

Converting legacy positions into an ETF provides the investor with a more manageable portfolio with far fewer line items, a clearer risk profile and a potentially better match for a target asset allocation.

Additionally, should the investor wish to liquidate the legacy portfolio, the secondary market liquidity of the ETF holdings may provide better execution versus disposing of the underlying portfolio directly.

Transition a legacy cash bond portfolio to liquid ETFs



BlackRock offers clients a proprietary transition management technology which can help facilitate the exchange of a portfolio of bonds for ETFs.

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1. Excluded bonds: Portfolio screening excludes securities that are not in the index that the iShares ETF tracks.



CHAPTER

8

Analyzing Bond ETFs

Comparing bond quote conventions

Bond market participants quote securities in a variety of ways, including prices, yields and spreads. Like equity securities, bond ETFs are quoted in price terms.

The following table provides a framework for the interpretation and comparison of individual bond and bond ETF quotes.

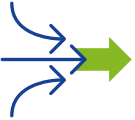




Instrument	Quote convention
Bond ETFs	Price
Investment grade bonds	Spread (over government securities and swaps)
High yield bonds	Price, but may trade on spread
Credit default swap indexes (CDX)	IG = spread (cost for protection) HY = price or spread (cost for protection)
Treasury bonds	Price in 1/32 nd increments
Treasury bills	Yield (known as discount yield)
Floating rate notes	Spread (known as discount margin)
Emerging market debt	Price (yield and spread taken into consideration)

For illustrative purposes only.

Units	Quote example (bid/offer)
Dollars	\$114.76/\$114.77
Basis points	137/131
Dollars	\$103.09/\$103.90
IG = basis points HY = dollars and basis points	IG = 58.82/58.26 HY = \$107.00/\$107.13 or 308.76/306.45
Ticks = 1/32 nd of a point	97-23/97-23+
Percentage points	0.06/0.05
Basis points	62/58
Dollars and basis points	\$99.25/\$99.75 or 120/117

Understanding bond ETF yield metrics

There are a number of different yield measures specific to bond ETFs. The table below summarizes the most common measures.

ETF yield metric	Definition
 <p>Aggregated cash flow yield (ACF)</p>	<p>The ACF yield is the discount rate that equates the ETF's aggregate cash flows (i.e., the sum of the cash flows of the ETF's bond holdings) to a given ETF price. The cash flows are based on the yield-to-worst methodology in which a bond's cash flows are assumed to occur at the call date or maturity, whichever results in the lowest yield.</p> <p>This yield measure can be used to compare cash bonds, credit derivatives, and ETFs. ACF yield is available in Bloomberg via the YAS <GO> function.</p>
 <p>Average yield to maturity (YTM)</p>	<p>This yield measure represents the weighted average YTM of the bonds in the fund at a point in time, assuming that the bonds will be held to maturity and that all coupon and final principal payments will be made on schedule. It is the only yield measure expressed as gross of fees instead of net (such as the fund's expense ratio), which means that fees should be deducted when comparing to other yield measures.</p>
 <p>Distribution yield</p>	<p>This is the annual yield an investor would receive if the most recent fund distribution and current fund price stayed the same going forward. It is calculated by dividing the most recent fund distribution by the most recent NAV and multiplying the result by 12.</p>
 <p>12-month yield</p>	<p>The 12-month yield represents the distributions paid by a fund over the past year. It is calculated by adding up any income distributions over the past 12 months, then dividing that by the sum of the most recent NAV and any capital gains distributions made over that time.</p>
 <p>30-day SEC yield</p>	<p>Based on the most recent 30-day period, this yield reflects the interest earned during the period by the average investor in the fund, after deducting the fund's expenses for the period. This is a required calculation developed by the SEC in order to provide a standard comparison among bond funds. Providers may calculate other yields differently, but every fund must follow the same formula for SEC yield.</p>

Implications

This methodology recognizes that, on any given day, the ETF represents a static portfolio of bonds. Under the ACF methodology, the cash flow streams from individual bond holdings are aggregated into a single cash flow stream. The ACF method simplifies the calculation of yields and spreads for bond ETFs by treating them as a single instrument, like an individual bond.

YTM represents what the bonds in the fund are yielding at a current point in time. When bond yields change in the market, the YTM on a fund also changes, and future bonds acquired by a fund will then be acquired at current YTM rates. In this way, YTM can be a good indicator of where the fund distribution may be headed.

Distribution yield measures a fund's most recent distribution to investors, so it can be used as an indicator of current income. The size of the distribution reflects the yield level that bonds traded when they entered into the fund. Because of this, the distribution yield is slow to adjust to changes in market yields.

Like the distribution yield, 12-month yield indicates the income paid out by a fund. Because it looks at the past year of payments, it is less affected by fluctuations in the monthly fund distribution. 12-month yield is helpful for understanding a fund's income history, or what it has paid out in the past.

The 30-day SEC yield is the only yield metric for which all fund providers must use the same calculation. It is generally considered to be a consistent metric to use when comparing funds. However, the 30-day SEC yield relies on short-term data, potentially making it difficult to draw longer term conclusions.

Bloomberg bond ETF analytics

Bloomberg offers robust functionality for analyzing bond ETFs.

Function	Description
EXTF	ETP home page
ETF	ETF home page
NI ETFS	ETF news feed
DES	ETF descriptive page
QM	Quotes/market share of traded exchanges
IOIA	Indication of interest and dealer axes
DVD	ETF distribution history
SI	Short interest analysis
ISHA	iShares ETP home page

Source: Bloomberg.

Function	Description
TRA	Calculate return on ETFs using the price, commissions and reinvestment rate using both trade price and NAV
NAV	Historical graph of ETF premium/discounts and creation/redemption amounts
COMP	Evaluate and graph ETF versus benchmark
IVAT	Visual time series analysis to identify whether prices are historically high or low
CSHF	Analyze projected and past bond payment schedule of the underlying bond holdings
PORT	Portfolio analysis of the underlying bond holdings
BETA	Graph correlation sensitivity of an ETF's total returns to a selected benchmark
YAS	Yield calculator, providing spread to government benchmark, swaps and basis to CDX on selected ETFs

Analyze a bond ETF with Bloomberg YAS function

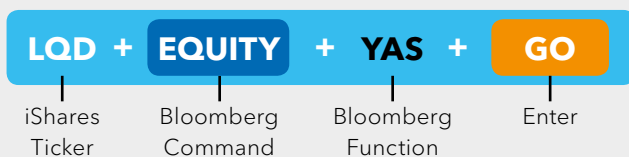
The Bloomberg Yield and Spread Analysis (YAS) tool enables users to analyze yield, spread and interest rate sensitivity. Originally developed for individual bonds, YAS has been enhanced for analyzing select iShares ETFs.

Using YAS, Bloomberg users can:

- Analyze a bond ETF in the same manner as a single bond
- View a last-traded ETF price, converted to yield
- Perform traditional yield analysis versus a selected benchmark
- Input custom parameters to analyze the relationship between price, yield and spread
- Measure risk based on custom inputs to determine if an ETF meets pre-determined investment criteria

1

Input an iShares ticker from the list:



2

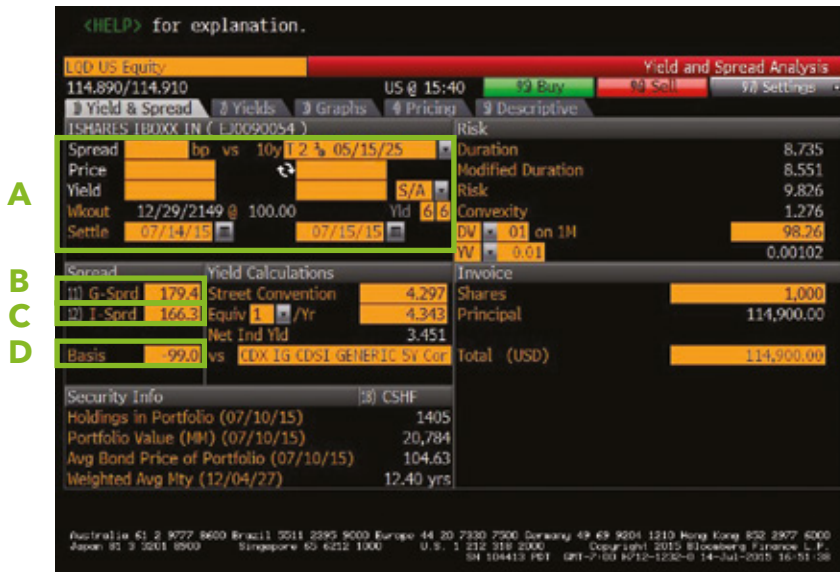
The ETF's last-traded price is displayed, with corresponding yield, spread and risk characteristics.

3

Modify spread, price or yield fields to identify target ETF trading price, then press <GO>.

For further YAS customization, modify:

- A** Benchmark bond using the **VS. FIELD**
- B** Curve from which the benchmark bond is selected using the **G-SPRD FIELD**
- C** Swap curve from which the benchmark is selected using the **I-SPRD FIELD**
- D** CDS spread using the **BASIS FIELD**



Source: Bloomberg.

Screenshot for illustrative purposes only.

In-kind basket trading with Bloomberg BSKT

Bloomberg has launched new functionality to help investors and brokers utilize the in-kind exchangeability of bond ETFs.

BSKT<GO> is a function to support the bond ETF creation and redemption process, which enables investors to see how a portfolio of cash bonds could be transitioned into an ETF, or vice versa. The function provides instant, visual guidance to assess the suitability of an in-kind exchange of bonds for iShares ETFs.*

Using guidelines set by iShares Portfolio Managers, BSKT has two heat map views that show how a proposed portfolio aligns with an iShares ETF using a stratified sampling methodology. The heat maps help pinpoint portions of a portfolio that do not meet a certain criteria of the ETF basket and may require modification.

* Proposed portfolios are not seen by iShares until the broker or investor sends the submission to iShares via a BSKT button. Investors should contact their broker to effect any transaction.

Market value view: Determines if portfolio has adequate diversification by market value

<Menu> to Return											
1) Send to iShares			2) Edit Securities			3) Export to Excel			4) Actions		
Fund Details			List Summary			Units			LQD Test 8/2 Orig		
Ticker	Curr	NAV	Unit Size	MV of Unit	# Total	# Eligible	# Ineligible	MV of Eligible	Max Possible	Units	MV of Max
GBF US	USD	114.45	50,000	5,722,500	116	116	0	125,934,822	22	125,895,000	
IUSB US	USD	50.97	100,000	5,097,000	116	116	0	125,934,822	24	122,328,000	
LQD US	USD	120.97	100,000	12,097,000	116	114	2	121,825,714	10	120,970,000	
AGG US	USD	109.63	100,000	10,963,000	116	112	4	118,333,197	10	109,630,000	
CTU US	USD	110.08	50,000	5,504,000	116	77	39	90,561,435	16	88,064,000	

Bonds Suitability Analytics											
Market Value Issuer Diversity											
Desired Units			Criteria			BCLASS2 > BCLASS3 vs Custom Duration			Inventory Deficit		
BCLASS2 > BCLASS3			0 - 5 yrs			5 - 10 yrs			10+ yrs		
Agencies						1			Not Classified		
Financial Institutions			9			7			4		
Industrial			19			30			23		
Not Classified											
Treasuries											
Utility											

Issuer view: Determines if portfolio has adequate diversification by issuer

<Menu> to Return											
1) Send to iShares			2) Edit Securities			3) Export to Excel			4) Actions		
Fund Details			List Summary			Units			LQD Test 8/2 Orig		
Ticker	Curr	NAV	Unit Size	MV of Unit	# Total	# Eligible	# Ineligible	MV of Eligible	Max Possible	Units	MV of Max
GBF US	USD	114.45	50,000	5,722,500	116	116	0	125,934,822	22	125,895,000	
IUSB US	USD	50.97	100,000	5,097,000	116	116	0	125,934,822	24	122,328,000	
LQD US	USD	120.97	100,000	12,097,000	116	114	2	121,825,714	10	120,970,000	
AGG US	USD	109.63	100,000	10,963,000	116	112	4	118,333,197	10	109,630,000	
CTU US	USD	110.08	50,000	5,504,000	116	77	39	90,561,435	16	88,064,000	

Bonds Suitability Analytics											
Market Value Issuer Diversity											
Desired Units			Criteria			BCLASS2 > BCLASS3 vs Custom Duration			Inventory Deficit		
BCLASS2 > BCLASS3			0 - 5 yrs			5 - 10 yrs			10+ yrs		
Agencies						2,000,000					
Financial Institutions			12,850,000			12,350,000			7,000,000		
Banking			8,600,000			8,050,000			2,625,000		
Brokerage, Asset Managers, Exch											
Finance Companies			4,125,000			2,100,000					
Insurance			150,000			2,225,000			4,375,000		
REITs											
Industrial			27,150,000			35,475,000			24,975,000		
Not Classified											
Treasuries											
Utility											

Screenshots for illustrative purposes only.

The strategies discussed are strictly for illustrative and educational purposes and are not a recommendation, offer or solicitation to buy or sell any securities or to adopt any investment strategy. There is no guarantee that any strategies discussed will be effective.

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Carefully consider the Funds' investment objectives, risk factors, and charges and expenses before investing. This and other information can be found in the Funds' prospectuses or, if available, the summary prospectuses which may be obtained by visiting www.iShares.com or www.blackrock.com. Read the prospectuses carefully before investing.

Investing involves risk, including possible loss of principal.

Fixed income risks include interest rate and credit risk. Typically, when interest rates rise, there is a corresponding decline in bond values. Credit risk refers to the possibility that the bond issuer will not be able to make principal and interest payments. Non-investment grade debt securities (high-yield/junk bonds) may be subject to greater market fluctuations, risk of default or loss of income and principal than higher-rated securities. An investment in the funds is not insured or guaranteed by the Federal Deposit Insurance Corporation or any other government agency and its return and yield will fluctuate with market conditions.

International investing involves risks, including risks related to foreign currency, limited liquidity, less government regulation and the possibility of substantial volatility due to adverse political, economic or other developments. These risks often are heightened for investments in emerging/developing markets and in concentrations of single countries.

Actively managed funds do not seek to replicate the performance of a specified index. Actively managed funds may have higher portfolio turnover than index funds.

When comparing stocks or bonds and iShares Funds, it should be remembered that management fees associated with fund

investments, like iShares Funds, are not borne by investors in individual stocks or bonds. Buying and selling shares of ETFs will result in brokerage commissions. Diversification and asset allocation may not protect against market risk or loss of principal.

With short sales, an investor faces the potential for unlimited losses as the security's price rises.

Shares of the iShares Funds may be bought and sold throughout the day on the exchange through any brokerage account. Shares are not individually redeemable from the Fund, however, Shares may be redeemed directly from a Fund by Authorized Participants in very large creation/redemption units. There can be no assurance that an active trading market for shares of an ETF will develop or be maintained.

No proprietary technology or asset allocation model is a guarantee against loss of principal. There can be no assurance that an investment strategy based on the tools will be successful.

Options involve risk and are not suitable for all investors. Prior to buying or selling an option, a person must receive a copy of "Characteristics and Risks of Standardized Options." Copies of this document may be obtained from your broker, from any exchange on which options are traded or by contacting The Options Clearing Corporation, One North Wacker Dr., Suite 500, Chicago, IL 60606 (1-888-678-4667). The document contains information on options issued by The Options Clearing Corporation. The document discusses exchange traded options issued by The Options Clearing Corporation and is intended for educational purposes. No statement in the document should be construed as a recommendation to buy or sell a security or to provide investment advice. If you need further information, please feel free to call the Options Industry Council Helpline. They will be able to provide you with balanced options education and tools to assist you with your iShares options questions and trading. The Options Industry Council Helpline phone number is 1-888-Options (1-888-678-4667) and its website is www.888options.com.

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