By the numbers:
New data behind the bond ETF primary process

iShares by BlackRock

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Events surrounding the COVID-19 health crisis in the spring of 2020 unleashed unprecedented volatility in global financial markets. Liquidity was challenged in nearly every corner of the bond market, including high grade credit and US Treasuries (which are typically the easiest bonds to buy and sell). During this period of time, bond exchange-traded funds (ETFs) set record trading volumes on exchange, providing a much-needed source of liquidity that allowed investors to adjust portfolios and manage risk. By allowing investors to take on or offset their fixed income exposures in the secondary market, bond ETFs alleviated pressure on the underlying bond markets during the worst of the crisis period of February-April 2020, as they have in previous bouts of market volatility.[1]

Most ETF trading occurs in the "secondary" market, or on-exchange, where investors buy and sell existing ETF shares. A separate, "primary" market involves authorized participants, or APs, transacting with ETF issuers to create or redeem ETF shares based on market demand.[2] The process of creation and redemption not only adds ETF shares to or removes ETF shares from the market based on supply and demand conditions, but also helps keep the price of the ETF aligned with the value of its underlying securities.[3]

While an ETF's market price (which reflects current market conditions) is informed by the value of its underlying holdings, ETFs may trade at prices above (premium) or below (discount) net asset value (NAV).[4]

Stressed markets can cause premiums and discounts to increase. For example, excess demand for an ETF on the secondary market may create a premium until additional shares are created or the demand subsides. Liquidity and market conditions, such as uncertainty around interest rates and the costs of hedging and macroeconomic events, which contribute to dispersion of bond prices, can also impact premiums and discounts.

While some bond ETFs did trade at substantial discounts and ultimately premiums (when sentiment abruptly turned positive) in March and April 2020, we have shown empirically that such deviations were generally more a function of latency in pricing in the underlying bond markets arising from diminished liquidity rather than anomalous behavior in the funds themselves.[5]

1. The Securities and Exchange Commission's Division of Economic and Risk Analysis found that "ETFs generally functioned as expected, allowing investors to transfer diversified bond risk on the secondary market without transacting directly in the underlying bonds." The report is available here.
2. An AP is a financial institution, often a bank, that enters into an agreement with an ETF sponsor or its affiliate allowing it to dynamically manage the creation and redemption of ETF shares in the primary market.
3. If the price of an ETF exceeds the value of its basket of underlying securities (the ETF is at a premium), an AP could buy the securities in the underlying market, deliver them to the ETF issuer in exchange for a share of the ETF, then sell the ETF in the market for a higher price. If an ETF is trading at a price below the value of its underlying securities (at a discount), the same process could happen in reverse.
4. The NAV for an ETF is generally calculated once per day pursuant to policies and procedures approved by the ETF's board of directors. Inputs for NAV calculation are typically actual trades (for bonds that traded that day) and/or estimates for bonds that trade infrequently or did not trade that day. Estimates for infrequently traded bonds are based on observed market activity for similar bonds that did trade or other metrics such as dealer quotes or interest rate movements.
5. "Pricing and Liquidity of Fixed income ETFs in the Covid-19 Virus Crisis of 2020," 2020. Laipply, S. and A. Madhavan, Journal of Index Investing.

iCRMH0521U/S-1630503-1/10

Recently, questions have emerged with respect to the bond ETF primary process—that which governs the creation or redemption of ETF shares—that is fundamental to ETF operations. One concern—addressed by Laipply and Madhavan (2020)—revolves around so-called "liquidity mismatch," where reduced liquidity in an ETF's underlying bonds may create challenges during periods of high volatility.[6] More recently, some have argued that the large discounts (as much as 5%) observed were a function of bond ETF sponsors deliberately adjusting their redemption baskets to include less liquid, less desirable bonds to discourage redemptions. The implication, if true, is that ETF issuers prevented a reconciliation of the dislocation between the ETF market price and NAV, prolonging the discount.[7]

This paper contributes to our understanding of the primary market process—particularly for custom in-kind redemptions—for iShares bond ETFs and provides empirical evidence on the liquidity and other characteristics of iShares bond ETF custom redemption baskets.[8] To our knowledge, this is the first such analysis of redemption baskets in the growing literature on ETFs. We aim to show that the custom redemption basket composition process was not a contributor to deviations of market prices from NAV in iShares bond ETFs during the spring of 2020. On the contrary, we believe the primary market process worked as expected despite the high level of market stress. Of course, we emphasize that our results hold only for iShares ETFs; we did not attempt to analyze redemption baskets by other asset managers as the data is not publicly available.

Before we turn to our empirical results, some institutional details require discussion. As of the time of this writing, bond ETFs have over $1.5 trillion in assets under management globally and continue to grow rapidly.[9] The primary market process is a critical component of the quality and performance of a bond ETF by allowing the shares outstanding to adjust in response to demand and supply conditions.

As bond ETFs continue to increase in size and scale relative to the bond market, a robust, durable primary market process governed by vigorous policies and procedures and resilient infrastructure are both necessary and important, not only for ETFs and their shareholders, but also for the health of the bond ETF ecosystem and the underlying market itself.

Primary market volumes for bond ETFs have increased rapidly in recent years due not only to growth in ETF AUM, but also in the use of bond ETFs as financial instruments within the fixed income markets. Bond ETFs have become increasingly integrated into the broader fixed income ecosystem and are used not only as investment tools, but also for broker-dealer inventory management, large client trade facilitation (e.g., "portfolio" trades), and the hedging of derivatives books. As a result, gross iShares bond ETF primary market volumes increased by 43% from 2019 to 2020, totaling nearly $500 billion in volume. Similarly, iShares UCITS bond ETF primary market volumes increased by 28% from 2019 to 2020, to nearly $200 billion.

In response, BlackRock has invested heavily in its primary market infrastructure over the past several years in order to bolster our ability to accommodate large, frequent flows especially under stressed market conditions. We have also provided, through our past publications, a high degree of insight into how iShares views the primary market process and the steps iShares has taken to help improve outcomes for the funds and their shareholders. Investing in process enhancements and technology helps facilitate the funds' investment objective and strategy, reduces operating risk and leads to more efficient primary market operations; in addition, this can provide for a healthier ETF ecosystem and better market quality for investors.

6. Some research argues that in times of stress, liquidity mismatch may induce APs to trade in the wrong direction (i.e., selling the ETF even if it were below its intrinsic value), thereby exacerbating volatility. See Pan, K., and Y. Zeng, 2020. "ETF Arbitrage under Liquidity Mismatch," Forthcoming, Journal of Finance.
7. See Todorov, K. 2021. "The Anatomy of Bond ETF Arbitrage." BIS Quarterly Review (March). Available here.
8. The iShares ETFs operate under policies and procedures that govern the construction and acceptance of baskets, including heightened requirements for certain types of custom baskets. Such policies and procedures provide the parameters for the construction and acceptance of custom baskets that are in the best interests of the ETF and its shareholders. The requirements may vary and differ among different types of custom baskets based on order type, potential risks, or conflict considerations. Custom creation baskets are often used in certain iShares fixed income ETFs to facilitate in kind transactions as delivering a pro rata basket of all the holdings in an ETF or underlying index may not be feasible. Custom redemption baskets may be used for optimization, tax efficiency and other reasons but are generally non-negotiable since the APs are not sourcing securities. iShares ETFs are subject to a robust internal governance process that oversees basket compliance for all iShares ETFs in accordance with regulatory requirements.
9. Source: SIFMA as of 3/31/2020

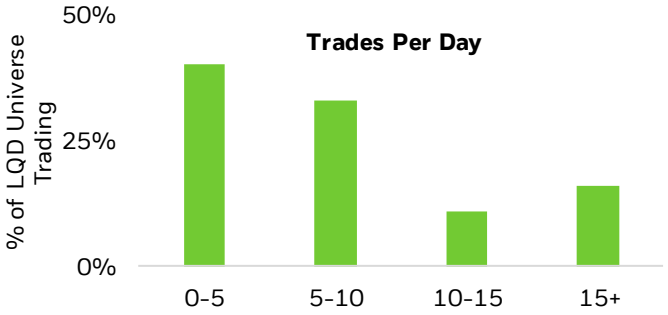
For example, Golub et al (2018) explain how custom fixed income creation baskets can be used with ETFs in a systematic, auditable, and repeatable manner. They use factor-based optimization to generate custom creation baskets for one or more ETFs (with one or many counterparties) and conclude that optimization can improve the efficiency of ETF creation basket generation, which in turn can induce improved ETF exchange liquidity and tighter spreads (given higher confidence around primary execution arising from faster turnaround times and improved basket composition), benefitting investors.[10]

These enhancements have served to reduce processing times (more specifically for custom creation baskets), increase operational efficiency and, importantly, have helped to manage the tracking and risk profile of the portfolios. APs also have better clarity and greater confidence around their own execution through our primary market process, which in turn helps to support and enhance ETF exchange liquidity. We believe shareholders have benefited from these improvements during normal times and particularly (as we show here) under stressed conditions.

The challenges of the bond market

Unlike the US equity market, the US corporate bond market is highly fragmented and opaque. The global bond market is $114 trillion in market value, with the US bond market representing over $40 trillion of that amount. There are hundreds of thousands of unique fixed income securities. By comparison, the US equity market has about 6,000 securities (as of March 2021 based on NYSE and Nasdaq listings). Furthermore, unlike equity securities, (i) most bonds don't trade on a given day (Figure 1);[11] (ii) most of a given bond's trading occurs immediately after issuance and then declines sharply over the remainder of its life (Figure 2);[12] (iii) bid/ask spreads in the bond market are multiples of those in the equity markets (Figure 3); and (iv) electronic trading (with the exception of US Treasuries) is still nascent.[13]

Figure 1: March 2020: Daily Trading in the iShares iBoxx $ Investment Grade Bond ETF (LQD) Bond Universe

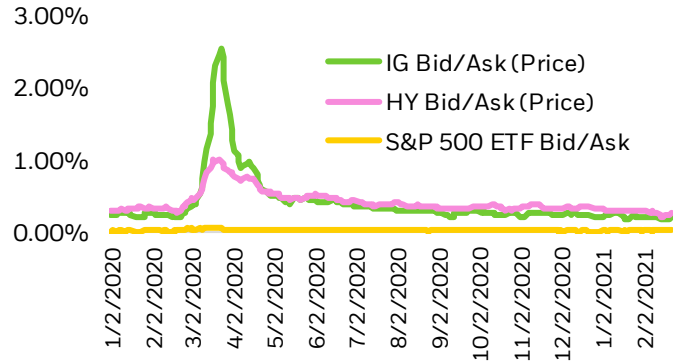


Source: FINRA TRACE, BlackRock from 3/2/2020 – 3/20/2020. Includes only end investor buys and sells – not dealer-to-dealer trades.

Figure 2: Post-Issuance Trading Patterns for Municipal Bonds

Source: MSRB as of 12/31/20

Figure 3: Bid/Ask Spreads for Investment Grade, High Yield & S&P 500 ETFs



Source: BlackRock, ICE, NYSE ARCA as of 2/28/21. Investment grade bid/ask represented by ICE BAML US Corporate Index, HY bid/ask represented by ICE BAML US High Yield Index, S&P 500 ETF is represented by iShares Core S&P 500 ETF (IVV).

10. See Golub, B., Ferconi, M., Madhavan, A., and A. Ulitsky "Factor-Based Optimization and the Creation/Redemption Mechanism of Fixed Income Exchange-Traded Funds" 2018. International Journal of Financial Engineering and Risk Management, Vol.2 No.4.
11. For example, out of more than 21,000 publicly registered corporate bonds, fewer than 1% trade daily in the over-the-counter market. Source: Citigroup, "The coming revolution in credit portfolio trading" (November 2019)
12. For example, we show the post issuance pattern for municipal bonds in Figure 2. Source: MSRB as of 12/31/2020.
13. See Hendershott, T. and A. Madhavan, "Click or Call? Auction vs. Search in the Over-the-Counter Market" (2015), Journal of Finance, Volume 70, No.1, pp 419-447, and Laipply S., Madhavan A., Sobczyk A., "Toward Greater Transparency and Efficiency in Trading Fixed-Income ETF Portfolios" (2016), Journal of Trading, Summer 2016, Vol. 11, No. 3: pp. 32–40.

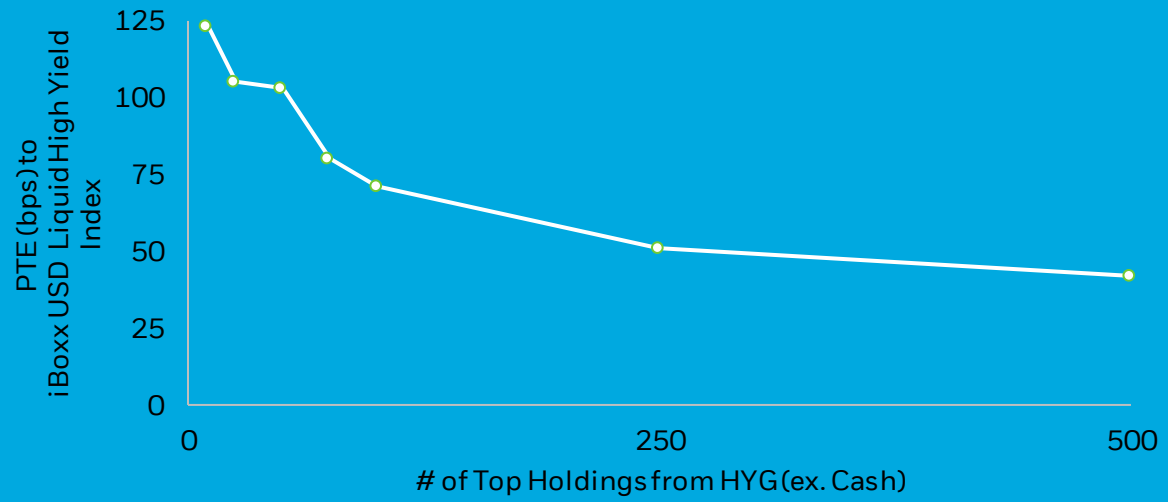
The necessity of sampling for fixed income index exposures

The unique attributes of the bond market make it challenging for a bond fund to attempt full replication of bond indices, which can include thousands of securities.[14] While some indices, such as those referencing the US Treasury market, may be theoretically easier to replicate, other indices, such as those referencing municipal, credit, and emerging markets, are more problematic as it is difficult to acquire the requisite securities at a reasonable cost and in a timely manner.

Accordingly, portfolios tracking such indices must, by necessity, be sampled (a subset of securities that meet the risk profile and characteristics relative to the parent index are used to seek the index exposure). However, in order to maintain the fund's investment objective of tracking the index, creation and redemption baskets — the securities delivered by an AP to the ETF for a creation of ETF shares, and vice versa for a redemption of ETF shares—generally aim to be representative of the broader index.

By definition, sampled baskets lead to a reduced security count relative to the reference index. However, the presence of fewer securities does not automatically translate into concentration of risk. Unlike equity securities, fixed income risk is largely explained by two factors: interest rate risk (i.e., duration) and credit spread risk (if the security is a non-sovereign security).[15] While idiosyncratic risk (e.g., the risk that a particular bond gets downgraded, as opposed to systematic risk such as rising rates that affects all bonds) does play a role in credit spread risk, it can be diminished greatly in a diversified portfolio. Figure 4 illustrates how idiosyncratic risk measured by portfolio tracking error in percent (y axis) in even a high yield portfolio can be reduced by increasing the number of holdings of securities (x axis). We see that portfolio tracking error begins to level out at about 500 securities, which is only about 40% of the index's 1,200+ holdings. Increasing the holdings beyond this level does not reduce tracking error in a significant manner because there are diminishing returns and actual costs in attempting to fully replicate a fixed income index due to the relatively high bid/ask spreads of the constituents.

Figure 4: HYG Estimated Portfolio Tracking Error (PTE) as a Function of Security Count

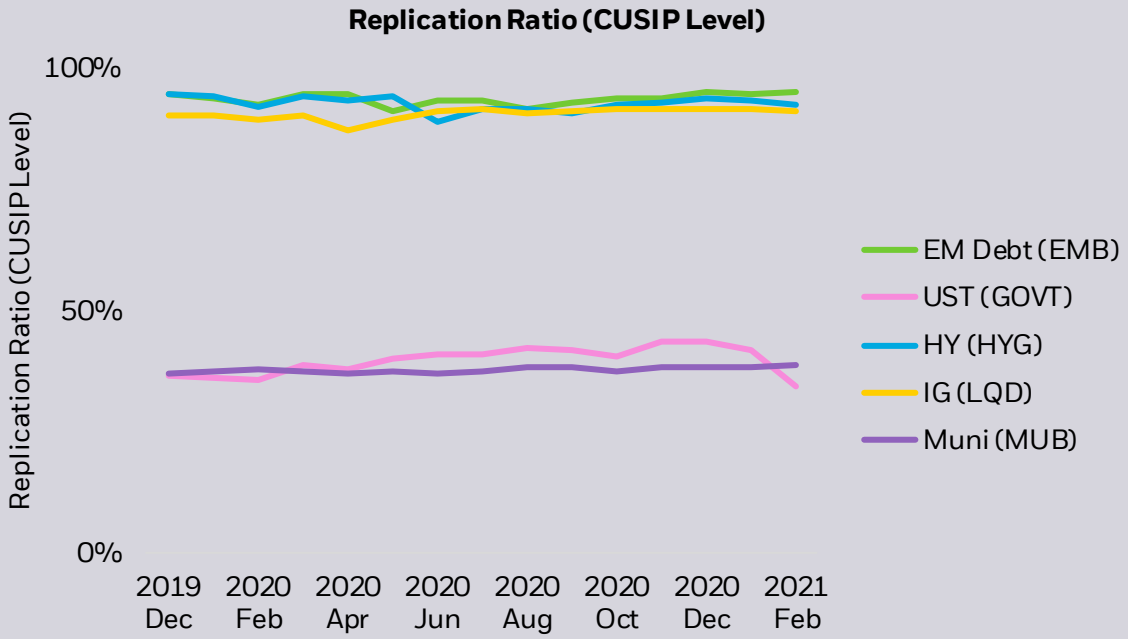


Source: BlackRock as of 3/17/21. Holdings weights normalized based on actual fund weightings. For illustrative purposes only.

14. As of 12/31/2020 the Bloomberg Barclays U.S. Aggregate Index held 11,984 securities and the iShares Core U.S. Aggregate Bond ETF (AGG) held 8,336 securities.
15. 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.

Figure 5 below shows the "replication ratio" across US Treasury, investment grade, high yield (HY), municipal and emerging market (EM) bond exposures defined as the ratio (in percent) of the security count for iShares bond ETF portfolios to the total number of constituents in each fund's underlying index. Note that the replication ratio increases with movement from sovereign risk (treasuries and municipals) to more idiosyncratic risk in corporate and emerging market debt portfolios. Nonetheless, the ratio is still below that of full replication (i.e., less than 100%).

Figure 5: Index Replication Ratios for Various Sectors Represented by ETFs



Source: BlackRock as of 2/26/21. EMB is the iShares J.P. Morgan USD Emerging Markets Bond ETF, GOVT is the iShares U.S. Treasury Bond ETF, HYG is the iShares iBoxx $ High Yield Corporate Bond ETF, LQD is the iShares iBoxx $ Investment Grade Bond ETF, MUB is the iShares National Muni Bond ETF.

To illustrate how this process has not translated into less liquid or adversely biased portfolios, we examine statistics for the redemption baskets of the iShares iBoxx $ High Yield Corporate Bond ETF (HYG), the largest and most liquid high-yield ETF in the market, and the iShares iBoxx $ Investment Grade Bond ETF (LQD), the largest and most liquid Investment Grade ETF.[16] The high-yield sector has a high degree of idiosyncratic risk relative to other sectors because the likelihood of default is higher for these bonds versus investment grade, municipal, or treasury securities. Accordingly, if any sampling biases were prevalent, it would be most evident in the basket composition. Figure 6 illustrates the risk and liquidity characteristics of the redemption baskets versus the fund over the period February 18, 2020 to March 12, 2020 (a period of elevated market stress and significant redemption activity). The Appendix contains similar statistics for the whole of 2020.

16. Source: BlackRock as of 12/31/20. Based on assets under management and average daily trading volume.

Figure 6: Custom Redemption Basket Composition vs. Fund Comparison for LQD & HYG (2/18/20-3/12/20)

LQD Redemption Baskets vs. Fund

	Redeem Baskets	Fund	Difference
Spread Duration	9.09	9.32	-0.23
Duration	8.99	9.22	-0.23
OAS	141	141	0
Bid/Ask Spread	31.3	31.1	0.20
Liquidity Score	81.7	81.2	0.50

HYG Redemption Baskets vs. Fund

	Redeem Baskets	Fund	Difference
Spread Duration	3.20	3.20	0.00
Duration	1.15	1.22	-0.06
OAS	433	427	6
Bid/Ask Spread	37.7	36.7	1.00
Liquidity Score	83.7	83.3	0.40

Source: BlackRock as of 3/12/2020. For illustrative purposes only. Not indicative of any future result or experience. For more explanation of these statistics, please see the end of this document.

As Figure 6 illustrates, the custom redemption basket compositions were nearly identical in risk characteristics and liquidity scores irrespective of market conditions, illustrating the nature of the systematic unbiased process. Another critical point is that custom redemption baskets have tended to broaden, not narrow in security count and replication ratio during periods of high redemptions. The explanation for this observation is intuitive: The greater the amount of redemptions, the more necessary it is to broaden the baskets to manage the fund's risk and tracking profile. If a fund were to incur large redemptions on a narrow basket repeatedly, the remaining holdings would become increasingly skewed relative to its reference index (see also Golub et al (2018) for a description of the optimization process). At the limit, a fund's risk profile relative to the index can be maintained through use of a pro rata basket which would serve to increase or decrease the fund uniformly relative to its reference index. However, the use of pro rata baskets may not always be feasible or practicable based on the type of fund. In the absence of employing a pro rata basket for each primary market event, the portfolio manager can instead rotate the custom redemption basket and increase the number of securities in an effort to facilitate primary market activity that captures the fund's risk characteristics over a redemption cycle. Figure 7 provides an illustration of a progression in custom basket size as redemption activity increased over the period February 18, 2020 to March 12, 2020. The data illustrates that baskets actually broadened during this period (as opposed to becoming more concentrated) and were very similar to the parent funds.

Figure 7: Redemption Basket Security Count & Replication Ratios

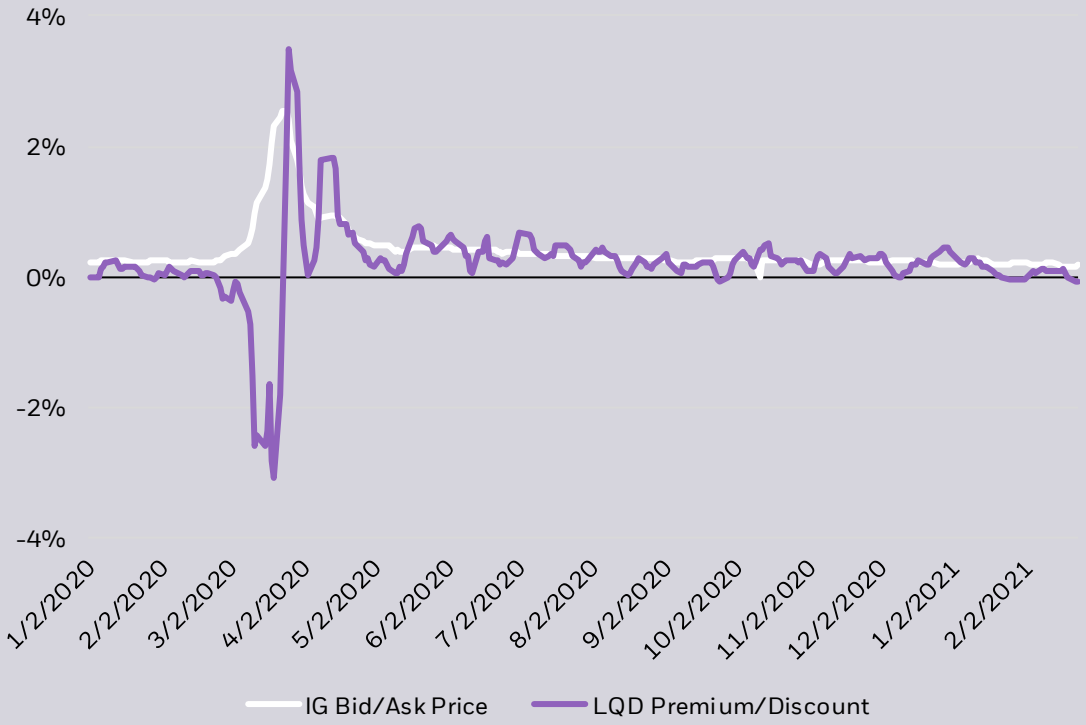
	iShares iBoxx $ High Yield Corporate Bond ETF			iShares iBoxx $ Investment Grade Corp Bond ETF		
Date	Fund Security Count	Cumulative # Redemption Securities	% of Fund	Fund Security Count	Cumulative # Redemption Securities	% of Fund
02/18/2020	1,017			2,029	547	27%
02/19/2020	1,020	405	40%	2,034	547	27%
02/20/2020	1,022	561	55%	2,033	803	39%
02/21/2020	1,023	603	59%	2,033	803	39%
02/24/2020	1,024	712	70%	2,033	803	39%
02/25/2020	1,023	861	84%	2,030	803	40%
02/26/2020	1,022	874	86%	2,019	953	47%
02/27/2020	1,022	890	87%	2,019	1,039	51%
02/28/2020	1,023	900	88%	1,982	1,222	62%
03/02/2020	1,022	908	89%	1,982	1,222	62%
03/03/2020	1,027	908	88%	1,985	1,224	62%
03/05/2020	1,019	936	92%	1,992	1,224	61%
03/06/2020	1,018	938	92%	1,992	1,224	61%
03/09/2020	1,016	959	94%	1,991	1,336	67%
03/10/2020	1,012	959	95%	1,991	1,336	67%
03/11/2020	1,011	959	95%	1,991	1,336	67%
03/12/2020	1,010	959	95%	1,991	1,336	67%

Source: BlackRock as of 3/12/20. For illustrative purposes only. Not indicative of any future result or experience. Cumulative # of redemption securities represents the number of unique CUSIPs that were redeemed from the portfolio with each sequential basket.

Why were large discounts observed?

In the previous section, we demonstrated that the composition of custom in-kind baskets was broadly reflective of the fund as opposed to being skewed or concentrated in ways that could impact tracking and market quality. Therefore, if basket composition did not create discounts, what did? As stated previously, the bond market experienced severe liquidity challenges during the spring of 2020 while bond ETFs saw record volumes over the same period. This disparity drove price discovery via ETF trading prices. As an example, on March 12, 2020, LQD traded over 90,000 times relative to an average of 37 times each for its five largest holdings. Price formation based on tens of thousands of trades is likely to be more informative than price formation based on dramatically fewer trades in the underlying bonds; the ETF price was potentially more indicative of what market participants believed was an actionable price for that basket of bonds. Figure 8 illustrates how the discount in LQD was very much related to liquidity conditions and uncertainty in the underlying bond market as measured by the pronounced widening in bid/ask spreads.

Figure 8: LQD Premium/Discount vs. Underlying Bid/Ask Spread



Source: ICE, FINRA TRACE, BlackRock as of 2/28/21

This conclusion is supported by empirical evidence showing that NAV returns were highly autocorrelated. Further, Laipply and Madhavan (2020) show that ETF prices tracked closely the prices of the most liquid index constituents.

Conclusion

We have written in the past about the primary market process and the role of APs as key elements of the ETF ecosystem.[17] Here, we show that a deeper understanding of the primary market process, particularly during times of market stress, can help explain the observed behavior in iShares bond ETFs during the volatile period of February through April of 2020.

We show that when faced with large redemptions, iShares portfolio managers—who have a fiduciary duty to all shareholders, including those redeeming and those remaining in the fund—have generally aimed to deliver custom in-kind redemption baskets that closely reflect the fund characteristics to help facilitate the fund's investment objective and minimize the tracking error of the fund. Strategically choosing to regularly deliver out a concentrated basket of bonds that does not broadly represent the fund's characteristics would generally not be in the best interest of the ETF and its shareholders and may lead to elevated tracking error. Further, such actions could create reputational risk for and uncertainty around intentions of the fund sponsor within the AP community which could potentially impact the fund's liquidity. The fact that custom baskets are a subset of the fund's bond holdings is not in and of itself sufficient to prove that the basket is not representative of the fund. As discussed, the nature of factor risks in fixed income—those arising from interest rate and credit spread risk—can be adequately reflected utilizing fewer securities.

We believe that this closer examination of the iShares ETF primary market process shows that it functioned well during a time of unprecedented volatility. Furthermore, we believe that significant investments in technology and infrastructure over a number of years to support this process served to increase its robustness and durability during this challenging period and should allow us to efficiently accommodate ever increasing flows going forward under a variety of market conditions.

17. Novick, B., Cohen, S., Van Nugteren, S., Rosenblum, A., Madhavan, A., and S. Samandar. 2017. "A Primer on ETF Primary Market Trading and the Role of Authorized Participants." Available here. See also Madhavan, A. 2016. "Exchange-traded Funds and the New Dynamics of Investing." New York, NY: Oxford University Press.

APPENDIX: Primary Basket Summary Full Year 2020

LQD Creations	Basket Count	Notional $B	
Creations	572	$47,133	
Factor	**Basket**	**Fund**	**Diff**
Duration	9.55	9.39	0.16
Spread Duration	9.62	9.48	0.14
OAS	183	186	-3
Position Count	201	1940	10%
Issuer Count	110	343	32%
Bid/Ask Spread	62.1	62.1	0.0
Liquidity Score	76.2	75.2	1.0

LQD Redemptions	Basket Count	Notional $B	
Redemptions	284	$ (33,592)	
Factor	**Basket**	**Fund**	**Diff**
Duration	9.36	9.58	-0.22
Spread Duration	9.42	9.65	-0.23
OAS	129	134	-5
Position Count	404	1940	21%
Issuer Count	180	343	52%
Bid/Ask Spread	35.3	36.1	-0.8
Liquidity Score	81.0	80.8	0.2

HYG Creations	Basket Count	Notional $B	
Creations	223	$36,784	
Factor	**Basket**	**Fund**	**Diff**
Duration	1	0.92	0.08
Spread Duration	3.76	3.53	0.23
OAS	508	531	-23
Position Count	283	1130	25%
Issuer Count	187	372	50%
Bid/Ask Spread	59.9	60.1	-0.2
Liquidity Score	80.2	80.5	-0.3

HYG Redemptions	Basket Count	Notional $B	
Redemptions	144	$(32,632)	
Factor	**Basket**	**Fund**	**Diff**
Duration	1.1	1.11	-0.01
Spread Duration	3.32	3.36	-0.04
OAS	448	458	-10
Position Count	450	1130	40%
Issuer Count	251	372	67%
Bid/Ask Spread	46.0	45.6	0.4
Liquidity Score	81.3	82.8	-1.5

Source: BlackRock as of 12/31/20.

Glossary

Spread Duration
Spread duration is the sensitivity of the price of a security to changes in its credit spread. The credit spread is the difference between the yield of a security and the yield of a benchmark rate, such as a cash interest rate or government bond yield.

Duration
Duration is a measure of the sensitivity of the price of a bond or other debt instrument to a change in interest rates.

OAS (Option-adjusted spread)
Measures the credit spread or additional yield potential over a similar maturity US Treasury bond in basis points. OAS includes the likelihood that the bond will be called or prepaid before the schedule maturity date.

Bid/Ask
A measure of the average cost to buy and sell securities on an exchange. Spreads are the difference between the bid price of the trade (what the buyer is willing to pay) and the ask price (what the seller is willing to accept).

Liquidity Score
Liquidity Score is a proprietary measure from 0 (minimum) to 100 (maximum) based on the highest available volume at the lowest transaction cost.

Redemption Basket
A "redemption basket" is a pre-specified bundle of securities that represents the securities of the ETF's portfolio available for delivery in connection with redemption requests for a business day. ETF sponsors determine the contents of a redemption basket prior to the start of each trading day and may modify the basket available for redemption throughout the day as needed in response to changing market conditions. Securities delivered may be a full replication or representative sample of the underlying index or the ETF's portfolio, as determined by the ETF sponsor.

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 prospectus 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.

Shares of iShares ETFs may be bought and sold throughout the day on the exchange through any brokerage account. Shares are not individually redeemable from the ETF, however, shares may be redeemed directly from an ETF 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.

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

Case studies 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.

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