08 Feb 2019 06:49:44 ET | 15 pages

High Grade
North America

US High Grade Focus

Hot Topics: Fade-The-Rally Edition

Daniel Sorid AC
+1-212-723-1992
daniel.sorid@citi.com

- **In this latest note in our "Hot Topics" series**, **we survey a multitude of developments in US high-grade credit** to consider if the sharp recovery in risk sentiment has reached a crescendo. We conclude that investors should look through the sanguine signals of falling cross-asset volatility, strong global inflows and light gross supply to position for a widening. We expect US high-grade credit spreads to rise 30 bps by year end, with some risk of overshooting to the wider side.
- **We show evidence that ratings were a less helpful predictor of spread "jump" risk** than in a prior episode of market widening. The breakdown between ratings and reality adds further evidence to support a recalibration of credit ratings that now sit in the single-A to high-BBB range. We show signs that ratings need not fall as low as HY for an issuers' bonds to lose out to international buying programs.
- **US high-grade investors may be underestimating the potential exposure** of bond issuers to a more severe outcome in US-China trade negotiations. Across a range of sectors, from autos, banking, chemicals, electrical equipment, machinery and logistics, dozens of US IG companies in 2019 have recently noted their close attention to trade talks. More than 40% of the investor calls from US IG companies this year make reference to the Chinese market in some capacity.
- **A drawdown on cash from US high-grade balance sheets** appears to be expanding net debt leverage at a time of rising concerns that earnings growth may be peaking. Rating agencies remain permissive of deleveraging plans that extend out years, at a moment of global reflection on the sustainability of the economic (and profit) expansion.
- **A lighter-than-expected primary calendar** supported the rally, but we offer four reasons that supply trends aren't as beneficial as they may seem at first.
- **We broaden the global demand variables in a fair-value model for IG credit spreads** to explicitly model for hedging costs as well as including both European and Japanese rate variables. We find that credit spreads do not look unreasonably cheap in the model, but the view is heavily dependent on a continuation of low cross-asset volatility.
- **We offer new visuals** to highlight relative value opportunities between subsectors after a sharp market move tighter.

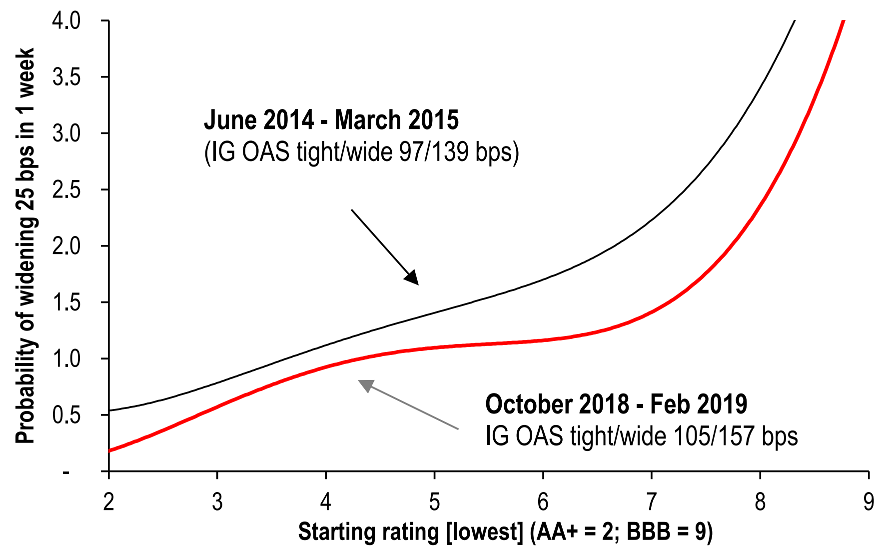
Credit recovers but not without stirring further doubts about ratings

Strange twists in this turn… – High-grade credit recovered most of the losses sustained during a fourth-quarter rout in a January marked by lighter-than-expected gross supply, realized expectations for a dovish tilt by the Federal Reserve, an earnings season notable for rising EBITDA, strong revenue growth and slowing total debt growth – all topped off with one of the biggest months for non-US investor demand for US IG that we've seen in years. We are skeptical sentiment can improve much from here, and address several factors that we believe point to an underlying instability within credit markets that should keep risk premia elevated over the course of 2019. To begin with, we continue to see evidence that credit ratings are misaligned with reality and prefer to position for a recalibration of ratings, especially in the single-A complex, in the months ahead. As the market bounced off mid-2014 tights, credit ratings proved useful in benchmarking risk of sharp jumps in spread. As Figure 2 shows, from June 2014 to March 2015 the probability of a non-financial bond jumping 25 bps in one week rose steadily as ratings moved lower. (We use lowest of two ratings in our study.) Yet since October 2018, this 'jump' curve flattens out between A1 (4) and BBB1 (7), indicating that starting ratings in this range did not provide an accurate guide to idiosyncratic risk events. This evidence builds on our earlier argument that the behavior of rating agencies as they resolve differences between themselves points to a more downside risk for single-A sectors that have received forbearance from rating agencies in an environment of steady EBITDA growth and easy market access. We think a reassessment of macroeconomic growth risks and/or profit shocks will be a catalyst for this ratings recalibration and that single-A and BBB+ credits will be at risk. Also, rising default rates are highly correlated with rising downgrade rates, and we recently raised our default rate forecast by two percentage points to 4.6%. Trade negotiations appear to us as an underappreciated risk factor. Further deterioration in the tenor of those talks poses risks to complex global supply chains and end-customer demand. Trade is a topic raised by fewer than one-quarter of US IG companies whose earnings calls we reviewed this year, yet interlinkages with China are apparent in more than 40 percent of quarterly investor updates.

Figure 1. IG credit spreads wobbled similarly before peaking above 200 bps in 2015-16

Source: Citi Research; Bloomberg Financial LP

Figure 2. Ratings have been a less helpful predictor of spread jumps than in prior episodes



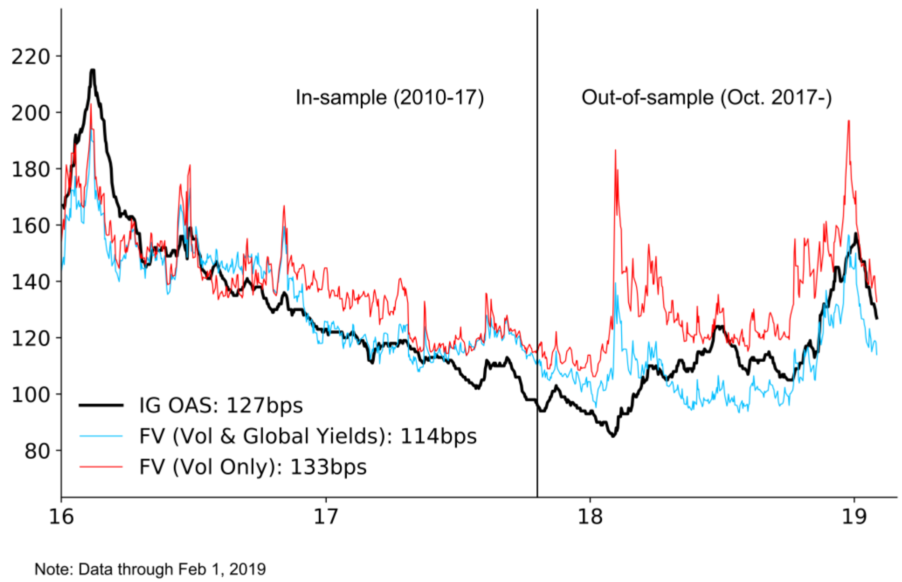
Source: Citi Research; Bloomberg Financial LP; Note: non-financial bonds, starting minimum maturity >3 years

Credit spreads hover within fair-value range on two regression models

Credit rode roundtrip on the vol train… – A 34 bp OAS tightening since Jan. 3 fits US IG's historical sensitivities to both implied cross-asset volatility levels and US fixed income's relative yield advantage to global bond markets (Figure 3). IG credit fair value under a passive "vol-absorbing" model sits +6 to current levels. Alternatively, incorporating the continued edge of US yields to euro and yen fixed income markets, spreads look 13 bps cheap. In other words, confined to judging credit valuations by these five variables, IG cannot be said to be unreasonably rich at present. That said, for as well as this formulation of credit as a mere *recipient* of global market factors fits surprisingly well within credit cycles, the paradigm is upended *across* cycles as credit markets metastasize into beacons of volatility across markets and the economy. A cascade of failed deleveraging, rising defaults, and outflows may feel distant, yet recent developments in loan outflows, speculative-grade issuance and tightening lending standards support a higher risk premium and encourage us to buy IG vol. Investors should look through the year's early sanguine signals (Figure 4) to position for a deterioration. A broader narrative of vulnerability may be at bay, but widening catalysts may emerge from underappreciated risks of a failure in trade negotiations with China or a mean-reverting bounce-back in corporate bond supply.

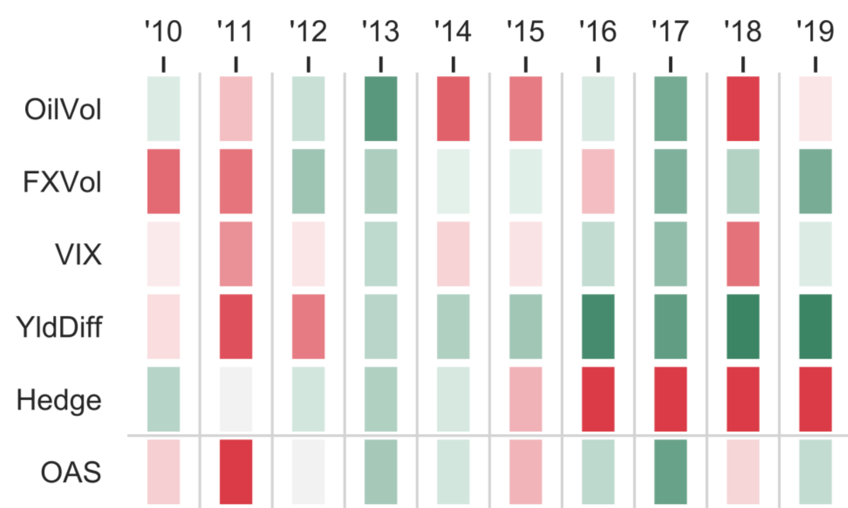
Effect on IG OAS from a 1σ rise in...	Model Variant: *Basic*	Model Variant: *Enhanced*
...Oil Vol	+4.1	+6.9
...FX Vol	+10.4	+9.8
...VIX *(σ = 6 pts)*	+15.1	+7.0
...JGB/Bund - UST Yield *(σ = 64 bps)*		+18.4
...€/¥ hedging costs *(σ = 95 bps)*		+5.7

Figure 3. Tight IG OAS supported by low x-asset implied volatility, rising US yield advantage



Source: Citi Research; Bloomberg Financial LP
Note: IG index level spreads compared to fair value under two regression models trained on 2010-Oct.2017 levels

Figure 4. A heat map of tightening and widening factors for US IG credit spreads, by year



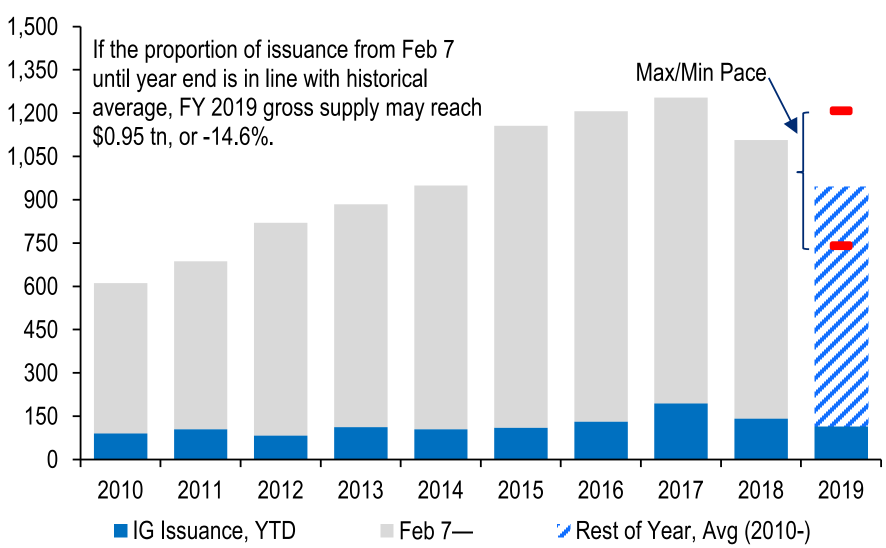
Source: Citi Research; Bloomberg Financial LP
Note: Colors represent z-scores (+2 [red] /-2 [green]) from 2010-, at each year-end; 2019 column as of Feb. 4

More than meets the eye from bond supply

Lighter but longer issuance, and the year is still young… – January's strength stems at least in part from perceived signals about 2019 issuance from a 19% decline in the year-over-year rate of corporate debt supply. Yet we take only modest comfort from this early signal from the supply side of the market, for three reasons. First, there is ample historical precedent for issuance surging after early February. In 2012, 2014, and 2015, IG-rated companies issued between 8x and 9.5x more debt after Feb 6 than before, implying a reasonable upper bound for IG issuance in 2019 remains $1.05 tn to $1.2 tn (Figure 5). That said, using the average pace of issuance from Feb 7 onward over the past eight years, issuance for the year may reach $950 bn, or down 14.6%. Second, the supply hitting the market is substantially longer in maturity than in recent years (11.3 years in 2019, up from 10.7 years in 2018 and 10.5 years in 2017), absorbing more of the market's appetite for spread duration. The pace of issuance of debt in 10-year equivalents is trending 2.6% lower, based on the average rate of issuance since 2010 before and after Feb 6 (Figure 6). Third, if maturity extension trades catch on, they could add another key source of gross issuance to debt-funded buybacks and acquisitions, and free up leverage-constrained companies to access the primary market. One such trade in January, which was paired with a debt tender, added $15.5 bn to January's total at an issuer than had been downgrade by credit rating agencies only a month earlier. Fourth, late-cycle years such as 2001 and 2007 have seen extremely high supply as issuers showed a canny sense of timing before the lights went out.

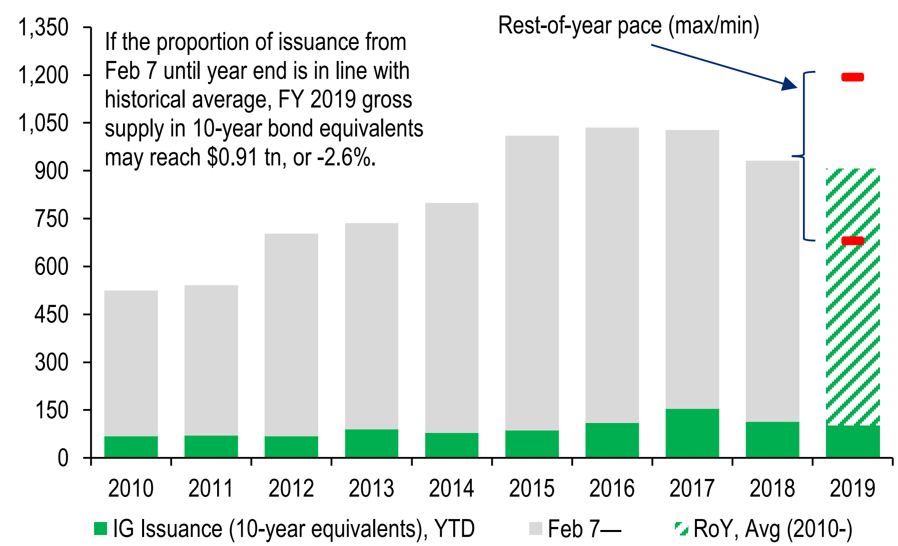
We continue to expect another trillion-dollar year from the US IG corporate market, with net supply of $400 bn, down 17% year-over-year, and gross issuance down 5%. As we noted in our 2019 supply outlook, even a lighter year for supply won't necessary feel that way. For example, we expect fixed-rate bond supply could be up 4%, with floating rate supply dropping off as investor demand declines with the Fed pares back the pace of hikes. We think 5% is a realistic lower bound on the YoY change, as it would place issuance as a percentage of market size at the lowest level since 2004.

Figure 5. Trend rate of gross US IG corporate issuance relative to prior years' pace



Source: Citi Research; Dealogic

Figure 6. Trend rate of gross US IG issuance in 10-year equivalents relative to prior years' pace

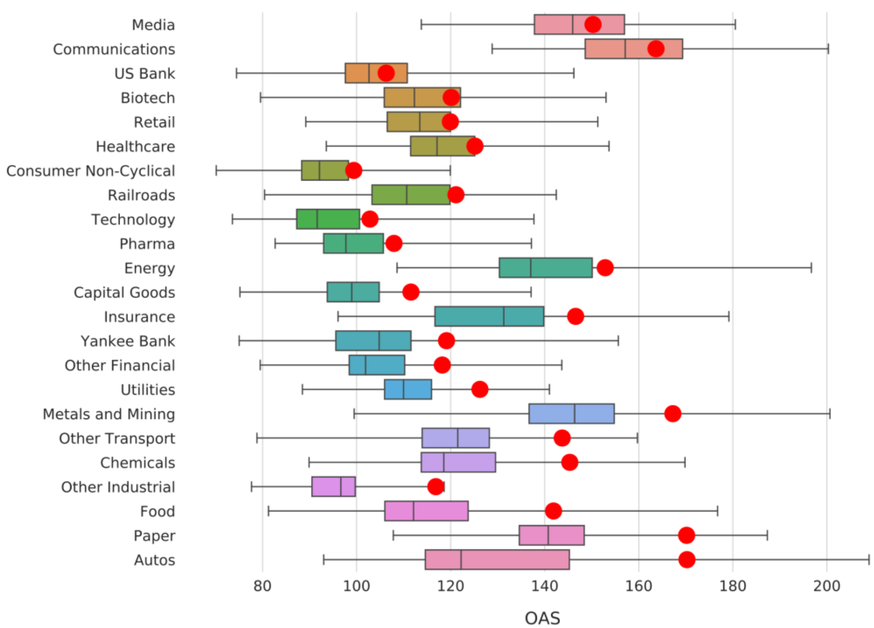


Source: Citi Research; Bloomberg Financial LP; Dealogic

An unequal recovery in spreads indicates lingering market anxiety over issuers

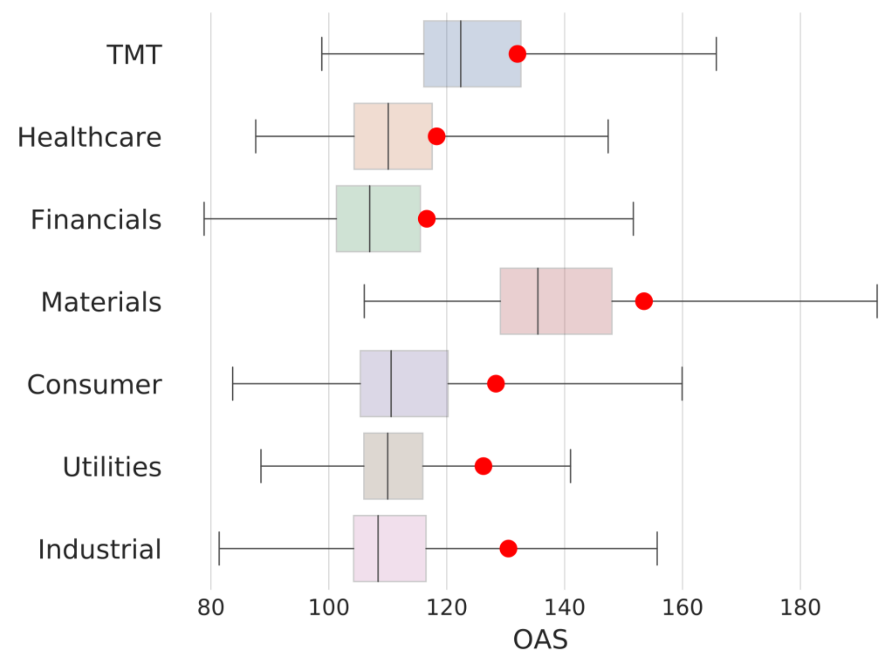
Few sectors back in the 'paint'… – To capture the credit rally with a picture, we place current subsector spreads in the context of their 2018- range in Figure 7 below. Red dots show the last level by subsector, while box plots indicate the full range of spreads covering the period of January 2018 to present. The colored rectangles represent the interquartile range, the 25th to 75th percentile range for each sector, with the vertical line in the middle indicating the median spread. Media and telecom remain consensus overweight positions for their relatively high spreads and stories perceived as complex but well understood, and the chart shows they are priced for it as the two subsectors trading closest to their 2018 tights. For a useful relative value guide for a reversal in market sentiment, consider that media, telecom, US bank, biotech and retail could be poised to underperform. Conversely, a risk-on return may spread to sectors such as food, paper, autos, chemicals and mining. (We have removed GE and California utilities when calculating these spreads, to avoid distorting the overall sector spread).

Figure 7. Current subsector spreads shown across both full and interquartile range, 2018-



Source: Citi Research, Bloomberg Financial LP; FTSE Financial Indexes; Note: Excludes California utilities and GE
Note: Boxplots indicate low/25th/median/75th/wides since 1/1/2018; red dot indicates 2/6/19 level

Figure 8. Parent sector spreads shown across full (wings) and interquartile range (box), 2018-

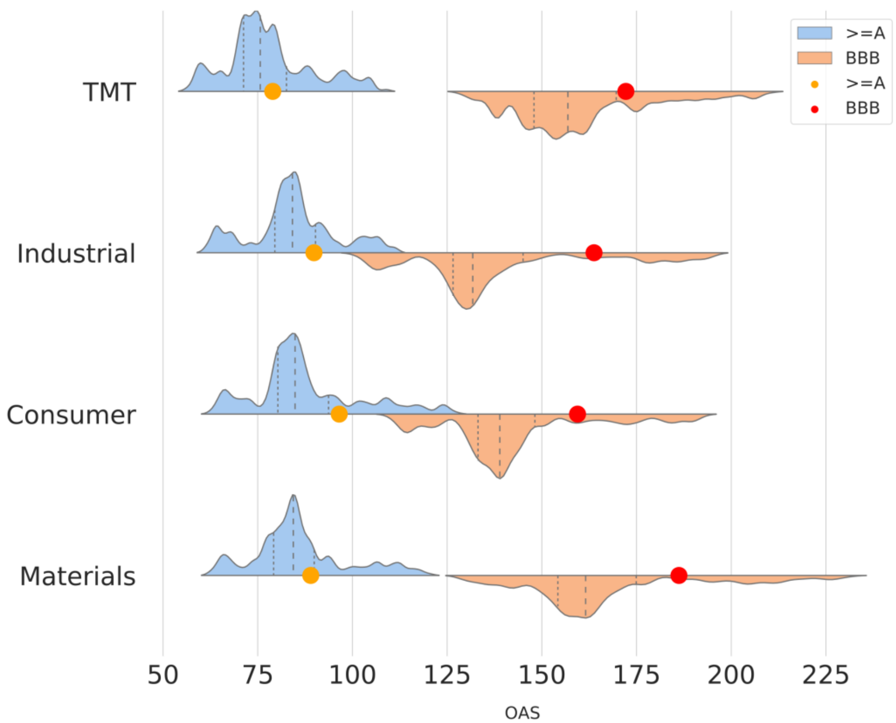


Source: Citi Research; Note: Excludes California utilities and GE
Note: Boxplots indicate low/25th/median/75th/wides since 1/1/2018; red dot indicates 2/6/19 level

A more limited risk rally for some BBBs tempts with low-hanging fruit

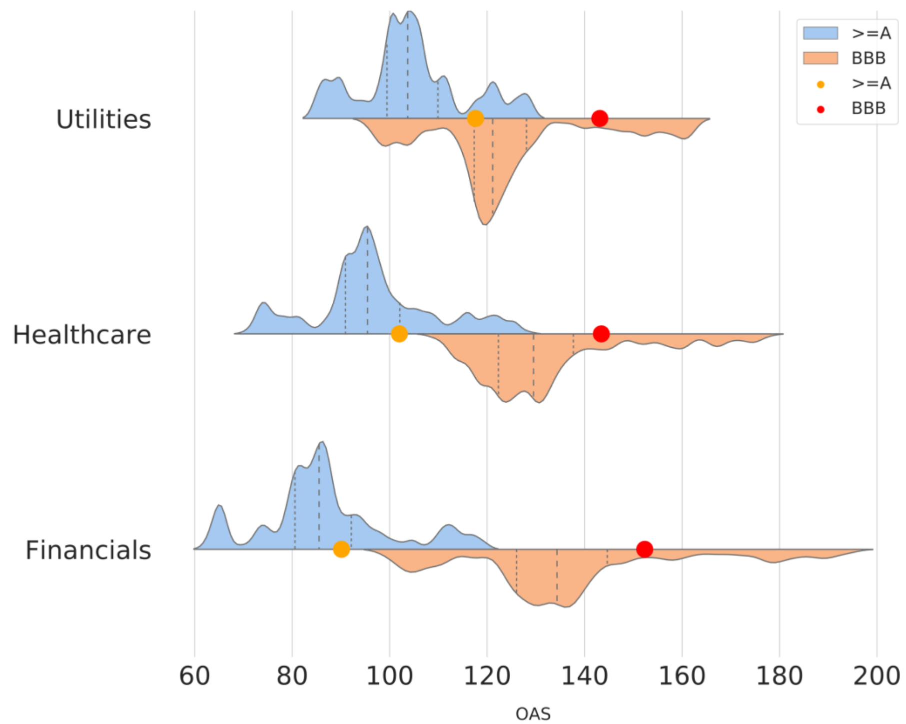
Ride the wider right tail – Investors clung to quality during the rally, leaving spreads within the BBB portions of many sectors well above the one-year average. In Figure 9 and Figure 10, we look at the latest subsector spreads (shown with a dot) and place them in the context of the frequency distribution (histogram) of spreads covering the period of Jan. 1, 2018 to Feb 6, 2019, which includes the recent tights (85 bps) and wides (157 bps) for the IG index. In each of the seven major sector groupings, the weighted average BBB spread sits well beyond one standard deviation above the mean, while in all major sectors but utilities and consumer, the single-A spreads are less than one sigma wide to the mean. While BBB credits can be expected to underperform single-A credits in a credit spread widening in aggregate, we believe that there are more hidden risks in the single-A complex, and the compensation for that risk is too low. We continue to like buying BBB risk toward the right tail of the distributions shown here during further waves of risk aversion. (As in previous charts, we have calculated weighted average spreads by sector excluding California utilities and GE paper to reduce credit-specific distortions.)

Figure 9. Frequency distribution of OAS, Jan 2018 – Feb 2019, major sector and rating



Source: Citi Research, Bloomberg Financial LP; FTSE Financial Indexes
Note: Excludes California utilities and GE

Figure 10. Frequency distribution of OAS, Jan 2018 – Feb 2019, major sector and rating

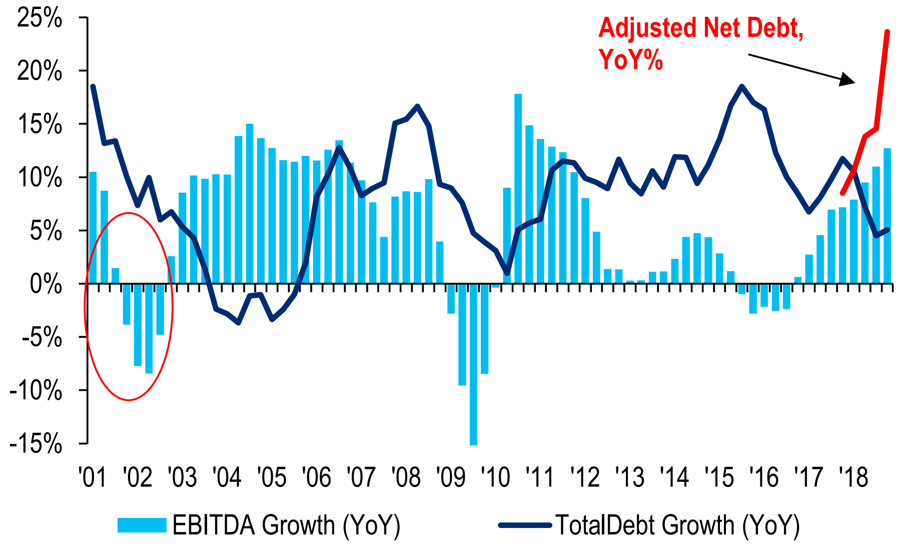


Source: Citi Research, Bloomberg Financial LP; FTSE Financial Indexes
Note: Excludes California utilities and GE

Follow the fundamentals, but also follow the cash

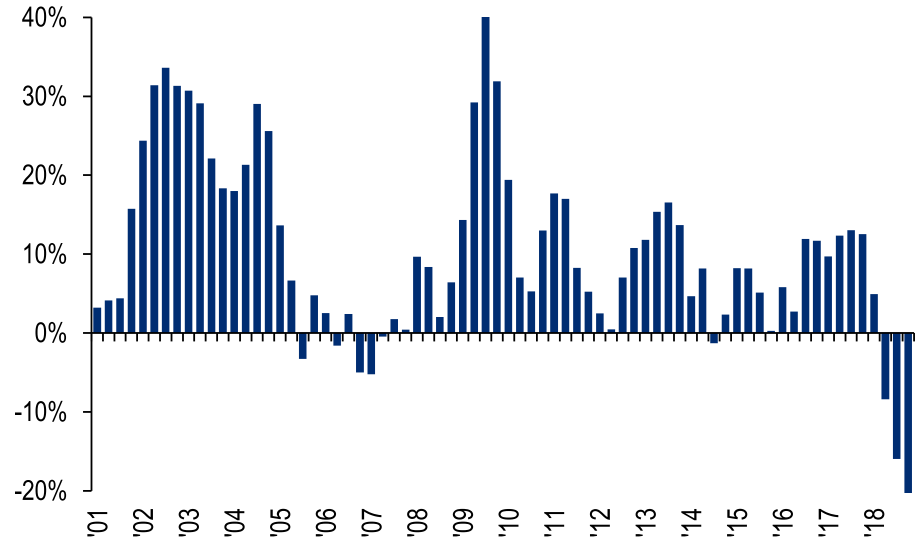
All the right signs, bar one… – U.S. IG companies can't seem to hold onto cash and marketable securities, the liquid assets that once supported lower net debt levels. So far in the fourth-quarter earnings season, non-fianncial US companies have posted greater than 10 percent year-over-year growth in 12m trailing EBITDA, while total debt levels have declined toward 5% on a year-over-year basis. Yet sharp declines in holdings of cash and similar liquid instruments has pushed net debt up sharply. Looking at the most recently reported quarter within our sample of slightly more than 300 IG companies, cash and marketable securities have declined $259 bn, down 16% year-over-year, with double-digit percentage declines in almost all sectors. (In dollar terms, most of the decline stems from technology, capital goods, pharmaceutical, food and communications companies, and we belive the trend was driven by tax law changes that made offshore cash accessible to companies, which proceeded to deploy those funds to shareholders.) The drop-off in cash is an important consideration to contrast with bullish commentary about lighter than expected gross supply, as from a bondholders' perspective the two factors may be equal and offsetting. Our preferred measure of net debt leverage, in which we floor the level of net debt at zero for any issuer in our aggregate calculations, has remained at 1.4x for more than a year, and preliminary indications suggest that net debt leverage will actually rise in the fourth quarter of 2018.

Figure 11. Growth rates of EBITDA, total debt and net debt at US IG non-financial issuers



Source: Citi Research, Bloomberg Financial LP
Note: Adjusted net debt is the percent change in aggregate net debt of companies with more cash than debt.

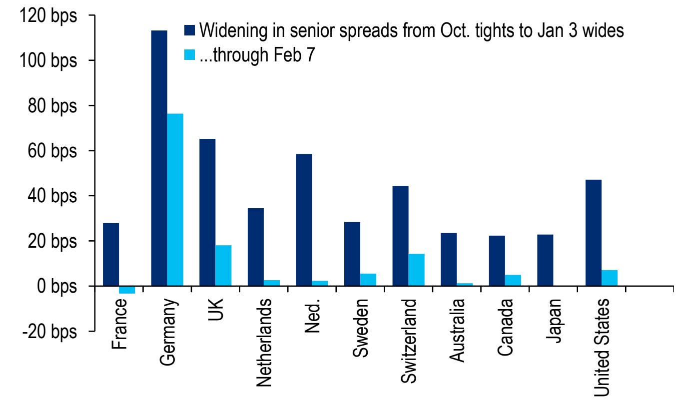
Figure 12. Cash and marketable securities, YoY%, US IG non-financial issuers



Source: Citi Research, Bloomberg Financial LP

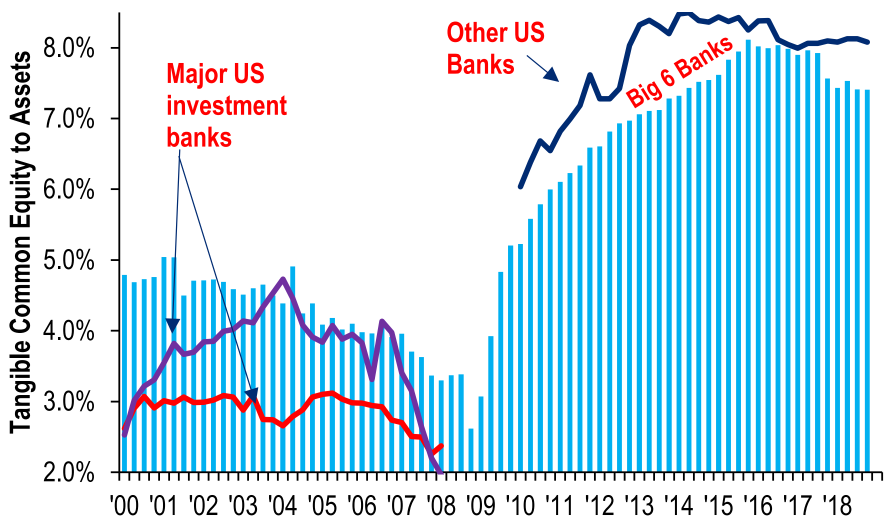
US bank fundamentals remain strong and but watch for slow deterioration

Bank issuer fundamentals remain sound… – US banks sit on sizable capital buffers to absorb macroeconomic shocks, although those buffers may be somewhat smaller than they once were. The trend in both bank capital relative to assets (Figure 13) and non-performing loans is consistent at both the biggest US banks and regionals. For context, however, we show pre-crisis trends and note the rapid turn in both variables that can emerge in the matter of 12 months. US bank senior debt trades 7 bps back of October tights, and Yankee bank paper from Australia, Canada, Japan, and the Netherlands have also clawed back most of their losses. The only exceptions are Germany and the UK, where senior Yankee bank spreads remain 20-80 bps back of October levels. We believe US bank senior bonds remain an appropriate lower-beta position provided capital buffers do not continue to erode.



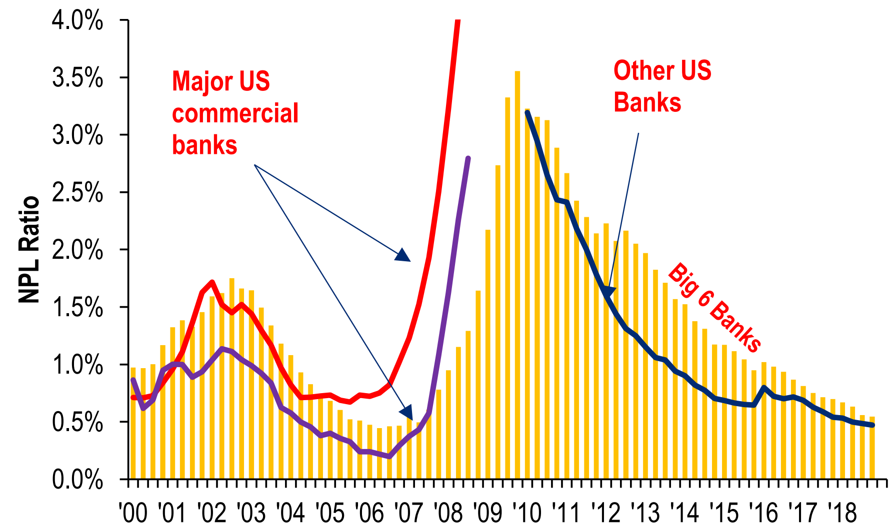
Source: Citi Research; Bloomberg Financial LP

Figure 13. US bank capital (tangible common equity) to tangible assets



Source: Citi Research, Bloomberg Financial LP

Figure 14. US bank non-performing loan ratios

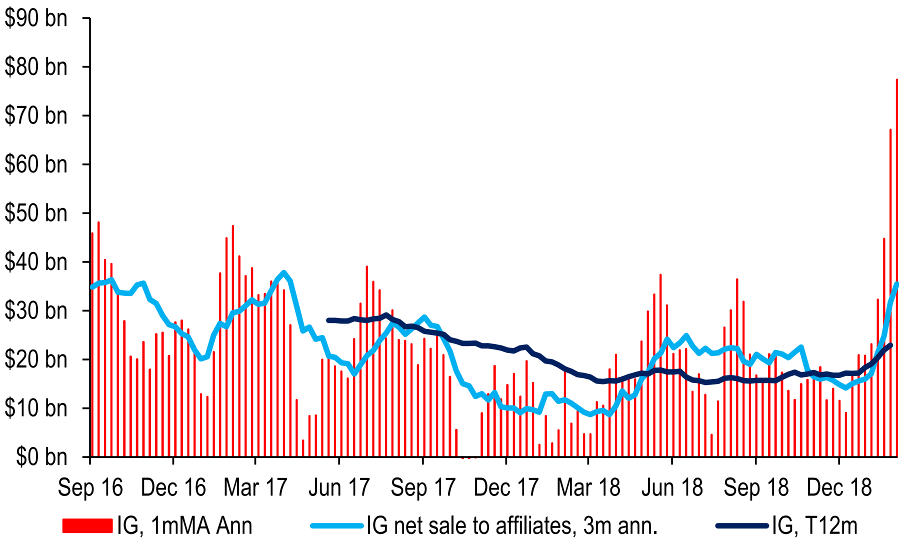


Source: Citi Research, Bloomberg Financial LP

A strong start to the year for global inflows

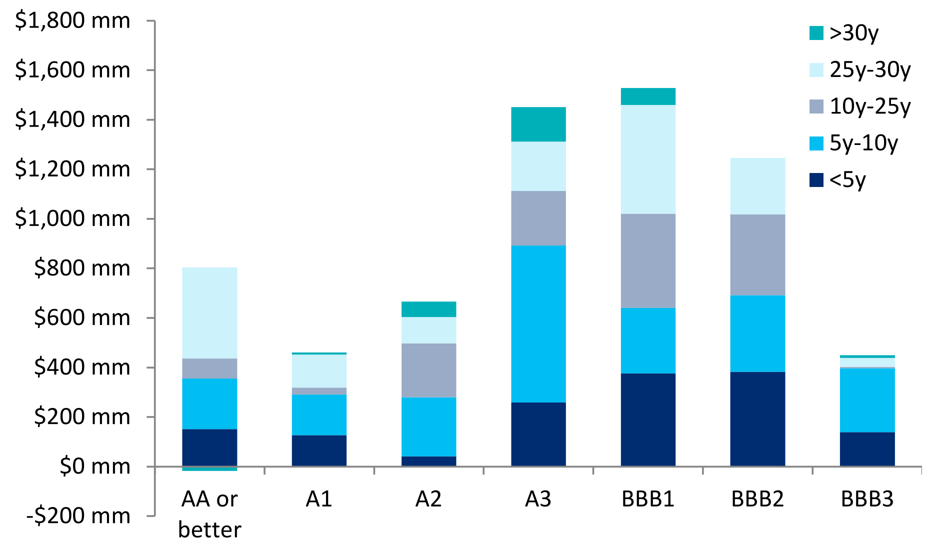
Global demand rebounded in January as measured by one key proxy, but we are skeptical that international flows will be sustained at these levels, particularly if our thesis for a ratings recalibration among over-leveraged single-A to high-BBB companies is realized. Dealer sales to affiliates, a proxy for direct selling to customers overseas, jumped to an annualized rate of $80 billion in late January, although we expect this rate to decline somewhat over February holidays. Buying from dealer affiliates developed across the curve, though it was most heavily focused in A3, BBB1 and BBB2-rated credits. Sustained demand for these mid-tier rated bonds from outside the United States opens a window, for now, to offload credits whose risk profiles have drifted lower than their ratings imply. Least popular in these flows are BBB3 rated bonds, toward which non-US investors have long shown a notable aversion. While market attention remains focused on "fallen angel" risk in BB territory, we view downgrades into BBB3 ratings as the more salient risk as even these lesser downgrades may be sufficient to interrupt the global reach for yield. Note that hedging costs, while somewhat less painful in an environment of slower fed funds rate hikes, do not play a very powerful role in our regression model for fair value. One reason why, we believe, is that investors may tend to offset higher hedged costs by accepting greater credit risk. Another factor may be that these costs may drive investors to take greater open FX risk, either because they believe the USD is unlikely to weaken further, or because they have natural hedges through FX policies.

Figure 15. Annualized rate of net buying by dealer affiliates of DM IG index-eligible bonds



Source: Citi Research; Refinitiv

Figure 16. Distribution of dealer affiliate net buying by rating and maturity bucket, Jan 2019 -

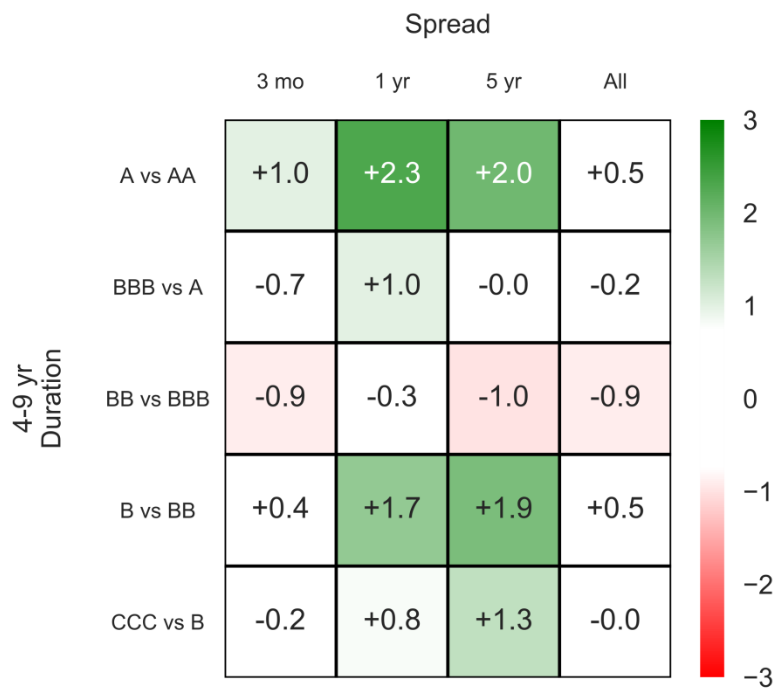


Source: Citi Research; Refinitiv; Bloomberg Financial

Spread curves across qualities

BBB-rated bonds in the intermediate duration space are 1 standard deviation wider than their one year average, according to our heatmaps of duration-matched quality curves.

Figure 17. Z-scores of credit quality pairs within 4-9 year duration segments

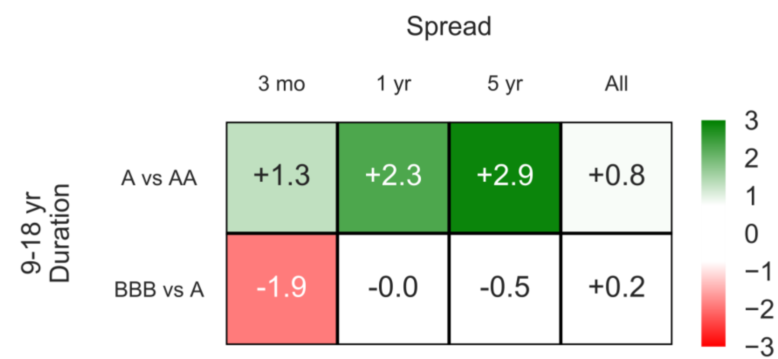


Source: Citi Research

Note: Data through Feb 06, 2019; Negative numbers indicate lower quality bonds are trading tighter than average relative to higher quality bonds within the same duration bucket. IG buckets are non-financial; HY buckets are broad USD DM

Source: Citi Research; Refinitiv

Figure 18. Z-scores of credit quality pairs within 9-18 year duration segments



Source: Citi Research

Note: Data through Feb 06, 2019; Negative numbers indicate lower quality bonds are trading tighter than average relative to higher quality bonds within the same duration bucket. IG buckets are non-financial; HY buckets are broad USD DM

Source: Citi Research; Thomson Reuters

Appendix A-1

Analyst Certification

The research analysts primarily responsible for the preparation and content of this research report are either (i) designated by "AC" in the author block or (ii) listed in bold alongside content which is attributable to that analyst. If multiple AC analysts are designated in the author block, each analyst is certifying with respect to the entire research report other than (a) content attributable to another AC certifying analyst listed in bold alongside the content and (b) views expressed solely with respect to a specific issuer which are attributable to another AC certifying analyst identified in the price charts or rating history tables for that issuer shown below. Each of these analysts certify, with respect to the sections of the report for which they are responsible: (1) that the views expressed therein accurately reflect their personal views about each issuer and security referenced and were prepared in an independent manner, including with respect to Citigroup Global Markets Inc. and its affiliates; and (2) no part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed by that research analyst in this report.

IMPORTANT DISCLOSURES

Disclosure for investors in the Republic of Turkey: Under Capital Markets Law of Turkey (Law No: 6362), the investment information, comments and recommendations stated here, are not within the scope of investment advisory activity. Investment advisory service is provided in accordance with a contract of engagement on investment advisory concluded between brokerage houses, portfolio management companies, non-deposit banks and clients. Comments and recommendations stated here rely on the individual opinions of the ones providing these comments and recommendations. These opinions may not fit to your financial status, risk and return preferences. For this reason, to make an investment decision by relying solely to this information stated here may not bring about outcomes that fit your expectations. Furthermore, Citi Research is a division of Citigroup Global Markets Inc. (the "Firm"), which does and seeks to do business with companies and/or trades on securities covered in this research reports. As a result, investors should be aware that the Firm may have a conflict of interest that could affect the objectivity of this report, however investors should also note that the Firm has in place organisational and administrative arrangements to manage potential conflicts of interest of this nature.

Analysts' compensation is determined by Citi Research management and Citigroup's senior management and is based upon activities and services intended to benefit the investor clients of Citigroup Global Markets Inc. and its affiliates (the "Firm"). Compensation is not linked to specific transactions or recommendations. Like all Firm employees, analysts receive compensation that is impacted by overall Firm profitability which includes investment banking, sales and trading, and principal trading revenues. One factor in equity research analyst compensation is arranging corporate access events between institutional clients and the management teams of covered companies. Typically, company management is more likely to participate when the analyst has a positive view of the company.

For securities recommended in the Product in which the Firm is not a market maker, the Firm is a liquidity provider in the issuers' financial instruments and may act as principal in connection with such transactions. The Firm is a regular issuer of traded financial instruments linked to securities that may have been recommended in the Product. The Firm regularly trades in the securities of the issuer(s) discussed in the Product. The Firm may engage in securities transactions in a manner inconsistent with the Product and, with respect to securities covered by the Product, will buy or sell from customers on a principal basis.

Unless stated otherwise neither the Research Analyst nor any member of their team has viewed the material operations of the Companies for which an investment view has been provided within the past 12 months.

For important disclosures (including copies of historical disclosures) regarding the companies that are the subject of this Citi Research product ("the Product"), please contact Citi Research, 388 Greenwich Street, 30th Floor, New York, NY, 10013, Attention: Legal/Compliance [E6WYB6412478]. In addition, the same important disclosures, with the exception of the Valuation and Risk assessments and historical disclosures, are contained on the Firm's disclosure website at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures. Valuation and Risk assessments can be found in the text of the most recent research note/report regarding the subject company. Pursuant to the Market Abuse Regulation a history of all Citi Research recommendations published during the preceding 12-month period can be accessed via Citi Velocity (https://www.citivelocity.com/cv2) or your standard distribution portal. Historical disclosures (for up to the past three years) will be provided upon request.

NON-US RESEARCH ANALYST DISCLOSURES

Non-US research analysts who have prepared this report (i.e., all research analysts listed below other than those identified as employed by Citigroup Global Markets Inc.) are not registered/qualified as research analysts with FINRA. Such research analysts may not be associated persons of the member organization and therefore may not be subject to the FINRA Rule 2241 restrictions on communications with a subject company, public appearances and trading securities held by a research analyst account. The legal entities employing the authors of this report are listed below:

Citigroup Global Markets Inc	Daniel Sorid

OTHER DISCLOSURES

Any price(s) of instruments mentioned in recommendations are as of the prior day's market close on the primary market for the instrument, unless otherwise stated.

The completion and first dissemination of any recommendations made within this research report are as of the Eastern date-time displayed at the top of the Product. If the Product references views of other analysts then please refer to the price chart or rating history table for the date/time of completion and first dissemination with respect to that view.

European regulations require that where a recommendation differs from any of the author's previous recommendations concerning the same financial instrument or issuer that has been published during the preceding 12-month period that the change(s) and the date of that previous recommendation are indicated. Please refer to the trade history in the published research or contact the research analyst.

European regulations require that a firm must establish, implement and make available a policy for managing conflicts of interest arising as a result of publication or distribution of investment research. The policy applicable to Citi Research's Products can be found at https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures.

The proportion of all Citi Research research recommendations that were the equivalent to "Buy","Hold","Sell" at the end of each quarter over the prior 12 months (with the % of these that had received investment firm services from Citi in the prior 12 months shown in brackets) is as follows: Q4 2018 Buy 33% (69%), Hold 43% (62%), Sell 23% (59%), RV 0.6% (100%); Q3 2018 Buy 33% (69%), Hold 43% (64%), Sell 23% (58%), RV 0.6% (99%); Q2 2018 Buy 33% (70%), Hold 43% (64%), Sell 23% (57%), RV 0.6% (89%); Q1 2018 Buy 32% (71%), Hold 44% (63%), Sell 24% (56%), RV 0.4% (98%). For the purposes of disclosing recommendations other than for equity or high yield recommendations (whose definitions can be found in their corresponding disclosure sections), "Buy" means a positive directional trade idea; "Sell" means a negative directional trade idea; and "Relative Value" means any trade idea which does not have a clear direction to the investment strategy.

European regulations require a 5 year price history when past performance of a security is referenced. CitiVelocity's Charting Tool (https://www.citivelocity.com/cv2/#go/CHARTING_3_Equities) provides the facility to create customisable price charts including a five year option. This tool can be found in the Data & Analytics section under any of the asset class menus in CitiVelocity (https://www.citivelocity.com/). For further information contact CitiVelocity support (https://www.citivelocity.com/cv2/go/CLIENT_SUPPORT). The source for all referenced prices, unless otherwise stated, is DataCentral, which sources price information from Thomson Reuters. Past performance is not a guarantee or reliable indicator of future results. Forecasts are not a guarantee or reliable indicator of future performance.

Investors should always consider the investment objectives, risks, and charges and expenses of an ETF carefully before investing. The applicable prospectus and key investor information document (as applicable) for an ETF should contain this and other information about such ETF. It is important to read carefully any such prospectus before investing. Clients may obtain prospectuses and key investor information documents for ETFs from the applicable distributor or authorized participant, the exchange upon which an ETF is listed and/or from the applicable website of the applicable ETF issuer. The value of the investments and any accruing income may fall or rise. Any past performance, prediction or forecast is not indicative of future or likely performance. Any information on ETFs contained herein is provided strictly for illustrative purposes and should not be deemed an offer to sell or a solicitation of an offer to purchase units of any ETF either explicitly or implicitly. The opinions expressed are those of the authors and do not necessarily reflect the views of ETF issuers, any of their agents or their affiliates.

Citigroup Global Markets India Private Limited and/or its affiliates may have, from time to time, actual or beneficial ownership of 1% or more in the debt securities of the subject issuer.

Citi Research generally disseminates its research to the Firm's global institutional and retail clients via both proprietary (e.g., Citi Velocity and Citi Personal Wealth Management) and non-proprietary electronic distribution platforms. Certain research may be disseminated only via the Firm's proprietary distribution platforms; however such research will not contain changes to earnings forecasts, target price, investment or risk rating or investment thesis or be otherwise inconsistent with the author's previously published research. Certain research is made available only to institutional investors to satisfy regulatory requirements. Individual Citi Research analysts may also opt to circulate published research to one or more clients by email; such email distribution is discretionary and is done only after the research has been disseminated. The level and types of services provided by Citi Research analysts to clients may vary depending on various factors such as the client's individual preferences as to the frequency and manner of receiving communications from analysts, the client's risk profile and investment focus and perspective (e.g. market-wide, sector specific, long term, short-term etc.), the size and scope of the overall client relationship with the Firm and legal and regulatory constraints.

Pursuant to Comissão de Valores Mobiliários Rule 598 and ASIC Regulatory Guide 264, Citi is required to disclose whether a Citi related company or business has a commercial relationship with the subject company. Considering that Citi operates multiple businesses in more than 100 countries around the world, it is likely that Citi has a commercial relationship with the subject company.

Securities recommended, offered, or sold by the Firm: (i) are not insured by the Federal Deposit Insurance Corporation; (ii) are not deposits or other obligations of any insured depository institution (including Citibank); and (iii) are subject to investment risks, including the possible loss of the principal amount invested. The Product is for informational purposes only and is not intended as an offer or solicitation for the purchase or sale of a security. Any decision to purchase securities mentioned in the Product must take into account existing public information on such security or any registered prospectus. Although information has been obtained from and is based upon sources that the Firm believes to be reliable, we do not guarantee its accuracy and it may be incomplete and condensed. Note, however, that the Firm has taken all reasonable steps to determine the accuracy and completeness of the disclosures made in the Important Disclosures section of the Product. The Firm's research department has received assistance from the subject company(ies) referred to in this Product including, but not limited to, discussions with management of the subject company(ies) or visiting company sites. Firm policy prohibits research analysts from sending draft research to subject companies. However, it should be presumed that the author of the Product has had discussions with the subject company to ensure factual accuracy prior to publication. All opinions, projections and estimates constitute the judgment of the author as of the date of the Product and these, plus any other information contained in the Product, are subject to change without notice. Prices and availability of financial instruments also are subject to change without notice. Notwithstanding other departments within the Firm advising the companies discussed in this Product, information obtained in such role is not used in the preparation of the Product. Although Citi Research does not set a predetermined frequency for publication, if the Product is a fundamental equity or credit research report, it is the intention of Citi Research to provide research coverage of the covered issuers, including in response to news affecting the issuer. For non-fundamental research reports, Citi Research may not provide regular updates to the views, recommendations and facts included in the reports. Notwithstanding that Citi Research maintains coverage on, makes recommendations concerning or discusses issuers, Citi Research may be periodically restricted from referencing certain issuers due to legal or policy reasons. Where a component of a published trade idea is subject to a restriction, the trade idea will be removed from any list of open trade ideas included in the Product. Upon the lifting of the restriction, the trade idea will either be re-instated in the open trade ideas list if the analyst continues to support it or it will be officially closed. Citi Research may provide different research products and services to different classes of customers (for example, based upon long-term or short-term investment horizons) that may lead to differing conclusions or recommendations that could impact the price of a security contrary to the recommendations in the alternative research product, provided that each is consistent with the rating system for each respective product.

Investing in non-U.S. securities, including ADRs, may entail certain risks. The securities of non-U.S. issuers may not be registered with, nor be subject to the reporting requirements of the U.S. Securities and Exchange Commission. There may be limited information available on foreign securities. Foreign companies are generally not subject to uniform audit and reporting standards, practices and requirements comparable to those in the U.S. Securities of some foreign companies may be less liquid and their prices more volatile than securities of comparable U.S. companies. In addition, exchange rate movements may have an adverse effect on the value of an investment in a foreign stock and its corresponding dividend payment for U.S. investors. Net dividends to ADR investors are estimated, using withholding tax rates conventions, deemed accurate, but investors are urged to consult their tax advisor for exact dividend computations. Investors who have received the Product from the Firm may be prohibited in certain states or other jurisdictions from purchasing securities mentioned in the Product from the Firm. Please ask your Financial Consultant for additional details. Citigroup Global Markets Inc. takes responsibility for the Product in the United States. Any orders by US investors resulting from the information contained in the Product may be placed only through Citigroup Global Markets Inc.

Important Disclosures for Bell Potter Customers: Bell Potter is making this Product available to its clients pursuant to an agreement with Citigroup Global Markets Australia Pty Limited. Neither Citigroup Global Markets Australia Pty Limited nor any of its affiliates has made any determination as to the suitability of the information provided herein and clients should consult with their Bell Potter financial advisor before making any investment decision.

The Citigroup legal entity that takes responsibility for the production of the Product is the legal entity which the first named author is employed by. The Product is made available in **Australia** through Citigroup Global Markets Australia Pty Limited. (ABN 64 003 114 832 and AFSL No. 240992), participant of the ASX Group and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. Citigroup Global Markets Australia Pty Limited is not an Authorised Deposit-Taking Institution under the Banking Act 1959, nor is it regulated by the Australian Prudential Regulation Authority. The Product is made available in Australia to Private Banking wholesale clients through Citigroup Pty Limited (ABN 88 004 325 080 and AFSL 238098). Citigroup Pty Limited provides all financial product advice to Australian Private Banking wholesale clients through bankers and relationship managers. If there is any doubt about the suitability of investments held in Citigroup Private Bank accounts, investors should contact the Citigroup Private Bank in Australia. Citigroup companies may compensate affiliates and their representatives for providing products and services to clients. The Product is made available in **Brazil** by Citigroup Global Markets Brasil - CCTVM SA, which is regulated by CVM - Comissão de Valores Mobiliários ("CVM"), BACEN - Brazilian Central Bank, APIMEC - Associação dos Analistas e Profissionais de Investimento do Mercado de Capitais and ANBIMA – Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais. Av. Paulista, 1111 - 14º andar(parte) - CEP: 01311920 - São Paulo - SP. If the Product is being made available in certain provinces of **Canada** by Citigroup Global Markets (Canada) Inc. ("CGM Canada"), CGM Canada has approved the Product. Citigroup Place, 123 Front Street West, Suite 1100, Toronto, Ontario M5J 2M3. This product is available in **Chile** through Banchile Corredores de Bolsa S.A., an indirect subsidiary of Citigroup Inc., which is regulated by the Superintendencia de Valores y Seguros. Agustinas 975, piso 2, Santiago, Chile. The Product is made available in **Germany** by Citigroup Global Markets Deutschland AG ("CGMD"), which is regulated by Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin). CGMD, Reuterweg 16, 60323 Frankfurt am Main. Research which relates to "securities" (as defined in the Securities and Futures Ordinance (Cap. 571 of the Laws of Hong Kong)) is issued in **Hong Kong** by, or on behalf of, Citigroup Global Markets Asia Limited which takes full responsibility for its content. Citigroup Global Markets Asia Ltd. is regulated by Hong Kong Securities and Futures Commission. If the Research is made available through Citibank, N.A., Hong Kong Branch, for its clients in Citi Private Bank, it is made available by Citibank N.A., Citibank Tower, Citibank Plaza, 3 Garden Road, Hong Kong. Citibank N.A. is regulated by the Hong Kong Monetary Authority. Please contact your Private Banker in Citibank N.A., Hong Kong, Branch if you have any queries on or any matters arising from or in connection with this document. The Product is made available in **India** by Citigroup Global Markets India Private Limited (CGM), which is regulated by the Securities and Exchange Board of India (SEBI), as a Research Analyst (SEBI Registration No. INH000000438). CGM is also actively involved in the business of merchant banking and stock brokerage in India, and is registered with SEBI in this regard. CGM's registered office is at 1202, 12th Floor, FIFC, G Block, Bandra Kurla Complex, Bandra East, Mumbai – 400098. CGM's Corporate Identity Number is U99999MH2000PTC126657, and its contact details are: Tel:+9102261759999 Fax:+9102261759961. The Product is made available in **Indonesia** through PT Citigroup Securities Indonesia. 5/F, Citibank Tower, Bapindo Plaza, Jl. Jend. Sudirman Kav. 54-55, Jakarta 12190. Neither this Product nor any copy hereof may be distributed in Indonesia or to any Indonesian citizens wherever they are domiciled or to Indonesian residents except in compliance with applicable capital market laws and regulations. This Product is not an offer of securities in Indonesia. The securities referred to in this Product have not been registered with the Capital Market and Financial Institutions Supervisory Agency (BAPEPAM-LK) pursuant to relevant capital market laws and regulations, and may not be offered or sold within the territory of the Republic of Indonesia or to Indonesian citizens through a public offering or in circumstances which constitute an offer within the meaning of the Indonesian capital market laws and regulations. The Product is made available in **Israel** through Citibank NA, regulated by the Bank of Israel and the Israeli Securities Authority. Citibank, N.A, Platinum Building, 21 Ha'arba'ah St, Tel Aviv, Israel. The Product is made available in **Italy** by Citigroup Global Markets Limited, which is authorised by the PRA and regulated by the FCA and the PRA. Via dei Mercanti, 12, Milan, 20121, Italy. The Product is made available in **Japan** by Citigroup Global Markets Japan Inc. ("CGMJ"), which is regulated by Financial Services Agency, Securities and Exchange Surveillance Commission, Japan Securities Dealers Association, Tokyo Stock Exchange and Osaka Securities Exchange. Otemachi Park Building, 1-1-1 Otemachi, Chiyoda-ku, Tokyo 100-8132 Japan. If the Product was distributed by SMBC Nikko Securities Inc. it is being so distributed under license. In the event that an error is found in an CGMJ research report, a revised version will be posted on the Firm's Citi Velocity website. If you have questions regarding Citi Velocity, please call (81 3) 6270-3019 for help. The product is made available in the **Kingdom of Saudi Arabia** in accordance with Saudi laws through Citigroup Saudi Arabia, which is regulated by the Capital Market Authority (CMA) under CMA license (17184-31). 2239 Al Urubah Rd – Al Olaya Dist. Unit No. 18, Riyadh 12214 – 9597, Kingdom Of Saudi Arabia. The Product is made available in **Korea** by Citigroup Global Markets Korea Securities Ltd., which is regulated by the Financial Services Commission, the Financial Supervisory Service and the Korea Financial Investment Association (KOFIA). Citibank Building, 39 Da-dong, Jung-gu, Seoul 100-180, Korea. KOFIA makes available registration information of research analysts on its website. Please visit the following website if you wish to find KOFIA registration information on research analysts of Citigroup Global Markets Korea Securities Ltd. http://dis.kofia.or.kr/websquare/index.jsp?w2xPath=/wq/fundMgr/DISFundMgrAnalystList.xml&divisionId=MDIS03002002000000&serviceId=SDIS03002002000. The Product is made available in Korea by Citibank Korea Inc., which is regulated by the Financial Services Commission and the Financial Supervisory Service. Address is Citibank Building, 39 Da-dong, Jung-gu, Seoul 100-180, Korea. This research report is intended to be provided only to Professional Investors as defined in the Financial Investment Services and Capital Market Act and its Enforcement Decree in Korea. The Product is made available in **Malaysia** by Citigroup Global Markets Malaysia Sdn Bhd (Company No. 460819-D) ("CGMM") to its clients and CGMM takes responsibility for its contents. CGMM is regulated by the Securities Commission of Malaysia. Please contact CGMM at Level 43 Menara Citibank, 165 Jalan Ampang, 50450 Kuala Lumpur, Malaysia in respect of any matters arising from, or in connection with, the Product. The Product is made available in **Mexico** by Citibanamex Casa de Bolsa, S.A. De C. V., Casa de Bolsa, Integrante del Grupo Financiero Citibanamex which is a wholly owned subsidiary of Citigroup Inc. and is regulated by Comision Nacional Bancaria y de Valores. Reforma 398, Col. Juarez, 06600 Mexico, D.F. In **New Zealand** the Product is made available to 'wholesale clients' only as defined by s5C(1) of the Financial Advisers Act 2008 ('FAA') through Citigroup Global Markets Australia Pty Ltd (ABN 64 003 114 832 and AFSL No. 240992), an overseas financial adviser as defined by the FAA, participant of the ASX Group and regulated by the Australian Securities & Investments Commission. Citigroup Centre, 2 Park Street, Sydney, NSW 2000. The Product is made available in **Pakistan** by Citibank N.A. Pakistan branch, which is regulated by the State Bank of Pakistan and Securities Exchange Commission, Pakistan. AWT Plaza, 1.1. Chundrigar Road, P.O. Box 4889, Karachi-74200. The Product is made available in the **Philippines** through Citicorp Financial Services and Insurance Brokerage Philippines, Inc., which is regulated by the Philippines Securities and Exchange Commission. 20th Floor Citibank Square Bldg. The Product is made available in the Philippines through Citibank NA Philippines branch, Citibank Tower, 8741 Paseo De Roxas, Makati City, Manila. Citibank NA Philippines NA is regulated by The Bangko Sentral ng Pilipinas. The Product is made available in **Poland** by Dom Maklerski Banku Handlowego SA an indirect subsidiary of Citigroup Inc., which is regulated by Komisja Nadzoru Finansowego. Dom Maklerski Banku Handlowego S.A. ul.Senatorska 16, 00-923 Warszawa. The Product is made available in the **Russian Federation** through AO Citibank, which is licensed to carry out banking activities in the Russian Federation in accordance with the general banking license issued by the Central Bank of the Russian Federation and brokerage activities in accordance with the license issued by the Federal Service for Financial Markets. Neither the Product nor any information contained in the Product shall be considered as advertising the securities mentioned in this report within the territory of the Russian Federation or outside the Russian Federation. The Product does not constitute an appraisal within the meaning of the Federal Law of the Russian Federation of 29 July 1998 No. 135-FZ (as amended) On Appraisal Activities in the Russian Federation. 8-10 Gasheka Street, 125047 Moscow. The Product is made available in **Singapore** through Citigroup Global Markets Singapore Pte. Ltd. ("CGMSPL"), a capital markets services license holder, and regulated by Monetary Authority of Singapore. Please contact CGMSPL at 8 Marina View, 21st Floor Asia Square Tower 1, Singapore 018960, in respect of any matters arising from, or in connection with, the analysis of this document. This report is intended for recipients who are accredited, expert and institutional investors as defined under the Securities and Futures Act (Cap. 289). The Product is made available by The Citigroup Private Bank in Singapore through Citibank, N.A., Singapore Branch, a licensed bank in Singapore that is regulated by Monetary Authority of Singapore. Please contact your Private Banker in Citibank N.A., Singapore Branch if you have any queries on or any matters arising from or in connection with this document. This report is intended for recipients who are accredited, expert and institutional investors as defined under the Securities and Futures Act (Cap. 289). This report is distributed in Singapore by Citibank Singapore Ltd ("CSL") to selected Citigold/Citigold Private Clients. CSL provides no independent research or analysis of the substance or in preparation of this report. Please contact your Citigold//Citigold Private Client Relationship Manager in CSL if you have any queries on or any matters arising from or in connection with this report. This report is intended for recipients who are accredited investors as defined under the Securities and Futures Act (Cap. 289). Citigroup Global Markets (Pty) Ltd. is incorporated in the **Republic of South Africa** (company registration number 2000/025866/07) and its registered office is at 145 West Street, Sandton, 2196, Saxonwold. Citigroup Global Markets (Pty) Ltd. is regulated by JSE Securities Exchange South Africa, South African Reserve Bank and the Financial Services Board. The investments and services contained herein are not available to private customers in South Africa. The Product is made available in the **Republic of China** through Citigroup Global Markets Taiwan Securities Company Ltd. ("CGMTS"), 14 and 15F, No. 1, Songzhi Road, Taipei 110, Taiwan, subject to the license scope and the applicable laws and regulations in the Republic of China. CGMTS is regulated by the Securities and Futures Bureau of the Financial Supervisory Commission of Taiwan, the Republic of China. No portion of the Product may be reproduced or quoted in the Republic of China by the press or any third parties [without the written authorization of CGMTS]. Pursuant to the applicable laws and regulations in the Republic of China, the recipient of the Product shall not take advantage of such Product to involve in any matters in which the recipient may have conflicts of interest. If the Product covers securities which are not allowed to be offered or traded in the Republic of China, neither the Product nor any information contained in the Product shall be considered as advertising the securities or making recommendation of the securities in the Republic of China. The Product is for informational purposes only and is not intended as an offer or solicitation for the purchase or sale of a security or financial products. Any decision to purchase securities or financial products mentioned in the Product must take into account existing public information on such security or the financial products or any registered prospectus. The Product is made available in **Thailand** through Citicorp Securities (Thailand) Ltd., which is regulated by the Securities and Exchange Commission of Thailand. 399 Interchange 21 Building, 18th Floor, Sukhumvit Road, Klongtoey Nua, Wattana ,Bangkok 10110, Thailand. The Product is made available in **Turkey** through Citibank AS which is regulated by Capital Markets Board. Tekfen Tower, Eski Buyukdere Caddesi # 209 Kat 2B, 23294 Levent, Istanbul, Turkey. In the **U.A.E**, these materials (the "Materials") are communicated by Citigroup Global Markets Limited, DIFC branch ("CGML"), an entity registered in the Dubai International Financial Center ("DIFC") and licensed and regulated by the Dubai Financial Services Authority ("DFSA") to Professional Clients and Market Counterparties only and should not be relied upon or distributed to Retail Clients. A distribution of the different Citi Research ratings distribution, in percentage terms for Investments in each sector covered is made available on request. Financial products and/or services to which the Materials relate will only be made available to Professional Clients and Market Counterparties. The Product is made available in **United Kingdom** by Citigroup Global Markets Limited, which is authorised by the Prudential Regulation Authority ("PRA") and regulated by the Financial Conduct Authority ("FCA") and the PRA. This material may relate to investments or services of a person outside of the UK or to other matters which are not authorised by the PRA nor regulated by the FCA and the PRA and further details as to where this may be the case are available upon request in respect of this material. Citigroup Centre, Canada Square, Canary Wharf, London, E14 5LB. The Product is made available in **United States** by Citigroup Global Markets Inc, which is a member of FINRA and registered with the US Securities and Exchange Commission. 388 Greenwich Street, New York, NY 10013. Unless specified to the contrary, within EU Member States, the Product is made available by Citigroup Global Markets

Limited, which is authorised by the PRA and regulated by the FCA and the PRA.
The Product is not to be construed as providing investment services in any jurisdiction where the provision of such services would not be permitted.
Subject to the nature and contents of the Product, the investments described therein are subject to fluctuations in price and/or value and investors may get back less than originally invested. Certain high-volatility investments can be subject to sudden and large falls in value that could equal or exceed the amount invested. Certain investments contained in the Product may have tax implications for private customers whereby levels and basis of taxation may be subject to change. If in doubt, investors should seek advice from a tax adviser. The Product does not purport to identify the nature of the specific market or other risks associated with a particular transaction. Advice in the Product is general and should not be construed as personal advice given it has been prepared without taking account of the objectives, financial situation or needs of any particular investor. Accordingly, investors should, before acting on the advice, consider the appropriateness of the advice, having regard to their objectives, financial situation and needs. Prior to acquiring any financial product, it is the client's responsibility to obtain the relevant offer document for the product and consider it before making a decision as to whether to purchase the product.
Citi Research product may source data from dataCentral. dataCentral is a Citi Research proprietary database, which includes the Firm's estimates, data from company reports and feeds from Thomson Reuters. The source for all referenced prices, unless otherwise stated, is DataCentral. Past performance is not a guarantee or reliable indicator of future results. Forecasts are not a guarantee or reliable indicator of future performance. The printed and printable version of the research report may not include all the information (e.g., certain financial summary information and comparable company data) that is linked to the online version available on the Firm's proprietary electronic distribution platforms.

 The research data in this report is not intended to be used for the purpose of (a) determining the price or amounts due in respect (or to value) of one or more financial products or instruments and/or (b) measuring or comparing the performance of a financial product, a portfolio of financial instruments, or a collective investment undertaking, and any such use is strictly prohibited without the prior written consent of Citi Research. Any unauthorized use, duplication, redistribution or disclosure of this report (the "Product"), including, but not limited to, redistribution of the Product by electronic mail, posting of the Product on a website or page, and/or providing to a third party a link to the Product, is prohibited by law and will result in prosecution. The information contained in the Product is intended solely for the recipient and may not be further distributed by the recipient to any third party. Where included in this report, MSCI sourced information is the exclusive property of Morgan Stanley Capital International Inc. (MSCI). Without prior written permission of MSCI, this information and any other MSCI intellectual property may not be reproduced, redisseminated or used to create any financial products, including any indices. This information is provided on an "as is" basis. The user assumes the entire risk of any use made of this information. MSCI, its affiliates and any third party involved in, or related to, computing or compiling the information hereby expressly disclaim all warranties of originality, accuracy, completeness, merchantability or fitness for a particular purpose with respect to any of this information. Without limiting any of the foregoing, in no event shall MSCI, any of its affiliates or any third party involved in, or related to, computing or compiling the information have any liability for any damages of any kind. MSCI, Morgan Stanley Capital International and the MSCI indexes are services marks of MSCI and its affiliates. Part of this product may contain Sustainalytics proprietary information that may not be reproduced, used, disseminated, modified nor published in any manner without the express written consent of Sustainalytics. Sustainalytics, its affiliates and any third party involved in, or related to, computing or compiling the information hereby expressly disclaim all warranties of originality, accuracy, completeness, merchantability or fitness for a particular purpose with respect to any of this information. Any information attributed to Sustainalytics is provided solely for informational purposes and on its own should not be considered an offer to buy or sell a security. Neither Sustainalytics nor all its third-party suppliers provide investment advice (as defined in the applicable jurisdiction) or any other form of (financial) advice. The information is provided "as is" and, therefore Sustainalytics assumes no responsibility for errors or omissions. Sustainalytics cannot be held liable for damage arising from the use of this product or information contained herein in any manner whatsoever. The Firm accepts no liability whatsoever for the actions of third parties. The Product may provide the addresses of, or contain hyperlinks to, websites. Except to the extent to which the Product refers to website material of the Firm, the Firm has not reviewed the linked site. Equally, except to the extent to which the Product refers to website material of the Firm, the Firm takes no responsibility for, and makes no representations or warranties whatsoever as to, the data and information contained therein. Such address or hyperlink (including addresses or hyperlinks to website material of the Firm) is provided solely for your convenience and information and the content of the linked site does not in any way form part of this document. Accessing such website or following such link through the Product or the website of the Firm shall be at your own risk and the Firm shall have no liability arising out of, or in connection with, any such referenced website.

ADDITIONAL INFORMATION IS AVAILABLE UPON REQUEST