How low can IG CDX go?

15 March 2013

MARKET OUTLOOK | SINGLE NAME NEWS & VIEWS | WEEK AHEAD | RECENT CITI RESEARCH | US KEY ECONOMIC DATA | KEY EARNINGS ANNOUNCEMENTS

Market Outlook

For the first time in roughly two years, the on-the-run IG CDX index has traded below 80bp. But can the rally continue? Many investors seem skeptical that the index can really go that much tighter. After all, the tightest post-Lehman index print was 75bp in January 2010. So how much room can there be?

What's more, with IG19 rolling to IG20 next week, the on-the-run index will soon be quoted wider by roughly 8-9bp to reflect the portfolio rotation and 6-month maturity extension. As such, it would take a fairly significant move tighter to really break into uncharted territory in the next few months.

And yet, the question of how low the IG CDX index can go is an interesting one worthy of some consideration.

On-the-run IG 5yr spread

bp

Source: Citi Research

Certainly, it doesn't take a large stretch of the imagination to envision a sub-70 print on IG CDX. There are 10 names in IG19 that have widened by more than 15bp since the beginning of the year, largely on the back of releveraging / buyout concerns and other idiosyncratic developments, and if those names were instead flat since the 31st of December, IG19 would be another 4-6bp tighter and within a few basis points of the 70bp mark.

High Grade Credit Strategy

Jason Shoup
+1-212-723-6147

Sonam T Pokwal
+1-212-723-3807

Single Name Credit Strategy

Erin Lyons
+1-212-723-1102

Credit
Investment Overview
North America
Corp. High Grade Strategy

Recent Citi Research

Crossing Over and Under – Rising Star and Falling Angel Candidates (Mar '13)

Ever Been a Better Time for an LBO? – By some measures, no… (Feb '13)

Thinking Outside the LBO Box – New screens give new candidates (Feb '13)

US CreditBrief – An Unlucky Start For Yield Players? (Feb '13)

The Goodwill Game – Expect more charge-offs to goodwill as 10Ks are filed (Jan '13)

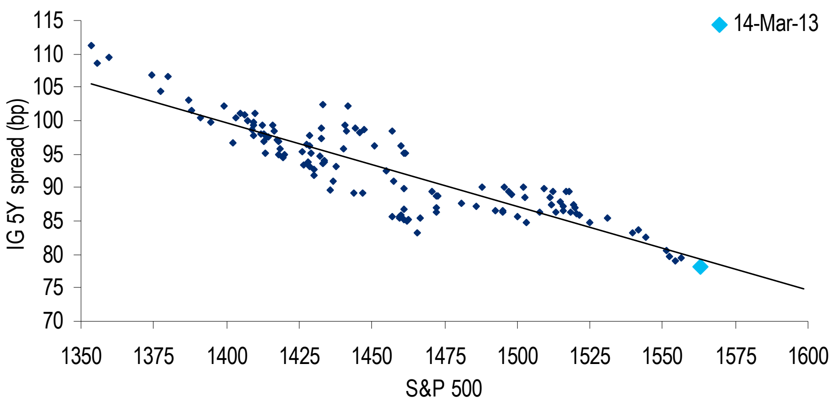
How Afraid of Rising Rates Should We Be? – More than usual (Jan '13)

An Unusual Argument for Long Bonds – Tender-exchange activity (Jan '13)

Alternatively, one could appeal to relative value considerations to get a sense of how much tighter IG CDX could go. A simple regression between IG CDX spreads and equities implies that if the S&P500 was to end the year above 1600, IG CDX could trade below 70bp (see figure).

But obviously such an approach is far from perfect. For a start, relationships that rely on equity prices only hold for short periods of time (P/E vs. spreads would be better over the long term). And there's also the issue of convexity. As corporate spreads tighten, their beta to the equity market naturally declines as they run up against the lower bound, whereas equity prices have no such analogous ceiling. In January 2010, there was evidence of this behavior after IG CDX traded into the mid-70s. As such, we caution against putting too much faith in out-of-sample regressions.

CDX IG spread vs. S&P 500



Source: Citi Research, Bloomberg

So if relative value relationships are doomed to break down as spreads go tighter, how should one go about getting their hands around how low IG CDX could go? Our suggestion is to work backwards and account for how the market has evolved structurally these last 6 years.

To wit, the IG CDX pre-Lehman tights were 29bp in the beginning of 2007. However, the structured credit bid—bespoke CSOs, CPDOs, etc.—created a significant technical that resulted in unusually tight CDS during that time period. Indeed, the relentless demand to sell protection pushed the cash-CDS basis into negative territory of about 10-20bp back then. Consequently, one could make the argument that IG CDX is unlikely to get much tighter than 50bp going forward without a resurgence in synthetic structured credit, which we view as unlikely in light of Basel III.

We also see reason to add at least another 10bp to reflect the increasing costs associated with trading CDS and CDX. In 2007, many of the most active and highly-rated CDS investors were not subject to initial margin or variation margin on their trades. And those investors who were required to post initial margin weren't required to post nearly as much as they do now.

What's more, the rise in initial margin requirements hasn't been symmetric for buyers and sellers of protection. In the post-Lehman world, sellers of protection must often pay initial margin that is at least two times higher than buyers of protection, in part to reflect greater MTM risk and the correlation between an investor's credit risk and wider spreads. As a result, we reckon IG CDX and the underlying CDS should trade wider now than in 2007, simply because protection sellers have been put at a disadvantage relative to protection buyers.

US Credit Outlook – 2013, Good to the Last Drop (Dec '12)

IG Corporate Supply Outlook – More gross, less net (Dec '12)

US Key Economic Data

Tuesday:	*Consensus*
Housing Starts	915k
Building Permits	925k
Wednesday:	
FOMC Rate Decision	0.5%
Thursday:	
Initial Jobless Claims	340k
House Price Index	0.7%
Philadelphia Fed	-3.0
Existing Home Sales	5mn
Leading Indicators	0.3%

Key Earnings Announcements

Tuesday:
Adobe Systems Inc
Cintas Corp
Wednesday:
Oracle Corp
General Mills Inc
Fedex Corp
Thursday:
Conagra Foods Inc
Discover Financial Services
Friday:
Darden Restaurants Inc

But exactly how much higher is a very difficult question to answer. At the very least, we assume that the impact to IG CDX spreads from having to post 1-2% more margin when selling protection should reflect the cost of borrowing that additional capital. For the typical market participant we expect the capital cost is somewhere between L+200 to L+300bp. And therefore the cost in terms of higher spreads should be 2-6bp given the current level of Libor. But we'd stress that, at least to our minds, this is a minimum estimate. In all likelihood, the spread impact relative to early 2007 could be much higher, say 10bp or more.

All together then, we see the new long-term floor on IG CDX as roughly 60bp +/- 5bp (i.e., the old 2007 tights of 29bp, plus 10-20bp for the lack of structured credit bid, and another 10bp for the asymmetric margin costs). Over the medium-to-short term, relative value considerations imply that 70bp might be a more realistic floor for IG CDX. But over a longer time frame, we get the sense that IG CDX could move lower than many expect (especially all those sellers of receivers) even if we are never likely to get back to pre-crisis levels.

Mandatory clearing and the IG CDX Arb

A related question to "how low can IG CDX go", is what, if any, impact will clearing have on the CDS/CDX market? To our minds, it's an equally difficult question to answer, but especially timely given that mandatory clearing went into effect on Monday for the most active swap investors, including dealers.

Broadly speaking, we believe the biggest impact is likely to be to liquidity. However, it's far too soon to make a determination on that front. Who knows how much liquidity will be lost as a result of greater initial margin requirements versus how much liquidity will be gained by moving to a more transparent system that mitigates counterparty risk. Net-net, we suspect this will prove to be a positive for the market, but only time will tell.

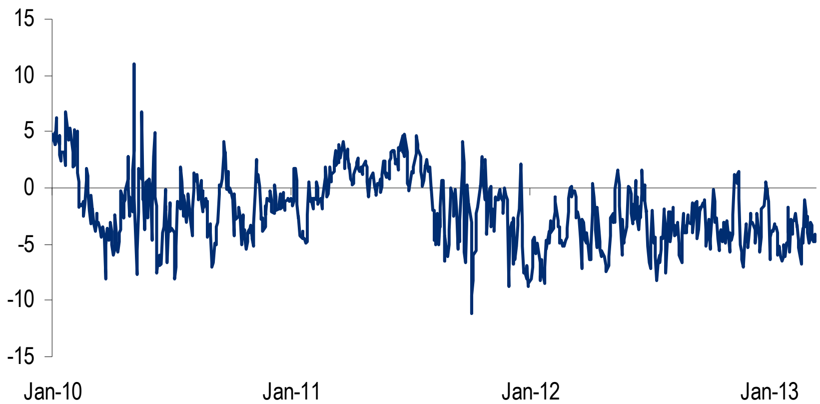
In the meantime, a more tangible impact is likely to be seen in the skew between fair value and the level at which the index trades, as the cost to execute an arbitrage has increased. Indeed, before clearing, broker dealers generally were able to offer portfolio margining (cross margining) on index arb trades that amounted to about 1-2% of the notional of the trade, which meant that arb investors targeting, say, 5bp of convergence between the index and the underlying CDS could expect to make returns of 10 to 20% on their initial margin capital.

But the advent of clearing has changed those return calculations significantly. While the SEC agreed to allow portfolio margining between CDS and CDX trades (i.e., the collateral can be commingled by the clearing house), the directive issued by the agency last Friday has placed a markup to 1.5-to-2-times the portfolio margin requirement, depending on the creditworthiness for non-clearing house counterparties. In other words, while a clearing house might typically charge 1.5-2.5% in initial margin on an IG CDX arb trade, the SEC requires them to collect closer to 3-5% from most hedge funds. Consequently, with initial margin that high, the economics of an arb trade will be 2 to 4 times lower.

As such, we expect that the skew may become more volatile. To be sure, if arbitrageurs stick to previous return targets, it would not be unreasonable to expect IG CDX to occasionally trade upwards of 15bp dislocated from fair value.

In addition, given the SEC's portfolio margining directive we believe that few investors will choose to clear CDS at the clearinghouses, which is still voluntary until the SEC mandates otherwise, because in many cases the portfolio margin numbers end up higher than the sum required to margin each position individually.

IG 5yr skew*
bp



Source: Citi Research
*Skew = traded index spread - average spread of index constituents

Index Roll IG20

Next Thursday (21st of March) marks the first day of trading for the new IG20 index. Markit has released the provisional changes between IG19 and the new index's constituents, and are described below. We do not believe there will be any additional changes prior to the publication of the final annex for the index.

The proposed membership changes are minimal – CenturyLink (downgraded to HY) and Canadian Natural Resources Limited are being replaced by Genworth Financial and Block Financial (H&R Block). Although the average spread of the additions is 34bp wider than the removals, these constituent changes only account for +0.7bp of the roll, compared to +7.9bp contributed from curve extension. We expect the IG19/20 roll to be worth a total of 8.6bp.

CDX IG Index roll summary

Credits added	
Genworth Financial	210bp
Block Financial	206bp
Average spread added	**208bp**
Credits removed	
CenturyLink, Inc.	261bp
Canadian Nat'l Resources Ltd.	93bp
Average spread removed	**177bp**

Current on-the-run	
IG19 5yr	78bp
Contributions to roll	
Composition Chg.	+0.7bp
6mo Extension	+7.9bp
Total Roll	**+8.6bp**
New on-the-run	
IG20 5yr Fair Value	**87bp**

Source: Citi Research

Single Name News & Views

With pressure from shareholders, LBO activity, and a still difficult macro-backdrop, we have seen IG companies become potential high yield targets. Conversely, other credits have traversed the recovery with strong balance sheets and improving earnings. This, coupled with management's commitment to higher ratings, positions them for an upgrade to investment grade. In our recent piece, **Crossing Over and Under - Rising Star and Falling Angel Candidates,** we present rising star and falling angel candidates and suggest trading strategies for the names. We note that an upgrade / downgrade doesn't always mean spreads trade tighter / wider, as many credits trade in line with their new rating prior to a change.

Our falling angel candidates operate in sectors experiencing secular weakness or have struggling business models and include Alcoa, AngloGold, Harsco and Transocean. Credits with potential to be upgraded to IG have benefited from low natural gas prices, a housing market recovery, and improving business profiles. These include Ashland, Celanese, Continental Resources, Delphi, DR Horton, Sally Beauty and Toll Brothers. Below we highlight a falling angel and a rising star candidate.

Alcoa (Baa3, Under review for downgrade / BBB-, Stable): On the back of weak Q3 2012 earnings due to continued pressure in the global aluminum market, Moody's placed Alcoa's Baa3 rating on review for downgrade in mid-December. The agency cited the weak results that have hampered credit metrics, including leverage that increased to about 6.0x. However, we expected a downgrade to HY post Q4 earnings that were okay, but metrics remained challenged and more in line with a HY credit profile.
We expect the credit to be downgraded if end markets continue to be weak, and if Aloca is unable to improve its cost profile and leverage. However, we do not rule out the prospect of the agencies giving AA more time to reduce debt, allowing this American bellwether to remain investment grade.

Trading strategy: If the company were to be downgraded, we'd expect spreads to widen from here to levels in line with MTNA, which would call for about 50bp of backup. We suggest lightening up on paper as we believe a downgrade is likely, and for fundamental reasons as the end market outlook hasn't yet turned the corner.

Celanese Corp (Ba2, Positive / BB, Positive): Celanese is a chemical producer with a diverse product and geographical footprint and leading market technology. The company's new CEO has publicly stated that he wants to attain investment grade ratings and has made progress on this front, reducing secured debt down to 52% from 67% of total debt in the fourth quarter. We think the company will continue to move towards an unsecured capital structure. Citi's HY chemicals analyst, James Finnerty, believes that Celanese is a solid crossover candidate with positive event risk and is Overweight the credit (**Celanese Corp. (CE)).**

Trading strategy: Celanese trades 100bp behind the BBB Index and IG peers, with the CE '22s trading 122bp wide of Dow '22s. We think this relationship should compress as the company continues to move towards its investment grade target.

Week Ahead

Even with so much on their plate, Congress starts their spring break on the 22nd. The Senate is scheduled to begin debating resolutions to the 2014 budget on Monday, but we remain skeptical of their ability to make substantial headway.

Likewise, we don't expect the Wednesday's FOMC meeting to be a market event. Increasing hawkishness among Fed members wouldn't be all that surprising in light of improving employment figures. But given Bernanke's resolve to continue easing, we think it is probably too early to see any meaningful shift in expectations of QE exit timing.

Economic data will focus primarily on the housing sector. Existing home sales and building permits are both expected to resume their upward trajectories after a brief setback in January figures. Other first tier data include US leading indicators and jobless claims, both of which are also expected to reflect an improving economic backdrop. But as sanguine as data has been recently, a **toppy economic surprise index** does raise concern of a euphoric market.

In Europe, with the Italian Parliament having taken office today, consultations to form a new government are likely to start. While negotiations between the parties are open, the outcome is still far from certain. With the Five Star Movement still refusing an alliance with the Democratic Party, new elections remain a material possibility, though the requirement first to elect a new president means that the earliest these could occur is late June, with autumn (after the summer recess) being more likely.

Appendix A-1

Analyst Certification

The research analyst(s) primarily responsible for the preparation and content of this research report are named in bold text in the author block at the front of the product except for those sections where an analyst's name appears in bold alongside content which is attributable to that analyst. Each of these analyst(s) certify, with respect to the section(s) of the report for which they are responsible, 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. No part of the research analyst's compensation was, is, or will be, directly or indirectly, related to the specific recommendation(s) or view(s) expressed by that research analyst in this report.

IMPORTANT DISCLOSURES

A director of Citi serves on the board of Alcoa Inc. Citigroup Global Markets Inc. owns a position of 1 million USD or more in the debt securities of Alcoa Inc

Citigroup Global Markets Inc. or its affiliates has received compensation for investment banking services provided within the past 12 months from Celanese Corp, Alcoa Inc..

Citigroup Global Markets Inc. or its affiliates expects to receive or intends to seek, within the next three months, compensation for investment banking services from Alcoa Inc..

Citigroup Global Markets Inc. or an affiliate received compensation for products and services other than investment banking services from Celanese Corp, Alcoa Inc. in the past 12 months.

Citigroup Global Markets Inc. currently has, or had within the past 12 months, the following as investment banking client(s): Celanese Corp, Alcoa Inc..

Citigroup Global Markets Inc. currently has, or had within the past 12 months, the following as clients, and the services provided were non-investment-banking, securities-related: Celanese Corp, Alcoa Inc..

Citigroup Global Markets Inc. currently has, or had within the past 12 months, the following as clients, and the services provided were non-investment-banking, non-securities-related: Celanese Corp, Alcoa Inc..

Analysts' compensation is determined based upon activities and services intended to benefit the investor clients of Citigroup Global Markets Inc. and its affiliates ("the Firm"). Like all Firm employees, analysts receive compensation that is impacted by overall firm profitability which includes investment banking revenues.

The Firm is a market maker in the publicly traded equity securities of Alcoa Inc..

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, 28th 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. 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 NYSE Rule 472 and NASD Rule 2711 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	Jason Shoup; Sonam T Pokwal; Erin Lyons

OTHER DISCLOSURES

Citigroup Global Markets Inc. and/or its affiliates has a significant financial interest in relation to Celanese Corp, Alcoa Inc.. (For an explanation of the determination of significant financial interest, please refer to the policy for managing conflicts of interest which can be found at www.citiVelocity.com.)

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.

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. 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). 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 research report, it is the intention of Citi Research to provide research coverage of

the/those issuer(s) mentioned therein, including in response to news affecting this issuer, subject to applicable quiet periods and capacity constraints. 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.

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 Morgan Stanley Smith Barney LLC Customers: Morgan Stanley & Co. LLC (Morgan Stanley) research reports may be available about the companies that are the subject of this Citi Research research report. Ask your Financial Advisor or use smithbarney.com to view any available Morgan Stanley research reports in addition to Citi Research research reports.
Important disclosure regarding the relationship between the companies that are the subject of this Citi Research research report and Morgan Stanley Smith Barney LLC and its affiliates are available at the Morgan Stanley Smith Barney disclosure website at www.morganstanleysmithbarney.com/researchdisclosures.
For Morgan Stanley and Citigroup Global Markets, Inc. specific disclosures, you may refer to www.morganstanley.com/researchdisclosures and https://www.citivelocity.com/cvr/eppublic/citi_research_disclosures.
This Citi Research research report has been reviewed and approved on behalf of Morgan Stanley Smith Barney LLC. This review and approval was conducted by the same person who reviewed this research report on behalf of Citi Research. This could create a conflict of interest.

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 Citi Global Markets Australia Pty Ltd. (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. 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, BACEN - Brazilian Central Bank, APIMEC - Associação dos Analistas e Profissionais de Investimento do Mercado de Capitais and ANBID - Associação Nacional dos Bancos de Investimento. Av. Paulista, 1111 - 11º andar - 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 **France** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. 1-5 Rue Paul Cézanne, 8ème, Paris, France. The Product is distributed 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, which is regulated by Securities and Exchange Board of India. Bakhtawar, Nariman Point, Mumbai 400-021. 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 and regulated by Financial Services Authority. 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. Shin-Marunouchi Building, 1-5-1 Marunouchi, Chiyoda-ku, Tokyo 100-6520 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 **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/fs/dis2/fundMgr/DISFundMgrAnalystPop.jsp?companyCd2=A03030&pageDiv=02. 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. 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 Acciones y Valores Banamex, S.A. De C. V., Casa de Bolsa, Integrante del Grupo Financiero Banamex ("Accival") 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 ZAO 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 **Spain** by Citigroup Global Markets Limited, which is authorised and regulated by Financial Services Authority. 29 Jose Ortega Y Gasset, 4th Floor, Madrid, 28006, Spain. 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 and/or through Citibank Securities (Taiwan) Company Limited ("CSTL"), 14 and 15F, No. 1, Songzhi Road, Taipei 110, Taiwan, subject to the respective license scope of each entity and the applicable laws and regulations in the Republic of China. CGMTS and CSTL are both 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 and CSTL]. 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. 18/F, 22/F and 29/F, 82 North Sathorn Road, Silom, Bangrak, Bangkok 10500, 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 and regulated by Financial Services Authority. This material may relate to investments or services of a person outside of the UK or to other matters which are not regulated by the FSA 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 regulated by Financial Services Authority.

Pursuant to Comissão de Valores Mobiliários Rule 483, 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.

Many European regulators 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.

Compensation of equity research analysts is determined by equity research management and Citigroup's senior management and is not linked to specific transactions or recommendations.

The Product may have been distributed simultaneously, in multiple formats, to the Firm's worldwide institutional and retail customers. 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.
With the exception of our product that is made available only to Qualified Institutional Buyers (QIBs) and other product that is made available through other distribution channels only to certain categories of clients to satisfy legal or regulatory requirements, Citi Research concurrently disseminates its research via proprietary and non-proprietary electronic distribution platforms. Periodically, individual Citi Research analysts may also opt to circulate research posted on such platforms to one or more clients by email. Such email distribution is discretionary and is done only after the research has been disseminated via the aforementioned distribution channels. Citi Research simultaneously distributes product that is limited to QIBs only through email distribution.
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 Citi and legal and regulatory constraints.
Citi Research product may source data from dataCentral. dataCentral is a Citi Research proprietary database, which includes Citi estimates, data from company reports and feeds from Reuters and Datastream.

ADDITIONAL INFORMATION IS AVAILABLE UPON REQUEST