



Global

Cross-Discipline

Thematic Research

Date

30 March 2020

Corona Crisis Daily

How cases have developed globally

- Global cases have risen to over 700,000, with the US (over 142,000 cases) driving the bulk of the recent growth rate. However, over the last 24 hours the global growth rate has dipped below 10 per cent after trending in a low double digit range for the past ten days. The peak of 14 per cent occurred last Sunday (March 22). Will that be the high watermark?
- In the US, new cases started to slow slightly over the weekend and in percentage growth terms are now in the teens not the twenties. This week will be important as today marks two weeks since New York City – the clear epicentre of the virus in the US, with nearly 24 per cent of total cases – closed all restaurants and bars and started to implement shutdown conditions. More alarmingly for the US, number of deaths have more than tripled over the last five days.
- Germany saw new case numbers increase 8.2 per cent over the last 24 hours. German case growth has fallen out of the mid-teen range it had been in for the last eight days. Meanwhile, newly reported death growth remains in the mid-20 per cent range for a second day, after it had been in a narrow range around 30 per cent for five days.
- Italy saw its number of fatalities pass 10,000 over the weekend - over three times that seen in China. Along with Spain (6,803 deaths), they have seen the most pressure on their healthcare systems, with deaths per 1m of the population at 178 and 146 respectively. China is at 2 on this measure. The next closest nation of those most adversely affected is France with 40.
- The good news for Italy is that its new case growth rate has been in the single digits for seven days in a row now, with yesterday the lowest at 5.6 per cent. Similarly three of the last four days have seen a sub-ten per cent growth rate in fatalities, indicating that Italy's containment may be working in flattening the curve.
- There are also indications that improvements are being seen in Spain too. New case growth has dipped under ten per cent for the first time with the growth in deaths (13.7 per cent) the lowest in over two weeks.
- One concern to keep an eye on are the increasing new case growth rates in Asia. Over the weekend, Japan posted a double digit new case growth rate for the first time since March 13. Furthermore, the Philippines saw two days of 30 per cent case growth rate over the weekend for the first time.
- In our tables and charts (click "View report"), we see that most of Europe has seen downward trajectories in the growth rate of new cases over the weekend. We have also included Open Table data for cities and countries

[Jim Reid](#)

Strategist

+44-20-754-72943

[Karthik Nagalingam](#)

Research Associate

+1-212-250-0521

[Luke Templeman, CPA](#)

Research Analyst

+44-20-754-17373

[Marion Laboure, Ph.D.](#)

Research Analyst

+44-207-545-0679

[Henry Allen](#)

Research Analyst

+44-20-754-11149



around the world to show the drop in restaurant business, which is a proxy for when lockdowns went in place effectively. We also show as much virus mortality rates by age as we can get at the moment. We'll try to add new graphs each day so keep clicking back to see them alongside the updated regulars.

Figure 1: Change in coronavirus cases over the last five days across major affected areas the world

Country/Territory	Confirmed Cases	Cases/1M Population	Last 5 Days Daily Rate of Change					Rate of Change 14 days ago
			T-1	T-2	T-3	T-4	T-5	
United States	142,178	430	15.1%	18.7%	21.9%	25.3%	24.2%	67.4%
Italy	97,689	1,616	5.6%	6.9%	7.3%	8.3%	7.5%	13.1%
China	81,470	57	0.0%	0.1%	0.1%	0.1%	0.1%	0.0%
Hubei	67,801	1,159	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ex-Hubei	13,669	10	0.2%	0.3%	0.4%	0.4%	0.5%	0.1%
Spain	80,110	1,713	9.4%	11.4%	13.7%	16.7%	17.7%	18.5%
Germany	62,435	745	8.2%	13.4%	15.8%	17.7%	13.1%	24.3%
France	40,174	615	6.9%	14.0%	13.1%	15.5%	13.1%	22.8%
Iran	38,309	456	8.2%	9.5%	10.0%	8.8%	8.9%	7.6%
Switzerland	14,829	1,713	5.3%	8.9%	9.5%	8.4%	10.3%	7.5%
United Kingdom	19,522	288	14.2%	17.5%	24.7%	22.3%	18.0%	10.9%
South Korea	9,661	188	1.9%	1.6%	1.0%	1.1%	0.0%	0.9%
Japan	1,866	15	10.2%	11.0%	9.0%	7.0%	9.6%	4.6%
Worldwide	722,196	92.59	8.9%	11.2%	12.1%	13.5%	10.7%	6.9%

Source : Deutsche Bank, WHO, CDC, ECDC

Figure 2: Change in coronavirus fatalities over the last five days across major affected areas the world

Country/Territory	Confirmed Deaths	Deaths/1M Population	Last 5 Days Daily Rate of Change					Rate of Change 14 days ago
			T-1	T-2	T-3	T-4	T-5	
United States	2,484	8	11.8%	31.0%	31.0%	38.5%	19.3%	22.4%
Italy	10,779	178	7.5%	9.7%	11.2%	9.5%	10.0%	19.3%
China	3,304	2	0.1%	0.2%	0.1%	0.2%	0.2%	1.1%
Spain	6,803	146	13.7%	16.4%	17.7%	19.7%	21.9%	7.3%
Germany	541	6	24.9%	23.4%	31.5%	29.6%	29.6%	0.0%
France	2,606	40	12.6%	16.0%	17.6%	27.4%	21.0%	23.3%
Iran	2,640	31	4.9%	5.8%	6.4%	7.6%	7.4%	17.8%
Switzerland	300	35	13.6%	14.3%	20.3%	25.5%	25.4%	35.7%
United Kingdom	1,228	18	20.5%	34.3%	31.3%	24.8%	9.7%	0.0%
South Korea	158	3	9.7%	3.6%	6.1%	4.0%	5.0%	4.2%
Japan	54	0	3.8%	6.1%	4.3%	4.4%	4.7%	16.7%
Worldwide	33,976	663	10.1%	12.9%	13.6%	13.6%	12.1%	12.4%

Source : Deutsche Bank, WHO, CDC, ECDC

Medical updates

- Germany is set to launch a large-scale coronavirus antibody test, with the aim of gaining a better understanding of how far the virus has spread across the population. According to the Helmholtz Center, "This will allow us to develop a clearer picture of immunity and the spread of the pandemic."
- A vaccine used to prevent tuberculosis, which can boost the immune system to defend against a range of infections, has been given to healthcare workers in Australia to test for its potential to protect from covid-19.

Major virus updates over the past day

- China's National Health Commission said the domestic transmission of covid-19 has "basically stopped".
- US: President Trump extended the guidelines for social distancing to 30



April. That came as one of his top medical advisors warned the number of US fatalities could reach 100,000-200,000.

- US: The CDC issued a domestic travel advisory on Saturday for residents of New York, New Jersey and Connecticut “to refrain from non-essential domestic travel for 14 days effective immediately.”
- US: New York Governor Cuomo delayed the state’s presidential primary from April 28th until June 23rd.
- Iran: President Rouhani said on Sunday that people will have to adopt a “new way of life” until a treatment of vaccine is discovered. Estimates on the timeline for a vaccine range from six months to over a year
- France: The Prime Minister said that the lockdown measures will be extended until April 15th
- UK: The government warned on Sunday that the national lockdown may continue beyond the current three-week period and suggested the possibility of stricter restrictions. That came as the UK’s deputy chief medical officer warned it could be six months or longer before ‘normal’ lives are resumed
- Australia: Public gatherings have been limited to 2 people. Those aged over 70 have been asked to stay at home, while outdoor gyms, and many parks and beaches have been closed.
- Japan: Prime Minister Abe is considering reopening schools next month following their closure at the beginning of March.
- Spain: The government banned all non-essential work for two weeks despite the country’s biggest employers federation warning of “massive destruction” of jobs and businesses.
- Ireland: A two-week lockdown was announced with all public and private gatherings banned, as well as visits to hospitals
- Mexico: The president shifted tack and advised people to stay home and practise social distancing, although he stopped short of curfews and mandatory stay-at-home orders.
- Russia: The country is temporarily closing its borders from March 30 while the mayor of Moscow has ordered a full quarantine of citizens from Monday
- Turkey: President Erdogan said that the country should observe a “voluntary quarantine”, and also stopped all international flights.
- UK: Prime Minister Boris Johnson has become the first world leader to test positive for the coronavirus, it was announced on Friday. He is self-isolating and continuing to lead the UK government. The country’s Health Secretary, Matt Hancock, also tested positive, while the Chief Medical Officer said he was experiencing symptoms and self-isolating.
- US: New York Mayor de Blasio promised to work with the state to implement a rent freeze for 1m rent stabilised units.
- UK: Gatwick Airport – the country’s second busiest – is closing its north terminal and reducing runway hours from April 1 for at least one month



Interesting Data

- A study last week from Imperial College found that in the absence of any preventative measures, COVID-19 would likely have infected 7bn people (90 per cent of the world's population) and caused 40m deaths this year. However, if suppression strategies are implemented early and sustained, then 38.7m lives could be saved. The study also said the social and economic costs "will be high and may be disproportionately so in lower income settings".
- Data from the Copernicus Sentinel-5P satellite showed that air pollution in Rome, Madrid and Paris had dropped significantly in late-March compared with the previous year. The data looks at the change in nitrogen dioxide concentrations.

Company Updates

- Some US states are threatening to force the insurance industry to honour virus-related claims that some insurers insist are excluded from their policies. Counsel for Chubb said "the losses involved would simply swamp the ability to pay".
- The UK government proposed a suspension of the 'wrongful trading' insolvency provisions such that businesses will still be able to pay staff and suppliers even if management believes the company could be insolvent.
- Tui received a commitment from the German federal government for a €1.8bn KfW loan.
- The chief executive of Qatar Airways said the airline has case for "a very short period" and will "go to our government eventually for equity".
- Ceconomy, the German electronics retailer, has also sought help from the state bank KfW, it was reported by Bloomberg.
- Deutsche Lufthansa has applied for subsidies from the German Kurzarbeit program, which helps offset lost wages
- The French government renewed its call for companies to cut or suspend dividend payments as they battle with the economic fallout from the coronavirus
- The UK government has in effect suspended the country's property market, stopping estate agents from marketing new homes and banning visits to those already for sale.
- The ECB told Eurozone banks on Friday to skip dividend payments and share buybacks until at least October.
- President Trump has ordered General Motors to immediately begin making ventilators, invoking the Defense Production Act in order to compel the automaker to meet the production demands that the nation is likely to face.
- Along similar lines, but without presidential decree, Toyota announced that its idle manufacturing facilities in the US will now make face shields and masks as the Japanese automaker closes on deals with medical-device makers to help them boost production.
- Jefferies announced on Sunday that its CFO, Peg Broadbent, has died of covid-19 complications

Economic Data Highlights

- Measures taken to contain the spread of the new coronavirus could lower



economic activity in the US and other developed countries by a quarter, and lower annual output by 6 per cent if they are sustained for three months, according to the OECD.

- US: The University of Michigan's final consumer sentiment reading came in at 89.1, below the preliminary 95.9 reading, and down from February's 101.0 reading. The 11.9 point fall from last month is the biggest monthly decline in the reading since October 2008.
- Italy: ISTAT's consumer confidence indicator fell to 101.0 in March, down from February's 110.9 and the lowest reading since January 2015.
- France: The INSEE's consumer confidence reading fell to 103 in March, down from 104 in February. However, the survey was conducted from February 26th until March 17th, so mostly before a lockdown was announced on March 16th

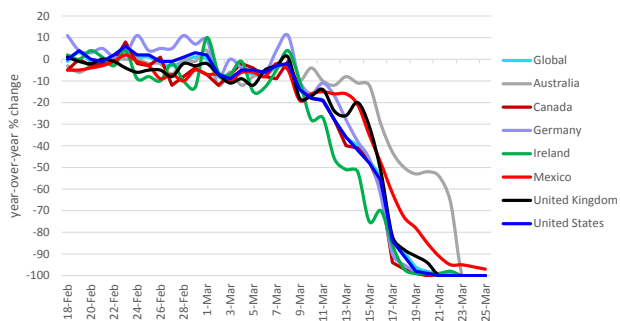
Fiscal and Monetary Updates:

- US: The House of Representatives passed the \$2tn coronavirus stimulus package and President Trump signed the legislation into effect after US markets closed on Friday. The package's major items includes a \$500bn corporate assistance fund, \$377bn of funds for small businesses, \$150bn for local governments, \$100bn for hospitals, and direct payments of \$1,200 to millions of Americans, including those earning up to \$75,000, and an additional \$500 per child.
- US: The Federal Reserve announced that banks which are required to adopt an updated accounting requirement in 2020, which makes them partially incur losses when they make a loan, can now hold off on implementing "the estimated cumulative regulatory capital effects for up to two years."
- US: Dallas Fed President Kaplan said that the US could see the unemployment rate peak "in the low to mid-teens", before declining back to 7-8 per cent by the end of 2020. However, he also said that "We were strong before we went into this, and we believe that we've got a great chance to come out of this very strong".
- Japan: Prime Minister Abe announced an economic package of "unprecedented scale" will be compiled in the next ten days.
- UK: Late Friday, Fitch Ratings cut Britain's credit rating from AA to AA-, citing the weakening of public finances caused by the Covid-19 outbreak.
- Germany: The Bundesrat (upper house) voted in favour of the €750bn coronavirus rescue package, following the Bundestag's vote in favour on Wednesday.
- Canada: In an unscheduled move, the Bank of Canada lowered its target for the overnight rate by 50 basis points to 0.25 per cent. In other measures, the central bank launched a Commercial Paper Purchase Program, and also said it will begin purchasing Canadian government securities in the secondary market, starting with a minimum of \$5bn per week. It said purchases "will continue until the economic recovery is well underway."
- China: Xinhua reported on Friday that China will raise its fiscal deficit in order to deal with the economic impact of the coronavirus.
- Israel: The government is preparing a \$22.4bn stimulus package to be unveiled within the coming days. In addition, the Bank of Israel announced on Sunday that it will lower the capital requirements of commercial banks by one percentage point. Banks boards were also instructed to re-examine their dividend distribution and share buy-back policies.



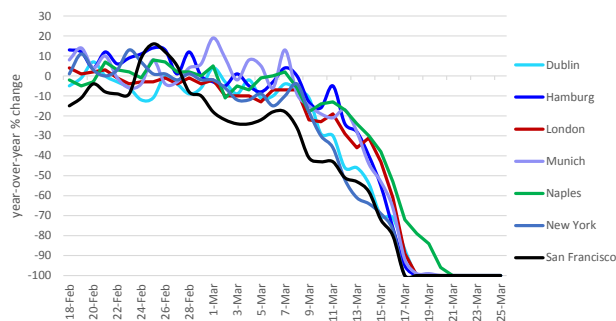
- Africa: The African Development Bank has raised \$3bn in a three-year bond paying 0.75 per cent annual interest to help alleviate the social and economic impact of the Covid-19 pandemic in African countries.
- Global: The Basel Committee’s oversight body, the Group of Central Bank Governors and Heads of Supervision, agreed to defer the introduction of new capital requirements by a year

Figure 3: Year-over-year % change of seated diners at restaurants across countries on the OpenTable network



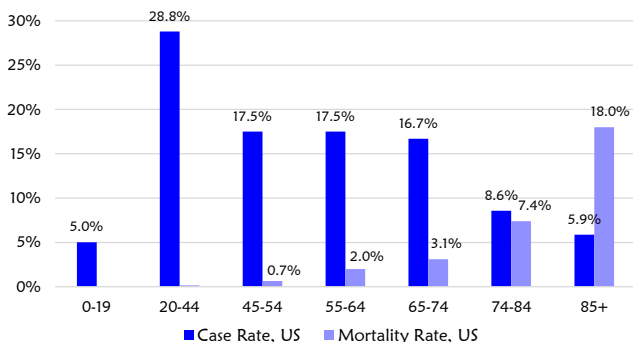
Source : Deutsche Bank, OpenTable

Figure 4: Year-over-year % change of seated diners at restaurants across major cities on the OpenTable network



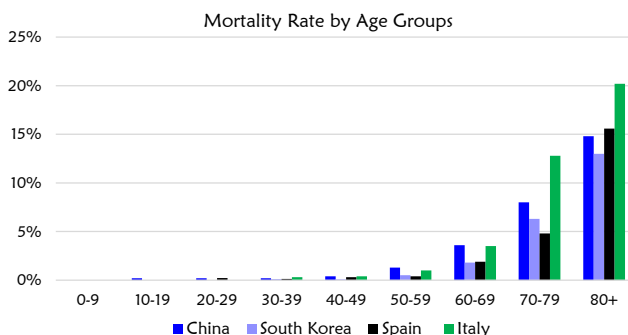
Source : Deutsche Bank, OpenTable

Figure 5: CDC Data of how the virus affects different ages across the US



Source : Deutsche Bank, CDC study through March 13

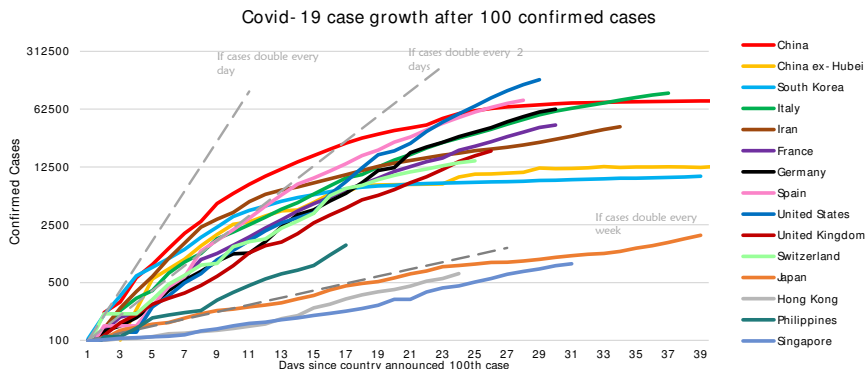
Figure 6: How the virus affects different ages across some of the most affected countries



Source : Deutsche Bank, CCDC, ECDC, OurWorldinData

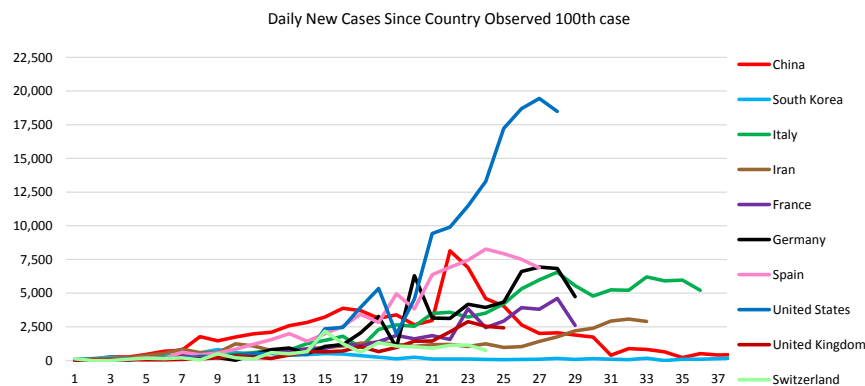


Figure 7: The US is now ahead of the rest of the world at the same point of the curve, growth rates continue to double every 2.5 days on average in Europe



Source : Deutsche Bank, WHO, CDC, Worldometer

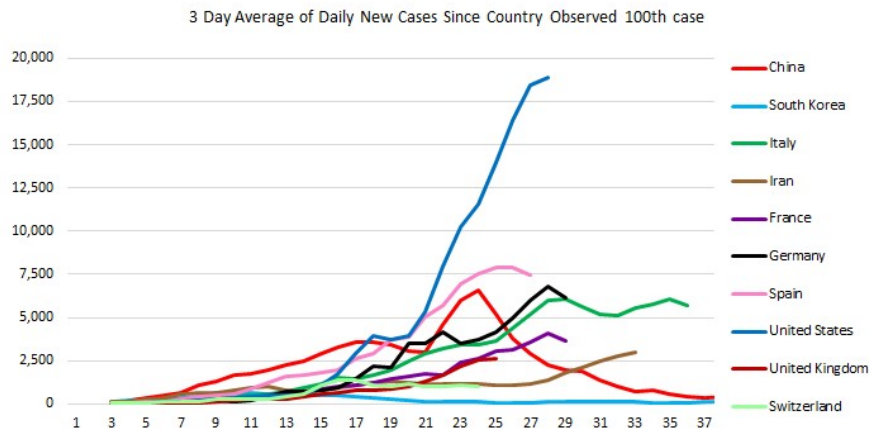
Figure 8: Cases in Europe and the US may be peaking a little later than China did at the same stage of the crisis



Source : Deutsche Bank, WHO, CDC, Worldometer

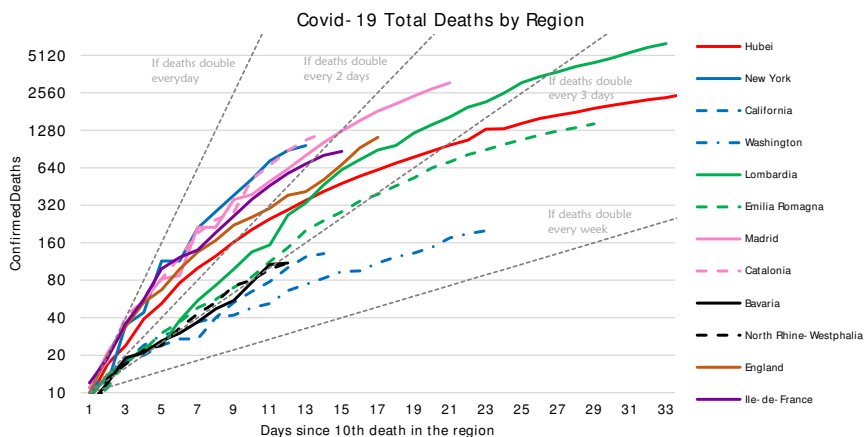


Figure 9: New cases in Europe on a 3 day average basis seem to be flattening and rolling a few days after China's curve did



Source : Deutsche Bank, WHO, CDC, Worldometer

Figure 10: The regions with most fatalities in the US have very different growth rates, compared to Germany, where the two most affected regions are mostly in-line

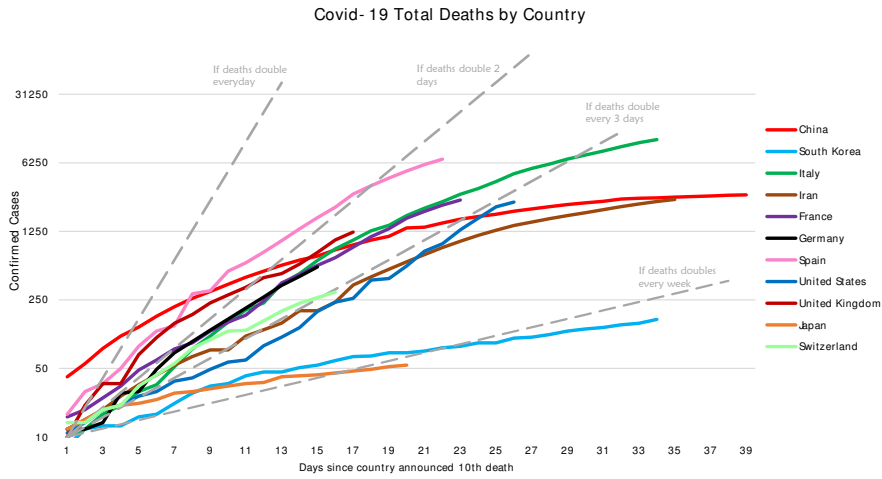


Source : Deutsche Bank, NHS, Covid Tracking Project, ECDC, Santepubliquefrance, Interaktiv.morgenpost

30 March 2020
Thematic Research



Figure 11: Spain's and Italian growth rate of fatalities have started to flatten over the past week



Source: Deutsche Bank, WHO, CDC, Worldometer



Appendix 1

Important Disclosures

*Other information available upon request

*Prices are current as of the end of the previous trading session unless otherwise indicated and are sourced from local exchanges via Reuters, Bloomberg and other vendors. Other information is sourced from Deutsche Bank, subject companies, and other sources. For disclosures pertaining to recommendations or estimates made on securities other than the primary subject of this research, please see the most recently published company report or visit our global disclosure look-up page on our website at <https://research.db.com/Research/Disclosures/CompanySearch>. Aside from within this report, important risk and conflict disclosures can also be found at <https://research.db.com/Research/Topics/Equities?topicId=RB0002>. Investors are strongly encouraged to review this information before investing.

Analyst Certification

The views expressed in this report accurately reflect the personal views of the undersigned lead analyst(s). In addition, the undersigned lead analyst(s) has not and will not receive any compensation for providing a specific recommendation or view in this report. Jim Reid, Karthik Nagalingam, Luke Templeman, Marion Laboure, Henry Allen.



Additional Information

The information and opinions in this report were prepared by Deutsche Bank AG or one of its affiliates (collectively 'Deutsche Bank'). Though the information herein is believed to be reliable and has been obtained from public sources believed to be reliable, Deutsche Bank makes no representation as to its accuracy or completeness. Hyperlinks to third-party websites in this report are provided for reader convenience only. Deutsche Bank neither endorses the content nor is responsible for the accuracy or security controls of those websites.

If you use the services of Deutsche Bank in connection with a purchase or sale of a security that is discussed in this report, or is included or discussed in another communication (oral or written) from a Deutsche Bank analyst, Deutsche Bank may act as principal for its own account or as agent for another person.

Deutsche Bank may consider this report in deciding to trade as principal. It may also engage in transactions, for its own account or with customers, in a manner inconsistent with the views taken in this research report. Others within Deutsche Bank, including strategists, sales staff and other analysts, may take views that are inconsistent with those taken in this research report. Deutsche Bank issues a variety of research products, including fundamental analysis, equity-linked analysis, quantitative analysis and trade ideas. Recommendations contained in one type of communication may differ from recommendations contained in others, whether as a result of differing time horizons, methodologies, perspectives or otherwise. Deutsche Bank and/or its affiliates may also be holding debt or equity securities of the issuers it writes on. Analysts are paid in part based on the profitability of Deutsche Bank AG and its affiliates, which includes investment banking, trading and principal trading revenues.

Opinions, estimates and projections constitute the current judgment of the author as of the date of this report. They do not necessarily reflect the opinions of Deutsche Bank and are subject to change without notice. Deutsche Bank provides liquidity for buyers and sellers of securities issued by the companies it covers. Deutsche Bank research analysts sometimes have shorter-term trade ideas that may be inconsistent with Deutsche Bank's existing longer-term ratings. Some trade ideas for equities are listed as Catalyst Calls on the Research Website (<https://research.db.com/Research/>), and can be found on the general coverage list and also on the covered company's page. A Catalyst Call represents a high-conviction belief by an analyst that a stock will outperform or underperform the market and/or a specified sector over a time frame of no less than two weeks and no more than three months. In addition to Catalyst Calls, analysts may occasionally discuss with our clients, and with Deutsche Bank salespersons and traders, trading strategies or ideas that reference catalysts or events that may have a near-term or medium-term impact on the market price of the securities discussed in this report, which impact may be directionally counter to the analysts' current 12-month view of total return or investment return as described herein. Deutsche Bank has no obligation to update, modify or amend this report or to otherwise notify a recipient thereof if an opinion, forecast or estimate changes or becomes inaccurate. Coverage and the frequency of changes in market conditions and in both general and company-specific economic prospects make it difficult to update research at defined intervals. Updates are at the sole discretion of the coverage analyst or of the Research Department Management, and the majority of reports are published at irregular intervals. This report is provided for informational purposes only and does not take into account the particular investment objectives, financial situations, or needs of individual clients. It is not an offer or a solicitation of an offer to buy or sell any financial instruments or to participate in any particular trading strategy. Target prices are inherently imprecise and a product of the analyst's judgment. The financial instruments discussed in this report may not be suitable for all investors, and investors must make their own informed investment decisions. Prices and availability of financial instruments are subject to change without notice, and investment transactions can lead to losses as a result of price fluctuations and other factors. If a financial instrument is denominated in a currency other than an investor's currency, a change in exchange rates may adversely affect the investment. Past performance is not necessarily indicative of future results. Performance calculations exclude transaction costs, unless otherwise indicated. Unless otherwise indicated, prices are current as of the end of the previous trading session and are sourced from local exchanges via Reuters, Bloomberg and other vendors. Data is also sourced from Deutsche Bank, subject companies, and other parties.

The Deutsche Bank Research Department is independent of other business divisions of the Bank. Details regarding our organizational arrangements and information barriers we have to prevent and avoid conflicts of interest with respect to our research are available on our website (<https://research.db.com/Research/>) under Disclaimer.

Macroeconomic fluctuations often account for most of the risks associated with exposures to instruments that promise to pay fixed or variable interest rates. For an investor who is long fixed-rate instruments (thus receiving these cash flows), increases in interest rates naturally lift the discount factors applied to the expected cash flows and thus cause a loss. The longer the maturity of a certain cash flow and the higher the move in the discount factor, the higher will be the loss. Upside surprises in inflation, fiscal funding needs, and FX depreciation rates are among the most common adverse macroeconomic shocks to receivers. But counterparty exposure, issuer creditworthiness, client segmentation, regulation (including changes in assets holding limits for different types of investors), changes in tax policies, currency convertibility (which may constrain currency conversion, repatriation of profits and/or liquidation of positions), and settlement issues related to local clearing houses are also important risk factors. The sensitivity of fixed-income instruments to macroeconomic shocks may be mitigated by indexing the contracted cash flows to inflation, to FX depreciation, or to specified interest rates – these are common in emerging markets. The index fixings may – by construction – lag or mis-measure the actual move in the underlying variables they are intended to track. The choice of the proper fixing (or metric) is particularly important in swaps markets, where floating coupon rates (i.e., coupons indexed to a typically short-dated interest rate reference index) are exchanged for fixed coupons. Funding in a currency that differs from the currency in which coupons are denominated carries FX risk. Options on swaps (swaptions) the risks typical to options in addition to the risks related to rates movements.

Derivative transactions involve numerous risks including market, counterparty default and illiquidity risk. The appropriateness

30 March 2020
Thematic Research



of these products for use by investors depends on the investors' own circumstances, including their tax position, their regulatory environment and the nature of their other assets and liabilities; as such, investors should take expert legal and financial advice before entering into any transaction similar to or inspired by the contents of this publication. The risk of loss in futures trading and options, foreign or domestic, can be substantial. As a result of the high degree of leverage obtainable in futures and options trading, losses may be incurred that are greater than the amount of funds initially deposited – up to theoretically unlimited losses. Trading in options involves risk and is not suitable for all investors. Prior to buying or selling an option, investors must review the 'Characteristics and Risks of Standardized Options', at <http://www.optionsclearing.com/about/publications/character-risks.jsp>. If you are unable to access the website, please contact your Deutsche Bank representative for a copy of this important document.

Participants in foreign exchange transactions may incur risks arising from several factors, including the following: (i) exchange rates can be volatile and are subject to large fluctuations; (ii) the value of currencies may be affected by numerous market factors, including world and national economic, political and regulatory events, events in equity and debt markets and changes in interest rates; and (iii) currencies may be subject to devaluation or government-imposed exchange controls, which could affect the value of the currency. Investors in securities such as ADRs, whose values are affected by the currency of an underlying security, effectively assume currency risk.

Unless governing law provides otherwise, all transactions should be executed through the Deutsche Bank entity in the investor's home jurisdiction. Aside from within this report, important conflict disclosures can also be found at <https://research.db.com/Research/> on each company's research page. Investors are strongly encouraged to review this information before investing.

Deutsche Bank (which includes Deutsche Bank AG, its branches and affiliated companies) is not acting as a financial adviser, consultant or fiduciary to you or any of your agents (collectively, "You" or "Your") with respect to any information provided in this report. Deutsche Bank does not provide investment, legal, tax or accounting advice, Deutsche Bank is not acting as your impartial adviser, and does not express any opinion or recommendation whatsoever as to any strategies, products or any other information presented in the materials. Information contained herein is being provided solely on the basis that the recipient will make an independent assessment of the merits of any investment decision, and it does not constitute a recommendation of, or express an opinion on, any product or service or any trading strategy.

The information presented is general in nature and is not directed to retirement accounts or any specific person or account type, and is therefore provided to You on the express basis that it is not advice, and You may not rely upon it in making Your decision. The information we provide is being directed only to persons we believe to be financially sophisticated, who are capable of evaluating investment risks independently, both in general and with regard to particular transactions and investment strategies, and who understand that Deutsche Bank has financial interests in the offering of its products and services. If this is not the case, or if You are an IRA or other retail investor receiving this directly from us, we ask that you inform us immediately.

In July 2018, Deutsche Bank revised its rating system for short term ideas whereby the branding has been changed to Catalyst Calls ("CC") from SOLAR ideas; the rating categories for Catalyst Calls originated in the Americas region have been made consistent with the categories used by Analysts globally; and the effective time period for CCs has been reduced from a maximum of 180 days to 90 days.

United States: Approved and/or distributed by Deutsche Bank Securities Incorporated, a member of FINRA, NFA and SIPC. Analysts located outside of the United States are employed by non-US affiliates that are not subject to FINRA regulations.

Germany: Approved and/or distributed by Deutsche Bank AG, a joint stock corporation with limited liability incorporated in the Federal Republic of Germany with its principal office in Frankfurt am Main. Deutsche Bank AG is authorized under German Banking Law and is subject to supervision by the European Central Bank and by BaFin, Germany's Federal Financial Supervisory Authority.

United Kingdom: Approved and/or distributed by Deutsche Bank AG acting through its London Branch at Winchester House, 1 Great Winchester Street, London EC2N 2DB. Deutsche Bank AG in the United Kingdom is authorised by the Prudential Regulation Authority and is subject to limited regulation by the Prudential Regulation Authority and Financial Conduct Authority. Details about the extent of our authorisation and regulation are available on request.

Hong Kong SAR: Distributed by Deutsche Bank AG, Hong Kong Branch, except for any research content relating to futures contracts within the meaning of the Hong Kong Securities and Futures Ordinance Cap. 571. Research reports on such futures contracts are not intended for access by persons who are located, incorporated, constituted or resident in Hong Kong. The author(s) of a research report may not be licensed to carry on regulated activities in Hong Kong, and if not licensed, do not hold themselves out as being able to do so. The provisions set out above in the 'Additional Information' section shall apply to the fullest extent permissible by local laws and regulations, including without limitation the Code of Conduct for Persons Licensed or Registered with the Securities and Futures Commission. This report is intended for distribution only to 'professional investors' as defined in Part 1 of Schedule of the SFO. This document must not be acted or relied on by persons who are not professional investors. Any investment or investment activity to which this document relates is only available to professional investors and will be engaged only with professional investors.

India: Prepared by Deutsche Equities India Private Limited (DEIPL) having CIN: U65990MH2002PTC137431 and registered office at 14th Floor, The Capital, C-70, G Block, Bandra Kurla Complex Mumbai (India) 400051. Tel: + 91 22 7180 4444. It is registered by the Securities and Exchange Board of India (SEBI) as a Stock broker bearing registration no.: INZ000252437;

30 March 2020
Thematic Research



Merchant Banker bearing SEBI Registration no.: INM000010833 and Research Analyst bearing SEBI Registration no.: INH000001741. DEIPL may have received administrative warnings from the SEBI for breaches of Indian regulations. Deutsche Bank and/or its affiliate(s) may have debt holdings or positions in the subject company. With regard to information on associates, please refer to the "Shareholdings" section in the Annual Report at: <https://www.db.com/ir/en/annual-reports.htm>.

Japan: Approved and/or distributed by Deutsche Securities Inc.(DSI). Registration number - Registered as a financial instruments dealer by the Head of the Kanto Local Finance Bureau (Kinsho) No. 117. Member of associations: JSDA, Type II Financial Instruments Firms Association and The Financial Futures Association of Japan. Commissions and risks involved in stock transactions - for stock transactions, we charge stock commissions and consumption tax by multiplying the transaction amount by the commission rate agreed with each customer. Stock transactions can lead to losses as a result of share price fluctuations and other factors. Transactions in foreign stocks can lead to additional losses stemming from foreign exchange fluctuations. We may also charge commissions and fees for certain categories of investment advice, products and services. Recommended investment strategies, products and services carry the risk of losses to principal and other losses as a result of changes in market and/or economic trends, and/or fluctuations in market value. Before deciding on the purchase of financial products and/or services, customers should carefully read the relevant disclosures, prospectuses and other documentation. 'Moody's', 'Standard Poor's', and 'Fitch' mentioned in this report are not registered credit rating agencies in Japan unless Japan or 'Nippon' is specifically designated in the name of the entity. Reports on Japanese listed companies not written by analysts of DSI are written by Deutsche Bank Group's analysts with the coverage companies specified by DSI. Some of the foreign securities stated on this report are not disclosed according to the Financial Instruments and Exchange Law of Japan. Target prices set by Deutsche Bank's equity analysts are based on a 12-month forecast period..

Korea: Distributed by Deutsche Securities Korea Co.

South Africa: Deutsche Bank AG Johannesburg is incorporated in the Federal Republic of Germany (Branch Register Number in South Africa: 1998/003298/10).

Singapore: This report is issued by Deutsche Bank AG, Singapore Branch (One Raffles Quay #18-00 South Tower Singapore 048583, 65 6423 8001), which may be contacted in respect of any matters arising from, or in connection with, this report. Where this report is issued or promulgated by Deutsche Bank in Singapore to a person who is not an accredited investor, expert investor or institutional investor (as defined in the applicable Singapore laws and regulations), they accept legal responsibility to such person for its contents.

Taiwan: Information on securities/investments that trade in Taiwan is for your reference only. Readers should independently evaluate investment risks and are solely responsible for their investment decisions. Deutsche Bank research may not be distributed to the Taiwan public media or quoted or used by the Taiwan public media without written consent. Information on securities/instruments that do not trade in Taiwan is for informational purposes only and is not to be construed as a recommendation to trade in such securities/instruments. Deutsche Securities Asia Limited, Taipei Branch may not execute transactions for clients in these securities/instruments.

Qatar: Deutsche Bank AG in the Qatar Financial Centre (registered no. 00032) is regulated by the Qatar Financial Centre Regulatory Authority. Deutsche Bank AG - QFC Branch may undertake only the financial services activities that fall within the scope of its existing QFCRA license. Its principal place of business in the QFC: Qatar Financial Centre, Tower, West Bay, Level 5, PO Box 14928, Doha, Qatar. This information has been distributed by Deutsche Bank AG. Related financial products or services are only available only to Business Customers, as defined by the Qatar Financial Centre Regulatory Authority.

Russia: The information, interpretation and opinions submitted herein are not in the context of, and do not constitute, any appraisal or evaluation activity requiring a license in the Russian Federation.

Kingdom of Saudi Arabia: Deutsche Securities Saudi Arabia LLC Company (registered no. 07073-37) is regulated by the Capital Market Authority. Deutsche Securities Saudi Arabia may undertake only the financial services activities that fall within the scope of its existing CMA license. Its principal place of business in Saudi Arabia: King Fahad Road, Al Olaya District, P.O. Box 301809, Faisaliah Tower - 17th Floor, 11372 Riyadh, Saudi Arabia.

United Arab Emirates: Deutsche Bank AG in the Dubai International Financial Centre (registered no. 00045) is regulated by the Dubai Financial Services Authority. Deutsche Bank AG - DIFC Branch may only undertake the financial services activities that fall within the scope of its existing DFSA license. Principal place of business in the DIFC: Dubai International Financial Centre, The Gate Village, Building 5, PO Box 504902, Dubai, U.A.E. This information has been distributed by Deutsche Bank AG. Related financial products or services are available only to Professional Clients, as defined by the Dubai Financial Services Authority.

Australia and New Zealand: This research is intended only for 'wholesale clients' within the meaning of the Australian Corporations Act and New Zealand Financial Advisors Act, respectively. Please refer to Australia-specific research disclosures and related information at <https://australia.db.com/australia/content/research-information.html> Where research refers to any particular financial product recipients of the research should consider any product disclosure statement, prospectus or other applicable disclosure document before making any decision about whether to acquire the product. In preparing this report, the primary analyst or an individual who assisted in the preparation of this report has likely been in contact with the company that is the subject of this research for confirmation/clarification of data, facts, statements, permission to use company-sourced material in the report, and/or site-visit attendance. Without prior approval from Research Management, analysts may not

30 March 2020
Thematic Research



accept from current or potential Banking clients the costs of travel, accommodations, or other expenses incurred by analysts attending site visits, conferences, social events, and the like. Similarly, without prior approval from Research Management and Anti-Bribery and Corruption ("ABC") team, analysts may not accept perks or other items of value for their personal use from issuers they cover.

Additional information relative to securities, other financial products or issuers discussed in this report is available upon request. This report may not be reproduced, distributed or published without Deutsche Bank's prior written consent.

Backtested, hypothetical or simulated performance results have inherent limitations. Unlike an actual performance record based on trading actual client portfolios, simulated results are achieved by means of the retroactive application of a backtested model itself designed with the benefit of hindsight. Taking into account historical events the backtesting of performance also differs from actual account performance because an actual investment strategy may be adjusted any time, for any reason, including a response to material, economic or market factors. The backtested performance includes hypothetical results that do not reflect the reinvestment of dividends and other earnings or the deduction of advisory fees, brokerage or other commissions, and any other expenses that a client would have paid or actually paid. No representation is made that any trading strategy or account will or is likely to achieve profits or losses similar to those shown. Alternative modeling techniques or assumptions might produce significantly different results and prove to be more appropriate. Past hypothetical backtest results are neither an indicator nor guarantee of future returns. Actual results will vary, perhaps materially, from the analysis.

Copyright © 2020 Deutsche Bank AG



David Folkerts-Landau

Group Chief Economist and Global Head of Research

Pam Finelli
Global Chief Operating Officer
Research

Anthony Klarman
Global Head of
Debt Research

Michael Spencer
Head of APAC Research

Steve Pollard
Head of Americas Research
Global Head of Company
Research

Gerry Gallagher
Head of European
Company Research

Andreas Neubauer
Head of Germany Research

Peter Milliken
Head of APAC
Company Research

Jim Reid
Global Head of
Thematic Research

Francis Yared
Global Head of Rates Research

George Saravelos
Global Head of FX Research

Peter Hooper
Global Head of
Economic Research

International Production Locations

Deutsche Bank AG

Deutsche Bank Place
Level 16
Corner of Hunter & Phillip Streets
Sydney, NSW 2000
Australia
Tel: (61) 2 8258 1234

Deutsche Bank AG

Equity Research
Mainzer Landstrasse 11-17
60329 Frankfurt am Main
Germany
Tel: (49) 69 910 00

Deutsche Bank AG

Filiale Hongkong
International Commerce Centre,
1 Austin Road West, Kowloon,
Hong Kong
Tel: (852) 2203 8888

Deutsche Securities Inc.

2-11-1 Nagatacho
Sanno Park Tower
Chiyoda-ku, Tokyo 100-6171
Japan
Tel: (81) 3 5156 6000

Deutsche Bank AG London

1 Great Winchester Street
London EC2N 2EQ
United Kingdom
Tel: (44) 20 7545 8000

Deutsche Bank Securities Inc.

60 Wall Street
New York, NY 10005
United States of America
Tel: (1) 212 250 2500
