

# Chief economist's comment

Does anyone know what is happening?

Chief Investment Office GWM | 30 March 2020 4:19 pm BST

Paul Donovan, Chief Economist, UBS GWM, paul.donovan@ubs.com

- Economic data is likely to become increasingly unreliable as a result of the coronavirus lockdown. We know the global economy will be bad. We will not know, with much accuracy, just how bad.
- Annualizing data is absurd in the current climate. What happens in the second quarter is not going to be repeated for the rest of the year. Time to stop annualizing numbers.
- Most economic data is survey based. Industrial production, some unemployment numbers, inflation numbers, GDP and the various sentiment opinion polls need people to fill in surveys. If you are filling in survey forms in a lockdown you are likely to be an unusual person, and possibly not representative.
- Social media spreads fear and affects sentiment. Sentiment affects answers to surveys. Data, like consumer price inflation, includes restaurant prices, but restaurants are closed. What happens when you survey something that is not there?
- Online spending is likely to have increased in lockdowns. Online spending may stay higher after the lockdowns end. It may not be properly captured in official data.
- Some data items are more reliable than others. Investors need to be careful about putting economic numbers into investment models, however. Garbage in means garbage out.

The global economy is going to have a very bad few months. Fear of the coronavirus has changed consumer behavior. Government policy aims to cut GDP growth in most major economies. But we may not really know what is actually going on in these economies. The quality of economic data is going to be affected by shutdowns. So where are the problems?

## Annualizing

One problem is the US habit of "annualizing" its data. A few other economies also do this. This is never a great idea in normal times. It is an absurd thing to do now.

Annualization works by saying that what happens in one quarter will keep on happening, exactly the same way, for a year. Economic activity in the second quarter is going to be badly hit by shutdowns. No one imagines that this will be repeated for a whole year. US GDP might drop 7.5% in the second quarter. No sensible economist thinks that US GDP will drop 30% over the next year, but that is how annualization reports it.

The sensible approach is to ignore annualized numbers. Focusing on the quarterly changes is quite bad enough. There is no need to sensationalize the data.

## Surveying a shutdown

Nearly all data is survey-based. That is obvious for things like sentiment opinion polls. But US unemployment is also a survey. The unemployment rate is categorized in the "household survey" part of the data. Across the world, industrial production is a survey. Retail sales numbers are surveys. Inflation data are surveys, normally weighted using the results of different surveys. GDP is a mass of surveys put together.

One of the reasons data quality has fallen in recent years is that fewer people fill in surveys. Those that do are less likely to answer all the questions. Surveys are a nuisance to do. In the age of email you can barely leave a shop or hotel without being asked to do a survey. People are fed up of answering questions.

In the current crisis, even fewer people are likely to want to fill in a survey. A business owner is not likely to want to answer detailed questions on retail sales in an economic lockdown. Anyone who does take the time to fill in a survey in the middle of this uncertainty is going to be "unusual". Right now you probably do not want the opinion of anyone who wants to give you their opinion.

Businesses that are very busy (like food shops) will not answer government data surveys. Businesses that have shut down (like restaurants) will not answer government data surveys. There is a risk that data is based on a smaller and less representative sample of answers in an economic lockdown.

## Twitter the super-spreader

Fear of the virus is a major economic problem. Social media is very good at promoting fear. Fake news is retweeted 70% more often than the truth. As people work from home, they feel cut off from news and information and turn to social media.

The risk is that social media will affect sentiment. If someone does take the time to fill in a survey, their answers may be biased by their sentiment. People are asked clear questions in data surveys. However, we know that people do not always answer these questions accurately.

## What if there isn't anything to survey?

Measuring inflation is a problem in a shutdown. In the UK, restaurants and hotels are over 11% of the consumer price index. But restaurants are closed. What do you do about their prices? It seems pointless including the restaurant meals in consumer price inflation. People have stopped spending on various leisure activities and travel. (Unless people cancelled their subscription they will still

spend on gym membership). If people are not spending, should the prices be counted?

In the United States medical care services are over 7% of the consumer price basket. A small sample of treatments are used to represent medical costs. But the medical care people used to pay for is no longer being bought. Medical care is focused on dealing with consequences of the coronavirus. So what is being paid for is now different. This will not be properly reflected in the prices.

Overall the demand shock of phase one should be disinflationary. It is unlikely to be measured properly. Producer prices may be more accurate than consumer prices. Producer prices are not affected by retail stores, or bars and restaurants closing. But some factories are closing (e.g. the auto sector). Gradually producer prices will also try to measure something that is not there.

Natural disasters, strikes and similar events sometimes mean that there is nothing to survey in part of an economy. However, this is often limited to a part of the country (for instance, US hurricanes). Alternatively only a relatively small sector is closed, as with a strike. Estimates can be made for the effect of the lost data. These estimates are often published alongside the numbers. The problem currently is that economies are shutting down nationally. Entire industries are closing. It is not going to be easy to adjust for that.

## The rise of online

Economic lockdowns have increased online spending. People are shopping for the things that they need online. This is very evident in online food sales. People are also going online for gaming or films while stuck at home. This is a structural change in the way people consume. The move to online spending may continue after the lockdown. Once people start online spending, they may be more reluctant to go back to shopping in stores. However, economic data can be slow to recognize such structural breaks. Consumer spending may be under reported if the surge in importance of online spending is not properly captured. It is worth noting that consumption data generally registers the time of sale, not the time of delivery. The sale is recorded, even if there is a delay in the customer receiving their purchase.

Some larger firms are under pressure to close online sales. This is because large numbers of people work together to supply goods in large firms. For smaller firms this is less of a problem. But the fact that smaller firms may find online sales easier may also make such sales harder to capture in economic data. Some firms may also have problems finding supply. This will give an uneven change to online sales. That may also create problems with measurement. If the firms questioned are not representative of the whole sector, the data will not be correct.

There has been some evidence of under-reporting online activity in China. Online services are not generally reported in the economic data. There is also evidence that internet activity grew faster during the recent lockdown than officially reported online retail sales.

## What can we look at?

What data can be relied upon in the lockdown period? As a general rule, data that avoids surveys or sentiment will be more reliable.

US initial jobless claims could be more reliable than US unemployment. Initial jobless claims require people to actually register. Many European unemployment numbers are based on people who file a claim. This will be reliable.

Data, like bank lending, should also be reliable. This has to be supplied for regulatory reasons, and is not done by a survey.

Investors are turning to data sources like electricity use to estimate what is happening to economies. This data needs to be used carefully. People working from home will still contribute to GDP, but electricity consumption will fall. Countries with a lot of manufacturing will tend to have larger drops in electricity use than countries that are more service sector focused, even if GDP falls equally in both places. Industries like steel use a lot of power relative to the amount of GDP they produce.

Similarly, measures of traffic or pollution in cities are only approximate measures of economic activity. Where people are able to work from home they will add to GDP without travelling. Again, the ability to work effectively from home will differ depending on what makes up an economy. A worker making cars will find it difficult to work from home. Economists often work from home.

## The challenge

Investors will have to realize that we do not know what is going on during the worst phases of the coronavirus crisis. The quality of economic data is going to be lower. Whole sections of data cannot be captured properly. Data is likely to be revised a lot. The fashion for "big data" also needs to be treated with care. In a period of structural upheaval, economic relationships change.

The UK Office of National Statistics has already warned of reduced quality and reduced detail in some of its data. It has also highlighted the possibility of suspending some data publication.

For a few months, investors need to be very careful about using economic data in investment models. If the data is wrong, models will be wrong. Remember the computing adage—garbage in, garbage out.

## Appendix

UBS Chief Investment Office's ("CIO") investment views are prepared and published by the Global Wealth Management business of UBS Switzerland AG (regulated by FINMA in Switzerland) or its affiliates ("UBS"). The investment views have been prepared in accordance with legal requirements designed to promote **the independence of investment research**.

**Generic investment research – Risk information:** This publication is **for your information only** and is not intended as an offer, or a solicitation of an offer, to buy or sell any investment or other specific product. The analysis contained herein does not constitute a personal recommendation or take into account the particular investment objectives, investment strategies, financial situation and needs of any specific recipient. It is based on numerous assumptions. Different assumptions could result in materially different results. Certain services and products are subject to legal restrictions and cannot be offered worldwide on an unrestricted basis and/or may not be eligible for sale to all investors. All information and opinions expressed in this document were obtained from sources believed to be reliable and in good faith, but no representation or warranty, express or implied, is made as to its accuracy or completeness (other than disclosures relating to UBS). All information and opinions as well as any forecasts, estimates and market prices indicated are current as of the date of this report, and are subject to change without notice. Opinions expressed herein may differ or be contrary to those expressed by other business areas or divisions of UBS as a result of using different assumptions and/or criteria.

In no circumstances may this document or any of the information (including any forecast, value, index or other calculated amount ("Values")) be used for any of the following purposes (i) valuation or accounting purposes; (ii) to determine the amounts due or payable, the price or the value of any financial instrument or financial contract; or (iii) to measure the performance of any financial instrument including, without limitation, for the purpose of tracking the return or performance of any Value or of defining the asset allocation of portfolio or of computing performance fees. By receiving this document and the information you will be deemed to represent and warrant to UBS that you will not use this document or otherwise rely on any of the information for any of the above purposes. UBS and any of its directors or employees may be entitled at any time to hold long or short positions in investment instruments referred to herein, carry out transactions involving relevant investment instruments in the capacity of principal or agent, or provide any other services or have officers, who serve as directors, either to/for the issuer, the investment instrument itself or to/for any company commercially or financially affiliated to such issuers. At any time, investment decisions (including whether to buy, sell or hold securities) made by UBS and its employees may differ from or be contrary to the opinions expressed in UBS research publications. Some investments may not be readily realizable since the market in the securities is illiquid and therefore valuing the investment and identifying the risk to which you are exposed may be difficult to quantify. UBS relies on information barriers to control the flow of information contained in one or more areas within UBS, into other areas, units, divisions or affiliates of UBS. Futures and options trading is not suitable for every investor as there is a substantial risk of loss, and losses in excess of an initial investment may occur. Past performance of an investment is no guarantee for its future performance. Additional information will be made available upon request. Some investments may be subject to sudden and large falls in value and on realization you may receive back less than you invested or may be required to pay more. Changes in foreign exchange rates may have an adverse effect on the price, value or income of an investment. The analyst(s) responsible for the preparation of this report may interact with trading desk personnel, sales personnel and other constituencies for the purpose of gathering, synthesizing and interpreting market information.

Tax treatment depends on the individual circumstances and may be subject to change in the future. UBS does not provide legal or tax advice and makes no representations as to the tax treatment of assets or the investment returns thereon both in general or with reference to specific client's circumstances and needs. We are of necessity unable to take into account the particular investment objectives, financial situation and needs of our individual clients and we would recommend that you take financial and/or tax advice as to the implications (including tax) of investing in any of the products mentioned herein.

This material may not be reproduced or copies circulated without prior authority of UBS. Unless otherwise agreed in writing UBS expressly prohibits the distribution and transfer of this material to third parties for any reason. UBS accepts no liability whatsoever for any claims or lawsuits from any third parties arising from the use or distribution of this material. This report is for distribution only under such circumstances as may be permitted by applicable law. For information on the ways in which CIO manages conflicts and maintains independence of its investment views and publication offering, and research and rating methodologies, please visit [www.ubs.com/research](http://www.ubs.com/research). Additional information on the relevant authors of this publication and other CIO publication(s) referenced in this report; and copies of any past reports on this topic; are available upon request from your client advisor.

**Important Information About Sustainable Investing Strategies:** Sustainable investing strategies aim to consider and incorporate environmental, social and governance (ESG) factors into investment process and portfolio construction. Strategies across geographies and styles approach ESG analysis and incorporate the findings in a variety of ways. Incorporating ESG factors or Sustainable Investing considerations may inhibit the portfolio manager's ability to participate in certain investment opportunities that otherwise would be consistent with its investment objective and other principal investment strategies. The returns on a portfolio consisting primarily of sustainable investments may be lower or higher than portfolios where ESG factors, exclusions, or other sustainability issues are not considered by the portfolio manager, and the investment opportunities available to such portfolios may differ. Companies may not necessarily meet high performance standards on all aspects of ESG or sustainable investing issues; there is also no guarantee that any company will meet expectations in connection with corporate responsibility, sustainability, and/or impact performance.

Distributed to US persons by UBS Financial Services Inc. or UBS Securities LLC, subsidiaries of UBS AG. UBS Switzerland AG, UBS Europe SE, UBS Bank, S.A., UBS Brasil Administradora de Valores Mobiliários Ltda, UBS Asesores Mexico, S.A. de C.V., UBS Securities Japan Co., Ltd, UBS Wealth Management Israel Ltd and UBS Menkul Degerler AS are affiliates of UBS AG. UBS Financial Services Incorporated of Puerto Rico is a subsidiary of UBS Financial Services Inc. **UBS Financial Services Inc. accepts responsibility for the content of a report prepared by a non-US affiliate when it distributes reports to US persons. All transactions by a US person in the securities mentioned in this report should be effected through a US-registered broker dealer affiliated with UBS, and not through a non-US affiliate. The contents of this report have not been and will not be approved by any securities or investment authority in the United States or elsewhere. UBS Financial Services Inc. is not acting as a municipal advisor to any municipal entity or obligated person within the meaning of Section 15B of the Securities Exchange Act (the "Municipal Advisor Rule") and the opinions or views contained herein are not intended to be, and do not constitute, advice within the meaning of the Municipal Advisor Rule.**

**External Asset Managers / External Financial Consultants:** In case this research or publication is provided to an External Asset Manager or an External Financial Consultant, UBS expressly prohibits that it is redistributed by the External Asset Manager or the External Financial Consultant and is made available to their clients and/or third parties.

**Austria:** This publication is not intended to constitute a public offer under Austrian law. It is distributed only for information purposes to clients of UBS Europe SE, Niederlassung Österreich, with place of business at Wächtergasse 1, A-1010 Wien. UBS Europe SE, Niederlassung Österreich is subject to the joint supervision of the European Central Bank ("ECB"), the German Central Bank (Deutsche Bundesbank), the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht), as well as of the Austrian Financial Market Authority (Finanzmarktaufsicht), to which this publication has not been submitted for approval. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by the ECB. **Bahrain:** UBS is a Swiss bank not licensed, supervised or regulated in Bahrain by the Central Bank of Bahrain and does not undertake banking or investment business activities in Bahrain. Therefore, clients have no protection under local banking and investment services laws and regulations. **Brazil:** This publication is not intended to constitute a public offer under Brazilian law or a research analysis report as per the definition contained under the Comissão de Valores Mobiliários ("CVM") Instruction 598/2018. It is distributed only for information purposes to clients of UBS Brasil Administradora de Valores Mobiliários Ltda. and/or of UBS Consenso Investimentos Ltda., entities regulated by CVM. **Canada:** In Canada, this publication is distributed to clients of UBS Wealth Management Canada by UBS Investment Management Canada Inc. **China:** This report is prepared by UBS Switzerland AG or its offshore subsidiary or affiliate (collectively as "UBS Offshore"). UBS Offshore is an entity incorporated out of China and is not licensed, supervised or regulated in China to carry out banking or securities business. The recipient should not contact the analysts or UBS Offshore which produced this report for advice as they are not licensed to provide securities investment advice in China. UBS Investment Bank (including Research) has its own wholly independent research and views which at times may vary from the views of UBS Global Wealth Management. This report shall not be regarded as providing specific securities related analysis. The recipient should not use this document or otherwise rely on any of the information contained in this report in making investment decisions and UBS takes no responsibility in this regard. **Czech Republic:** UBS is not a licensed bank in the Czech Republic and thus is not allowed to provide regulated banking or investment services in the Czech Republic. Please notify UBS if you do not wish to receive any further correspondence. **Denmark:** This publication is not intended to constitute a public offer under Danish law. It is distributed only for information purposes to clients of UBS Europe SE, Denmark Branch, filial af UBS Europe SE, with place of business at Sankt Annæ Plads 13, 1250 Copenhagen, Denmark, registered with the Danish Commerce and Companies Agency, under No. 38 17 24 33. UBS Europe SE, Denmark Branch, filial af UBS Europe SE is subject to the joint supervision of the European Central Bank ("ECB"), the German Central Bank (Deutsche Bundesbank), the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht), as well as of the Danish Financial Supervisory Authority (Finanstilsynet), to which this publication has not been submitted for approval. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by the ECB. **France:** This publication is distributed by UBS (France) S.A., French "société anonyme" with share capital of € 132.975.556, 69, boulevard Haussmann F-75008 Paris, R.C.S. Paris B 421 255 670, to its clients and prospects. UBS (France) S.A. is a provider of investment services duly authorized according to the terms of the "Code Monétaire et Financier", regulated by French banking and financial authorities as the "Autorité de Contrôle Prudential et de Résolution". **Germany:** This publication is not intended to constitute a public offer under German law. It is distributed only for information purposes to clients of UBS Europe SE, Germany, with place of business at Bockenheimer Landstrasse 2-4, 60306 Frankfurt am Main. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by the European Central Bank ("ECB"), and supervised by the ECB, the German Central Bank (Deutsche Bundesbank) and the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht), to which this publication has not been submitted for approval. **Greece:** UBS Switzerland AG and its affiliates (UBS) are not licensed as a bank or financial institution under Greek legislation and do not provide banking and financial services in Greece. Consequently, UBS provides such services from branches outside of Greece, only. This document may not be considered as a public offering made or to be made to residents of Greece. **Hong Kong:** This publication is distributed to clients of UBS AG Hong Kong Branch by UBS AG Hong Kong Branch, a licensed bank under the Hong Kong Banking Ordinance and a registered institution under the Securities and Futures Ordinance. UBS AG Hong Kong Branch is incorporated in Switzerland with limited liability. **India:** UBS Securities India Private Ltd. (Corporate Identity Number U67120MH1996PTC097299) 2/F, 2 North Avenue, Maker Maxity, Bandra Kurla Complex, Bandra (East), Mumbai (India) 400051. Phone: +912261556000. It provides brokerage services bearing SEBI Registration Number INZ000259830; merchant banking services bearing SEBI Registration Number: INM000010809 and Research Analyst services bearing SEBI Registration Number: INH000001204. UBS AG, its affiliates or subsidiaries may have debt holdings or positions in the subject Indian company/companies. Within the past 12 months, UBS AG, its affiliates or subsidiaries may have received compensation for non-investment banking securities-related services and/or non-securities services from the subject Indian company/companies. The subject company/companies may have been a client/clients of UBS AG, its affiliates or subsidiaries during the 12 months preceding the date of distribution of the research report with respect to investment banking and/or non-investment banking securities-related services and/or non-securities services. With regard to information on associates, please refer to the Annual Report at: [http://www.ubs.com/global/en/about\\_ubs/investor\\_relations/](http://www.ubs.com/global/en/about_ubs/investor_relations/)

## Appendix

annualreporting.html **Indonesia, Malaysia, Philippines, Thailand:** This material was provided to you as a result of a request received by UBS from you and/or persons entitled to make the request on your behalf. Should you have received the material erroneously, UBS asks that you kindly destroy/delete it and inform UBS immediately. Any and all advice provided and/or trades executed by UBS pursuant to the material will only have been provided upon your specific request or executed upon your specific instructions, as the case may be, and may be deemed as such by UBS and you. The material may not have been reviewed, approved, disapproved or endorsed by any financial or regulatory authority in your jurisdiction. The relevant investments will be subject to restrictions and obligations on transfer as set forth in the material, and by receiving the material you undertake to comply fully with such restrictions and obligations. You should carefully study and ensure that you understand and exercise due care and discretion in considering your investment objective, risk appetite and personal circumstances against the risk of the investment. You are advised to seek independent professional advice in case of doubt. **Israel:** UBS is a premier global financial firm offering wealth management, asset management and investment banking services from its headquarters in Switzerland and its operations in over 50 countries worldwide to individual, corporate and institutional investors. In Israel, UBS Switzerland AG is registered as Foreign Dealer in cooperation with UBS Wealth Management Israel Ltd., a wholly owned UBS subsidiary. UBS Wealth Management Israel Ltd. is a Portfolio Manager licensee which engages also in Investment Marketing and is regulated by the Israel Securities Authority. This publication is intended for information only and is not intended as an offer to buy or solicitation of an offer. Furthermore, this publication is not intended as an investment advice and/or investment marketing and is not replacing any investment advice and/or investment marketing provided by the relevant licensee which is adjusted to each person needs. The word "advice" and/or any of its derivatives shall be read and construed in conjunction with the definition of the term "investment marketing" as defined under the Israeli Regulation of Investment Advice, Investment Marketing and Portfolio Management Law, 1995. **Italy:** This publication is not intended to constitute a public offer under Italian law. It is distributed only for information purposes to clients of UBS Europe SE, Succursale Italia, with place of business at Via del Vecchio Politecnico, 3-20121 Milano. UBS Europe SE, Succursale Italia is subject to the joint supervision of the European Central Bank ("ECB"), the German Central Bank (Deutsche Bundesbank), the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht), as well as of the Bank of Italy (Banca d'Italia) and the Italian Financial Markets Supervisory Authority (CONSOB - Commissione Nazionale per le Società e la Borsa), to which this publication has not been submitted for approval. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by the ECB. **Jersey:** UBS AG, Jersey Branch, is regulated and authorized by the Jersey Financial Services Commission for the conduct of banking, funds and investment business. Where services are provided from outside Jersey, they will not be covered by the Jersey regulatory regime. UBS AG, Jersey Branch is a branch of UBS AG a public company limited by shares, incorporated in Switzerland whose registered offices are at Aeschenvorstadt 1, CH-4051 Basel and Bahnhofstrasse 45, CH 8001 Zurich. UBS AG, Jersey Branch's principal place business is 1, IFC Jersey, St Helier, Jersey, JE2 3BX. **Luxembourg:** This publication is not intended to constitute a public offer under Luxembourg law. It is distributed only for information purposes to clients of UBS Europe SE, Luxembourg Branch, with place of business at 33A, Avenue J. F. Kennedy, L-1855 Luxembourg. UBS Europe SE, Luxembourg Branch is subject to the joint supervision of the European Central Bank ("ECB"), the German Central bank (Deutsche Bundesbank), the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht), as well as of the Luxembourg supervisory authority (Commission de Surveillance du Secteur Financier), to which this publication has not been submitted for approval. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by the ECB. **Mexico:** This information is distributed by UBS Asesores México, S.A. de C.V. ("UBS Asesores"), an affiliate of UBS Switzerland AG, incorporated as a non-independent investment advisor under the Securities Market Law due to the relation with a Foreign Bank. UBS Asesores is a regulated entity and it is subject to the supervision of the Mexican Banking and Securities Commission ("CNBV"), which exclusively regulates UBS Asesores regarding the rendering of portfolio management, as well as on securities investment advisory services, analysis and issuance of individual investment recommendations, so that the CNBV has no surveillance faculties nor may have over any other service provided by UBS Asesores. UBS Asesores is registered before CNBV under Registry number 30060. You are being provided with this UBS publication or material because you have indicated to UBS Asesores that you are a Sophisticated Qualified Investor located in Mexico. The compensation of the analyst(s) who prepared this report is determined exclusively by research management and senior management of any entity of UBS Group to which such analyst(s) render services. **Nigeria:** UBS Switzerland AG and its affiliates (UBS) are not licensed, supervised or regulated in Nigeria by the Central Bank of Nigeria or the Nigerian Securities and Exchange Commission and do not undertake banking or investment business activities in Nigeria. **Portugal:** UBS Switzerland AG is not licensed to conduct banking and financial activities in Portugal nor is UBS Switzerland AG supervised by the Portuguese regulators (Bank of Portugal "Banco de Portugal" and Portuguese Securities Exchange Commission "Comissão do Mercado de Valores Mobiliários"). **Singapore:** This material was provided to you as a result of a request received by UBS from you and/or persons entitled to make the request on your behalf. Should you have received the material erroneously, UBS asks that you kindly destroy/delete it and inform UBS immediately. Clients of UBS AG Singapore branch are asked to please contact UBS AG Singapore branch, an exempt financial adviser under the Singapore Financial Advisers Act (Cap. 110) and a wholesale bank licensed under the Singapore Banking Act (Cap. 19) regulated by the Monetary Authority of Singapore, in respect of any matters arising from, or in connection with, the analysis or report. **Spain:** This publication is not intended to constitute a public offer under Spanish law. It is distributed only for information purposes to clients of UBS Europe SE, Sucursal en España, with place of business at Calle María de Molina 4, C.P. 28006, Madrid. UBS Europe SE, Sucursal en España is subject to the joint supervision of the European Central Bank ("ECB"), the German Central bank (Deutsche Bundesbank), the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht), as well as of the Spanish supervisory authority (Banco de España), to which this publication has not been submitted for approval. Additionally it is authorized to provide investment services on securities and financial instruments, regarding which it is supervised by the Comisión Nacional del Mercado de Valores as well. UBS Europe SE, Sucursal en España is a branch of UBS Europe SE, a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by the ECB. **Sweden:** This publication is not intended to constitute a public offer under Swedish law. It is distributed only for information purposes to clients of UBS Europe SE, Sweden Bankfilial, with place of business at Regeringsgatan 38, 11153 Stockholm, Sweden, registered with the Swedish Companies Registration Office under Reg. No 516406-1011. UBS Europe SE, Sweden Bankfilial is subject to the joint supervision of the European Central Bank ("ECB"), the German Central bank (Deutsche Bundesbank), the German Federal Financial Services Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht), as well as of the Swedish supervisory authority (Finansinspektionen), to which this publication has not been submitted for approval. UBS Europe SE is a credit institution constituted under German law in the form of a Societas Europaea, duly authorized by the ECB. **Taiwan:** This material is provided by UBS AG, Taipei Branch in accordance with laws of Taiwan, in agreement with or at the request of clients/prospects. **UAE:** UBS is not licensed in the UAE by the Central Bank of UAE or by the Securities & Commodities Authority. The UBS AG Dubai Branch is licensed in the DIFC by the Dubai Financial Services Authority as an authorised firm. **UK:** This document is issued by UBS Wealth Management, a division of UBS AG which is authorised and regulated by the Financial Market Supervisory Authority in Switzerland. In the United Kingdom, UBS AG is authorised by the Prudential Regulation Authority and is subject to regulation by the Financial Conduct Authority and limited regulation by the Prudential Regulation Authority. Details about the extent of regulation by the Prudential Regulation Authority are available from us on request. A member of the London Stock Exchange. This publication is distributed to retail clients of UBS Wealth Management. Version 06/2019. CIO82652744

© UBS 2020. The key symbol and UBS are among the registered and unregistered trademarks of UBS. All rights reserved.