



Fixed income ETFs: primary market participation and resilience of liquidity during periods of stress

*Matteo Aquilina, Karen Croxson,
Gian Giacomo Valentini, Lachlan Vass*

FCA research notes in financial regulation

The FCA research notes

The FCA is committed to encouraging debate on all aspects of financial regulation and to creating rigorous evidence to support its decision-making. To facilitate this, we publish a series of Research Notes, extending across economics and other disciplines.

The main factor in accepting papers is that they should make substantial contributions to knowledge and understanding of financial regulation. If you want to contribute to this series or comment on these papers, please contact Kevin James (kevin.james@fca.org.uk) or Karen Croxson (karen.croxson@fca.org.uk).

Disclaimer

Research Notes contribute to the work of the FCA by providing rigorous research results and stimulating debate. While they may not necessarily represent the position of the FCA, they are one source of evidence that the FCA may use while discharging its functions and to inform its views. The FCA endeavours to ensure that research outputs are correct, through checks including independent referee reports, but the nature of such research and choice of research methods is a matter for the authors using their expert judgement. To the extent that Research Notes contain any errors or omissions, they should be attributed to the individual authors, rather than to the FCA.

Authors

Matteo Aquilina, Karen Croxson, Gian Giacomo Valentini, Lachlan Vass.

Acknowledgements

We would like to thank Dean Sullivan, Barry Munson, Peter Maas and other FCA colleagues for helpful discussions. We would also like to thank the participants at the June 2019 IOSCO / FSB Workshop in Washington DC.

All our publications are available to download from www.fca.org.uk. If you would like to receive this paper in an alternative format, please call 020 7066 9644 or email publications_graphics@fca.org.uk or write to Editorial and Digital Department, Financial Conduct Authority, 12 Endeavour Square, London E20 1JN.

Contents

Abstract	3
Introduction	4
International context and previous research	5
The functioning of an ETF	5
Data	7
Participation in ETF primary markets	8
Resilience of liquidity in primary markets during times of stress	10
Conclusions and directions for future research	12
Annex	14
References	17

Abstract

The rapid growth in exchange-traded fund (ETF) markets creates potential risks to investor protection and financial stability. Using a unique transactions dataset, we present initial facts about participation in ETF primary markets and our preliminary analysis of the behaviour of liquidity providers in times of stress. We find ETF primary markets are highly concentrated, particularly for fixed income ETFs, where concerns about 'liquidity mismatch' have been raised. However, our preliminary analysis of stress events provides some evidence that alternative liquidity providers 'step in' during times of market disruption. We do not observe other immediate features of participation that raise concerns about financial stability.

Introduction

Over the last decade there has been a sharp rise in passively-managed funds – these have grown from 8% in 2007 to 20% of global funds' Assets Under Management (AUM) a decade later. This increasing popularity of passive investment has been underpinned by a strong expansion in index mutual funds and even faster growth in Exchange-Traded Funds – or ETFs.

In most cases ETFs track the returns of an index, like passive mutual funds. However, they are different to mutual funds as they allow intraday trading of their shares.

ETF shares are created or redeemed in primary markets by Authorised Participants (APs) and then exchanged between investors on the secondary market. As a share of total passive AUM, ETFs have grown from 30% in 2007 to 40% in 2017.

ETFs provide a flexible option to gain exposure to underlying asset markets, traditionally equities but recently also fixed income. As a result, they have become increasingly popular with both retail and institutional investors. Beyond providing convenient, diversified access to an asset class or a market, they also facilitate hedging and can sometimes provide arbitrage opportunities.

Following their increasing popularity, concerns have been raised about potential risks to financial stability from the rapid growth in ETFs. This is particularly relevant for fixed income ETFs, which have a greater risk of liquidity mismatch when they are invested in relatively illiquid underlying bond markets.

Our research on ETFs uses unique regulatory data to shed light on a number of open questions about the impact of ETFs on market functioning and systemic risk.

We recently presented initial insights from our work at a joint Financial Stability Board / IOSCO workshop on 'ETFs and market liquidity' in Washington D.C. Our early research provides a new lens on the resilience of liquidity provision in ETF primary markets.

We find that these markets are concentrated, especially in fixed income ETFs, but also see signs of alternative liquidity providers 'stepping up' in times of stress.

In particular, we find:

- Most APs are split between Investment/Wholesale Banks (IWBs) and Principal Trading Firms (PTFs). These account for 32 of the 34 active APs in our sample.
- There is a high level of concentration among APs. The 5 most active APs are responsible for about 75% of overall reported primary market volumes (across all asset classes). Concentration is particularly pronounced in the fixed income market, with the top 5 APs there accounting for around 91% of overall volumes and the top AP itself accounting for 51%.

Following various stress events with a marked rise in fixed income redemptions, we observe:

- An expansion in the overall number of APs active in fixed income ETFs.
- A decrease in concentration amongst the most active APs in fixed income ETFs.

We also observe a similar pattern in equity ETFs in 2018 stress events. Our analysis therefore provides tentative evidence that alternative liquidity providers step into the market to some extent during times of stress.

International context and previous research

ETFs accounted for approximately \$400m of AUM in 2005. ETFGI data shows the corresponding figure for 2019 is over \$5tn. Such rapid growth has attracted the attention of national and international regulators and policy makers.

The 2019 work program of the International Organization of Securities Commissions (IOSCO) commits to further work on ETFs from both an investor protection and market integrity perspective. The same program will see IOSCO collaborate with the Financial Stability Board (FSB) on its work on potential financial stability risks from the impact of ETFs on market liquidity.

While there is existing research on ETFs, there has been limited work on the role of APs in the primary market and their potential impact on financial stability.

Several papers have studied ETFs and secondary market liquidity. These generally investigate the liquidity of ETFs and their underlying instruments, providing evidence on the main drivers of liquidity. Much of this literature focuses on the relation between ETFs and portfolio constituents. Examples include Marshall et al (2015), which suggests a strong relation between ETFs and underlying stocks' liquidity. More recently, Ben-David et al (2019) conclude that ETFs tend to be more liquid than their underlying components, attracting a new breed of high-frequency investors whose demand shocks can lead to higher volatility in the underlying securities.

A different strand of literature focuses more on the intrinsic characteristics of ETFs. Subrahmanyam (1991) documents how diversification makes ETFs more liquid than the underlying securities. Pham et al (2019) show how liquidity for an active ETF is lower than its weighted average underlying liquidity and that diversification has a negative impact. Pan & Zeng (2017) investigates the structural incentives faced by APs who are also market makers in the secondary market, and when the incentives from their different roles may mean their different roles conflict.

Despite the relatively developed literature on secondary market liquidity, very little work has been conducted exclusively on primary markets. Antoniewicz et al (2015) is the only work we are aware of that directly addresses the role of APs solely as liquidity provider in the primary market. Relying on a survey by the Investment Company Institute, the report describes the role of APs and provides a basic description of their behaviour.

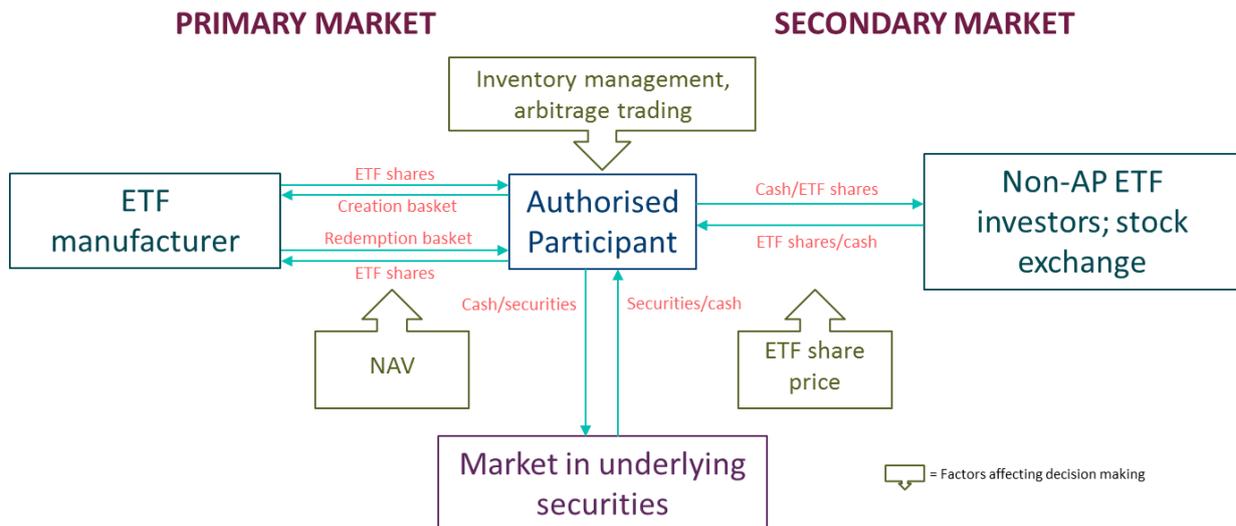
The functioning of an ETF

ETFs are exchange-traded products that combine the features of traditional open-end and closed-end funds. Like traditional open-end funds, units can be created and redeemed in the primary market. However, unlike traditional open-end products, most ETF investors trade shares in the fund in secondary markets, rather than with the fund transfer agent under the rules laid out in the fund prospectus.

Only a specific category of investors, called Authorised Participants (APs), can create and redeem shares. Like closed-end funds, end-investors can buy the shares of an ETF in the secondary market. So, net buying or selling by end investors in the secondary market does not immediately or directly result in inflows and outflows in the ETF, because APs and market-makers act as a 'buffer' between investors and the fund.

Figure 1 gives an illustration of the mechanism underlying the creation and redemption of shares in an ETF.

Figure 1: ETF ecosystem



Source: adapted from Pan & Zeng (2017)

APs' ability to transact in both primary and secondary market gives them a unique opportunity to arbitrage price discrepancies between the ETF and the basket of underlying securities. Liquidity of the underlying securities, fees and available trading technologies play a key role in determining how wide the price gap needs to be to make this arbitrage profitable.

Nonetheless, APs generally use more complex strategies than 'buying the undervalued asset and selling the overvalued asset', which are strictly dependent on their portfolios' broader risk exposures. A great deal of attention has been paid to the arbitrage mechanism as providing a strong incentive for APs to trade. But most ETF activity is driven by market making in the secondary market, with inventory adjustments causing creations and redemptions in the primary market.

ETFs have grown rapidly in recent years, reaching about \$5.3tn of AUM globally. With a share of around 80%, equities are by far the largest asset class in which ETFs are invested. Fixed income ETFs represent the second largest category and contribute approximately 18%. Our analysis of Bloomberg data (November 2018) shows over half of these are invested in investment grade instruments.

This rapid growth has attracted the attention of both domestic and international regulators and policy makers. Everyone recognises that low fees and easy access to liquidity are positive features that underpin the success of ETFs. However, questions have been raised as to whether ETFs would still be able to offer the expected level of liquidity in times of market stress, and the potential financial stability consequences if not.

ETFs holding less liquid assets, such as high yield corporate bonds, may be more exposed to such a scenario. For these types of funds, the 'liquidity mismatch' between investors' expectation that they can redeem and the liquidity of the underlying portfolio can be significant.

Regulators and policy makers want to assess whether APs will continue to be able (and willing) to create and redeem shares in the primary market in stressful periods. We provide an initial answer to this question in our analysis.

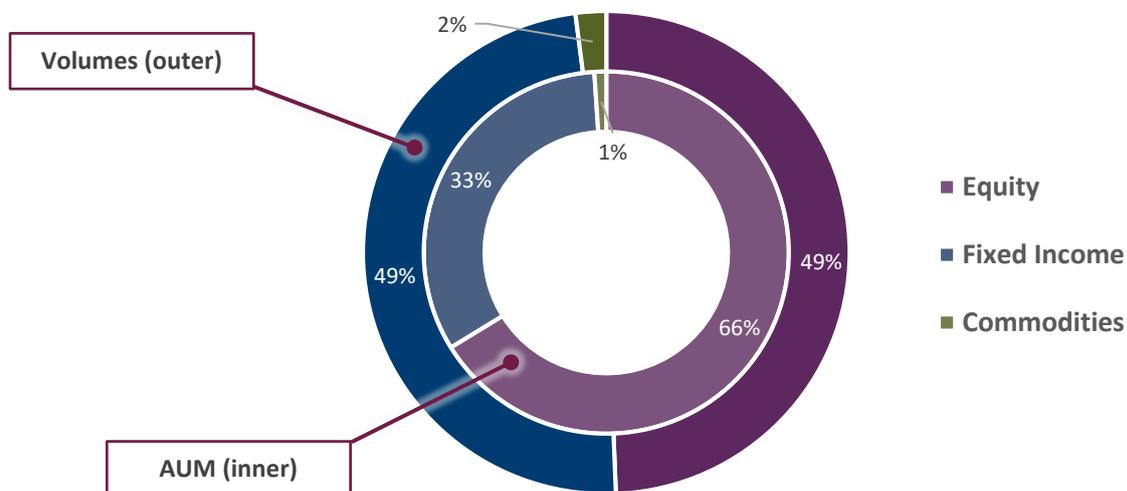
Data

We constructed a unique dataset following a regulatory data request to ETF manufacturers. The dataset includes all primary market transactions for EU-domiciled ETFs from a sample of ETFs managed by 4 of the largest global issuers.

The dataset covers daily creations and redemptions for 257 ETFs (\$381bn AUM), representing around 7.2% of the \$5.3tn managed by ETFs globally. It contains each transaction (both creations and redemptions) of ETF units that takes place between the AP and the manufacturer over our sample period 2016 to 2018.

Figure 2 shows the split of ETFs in our dataset. Equity ETFs are the largest share of AUM (66%), followed by fixed income (33%) and commodities (1%).

Figure 2: Share of AUM & volume by asset class – ETF primary market 2016-2018



Source: firm data, FCA calculations

Despite the significantly lower share of fixed income ETFs AUM relative to equity ETFs, fixed income ETFs account for a similar level of aggregated volumes to equity ETFs. A possible explanation for this is that investors use fixed income ETFs to manage their exposure to the asset class as a whole. In other words, while it is easy to manage the exposure to stocks by trading them directly, it is relatively easier to manage exposure to fixed income products by trading ETFs.

Table 1 reports summary statistics for daily creations and redemptions of individual ETFs in each asset class. The maximum is calculated as the largest reported creation/redemption at daily level across ETFs that have been traded.

Besides redemptions in commodities, all other asset classes show primary market activity most of the days during the 3-year period, both in creations and redemptions.

Commodity ETFs report the lowest average redemption activity by a large margin. Equity and fixed income ETFs show similar statistics for redemptions. Nonetheless, it is a fixed income ETF that registers the largest daily redemption over the considered period.

Table 1: Summary statistics of creations and redemptions of ETF units by asset class (millions of USD)

		% of active days	Max	Mean	Median
Redemptions	Commodities	34.9	254.9	9.1	4.3
	Equity	98.3	519.9	17.6	7.8
	Fixed income	97.2	732.4	16.5	7.6
Creations	Commodities	75.9	142.0	7.0	2.5
	Equity	99.2	664.6	17.3	7.2
	Fixed income	99.3	474.6	13.2	5.3

Source: firm data, FCA calculations

Participation in ETF primary markets

There is little literature that details the types of participants active in the ETF primary market. This section provides an overview of the types of firms who participate in this market and reports market concentration.

We classify APs into three broad categories based on high-level differences in business model and type of engagement with ETF markets:

1. Investment/Wholesale Banks (IWBs)
2. Principal Trading Firms (PTFs)
3. Broker Dealers (BDs)

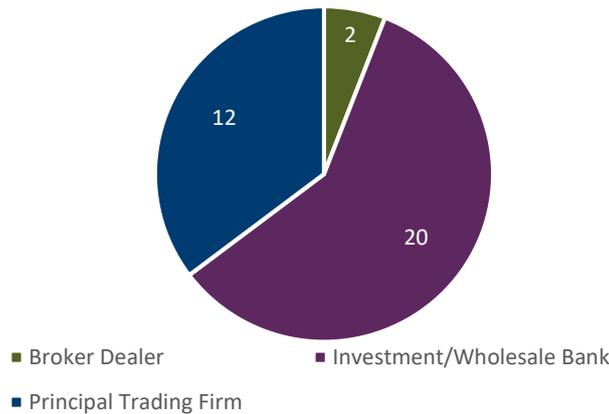
IWBs are traditional banks which have a branch of their business that acts as an AP. IWBs have been active in ETFs since the asset class was created and must usually meet strict capital requirements.

PTFs are relatively newer firms who tend to be more focused on certain sub-sectors of the ETF market, such as fixed income. As they are not involved in the traditional banking business, they tend to have less rigid capital constraints. This, combined with the use of sophisticated technology for high-frequency trading, allows PTFs to run a larger balance sheet and manage risk more effectively.

BDs combine brokerage business with proprietary trading. They rarely act as an AP.

As Figure 3 shows, the majority of APs are IWBs followed by PTFs. There are only a small number of BDs.

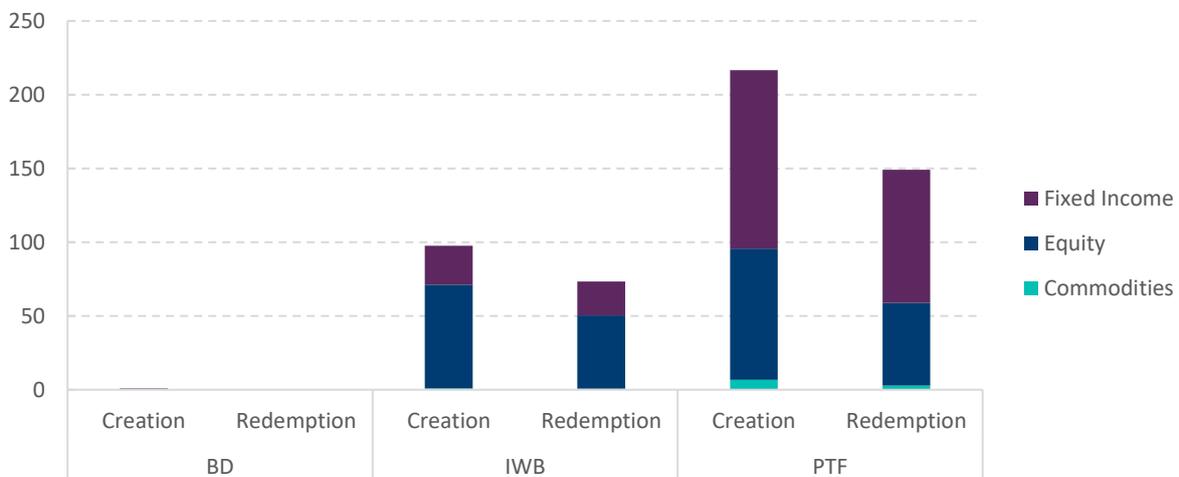
Figure 3: Breakdown of APs by type



Source: firm data, FCA calculations

While there are fewer PTFs than IWBs, PTFs are by far the most active group in the primary market - accounting for 80% market share across asset classes (see Figure 4). Their combined market share is even higher in fixed income ETFs where collectively they account for 82% of creations and 79% of redemptions overall. While PTFs have relatively balanced activity across fixed income and equity ETFs, IWBs appear to focus disproportionately on equity ETFs.

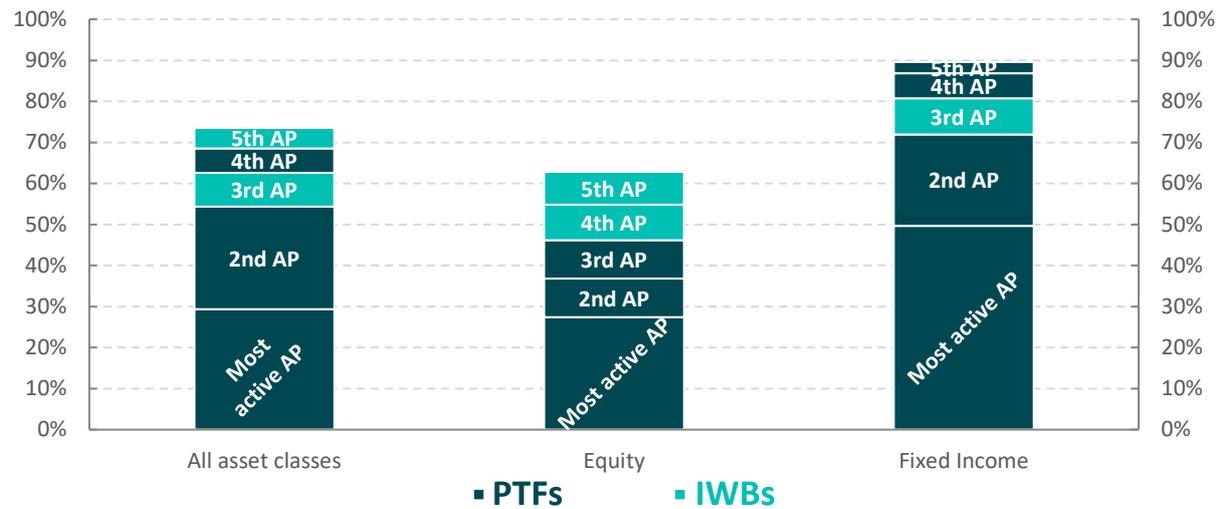
Figure 4: Primary market volumes (USD billion) by type of AP



Source: firm data, FCA calculations

We also observe significant concentration among APs (see Figure 5). We define AP activity as the aggregation of creation and redemption volumes over the sample period. Using this definition, the 5 most active APs account for around 75% of the observed primary market volumes. The remaining 25% of volume is spread across 29 APs.

Concentration is particularly high in fixed income ETFs, where the top five APs account for around 91% of overall volumes and the top AP itself accounts for 51%. The largest market shares are taken up by PTFs.

Figure 5: Market share of 5 most active APs

Source: firm data, FCA calculations

Resilience of liquidity in primary markets during times of stress

The international regulatory community has highlighted risks in the way APs behave in times of stress. Would APs be willing to step up and participate in the market if, for any reason, investors were engaged in heavy selling? To provide a partial answer to this question we investigated the primary market behaviour of APs during these periods.

We first identify periods of stress, focusing on time periods that exhibit peaks in both the amount of overall redemptions and in broader market volatility (as measured by the VIX index).

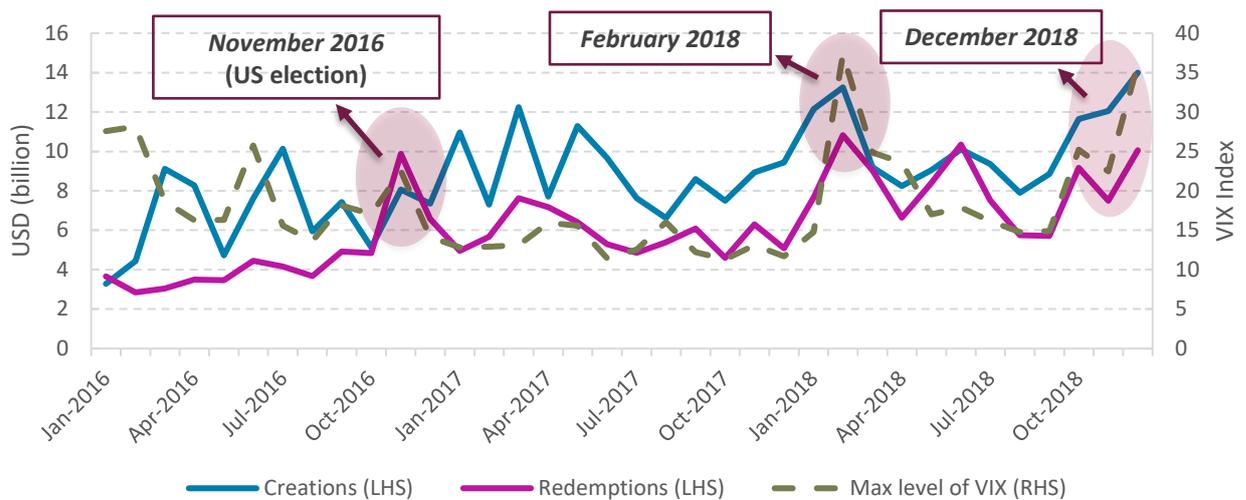
Figure 6 highlights three potential stress periods in our sample. This is aggregated across all asset classes. The stress periods identified are:

1. the U.S. Presidential Election in November 2016
2. a volatility spike in February 2018, and
3. an early December 2018 fixed income sell-off, ahead of the mid-month volatility spike

It is interesting that we do not observe a spike in redemptions in the period around the Brexit referendum in June 2016.

Because of the higher liquidity mismatch between the heavily traded fixed income ETFs and less liquid underlying securities, we focus our analysis on fixed income ETFs. Due to the severity of the event, the rest of this note focuses in more detail on the findings from our analysis of the impact of the 2016 US Presidential Election. The results are similar, though less pronounced, for the two other stress events we identify in Figure 6 (see the Annex for similar charts).

Figure 6: Monthly market volumes versus VIX index

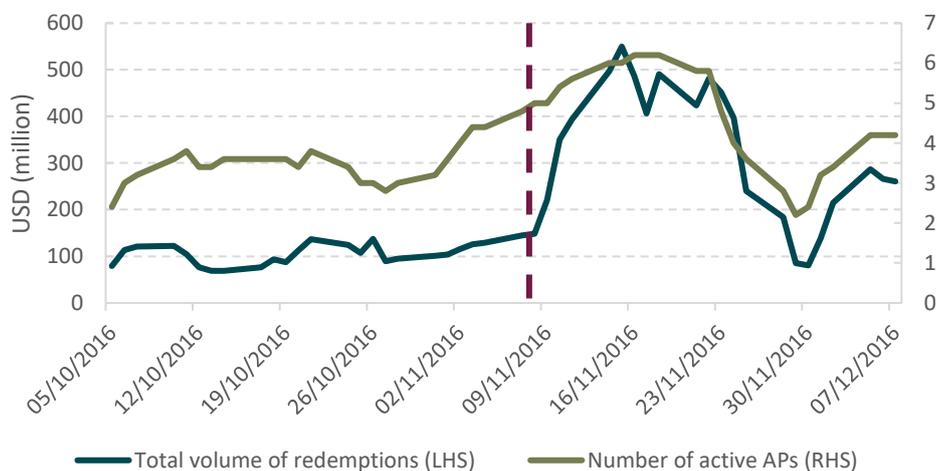


Note: total volume of creations and redemptions across all asset classes
 Source: firm data, FCA calculations

Figure 6 also shows there were net outflows for ETFs around the US Presidential Election stress event – the only period in our sample where this happens. In all other cases, even when redemptions spike, redemptions always remain below the level of creations (ie there are net inflows), which is consistent with the global growth observed in the sector in the last years.

This suggests that studying this particular event is likely to be a natural starting point for understanding AP behaviour, since it shows the greatest stress in primary market liquidity.

Figure 7: US election – volume of redemptions and number of APs active in fixed income ETFs



Note: values calculated as a 5-day moving average.
 Source: firm data, FCA calculations

To assess the potential for other liquidity providers to step-in at times of stress we looked at two indicators:

- (i) the number of APs active around the event, and
- (ii) the market share of the three most active APs on each day around the stress event

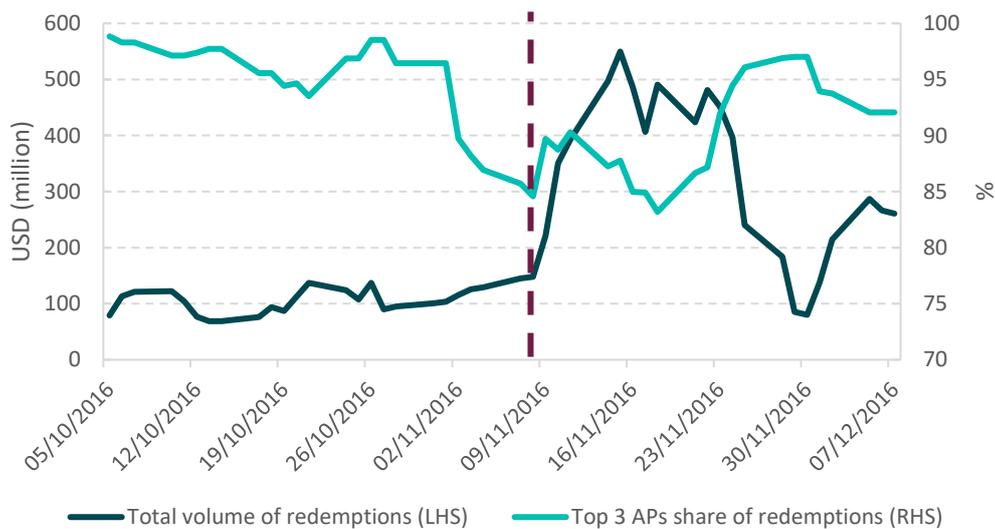
We can observe from both Figure 7 and Figure 8 that, following the US Election there was a significant increase in the volume of redemptions in fixed income ETFs. This is consistent with the aggregated data we showed in Figure 6.

How did APs respond during this period?

Figure 7 shows the number of active APs in the days leading up to and following the US Election. We can observe that their number increased significantly, from an average of around 3 in October to an average of around 6 in the two weeks following the Election. This suggests that some other (typically less active) APs become active in the market during this period of stress.

Figure 8 looks at market concentration around the time. The combined market share of the 3 most active APs¹ declines following the stress event, from around 95% to around 85%. This suggests that other APs have become more active. There are signs that typically less active APs are absorbing a relatively higher proportion of redemption volumes.

Figure 8: US election – volume of redemptions and market share of top 3 APs in fixed income ETF redemptions



Note: values calculated as a 5-day moving average.

Source: firm data, FCA calculations

Taken together these results suggest that, despite the primary markets being highly concentrated, lower activity APs can 'step up' and act as alternative liquidity providers in times of stress. Though we have not analysed why this happens, it is possible that the arbitrage opportunities that emerge from the selling pressure in the secondary market during times of market stress – which would likely result in the ETF trading at a discount to the value of the underlying – make it profitable for less active APs to enter and provide the necessary liquidity.

Conclusions and directions for future research

This paper presents some facts about participation in ETF primary markets and some initial evidence about the behaviour of liquidity providers in times of stress. On one hand, we find that ETF primary markets are highly concentrated, particularly so for fixed income ETFs. On the other, we find preliminary evidence that alternative liquidity providers step in during times of market stress. We did not observe any other behaviour that would raise concerns for financial stability.

¹ To show this we have calculated the market share of the 3 most active APs on each day. The firms that are amongst the top 3 may change day to day. This is calculated based on redemption volumes in fixed income ETFs.

But this analysis is just the first step in investigating the resilience of ETF markets. By combining unique regulatory data from primary markets, secondary markets, and markets for underlying assets, our future work will systematically explore the links between ETFs and stability. This will allow us to address some of the more complex questions currently being debated, such as how the primary and secondary markets for ETFs interact with the market in the underlying securities.

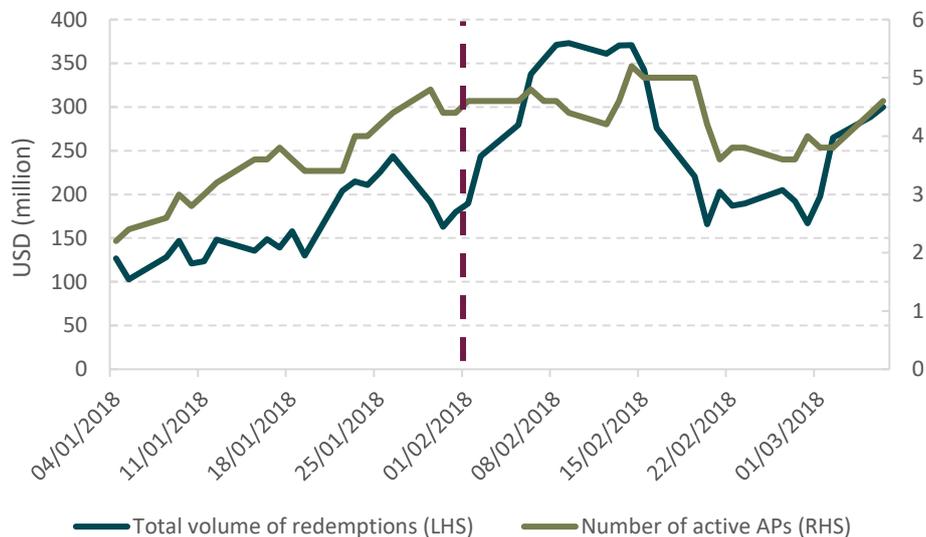
Resilience is a particular concern for ETFs with less liquid underlying assets, so we will also be extending our analysis to this aspect of fixed income ETFs.

Annex

The analysis in this research note focuses on AP behaviour in response to the market stress around the 2016 US Presidential election. However, Figure 6 also highlights two other events that may be of interest – one in February 2018 and one in December 2018. While these two additional events do not see net outflows in the primary market (like we observe around the 2016 US Presidential election), they both see a sharp spike in redemptions at the same time as a spike in broader market volatility (as measured by the VIX index).

For both events we observe similar dynamics to those we discuss in the main body of this research note. Below we provide charts equivalent to those in Figures 6 and 7 for these two additional stress events.

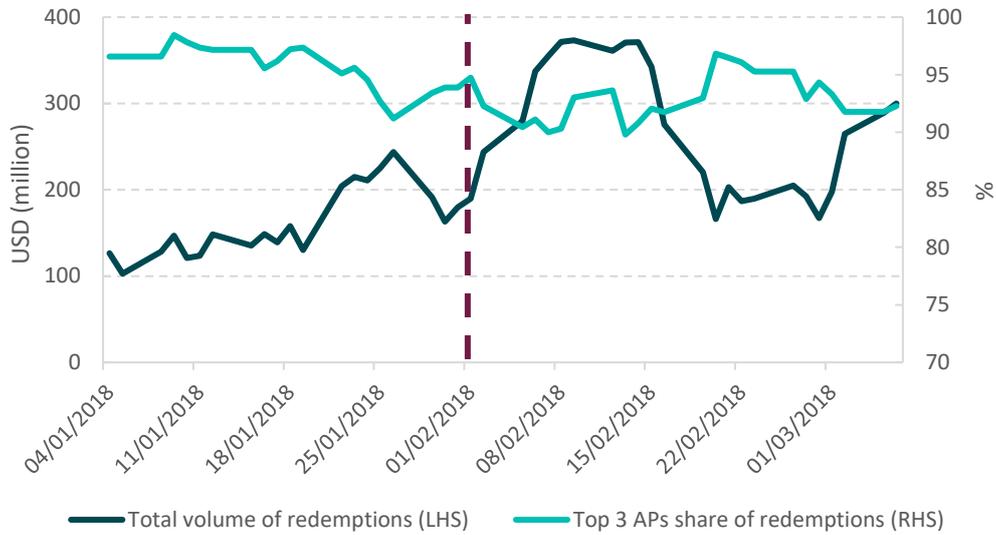
Figure 9: February 2018 – volume of redemptions and number of APs active in fixed income ETFs



Note: values calculated as a 5-day moving average.

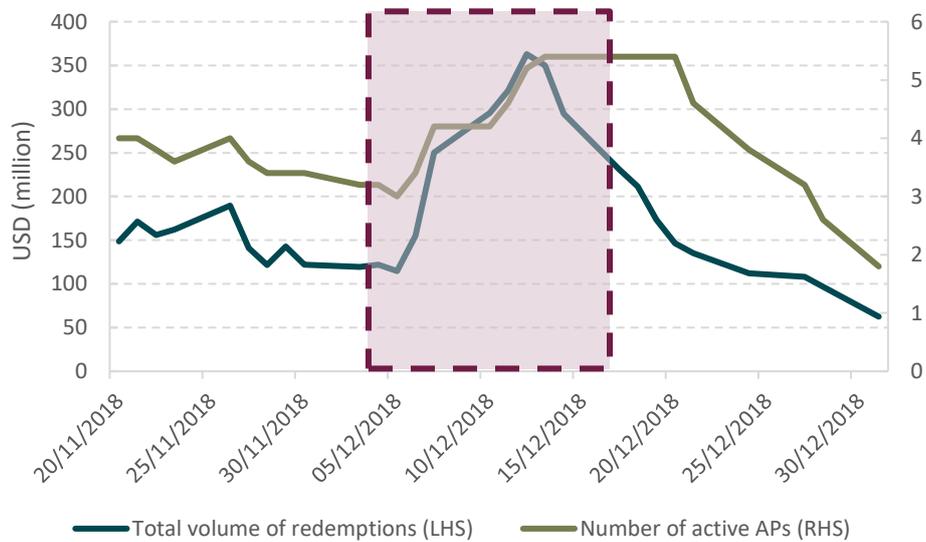
Source: firm data, FCA calculations

Figure 10: February 2018 – volume of redemptions and market share of top 3 APs in fixed income ETF redemptions



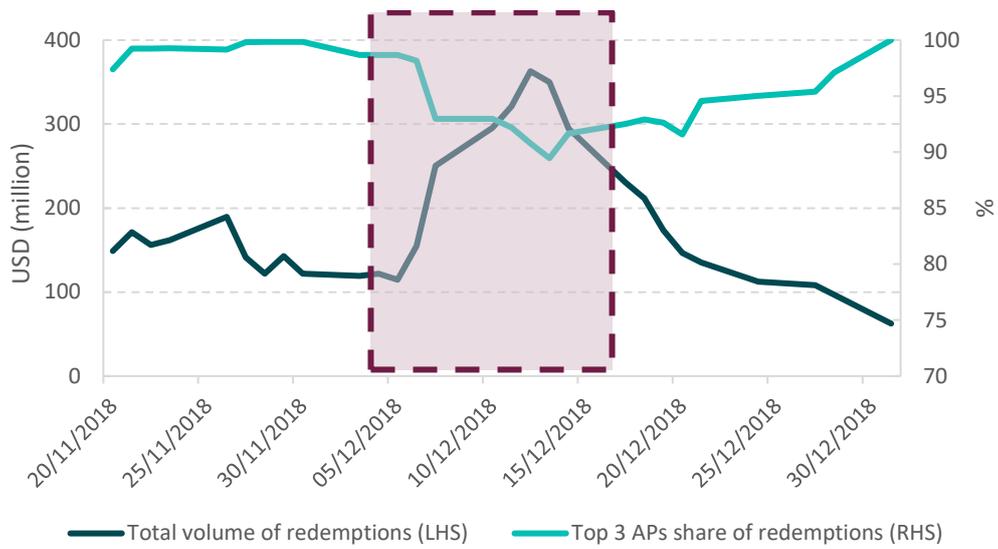
Note: values calculated as a 5-day moving average.
 Source: firm data, FCA calculations

Figure 11: December 2018 – volume of redemptions and number of APs active in fixed income ETFs



Note: values calculated as a 5-day moving average.
 Source: firm data, FCA calculations

Figure 12: December 2018 – volume of redemptions and market share of top 3 APs in fixed income ETF redemptions



Note: values calculated as a 5-day moving average.
 Source: firm data, FCA calculations

References

Avanidhar, Subrahmanyam, A Theory of Trading in Stock Index Futures, *The Review of Financial Studies*, Volume 4, Issue 1, January 1991, Pages 17–51, <https://doi.org/10.1093/rfs/4.1.17>

Ben-David, Itzhak and Franzoni, Francesco A. and Moussawi, Rabih, Do ETFs Increase Volatility? (November 30, 2017). *Journal of Finance*, Forthcoming; Fisher College of Business Working Paper No. 2011-03-20; Swiss Finance Institute Research Paper No. 11-66; AFA 2013 San Diego Meetings Paper; Charles A. Dice Center Working Paper No. 2011-20. Available at SSRN: <https://ssrn.com/abstract=1967599> or <http://dx.doi.org/10.2139/ssrn.1967599>

Ben R. Marshall, Nhut H. Nguyen and Nuttawat Visaltanachoti, ETF Liquidity, 14 August 2015, <https://www.nzfc.ac.nz/archives/2016/papers/updated/50.pdf>

Board Priorities - IOSCO work program for 2019, 25 March 2019, <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD625.pdf>

BIS Quarterly Review 'The implications of passive investing for securities markets', March 2018 https://www.bis.org/publ/qtrpdf/r_qt1803j.htm

Pan, Kevin and Zeng, Yao, ETF arbitrage under liquidity mismatch, December 2017, ESRB Working Paper Series 59, European Systemic Risk Board

Pham, Son Duy and Marshall, Ben R. and Nguyen, Nhut (Nick) Hoang and Visaltanachoti, Nuttawat, Portfolio Liquidity: Is the Whole More Than the Sum of Its Parts? (April 9, 2019). Available at SSRN: <https://ssrn.com/abstract=3369235> or <http://dx.doi.org/10.2139/ssrn.3369235>

Rochelle Antoniewicz and Jane Heinrichs, The Role and Activities of Authorized Participants of Exchange-Traded Funds, Investment Company Institute https://www.ici.org/pdf/ppr_15_aps_etfs.pdf

