

Mutually Assured Destruction

Jeffrey Meli
+1 212 412 2127
jeff.meli@barclays.com
BCI, US

Shobhit Gupta
+1 212 412 2056
shobhit.gupta@barclays.com
BCI, US

Arvind Kumar
+ 1 646 333 1184
arvind.kumar4@barclays.com
BCI, US

High yield mutual funds experienced significant outflows during the recent bout of volatility. Outflows exceeded 4.4% of AUM over a short period of four weeks ending last Wednesday, according to the universe of weekly reporters to Lipper. This ranks among four largest outflows for similar periods and is the largest since August 2014.

The timing of outflows corresponded to a period of significant share destruction in high yield ETFs and a reduced net investor position in CDX.HY. While some of the ETF and CDX selling was likely driven by underlying investors de-risking for reasons similar to those of high yield mutual fund investors, we believe this explains only a minority of the activity in portfolio products. Instead, we think the vast majority of portfolio product selling was driven by mutual funds and other institutional investors that use those products to manage their liquidity needs. In other words, the products were sold to fund the outflows and, thus, do not represent additional de-risking. First, we examine this hypothesis using evidence from the recent episode of outflows. Second, we estimate the potential rebalancing and determine the characteristics of bonds that could benefit from incremental mutual fund demand should managers replenish their liquidity buffers.

Recent Outflows Were Historically Significant

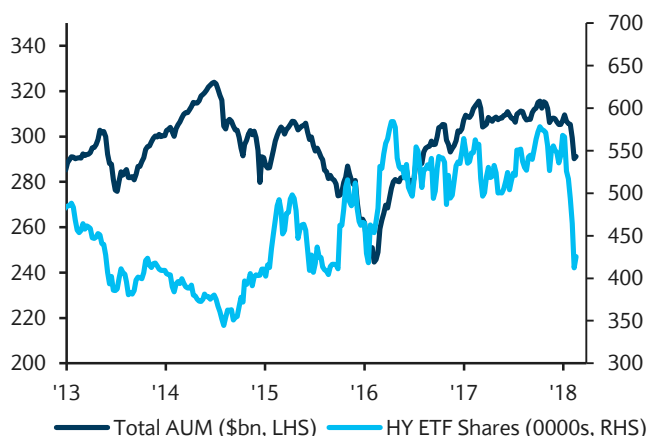
Figure 1 compares the recent period of outflows with other periods of concentrated investor selling. Along with episodes such as the Taper Tantrum and the oil-led volatility of 2015, it ranks among the most severe – in fact, it constitutes the largest outflow in almost five years.

Although severe relative to other periods of mutual fund outflows, the recent flows were well below those experienced in other products – notably, high yield ETFs. HYG and JNK, the high yield ETFs with the most assets under management, saw the largest-ever percentage decline in their combined shares outstanding, with a near 18% drop over the one-month period ending last Wednesday, dwarfing the 4.4% decline in mutual fund AUM over the same period. Figure 2 compares the change in mutual fund AUM with the change in ETF shares to demonstrate the magnitude of the disparity.

FIGURE 1
Periods Characterized by Large Mutual Fund Outflows

Period	Episode	Fund Flow (\$ bn)	Flow as % of AUM
Feb-18	Equity & Rates-Led Risk-Off	-6.9	-4.4%
Mar-17	Wirelines Weakness	-5.1	-3.0%
Dec-15	Oil-Led Volatility	-5.9	-3.9%
Aug-14	Geopolitical Risk Flare	-8.9	-5.8%
Jun-13	Taper Tantrum	-8.5	-6.4%

FIGURE 2
High Yield Total Mutual Fund AUM versus High Yield ETF Shares Outstanding

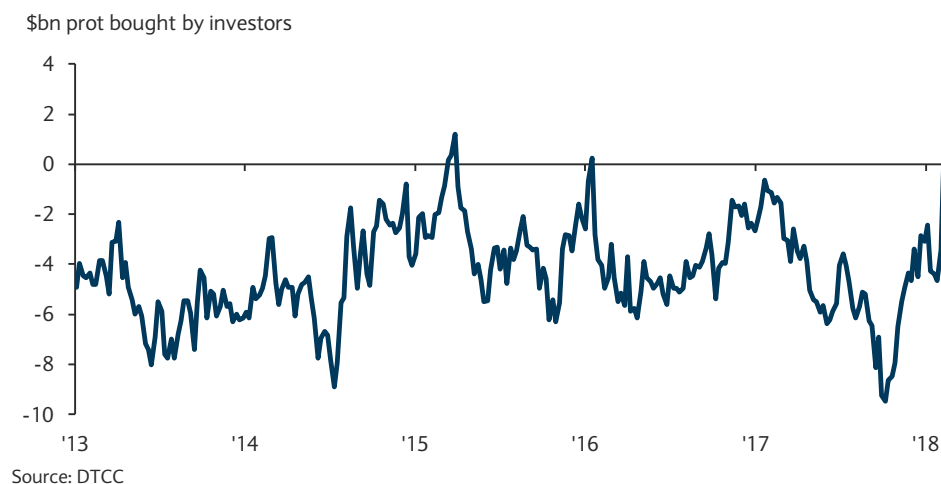


Note: Outflows measured for weekly only reporters captured in the Lipper high yield dedicated mutual fund universe. Source: Lipper, Bloomberg

Source: Lipper, Bloomberg

The HY CDX market experienced similar flows. Figure 3 shows the net protection bought by investors over time. In general, investors are short protection, meaning that, on average, the investor community is long risk through the indices (in contrast to the dealer community, which is, on average, short risk, likely to hedge inventory). Investors approached the end of last year particularly long via the indices, and although that began to normalize before volatility picked up, the change during the volatility was particularly acute. Investors bought more than \$3.5bn of protection through mid February, leaving them net short for only the third time in the past five years.

FIGURE 3
HY CDX (All-Series) Protection Bought by Investors



Double-Counting Not De-risking

A key question is what proportion of the portfolio product selling represented true de-risking. On the one hand, it would not be surprising to have seen significant de-risking in both ETFs and CDX, given the magnitude of the volatility and the obvious retail selling. Clearly, both retail and institutional investors were re-evaluating their portfolios. On the other hand, it is also possible that much of the selling in portfolio products was driven by mutual funds themselves, to fund the outflows that they were experiencing. There is strong evidence that funds have increased their holdings of portfolio products in order to manage their liquidity risk (see *Using ETFs to Mitigate Fund Flows*), and it is precisely in periods of outflows that they would sell those holdings and avoid selling individual securities.

Quantifying Selling of ETFs by Mutual Funds

One way to estimate the extent to which the ETF selling was driven by funds using the products for liquidity management (thus representing a double-counting of outflows) is to estimate how much retail holders of ETFs might have sold. The simplest starting point is to assume that retail investors sold ETFs in the same proportion that they sold high yield mutual funds. Assuming a 50/50 retail/institutional split of ETF ownership, this implies \$1.1bn of ETF outflows from retail: [\$52bn in ETF AUM]*[50% retail ownership of ETFs]*[4.4% in retail outflows].¹ The residual \$4.4bn of outflows would then be attributed to institutional holders, representing 79% of the total share destruction.

¹ The 50% split is only an estimate, based both on feedback from our ETF trading desk and on our previous research (*Using ETFs to Mitigate Fund Flows*), but given the changes in trading patterns of high yield ETFs documented below, it is likely to be conservative.

However, this is almost surely an underestimate of retail ETF selling, as the intra-day liquidity of ETFs is likely to attract higher-frequency retail traders, who would be more prone to sell amid volatility. We compare flows in high yield ETFs with those for loans during periods of outflows for both. We choose loans to arrive at a sensible baseline for “retail-only” selling, considering that loan managers typically use revolvers to managing liquidity and typically do not manage this risk with portfolio products.

- First, we isolate periods during which high yield funds endured large outflows (such as the Taper Tantrum, the liquidation of Third Avenue Management, and the most recent flare in volatility) and consider the ratio of ETF flows to mutual fund flows in these periods.
- Second, we look at the same ratios for BKLN and the universe of loan fund managers tracked during periods when these managers experienced outflows. Given that loan managers do not typically use ETFs for liquidity management, this estimate provides a sensible baseline for “retail-only” selling.

FIGURE 4

Fund Flow Ratios over Periods of Outflows in High Yield and Loans with Cumulative Mutual Fund Flows in Excess of 2%

Period	Cumulative ETF Flow	Cumulative Mutual Fund	Ratio of ETF to Mutual Fund Flow
<i>High Yield</i>			
4-wk Period Ending 2/21/2018	-17.7%	-4.4%	4.0x
3-wk Period Ending 12/23/2015	-9.7%	-3.9%	2.5x
4-wk Period Ending 6/23/2013	-9.7%	-6.2%	1.6x
<i>Loans</i>			
3-wk Period Ending 11/8/2017	-1.5%	-2.1%	0.7x
6-wk Period Ending 1/20/2016	-8.9%	-7.1%	1.2x
4-wk Period Ending 12/31/2014	-5.9%	-5.6%	1.1x
5-wk Period Ending 10/29/2014	-6.4%	-5.2%	1.2x

Source: Lipper, Bloomberg

Figure 4 compares distinct periods of retail outflows observed for each asset class, the corresponding ratios over those periods, and total outflows from mutual funds and ETFs for each period observed. The observed ratio of loan ETF to mutual fund flows is slightly above 1.0x in most cases, suggesting that retail investors do, in fact, use ETFs more frequently than they do mutual funds, but only barely – the average ratio is only 1.1x. Assuming that retail behavior is consistent in the high yield and loan markets, we still conclude that institutions are responsible for more than 75% of the ETF share destruction.

Interestingly, the ratio is higher for high yield than it is for loans for all periods considered (Figure 4), although it has increased sharply, suggesting that ETF usage for liquidity management is more likely to have increased over time.

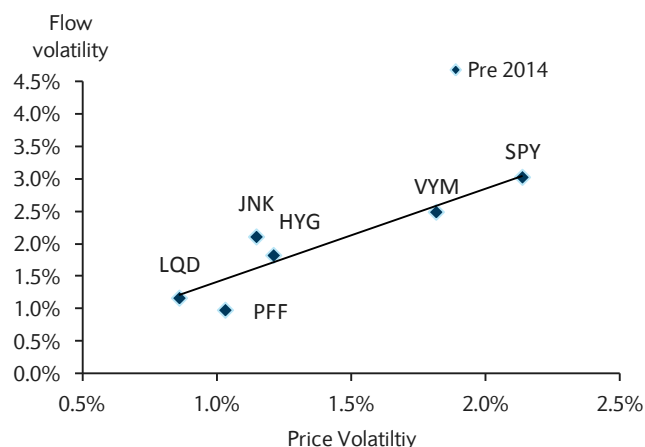
Paradigm Shift in High Yield ETF Activity

In fact, a convincing piece of evidence in favor of our conclusion that mutual funds are increasingly using ETFs to manage liquidity risk has been the stark change in the relationship between high yield ETF activity and price volatility over time. Our prior research (see *Sizing up the Liquidity Window*) has explored the link between volatility and volumes, showing that higher price volatility tends to coincide with higher trading.

Figure 5 compares the volatility in fund flows for select cross-asset ETFs with their price volatility prior to 2014. We selected a broad representation of ETFs spanning several asset classes, including investment grade corporate bonds, preferreds, dividend stocks, and equities. The mix of ETF products is characterized by varying degrees of volatility, ranging from least volatile (IG corporate ETFs) to most volatile (equity ETFs). Commensurate with our expectations, there was a strong relationship between price volatility and ETF fund flow volatility prior to 2014.

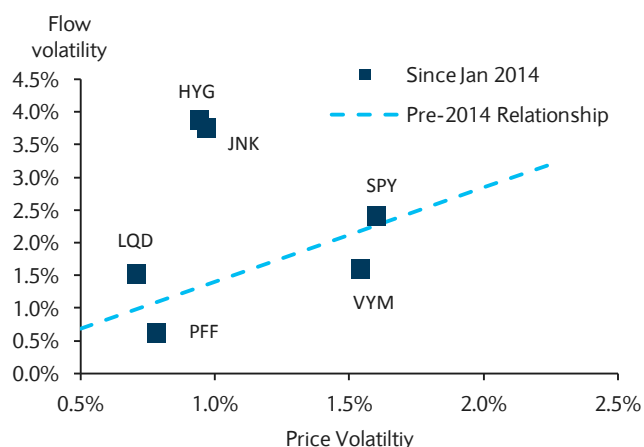
This dynamic has changed drastically for the set of observed high yield ETFs since 2014, following increased investor adoption of these products. Figure 6 examines the same relationship after 2014. The high yield ETFs – JNK and HYG – stand out relative to their cross-asset peers and exhibit fund flow volatility well in excess of levels implied by price volatility. This heightened trading activity gives credence to our view that mutual fund managers have increased their participation in ETFs and in fact, are the largest contributors to retail selling during periods of outflows. Our analysis indicates that institutional participation is lower in other asset classes than in high yield. We believe that high yield ETFs are more likely to be used to manage liquidity because the high yield market is characterized by a combination of relatively low liquidity at the security level and a sizable open-end mutual fund presence. Other less-liquid asset classes, such as bank preferreds, have a larger closed-end fund universe that does not have liquidity needs, as the shares are not redeemed but trade on the secondary market instead. Other asset classes with significant ownership by open-end funds have liquid assets to sell and, thus, do not need to manage fund flows with ETFs. Many investment grade funds, for example, are benchmarked against indices such as the Barclays Bloomberg Aggregate, which includes Treasuries and agencies, and are more liquid than the investment grade ETFs. High yield is unique in this regard, so we see more active management of the risks associated with fund flows.

FIGURE 5
ETF Flow Volatility versus Price Volatility (Pre-2014)



Source: Bloomberg

FIGURE 6
ETF Flow Volatility versus Price Volatility (Since January 2014)



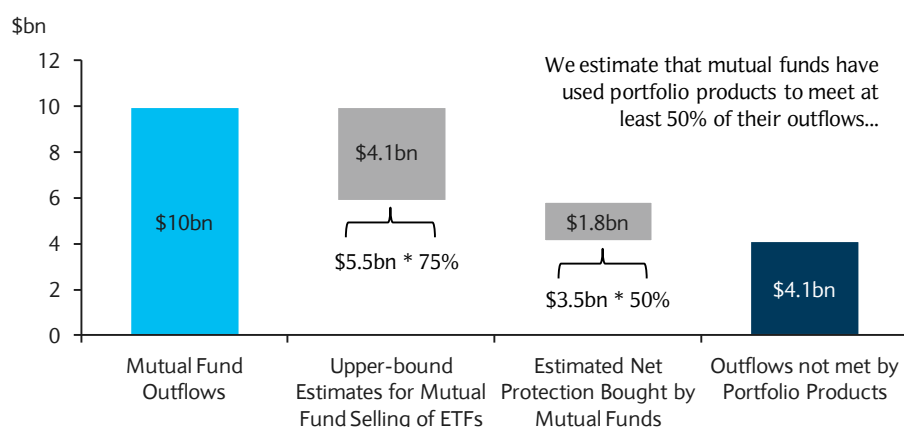
Source: Bloomberg

Putting the Pieces Together

Putting the various pieces together, Figure 7 outlines the steps to estimate the extent to which fund managers have used portfolio products to meet outflows. First, we estimate that institutions were responsible for roughly 75% of the \$5.5bn worth of ETF share destruction. We believe that mutual funds would have made up the vast majority of the institutional selling of ETFs. Given that CDX.HY is used by a wider variety of institutions, we haircut the \$3.5bn of protection buying and ascribe 50% of it to mutual funds. Together, these suggest that more than 60% of the recent mutual fund outflows could have been funded with portfolio products. Even if other types of institutions were responsible for some of the ETF share destruction, we believe plausible estimates would still suggest that more than half of the recent outflows were funded by selling portfolio products.

FIGURE 7

Estimated Use of Portfolio Products by Mutual Funds to Meet Outflows



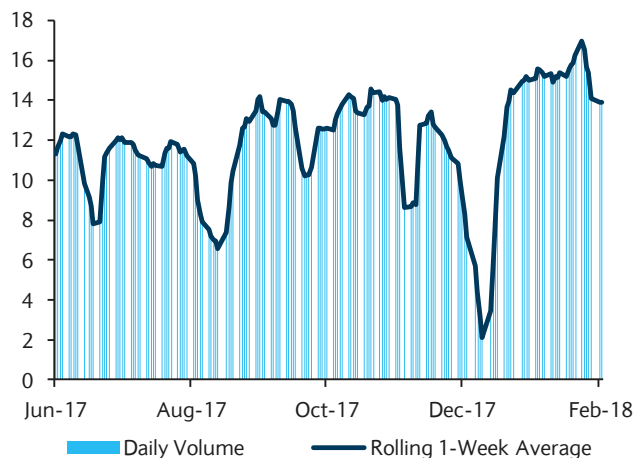
Source: Lipper, Bloomberg, Barclays Research

Estimating Magnitude of Potential Rebalancing

The unprecedented ETF share destruction and dramatic increase in CDX protection net bought raise the question of how managers may respond after sharply reducing their liquidity buffers. We believe that managers will replenish these buffers and, thus, anticipate further near-term rebalancing considering that much of the selling was driven by technical factors as opposed to managers' taking a directional view. Our assumption is that managers will, at the very least, need to repurchase the ETFs sold and increase long CDX exposure against the protection that they bought. In the foreseeable future, they will have to fund this buffer – typically defined as a percentage of AUM – either through inflows or by selling bonds.

Given that combined JNK and HYG shares outstanding have increased by 4%, after reaching a low in the middle of February, while mutual funds have continued to experience outflows, we posit that the recent share creation has been facilitated by selling bonds. This, combined with our estimate of ETF selling by mutual funds from the analysis above, implies that managers will still have to buy back roughly \$2-3bn in ETF assets to fully replenish their buffers. Recent data suggest that managers have been using CDX even more aggressively to address their liquidity needs. After buying \$3.5bn in protection through mid-February, managers have sold roughly \$1.6bn in protection in subsequent weeks, and we estimate that an additional \$1.0bn will need to be sold before institutions meet their liquidity targets. Of course, we cannot definitively attribute the increased balances in portfolio products to the same funds that experienced outflows. But we would expect those funds to rebalance along those lines over time as they re-establish appropriate liquidity buffers.

High Yield Average Institutional Trade Volume (\$bn)



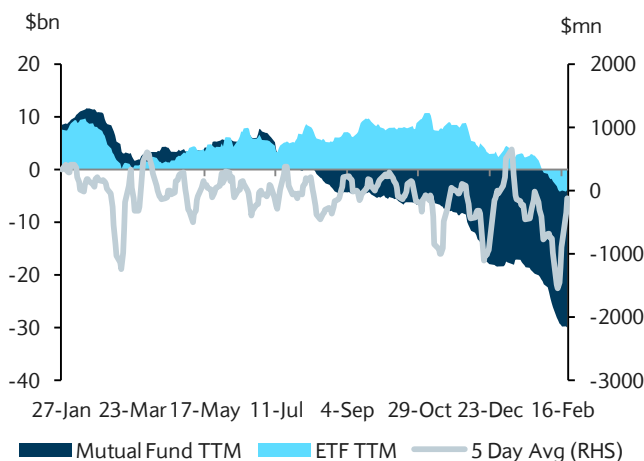
Note: Includes both registered and 144A volumes. Source: FINRA TRACE

On-the-Run HYCDX versus US High Yield Index (bp)



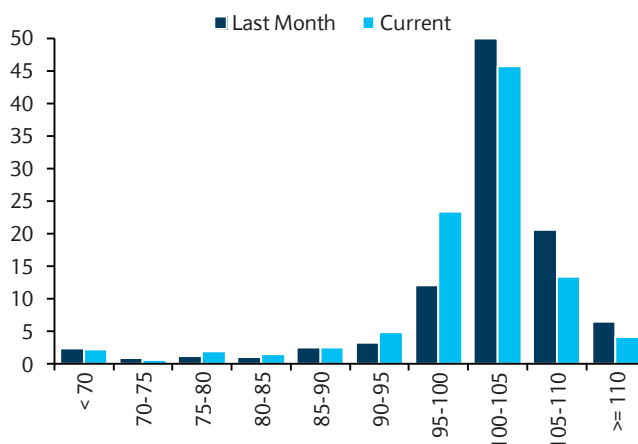
Source: Barclays Research

Flows to High Yield Mutual Funds and ETFs



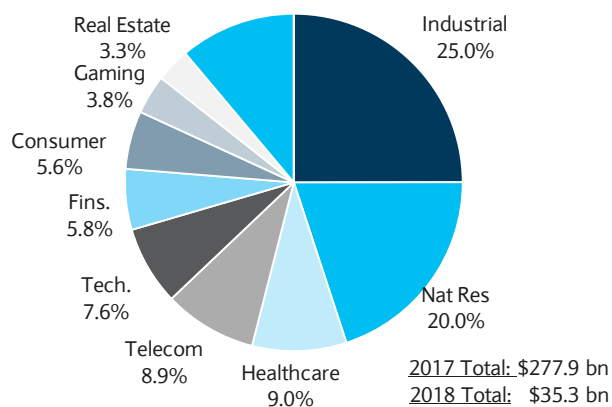
Note: Daily reporters only. Source: EPFR

High Yield Index Price Distribution by Par (%)



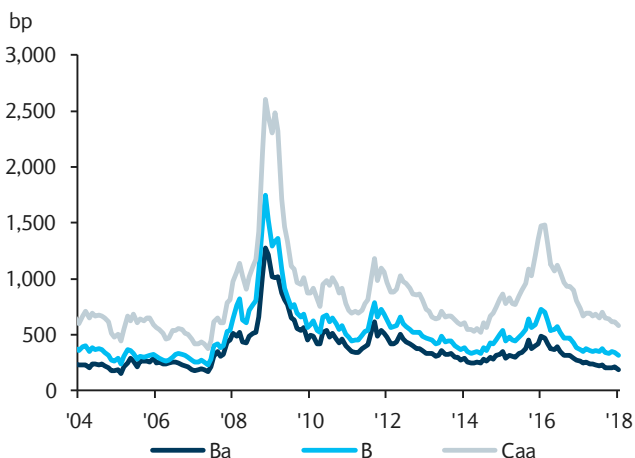
Source: Barclays Research

High Yield Supply by Sector



Source: Barclays Research

High Yield Spreads by Credit Quality



Source: Bloomberg Barclays Indices

Analyst Certification

We, Shobhit Gupta, Arvind Kumar and Jeffrey Meli, hereby certify (1) that the views expressed in this research report accurately reflect our personal views about any or all of the subject securities or issuers referred to in this research report and (2) no part of our compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this research report.

Important Disclosures:

Barclays Research is produced by the Investment Bank of Barclays Bank PLC and its affiliates (collectively and each individually, "Barclays")

All authors contributing to this research report are Research Analysts unless otherwise indicated. The publication date at the top of the report reflects the local time where the report was produced and may differ from the release date provided in GMT.

Availability of Disclosures:

For current important disclosures regarding any issuers which are the subject of this research report please refer to <https://publicresearch.barclays.com> or alternatively send a written request to: Barclays Research Compliance, 745 Seventh Avenue, 13th Floor, New York, NY 10019 or call +1-212-526-1072.

Barclays Capital Inc. and/or one of its affiliates does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that Barclays may have a conflict of interest that could affect the objectivity of this report. Barclays Capital Inc. and/or one of its affiliates regularly trades, generally deals as principal and generally provides liquidity (as market maker or otherwise) in the debt securities that are the subject of this research report (and related derivatives thereof). Barclays trading desks may have either a long and / or short position in such securities, other financial instruments and / or derivatives, which may pose a conflict with the interests of investing customers. Where permitted and subject to appropriate information barrier restrictions, Barclays fixed income research analysts regularly interact with its trading desk personnel regarding current market conditions and prices. Barclays fixed income research analysts receive compensation based on various factors including, but not limited to, the quality of their work, the overall performance of the firm (including the profitability of the Investment Banking Department), the profitability and revenues of the Markets business and the potential interest of the firm's investing clients in research with respect to the asset class covered by the analyst. To the extent that any historical pricing information was obtained from Barclays trading desks, the firm makes no representation that it is accurate or complete. All levels, prices and spreads are historical and do not represent current market levels, prices or spreads, some or all of which may have changed since the publication of this document. Barclays Research Department produces various types of research including, but not limited to, fundamental analysis, equity-linked analysis, quantitative analysis, and trade ideas. Recommendations and trade ideas contained in one type of Barclays Research may differ from those contained in other types of Barclays Research, whether as a result of differing time horizons, methodologies, or otherwise.

The Barclays Research Department operates independently from the Absa Research Department. Absa Research is produced by Absa Bank Limited acting through its Corporate and Investment Bank division, which is a part of Barclays Africa Group Limited and affiliated with the Investment Bank of Barclays Bank PLC. Eligible clients may receive research reports from both research departments, which may reach different conclusions and may contain different and conflicting forecasts, recommendations, or trade ideas. In order to access Barclays Statement regarding Research Dissemination Policies and Procedures, please refer to <https://publicresearch.barclays.com/S/RD.htm>. In order to access Barclays Research Conflict Management Policy Statement, please refer to: <https://publicresearch.barclays.com/S/CM.htm>.

All pricing information is indicative only. Prices are sourced from Thomson Reuters as of the last available closing price at the time of production of the research report, unless another time and source is indicated.

Explanation of other types of investment recommendations produced by Barclays FICC Research:

Trade ideas contained herein that have been produced by the Credit teams within Barclays Research are valid at current market conditions and may not be otherwise relied upon.

Trade ideas contained herein that have been produced by other research teams within Barclays FICC Research shall remain open until they are subsequently amended or closed in a future research report.

Disclosure of previous investment recommendations produced by Barclays FICC Research:

Barclays FICC Research may have published other investment recommendations in respect of the same securities/instruments recommended in this research report during the preceding 12 months. To view previous investment recommendations published by Barclays FICC Research in the preceding 12 months please refer to <https://live.barclays.com/go/research/Recommendations>.

Legal entities involved in producing Barclays Research:

Barclays Bank PLC (Barclays, UK)

Barclays Capital Inc. (BCI, US)

Barclays Securities Japan Limited (BSJL, Japan)

Barclays Bank PLC, Hong Kong branch (Barclays Bank, Hong Kong)

Barclays Capital Canada Inc. (BCCI, Canada)

Barclays Bank Mexico, S.A. (BBMX, Mexico)

Barclays Securities (India) Private Limited (BSIPL, India)

Barclays Bank PLC, India branch (Barclays Bank, India)

Barclays Bank PLC, Singapore branch (Barclays Bank, Singapore)

Disclaimer

This publication has been produced by Barclays Research Department in the Investment Bank of Barclays Bank PLC and/or one or more of its affiliates (collectively and each individually, "Barclays"). It has been distributed by one or more Barclays affiliated legal entities listed below. It is provided to our clients for information purposes only, and Barclays makes no express or implied warranties, and expressly disclaims all warranties of merchantability or fitness for a particular purpose or use with respect to any data included in this publication. To the extent that this publication states on the front page that it is intended for institutional investors and is not subject to all of the independence and disclosure standards applicable to debt research reports prepared for retail

investors under U.S. FINRA Rule 2242, it is an "institutional debt research report" and distribution to retail investors is strictly prohibited. Barclays also distributes such institutional debt research reports to various issuers, regulatory and academic organisations for informational purposes and not for the purpose of making investment decisions regarding any debt securities. Any such recipients that do not want to continue receiving Barclays institutional debt research reports should contact debtresearch@barclays.com. Barclays will not treat unauthorized recipients of this report as its clients and accepts no liability for use by them of the contents which may not be suitable for their personal use. Prices shown are indicative and Barclays is not offering to buy or sell or soliciting offers to buy or sell any financial instrument.

Without limiting any of the foregoing and to the extent permitted by law, in no event shall Barclays, nor any affiliate, nor any of their respective officers, directors, partners, or employees have any liability for (a) any special, punitive, indirect, or consequential damages; or (b) any lost profits, lost revenue, loss of anticipated savings or loss of opportunity or other financial loss, even if notified of the possibility of such damages, arising from any use of this publication or its contents.

Other than disclosures relating to Barclays, the information contained in this publication has been obtained from sources that Barclays Research believes to be reliable, but Barclays does not represent or warrant that it is accurate or complete. Barclays is not responsible for, and makes no warranties whatsoever as to, the information or opinions contained in any written, electronic, audio or video presentations of third parties that are accessible via a direct hyperlink in this publication or via a hyperlink to a third-party web site ('Third-Party Content'). Any such Third-Party Content has not been adopted or endorsed by Barclays, does not represent the views or opinions of Barclays, and is not incorporated by reference into this publication. Third-Party Content is provided for information purposes only and Barclays has not independently verified its accuracy or completeness.

The views in this publication are solely and exclusively those of the authoring analyst(s) and are subject to change, and Barclays Research has no obligation to update its opinions or the information in this publication. Unless otherwise disclosed herein, the analysts who authored this report have not received any compensation from the subject companies in the past 12 months. If this publication contains recommendations, they are general recommendations that were prepared independently of any other interests, including those of Barclays and/or its affiliates, and/or the subject companies. This publication does not contain personal investment recommendations or investment advice or take into account the individual financial circumstances or investment objectives of the clients who receive it. The securities and other investments discussed herein may not be suitable for all investors. Barclays is not a fiduciary to any recipient of this publication. Investors must independently evaluate the merits and risks of the investments discussed herein, consult any independent advisors they believe necessary, and exercise independent judgment with regard to any investment decision. The value of and income from any investment may fluctuate from day to day as a result of changes in relevant economic markets (including changes in market liquidity). The information herein is not intended to predict actual results, which may differ substantially from those reflected. Past performance is not necessarily indicative of future results.

This document is being distributed (1) only by or with the approval of an authorised person (Barclays Bank PLC) or (2) to, and is directed at (a) persons in the United Kingdom having professional experience in matters relating to investments and who fall within the definition of "investment professionals" in Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "Order"); or (b) high net worth companies, unincorporated associations and partnerships and trustees of high value trusts as described in Article 49(2) of the Order; or (c) other persons to whom it may otherwise lawfully be communicated (all such persons being "Relevant Persons"). Any investment or investment activity to which this communication relates is only available to and will only be engaged in with Relevant Persons. Any other persons who receive this communication should not rely on or act upon it. Barclays Bank PLC is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority and is a member of the London Stock Exchange.

The Investment Bank of Barclays Bank PLC undertakes U.S. securities business in the name of its wholly owned subsidiary Barclays Capital Inc., a FINRA and SIPC member. Barclays Capital Inc., a U.S. registered broker/dealer, is distributing this material in the United States and, in connection therewith accepts responsibility for its contents. Any U.S. person wishing to effect a transaction in any security discussed herein should do so only by contacting a representative of Barclays Capital Inc. in the U.S. at 745 Seventh Avenue, New York, New York 10019.

Non-U.S. persons should contact and execute transactions through a Barclays Bank PLC branch or affiliate in their home jurisdiction unless local regulations permit otherwise.

Barclays Bank PLC, Paris Branch (registered in France under Paris RCS number 381 066 281) is regulated by the Autorité des marchés financiers and the Autorité de contrôle prudentiel. Registered office 34/36 Avenue de Friedland 75008 Paris.

This material is distributed in Canada by Barclays Capital Canada Inc., a registered investment dealer, a Dealer Member of IIROC (www.iiroc.ca), and a Member of the Canadian Investor Protection Fund (CIPF).

Subject to the conditions of this publication as set out above, Absa Bank Limited, acting through its Corporate and Investment Bank division, which is a part of Barclays Africa Group Limited and affiliated with the Investment Bank of Barclays Bank PLC, an authorised financial services provider (Registration No.: 1986/004794/06. Registered Credit Provider Reg No NCRCPT7), is distributing this material in South Africa. Absa Bank Limited is regulated by the South African Reserve Bank. This publication is not, nor is it intended to be, advice as defined and/or contemplated in the (South African) Financial Advisory and Intermediary Services Act, 37 of 2002, or any other financial, investment, trading, tax, legal, accounting, retirement, actuarial or other professional advice or service whatsoever. Any South African person or entity wishing to effect a transaction in any security discussed herein should do so only by contacting a representative of Absa Bank Limited acting through its Corporate and Investment Bank division in South Africa, 7th Floor, Barclays Towers West, 15 Troye Street, Johannesburg. Absa Bank Limited is an affiliate of the Barclays group.

All Barclays research reports are distributed to institutional investors in Japan by Barclays Securities Japan Limited. Barclays Securities Japan Limited is a joint-stock company incorporated in Japan with registered office of 6-10-1 Roppongi, Minato-ku, Tokyo 106-6131, Japan. It is a subsidiary of Barclays Bank PLC and a registered financial instruments firm regulated by the Financial Services Agency of Japan. Registered Number: Kanto Zaimukyokuchō (kinsho) No. 143. Barclays Bank PLC, Hong Kong Branch is distributing this material in Hong Kong as an authorised institution regulated by the Hong Kong Monetary Authority. Registered Office: 41/F, Cheung Kong Center, 2 Queen's Road Central, Hong Kong.

All Indian securities-related research and other equity research produced by Barclays' Investment Bank are distributed in India by Barclays Securities (India) Private Limited (BSIPL). BSIPL is a company incorporated under the Companies Act, 1956 having CIN U67120MH2006PTC161063. BSIPL is registered and regulated by the Securities and Exchange Board of India (SEBI) as a Research Analyst: INH000001519; Portfolio Manager INP000002585; Stock Broker/Trading and Clearing Member: National Stock Exchange of India Limited (NSE) Capital Market INB231292732, NSE Futures & Options INF231292732, NSE Currency derivatives INE231450334, Bombay Stock Exchange Limited (BSE) Capital Market INB011292738, BSE Futures & Options INF011292738; Depository Participant (DP) with the National Securities & Depositories Limited (NSDL): DP ID: IN-DP-NSDL-299-2008; Investment Adviser: INA000000391. The registered office of BSIPL is at 208, Ceejay House, Shivsagar Estate, Dr. A. Besant Road, Worli, Mumbai – 400 018, India. Telephone No: +91 2267196000. Fax number: +91 22 67196100. Any other reports produced by Barclays' Investment Bank are distributed in India by Barclays Bank PLC, India Branch, an associate of BSIPL in India that is registered with Reserve Bank of India (RBI) as a Banking Company under the provisions of The Banking Regulation Act,

1949 (Regn No BOM43) and registered with SEBI as Merchant Banker (Regn No INM000002129) and also as Banker to the Issue (Regn No INBI00000950). Barclays Investments and Loans (India) Limited, registered with RBI as Non Banking Financial Company (Regn No RBI CoR-07-00258), and Barclays Wealth Trustees (India) Private Limited, registered with Registrar of Companies (CIN U93000MH2008PTC188438), are associates of BSIPL in India that are not authorised to distribute any reports produced by Barclays' Investment Bank.

Barclays Bank PLC Frankfurt Branch distributes this material in Germany under the supervision of Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin).

This material is distributed in Mexico by Barclays Bank Mexico, S.A.

Nothing herein should be considered investment advice as defined in the Israeli Regulation of Investment Advisory, Investment Marketing and Portfolio Management Law, 1995 ("Advisory Law"). This document is being made to eligible clients (as defined under the Advisory Law) only. Barclays Israeli branch previously held an investment marketing license with the Israel Securities Authority but it cancelled such license on 30/11/2014 as it solely provides its services to eligible clients pursuant to available exemptions under the Advisory Law, therefore a license with the Israel Securities Authority is not required. Accordingly, Barclays does not maintain an insurance coverage pursuant to the Advisory Law.

Barclays Bank PLC in the Dubai International Financial Centre (Registered No. 0060) is regulated by the Dubai Financial Services Authority (DFSA). Principal place of business in the Dubai International Financial Centre: The Gate Village, Building 4, Level 4, PO Box 506504, Dubai, United Arab Emirates. Barclays Bank PLC-DIFC Branch, may only undertake the financial services activities that fall within the scope of its existing DFSA licence. Related financial products or services are only available to Professional Clients, as defined by the Dubai Financial Services Authority.

Barclays Bank PLC in the UAE is regulated by the Central Bank of the UAE and is licensed to conduct business activities as a branch of a commercial bank incorporated outside the UAE in Dubai (Licence No.: 13/1844/2008, Registered Office: Building No. 6, Burj Dubai Business Hub, Sheikh Zayed Road, Dubai City) and Abu Dhabi (Licence No.: 13/952/2008, Registered Office: Al Jazira Towers, Hamdan Street, PO Box 2734, Abu Dhabi).

Barclays Bank PLC in the Qatar Financial Centre (Registered No. 00018) is authorised by the Qatar Financial Centre Regulatory Authority (QFCRA). Barclays Bank PLC-QFC Branch may only undertake the regulated activities that fall within the scope of its existing QFCRA licence. Principal place of business in Qatar: Qatar Financial Centre, Office 1002, 10th Floor, QFC Tower, Diplomatic Area, West Bay, PO Box 15891, Doha, Qatar. Related financial products or services are only available to Business Customers as defined by the Qatar Financial Centre Regulatory Authority.

This material is distributed in the UAE (including the Dubai International Financial Centre) and Qatar by Barclays Bank PLC.

This material is not intended for investors who are not Qualified Investors according to the laws of the Russian Federation as it might contain information about or description of the features of financial instruments not admitted for public offering and/or circulation in the Russian Federation and thus not eligible for non-Qualified Investors. If you are not a Qualified Investor according to the laws of the Russian Federation, please dispose of any copy of this material in your possession.

This material is distributed in Singapore by the Singapore branch of Barclays Bank PLC, a bank licensed in Singapore by the Monetary Authority of Singapore. For matters in connection with this report, recipients in Singapore may contact the Singapore branch of Barclays Bank PLC, whose registered address is 10 Marina Boulevard, #23-01 Marina Bay Financial Centre Tower 2, Singapore 018983.

This material is distributed to persons in Australia by either Barclays Bank plc, Barclays Capital Inc., Barclays Capital Securities Limited or Barclays Capital Asia Limited. None of Barclays Bank plc, nor any of the other referenced Barclays group entities, hold an Australian financial services licence and instead they each rely on an exemption from the requirement to hold such a licence. This material is intended to only be distributed to "wholesale clients" as defined by the Australian Corporations Act 2001.

IRS Circular 230 Prepared Materials Disclaimer: Barclays does not provide tax advice and nothing contained herein should be construed to be tax advice. Please be advised that any discussion of U.S. tax matters contained herein (including any attachments) (i) is not intended or written to be used, and cannot be used, by you for the purpose of avoiding U.S. tax-related penalties; and (ii) was written to support the promotion or marketing of the transactions or other matters addressed herein. Accordingly, you should seek advice based on your particular circumstances from an independent tax advisor.

© Copyright Barclays Bank PLC (2018). All rights reserved. No part of this publication may be reproduced or redistributed in any manner without the prior written permission of Barclays. Barclays Bank PLC is registered in England No. 1026167. Registered office 1 Churchill Place, London, E14 5HP. Additional information regarding this publication will be furnished upon request.

BRCF2242

