NEUBERGER BERMAN

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Update on Coronavirus (COVID-19) outbreak

US cases are inflecting as priority testing goes toward the most vulnerable, and encouraging news on the treatment front provides a glimmer to the light at the end of the tunnel.

COVID-19 cases have increased globally to >230,000, with the epicenter of the outbreak now in Europe and not surprisingly, ramping in the US. Regarding mainland China where the SARS-CoV2 virus began wreaking havoc in late December, cases have flattened to ~81,100 with 87% having recovered, as have those in South Korea, the latter with a notable low death rate of 0.9%.

What is going on in the European Union and United States?

Regarding EU:

- Cases in Italy, which appears to be the hardest hit, have crossed 41,000 with no trend of slowing with total deaths now above what we have seen in China at 3,405.
- Spain & Germany, while each has a similar number of cases (>15,000), is a tale of two countries with the former experiencing more severe cases (Germany's death rate is 43/14,544 or 0.3%).
- France has just over 9,100 cases with 265 fatalities.

And in the US:

- The US has >11,000 cases, with >4,000 in New York State and ~2,500 in NYC alone.
- The death toll in the US is 161: 21 in New York State and 11 in NYC for a US death rate of 1.4%, far below the frightening projections in a NY Times article of 3/18/2020.
- We now expect cases in the US to inflect as the availability of COVID-19 tests increase and turnaround times decrease, though our belief is the fatality rate will likely end up under 1%.

Testing update on COVID-19:

- We have repeatedly said that the US needed to increase testing in order to gain a better understanding of the actual infection rate, which currently stands at ~11%, as well as the fatality rate hovering around 1.58%.
- Additionally, faster detection of cases can lead to immediate isolation of the patient and tracing of contacts, which could limit the spread, with social distancing also helping.
- On the testing front, the FDA recently granted emergency use authorization of high throughput testing platforms for COVID-19, including those made by Roche, Thermo Fisher Scientific and Hologic, bringing the number of tests per day to 10,000. This has the potential to ramp up to 30,000 per day if needed now that the reference labs LH and DGX are involved.
- One note of caution: with more testing comes more positive cases, and testing is prioritized to the most vulnerable with symptoms, so we expect the infection rate to inflect in the near term but then settle back down as more folks get tested.

Can the US healthcare infrastructure handle the surge from increased testing, especially in light of commentary by respected experts who have postulated 20%-60% of the US population may be "infected", and what this could mean for the healthcare system overall?

- First, it is notable that the 60% estimate includes "asymptomatic individuals who don't even know they have or had COVID-19 and recovered".
- Second, based on what we know about the age cohorts in the US and who is most susceptible to the COVID-19 infection (90M as a starting point, those >50 yrs of age), 13.5M-18M as the 15%-20% needing some type of in hospital medical care, and ~675,000-~900,000 needing more intense medical intervention.
- In the backdrop of the 36.3M admissions in 2019 across the 6,150 hospitals in the US and 925,000 beds, it is concerning but manageable if the 7.5% infection rate holds (currently is 10%-11% according to the CDC, but impacted by priority testing to those hospitalized and showing severe symptoms so likely positive). Additionally, we are hearing of anecdotal cases in those a bit younger, so we are keeping an eye on this dynamic which could change the math.

- Moreover, we are not naïve to the likelihood of rolling clusters of outbreaks, especially in major cities such which will likely tax the system from a perspective of available beds, ventilators etc. That said, actions such as social distancing could slow the virus as it did in China, so the next 25 days should tell the tale in our view.

Which brings us to the most important question, when do we think COVID-19 will peak in the US and what are we monitoring on the treatment or vaccine front?

- Based on several transmission models we have looked at, the US is on the China trajectory, so not as bad as Italy, but not as good as South Korea. It is still early days and increased testing over the next week or so will most likely alter the model.
- Given that social distancing started a few days ago in earnest, we think it will take another 2-3 weeks before cases slow down and believe we could see a flattening of the curve towards the end of April/early May.
- Lastly, while we think the peak could be ~1.5 months away, we still do not know if this virus is seasonal and hence could linger, albeit at a lower transmission rate through the fall as well as "rolling clusters of cases" for the remainder of the year.

On potential countermeasures such as treatments/vaccines; we are cautiously optimistic for Chloroquine and Remdesvir:

Chloroquine & Remdesivir

- Chloroquine is a generic available in plenty of supply, and Remdesivir is an anti-viral. Both have anecdotal data suggesting treatment effects.
- Confusing statements out of the President's news conference on 3/19/2020, that initially reported that the FDA-approved Chloroquine for the treatment of COVID-19 was "fast tracking" its approval pending data.
- It may just be semantics as Chloroquine is already FDA-approved for the treatment of Rheumatoid Arthritis (Plaquenil) as a generic, and is available in large quantities for pennies on the dollar. This has shown anti-viral and anti-inflammatory properties, potentially making its oral dosing ideal to treat COVID-19.
- Data on Chloroquine used in French COVID-19 patients showed robust results with 20 patients given Chloroquine alone with viral reductions in the 70%+ range and in combination with azithromycin, over 98% drops in viral load. This is impressive in our view.
- Remdesevir is currently in 2 clinical trials in China, one NIH study and 2 phase III studies run by Gilead. Anecdotal data is mixed, but it is IV-administered and is generally given before day 7-8 for efficacy. While the market is hyper-focused on this agent (which we hope works), Gilead has told investors it is not a commercial opportunity for them and given complicated synthesis, they may have doses for ~100,000 patients in the near term, but are trying to ramp production just in case. Also, a biotech company in China is currently making a Remdesivir generic, which may also lessen the commercial opportunity that could result from stockpiling.

Other antivirals and antibodies:

- Other old antivirals are also being tested with data out of China yesterday for Lopinaivir/Ritonavir combos that failed in a COVID-19 study (published in NEJM). Favipravir data was mixed, but did show viral clearance and is intriguing, but South Korea passing on the use of this drug due to toxicity gives us pause.
- Other marketed drugs to control lung inflammation (such as Roche's Actemra & REGN/SNY Kevzara) are notable as are therapeutic antibodies (Takeda, Regeneron, Vir Biotech), but clinical trials have yet to begin, with data coming at the end of 2020/early 2021.
- Most importantly on vaccines, the furthest along is Moderna's novel mRNA vaccine, which is expected to report data in healthy individuals by early June with a go decision to phase III by late June. We believe a vaccine could be available by the end of 2020/early 2021 to help protect healthcare workers, etc., with broader vaccination by 2H21.
- Lastly, we point out the only positive from broad spread infection is herd immunity, something the press rarely speaks of yet something we believe in strongly. We should start reporting recovering rates in the US in the next week or so as well as total tests performed in the US once the reference lab volume gets reported in the CDC numbers. These are posted on their website each day at 4PM.

In summary we are firm believers in the actions taken to date, are encouraged by increased testing and faster turnaround times, are still monitoring the impact to our hospitals and HC system in general, and cautiously optimistic regarding eventual treatments, especially Chloroquine as a bridge to a vaccine.

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For more information on COVID-19, please refer to the Center for Disease Control and Prevention at cdc.gov

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