
The Dynamics of Bond ETF Creation, Redemption and the Market Arbitrage Mechanism

Our panel of experts discuss the fixed income ETF creation and redemption process, how a well-managed custom basket process may support efficient executions, and how bond ETF arbitrage functions in a balanced ecosystem.

Section 1: Bond ETF Creation and Redemption

Marcus Miholich
Managing Director,
Head of SPDR ETF
Capital Markets
EMEA & APAC

How does the ETF primary market basket process differ between ETF asset classes and why?

An efficient primary market is key to supporting end execution levels for our investors. As such, we have calibrated our primary market dealing models to reflect the nuances of the underlying asset classes that our ETFs track. This has resulted in tailored and flexible optionality across our product set both in terms of cash and in specie interactions. For example, with fixed income, custom baskets benefit investors by allowing an ETF to meet its investment objective more efficiently and to facilitate a more cost-effective creation and redemption process, resulting in narrower bid-ask spreads and smaller premiums/discounts relative to bond ETFs without basket flexibility.

Ultimately, custom baskets can be beneficial for the ETF, Market Makers (“MMs”)/Authorised Participants (“APs”) and investors, as they allow our investment teams to select from an MM’s/AP’s inventory and to better align the fund overweights/underweights to the index, benefitting from the liquidity provided directly by the MM/AP rather than sourcing liquidity elsewhere. In turn, it allows MMs/APs to use existing bond inventories and reduce the amount of bond buying and/or selling from other dealers, which lowers transaction costs, meaning investors can access secondary market pricing in a more efficient way via tighter bid-ask spreads.

Andreas Roy
Fixed Income Trading,
Jane Street
Financial Limited

There can be distinct and notable differences in the ETF creation-redemption process across asset classes. Typically these nuances are driven by differences in the underlying market structures of each asset class. The fixed income market is entirely over-the-counter, liquidity is less uniform, and it contains a much larger variety of individual bonds.

An ETF can have a portfolio consisting of thousands of bonds, including some that may be too costly, or simply not available, to trade at a given point in time. In response, many fixed income ETFs utilise a sampling approach where baskets maintain similar risk characteristics to the ETF but contain a subset of the total holdings. This sampling approach also aligns with the greater adoption of custom baskets by fixed income ETFs.

In contrast, liquidity in the equity markets tends to be more uniform where all underlying positions trade daily. Equity ETF creations typically contain shares of each holding in the portfolio, with some exceptions for funds with a very large number of portfolio holdings. As a result, custom and sampled baskets are used less frequently by equity ETFs.

What steps has State Street Global Advisors taken to ensure that its fixed income primary market process can handle sharp increases in the number and size of orders during stressed market periods?

Sebastjan Smodis

Managing Director,
Risk Management, State
Street Global Advisors

The Risk Management team monitors both ETF primary and secondary market liquidity. Daily liquidity surfaces in three dimensions (cost, time, size) and is captured for every bond held in the ETF. Portfolio-level analytics for both normal and stressed scenarios are generated and compared against the worst historical redemptions. The liquidity coverage ratio for each ETF is calculated by taking the amount of underlying securities that can be liquidated, divided by an estimated stressed redemption amount. State Street Global Advisors Risk Management regularly reviews these metrics with Investment and Capital Markets teams to ensure accuracy, especially during periods of volatility.

Stephen Yeats

Senior Managing
Director, Global
Fixed Income, State
Street Global Advisors

Stratified sampling is the key to the success of our primary markets process. At State Street Global Advisors, we have been running index strategies in fixed income since the 1990s and this process has been stress-tested on a number of occasions. Our focus is understanding the risk of the index and also the trade-off between costs and tracking error for the fund. This trade-off is much more meaningful during periods of market stress.

Our Fixed Income Beta Solutions team is organised into sector teams, located around the globe — typically close to where the bonds are issued and trade the most. They are specialists in the bond market structure and have a deep understanding of liquidity and the trade-off between costs and the tracking error benefit of the bonds within a particular sector of the bond market.

In terms of handling an increase in volumes, it is important to have refined processes, technology and infrastructure to complement seasoned portfolio managers, allowing them to use their experience and knowledge in a scalable way.

Kimberly Russell

Market Structure
Specialist, SPDR ETF
Capital Markets US

Globally, we saw a strong increase in the number of primary orders during the COVID-19 sell-off in March to April 2020. The heightened volumes across major exposures in fixed income ETFs during this period highlighted how Authorised Participants and investors increasingly use ETFs for liquidity and risk transfer purposes. We experienced no issues with this heightened activity, and the primary market continued to operate in a normal fashion, albeit under more volatile conditions.

Marcus Miholich

One of the common questions we receive about market resilience is whether APs will continue to perform their primary market functions during episodes of extraordinary volatility. During COVID-19, we observed that more market participants than normal were active in the primary market during these volatile markets in both equities and fixed income, further broadening the number of liquidity providers. State Street Global Advisors' scalable platform for accepting primary market orders showed its resiliency and was able to accommodate a record number of orders throughout a significant time period.

Let's take US corporate credit as an example. What impact does the fragmented nature and opaqueness of the market have on the primary markets process?

Stephen Yeats

Market structure is a challenge for market participants, across most sectors of the bond market, but the challenge in US credit is one of the more acute. No one designed the bond market, it is a function of how issuers choose to structure their bond issuance programs over many years — put simply, there are too many bonds, some of which no longer trade and others where the cost of trading is high relative to the index tracking benefit of buying them.

The fixed income indices on which ETFs are based also reflect these challenges, which is why portfolio managers use stratified sampling. They build a representative portfolio of bonds to track the index, without needing to buy illiquid bonds or bonds that are expensive to trade. This is also how the primary market works, where portfolio managers work with APs to transact representative baskets, the contents of which are at the discretion of the investment manager, based on the stratified sampling process.

Andreas Roy

Given their diversified nature, most bond ETFs hold a significant number of line items, which are usually a mix of frequently traded bonds and bonds that trade less actively. For ETFs relying solely on pro-rata creation/redemption, MMs/APs must deliver or receive all of the bonds in the portfolio, including any that rarely trade. They factor the high expected cost of trading the less actively traded bonds into their ETF pricing.

As the name implies, custom baskets allow for more flexibility. However, ETFs still want their custom baskets to reflect the characteristics of the portfolio (duration, sector exposure, etc.), which means including a mix of actively traded and less actively traded bonds. What distinguishes custom baskets is that ETFs can use different sets of less actively traded bonds. Thus, ETFs and MMs/APs have more scope to negotiate in order to find a basket of bonds that the MM/AP either holds or can reasonably source and that still reflects the characteristics of the portfolio. The ETF maintains its desired exposure, and MMs/APs can be tighter with their ETF pricing because their trading costs are lower.

Does the flexibility of the custom basket introduce tracking or other risks to investors?

Andreas Roy

For all of the benefits that customs provide, they can introduce some risks as well. Any basket that isn't a pro-rata slice can potentially lead to tracking error because the fund's holdings won't line up perfectly with the composition of the index. Also, custom baskets increase the risk of the fund losing (or gaining) value as the fund and the market maker assess the values of the underlying bonds. The good news is that ETF issuers have become adept at managing these risks. Meanwhile, ETFs covered by the SEC's ETF rule are required to monitor the construction of custom baskets to ensure they are in the best interest of the ETF and its shareholders.

Stephen Yeats

The key to answering this question is to define what type of flexibility we are talking about and defining who has decision rights on the ultimate construction of a basket.

Under a stratified sampling process, flexibility is beneficial at a security level, and it is sub-optimal to try and own or transact every bond in the index. A bond issuer could have hundreds of bonds and if an investor were to try and buy all of them, the transaction costs could be very high indeed, so that ex-post they would struggle to get close to the return of that issuer's bonds. However, if they were to buy, say, 20 bonds from that issuer — making sure they had the same overall term and subordination structure as the overall profile of that issuer, but also picking bonds actively trading in the market and/or held as inventory at dealers — then by balancing transaction costs with tracking risk benefit the outcome should be better for the fund.

This is also the approach taken with custom baskets. The bonds accepted by the portfolio manager are a sub-set of the portfolio and/or index and help to meet the investment objective of the fund, i.e. to track the index after transaction costs. It is important to remember that in more challenging areas of the bond market, it is typically not optimal to try and transact every bond on an index, whether buying or selling bonds in the secondary on an index fund for cash or transacting a basket with an AP/MM for an ETF. Transacting a sub-set is a more efficient means of risk transfer. Under a stratified sampling process, this is what flexibility means — it does not mean accepting baskets of bonds that would significantly skew the risk of the fund.

What will and will not be included in a basket is at the discretion of the investment manager, not the AP. At State Street Global Advisors, we have a well-defined process for fixed income indexing, tested over decades, which sets clear risk limits versus the index. And, importantly, portfolio managers are incentivised to act in the best interest of the fund and the underlying owners of that fund. A key part of the value-add we provide as a manager is to have a deep understanding of bond market structure and to help our clients navigate it, to achieve the risk/return outcomes they require after transaction costs. This is one of the reasons our clients have entrusted us to run around \$500 billion in index fixed income assets globally.

Sebastjan Smodis

Over time, custom baskets have been representative of the fund in terms of overall duration, credit spreads, liquidity scores and price volatility even though it may not have the same number of securities as the funds. This is true pre and post COVID periods. In fact, during times of stress and heightened market volatility, the basket representative ratio was higher in order to minimise tracking error. Also, misalignment of custom baskets would lead to misalignment of the ETF and cause elevated tracking error against the index. A robust end-to-end risk monitoring process is in place to ensure that doesn't happen.

The Risk Management team monitors bond ETF exposures against the index across multiple dimensions including duration, key rate duration, spread duration, issuer, sector, rating and country weight. In addition, estimated tracking error volatilities, model-based estimates of future portfolio and benchmark return deviations, with tight strategy-specific thresholds, are monitored across all ETFs with any exceptions reported to the portfolio managers daily. The portfolio managers could use custom baskets to adjust the weights and keep the fund within the risk thresholds. Ultimately, investors are investing in a fund, not a creation or redemption basket, and therefore an investor's key focus will be on the fund's overall performance attributes.

Section 2: Overview of ETF Arbitrage

Marcus Miholich

What is ETF arbitrage? Why is it important?

ETF arbitrage is the process by which liquidity providers in the market aim to capitalise on any price discrepancies between the ETF and its net asset value (“NAV”). These discrepancies are usually referred to as “premiums” and “discounts” depending on whether the ETF is trading at

a higher or lower price than its corresponding NAV. ETF arbitrageurs can take advantage of this difference by, for example, trading ETF shares and underlying holdings in the secondary markets (at market prices) and creating or redeeming ETF shares at NAV through APs to close out their positions. This activity drives the market value of ETF shares back in line with the ETF’s NAV. The result is that investors are able to buy and sell ETF shares at a price that is close to the ETF’s NAV.

Kimberly Russell

ETF arbitrage opportunities provide an economic incentive for liquidity providers to be active in both the ETF market and underlying fixed income markets. Nevertheless, dislocations can occur for various reasons, and investors should be mindful when selecting their execution strategies. A dislocation could be due to minor differences in the composition or proportion of the basket of securities that each ETF holds. It could be due to volatile and fast-moving prices of the underlying securities, as we experienced during the peak of COVID-19 across global financial markets. Or it could be due to market structure problems in the equity markets (where ETF shares trade) or underlying fixed income markets. When dislocations occur, they are usually temporary, thanks to arbitrage activity regulating the ETF’s market price and NAV per share.

Andreas Roy

ETF arbitrage is the mechanism that keeps ETFs trading at levels that align with the value of the underlying portfolio. It is an important function in the overall ETF ecosystem and helps ensure that market participants are able to trade at prices that reasonably reflect the value of an ETF’s underlying assets.

In its simplest form, MMs/APs will employ ETF arbitrage strategies when an ETF is trading at too large of a premium (or discount) compared to the underlying assets. In these scenarios, the market maker sells (or buys) the ETF shares, while simultaneously buying (or selling) the underlying components. Depending on whether the ETF was at a premium or discount, the market maker will then work with an Authorised Participant to either create or redeem the ETF in order to collapse the two positions. Market makers will continue this process until the premium or discount collapses to a level where the arbitrage opportunity no longer exists.

Are the same market dynamics driving arbitrage opportunities across ETF asset classes?

Kimberly Russell

While the underlying process is largely the same, fixed income ETF arbitrage introduces different market structure considerations not applicable to equity ETFs. These structural differences can produce wider-than-normal premiums and discounts, especially during periods of volatility. Unlike equities, fixed income pricing is typically opaque with some issuances reflecting stale pricing, and during periods of volatility these issues can become even more pronounced. However, fixed income ETFs tend to reflect more real-time sentiment and realistic pricing levels as to where the basket of bonds should trade.

Marcus Miholich

Yes, we have seen that pricing on individual bonds can lag behind the real-time market sentiment and executable pricing levels reflected by the ETF, resulting in the appearance of large discounts to NAV. In addition, end-of-day NAV prices can be struck at a different time than the ETF's closing auction, resulting in different values depending upon the region where the ETF shares trade. Premium and discount calculations only use a single point in time, thus in some instances not capturing intraday evolution. These examples of specific fixed income dynamics can play a role in how APs view the fixed income ETF arbitrage mechanism.

Andreas Roy

The nuances may be different, but at a high level the market dynamics driving arbitrage opportunities are very similar across asset classes: market participants impact prices by demanding liquidity in, say, the ETF, creating an opportunity for market makers to trade the ETF and its underlyings to bring their prices closer in line to one another. Of course, ETF market makers do much more than simple arbitrage of this kind — they can warehouse risk for long periods, they can trade the ETF without choosing to pair that with other trades, and they can hedge and lay off risk using instruments other than the underlyings.

Can custom baskets have a negative impact on the arbitrage mechanism for bond ETFs?

Marcus Miholich

In theory, it should have the opposite effect and make the arbitrage process easier, as difficult-to-source bonds are excluded and APs only have to execute a subset of the index. Stratified sampling is an efficient technique for constructing portfolios, as many broad-based fixed income indices have a large number of bonds in comparison to the custom baskets that are used with this method. Via a well-managed and risk-controlled sampling approach, a portfolio manager can seek to build a portfolio with the same characteristics as the index without impacting the separate secondary market arbitrage operation. At SPDR ETFs, we work closely with our portfolio managers and Authorised Participants to ensure that we have an efficient and robust mechanism in place for negotiating baskets as a normal part of the primary market order placement process.

Andreas Roy

If an ETF and MM/AP are able to work together to negotiate a custom creation basket that is desirable for both parties and the ETFs offer custom redemption baskets that are representative of the fund's underlying exposures, then the arbitrage mechanism for fixed income ETFs should continue to function as intended. The risks to the arbitrage mechanism increase as the custom basket deviates from the underlying fund.

Does an Authorised Participant's role as an ETF arbitrageur and (potentially) as a bond dealer cause any conflicts in this operation?

Andreas Roy

In many cases, MMs/APs that are also bond dealers can help make tighter ETF markets by offering a larger liquidity network for the ETF to take advantage of. A market maker that is able to hold a large number of bonds on its book and tap into a variety of liquidity channels, including the ETF primary market, is often able to provide liquidity to ETFs without having to cross bid-ask spreads. This cost savings is passed on to investors through tighter ETF pricing.

Marcus Miholich

We work with a broad spectrum of top-tier market making firms and investment banks, many of which are active across bond markets and ETF products. This diversity works to harmonise the balance between these activities, ensuring that a high level of liquidity and pricing is available across our fixed income range. So from our experience, these dual roles typically complement each other. The feedback we receive from many Authorised Participants is that ETFs are an efficient tool to manage bond inventories and, as such, play an increasingly important part in the daily activities of fixed income trading desks.

What happens to the bond ETF arbitrage mechanism in periods of market stress?

Andreas Roy

The fixed income ETF arbitrage mechanism still functions during periods of market stress. It is important to remember that the arbitrage mechanism is designed to limit gaps between the price of the ETFs and the value of the underlying holdings, which is not always the same as an ETF's NAV. In stressed markets, security-specific price information for many bonds tends to be less readily available, which can lead to marks from bond pricing services that are not reflective of actionable price levels.

Market participants, on the other hand, don't have to wait for tangible evidence that an inactive bond is worth less before marking its value down. In this situation, prices reflect the level at which market participants are willing to transfer the underlying risk of the ETF rather than an apparent arbitrage opportunity. The active primary and secondary markets for fixed income ETFs in March of 2020 are a testament to the ability of ETFs to facilitate risk transfer during periods of market stress at price levels that incorporate real-time market sentiment.

Sebastjan Smodis

During March 2020 ETFs saw record volumes in the secondary market as investors gravitated toward ETFs to hedge and manage risk. ETFs drove price discovery while the underlying bond market experienced severe liquidity challenges, with bid-ask spreads widening up to 10x, and saw much fewer trades. The price uncertainty and latency in NAV contributed to the large ETF NAV discounts observed in March 2020, which later swung to large premiums.

During periods of market stress, it is even more imperative that creation and redemption baskets, custom or otherwise, are constructed as representative slices closely matching characteristics of the fund. Any differences would get amplified during periods of increased market volatility and lead to material mismatches between fund and index characteristics, resulting in increased tracking error for the fund.

The unprecedented volatility across markets and asset classes in 2020 saw many bond ETFs reflect wider-than-average dislocations to their fair value NAVs. Why did we see these dislocations persist during multiple trading days if the arbitrage mechanism was still functioning?

Andreas Roy

In stressed markets, it's very difficult for pricing services to capture real-time trading dynamics and information in the way that market makers can. Market conditions in March 2020 were marked by high volatility and low bond liquidity, which led to NAV becoming a less reliable benchmark for comparing the value of the ETF to the underlying portfolio. Despite a lack of underlying bond trading activity, fixed income ETFs continued to facilitate risk transfer and actively changed hands, providing valuable price discovery.

In effect, ETF prices became the only reflections of current risk levels in the bond market. This led to wider average differences between ETF prices and NAVs. The reason the ETF arbitrage mechanism did not close this gap was that there was no arbitrage to take advantage of between ETF prices and NAVs: the prices reflected the current risk levels while NAVs remained artificially elevated due to the lack of underlying bond trading activity contributing to stale bond prices.

The perceived dislocations persisted for multiple days because there were many consecutive days in spring 2020 when risk was primarily being transferred via ETFs and not via the underlying bonds. That led to perceived discounts to NAV when in reality the actively traded ETFs were often more reactive to changing market dynamics than their underlying bonds.

Marcus Miholich

During the COVID-19 period of heightened volatility in March–April of 2020, sharp moves in the underlying equity and bond markets led to dislocations that caused premiums and discounts to NAV. Questions were raised by investors and regulators alike as to whether this represented a failure of the arbitrage mechanism. It is our contention that it did not and that the premiums and discounts witnessed were often the result of stale bond prices used by index providers that did not reflect the most up-to-date prices in the market. Index providers need to get a price for every bond in their corresponding indices and different providers can have their own particular methodology and pricing source.

Kimberly Russell

Delayed or “stale” NAV pricing may have meant that ETFs were a more accurate reflection of real-time market sentiment and the level at which buyers and sellers were transacting. The NAV of underlying securities is based on the actual trading price for liquid securities, while for less frequently traded securities this is based on estimates that incorporate a number of factors. When market liquidity effectively disappears to the extent that it did in the March–April 2020 period, and when considering the opacity of pricing in fixed income markets, it may result in “unrealistic” NAVs that do not fully reflect prevailing conditions in a volatile and rapidly evolving market environment.

When considering a new fund, State Street Global Advisors will examine and stress-test the liquidity of the underlying securities in different market environments to understand how their liquidity profile changes over time and what impact that may have on the liquidity of the fund itself. Additional stress-testing and analysis is performed on less liquid investments. This is done to ensure that both the index and investment processes to be used for a daily dealing ETF are robust in all market cycles.

State Street Global Advisors also works with index providers to ensure that the benchmarks being tracked are investable and, where necessary, use screens within the index methodology to help remove the least liquid constituents from the investible universe.

Investors need to evaluate a number of metrics when selecting an ETF. Should an efficient arbitrage process be one of them?

Marcus Miholich

This should not be a consideration for investors but, rather, the Authorised Participants that transact directly with the ETF issuer in the primary market. In terms of creation/redemption baskets, for most fixed income ETFs, a fully replicated slice is impossible and/or impractical given the breadth of index constituents and market dynamics with respect to the ability to source fixed income securities and price transparency. Hence, the most prevalent form of basketing for SPDR fixed income ETFs occurs via custom negotiated baskets, which comprise a subset of an ETF's holdings that is constructed by the portfolio management team in a manner consistent with the stratified sampling security selection process used for managing fixed income index portfolios.

As an ETF provider, State Street Global Advisors maintains close working relationships with a broad set of APs and market makers. Through our ongoing dialogue and continuous due diligence, we set creation/redemption characteristics to ensure efficient trading in the primary and secondary markets. Additionally, we secure AP and market making support for all SPDR ETFs.

Kimberly Russell

It's important to recognise that investors have come to expect that an ETF's market price will maintain a close tie to the ETF's NAV per share over time. And although arbitrage opportunities may be market-driven, the regulatory framework for ETFs serves an important function in allowing for both efficient arbitrage and narrow bid-ask spreads. There are implications for regulators globally to consider in terms of how the market structure and regulatory frameworks (both for ETFs and underlying markets) provide for efficient arbitrage, and whether improvements can be made from this perspective to enhance the ETF investor experience.

Andreas Roy

For the vast majority of ETFs, the arbitrage process is extremely efficient. If an investor is unsure how an ETF's arbitrage process functions, it can be beneficial to consult with a market maker or the issuer's capital markets team. We regularly partner with our clients to help clarify nuances and provide additional insight on a given ETF's liquidity and trading profile.

About State Street Global Advisors

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* Pensions & Investments Research Center, as of December 31, 2020.

† This figure is presented as of June 30, 2021 and includes approximately \$63.59 billion of assets with respect to SPDR products for which State Street Global Advisors Funds Distributors, LLC (SSGA FD) acts solely as the marketing agent. SSGA FD and State Street Global Advisors are affiliated.

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