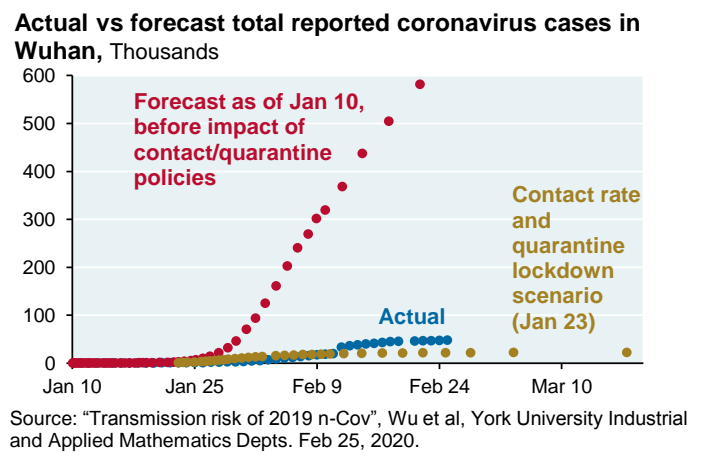
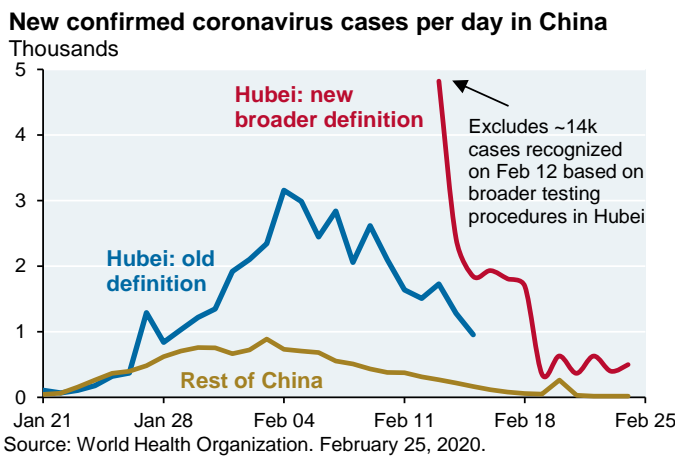




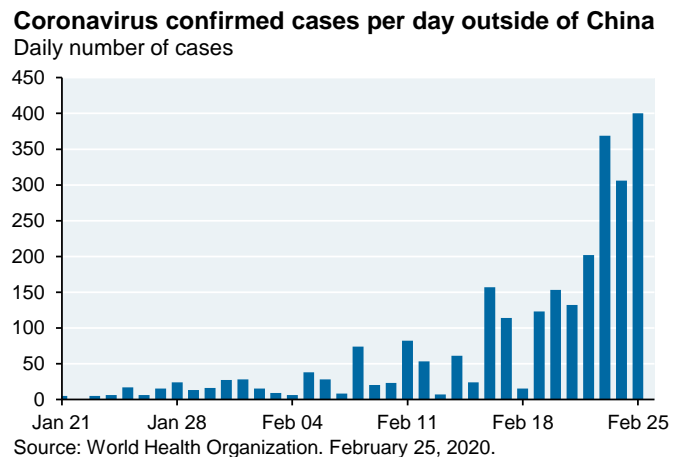
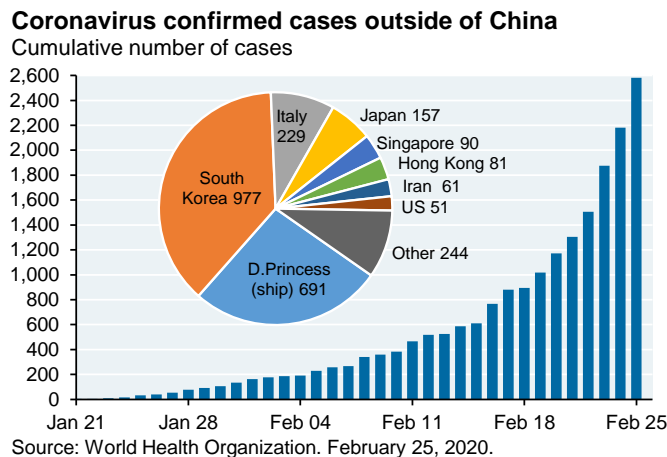
Topics: Coronavirus severity and global impacts

- While infection rates are slowing *inside* China, COVID-19 infections are now rising *outside* China
- Mortality rates are skewed heavily towards older individuals with pre-existing conditions
- Since the virus is lethal for people with compromised lung capacity, mortality rates outside China might be lower given China’s combination of poor air quality and high smoking rates
- Global supply chains have been impacted given reliance on Chinese production for key intermediate goods, but the impact on the US should be manageable
- While there are reports of Chinese factories reopening, most activity indicators are still close to their post-lunar new year lows
- Markets are now pricing in large earnings declines from the virus in 2020; the hit to Chinese earnings may be even bigger than what’s priced in, while the hit to US earnings might be smaller
- COVID-19 raises important questions about the right risk premia for holding Chinese financial assets

New infections in Wuhan/Hubei and the rest of China have fallen sharply, although new infections in Hubei are still running in the hundreds (it seems like Wuhan, in contrast to the rest of China, is being left to fend for itself). The second chart shows the evolution of actual Wuhan cases (in blue) compared to forecasts from York University epidemiologists in January. Their base case for COVID-19 at the time (red dots) was very high given an estimated maximum reproductive rate of 6.5 compared to 4.9 for SARS, and 2.0-2.8 for MERS in Riyadh. They published a second scenario that assumed severe quarantine/contact restrictions (gold dots). Actual results have been much closer to the latter, showing that these policies can “work”.



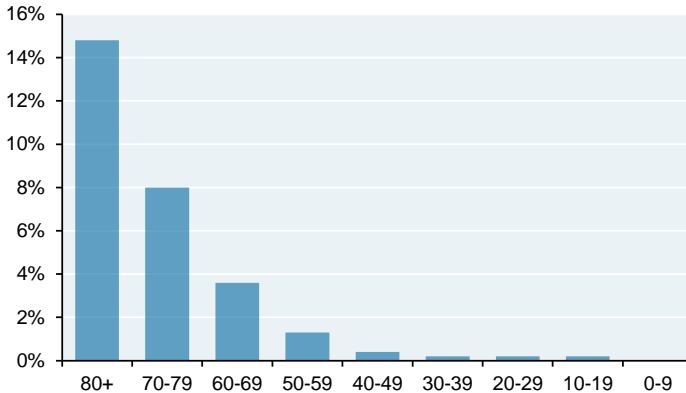
However, markets are now reacting to the jump in cases outside China (mostly in S. Korea, Italy, Japan and Iran), as well to the 700 people infected on the Diamond Princess ship (out of 3700 total crew/passengers).





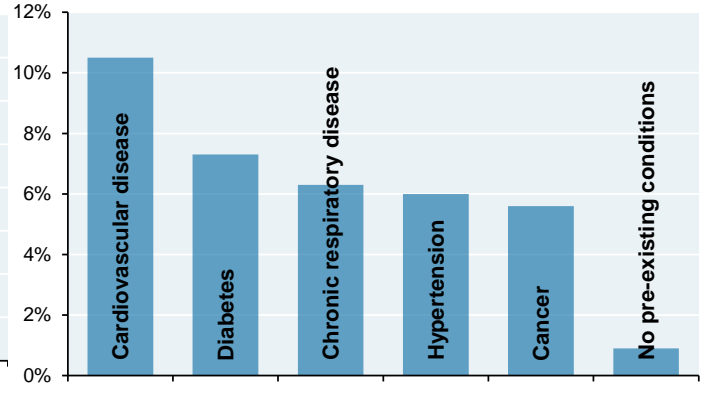
Economic and market reactions to pandemics are more a function of mortality than contagion per se. Here's the latest from China's Center for Disease Control. COVID-19 mortality rates have been drifting higher from 2.2% to 3.5% over the last month. That said, COVID-19 primarily affects older individuals with pre-existing conditions whose mortality rates are much higher than the average. Individuals below 50 and/or those with no pre-existing conditions have mortality rates well below 2% (almost 0% for people below the age of 40). As a percentage of hospitalized cases with a specific outcome (mortality or discharged/recovered), mortality rates are closer to 10%. For a comparison of COVID-19 mortality and contagion characteristics vs other diseases, see page 8.

Coronavirus mortality rate by age



Source: Chinese Center for Disease Control and Prevention. February 2020.

Coronavirus mortality rate based on pre-existing conditions



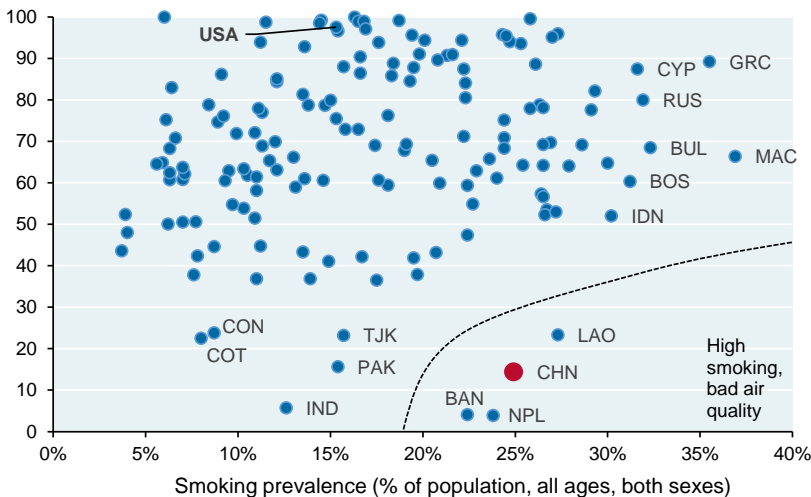
Source: Chinese Center for Disease Control and Prevention. February 2020.

When a virus either has a cure or palliative treatments that mitigate mortality, then quality of healthcare systems could have a large effect on cross-country mortality rates. But with COVID-19, that's not the case: there's no cure yet, and palliative care does not seem to have much of an impact on outcomes. In China, the median number of days for those who died from the disease was only 11-14 days.

What might play a bigger role: behavioral and environmental factors. COVID-19 is particularly lethal for people with compromised lung capacity. Here's where China has a problem: it has high smoking rates *and* terrible air quality (see chart). There are countries with high smoking rates but better air quality (Russia, Greece, Indonesia), and countries with poor air quality but low smoking rates. China, along with Nepal, Laos and Bangladesh, have both. **If these factors do contribute to mortality rates for COVID-19, mortality rates outside China might be lower.**

Countries at risk: poor air quality combined with high smoking rates

Air quality index, 100 = best



Source: Yale Environmental Health Index, Global Health Data Exchange, JPMAM. 2019.

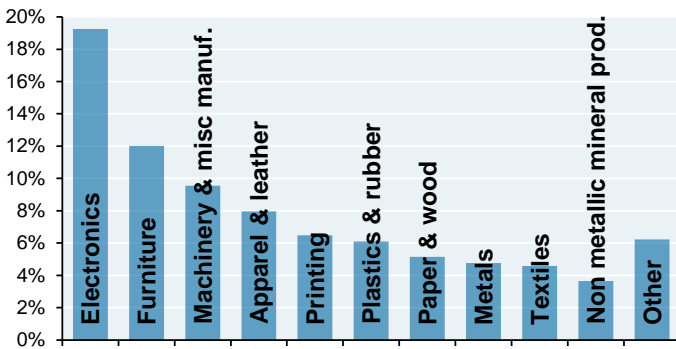


Economic impacts

While the US is reliant on Chinese supply chains, we need to be careful not to overstate this. The first chart shows the % of US intermediate goods inputs sourced from China by industry (i.e., China imports as a % of all imported and domestically sourced intermediate goods). Electronics, furniture, machinery and apparel are all impacted, but none of these reliance shares exceed 20%. Furthermore, manufacturing and wholesaling inventories are at high levels right now, which could help with supply chain disruptions. That may be one reason why the estimated economic impact of the virus on the US in the second chart is negligible. Exception: much tighter inventory levels in retailing and electronics. On a related China exposure note, the Asia-Pacific region represents 11% of S&P 500 revenue exposure, with roughly a third of that in China directly.

US reliance on China by industry

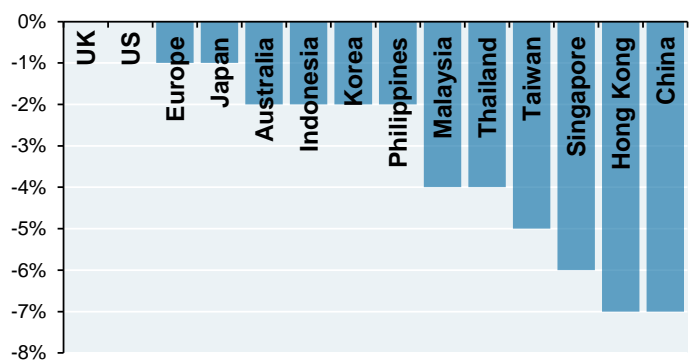
% of intermediate goods input reliance by sector



Source: BEA, J.P. Morgan Asset Management. 2018.

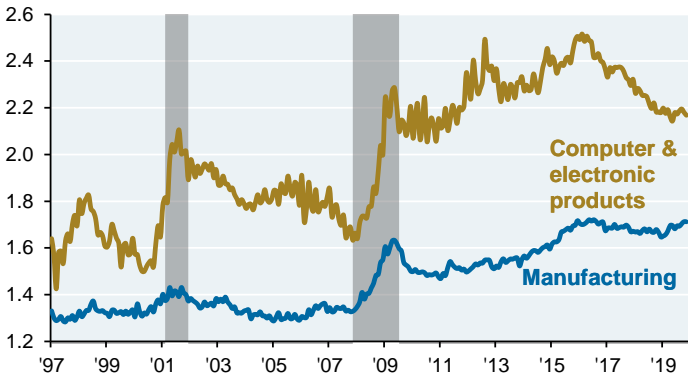
Coronavirus estimated impact on first quarter growth

q/q % change, annualized



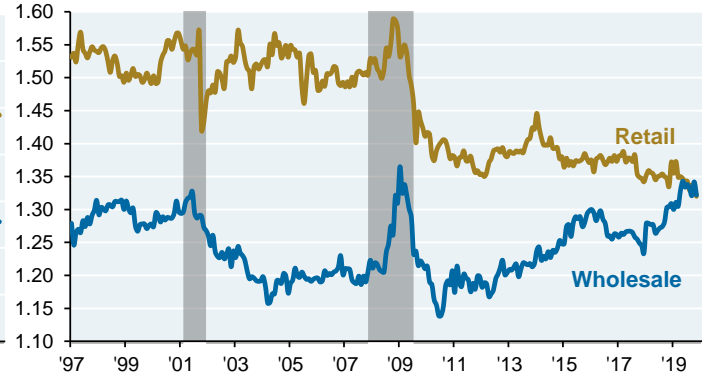
Source: Bridgewater Daily Observations. February 19, 2020.

US inventory to sales ratios



Source: BEA. Grey bars indicate recession. November 2019

US inventory to sales ratios

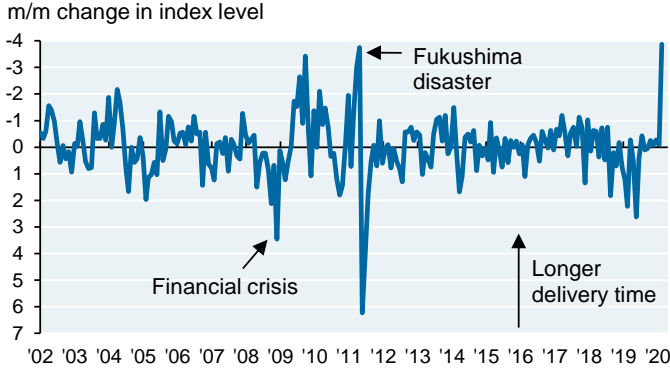


Source: BEA. Grey bars indicate recession. November 2019



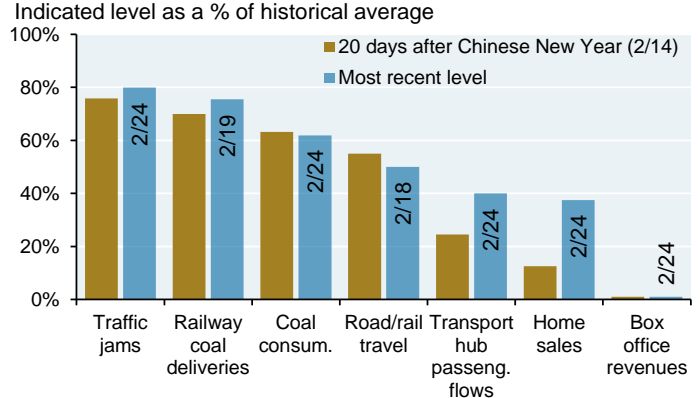
Even so, global supply chains are highly disrupted right now and help explain why China's trading partners in Asia are expected to suffer larger economic damage than the US. Within China, we're tracking indicators that reflect the impact of the lockdown. Twenty days after the Chinese Lunar New Year was the low point for economic activity due to quarantines and travel bans. The latest readings show that economic activity has only picked up by a very small degree.

Change in suppliers' delivery times



Source: Markit, Jibun Bank. Average of Japan, Euro Area, UK, and US. February 2020.

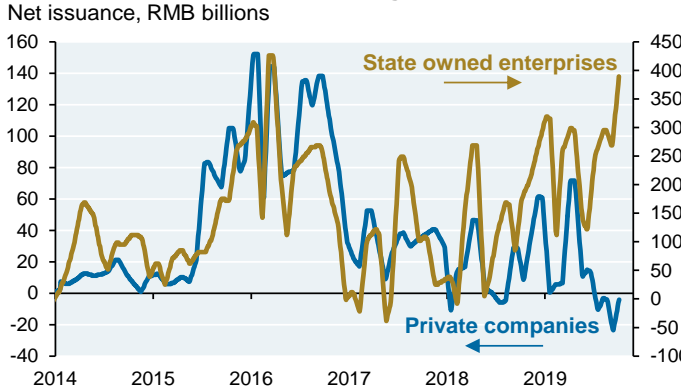
High frequency Chinese economic indicators



Source: J.P. Morgan Emerging Markets Research, Goldman Sachs, Feb 24.

China's corporate sector is going to take a big hit in Q1. Pre-virus, assuming nominal GDP growth of 7%, China's corporate sector was projected to generate net operating cash flow in Q1 of RMB 5.7trn. Instead, net cash flow could be as low as RMB 750 bn, even after accounting for the high degree of variable production and materials costs in many sectors¹. Most emergency government funding may end up benefitting state owned enterprises, and bond market investors may continue to prefer state issuers with implicit guarantees. In other words, the virus is another blow to the development of China's private sector.

Chinese private companies losing access to debt markets



Source: Gavekal, Wind. November 2019.

Yield spread of Chinese private debt over state owned enterprise debt



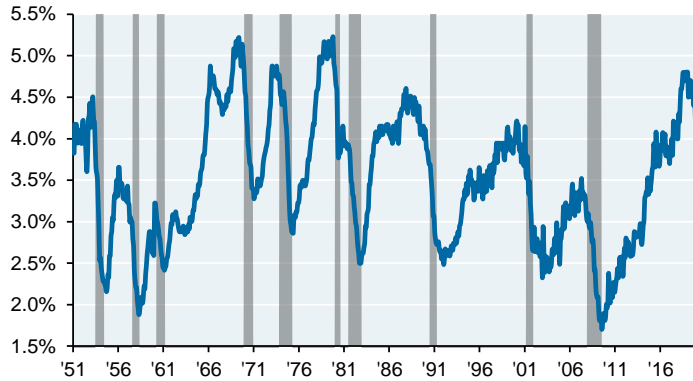
Source: Gavekal, Wind. February 2020.

¹ Gavekal Dragonomics, February 25, 2020.



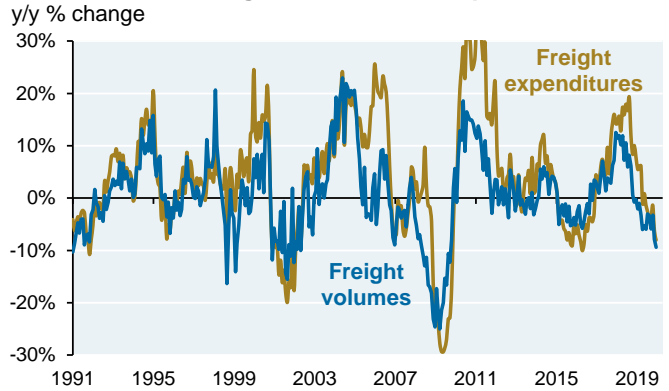
Despite our expectations of an eventual post-virus bounce in global activity, there are still weak signals worth paying attention to in the US: a large decline in job openings in the US (from high levels), declines in US freight measures and the negative impact of the Boeing 737 Max grounding. The latter is expected to hit first quarter growth now that aircraft inventory levels have been climbing and no one is buying. The other two (jobs and freight) are most likely lingering aftershocks from Trump's Trade War.

Composite help wanted index and job openings rate



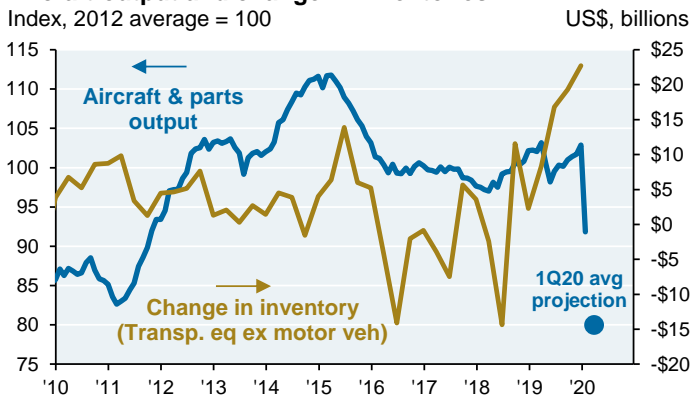
Source: Barnichon, SF Fed, J.P. Morgan Economic Research. Dec 2019.

North American freight volumes and expenditures



Source: Cass Information Systems. January 2020.

Aircraft output and change in inventories



Source: BEA, FRB, J.P. Morgan Economic Research. January 2020.



Markets

Some quick facts on the S&P 500 selloff: at -8.1%, it has been the second largest 4-day decline from an all-time high on record, and is equal to the median level of all 5%+ selloffs since 1927.

The magnitude of US and MSCI China declines over the last week appears to price in a full year earnings decline of 20%-25% in China, and 10%-15% in the US and Europe. My sense is that the earnings results may be worse than expected in China, and better in the US. Furthermore, large S&P 500 selloffs have historically been followed by a rebound within 6 months if there's no recession, which we do not expect given the strength of the US consumer. And for all the talk of collapsing interest rates, the spread between the 10 year and 30 year US Treasury is steepening, not inverting.

The most obvious comment to make is that markets were not set up for a massive global shock like COVID-19 given where financial assets were priced coming into the year. The table below shows the percentile of expensiveness for the S&P 500 across various metrics as of mid December. Almost all of them were at the very high end of the range, which is why we wrote about much lower return expectations in our 2020 Outlook even before the virus came along. Usually a year of very high market returns combined with weak profits growth (like 2019) is followed by a year when profits catch up to what's priced in, resulting in flattish markets; that's what we were expecting already.

Yield curve is steepening, not inverting
30 year US Treasury minus 10 year US Treasury



Source: Bloomberg. February 25, 2020.

| S&P 500 valuation metric | Current | Historical percentile |
|------------------------------|---------|-----------------------|
| US market cap / GDP | 199% | 99th |
| Enterprise value / Sales | 2.5x | 99th |
| Enterprise value / EBITDA | 12.7x | 93rd |
| Price / Book | 3.6x | 90th |
| Cyclically adjusted P/E | 27.8x | 89th |
| Forward P/E | 18.4x | 88th |
| Cash flow yield | 7.2% | 85th |
| Free cash flow yield | 4.1% | 53rd |
| S&P earnings yield - 10Y UST | 362 bps | 28th |
| Median metric | | 89th |

Source: Goldman Sachs Investment Research. EBITDA = earnings before interest, tax, depreciation, and amortization. December 16, 2019.

S&P 500 index
Index level



Source: Bloomberg. February 25, 2020.

MSCI emerging markets index
Index level



Source: Bloomberg. February 25, 2020.



Another important issue regarding COVID-19 is that it comes at a time when **MSCI and Barclay's are gradually increasing China's weight in global equity and fixed income index products**. While foreign portfolio inflows into China are helping stabilize its capital account and offset whatever capital flight might be taking place, **COVID-19 raises important questions about the necessary risk premia for holding Chinese assets**. The severity of the pandemic has reportedly been exacerbated by Chinese government repression of virus scientists last December for rumormongering, and who were compelled to sign a document admitting that they were "spreading lies" (some eventually died)².

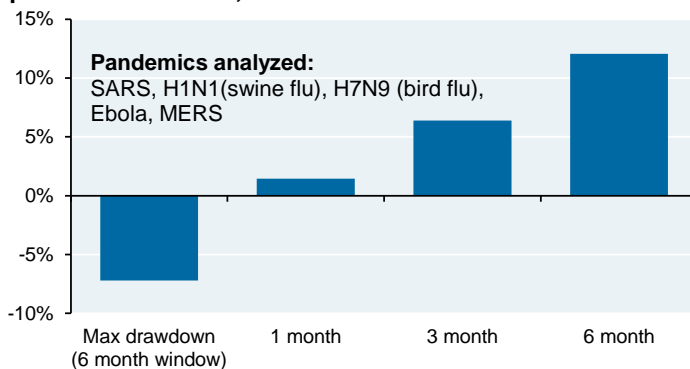
Eventually, COVID-19 may reach the US in much larger numbers, and if it does, equity markets may get hit again given what China has shown as the necessary steps to contain it (extreme quarantine measures and massive disruptions to economic activity). All things being equal, I would be tempted to see such a selloff as a buying opportunity. After all, in the history of pandemics, equity markets tend to decline sharply and then recover. This pattern also influences current economic forecasts of a sharp and temporary period of above-trend growth when COVID-19 eventually subsides.

What may be different this time: a front-runner candidate in one party who advocates a radical change in the structure of the US economy, combined with a prior Senate Majority Leader arguing for an end to the filibuster³, which would allow for a simple majority to pass major economy-wide legislation. I received some grief for our February 6th note on this, but his supporters cannot have it both ways: you cannot argue for radical changes across multiple sectors of the US economy without people like myself discussing the potential for a radical repricing of financial assets in response. In any case, we will discuss this in an *Eye on the Market* next week after Super Tuesday. The 2020 energy paper is finished but will have to wait.

Michael Cembalest
JP Morgan Asset Management

(see following page for COVID-19 charts vs other communicable diseases)

Average S&P 500 performance during and after start of pandemic outbreak, Total return %



Source: J.P. Morgan Asset Management. 2020.

Impact of coronavirus on global real GDP forecast



Source: J.P. Morgan Global Economic Research. February 2020.

² See "How China's incompetence endangered the world", Foreign Policy Magazine (a subsidiary of the Washington Post), Feb 15, 2020; "Wuhan virus cover-up exposes a China built on lies", Foreign Policy Magazine, Feb 3, 2020; "Coronavirus and the Blindness of Authoritarianism", Atlantic Monthly, Feb 22, 2020; and our December 4, 2019 Eye on the Market which included charts on China's remarkable economic transformation measured against an empirical assessment of the rights of the individual in China compared to all other countries in the world.

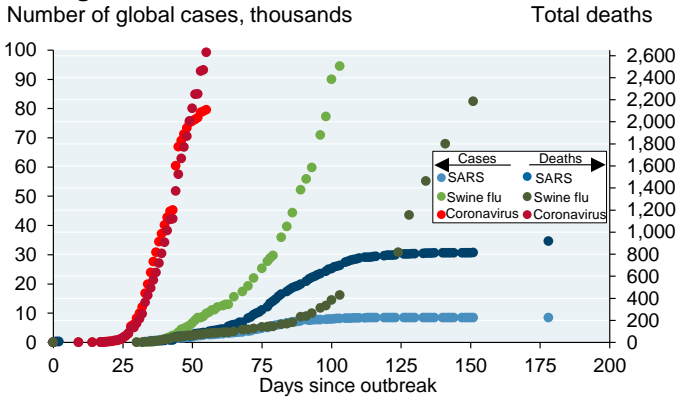
³ "The Filibuster Is Suffocating the Will of the American People", Harry Reid, NY Times, August 12, 2019.



Appendix charts: COVID-19 in context

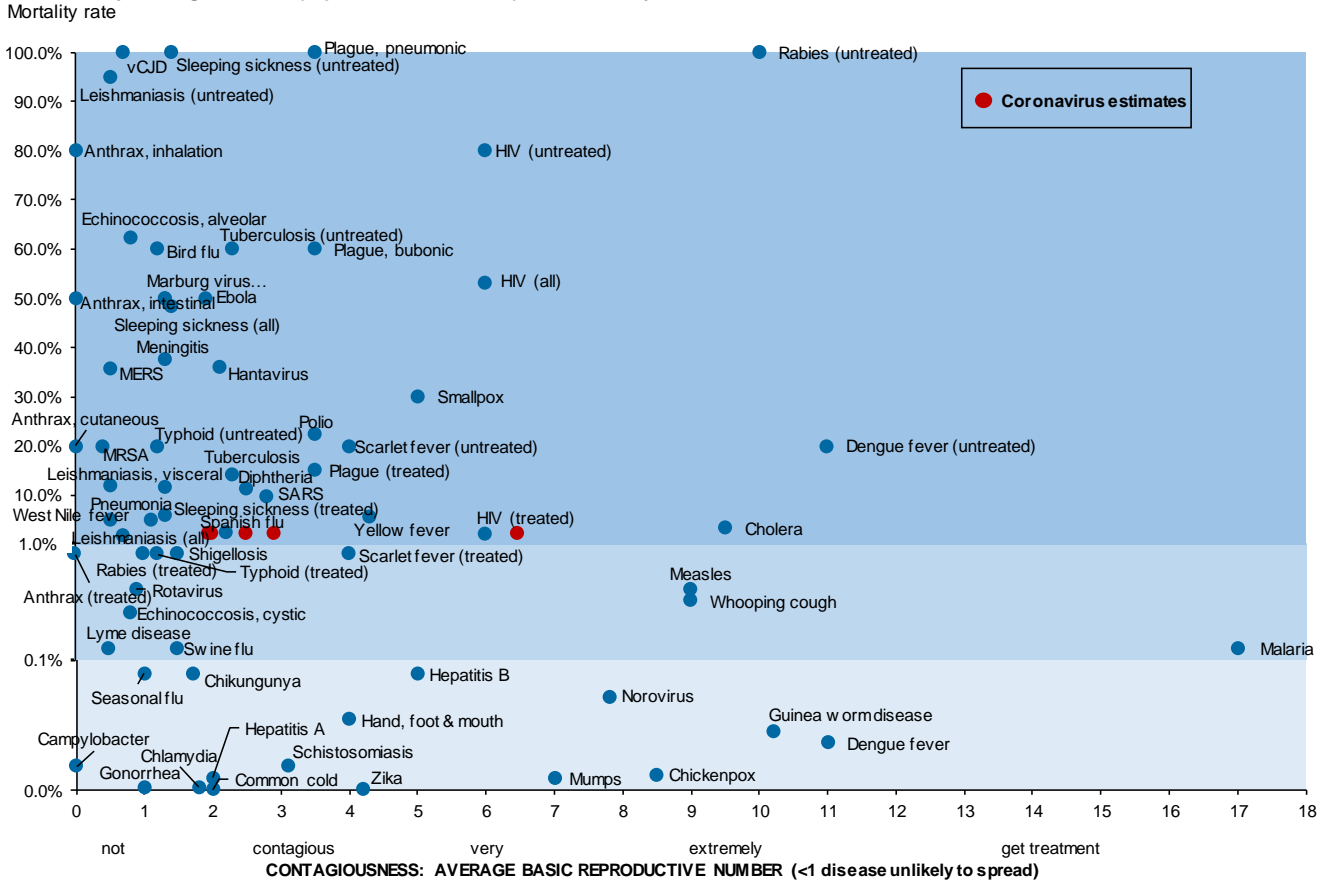
The first chart shows infection and mortality comparisons of COVID-19 to SARS and the Swine Flu, while the second chart takes a more comprehensive look vs a wider variety of communicable diseases. In the second chart, the mortality axis is not linear at the bottom in order to highlight differences in diseases with much lower mortality rates. As a reminder, preliminary estimates from the US CDC on the US flu season are as follows: 29 - 41 million illnesses, 280k-500k hospitalizations and 16,000 – 41,000 deaths.

Contagion from coronavirus vs SARS and swine flu



Source: Johns Hopkins University, J.P. Morgan. February 24, 2020.

Diseases by contagiousness (reproductive number) and mortality



Sources include: Food and Drug Administration, National Center for Biotechnology Information, Global Health Data Exchange, Cambridge, eMedicine, Chinese Center for Disease Control, World Health Organization, ScienceDirect, AAB. Coronavirus estimate sources: Imperial College London, Chinese University of Hong Kong, York University. 2020.



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