

Telecom Services

Quantifying Churn Benefits During COVID-19

21 April 2020

Key Takeaway

There can be no doubt that virus-related lockdowns reduce mobile churn. The question is by how much. Heading into results season, we show real-time mobile number porting data suggesting churn reduction of 55-63% in France, Italy and Belgium. Associated lower commercial costs would provide a material lever to mitigate top-line pressures. We discuss why so far stable porting activity in other countries indicates almost certainly just a delay of the effect.

Quantifying churn reduction. Given the still material share of brick-and-mortar distribution in many mobile markets, it stands to reason that the virus-related lockdowns across Europe will reduce churn. The question is by how much. To address this question, we analyse proprietary real-time data on number porting activity. Heading into 1Q20 results season, this is leading, not lagging information.

Number porting down 55-63%. Naturally, effects should be expected to show up first in markets with short notice periods (see last point on limitations). Mainly for that reason, we focus on Italy, France and Belgium.

- In Italy, number porting post-lockdown reduced by 59% compared to the pre-lockdown situation. This is a 3.9x standard deviations effect.
- In France, number porting reduced by 63% (4.3x sigma).
- In Belgium, number porting reduced by 55% (4.2x sigma).

A particularly striking feature of these three markets is the relative uniformity of the size of the churn reduction, despite significantly different market structures and dynamics. This is a major reason why we (a) write up these conclusions in a sector context (and not just for the countries in question), and (b) are confident that markets with longer notice periods will see similar effects once number porting reflects customer decisions taken *during* the lockdown (rather than *before*).

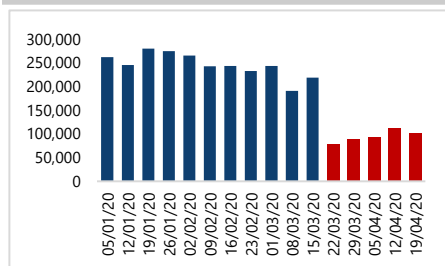
Impact I: Cost reprieve. Most obviously, reduced churn (porting activity) means lower commercial cash costs. Under normal circumstances, these can run at 15-20% of sales. Together with the churn reduction figures quoted above, this suggests savings potential of 10+pp of sales, in principle. We believe that this, together with capex flexibility, supports the view that outlook statements on FCF made pre-lockdown may prove resilient.

Impact II: Challengers lose momentum. A second impact of reduced churn is a changed dynamic in markets with secular share shifts. In Italy, Iliad's share momentum is clearly flagging post-lockdown (giving Wind-Tre some reprieve, in particular), and in France, Bouygues and, to an extent, SFR lost momentum, benefitting Orange and Iliad. Clearly, the challengers will benefit from lower commercial costs as well, but the incumbent operators are the "double winners" (lower cost, less share loss).

Limitations. Among the limitations of this analysis, we highlight: (a) lengthy notice periods in some markets introduce a delay between the subscriber decision and the number port; (b) certain types of post-M&A number migrations as well as MVNOs changing network host do not reflect subscriber decisions; (c) resellers in operators' number spaces do not show up as ports; (d) IFRS15 'smoothing' of contract acquisition costs washes out the P&L impact.

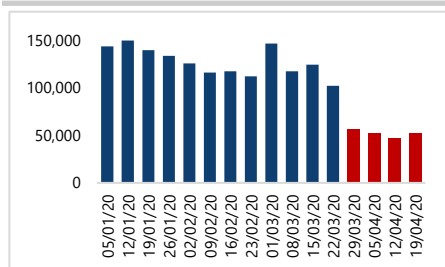
EQUITY RESEARCH
POWERED BY
Jefdata.

Italy - Mobile ports per week



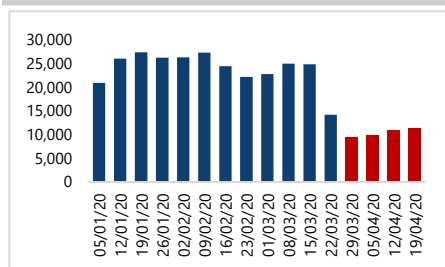
Source: Jefferies, TMT Analysis

France - Mobile ports per week



Source: Jefferies, TMT Analysis

Belgium - Mobile ports per week



Source: Jefferies, TMT Analysis

Jerry Dellis *

Equity Analyst

+44 (0) 20 7029 8517

jdellis@jefferies.com

Ulrich Rathe, CFA *

Equity Analyst

+44 (0) 20 7029 8286

urathe@jefferies.com

Martin Hammerschmidt *

Equity Analyst

+44 (0) 20 7029 8758

mhammerschmidt@jefferies.com

Alex Caldwell *

Equity Associate

+44 (0) 20 7029 8044

acaldwell@jefferies.com

^Prior trading day closing price unless otherwise noted.

Please see analyst certifications, important disclosure information, and information regarding the status of non-US analysts on pages 9 to 14 of this report.

* Jefferies International Limited

Quantifying Churn Benefits During COVID-19

Virus-related lockdowns across Europe naturally suppress commercial activity. On top of that, consumers might at the moment have priorities other than upgrading mobile handsets (a major driver of contract sales) or running the risk of connectivity disruptions, as is always possible when switching supplier.

When discussing our expectation for relative resilience of the telco sector in prior research (see [Telcos and the virus, 11 Mar 2020](#), and the more detailed analysis in [Looking beyond collective punishment, 19 Mar 2020](#)), we referred to an expectation of reduced churn on the back of generally reduced commercial activity and also more telco-specific reasons. However, in the absence of hard data on the level of churn reduction, this is a structural argument at best.

This is not a marginal question. All-in commercial costs can run as high as 15-20% of sales, based on anecdotal information we have heard from operators. This means materially reduced churn (as compared to just marginally reduced one) will hand operators a major lever to mitigate top-line issues, e.g., from roaming-in, out-of-bundle roaming-out, or B2B.

To address the issue, we have analysed proprietary real-time number porting data sourced from TMT Analysis. We describe this data in a following paragraph, but highlight here that 'real-time' means daily data for the prior day's number ports. This means we are dealing with leading, not lagging information as we are heading into 1Q20 results season where management teams will likely comment on the COVID-19 impact on their business, including churn.

While we have analysed the data for a number of European countries, it proves useful for the present purposes in only three of them - Italy, France and Belgium. The main reason is that in many markets, lengthy notice periods introduce a delay between the subscriber's decision to churn on the one hand, and the number porting event that is visible in this type of data on the other. For example, in Switzerland this notice period is 60 days, in Germany it varies between 1 and 3 months, in Austria it is mostly 3 months. Notably, these notice periods apply to *out-of-contract* customers. In other words, current number ports in these situations reflect subscriber decisions even before the lockdowns were put into effect.

We have highlighted the main conclusions on the front page. Prior to discussing the individual countries, we now describe the nature of the data for context.

- TMT Analysis mainly routes text messages from businesses to their customers ("A2P [application to person] SMS routing"). This requires information about which network services a given target number.
- Operators are allocated 'number spaces' by regulators. Initially, this means a given number can be attributed to the operator directly.
- Mobile number porting is a regulated process that enables a mobile customer to change network while keeping their phone number.
- This means the initial attribution of number to operator through the regulator's number space breaks up over time.
- TMT Analysis uses a number of sources to trace the number-to-operator attribution through porting events.
- This process produces aggregate information on the amount of number porting activity between operators. This is the data we are discussing here. Notably, we have no access to data on individual telephone numbers, only the number of porting events between operators on a given day.

Unsurprisingly, the data suffers from limitations. Again, for context, we summarise the ones we consider material for our purposes.

- **Notice periods.** As highlighted earlier, subscribers are tied into lengthy notice periods in many markets. This means that today's number porting activity reflects subscriber decisions that were made well before the lockdown. We believe this is the main reason why the data for Switzerland, Germany, and Austria in particular shows no material identifiable reaction.
- **M&A.** Certain types of post-acquisition number migrations do not reflect subscriber decisions but simply the migration of the acquired operator's subscribers onto the consolidated network. This naturally happens with a delay, and then often in waves such that the number ports are difficult to distinguish from moves that reflect individual subscriber decisions which are of course the focus of our interest. This area is a particular issue in Scandinavian data.
- **MVNO host changes.** Independent MVNOs and resellers can switch their network host on management's volition. In some countries, this results in large numbers of migrations, which again can happen in waves and are therefore not distinguishable from subscriber-led ports. This area is a particular issue in Scandinavian data.
- **Independent resellers in the operator's number spaces.** Independent resellers without own number spaces (i.e., 'light' MVNOs or resellers relying on plain wholesale) produce churn within the host operator's number space that is not visible as number porting. This breaks the link of observable number porting to actual operator-reported churn.
- **IFRS15.** The cost savings we are discussing here – arising from lower churn during lockdown – will provide immediate benefit to reported cash flows. However, under IFRS15, contract acquisition costs are recognised in the P&L over the contract duration. This means that EBITDA benefit will be spread over the next 18 months or two years, being much less pronounced during any given quarter.
- **Availability.** Porting data is not readily available to us for certain markets, most notably Spain and the UK. This reflects technical issues arising from local MNP rules, more than anything else.

This list might seem overly detailed, but we highlight these issues here so explicitly in order to head off the obvious discussions, such as: why are the number ports not directly matching reported churn levels, and why do we refrain from drawing more quantitative conclusions directly from the data?

The discussion of the nature of the data and its limitations does, however, also underpin what we *can* conclude with some confidence from the data. Based on everything we've stated so far, we believe the *trend* in churn should be not only directionally correct but also by order of magnitude, as any limitations in the total number of economically relevant churn events (our focus) that are caught by number porting (our data) should not have materially changed post-lockdown vs pre-lockdown.

France

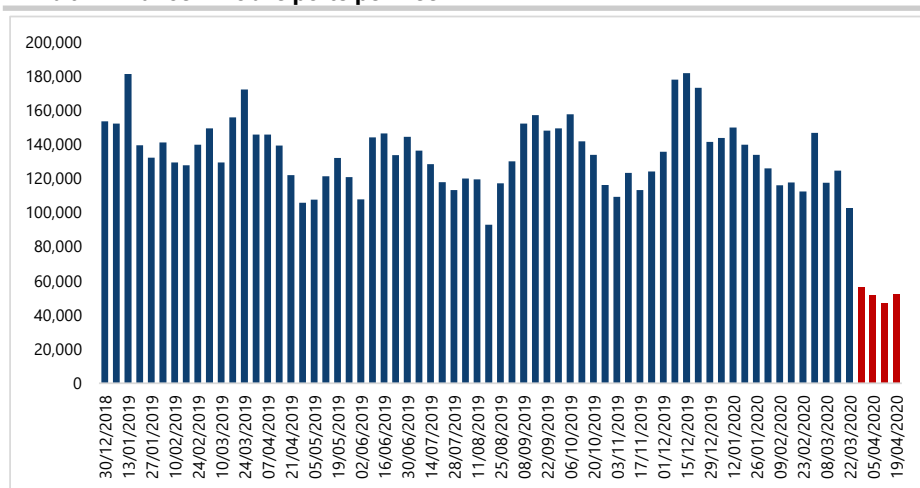
The French government announced a strict nationwide lockdown on 17 March. All public gatherings were banned, with residents instructed to stay at home except for grocery shopping and other essential tasks. As of the release of this note, the lockdown is still in place, with the original end date extended to 11 May.

In France, for an out-of-contract postpaid customer wanting to port their number to a new network, there is a 3-day deadline for the port to take place. Therefore, we consider

20 March to be the date for which the lockdown's impact would begin to appear in the porting data.

Exhibit 1 shows the total porting cases in France between the key mobile players and with the smaller providers on a weekly basis. The bars are for the total ports in each week, Monday-Sunday. The final four bars cover the period 23 March-19 April. There is a clear drop off in total ports. In relative terms, the volume of ports has dropped by 63%, a change by 4.3x the standard deviation during the pre-lockdown period shown.

Exhibit 1 - France - Mobile ports per week

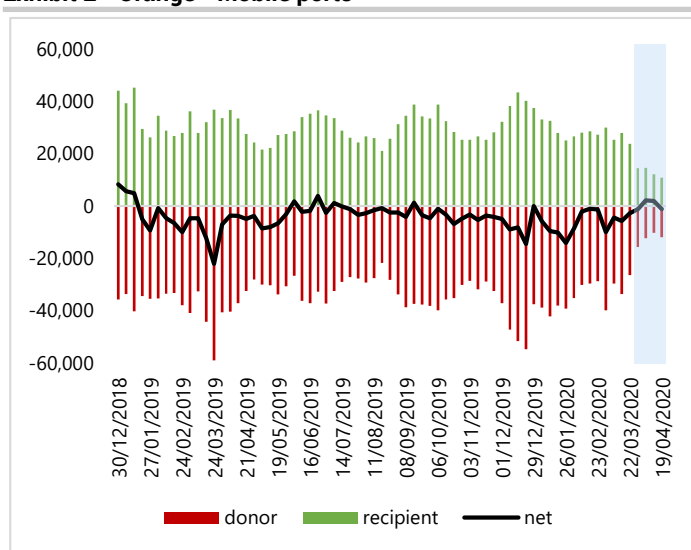


Source: Jefferies, TMT Analysis

In Exhibits 2-5 we present the ports for the four major players in the French mobile market; Orange, SFR, Bouygues and Free Mobile (Iliad). The green bars are for the ports-in, and the red bars for the ports-out. The black line is the net ports. The blue region highlights the COVID-19 impact on the last four weeks.

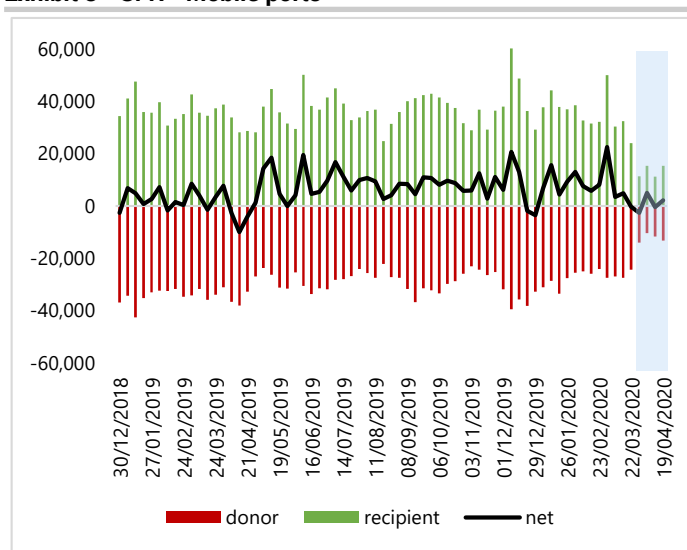
The decline in ports is evident across each of the key operators. The beneficiaries of the reduced porting appear to be Orange and Free Mobile, as their net ports move away from a negative net position to neutral. However, Bouygues and SFR, who had been consistently achieving positive net ports (more customers porting to their networks than leaving) are now achieving about neutral net ports.

Exhibit 2 - Orange - Mobile ports



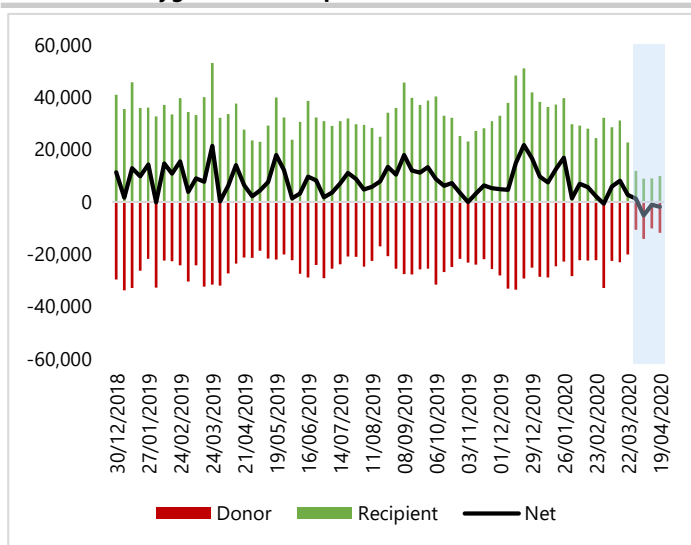
Source: Jefferies, TMT Analysis

Exhibit 3 - SFR - Mobile ports



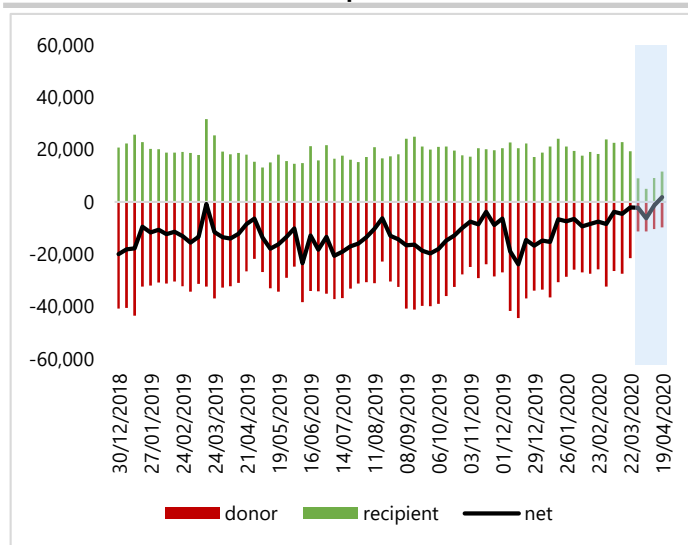
Source: Jefferies, TMT Analysis

Exhibit 4 - Bouygues - Mobile ports



Source: Jefferies, TMT Analysis

Exhibit 5 - Free Mobile - Mobile ports



Source: Jefferies, TMT Analysis

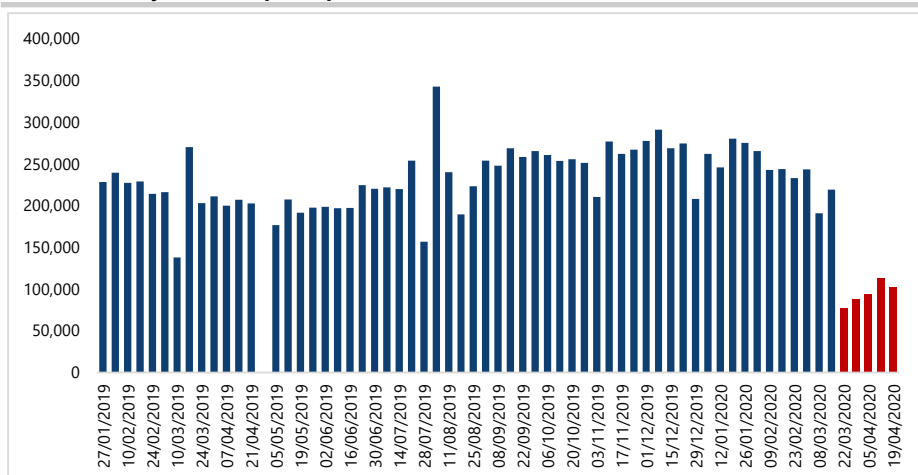
Italy

The Italian government's nationwide lockdown began on 9 March. Citizens have strict limitations on leaving their homes. Activity limited to solitary exercise close to home, grocery shopping and going to the doctor. Currently the lockdown remains in effect, with the deadline having been extended to 3 May.

In Italy, for an out of contract post-paid customer, the intra-operator port takes place on the second working day after the request. Therefore we consider 11 March to be the date for which the lockdown's impact would begin to appear in the porting data.

Exhibit 6 shows the total porting cases in Italy. The final four red bars cover the period 16 March-19 April. There is a clear drop-off in total ports, similarly to France, with port volume down by 59% (3.9x pre-lockdown standard deviation).

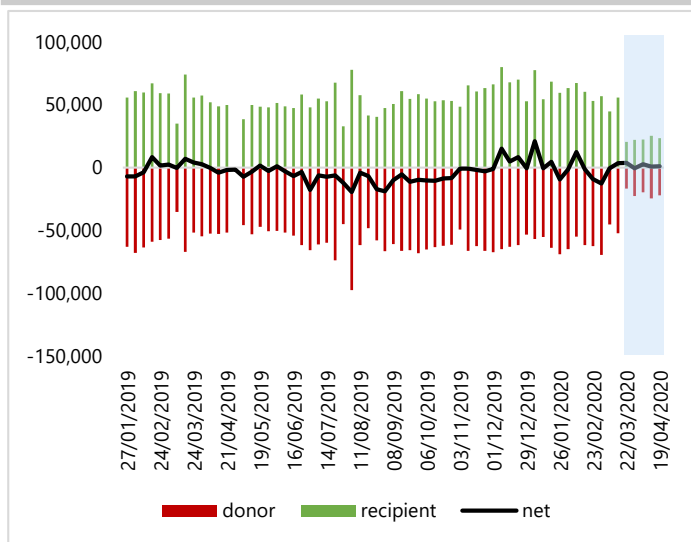
Exhibit 6 - Italy - Mobile ports per week



Source: Jefferies, TMT Analysis. Note: not displaying ports in week ending 28/04/2019

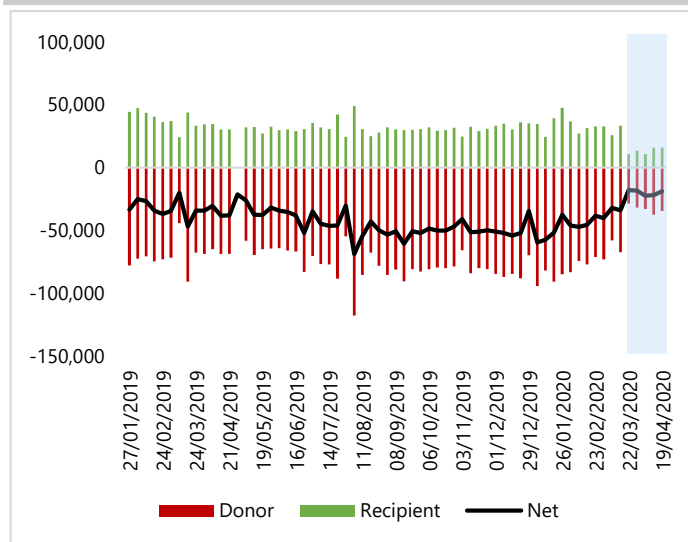
As in France, secular share shifts between the operators have slowed materially post lock-down. The notably beneficiary appears to be Wind Tre, and to an extent also Telecom Italia and Vodafone, unsurprisingly at the expense of new entrant Iliad. We note the effect seemed to have somewhat of a run-up into the lockdown, but the trend changes further strengthened post-lockdown.

Exhibit 7 - Telecom Italia - Mobile ports



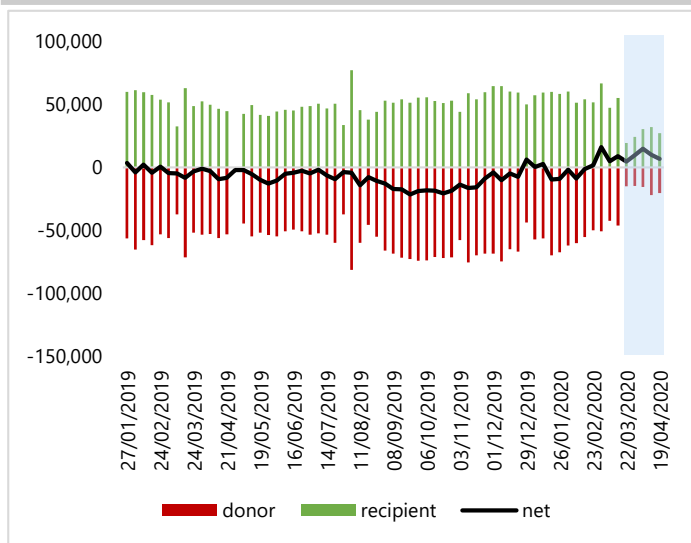
Source: Jefferies, TMT Analysis

Exhibit 8 - Wind Tre - Mobile ports



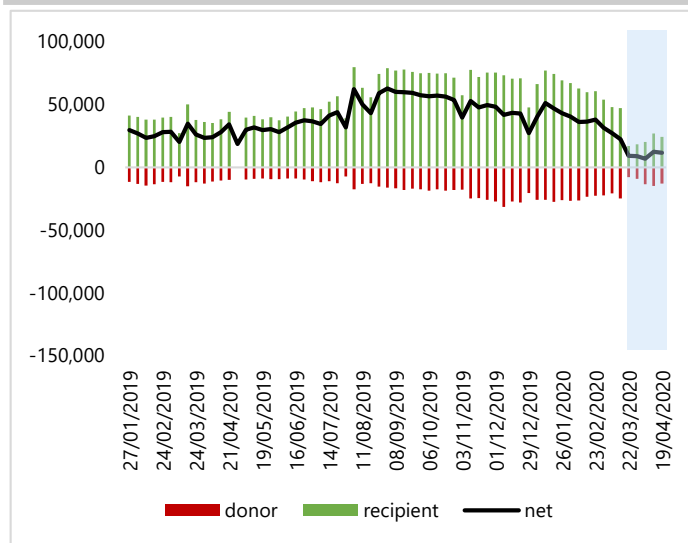
Source: Jefferies, TMT Analysis

Exhibit 9 - Vodafone - Mobile ports



Source: Jefferies, TMT Analysis

Exhibit 10 - Iliad - Mobile ports



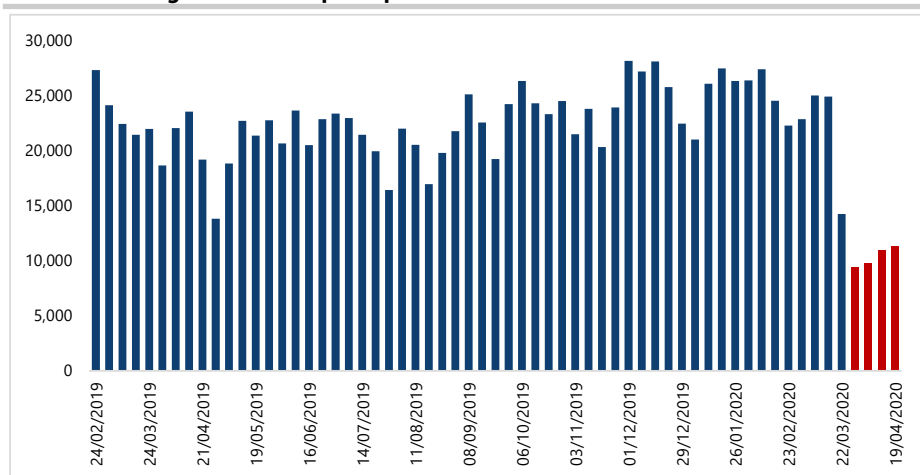
Source: Jefferies, TMT Analysis

This report is intended for jefferies@fticonsulting.com. Unauthorized distribution is prohibited.

Belgium

Exhibit 11 below shows porting volume per week for Belgium. Lockdown began on 18 March. The final four red bars highlighted COVID-19 impact with average ports down 55% from the 2019 norm, a shift of 4.2x standard deviations.

Exhibit 11 - Belgium - Mobile ports per week

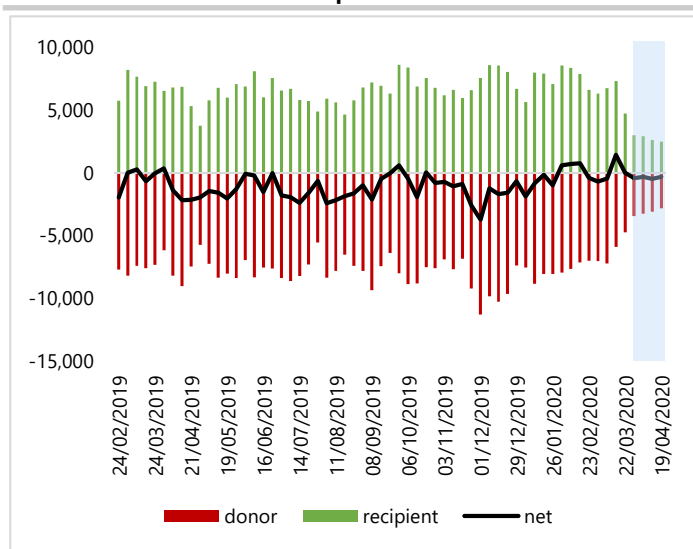


Source: Jefferies, TMT Analysis

Exhibits 12-15 illustrate the four main mobile operators in Belgium. Net ports flatten to neutral for Proximus and Orange Belgium. After an initial reduction in net port losses, Telenet looks to be returning to an net loss as seen in early 2020, mainly to VOO. Exhibits 14 and 15 clearly show the negative retail impact on Telenet of the arrival by VOO's MVNO project as net adds inflect from to negative as VOO ports emerge.

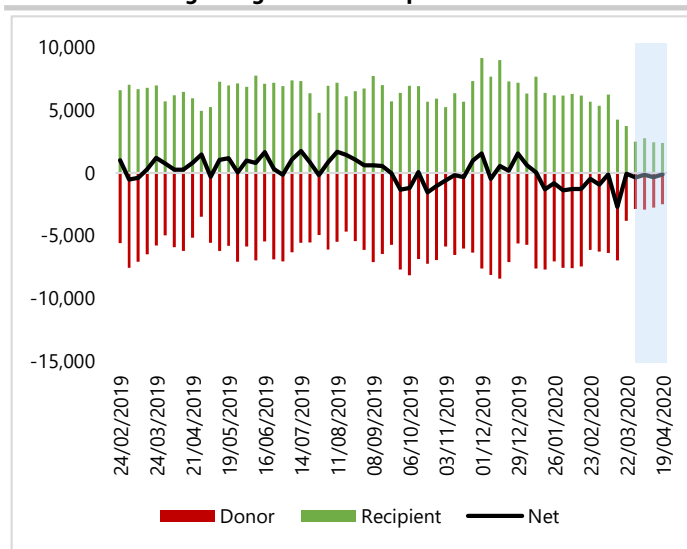
We have highlighted in prior research that OBEL had planned a major share campaign on the back of a new mobile portfolio whose launch was overshadowed by the onset of the COVID-19 crisis. Exhibit 13 shows a lack of impact from the new portfolio on net adds since the lockdown started to take effect.

Exhibit 12 - Proximus - Mobile ports



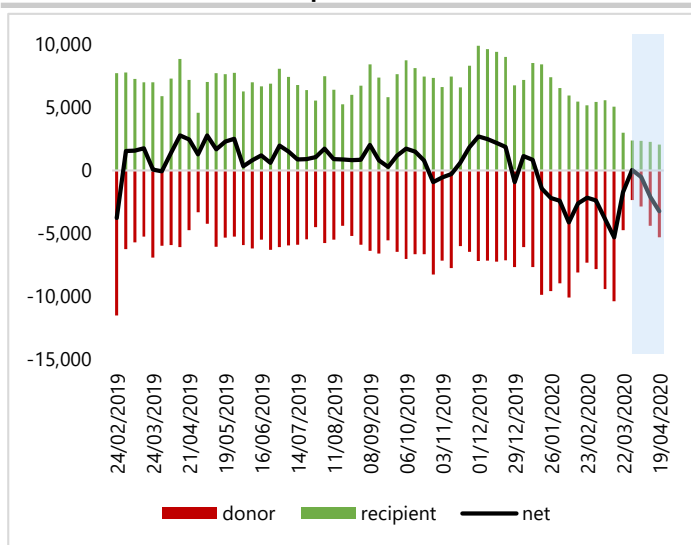
Source: Jefferies, TMT Analysis

Exhibit 13 - Orange Belgium - Mobile ports



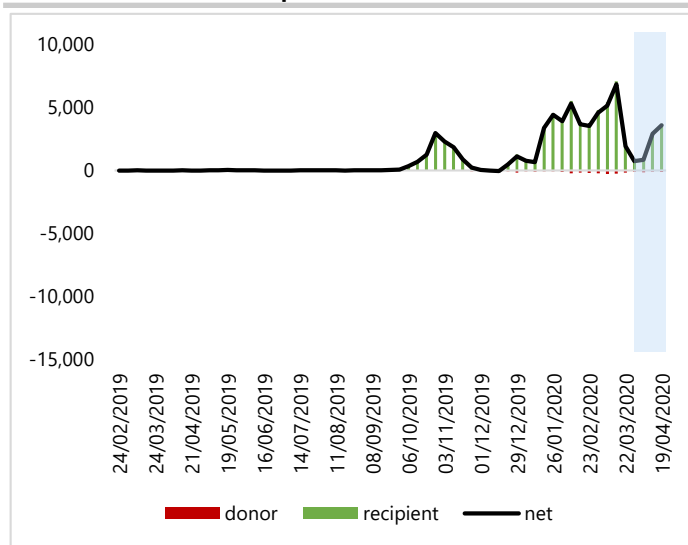
Source: Jefferies, TMT Analysis

Exhibit 14 - Telenet - Mobile ports



Source: Jefferies, TMT Analysis

Exhibit 15 - VOO - Mobile ports

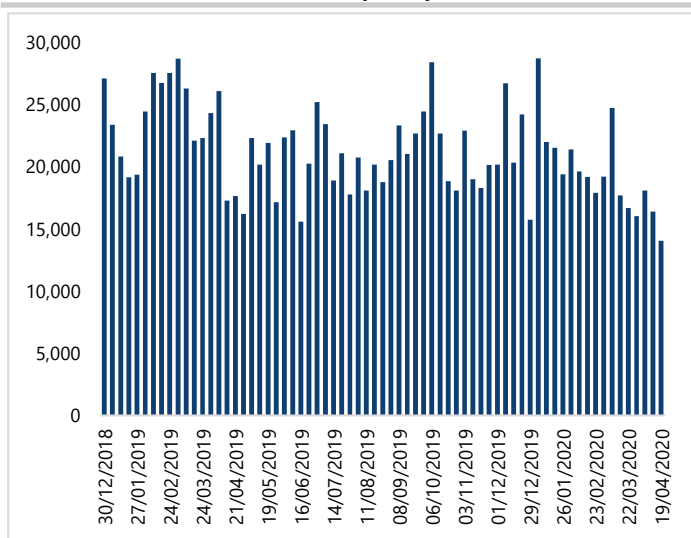


Source: Jefferies, TMT Analysis

Netherlands & Germany

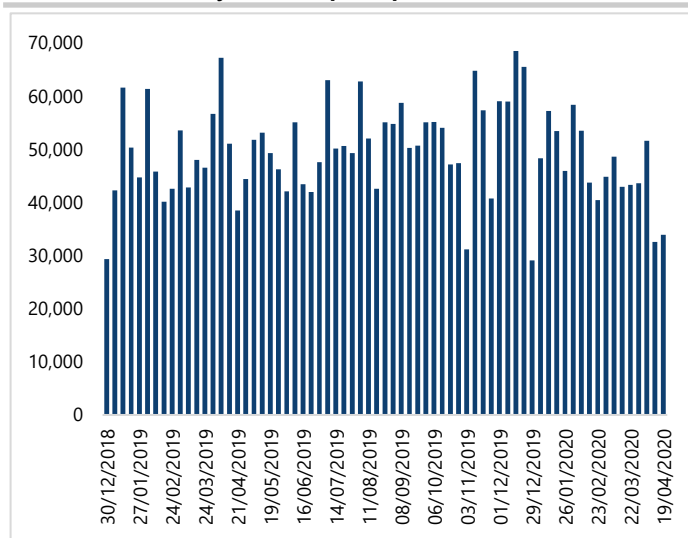
For comparison, Exhibits 16 and 17 show the porting volume in Netherlands and Germany. While these graphs appear to indicate some reduction to porting activity, the effect is washed out and difficult to isolate from other factors (campaign timing, seasonality effects), in our view. We believe this mostly reflects the contract tie-ins mentioned earlier. In addition, the German data is heavily affected by the reseller issue mentioned earlier (about 20% of the market is in the hands of independent resellers without their own number space).

Exhibit 16 - Netherlands - Mobile ports per week



Source: Jefferies, TMT Analysis

Exhibit 17 - Germany - Mobile ports per week



Source: Jefferies, TMT Analysis

This report is intended for jefferies@fticonsulting.com. Unauthorized distribution is prohibited.

Company Valuation/Risks

For Important Disclosure information on companies recommended in this report, please visit our website at <https://javatar.bluematrix.com/sellside/Disclosures.action> or call 212.284.2300.

Analyst Certification:

I, Jerry Dellis, certify that all of the views expressed in this research report accurately reflect my personal views about the subject security(ies) and subject company(ies). I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed in this research report.

I, Ulrich Rathe, CFA, certify that all of the views expressed in this research report accurately reflect my personal views about the subject security(ies) and subject company(ies). I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed in this research report.

I, Martin Hammerschmidt, certify that all of the views expressed in this research report accurately reflect my personal views about the subject security(ies) and subject company(ies). I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed in this research report.

I, Alex Caldwell, certify that all of the views expressed in this research report accurately reflect my personal views about the subject security(ies) and subject company(ies). I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed in this research report.

Registration of non-US analysts: Jerry Dellis is employed by Jefferies International Limited, a non-US affiliate of Jefferies LLC and is not registered/qualified as a research analyst with FINRA. This analyst(s) may not be an associated person of Jefferies LLC, a FINRA member firm, and therefore may not be subject to the FINRA Rule 2241 and restrictions on communications with a subject company, public appearances and trading securities held by a research analyst.

Registration of non-US analysts: Ulrich Rathe, CFA is employed by Jefferies International Limited, a non-US affiliate of Jefferies LLC and is not registered/qualified as a research analyst with FINRA. This analyst(s) may not be an associated person of Jefferies LLC, a FINRA member firm, and therefore may not be subject to the FINRA Rule 2241 and restrictions on communications with a subject company, public appearances and trading securities held by a research analyst.

Registration of non-US analysts: Martin Hammerschmidt is employed by Jefferies International Limited, a non-US affiliate of Jefferies LLC and is not registered/qualified as a research analyst with FINRA. This analyst(s) may not be an associated person of Jefferies LLC, a FINRA member firm, and therefore may not be subject to the FINRA Rule 2241 and restrictions on communications with a subject company, public appearances and trading securities held by a research analyst.

Registration of non-US analysts: Alex Caldwell is employed by Jefferies International Limited, a non-US affiliate of Jefferies LLC and is not registered/qualified as a research analyst with FINRA. This analyst(s) may not be an associated person of Jefferies LLC, a FINRA member firm, and therefore may not be subject to the FINRA Rule 2241 and restrictions on communications with a subject company, public appearances and trading securities held by a research analyst.

As is the case with all Jefferies employees, the analyst(s) responsible for the coverage of the financial instruments discussed in this report receives compensation based in part on the overall performance of the firm, including investment banking income. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Aside from certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgement.

Investment Recommendation Record

(Article 3(1)e and Article 7 of MAR)

Recommendation Published	April 20, 2020 , 14:30 ET.
Recommendation Distributed	April 20, 2020 , 19:00 ET.

Company Specific Disclosures

Jefferies Group LLC makes a market in the securities or ADRs of Vodafone plc.

For Important Disclosure information on companies recommended in this report, please visit our website at <https://javatar.bluematrix.com/sellside/Disclosures.action> or call 212.284.2300.

Explanation of Jefferies Ratings

Buy - Describes securities that we expect to provide a total return (price appreciation plus yield) of 15% or more within a 12-month period.

Hold - Describes securities that we expect to provide a total return (price appreciation plus yield) of plus 15% or minus 10% within a 12-month period.

Underperform - Describes securities that we expect to provide a total return (price appreciation plus yield) of minus 10% or less within a 12-month period.

The expected total return (price appreciation plus yield) for Buy rated securities with an average security price consistently below \$10 is 20% or more within a 12-month period as these companies are typically more volatile than the overall stock market. For Hold rated securities with an average security price consistently below \$10, the expected total return (price appreciation plus yield) is plus or minus 20% within a 12-month period. For Underperform rated securities with an average security price consistently below \$10, the expected total return (price appreciation plus yield) is minus 20% or less within a 12-month period.

NR - The investment rating and price target have been temporarily suspended. Such suspensions are in compliance with applicable regulations and/or Jefferies policies.

CS - Coverage Suspended. Jefferies has suspended coverage of this company.

NC - Not covered. Jefferies does not cover this company.

Restricted - Describes issuers where, in conjunction with Jefferies engagement in certain transactions, company policy or applicable securities regulations prohibit certain types of communications, including investment recommendations.

Monitor - Describes securities whose company fundamentals and financials are being monitored, and for which no financial projections or opinions on the investment merits of the company are provided.

Valuation Methodology

Jefferies' methodology for assigning ratings may include the following: market capitalization, maturity, growth/value, volatility and expected total return over the next 12 months. The price targets are based on several methodologies, which may include, but are not restricted to, analyses of market risk, growth rate, revenue stream, discounted cash flow (DCF), EBITDA, EPS, cash flow (CF), free cash flow (FCF), EV/EBITDA, P/E, PE/growth, P/CF, P/FCF, premium (discount)/average group EV/EBITDA, premium (discount)/average group P/E, sum of the parts, net asset value, dividend returns, and return on equity (ROE) over the next 12 months.

Jefferies Franchise Picks

Jefferies Franchise Picks include stock selections from among the best stock ideas from our equity analysts over a 12 month period. Stock selection is based on fundamental analysis and may take into account other factors such as analyst conviction, differentiated analysis, a favorable risk/reward ratio and investment themes that Jefferies analysts are recommending. Jefferies Franchise Picks will include only Buy rated stocks and the number can vary depending on analyst recommendations for inclusion. Stocks will be added as new opportunities arise and removed when the reason for inclusion changes, the stock has met its desired return, if it is no longer rated Buy and/or if it triggers a stop loss. Stocks having 120 day volatility in the bottom quartile of S&P stocks will continue to have a 15% stop loss, and the remainder will have a 20% stop. Franchise Picks are not intended to represent a recommended portfolio of stocks and is not sector based, but we may note where we believe a Pick falls within an investment style such as growth or value.

Risks which may impede the achievement of our Price Target

This report was prepared for general circulation and does not provide investment recommendations specific to individual investors. As such, the financial instruments discussed in this report may not be suitable for all investors and investors must make their own investment decisions based upon their specific investment objectives and financial situation utilizing their own financial advisors as they deem necessary. Past performance of the financial instruments recommended in this report should not be taken as an indication or guarantee of future results. The price, value of, and income from, any of the financial instruments mentioned in this report can rise as well as fall and may be affected by changes in economic, financial and political factors. If a financial instrument is denominated in a currency other than the investor's home currency, a change in exchange rates may adversely affect the price of, value of, or income derived from the financial instrument described in this report. In addition, investors in securities such as ADRs, whose values are affected by the currency of the underlying security, effectively assume currency risk.

Other Companies Mentioned in This Report

- Bouygues (EN FP: €26.70, BUY)
- Orange Belgium (OBEL BB: €15.50, BUY)
- Orange S.A. (ORA FP: €11.51, BUY)
- Proximus (PROX BB: €21.78, UNDERPERFORM)
- Telecom Italia S.p.A. (TIT IM: €0.35, BUY)
- Vodafone plc (VOD LN: p111.00, BUY)

Distribution of Ratings

Distribution of Ratings						
			IB Serv./Past12 Mos.		JIL Mkt Serv./Past12 Mos.	
	Count	Percent	Count	Percent	Count	Percent
BUY	1319	54.57%	107	8.11%	11	0.83%
HOLD	947	39.18%	34	3.59%	2	0.21%
UNDERPERFORM	151	6.25%	1	0.66%	0	0.00%

This report is intended for jefferies@fticonsulting.com. Unauthorized distribution is prohibited.

Other Important Disclosures

Jefferies does business and seeks to do business with companies covered in its research reports, and expects to receive or intends to seek compensation for investment banking services among other activities from such companies. As a result, investors should be aware that Jefferies may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision.

Jefferies Equity Research refers to research reports produced by analysts employed by one of the following Jefferies Group LLC ("Jefferies") group companies:

United States: Jefferies LLC which is an SEC registered broker-dealer and a member of FINRA (and distributed by Jefferies Research Services, LLC, an SEC registered Investment Adviser, to clients paying separately for such research).

United Kingdom: Jefferies International Limited, which is authorized and regulated by the Financial Conduct Authority; registered in England and Wales No. 1978621; registered office: 100 Bishopsgate, London EC2N 4JL; telephone +44 (0)20 7029 8000; facsimile +44 (0)20 7029 8010.

Hong Kong: Jefferies Hong Kong Limited, which is licensed by the Securities and Futures Commission of Hong Kong with CE number ATS546; located at Suite 2201, 22nd Floor, Cheung Kong Center, 2 Queen's Road Central, Hong Kong.

Singapore: Jefferies Singapore Limited, which is licensed by the Monetary Authority of Singapore; located at 80 Raffles Place #15-20, UOB Plaza 2, Singapore 048624, telephone: +65 6551 3950.

Japan: Jefferies (Japan) Limited, Tokyo Branch, which is a securities company registered by the Financial Services Agency of Japan and is a member of the Japan Securities Dealers Association; located at Tokyo Midtown Hibiya 30F Hibiya Mitsui Tower, 1-1-2 Yurakucho, Chiyoda-ku, Tokyo 100-0006; telephone +813 5251 6100; facsimile +813 5251 6101.

India: Jefferies India Private Limited (CIN - U74140MH2007PTC200509), licensed by the Securities and Exchange Board of India for: Stock Broker (NSE & BSE) INZ000243033, Research Analyst INH000000701 and Merchant Banker INM000011443, located at 42/43, 2 North Avenue, Maker Maxity, Bandra-Kurla Complex, Bandra (East), Mumbai 400 051, India; Tel +91 22 4356 6000.

Australia: Jefferies (Australia) Securities Pty Limited (ACN 610 977 074), which holds an Australian financial services license (AFSL 487263) and is located at Level 22, 60 Martin Place, Sydney NSW 2000; telephone +61 2 9364 2800.

This report was prepared by personnel who are associated with Jefferies (Jefferies International Limited, Jefferies Hong Kong Limited, Jefferies Singapore Limited, Jefferies (Japan) Limited, Tokyo Branch, Jefferies India Private Limited), Jefferies (Australia) Pty Ltd; or by personnel who are associated with both Jefferies LLC and Jefferies Research Services LLC ("JRS"). Jefferies LLC is a US registered broker-dealer and is affiliated with JRS, which is a US registered investment adviser. JRS does not create tailored or personalized research and all research provided by JRS is impersonal. If you are paying separately for this research, it is being provided to you by JRS. Otherwise, it is being provided by Jefferies LLC. Jefferies LLC, JRS, and their affiliates are collectively referred to below as "Jefferies". Jefferies may seek to do business with companies covered in this research report. As a result, investors should be aware that Jefferies may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only one of many factors in making their investment decisions. Specific conflict of interest and other disclosures that are required by FINRA and other rules are set forth in this disclosure section.

If you are receiving this report from a non-US Jefferies entity, please note the following: Unless prohibited by the provisions of Regulation S of the U.S. Securities Act of 1933, as amended, this material is distributed in the United States by Jefferies LLC, which accepts responsibility for its contents in accordance with the provisions of Rule 15a-6 under the US Securities Exchange Act of 1934, as amended. Transactions by or on behalf of any US person may only be effected through Jefferies LLC. In the United Kingdom and European Economic Area this report is issued and/or approved for distribution by Jefferies International Limited ("JIL") and is intended for use only by persons who have, or have been assessed as having, suitable professional experience and expertise, or by persons to whom it can be otherwise lawfully distributed.

JIL allows its analysts to undertake private consultancy work. JIL's conflicts management policy sets out the arrangements JIL employs to manage any potential conflicts of interest that may arise as a result of such consultancy work. Jefferies LLC, JIL and their affiliates, may make a market or provide liquidity in the financial instruments referred to in this report; and where they do make a market, such activity is disclosed specifically in this report under "company specific disclosures".

For Canadian investors, this material is intended for use only by professional or institutional investors. None of the investments or investment services mentioned or described herein is available to other persons or to anyone in Canada who is not a "Designated Institution" as defined by the Securities Act (Ontario). In Singapore, Jefferies Singapore Limited ("JSL") is regulated by the Monetary Authority of Singapore. For investors in the Republic of Singapore, this material is provided by JSL pursuant to Regulation 32C of the Financial Advisers Regulations. The material contained in this document is intended solely for accredited, expert or institutional investors, as defined under the Securities and Futures Act (Cap. 289 of Singapore). If there are any matters arising from, or in

connection with this material, please contact JSL, located at 80 Raffles Place #15-20, UOB Plaza 2, Singapore 048624, telephone: +65 6551 3950. In Japan, this material is issued and distributed by Jefferies (Japan) Limited to institutional investors only. In Hong Kong, this report is issued and approved by Jefferies Hong Kong Limited and is intended for use only by professional investors as defined in the Hong Kong Securities and Futures Ordinance and its subsidiary legislation. In the Republic of China (Taiwan), this report should not be distributed. The research in relation to this report is conducted outside the People's Republic of China ("PRC"). This report does not constitute an offer to sell or the solicitation of an offer to buy any securities in the PRC. PRC investors shall have the relevant qualifications to invest in such securities and shall be responsible for obtaining all relevant approvals, licenses, verifications and/or registrations from the relevant governmental authorities themselves. In India, this report is made available by Jefferies India Private Limited. In Australia, this report is issued and/or approved for distribution by, or on behalf of, Jefferies (Australia) Securities Pty Ltd. It is directed solely at wholesale clients within the meaning of the Corporations Act 2001 of Australia (the "Corporations Act"), in connection with their consideration of any investment or investment service that is the subject of this report. This report may contain general financial product advice. Where this report refers to a particular financial product, you should obtain a copy of the relevant product disclosure statement or offer document before making any decision in relation to the product. Recipients of this document in any other jurisdictions should inform themselves about and observe any applicable legal requirements in relation to the receipt of this document.

This report is not an offer or solicitation of an offer to buy or sell any security or derivative instrument, or to make any investment. Any opinion or estimate constitutes the preparer's best judgment as of the date of preparation, and is subject to change without notice. Jefferies assumes no obligation to maintain or update this report based on subsequent information and events. Jefferies, and their respective officers, directors, and employees, may have long or short positions in, or may buy or sell any of the securities, derivative instruments or other investments mentioned or described herein, either as agent or as principal for their own account. This material is provided solely for informational purposes and is not tailored to any recipient, and is not based on, and does not take into account, the particular investment objectives, portfolio holdings, strategy, financial situation, or needs of any recipient. As such, any advice or recommendation in this report may not be suitable for a particular recipient. Jefferies assumes recipients of this report are capable of evaluating the information contained herein and of exercising independent judgment. A recipient of this report should not make any investment decision without first considering whether any advice or recommendation in this report is suitable for the recipient based on the recipient's particular circumstances and, if appropriate or otherwise needed, seeking professional advice, including tax advice. Jefferies does not perform any suitability or other analysis to check whether an investment decision made by the recipient based on this report is consistent with a recipient's investment objectives, portfolio holdings, strategy, financial situation, or needs. By providing this report, neither JRS nor any other Jefferies entity accepts any authority, discretion, or control over the management of the recipient's assets. Any action taken by the recipient of this report, based on the information in the report, is at the recipient's sole judgment and risk. The recipient must perform his or her own independent review of any prospective investment. If the recipient uses the services of Jefferies LLC (or other affiliated broker-dealers), in connection with a purchase or sale of a security that is a subject of these materials, such broker-dealer may act as principal for its own accounts or as agent for another person. Only JRS is registered with the SEC as an investment adviser; and therefore neither Jefferies LLC nor any other Jefferies affiliate has any fiduciary duty in connection with distribution of these reports.

The price and value of the investments referred to herein and the income from them may fluctuate. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. Fluctuations in exchange rates could have adverse effects on the value or price of, or income derived from, certain investments.

This report may contain forward looking statements that may be affected by inaccurate assumptions or by known or unknown risks, uncertainties, and other important factors. As a result, the actual results, events, performance or achievements of the financial product may be materially different from those expressed or implied in such statements.

This report has been prepared independently of any issuer of securities mentioned herein and not as agent of any issuer of securities. No Equity Research personnel have authority whatsoever to make any representations or warranty on behalf of the issuer(s). Any comments or statements made herein are those of the Jefferies entity producing this report and may differ from the views of other Jefferies entities.

This report may contain information obtained from third parties, including ratings from credit ratings agencies such as Standard & Poor's. Reproduction and distribution of third party content in any form is prohibited except with the prior written permission of the related third party. Jefferies does not guarantee the accuracy, completeness, timeliness or availability of any information, including ratings, and is not responsible for any errors or omissions (negligent or otherwise), regardless of the cause, or for the results obtained from the use of such content. Third-party content providers give no express or implied warranties, including, but not limited to, any warranties of merchantability or fitness for a particular purpose or use. Neither Jefferies nor any third-party content provider shall be liable for any direct, indirect, incidental, exemplary, compensatory, punitive, special or consequential damages, costs, expenses,

legal fees, or losses (including lost income or profits and opportunity costs) in connection with any use of their content, including ratings. Credit ratings are statements of opinions and are not statements of fact or recommendations to purchase, hold or sell securities. They do not address the suitability of securities or the suitability of securities for investment purposes, and should not be relied on as investment advice.

Jefferies research reports are disseminated and available electronically, and, in some cases, also in printed form. Electronic research is simultaneously made available to all clients. This report or any portion hereof may not be reprinted, sold or redistributed without the written consent of Jefferies. Neither Jefferies nor any of its respective directors, officers or employees, is responsible for guaranteeing the financial success of any investment, or accepts any liability whatsoever for any direct, indirect or consequential damages or losses arising from any use of this report or its contents. Nothing herein shall be construed to waive any liability Jefferies has under applicable U.S. federal or state securities laws.

For Important Disclosure information relating to JRS, please see https://adviserinfo.sec.gov/IAPD/Content/Common/crd_iapd_Brochure.aspx?BRCHR_VRSN_ID=483878 and <https://adviserinfo.sec.gov/Firm/292142> or visit our website at <https://javatar.bluematrix.com/sellside/Disclosures.action>, or www.jefferies.com, or call 1.888.JEFFERIES.

© 2020 Jefferies Group LLC

This report is intended for jefferies@fticonsulting.com. Unauthorized distribution is prohibited.