

Fixed Income ETFs: Behind the growth story

The recent, turbulent times have tested the limits of ETFs, with underlying Fixed Income markets experiencing extreme stress. This episode has demonstrated that Fixed Income ETFs coped well: they have passed the test of time and perceived weaknesses have turned out to be strengths. We look into how ETFs respond to Fixed Income market realities and conclude with a scorecard to help investors better assess and select Fixed Income ETFs.

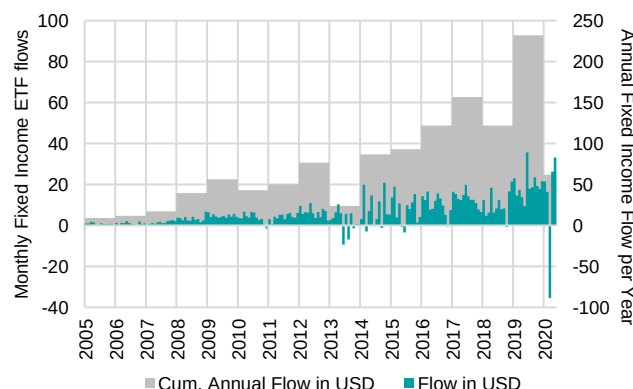
Fixed Income ETFs growth: An unstoppable trend?

2019 was a record year for Fixed Income ETFs. Globally, Fixed Income ETFs attracted \$240bn in net new assets, bringing total Fixed Income ETF Assets under Management (AUM) to more than \$1.3trn. Overall, Fixed Income ETFs have seen a decade of outstanding growth on the back of broader investor acceptance. Fixed Income ETFs have seen net global outflows in only 15 of 185 months since 2005.

Even in light of the most recent episode of market volatility, Fixed Income ETF flow momentum has been strong. Despite posting \$35bn of outflows during the period of heightened volatility in March, Fixed Income ETFs collected over \$60bn in net new assets between January and end-May 2020 – equivalent to more than three years of cumulative Fixed Income ETF inflows in 2005-8.

Some of the drivers behind this success story are well known. Fixed Income ETFs provide standardised, affordable, granular access to the bond market, a market where over-the-counter (OTC) trading, associated transaction costs and large denominations create major hurdles for diversified, direct bond investments. It is also established that the on-exchange nature of ETFs allows for transparent pricing and gives investors opportunities to implement their ideas quickly and efficiently, while also adding liquidity to an otherwise fragmented market.

FIGURE 1. GATHERING PACE: FIXED INCOME FLOW MOMENTUM



Source: Bloomberg, based on global ETF universe, as of 15 June 2020

We argue that Fixed Income ETF growth is anchored in solid fundamental trends and is here to stay. Over time, technological, index and market infrastructure difficulties, which had been seen as obstacles to growth, have been successfully addressed. As what looks like another decade of ultra-low interest rates begins, there will be even fewer alternatives to efficient Fixed Income allocation. In this paper we discuss five ways in which Fixed Income ETFs have, in our view, passed the test. And this is only the beginning. As of end-May 2020, with global Fixed Income ETF AUM of \$1.37trn, ETF ownership of the global Fixed Income market

comes to only an estimated 2%¹. The scope for further growth in Fixed Income ETFs is huge.

The 5 tests Fixed Income ETFs have passed

1. Portfolio Diversification – The “Bums Problem” solved

As with equities, a market-capitalisation (i.e. value-weighting) approach is the default for a Fixed Income index. While in equity indices this market-capitalisation approach is largely unquestioned, translating it to the Fixed Income world and relying on the aggregated value of debt was long perceived as flawed – at least according to critics in academia that emerged as Fixed Income indexing gained popularity in early 2000 and have stuck since (cf. Siegel 2003²). According to these critics, a key risk for an investor when investing in a Fixed Income index is the so-called “Bums problem” whereby the least creditworthy issuers with the most debt outstanding begin to constitute a larger share of the index than their more creditworthy counterparts. The risk of downgrades and consequent lower future returns then makes index tracking suboptimal for the investor.

Closer investigation makes it clear that the “Bums problem” reflects effectively the combination of two interlinked portfolio construction risks. First, the investor faces the threat that weighting by debt exposes him to excessive and supposedly inadequately rewarded credit risk. And secondly, by relying on this weighting approach, the investor faces idiosyncratic concentration risks for his overall portfolio for which no risk premium is earned.

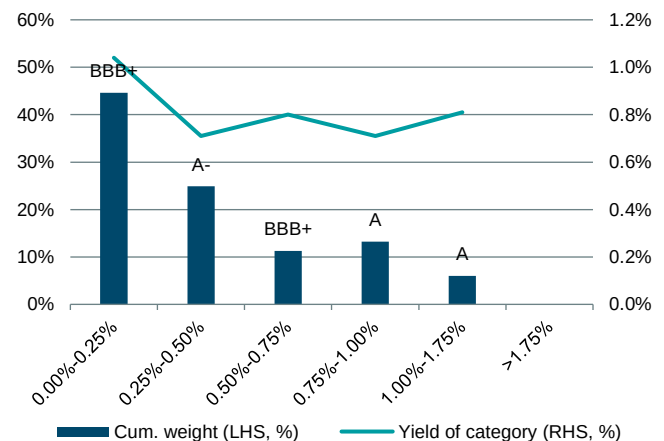
More detailed inspection of popular fixed income indices confirms that excessive exposure to riskier issuers is currently not a threat for ETF investors. Market value weighting in Fixed Income indices mostly leads to a portfolio that overweights larger issuers, instead of issuers with poorer credit quality: the largest issuers in a corporate bond index typically tend to be long-established, highly diversified businesses that possess better interest coverage and higher ratings.

When segmenting popular Fixed Income indices by the size of their issuers (see Figure 2 and Annex), it becomes clear that no evidence of higher credit risk among the larger issuers of an index can be found. Rather credit quality (as measured by rating) appears to increase across indices as we move from smaller to larger issuer size brackets. When comparing the smallest to the largest size category, all indices see a rating improvement of at least one notch. Also, the yield on the smaller issuers tends to be higher, which

not only points to higher credit risk, but also to the existence of some (small) liquidity premia. Hence, from a credit risk perspective, smaller issuers with less debt tend to pose larger risks for investors. However, that risk is widely spread.

FIGURE 2. THE “BUMS PROBLEM” SOLVED: DIVERSIFICATION ACROSS EURO IG CORPORATES

Grouped by index issuer weight



Source: BRS Aladdin, EUR IG Corporates (BBG Barc Euro Aggregate Corporate Index)

This makes the role of overall index diversification all the more important. Corporate bond indices are designed to tackle concentration risks by their “inclusive” nature, i.e. any bond that satisfies the minimum index requirements is included. At the same time, restricting the universe to, for example, certain types of bonds, maturities or seniorities, helps to prevent allocations to particularly heavy debt issuers that use a broad range of debt instruments. A common example is exclusion of short-term and regulatory capital funding of Financials from standard corporate bond indices. The result of this approach is typically a broadly diversified corporate bond index. For example, the Bloomberg Barclays US Dollar Liquid Investment Grade Corporate Index features close to 2,300 different bonds from over 470 different parent issuers. This results in a situation where the segment of smaller and more risky issuers in the index (with issuer weights of 0-0.25%) that are on average BBB+ rated is composed of around 350 different issuers. This substantially increases diversification and helps counterbalance concentration risks from the heavyweights in the index.

Adopting a similar size segmentation for corporates, however, yields slightly different results for sovereign bond exposures. Both in developed market government bond as well as emerging market sovereign bond indices, credit quality appears less related to size segments. While in the government bond space, diversification can pose serious is-

¹ Based on Bloomberg ETF search, bond market size based on Bloomberg Barclays Multi-verse (LF93TRUU Index)

² Benchmarks and Investment Management, Research Foundation Books, Volume 2003 Issue 1. <https://www.cfainstitute.org/-/media/documents/book/rf-publication/2003/rf-v2003-n1-3922-pdf.ashx>

issues, we note that since the Eurozone crisis, investors' focus on sovereign risks and low yields shifted towards Europe, while the case of Japan became much less discussed among investors³ in developed markets debt. We also note that potential concentration issues are most elegantly solved in the Emerging Markets space by introducing caps on the notional inclusion of a country's debt, effectively capping country weights while generating lower amounts of turnover.

Another popular way to broaden the exposure of sovereign indices has been the inclusion of agencies and other government-affiliated enterprises. Especially in Emerging Markets, where idiosyncratic risk can make up a large share of overall investment risk, this diversification approach can help manage single country exposures. However, investors should beware that too much inclusiveness means index exposure is shifted from quasi-sovereign towards "quasi-corporates"⁴ that typically are no longer government-guaranteed and face different risk exposures. Besides that alternative indexing concepts such as weighting issuers based on their quality have gained popularity amongst more conservative investors⁵.

This also means that assessing the inclusion criteria of an index can help investors to identify suitable index exposures. One commonly used metric for the degree of diversification is the Herfindahl-Hirschman Index (HHI), which is defined as the sum of squares of the portfolio issuer weights (see Annex for the issuer level HHIs across key Fixed Income segments).

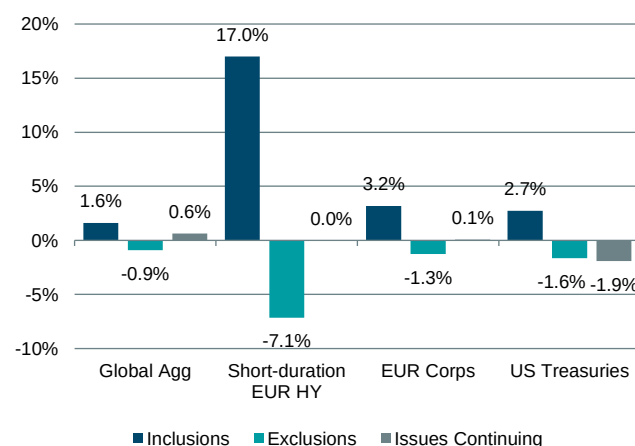
2. Indices are established "buy and maintain" concepts

It is important to note that a market value weighted Fixed Income index best replicates a static portfolio of bonds across the whole market structure, as (i) no re-investment is needed as bond values change, reducing unnecessary trades, and (ii) exclusion rules are often linked to fixed rating criteria.

There are essentially three drivers of index rebalancing in Fixed Income – inclusions, exclusions and adjustments made to securities in the index to reflect corporate actions. Inclusions and exclusion rules, which determine under what conditions a bond may be included in the index (typically used for new issues) and under which it loses this eligibility (typically involving the issues approaching maturity), drive most of the turnover in the index. Adjustments made to securities that remain in the indices are related to changes in

the amount outstanding. A high level of stability in these criteria over time means that the index exposure will remain true to the investor's intentions. Equally, Fixed Income indices are developing from purely theoretical concepts, used for performance measurement and investment universe definition purposes, into fully fledged investment portfolios designed to be physically replicated. The decision made by index providers, after consultation with market participants, to forego aspects of their rebalancing in April 2020 in the midst of the Coronavirus crisis, is testament to the fact that index providers have now realised that indices have become highly diversified "buy and maintain" portfolios where passive replicability is becoming an increasingly important consideration.

FIGURE 3. INDEX MAINTENANCE ACROSS EXPOSURES: INCLUSIONS, REMOVALS AND RESTRUCTURES IN NUMBER OF BONDS



Source: Bloomberg, as of June 15, 2020. Based on May 2020 month end turnover, values for Bloomberg Barclays Global Aggregate, Bloomberg Barclays Euro HY Corp 1-3 Years, Bloomberg Barclays Euro Aggregate Corporate and Bloomberg Barclays US Treasury Index, respectively

Looking at the monthly turnover of major indices across several different investment universes illustrates the key role played by frequent maintenance of exposure levels. In exposures such as short-duration high yield, where maturity band constraints are key to duration, and even in core exposures such as EUR Corporates or US Treasuries, monthly portfolio maintenance (rebalancing) is essential to preserve a representative and liquid exposure (for example, in terms of duration profile, coupon reinvestment, and eviction of downgraded bonds and less liquid bonds approaching maturity). Take the example of EUR corporates where, about 150 bond trades (equivalent to about 4.5% of the index weight) are needed to keep the exposure representative. Note this maintenance affects only a small fraction of the over 3,000 eligible bonds and does not present a challenge for Fixed

³ From 1997 to 2000 the weight of Japan in the FTSE World Government Bond Index more than doubled from 17% to approximately 30%, as the risk of credit crunch promoted considerable Japanese Government Bond (JGB) issuance. The Yen displayed considerable stability during this time. Overall credit risk perception (or the risk of debt monetisation) therefore does not seem to have been significantly impacted by this debt build-up. With sizeable supply coming from other developed market (DM) countries since, the

weight of Japanese government bonds has fallen to currently 18%, considerably reducing the concentration within global DM government bonds (source FTSE, 30 June 2020).

⁴ Typical examples exclude large allocations to government-owned enterprises in the energy or financials sector.

⁵ See USD Bonds: A Strategic Beta Toolkit, DWS Passive Insights, June 2017

Income ETFs, and is operated in some shape or form in any benchmarked investment strategy, active, passive or quant.

3. Indices enable efficient ETF replication

Their market cap weighting and broad inclusiveness enable indices to be steered towards liquidity and representativeness. They also enable Fixed Income portfolio managers replicating them to access potential liquidity premia, thanks to their broad inclusiveness, and new issue premia, even as new issues are only inserted at month end.

Liquidity: the importance of data

In an environment where yield opportunities are limited and plenty of buy-and-hold investors are looking beyond core allocations for yield, liquidity risks are only partially compensated. Investing in the less liquid issues of a EUR investment grade (IG) benchmark issuer, for example, typically only earns a small pick-up of about 3 basis points (bps) – a fraction of the yield differences between benchmark sectors, let alone different ratings. A liquid benchmark construction is therefore not only prudent but also efficient as venturing “off-benchmark” is poorly rewarded. However, for passive investors, it is therefore also advisable to balance liquidity considerations with a broader need for representative exposure.

As the liquidity of single bonds varies across time and issuers, portfolio managers can benefit from many metrics made available by regulators, such as TRACE (see below) and MiFID transparency, as well as data service providers (Bloomberg LQA, ICE pre-trade, Barclays LCS, etc.) which are becoming instrumental to managing the replication of a broad and inclusive index in a proactive way. All of these metrics provide transparency in Fixed Income markets, traditionally

considered rather opaque and still dominated by OTC trading.

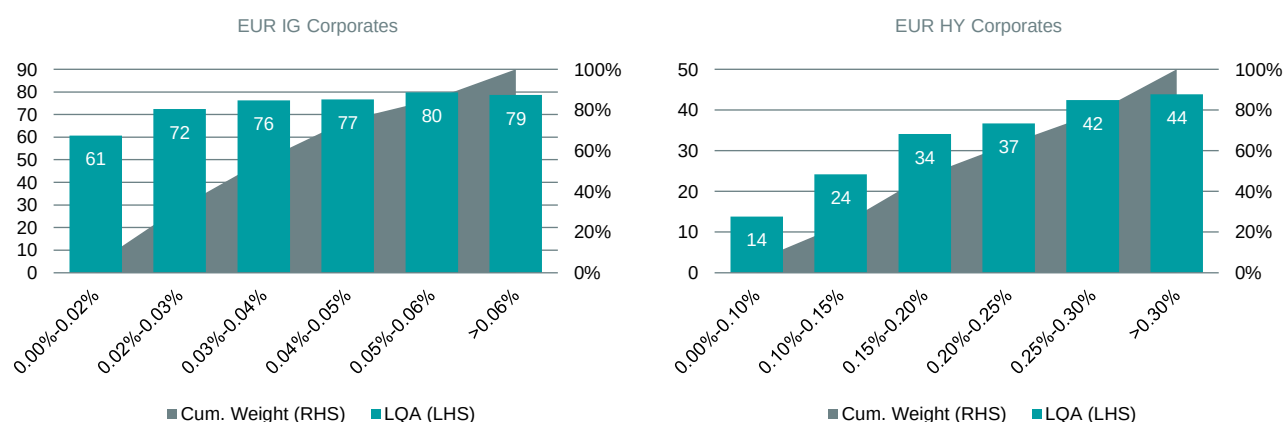
FIGURE 4. FIXED INCOME LIQUIDITY PREMIA ANALYSIS

Liquidity Criterion	Liquidity Risk Type	Risk metric	Reward
Less liquid issues from a given issuer	Special covenants, bond age, placement type	Liquidity score constrained per issuer (</>80)	~3bp
Smaller issues	Size of company, bid/offer costs	Outstanding par amount (</> 500mn)	~1bp
Pure liquidity score (quantitative)	Time and ability to liquidate the bond within a peer group	Bloomberg LQA score (</>80)	A ratings*: ~18bp BBB ratings*: ~28bp

As of: November 30, 2019; Source: DWS International GmbH, analysis based on equal weighted average, Bloomberg Barclays LECPTREU; (*) Normalised by single rating notch

Regulators are also increasingly looking to improve trade transparency and thereby reveal important information that can help passive portfolio managers. The SEC’s Trade Reporting And Compliance Engine (TRACE) specifies how OTC trades must be recorded and disseminates this information in real time to the public. Index providers and data service providers alike build on this data, enriching it with proprietary information to provide indications of liquidity on a single bond level. Bloomberg’s LQA metrics⁶, for example, measure liquidity on a scale of 1 to 100 that indicates the relative liquidity of an instrument in a specific universe. Figure 5 illustrates that market value weighting naturally steers towards more liquidity, which is important, especially in credit markets where liquidity is critical to measuring the ability to sell a security at the lowest cost for a comparable range of volumes.

FIGURE 5. LQA BY SINGLE BOND WEIGHT IN EUR IG AND EUR HY INDICES



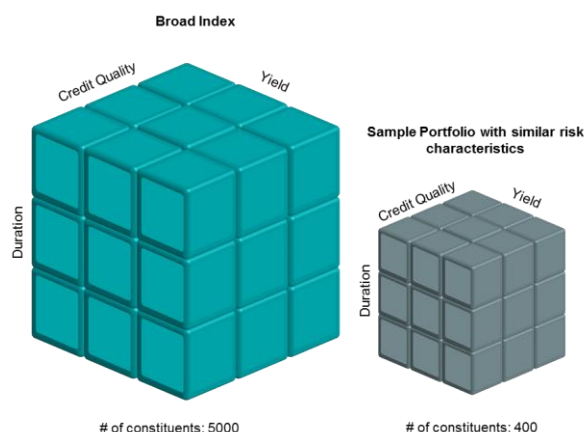
As of: June 30, 2020; source: DWS International GmbH, Bloomberg LP

⁶ See here for a summary of Bloomberg’s LQA methodology: <https://data.bloomberg-glp.com/professional/sites/10/LQA-Fact-Sheet.pdf>

The help of technology to reduce transaction costs

In a context of large and inclusive benchmarks with variable liquidity across segments of the benchmark, passive portfolio managers can benefit from sampling approaches for index replication, ETF creation and redemption processes. Sampling is aimed at selecting bonds for the ETF tracking portfolio that mimic the index's structure. Thanks to transparent and qualitatively improving single bond price data, traditional optimisation tools can be used under constraints (as per Figure 6) to generate liquid portfolio samples of a comparatively small number of bonds that enable creation and redemption processes with lower transaction costs or enable rebalancing with a minimal number of trades and turnover.

FIGURE 6. INDEX REPLICATION USING OPTIMISED SAMPLING



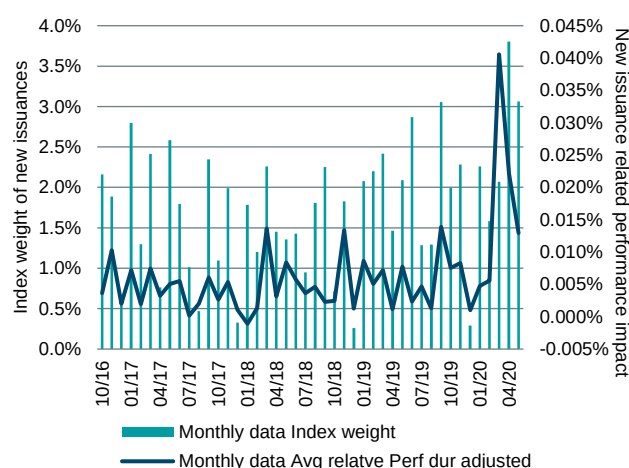
Source: DWS International GmbH, for illustrative purposes only

Accessing new issue premia

Another way passive portfolio managers can exploit market inefficiencies is to participate in primary market issuance. Given a transparent and highly dependable index methodology, passive portfolio managers can anticipate future inclusions in the benchmark from new issuance. Participating in the issuance intra-month allows the passive manager to extract a new issuance premium by accessing early a security that is pending inclusion within their risk limits. Figure 7 shows that this premium can be harvested regularly and can increase in periods of lower liquidity. An order of magnitude for the premium is about 10bps per annum⁷. The resulting turnover is negligible as the trade merely pre-empts upcoming turnover from rebalancing, and the marginal excess duration resulting from early inclusion can be compensated within the overall duration management process of the ETF.

Taken together, the combination of a dependable index framework and a passive portfolio increasingly supported by data and technology, implementation can enable efficient access to Fixed Income benchmark indices.

FIGURE 7. NEW ISSUES IN EUR IG CORPORATES



Source: DWS International GmbH, DWS calculations, past performance is not a reliable indicator of future results

4. ETFs are adapting to changing Fixed Income markets

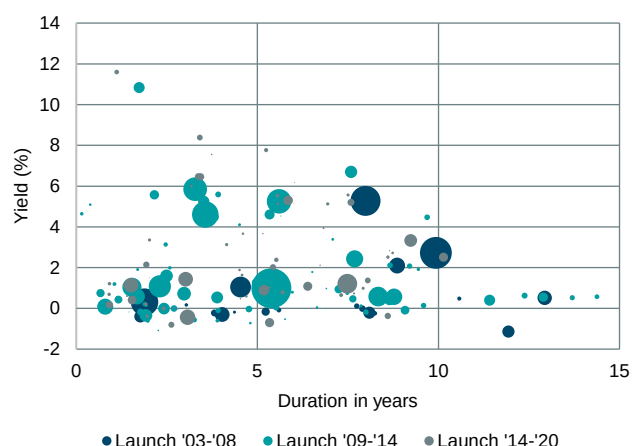
With increased ETF volumes and levels of liquidity, combined with increasing breadth and depth in the product offering, Fixed Income ETFs offer an effective tool to steer a portfolio actively towards specific duration, credit or regional exposures. This breadth in the product offering also helps investors adapt to changing Fixed Income market structures.

Combining ETFs to manage duration

A traditional concern with benchmark-driven investing is “duration drift”. In a world without perfect capital markets but with transaction costs, taxes, skewed demand and lower interest rates for a long period of time, the role of a company's CFO is to refinance at the lowest cost of debt, in turn minimising the return on debt for the investor. This creates an inherent conflict given investors' return maximisation ambitions, but also with the duration matching needs of certain investors groups in particular. Benchmark duration, which in many ways is comparable to equity market “beta”, is sometimes said to become a function of optimal issuer decisions and beyond investor control.

We argue, however, that given extensive choice the perceived “duration problem” is now mostly an asset-allocation decision (see figure 8). While it is true that with global yields near all-time lows and flatter curves, the increasing maturity of new issues has been a persistent feature in recent years in both sovereign and corporate bond indices, investors are not forced to accept this new reality. Indeed, depending on his or her objectives, the investor can select either an allocation to the maturity band index, the broad index or a combination of the two.

⁷ Source DWS calculations, as at May 2020

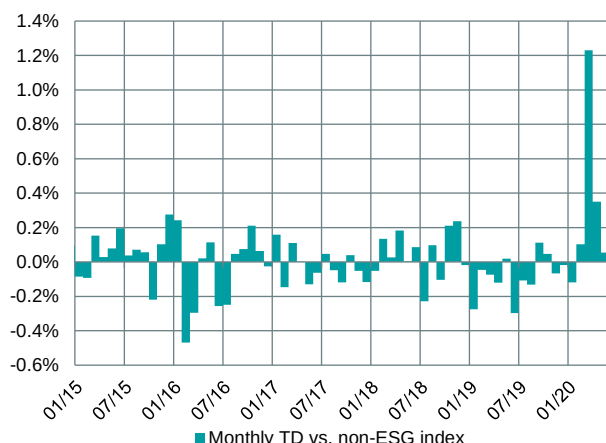
FIGURE 8. A RANGE OF OPPORTUNITIES: YIELD AND DURATION ACROSS 180 FIXED INCOME UCITS ETFs

All data as of: July 10, 2020; source: Bloomberg, based on YAS, using UCITS Fixed Income ETFs only, bubble size shows relative ETF AUM, Yields in local currency.

ESG integration in Fixed Income ETFs

Since the first Fixed Income ETF was launched in 2002, the Fixed Income ETF space has seen constant growth and innovation. ETFs have branched out of traditional core exposures such as government bonds or corporate bonds into high yield and emerging markets, the rise of short-duration, quality/carry tilted and downgrade tolerant/fallen angels' indices and it becomes clear that investors have a wide range of choice.

A particular recent addition to this investor toolkit has been the integration of Environmental, Social and Governance (ESG) considerations into Fixed Income indices. The rise of ESG is not only limited to developed market corporate bond indices but also on the rise in high yield and emerging market exposures. The integration of ESG into Fixed Income indices has been made possible by recent improvements in ESG coverage and data quality. Unlike in the equities space, the application of ESG in Fixed Income indices is more clearly focused on risk management, as ESG metrics help screen for risk factors beyond standard accounting measures. In fact, the recent COVID-19 crisis has illustrated that despite their moderate tracking error, ESG screening can add resilience to Fixed Income indices. Take the example of US Dollar IG where an ESG-screened index features only about half as many bonds as the original benchmark, while the tracking error is limited to about 40 to 60 bps per year in normal market situations, and where, for a similar duration, the year-to-date performance as of June 2020 improved materially.

FIGURE 9. TRACKING PERFORMANCE (PANEL 1) AND USD IG ESG CHARACTERISTICS (PANEL2)

	ESG USD Corporates	USD Corporates
# Holdings	1,251	2,324
Yield	2.24	2.31
Duration	9.91	9.67
H1 performance	7.29%	5.64%
COVID-19 performance		
Drawdown	-15.88%	-17.52%
Trough to new peak	94 days	112 days
Index fundamentals		
Interest coverage	11.58x	7.87x
Defensive interval	247 days	211 days

As of: June 30, 2020; source Bloomberg; based on monthly data.
Past performance is not a reliable indicator of future returns

5. Fixed Income ETF liquidity and the test of time

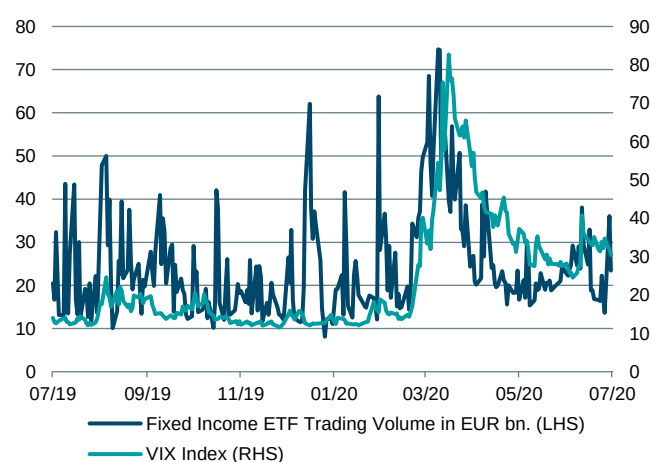
Have Fixed Income ETFs passed the liquidity test? They can at least provide valuable access to liquidity thanks to their unique market structure, with multiple layers of liquidity. The global COVID-19 pandemic fuelled another liquidity crunch in Fixed Income markets in early 2020, which has been the most severe stress test Fixed Income ETFs have had to face so far. It has proven the clearest demonstration of their capabilities. As spreads widened to levels not seen since the financial crisis and underlying bond market liquidity dried up, our colleagues showed earlier this year that Fixed Income ETFs did their job well⁸. In their analysis they looked at the secondary to primary market ratio for a range of Fixed Income ETFs and found that when the liquidity in the underlying bonds dried up, the ratio went up from its 2019 average of 1.3x to 3.5x in March, indicating that for every 1 EUR traded in the primary market, 3.5 EUR traded

⁸ For a comprehensive review of Fixed Income ETF performance we recommend the recent DWS Investment Insights Publication "ETF Trading in Volatile Times" written by the

DWS Capital Markets Team, available online at: <https://www.dws.com/en-gb/insights/investment-insights/etf-trading-in-volatile-times/>

in the secondary market. It is important to understand that while a primary market trade of an ETF triggers trading in the underlying bonds, a secondary market trade does not. The fact that the ratio went up during a period of market stress illustrates how the secondary market liquidity of an ETF was able to reduce the pressure on the underlying bonds as market participants were able to offset buys against sales and ETF brokers were not obliged to create or redeem a client trade immediately in the primary market. This ensures efficient inventory management and recycling of already issued ETF units.

FIGURE 10. BOND ETF TRADING ACTIVITY IN STRESSED MARKETS



As of: June 7, 2020; source: DWS International GmbH, Bloomberg LP

Trading Fixed Income ETFs like a stock: are high volumes a must?

Both Equity and Fixed Income ETFs trade very similarly to a stock given their on-exchange nature. ETFs can be traded via the exchange, specialised trading platforms or over-the-counter. One of the main differences between stock trades and ETF trades is the trade counterparty. On the single stock exchange, buyers and sellers represent the supply and demand for a stock which in turn sets its price. In contrast, ETFs have a liquidity provider in-between who provides liquidity between buyers and sellers by showing bid and offer quotes throughout the day⁹.

In stock trading, there are two elements that typically define liquidity. The cost to trade (i.e. the bid/offer spread) and the trading volume. In this configuration, high average trading volumes are a good indicator of liquidity. However, these two metrics only partially reflect the liquidity of a Fixed Income ETF. The reason is simple: in contrast to stocks, ETF shares can be created and redeemed in exchange for an

underlying basket of securities. An ETF's liquidity is anchored in that of its underlying market. However, its liquidity can be improved:

- _if its average traded volume is above the creation basket size (typically between a notional 3-4 Mn EUR) as the interaction between the secondary and primary becomes more efficient
- _if its size allows for more liquid sampling of the underlying basket of securities, typically more than 500 Mn EUR equivalent in the corporate bond space

Another common misperception is that an ETF with low assets under management (AUM) cannot trade larger amounts. Provided an authorised participant can buy the underlying basket of securities, a creation of new ETF shares can take place and trade sizes larger than the current AUM can be easily facilitated. This aspect of ETFs is especially relevant for more liquid asset classes such as government bonds.

Fixed Income ETFs price better than a bond: the price discovery phenomenon

In theory, an ETF's fair value at any time of the day should always equal the price of the securities it holds. For Equity ETFs this fair value calculation is trivial. Take the example of a UK-listed ETF tracking a UK equity index. The trading hours of the ETF and the underlying basket of securities are the same, so to determine the intraday fair value one could simply use the number of shares for each underlying stock in the fund times its current exchange price¹⁰.

For Bond ETFs, this is not as simple. There are two main challenges in valuing bonds. The first is that most bond trades do not occur on exchanges, which makes bond prices less observable. The second is that certain types of bonds do not trade as frequently as stocks. Both challenges are intertwined. While the high trading frequency of government bonds helps to overcome pricing difficulties, determining the value of a corporate bond basket (a liquid USD IG index contains over 2,000 constituents) can be very challenging. It is a task that index providers must address¹¹, and it can be particularly daunting during times of stress, such as those seen recently. But we suggest that ETFs can provide light in dark times. For example, in the USD Corporate bond market, as Figure 11 indicates, daily trading in the secondary market this year has amounted to only 0.5% of the total amount of bonds outstanding. The same ratio applied to corporate bond ETFs is far higher, at 3.1% of the total assets. This shows much higher secondary market liquidity in the ETF than in the bond. Similarly, while the total assets invested in US corporate bond ETFs amounts to around 3.3%

⁹ Note that while there is an incentive to provide liquidity as a means to charge a spread around the ETF price, the ETF price will never trade away from the underlying basket value as ETF shares can be created and redeemed daily through the primary market directly with the ETF issuer.

¹⁰ Note that also any cash balances the fund holds are included in the calculation

¹¹ Please refer to the next section

of the corresponding number of bonds volume outstanding, secondary market trading in US corporate ETFs is equivalent to 22.4% of the underlying bond trading volume.

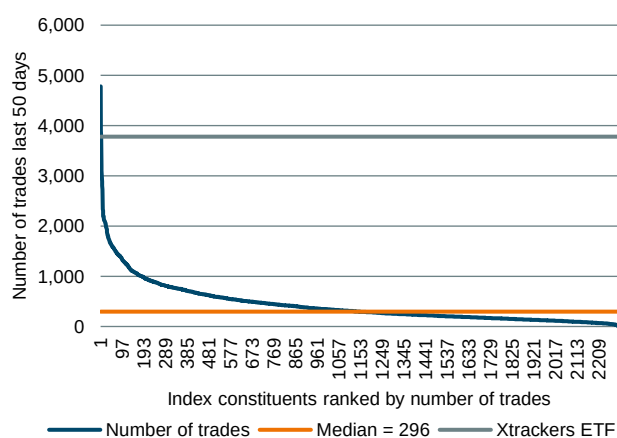
FIGURE 11. RELATIONSHIP BETWEEN PRIMARY AND SECONDARY CORPORATE BOND MARKET LIQUIDITY AND ETF AUM TO SECONDARY MARKET

	Debt outstanding / AUM	Year -to-May 2020 Average Daily Volume	Ratio
US Corporate Bonds	EUR 8,775bn	EUR 40bn	0.5%
US Corporate Bond ETFs	EUR 293bn	EUR 9bn	3.1%
Ratio	3.3%	22.5%	

As of: May 2020; source: DWS International GmbH, SIFMA, Bloomberg LP

More specifically, Figure 12 below looks at the number of trades for each corporate bond in the index tracked by the Xtrackers USD Corporate Bond UCITS ETF and compares it to the number of on-exchange trades of the ETF over a time period of 50 days. The median number of trades for a bond in the index during the 50 day period was 296 trades per bond – less than six price quotations a day. The ETF, in contrast, traded almost 3,800 times during that time period – 76 quotes a day. And every time ETF shares trade on an exchange is reported, ETFs with greater on-exchange liquidity naturally become a compelling price discovery tool for the benchmark they track.

FIGURE 12. NUMBER OF CORPORATE BOND TRADES VS ETF TRADES OVER 50 DAYS



As of: June 22, 2020; source: DWS International GmbH, Bloomberg LP. Based on the Bloomberg Barclays USD Liquid IG Index (2321 members)

Determining the Net Asset Value of a bond ETF

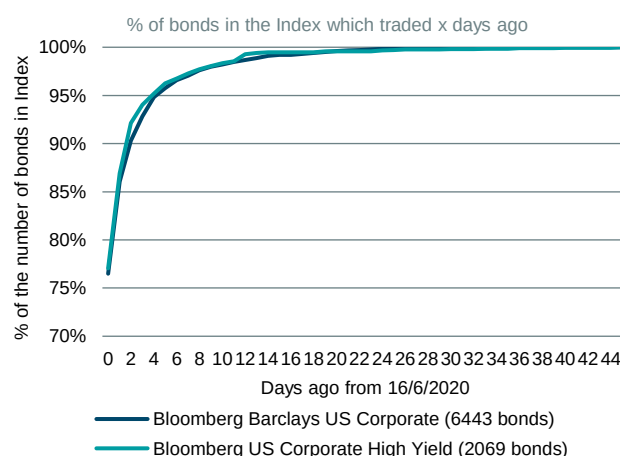
European ETFs have to comply with UCITS (Undertakings for Collective Investment in Transferable Securities) rules and their official net asset value (NAV) is calculated independently from the price at which they may trade. In a similar way to any UCITS fund, the ETF custodian captures an

independent price for each security held. The market standard to determine the NAV of a Fixed Income ETF is to value the underlying bonds at levels where the index provider marks them. Thus, it is very important to understand how index providers value the bonds.

Index providers often use multiple bond pricing sources to value each bond in the index at a fixed bond valuation time. For example, US Corporate indices often mark the bonds at 3pm Eastern Standard Time. Another common practice is to value the bonds at bid prices. Most index providers rely on a variety of inputs such as transaction data, quotes from market makers or panels of bonds dealers providing indicative pricing. Further, most index providers use models to estimate the market price of a bond, essentially aiming to reflect overall price movements and to remove outliers.

The challenge with Fixed Income markets such as corporate bonds is that certain (typically smaller or older) bonds do not trade every day. Figure 13 looks at trades reported on TRACE for all bonds in both IG and High-Yield Indices over the last 50 days as of June 16th to analyse how long it takes for all bonds in the indices to trade. In the US, all trades involving IG, high yield and convertible corporate bonds must be reported to TRACE. On June 16th, around 76% of IG bonds and 77% High Yield bonds in the respective indices traded within one day. About 95% of the bonds in both indices traded at least once during the five days preceding June 16th.

FIGURE 13. UNDERLYING LIQUIDITY OF US CORPORATE BOND INDICES



As of: June 17, 2020; source: DWS International GmbH, Bloomberg LP.

All of the bond valuation methods have one thing in common. They are attempting to approximate the fair value of securities for which the fair value is not necessarily known. While not all bonds that make up an ETF trade every day, an index has to assign fair bid prices to them. When markets are stressed and only a small fraction of bonds trade the valuation mechanisms in place in most index providers and bond valuation agents are stressed alike. There may be

discrepancies between live ETF prices, which reflect investors and market makers' sentiment in a transparent way, and official Fund NAVs, reflecting the attempt by bond valuation agents to value funds when not all of the component bonds have traded.

During the recent COVID-19 crisis, we have seen large dislocations between NAVs and market prices, especially in the corporate bond space. The dislocations remained in the market over some time until central bank interventions were announced. Here too, we much rather saw the ETF prices as a leading indicator for index prices rather than the reverse.

Conclusions

The recent turbulent times have tested the limits of Fixed Income ETFs. In our view they have passed the test of time. Fixed Income ETFs nowadays track highly diversified index concepts that overcome concentration concerns by their broad inclusive nature and index construction. Their comprehensive methodology turns them into suitable "buy and

maintain" exposures, while advancements in technology and data quality improve replication. Given the considerable expansion in the Fixed Income ETF landscape and structural drivers increasingly favouring efficient benchmark replication, we believe that passive Fixed Income ETFs are becoming an increasingly compelling proposition. Nevertheless, as we highlight in this paper, not all Fixed Income ETFs are created equal and ETF selection is still a challenge for investors. The below scorecard provides simple criteria to help investors better assess and select Fixed Income ETFs.

ETF scorecarding: what to watch for

Criteria	Metrics	Comments
Index Diversification & market representativeness	_ Breadth (inclusion) min outstanding (EUR millions) _ Breadth (inclusion) no. countries _ Depth: no. bonds _ Rebalance frequency _ Index governance _ Weight of greatest issuer, possible index caps _ Herfindahl-Hirschman Index (HHI)	Indices need to strike a balance between solving the diversification ("Bums") problem and offering a representative exposure to the market and its realities
Buy and Maintain: efficiency of index rules	_ Liquidity score of the underlying assets _ Index inclusion and removal rules _ Aggregated Rating calculation methodology _ Index Turnover (breadth of the maturity band) _ Index pricing (bid, ask insertions)	While maturity band indices will exhibit very high turnover, simple aspects such as hold to maturity in less liquid bond markets can help reduce transaction costs with moderate return dilution
ETF replication quality	_ Tracking error during crisis times _ Off-benchmark securities _ Cash management _ Physical creation/redemption processes as key protection mechanism	The recent COVID-19 crisis tested the limits of sampling and trading in Fixed Income and ETF tracking differences and tracking errors
Investor choice: breadth of the range	_ Availability of short-term products to manage duration _ Consistency in index rules across products _ Alternative indexing to express granular views on market or issuer structure	Sometimes a simple combination of standard products or a standard core. Alternative Indexing satellite approach can help solve complex issues
ETF trading and liquidity	_ ETF size _ Trading volumes (versus creation basket size)¹² _ Average bid/offer spread of ETF _ Number of APs _ ETF pricing / NAV Dislocation	ETF size becomes all the more relevant for more complex and broader markets. ETFs' market prices are a leading indicator vs NAVs, especially during market stress

¹² The "90D Avg Agg Vol" field in DES<GO> page of an ETF in Bloomberg aggregates volumes (no. of shares) across all listings of an ETF share class. Further, one can add the 90D Avg Agg Vol of all share classes that belong to the same fund together, as shares of

different share classes of the same fund, can be converted by liquidity providers without trading the underlying bonds

Annex Table: the Bums problem solved

USD Corporates					EUR Corporates				
Bond weight (%)	Cum. weight (%)	Yield of category	Numbers of Issues	Rating	Bond weight (%)	Cum. weight (%)	Yield of category	Numbers of Issues	Rating
0.00%-0.25%	29.7%	2.45	923	BBB+	0.00%-0.25%	44.6%	1.04	1649	BBB+
0.25%-0.50%	19.3%	2.49	483	A-	0.25%-0.50%	24.9%	0.71	687	A-
0.50%-0.75%	12.0%	2.46	255	BBB+	0.50%-0.75%	11.3%	0.80	270	A-
0.75%-1.00%	8.5%	2.39	181	A	0.75%-1.00%	13.2%	0.71	289	A-
1.00%-1.75%	12.1%	2.31	174	A	1.00%-1.75%	6.0%	0.81	125	A-
>1.75%	18.3%	2.26	277	A-	>1.75%				
Herfindahl-Hirschman Index (HHI) = 87.02					Herfindahl-Hirschman Index (HHI) = 40.21				

USD High Yield Corporates					EUR High Yield Corporates				
Bond weight (%)	Cum. weight (%)	Yield of category	Numbers of Issues	Rating	Bond weight (%)	Cum. weight (%)	Yield of category	Numbers of Issues	Rating
0.00%-0.25%	29.4%	7.12	292	B+	0.00%-0.25%	29.4%	7.44	227	B+
0.25%-0.50%	28.8%	5.61	201	B+	0.25%-0.50%	20.7%	4.42	100	BB-
0.50%-0.75%	13.1%	5.55	84	B+	0.50%-0.75%	17.3%	4.26	76	BB-
0.75%-1.00%	2.6%	4.51	16	B+	0.75%-1.00%	10.5%	3.57	49	BB-
1.00%-1.75%	18.5%	5.12	89	BB-	1.00%-1.75%	13.1%	3.41	52	BB-
>1.75	7.6%	5.17	47	BB	>1.75	9.1%	3.55	31	BB
Herfindahl-Hirschman Index (HHI) = 62.95					Herfindahl-Hirschman Index (HHI) = 70.08				

Developed Market Sovereigns					Emerging Market Sovereigns and Quasi-Sovereigns				
Bond weight (%)	Cum. weight (%)	Yield of category	Numbers of Issues	Rating	Bond weight (%)	Cum. weight (%)	Yield of category	Numbers of Issues	Rating
0.00%-2.50%	13.3%	0.15	241	AA+	0.00%-1.00%	14.9%	5.07	61	BB
2.50%-5.00%	8.6%	0.39	71	A+	1.00%-2.00%	17.2%	8.16	60	BB
5.00%-7.50%	13.6%	0.39	122	A	2.00%-3.00%	16.8%	4.78	73	BB+
7.50%-15.00%	8.3%	-0.14	44	AA	3.00%-4.00%	13.2%	4.92	35	BB
15.00%-20.00%	18.8%	0.11	260	A+	4.00%-5.00%	13.0%	5.34	52	BB
>20%	37.4%	0.54	245	AAA	>5%	24.8%	3.72	60	BB+
Herfindahl-Hirschman Index (HHI) = 1971.29					Herfindahl-Hirschman Index (HHI) = 332.64				

Source: BRS Aladdin, USD IG Corporates (BBG Barc USD Liquid Investment Grade Corporate Index), EUR IG Corporates (BBG Barc Euro Aggregate Corporate Index), USD HY Corporates (BBG Barclays US High Yield Very Liquid Index ex 144A Index), EUR HY Corporates (iBoxx EUR Liquid High Yield Index), Developed Market Sovereigns (FTSE World Government Bond Index - Developed Markets), EM Sovereigns and Quasi-Sovereigns (FTSE Emerging Markets Government and Government-Related Select Bond Index). HHI is defined as sum of the squares of the portfolio issuer weights

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