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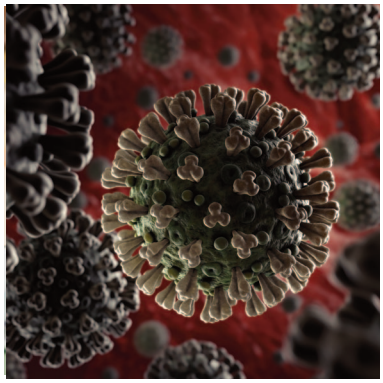
TOP of MIND

2020'S BLACK SWAN: CORONAVIRUS



Amid many concerns heading into 2020, the event that no one expected was the outbreak of COVID-19—a coronavirus that first emerged in the populous city of Wuhan, China, and which is now proving to be both more infectious and virulent than the common flu. As China attempts to restart its economy after an unprecedented lockdown, the virus continues to spread globally, and data on the sizeable economic fallout starts to trickle in, coronavirus is Top of Mind. We feature expert interviews with Harvard's Dr. Barry Bloom and University of Minnesota's Dr. Michael Osterholm to better understand what we know—and don't know—about the virus today. We assess the potential hit to global growth, which we now expect will be -5pp and -2pp qoq ann. in Q1 and Q2, respectively—enough to prompt the Fed to cut 75bp by June, in our view. And we discuss where markets that have already been pummeled—albeit from lofty levels—go from here. Finally, CSIS's Jude Blanchette gives his take on what this all could mean for China over the near and longer term.

"The sense is that this infection will probably spread worldwide...stringent control measures...won't stop an epidemic, but they will slow it down and ultimately reduce the total number of cases."

- Dr. Barry Bloom

"While the case-fatality rate is much lower, the transmission is quite dynamic, and many more people will get it. So comparing this illness with SARS or MERS is not helpful."

- Dr. Michael Osterholm

"I think climbing out of this hole will likely stress the [Chinese] leadership in a way that it hasn't been stressed since the 1989-1991 period."

- Jude Blanchette

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Dr. Michael Osterholm, Director of Center for Infectious Disease Research and Policy, University of Minnesota

Jude Blanchette, Freeman Chair in China Studies, CSIS

Andrew Tilton, Chief Asia-Pacific Economist, Goldman Sachs

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...AND MORE

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Macro news and views

We provide a brief snapshot on the most important economies for the global markets

US

Latest GS proprietary datapoints/major changes in views

- We expect a larger coronavirus drag on growth, but expect an eventual recovery will partially offset the hit to full-year GDP.
- In response to coronavirus risks, we now expect the Fed to cut rates by 75bp by June.

Datapoints/trends we're focused on

- A potential uptick in new coronavirus cases in the US, which would pose significant downside risk to our GDP forecast.
- The supply chain impact of the virus; though limited so far, we think it could grow if China production disruptions continue.
- The Democratic primary; we expect the general election to be competitive irrespective of who wins the party's nomination.

Japan

Latest GS proprietary datapoints/major changes in views

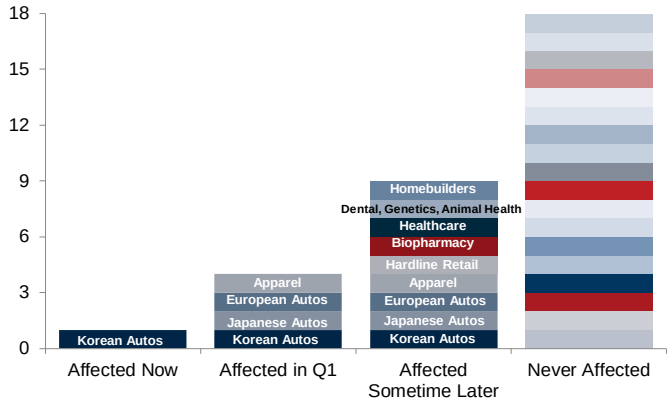
- We lowered our annualized Q1 2020 GDP estimate by 0.6pp to -0.3% based on lower expected external demand and personal consumption as a result of the coronavirus, indicating Japan will likely enter a technical recession; we've slightly reduced full-year 2020 growth by 0.1pp to -0.4%.

Datapoints/trends we're focused on

- The domestic consumption outlook, which would skew growth risks to the downside if people increasingly avoid public activity.
- The govt's. stimulus package; we expect implementation to be pulled forward to some extent to help offset the virus impact.

Potential supply disruptions ahead

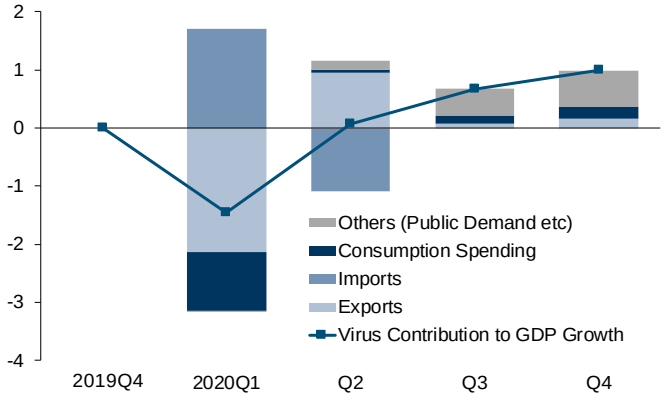
Supply chain disruptions by industry based on GS sector analysis,



Source: Goldman Sachs Global Investment Research.

Likely entering technical recession

Estimated COVID-19 impact on Japan GDP qoq ann, contribution pp



Source: Goldman Sachs Global Investment Research.

Europe

Latest GS proprietary datapoints/major changes in views

- We continue to expect a virus-related drag on growth in the first part of the year, followed by an eventual rebound, but much depends on the breadth of regional virus-related disruptions.

Datapoints/trends we're focused on

- The spread of the virus throughout Europe, which presents the danger of an economically disruptive outbreak.
- The second phase of Brexit negotiations; we think the UK government will make enough concessions to secure a zero-tariff/quota free trade agreement before the December deadline.

Emerging Markets (EM)

Latest GS proprietary datapoints/major changes in views

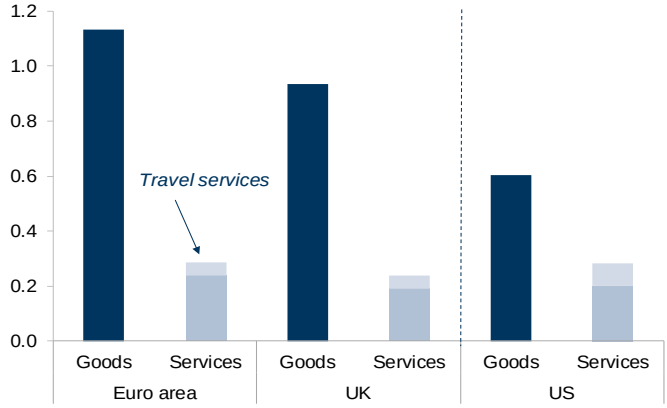
- Over the past month, we reduced our Q1 China GDP forecast to 2.5% yoy and full-year 2020 growth forecast to 5.5% yoy based on deep and prolonged disruptions from the coronavirus outbreak.
- We lowered full-year 2020 GDP across EM Asia, including by 0.4pp in South Korea, 1.1pp in Thailand, and 1.3pp in Malaysia.
- We see China policy settings being far looser through year-end in an effort to push the economy to above-trend growth in H2.

Datapoints/trends we're focused on

- China macro data; we expect the Feb manuf. PMI to drop as low as 38, a sharp dip in the services PMI, and very weak trade growth.

Europe more vulnerable to China shock than US

Exports to China by source country and type, % of GDP



Note: Based on latest available annual data; EU used as proxy for Euro area
Source: Eurostat, Goldman Sachs Global Investment Research.

China electricity consumption still well below normal

Daily coal consumption of major electricity producers, thousand tons



Note: We adjusted the chart for a 2-day delay in reports of coal consumption.
Source: Wind, Haver Analytics, Goldman Sachs Global Investment Research.

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2020's Black swan: Coronavirus

Heading into 2020, there was no shortage of concerns about the global environment, including elevated tensions with the Middle East and North Korea, a high-stakes election year in the US, and few monetary policy levers left in several major economies to fight the next downturn amid ongoing growth worries. But the event that no one expected was the outbreak of COVID-19—a coronavirus that first emerged in the populous city of Wuhan, China, and which is now proving to be both more infectious and virulent than the common flu.

As a result, China implemented an unprecedented lockdown of much of the country in late January, effectively halting a vast amount of activity in the world's second-largest economy, with knock-on effects to global supply chains just beginning to emerge. Although the Chinese economy is starting to limp back to life, with the country continuing to grapple with containing the virus, a rising number of international cases, and data on the sizeable economic fallout trickling in, coronavirus is Top of Mind.

We first dig into the virus itself, turning to Dr. Barry Bloom, professor at Harvard University's T.H. Chan School of Public Health, and Dr. Michael Osterholm, director of the Center for Infectious Disease Research and Policy (CIDRAP) at the University of Minnesota. They collectively describe what we know about the virus at this point: it transmits easily from person to person, and each infected person infects about 2 or slightly more people (vs. 1.2-1.4 people for regular influenza); the vast majority of infected people show only mild or no symptoms, and people without symptoms can transmit the disease to others (which differs from past outbreaks of SARS/MERS, in which people didn't typically become infectious until after they showed severe symptoms); and a small percentage of infected people develop severe symptoms, with an even smaller percentage of those dying.

Given these attributes, Bloom and Osterholm agree that further global spread is likely. But they also argue (though Bloom more ardently) that quarantines and control measures can slow the spread of the virus even if they won't stop it. This is important because it buys crucial time for the medical community to prepare for outbreaks and eases acute demand for critical care, which helps healthcare systems from becoming overwhelmed. That said, both believe the US is unprepared on almost every level—from policy and preparedness coordination across national, state and local levels to the availability of drugs and medical supplies—to deal with any sizeable outbreak today.

GS economists Jan Hatzius and Daan Struyven then size the potential global economic shock, which they now expect to amount to a -5pp and -2pp hit to quarter-on-quarter annualized GDP growth in Q1 and Q2, respectively, followed by a rebound in the second half of 2020. All else equal, this would imply a short-lived global contraction that stops short of an outright recession. As a result, we now expect the Fed to cut rates by 75bp by June. This baseline scenario assumes a recovery in economic activity in China over the coming quarters, moderate supply chain disruptions, and some drag on consumer spending and business activity from national outbreaks outside of China (see pages 18-19 for a round-up on supply disruptions so far from our equity analysts.)

Andrew Tilton, GS Chief Asia-Pacific economist, then digs further into the economic implications for China as policymakers carefully attempt to balance the priority of containing the virus with the need to manage its economic impact. Tilton expects the largest decline in quarter-on-quarter China GDP in over three decades. That said, as with past viral outbreaks, he expects growth to rebound in subsequent quarters, substantially aided by government stimulus. But he cautions that this expected rebound is contingent on the authorities getting the virus largely under control over the next month, and he views the balance of risks to these forecasts as skewed to the downside.

The markets have clearly begun to digest the economic hit, with the S&P 500 now down on the year and US 10-yr yields declining to a new all-time low. Zach Pandl, GS Co-Head of Global FX, Rates and EM Strategy, and David Kostin, GS Chief US Equity Strategist, believe the risk-off move in markets has more room to run, with Kostin now expecting no earnings growth for US companies this year and lowering his near-term S&P 500 target to 2900. And they argue to position defensively across US equities, FX and rates.

As for the assets most exposed to China, Tim Moe, GS Chief Asia Equity Strategist, also advises to focus on stocks in Asia that are likely beneficiaries of a stimulus boost in China, or are well positioned to snap back as the sharp, but ultimately temporary, demand hit in the region reverses. And Jeff Currie, GS Global Head of Commodities Research, warns that a tug-of-war between ample commodity inventories in the wake of virus-related disruptions and the potential for a stimulus-led demand boost in China is likely to create more commodity price volatility ahead. But the one thing he says is for sure: gold is immune to the virus.

Finally, looking beyond the near-term economic and market implications, we ask China scholar Jude Blanchette of the Center for Strategic and International Studies if these events could have longer-term implications for Chinese President's Xi Jinping's leadership, and China's political stability more broadly. His short answer: No. In his view, although the recent situation will come at a political cost for Xi, a challenge to his leadership is very unlikely given the amount of power he has amassed as well as the logistical obstacles to such a challenge today.

P.S. Don't forget to check out the podcast version of this and other recent GS Top of Mind reports—on Apple and Spotify.

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Interview with Dr. Barry Bloom

Dr. Barry Bloom is the Joan L. and Julius H. Jacobson Research Professor of Public Health at the Harvard T.H. Chan School of Public Health. Below, he discusses what we know about COVID-19 right now, why it's likely to spread further, and how control measures and public health preparedness will be crucial to mitigating the outbreak.

The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.



Allison Nathan: Is it time to call COVID-19 a global pandemic?

Dr. Barry Bloom: The World Health Organization (WHO) generally uses the term "pandemic" when a major infectious disease is spreading within communities on multiple continents. It denotes the highest level of concern. The dilemma with this coronavirus is that while cases have now been identified on multiple continents, the number of cases we know about is relatively small in most places. That said, there are almost certainly lots of cases we don't know about. So, on the one hand, you could say it is a pandemic, and I believe that the public health community everywhere is treating it as such. But one wants to alert the public, not panic the public. And the concern is that when you call something a pandemic, there will be a rush on everything from face masks to vegetables, which isn't necessary when only 15 or even 100 people are currently infected. All that said, it is almost a meaningless designation, provided we start to prepare for a serious set of outbreaks and community transmission in multiple places around the world.

Allison Nathan: What do we know and what do we not know about COVID-19 at this point?

Dr. Barry Bloom: Thanks to extraordinary scientific work in China, we know the genome sequence of the virus. Within 10 days Chinese scientists figured out the sequence and nature of the virus and alerted the WHO and the world, so that scientists around the world could start to think about developing diagnostic tests, drugs and vaccines. It's astonishing that the science moved so quickly. We also know that the disease is spreading from person to person and the effective transmission rate, which is how many people get a disease from a single individual source, is around 2.3. That number is important because when it declines to less than one, meaning that every sick person is transmitting to fewer than one person, we'll know we're past the peak of the outbreak.

And we know that unlike most flu and common upper respiratory infections, this is a lower lung infection, which means that it's more likely to be spread by coughing than just sneezing, though both are possible. We also see increasing evidence of asymptomatic transmission, meaning that some infected people don't feel sick, but can still transmit the virus to others. And we know that some small percentage of people who do get sick, die. These attributes suggest this is a serious, lethal and rapidly spreading infection.

Allison Nathan: We keep hearing about a 2% case-fatality rate. Is that an accurate reflection of the virus' virulence?

Dr. Barry Bloom: The case-fatality rate estimates, or the percent of infected people who die, doesn't provide any information about how lethal this virus is at this point. That's because those estimates basically reflect the percent of hospitalized people who die from the disease. In the case of SARS, this was around 10% and a relatively accurate reflection of the disease's virulence because virtually everybody infected had severe symptoms. But with this virus, which can be asymptomatic, we don't know the total number of people infected; so the case-fatality rate's denominator is unknown. In these situations, the initial case-fatality figures are almost always frighteningly high, but then come down when the total number of infected people becomes known. For example, rates for H1N1 were terrifying in the beginning, at 4%, but ended up at around 0.07%.

Allison Nathan: Given that the disease has already spread to multiple countries, can it be contained at this point?

Dr. Barry Bloom: In places that have a limited number of cases, public health systems should be able to identify, isolate and effectively contain the spread of the disease. The problem is that this disease is likely more widespread than the number of identified cases reflects given that people can be asymptomatic, mildly sick people don't typically go to hospitals and diagnostic tests are not widely available. And when you get to a much larger number of cases—several hundred or thousands of cases—the ability of the public health system to track down and contain every contact becomes overwhelmed. Add to that the fact that an awful lot of exposed people flew out of Wuhan before restrictions were imposed who we don't know anything about. So the sense is that this infection will probably spread worldwide.

Allison Nathan: That said, do control measures and quarantines like those that China has implemented help thwart the disease's spread?

Dr. Barry Bloom: There's no question that they do. We've seen the number of new cases in China decline, and my contacts in China believe these numbers are accurate. So, as draconian as the lockdowns have been, they've been effective. Now, is that kind of draconian imposition possible in the United States? Most of us would say no.

But what China's success has taught us is that stringent control measures like restricting mobility, prohibiting large gatherings, closing schools etc., can reduce the spread of a major localized outbreak. These measures won't stop an epidemic, but they will slow it down and can ultimately reduce the total number of cases. And that is critical because it delays spread and allows public health systems to be better prepared and avoid becoming overwhelmed. This issue of hospital care extends beyond patients with the virus; more people died in West Africa from ordinary diseases like measles and

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cardiovascular illnesses than from Ebola during the 2014 outbreak because hospitals were unable to cope with Ebola. As the duration of a pandemic is extended, the number of people demanding hospital care at any one time is lower, and the care they get is therefore better. The 1918 influenza pandemic provides evidence of this—it hit the East Coast very hard, but by the time it got to the Midwest, the epidemic curve was lower and more prolonged, and health officials were better prepared, so they had a much more effective response.

> "China's success has taught us that stringent control measures like restricting mobility, prohibiting large gatherings, closing schools etc., can reduce the spread of a major localized outbreak. These measures won't stop an epidemic, but they will slow it down and can ultimately reduce the total number of cases."

Allison Nathan: Once restrictions are lifted in China, could we see the number of cases pick up again?

Dr. Barry Bloom: I am increasingly optimistic about China, but we can't assume that we've seen the worst of this globally. During the 2003 SARS epidemic, there was a second peak in Toronto once restrictions were relaxed. There was also a second peak during the 1918 pandemic in New York and Pennsylvania. But there was no second peak in the Midwest during the same pandemic, because they had more time to prepare for and attenuate the impact.

Allison Nathan: What scares you the most about this virus?

Dr. Barry Bloom: What scares me the most is the prospect of the virus spreading to developing countries, especially Africa, which has limited capabilities to assist patients in severe respiratory distress. Developing countries are going to have great difficulty dealing with the most serious cases. With SARS, there were no cases in Africa. But Africa has just reported its first case—in Nigeria—and that worries me greatly.

Allison Nathan: When will this peak, and how can we gauge if it has?

Dr. Barry Bloom: It's very hard for scientists to make evidence-based predictions on that. We couldn't have predicted that the quarantine around the Wuhan area would have resulted in such a rapid decline in cases; the classic epidemiology model suggested that the number of cases would have declined around the middle of March, at the earliest. So the real answer is testing, testing, and testing, and keeping accurate data and records on new infections. Such testing is currently happening in Hong Kong; they've run about 300,000 PCR tests in the last month. But we're not now prepared to do that in the US. So far, tests are only going to the CDC, which has a diagnostic test that is not fully functional. If the virus starts to spread in the US, there will be a desperate need for information on the number of cases, where it's spreading, and so forth. At this point, only six centers in the US have been sent testing kits. That's shameful.

Allison Nathan: Will the onset of summer in the Northern Hemisphere help thwart the virus?

Dr. Barry Bloom: That has been the case for influenza, which moves seasonally. And SARS wound down over the summer. But it is not at all predictable whether this infection will be seasonally controlled. There's good evidence that coronaviruses don't do well in warm, humid weather, and that they thrive in cold, dry weather. But is that because of the climate, or because people are huddled closer together in the wintertime? It's not clear. A couple of small studies on parts of China versus places like Hong Kong that are in a tropical belt show no evidence that weather differences between these regions have been a big determinant in the viral spread. But we just don't know.

Allison Nathan: So what do you think will most likely end this outbreak?

Dr. Barry Bloom: If the virus turns out to be seasonal, it will decline in the summertime. And if we're lucky, as in the case of SARS, it will not come back again. But it could instead become a recurring seasonal infection, like influenza, that reappears each year; 61k people died from the flu in 2018. All that said, we think it's unlikely that seasonality alone will stop this outbreak. So what we really need to do is reinforce whatever benefits the seasonality might bring us with public health preparedness, so that we can detect and isolate cases while the numbers are still very small, and hopefully avoid having to use massive mitigation strategies like closing schools and major public events and congregations.

Allison Nathan: Is the US prepared to deal with this?

Dr. Barry Bloom: No. As Laurie Garrett has recently written about, during the Obama Administration, all 17 agencies involved in emergency preparedness, including the White House's Office of Emergency Preparedness and the Department of Homeland Security, had regular conference calls to discuss how to tackle scenarios such as a viral outbreak or a bioterrorism attack. There were plans in cities to prepare for either of those eventualities, and there was a legislative fund created for emergency preparedness that could be released by CDC very rapidly if need be. Such emergency preparedness offices do not exist today and the emergency fund has disappeared. It is a question of whether there is current leadership in this country that is able to efficiently organize the public health system in every federal agency, state, city, and town. The CDC cannot yet get a workable diagnostic test to every public health laboratory in the country. And we're already facing shortages of supplies of medicine, gloves, and masks—and that's before we've had any community spread. Much of our drugs and medical supplies come from China. So, in summary, we are regrettably not adequately prepared on almost any level.

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A viral global slowdown

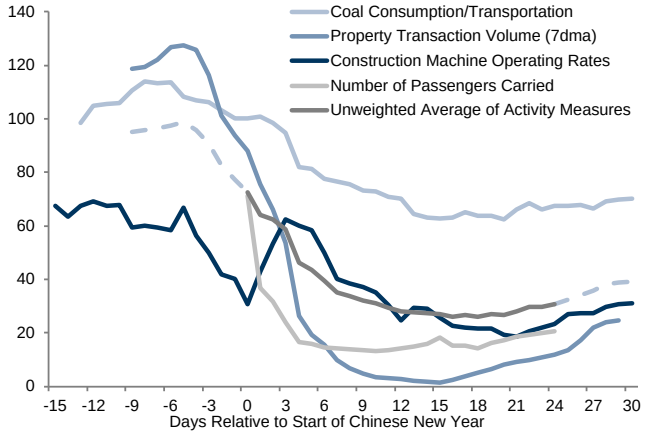
Jan Hatzius and Daan Struyven expect a larger drag on global growth from the coronavirus, likely prompting 75bp of Fed rate cuts by June

In early February, we estimated that the coronavirus would subtract about 2pp (annualized) from Q1 global GDP growth. Since then, we have seen several important developments that now suggest a considerably more serious impact on the global economy.

First, our China economists have cut their growth forecast further and, despite a sharp slowdown in reported infections in China, high frequency indicators of economic activity in China remain about 60% below 2019 levels. Second, the production shutdowns in China have increased the risk of global supply chain disruptions. Third, disruptions are no longer confined to China as community transmission has spread to a broader set of countries. These developments require a rethink of our analysis and a fuller consideration of the range of economic scenarios that could play out.

High-frequency proxies for China activity still depressed

2020 activity relative to 2019 activity, percent



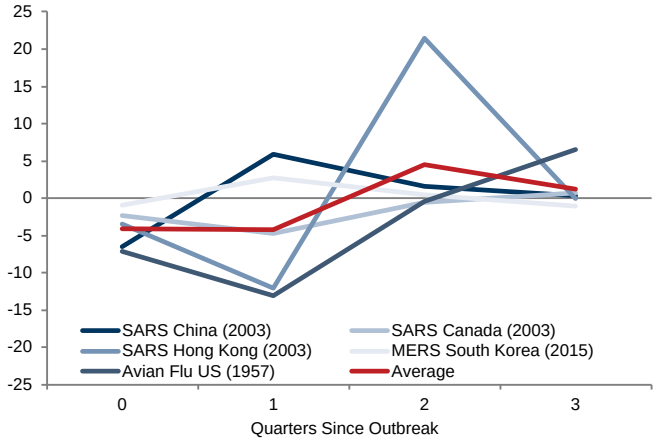
Note: Dotted line is where any missing series are projected using remaining data.
Source: Wind, Ministry of Transportation, Goldman Sachs Global Investment Research.

We broaden our previous analysis to include five different effects on global GDP growth.

First, we estimate the direct impact of the virus on economic activity, relying on the official Chinese GDP numbers in our estimates because they enter the global GDP aggregates. Second, we estimate spillovers from China via reduced goods imports, relying on the hit to estimated activity in the China tradable sector and the income elasticity of Chinese import demand. Third, we estimate spillovers from China via reduced spending by Chinese tourists assuming a very slow recovery from the February lows. Fourth, we estimate the damage to production outside of China from production shutdowns in China using our supply chain model. Fifth, we estimate the disruptions to domestic economic activity in virus-hit countries other than China, including South Korea, Japan, Italy, Iran, and potentially a large range of other countries. To get a rough sense of the magnitude of this channel, we look at GDP changes during other pandemics, including the 2003 SARS episodes in China, Hong Kong, and Canada, the 1957 Avian Flu in the US, and the 2015 MERS episode in South Korea. The average episode saw a GDP hit of 4-5% in the 1-2 quarters after the outbreak, although the variation is substantial.[1]

We use past pandemics to estimate the potential growth impact of global community spread

Real GDP growth minus average growth over year before outbreak, pp



Source: Haver Analytics, Goldman Sachs Global Investment Research.

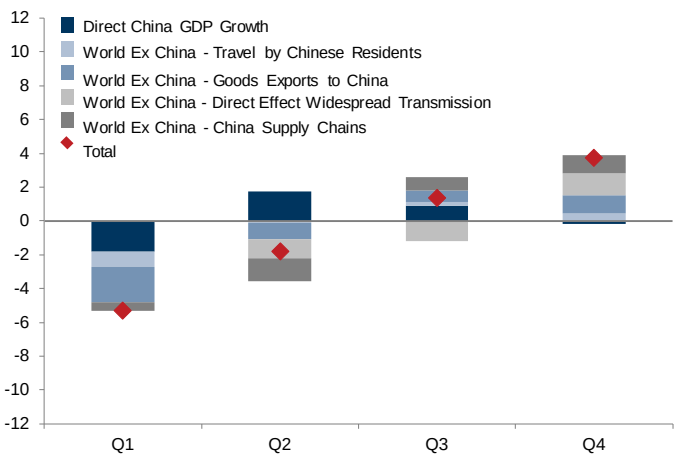
Three scenarios for the global virus impact

We consider three scenarios of varying severity. In our updated baseline scenario, we assume a gradual recovery in Chinese import demand and now incorporate both limited supply chain disruptions and an intermediate level of global community spread. We assume that the direct growth effect of community spread outside of China is roughly one-third of the impact of the average pandemic.

Our analysis shows effects on quarter-on-quarter annualized global GDP growth of -5pp in Q1 and -2pp in Q2, followed by a rebound in the second half of 2020, leaving our full-year global growth forecast at about 2%. All else equal, this would imply a short-lived global contraction that stops short of an outright recession.

Baseline scenario: global growth remains weak in Q2 but stops short of full recession

Baseline scenario: impact of COVID-19 on 2020 ann. global growth, pp



Source: Goldman Sachs Global Investment Research.

[1] In addition to these effects, potential amplification channels through financial conditions or labor markets could add to the drag on growth but we have not modeled these separately.

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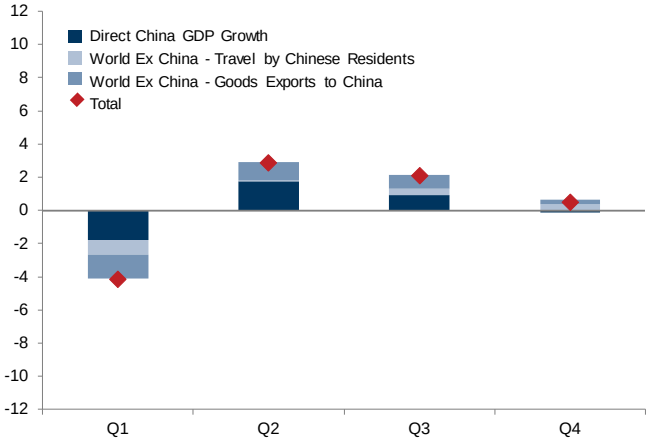
In this scenario, we would expect some monetary easing from a number of the world's major central banks, including 75bp of rate cuts by the Federal Reserve through June starting with a 25bp cut in March. Although moderate Fed rate cuts are unlikely to be very powerful, the committee will probably be reluctant to disappoint market expectations for substantial rate cuts for fear of tightening financial conditions further.

We also consider two alternative scenarios. The upside scenario assumes that the global spread of the virus is brought under control quickly, that supply chain disruptions remain mostly absent, and that Chinse activity rebounds in Q2/Q3. In this scenario, the data outside of China—especially the business surveys—would likely show noticeable signs of a virus hit in the short term, but with a rebound toward the middle of the year. If so, risk asset markets would recover sharply, and central banks may stay on hold.

Upside scenario: the global economy quickly recovers in Q2

Upside scenario: impact of COVID-19 on 2020 ann. global growth, pp

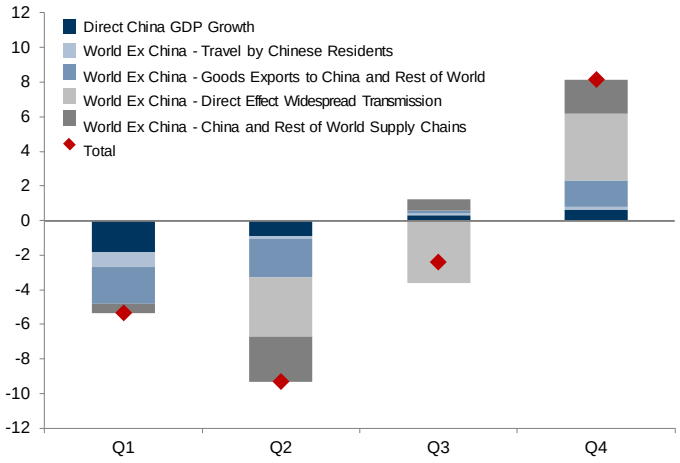


Source: Goldman Sachs Global Investment Research.

Conversely, in our downside scenario, the virus becomes a more severe global pandemic with large direct effects on economic activity. In this scenario, we assume that Chinese GDP continues to decline through Q2 and recovers only modestly in the second half of the year, that import demand remains depressed for longer in both China and other heavily affected Asian economies, that global supply chains are substantially disrupted by shortages from both China and other Asian economies, and that the virus has a direct effect on growth outside of China equal to the full impact of the average pandemic. This scenario produces a sharp sequential contraction in global GDP in Q1 and Q2—i.e., a global recession—and probably an aggressive monetary easing campaign, including a return to the near-zero funds rate of the post-crisis period.

Downside scenario, the Q1 hit deepens in Q2

Downside scenario: impact of COVID-19 on 2020 ann. global growth, pp



Source: Goldman Sachs Global Investment Research.

Ideally, we would assign probabilities to the different scenarios. This would allow us to calculate probability-weighted expectations for global growth and monetary policy outcomes, which could then be compared to market pricing. However, we feel too uncertain both about the development of the disease itself, and are therefore reluctant to provide a probability distribution, however stylized.

What we can say with greater confidence is that the distribution of outcomes has shifted significantly in an unfavorable direction in the past two weeks. Our upside case is relatively similar to our latest country-level forecasts, which translate into low but roughly stable full-year global GDP growth of around 3% in 2020. This would require not only a very rapid turnaround in the news about the virus but also an end to the increasing reports of household and business disruptions before long, which no longer seems like the most likely outcome.

Staying nimble

Although uncertainty is a fact of life in economic forecasting, the current situation is much more uncertain than normal. Even if we had perfect medical foresight, it would be challenging to derive the economic impact of the viral outbreak. This is largely because of the important role of psychology in driving the impact of a given local viral outbreak on economic activities such as airline travel and entertainment. And we have no particular expertise in the medical or epidemiological field.

We therefore plan to take an eclectic and data-driven approach in assessing whether we are on track for our baseline scenario or seem to be diverging in a more optimistic or pessimistic direction. In assessing whether a shift in our baseline view is required, we will rely on a wide range of indicators, including the monthly hard economic data, higher-frequency indicators on economic activity, financial conditions, medical statistics, and more anecdotal reports. In the meantime, our thoughts are with all those affected by the emerging pandemic both in China and elsewhere in the world.

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Interview with Dr. Michael Osterholm

Dr. Michael Osterholm is the director of the Center for Infectious Disease Research and Policy at the University of Minnesota and author of the 2017 book, *Deadliest Enemy: Our War Against Killer Germs*. Below, he argues that we shouldn't take comfort from the recent trends in COVID-19 case numbers, and the coming weeks will be critical in assessing the ultimate magnitude of the outbreak.

The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.



Allison Nathan: Are we facing a global pandemic?

Dr. Michael Osterholm: At this point, it's not clear what the future holds. However, we do know several facts. First, this virus is easily transmitted, much like the influenza virus. Over 80% of cases are mild or asymptomatic, and there appears to be clear evidence from several clusters of cases that even asymptomatic people can transmit the virus to others. That is concerning, because it means that the public health measures we traditionally use, like quarantine or isolation, will be ineffective. Second, we know that about 5% of cases are severe, and about 2% of those infected die—a case-fatality rate 20-times higher than during a severe influenza season. That could come down as more infected people are detected through increased testing, but in regards to both the transmission and severity of cases, this could be a very significant event. Should it continue to unfold in this manner, that would make it a global pandemic.

Allison Nathan: You don't think the 2003 SARS and 2012 MERS epidemics are useful guides for COVID-19. Why?

Dr. Michael Osterholm: The key reason is that in both of these prior episodes, the majority of transmissions occurred well into patients' illnesses, meaning that patients experienced four to six days of critical illness before they became infectious. So while these prior episodes had much higher case-fatality rates—with SARS about 10% and MERS as high as 25-30%—we could address those illnesses fairly easily, by recognizing cases early on, and getting patients into isolation while still in very low states of infectiousness. That's not the case with COVID-19. While the case-fatality rate is much lower, the transmission is quite dynamic, and many more people will get it. So comparing this illness with SARS or MERS is not helpful.

Allison Nathan: Is the 1918 pandemic a better comparison?

Dr. Michael Osterholm: The transmission characteristics of the 1918 pandemic—how it spread around the world and how fast it could infect people in a population—make it a better basis of comparison. But there are also key differences between the two illnesses, one being that the fatality rate of the 1918 pandemic was much higher, in some cases killing 3-4% of the population. Another main difference is that the largest number of deaths in the 1918 pandemic actually occurred among young, healthy adults, as opposed to the preponderance of cases in those over 50 years of age, and particularly those with underlying health conditions, in the current outbreak.

Allison Nathan: How accurate and reliable are the numbers on new cases we're seeing today?

Dr. Michael Osterholm: As in almost any outbreak, the numbers in the earliest days weren't reliable because there wasn't a test to determine if someone was actually infected, and even once a test was developed, the number of available test kits was initially extremely limited. So through much of January and early February, the case numbers out of China just reflected a sub-sample of cases in the Wuhan area in particular. There is little doubt these numbers vastly underreported the number of actual infections; there were numerous reports of people who couldn't get into a hospital because they were overflowing with cases and eventually died at home. None of these people were ever tested, so they weren't considered a case. More recently, test kits have become more widely available in China, so the numbers have become increasingly reliable, although the way the numbers have been reported has changed a few times, causing some confusion. As for the rest of the world, the availability of test kits is still extremely limited. So the reality is we'll never really have an accurate number of total cases.

Allison Nathan: While the number of new cases is still rising in China, the growth rate of new infections is slowing. Should that give us comfort?

Dr. Michael Osterholm: I don't take much comfort in that. Remember that much of China has been under an extremely severe population lockdown, well beyond a standard isolation or even quarantine from a public health standpoint. And even despite that, we're still seeing new cases, which is a testament to this virus' infectiousness. When China loosens its population control efforts to restart its economy and people go back to work and gather in crowds again, we could easily see a major rebound in the number of cases in the ensuing 4-6 weeks. We saw something similar in Toronto in during the 2003 SARS outbreak. An outbreak in April was brought under control, but then two unknown cases reignited the spread in May, which became the more severe part of the outbreak. The lesson from that was don't celebrate the end of this prematurely.

Allison Nathan: But hasn't the extensiveness of the lockdown in China at least thwarted the spread of this?

Dr. Michael Osterholm: I don't think so; the shutdown is just delaying cases, not materially reducing the ultimate magnitude of the outbreak. A legitimate point may be that such a delay helps buy time to better prepare by, for example, getting more personal protective equipment into healthcare settings. But we have no indication this is happening. At this point, we have no evidence that quarantine measures are going to make much difference, and we have no such evidence from past outbreaks, either. If this virus were behaving like SARS or MERS—with people not becoming infectious until several days into their illness—then intervention would be effective because we would be able to isolate people before they transmitted the

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virus to others. But with the model that's emerged for COVID-19, in which you may be infectious well before you get sick, quarantines don't work.

Allison Nathan: What do you make of the rise in international cases? Should we expect more to come?

Dr. Michael Osterholm: More cases are very likely. To see why, take a look at what happened in Wuhan. The virus emerged there in late November at the latest, and no one in the medical community picked up any activity until the end of December—a month later. The best data we have so far suggests that each infected person not in protective isolation infects about two other people on average; that compares to 1.2-1.4 people for regular influenza, and about 1.8 people for pandemic influenza. Using an incubation period of around 6 days, in the first 24 days, or four generations of the virus there are 31 total new cases per every individual initially infected. Over the next four generations, there are a total of 480 cases. At that point, you might start picking up something, but, if 80% of these cases are mild, not a lot of cases would be detected by the medical system. After the tenth generation, there are 1,548 total cases. If 5% of these are severe, you really start picking this up, but that's already ten generations, or 60 days, out.

Every country in which the virus is introduced around the world will go through a similar pattern in which the disease goes undetected for the first month or two. And once the virus is detected, it will take time to see a buildup in the number of cases. So that is why we are just beginning to see a rise in international cases, and why we can expect more to come.

Allison Nathan: Given what we know today, when is the virus most likely to peak, and what would you need to see to get some comfort that we are on the back side of this?

Dr. Michael Osterholm: You're asking the trillion-dollar question that none of us can answer. I will say that, internationally, the number of cases over the next several weeks will be very important to watch given the math I just reviewed. If we don't see case clusters continuing to emerge and the number of detected cases building up as I laid out, that would give me comfort, as would no flare up in cases in China once activity there starts to normalize.

Allison Nathan: Will seasonality help thwart the virus?

Dr. Michael Osterholm: I keep hearing people talk about how the onset of summer will help slow the virus' spread. That's wishful thinking, often based on faulty data. One piece of evidence that people use to support this claim is the fact that the 2003 SARS outbreak basically ended in June. But I think that just owed to the illness being detected in February, and that's just how long it took to get it under control. During the MERS outbreak on the Arabian Peninsula, I observed the virus continue to successfully transmit from camels to humans and then from humans to humans in 110-plus degree heat; heat presented no obstacle for transmission. And while people often hang onto the seasonality of flu, which tends to become more prevalent in both hemispheres during their respective winters, the flu virus circulates year-round in the tropics. So the collective experience of what we know about other coronaviruses and about the influenza virus gives me no reason to think that this is just going to end with the onset of warmth in the Northern Hemisphere. I'm afraid that this could very well play out like a pandemic influenza over the months ahead in both hemispheres at the same time.

Allison Nathan: What do you think will most likely end the outbreak, then? Will this require a vaccine, or will enough people just be exposed and become immune?

Dr. Michael Osterholm: Again, no one knows the answer to this. If it doesn't slow seasonally like a typical influenza virus as I suspect, we'll see the number of cases peak in countries after some weeks or months of transmission, and then, just by the mere fact that the number of people who are now immune after having previously been infected will increase, the spread will slow or even stop, but it won't disappear.

In terms of stopping this outbreak, I have no hope a vaccine will play any role. There's no way we're going to have a vaccine tested for safety, effectiveness, approved by a regulatory agency, manufactured and administered to the public any time short of more than a year, or even several years. But vaccines could become very important if this illness is like an influenza virus, becoming part of our regular illness repertoire that periodically reasserts itself.

Allison Nathan: Are countries like the US prepared to deal with this?

Dr. Michael Osterholm: I don't think so. We're only now beginning to understand how dependent we are on the rest of the world for our preparedness. For example, for the last 18 months, I have been part of a group that has been studying supply chains for critical care drugs—meaning, you need them within hours, or people start to die—in the US. We've identified 153 of these drugs, all of which are generic and most of which are made outside of the US, with a sizable portion made in China. Sixty-three of these drugs were already in short supply even before this outbreak. So we are potentially setting up for a perfect storm in which we have an increase in illnesses at the same time that we have shortages of critical drugs. The same is true for personal protective equipment; most US hospitals today have no meaningful stockpiles of these supplies, which are on backorder because companies can't ramp up fast enough to meet the demand. So we are not in much better shape than China is. The whole world will struggle with this challenge.

Allison Nathan: Is the world more vulnerable to these types of outbreaks given such supply challenges, growing antimicrobial resistance, and more global travel?

Dr. Michael Osterholm: I do think we're all more vulnerable given the degree to which we've outsourced so much of our everyday lives to other parts of the world. And while increasing antimicrobial resistance is definitely a concern, if you don't even have the drugs to begin with, it just won't matter. In terms of transmission, of course we move a lot more people, animals, and goods around the world today than any time in our history. But the 1918 virus made its way around the world just fine, so I have no reason to believe we're much more vulnerable from that perspective.

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Interview with Andrew Tilton

Andrew Tilton is Chief Asia-Pacific Economist at Goldman Sachs. Below he shares his expectations for a sizeable hit to Q1 growth in China from COVID-19 followed by a sharp rebound in Q2 and Q3, assuming the virus spread is largely contained in China by the end of Q1 and policy is eased.



Allison Nathan: What is the current state of activity levels in China, and how are you gauging this?

Andrew Tilton: In Hubei province, which is the center of the outbreak, economic activity remains very low: a large-scale quarantine remains in place and travel is severely restricted. More broadly across the country, activity is slowly starting to resume; local government data suggest 60% of all companies are back to work, although that should not be interpreted as meaning they are back to normal production levels.

That said, gauging activity levels at this time of year is challenging given a big gap in official data owing to the Chinese New Year. Because the timing of the holiday shifts every year, most of the key data for January and February are reported together and released in mid-March. So, we're operating with very little information about the economic impact of the virus. But the early survey data that we do have has declined to record lows. And we're monitoring several daily indicators that we think shed some light on the situation, such as data on traffic congestion, coal consumption at electric power producers, property transactions, and movie box office revenues. These types of indicators still show activity levels at least 20% below normal.

Allison Nathan: Is this daily data—and the monthly indicators we will get in March—reliable?

Andrew Tilton: For any country, it's best to look at a mosaic of different macro and micro data points. The obvious advantage of daily data is that it is real time, but the drawback is that it tends to provide a narrow glimpse of the economy and is difficult to adjust for seasonality, so you can get a lot of noise along with your signal. The advantage of the monthly government data is that it provides a broader sense of the economy. But the challenge in China especially is that the government sets out formal GDP growth targets each year, which recent official statements suggest they may stick to despite the economic hit from the virus. With officials putting a lot of pressure on themselves publicly to get to those numbers, that can obviously lead to questions about how reliable the numbers are. Again, that argues for looking at a mosaic of data points to get an accurate read on the situation.

Allison Nathan: How big of a virus-induced hit to Chinese growth do you ultimately expect?

Andrew Tilton: We've cut our first quarter GDP growth forecast by more than three percentage points from pre-virus levels to 2.5% in year-over-year terms, which implies a sizable contraction in quarter-over-quarter GDP and the worst quarter for Chinese growth in three-plus decades. And some high frequency data points look much worse. So when we do see the monthly macro data for this period, we expect it to be pretty ugly, with, for example, real retail sales numbers likely meaningfully negative and the manufacturing PMI for February likely in the neighborhood of 2008 lows.

Having said that, the typical pattern of past viral outbreaks has been a rapid decline in economic activity over a few months, followed by a sharp rebound. And that's the template we've assumed. So even though Q1 is likely to be very weak, we're expecting a strong rebound in Q2 and Q3. For that reason, we expect a total hit for the year of only around half a percentage point of GDP relative to our pre-virus forecast. But this assumes the outbreak is brought largely under control by quarter-end, which remains highly uncertain.

Allison Nathan: Are past viral outbreaks like SARS in 2003 really a good guide for assessing the likely economic hit today, given that the magnitude of the lockdown has been so much larger, and the Chinese economy is so much more important to the global economy?

Andrew Tilton: In magnitude, SARS isn't a very good analogy, but in pattern it might be. What I mean by that is the types of industries and economic activities that get hit in a viral outbreak are likely to persist from one episode to another. And I think the pattern of seeing a sharp deceleration in activity ultimately followed by a strong rebound is likely to be repeated. But I agree that the intensity and breadth of the control measures in this episode as well as China's much greater importance to the global economy makes the current situation quite different from the experience with SARS, with uncertain consequences. To put some figures on this, as compared to SARS in 2003, the contribution of Chinese goods imports and foreign travel spending by Chinese tourists to global GDP are about 3x and 8x larger today, respectively, and its share of the global economy is more than twice as big. So, the spillovers to the rest of the world is certainly higher.

Allison Nathan: Given that, are risks to your growth forecast skewed to the downside?

Andrew Tilton: Yes, the balance of risk remains skewed to the downside. Two drivers will ultimately determine the hit to growth. The first is obviously the trajectory of the virus itself, which we assume—and I emphasize that this is an assumption as opposed to a forecast because we're not epidemiologists—will be largely brought under control before the end of the quarter. Although the spread of the virus has slowed materially in China, there is still a risk that the virus picks up again as activity levels normalize and/or that the outbreak is longer or broader then we've assumed. The second driver is the magnitude of the actual hit to economy, which could end up less than we assume if consumer spending bounces back quickly once the virus is controlled or stimulus measures are even larger than we expect. But the hit could also be larger than we assume if there are greater ripple effects into supply chains, credit markets or the labor market.

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Allison Nathan: How worried are senior officials about the economic impact of the virus?

Andrew Tilton: Senior officials' recent statements suggest that they're getting more worried about the impact of control measures on the overall economy. In recent communications, Chinese policymakers have emphasized a bifurcated approach to imposing activity controls: in high-risk jurisdictions, virus control should remain the priority, whereas in lower-risk jurisdictions, returning to normal economic activity should instead be the main focus. But, as is often the case in China, incentives may differ between the central and local levels of government. Local officials in low-risk jurisdictions may still feel pressure to avoid infections in order to be viewed favorably, and so may remain more focused on virus control than on the revival of economic activity. And, as a result, they may retain some of their own restrictions that aren't necessarily mandated or even desired by national authorities.

Allison Nathan: What policies is the government pursuing to help growth normalize?

Andrew Tilton: First and foremost, the government has focused on getting the virus under control, which is paramount to returning activity levels back to normal. But as the pace of new cases has declined, we've also seen a shift towards the use of traditional policy levers to help support the economy. The PBOC has injected additional liquidity, which has pushed short-term interest rates lower. We've seen measures to encourage banks to continue to roll over lending to struggling enterprises, as well as a frontloading of fiscal expenditure. Another key focus has been transmission into the labor market, which could substantially worsen and prolong the economic impact of the virus. You're already hearing stories of firms laying off workers, and every week that goes by without a return to normal activity creates a bigger risk to the labor market, which could create knock-on effects to income and lead to a negative spiral. Because of this, there has been a lot of official encouragement of firms to avoid laying off workers.

Should damages from the virus worsen, I think officials would likely use fiscal levers even more aggressively, further ramping up fiscal spending, cutting taxes and/or providing incentives for consumption in different areas. Money and credit easing would also certainly be employed—credit easing to facilitate fiscal spending and monetary easing to ensure that debt could still be serviced. That said, I think there is probably still a residual wariness about going too far in the direction of policy easing given the 2015/16 experience that saw an equity market bubble burst and capital outflow pressure as a side effect of excessive easing. That was a cautionary experience and suggests to me that while authorities will do more to support the economy, they probably won't be quite as aggressive as they would have been five or ten years ago in a similar situation.

Allison Nathan: Could currency depreciation become part of the mix?

Andrew Tilton: Ultimately, yes, but we think that would be lower down on the list of policy options. At least so far, policymakers have leaned against depreciation pressures. The currency has weakened against the US Dollar over the past month, but that largely reflects broad Dollar strength rather than idiosyncratic weakness in the renminbi.

Allison Nathan: Does this shock increase the risk of financial instability in China?

Andrew Tilton: The concern is that the sharp decline in economic activity could lead to a big pickup in delinquencies, non-performing loans (NPLs) and banking sector problems. But the authorities have made it clear that they don't want credit cut off to firms that are struggling. Our sense is that larger firms will see forbearance, and we probably won't see a large pickup in defaults. The bigger challenge may be in the small-medium enterprise (SME) space that is harder for regulators to monitor. Those entities are more likely to have lower cash reserves and are at greater risk of being cut off from credit, which could lead to loan losses as well as employment losses if firms shut down. But these entities comprise a relatively small fraction of the overall stock of debt. So while the slowing economy is a source of stress, we don't think credit problems will be the primary channel of that stress.

Allison Nathan: Which regional economies are most exposed to this shock?

Andrew Tilton: Countries in the region are being impacted through three channels. The first and most immediate channel is Chinese tourism, which has been rapidly shut off by a combination of outbound and inbound travel restrictions; in some countries, Chinese tourism appears to be down by as much as 90% versus typical levels. The places most exposed to this are Hong Kong and Thailand. Second, regional trade has been hit by the slowdown in the Chinese economy, which has affected exports to China from elsewhere. That will be material for the region's smaller, more export-oriented economies such as Thailand, Malaysia, and Singapore. In places like Korea, Taiwan, and Japan there is also concern about the possible impact of supply chain disruptions. For example, some automakers in both Japan and Korea have announced production stoppages because of the unavailability of certain parts from China. That problem could grow significantly over the next few weeks if there's not a meaningful ramp up in Chinese production. Finally, some countries, especially South Korea and Japan, are now grappling with containing their own outbreaks, which will likely weigh on domestic consumption. All told, we have taken down our Q1 and full-year forecasts for most of the economies in the region.

Allison Nathan: How will the virus-induced demand shock affect the Phase 1 US-China deal?

Andrew Tilton: In order for China to purchase the $200bn of goods and services that it agreed to as part of the deal, many of the existing retaliatory tariffs may need to be reduced or removed entirely, either through exemptions or waivers. Sure enough, on February 18, the Ministry of Finance announced that Chinese firms can apply for exemptions on nearly 700 types of US goods, including soybeans, starting on March 2, which suggests that the original purchase agreement is likely to remain on track. However, as both the US and China have acknowledged, the timing of purchases will likely be delayed by the viral outbreak.

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Markets: bracing for more uncertainty

Zach Pandl and David Kostin argue that investors should prepare portfolios for a longer period of virus-related uncertainty

Toward the end of February, the market response to the coronavirus outbreak entered a new, more concerning phase. Investors seemed able to look through the first wave of infections and even the significant retrenchment in economic activity in China caused by the government's aggressive containment measures. But this changed following news that the virus had spread to Europe and guidance from public health officials that its emergence in the US is just a matter of time.

From an economic perspective, what started as a temporary regional shock now seems at risk of transforming into a more protracted global phenomenon—with possible effects on public confidence and supply chains well beyond the worst affected areas. Although we cannot predict the path of the virus itself, we do think markets will now need to price a wider distribution of possible outcomes for the global economy. Investors should prepare for a longer period of virus-related uncertainty and position portfolios for the range of possible macroeconomic implications of the outbreak.

Position defensively in equities…

For **equity markets**, the expanded set of virus-related impacts has led us to reduce our expectations for earnings growth for US companies, and we now expect no earnings growth in 2020. We recommend shifting defensively, and have raised Real Estate to Overweight from Neutral, Utilities to Neutral from Underweight, while lowering Industrials to Neutral from Overweight, and Financials to Underweight from Neutral.

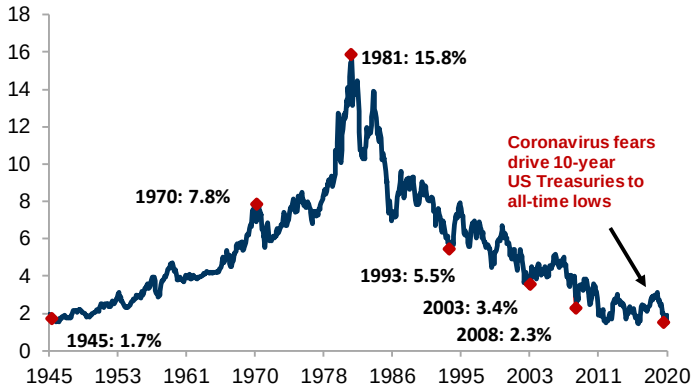
…And in FX and Rates

The shifting regional pattern of the virus should also have implications for **currency markets**. Before this week, the Dollar had appreciated sharply and Dollar-neutral carry trades generally performed well—suggesting a consensus among investors that the virus would leave the US economy and global growth relatively unscathed in 2020. Both assumptions now look questionable. An outbreak in the US would likely weigh on domestic growth through confidence and travel/leisure-related channels. And it's difficult to envision global risk appetite rebounding if the US experiences an economic hit from the virus. The odds of a US outbreak are difficult to assess, but it seems a clear risk that markets will need to discount to some degree. As a result, we expect this year's sharp Dollar rally to stall, and favor longs in defensive G10 currencies like the Japanese Yen.

The global spread of the virus introduces new downside risks to growth, which could tip the scales towards easing for a number of central banks—resulting in even lower short-dated interest rates. Among developed market economies, rate cuts appear most likely in the US—and we now expect the Fed to cut rates by 75bps by June—as well as Canada, Australia, and the UK. Although bond yields have fallen to record lows in major markets, monetary easing could prolong the rally.

US 10-year Treasuries reach all-time lows

US 10-year Treasury yield, %



Source: Haver Analytics, Goldman Sachs Global Investment Research.

The risk-off likely has more room to run

Our best guess is that the drawdown in **risky assets** has further to go over the short run. US markets, in particular, will need to price not only a possible drag on activity from the virus, but election-related risks as well. Based on our proprietary tools, it appears that investors have marked down their growth expectations meaningfully, but still not to the lows of 2016, or even 2019. On the equity side, the market has moved to our near-term target of 2900, but we see near-term risks still skewed to the downside on virus-related developments.

Market growth expectations: worried, but less than recently

Cross-asset growth factor, index



Source: Goldman Sachs Global Investment Research.

Looking ahead, we would expect risky assets to find a floor as the disruption from the virus begins to fade—which has already begun to happen in China—and policy provides new support. At this point our "shopping list" for an eventual rebound would include several EM currencies (especially the Russian Ruble and Mexican Peso), pro-cyclical G10 currencies (especially the Scandinavian currencies), and US breakeven inflation. And we would expect the S&P 500 to retrace to 3400 by year-end, assuming activity rebounds and the yield gap narrows.

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The physical realities of disruption

Jeff Currie argues that we're facing the largest commodity demand shock since the Global Financial Crisis and sees more volatility ahead

The global economy is a complex physical system with real physical frictions—a reality that financial markets often seem to forget, but have been painfully reminded of with the outbreak of COVID-19. If a ship is in the wrong place, it can take weeks to get it in the right one. That said, the extent of the physical disruption owing to the current outbreak was both minimized and masked by the timing of the Chinese travel disruption.

Occurring during the Lunar New Year holiday, which sees 2.1 billion people—representing nearly 30% of global output—celebrate for one to two weeks, the entire global economy was already prepared for reduced activity in a large part of Asia during this period, with order times and inventories adjusted accordingly. Ships leave Asia before the Lunar New Year laden with goods destined for the West, a 30-40-day trip, and return with scrap and raw materials in late February. This buffer in supply chains bought China nearly a month to contain the spread of the virus, and their strategy is increasingly looking successful, with early indicators suggesting viral containment and economic restarts.

Economic and viral contagion into the Atlantic basin

However, economic contagion from China is now likely to spread into the Atlantic over the next month, on top of the viral contagion that has already begun to occur. We estimate that c.45% of scheduled Asia-Europe containership sailings were cancelled in the four weeks following the onset of the Lunar New Year holiday, and as much as 60% of the weekly containership sailings from Asia-Europe/US have been cancelled during the first three weeks of February. This means the March ramp-up in Chinese activity could be slow given the physical realities of re-starting global supply chains. Goods need to be produced, trucked to the ports, documented and then loaded.

This large and unexpected cancellation of sailings to China will likely create shortages in backhaul capacity from the Atlantic that will cause freight rates to spike in coming weeks. Transportation bottlenecks in the Atlantic basin should peak in the next 30-40 days, assuming the recent restarts in China continue. At the same time, supply chain disruptions in the Atlantic basin face further downside risks from internal European travel restrictions, with, for example, 58% of German goods exports in 2018 going to other EU countries, and only 7% going to China. And unlike in China, there is no holiday period that companies have planned for to buffer these disruptions. Indeed, auto-parts maker MTA, whose factory sits inside the Italian quarantine zone, has warned German car producers would shut in a week without their components.

Largest commodity demand shock since 2008

The unprecedented disruption to economic activity in China has resulted in an estimated 4 million b/d of lost oil demand compared to 5 million b/d during the Great Recession in 2008/09. While we see severe travel disruption contained to East Asia for now, further disruption across the West is a real risk with both Italy and Iran now under travel restrictions. And finite storage capacity in China—though large—is filling up quickly, presenting further downside risk if storage is ultimately breached. Solid goods like metals do not face that risk. Although steel demand in China is down nearly 50% yoy, the unprecedented inventory increases have been accommodated.

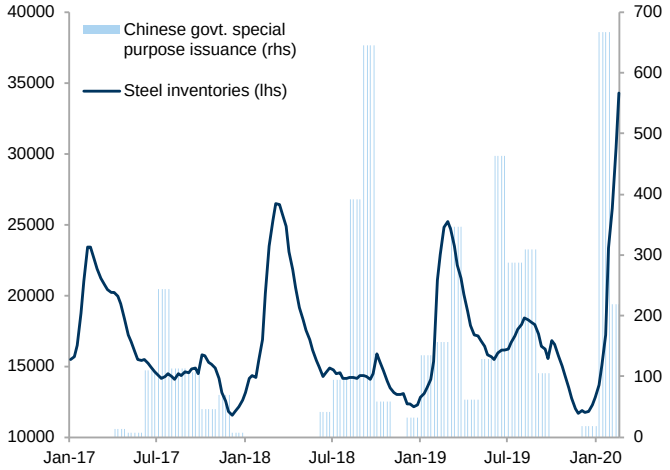
Tension between surplus and stimulus drives volatility

The disruption to commodity demand falls broadly into two categories. Either the commodity is consumed as a stock—steel in infrastructure or aluminium in durable goods—or it is consumed as a flow—crude in transport or coal in energy production. Demand for the stock is ***deferred***, as projects resume after the shutdown ends, while demand for the flow is ***lost***, with energy use and transport returning to previous levels.

As Chinese policymakers become increasingly vocal about their intention to use monetary, fiscal and macro-prudential policies to minimize the economic impact of the coronavirus shock, markets have focused on the potential for this stimulus to save deferred demand. Case in point: onshore steel rebar prices are now above pre-outbreak levels despite a massive build in inventory, while Brent crude is down 23% since the onset of coronavirus fears. This continued tension between economic stimulus and surplus inventory will likely create commodity price volatility.

Commodity markets caught between rising surplus and stronger stimulus

Chinese special purp. issuance (rhs), RMB bn; steel inventories, kbd (lhs)



Source: Wind, MySteel, Goldman Sachs Global Investment Research.

Gold has immunity to the virus

While so much about the current environment remains unclear, there's one thing that isn't: gold, which—unlike people and our economies—is immune to the virus. It is the currency of last resort and avoids the concern that paper currencies could be a medium of transfer for the virus. As a result, gold has outperformed other safe haven assets like the Japanese Yen or Swiss Franc, a trend we see continuing as long as uncertainty around the full impact of COVID-19 remains.

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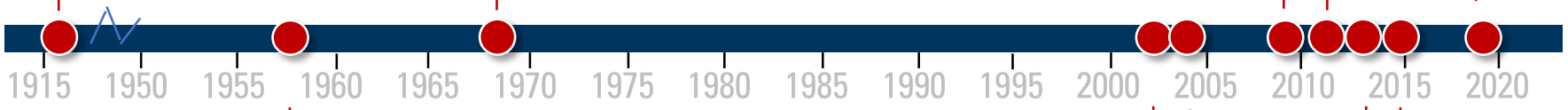
History of pandemics

Unlike the current COVID-19 outbreak, there is little evidence that asymptomatic transmission occurred in past epidemics. No such evidence exists for the SARS or MERS outbreaks.



1 1918-1919
Spanish influenza
Total infections: 350 – 750 million
Mortality: 20-50 million people
Case-fatality rate: 2-3%
R0: 1.5-1.8
Transmission: Through nearby contact with infected respiratory droplets

2 1957-1958
Asian flu (H2N2)
Mortality: 1-4 million
Case-fatality rate: <0.2%
R0: 1.5
Transmission: Through nearby contact with infected respiratory droplets

3 1968-1969
Hong Kong flu (H3N2)
Mortality: 1-4 million
Case-fatality rate: <0.2%
R0: 1.6-1.8
Transmission: Through nearby contact with infected respiratory droplets

4 2002-2003
Severe acute respiratory syndrome (SARS)
Total infections: 8,000
Mortality: 770 people
Case-fatality rate: 10%
R0: 3
Transmission: Close person-to-person contact

5 2003-2009
Avian flu (H5N1)
Total infections: 470
Mortality: 280 people
Case-fatality rate: 60%
R0: 0.1-1.1
Transmission: Contact with infected birds; person-to-person spread rare

6 2009-2010
Swine flu (H1N1)
Total infections: 750 million – 1.4 billion
Mortality: 150k-575k people
Case-fatality rate: 0.01-0.08%
R0: 1.3-1.7
Transmission: Contact with infected pigs; limited person-to-person spread

7 2012-2020
Middle East respiratory syndrome (MERS)
Total infections: 2500
Mortality: 860 people
Case-fatality rate: 34%
R0: <1
Transmission: Close person-to-person contact

8 2013-2017
Bird flu (H7N9)
Total infections: 1600
Mortality: 600 people
Case-fatality rate: 39%
R0: 0.03-0.4
Transmission: Contact with infected poultry; person-to-person spread rare

9 2014-2016
Ebola
Total infections: 30,000
Mortality: 11,000 people
Case-fatality rate: 50%
R0: 1.5-2.5
Transmission: Bodily fluids

10 2019-
Coronavirus (COVID-19)
Total confirmed infections: 84,000
Mortality: 2,800 people
Case-fatality rate: Unknown*
R0: 2.3
Transmission: Unconfirmed; suspected spread by close contact; respiratory droplets

Note: R0 refers to the number of expected cases of a disease directly generated by one infected case.
**Case-fatality rates are not quoted for active epidemics due to lack of data around the true number of cases.*
Source: CDC, WHO, NCBI, NIH, NLM, Johns Hopkins, Goldman Sachs Global Investment Research.

Sizing the coronavirus shock



60 **countries with confirmed cases** of COVID-19



240,000 **global flights cancelled** between January 23 and February 18



11 **towns, representing 50,000 people, under quarantine in Italy**, the country currently most affected by the viral outbreak outside of Asia



25x size of temporary global GDP hit from viral outbreak compared to the **disruption from a major US hurricane**



40 billion "missing working hours" if all Chinese firms had restarted on the 1st allowable day—the equivalent of **all US workers taking an unplanned break for two months**



60 million the population of Hubei, the province where the virus outbreak began, similar to the **total number of people living in Spain and Portugal**



2,000 **Starbucks locations** that have temporarily closed in China



0.30 - 0.35% of annual global GDP is generated by China's travel spending, **double the amount of the US**

Source: Johns Hopkins, Goldman Sachs Global Investment Research.

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Interview with Jude Blanchette

Jude Blanchette holds the Freeman Chair in China Studies at the Center for Strategic and International Studies. Below, he argues that while the COVID-19 outbreak in China will make it more difficult for President Xi Jinping to implement policy, his leadership isn't under threat.

The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.



Allison Nathan: You argue in your recent book, *China's New Red Guards,* that China is undergoing a revival of extreme authoritarianism inspired by Mao Zedong. How do you view the government's response to the COVID-19 outbreak through that lens?

Jude Blanchette: China's response to the coronavirus has employed many tactics, tools and important elements of the Communist Party's traditional political culture, ranging from General Secretary Xi Jinping invoking the idea of a "people's war" to combat the virus, which is an idea that traces back to the Mao Zedong era when China was engaged in guerrilla warfare against the Japanese, to the mounting of a top-down, highly-mobilized campaign to deal with the issue.

Allison Nathan: In theory, this type of top-down approach that enables the mobilization of vast resources quickly should have left the government well-positioned to respond to the crisis. How do you rate its response?

Jude Blanchette: That certainly is the theory underlying many of Xi Jinping's efforts to further centralize control since he assumed the leadership in 2012. Xi himself has stressed that his underlying approach to governance is to better react to sudden crises. However, the government's response to this outbreak has not been a reassuring example of effective governance. In the early weeks of the outbreak, we saw inaction bordering on incompetence from the Wuhan municipal officials, as well as provincial officials in Hubei.

Some people have framed this as officials being too timid to report bad news to Xi Jinping, but I don't think the facts bear that out. To me, this was a case of general bureaucratic incompetence; these officials were looking the other way, and underestimating the problem so that it wasn't until January 20, nearly two months after the initial outbreak, when Xi Jinping himself weighed in that the system really lurched into gear. So, while Xi Jinping's efforts to centralize power have arguably reduced governance problems in China relative to the past, I think this situation reveals that there are still extraordinary weaknesses in the system. In fact, many of the problems with the government's response to the virus are a direct result of this centralization of power to the extent that it has resulted in a disempowered, ineffective and, in some cases, incompetent bureaucracy.

Allison Nathan: To what extent do the Chinese people blame the government for the current situation?

Jude Blanchette: There is little doubt that the people blame the government for not acting sooner. Moments where you see a groundswell of frustration at the Communist Party in modern China are rare, and this is one of them. The common framing of the unspoken pact between the Chinese people and the party is: "we'll stay quiet on politics as long as you provide economic growth." But I see the pact in reality as "we'll permit some lack of freedom in exchange for a safe and healthy living environment"—and that's been violated. The level of frustration and anger being directed at the Chinese leadership is truly extraordinary in the context of an overall political climate that demands quiescence. That said, it's interesting to note that most of the anger at this point is being directed downwards to municipal and provincial officials, which is a very common pattern in Chinese politics; the party leadership is typically able to point its finger at lower level officials. And, in fact, most Chinese people deal with local Communist Party officials—not Xi Jinping—so it's more natural to direct their frustrations there.

That said, a recent development may start to shift the focus of frustration upward. It recently came to light that Xi Jinping was aware of the virus as early as January 7, which we know because of a speech he gave on that day to the Politburo Standing Committee, which was recently published in a top party journal. Before this speech, it was unclear how much Xi Jinping really knew before he officially acknowledged the issue on January 20. So that has started to raise some serious questions about why he wasn't more involved earlier—especially when we now know the weeks between January 7 and January 20 were critical to the initial spread of the illness.

Allison Nathan: To what extent have Xi Jinping's own actions helped orchestrate the deflection of blame?

Jude Blanchette: Xi Jinping understands that power comes from perception, and it's clear that he has tried to orchestrate a Goldilocks balance between not appearing too close to the worsening situation—and thereby risk appearing ineffectual—and maintaining a leadership presence. He essentially went missing from the state mouthpiece *People's Daily* and the nightly news broadcast for a seven or eight-day period as the number of new cases in China sky-rocketed, at the same time that he sent Premier Li Keqiang—the number two in the Communist Party hierarchy who has been marginalized for years from the center of policymaking—to the front lines of the outbreak in Wuhan. But as narratives about his absence began to run counter to his political goals, he re-appeared adorning a face mask in a hospital in Beijing, which showed that he understood it was time to start demonstrating leadership.

Allison Nathan: Will Xi Jinping, and the Communist Party more broadly, use this crisis to broaden the powers of the state?

Jude Blanchette: Most likely, especially given the well-established pattern of governments ratcheting-up controls to manage a crisis and then keeping many of the expanded powers in place even after the crisis has passed. In this case, the state has increased the use of tools like facial recognition and real-name identification to help fight the virus. So a likely

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outcome of the virus will be an even further ramp-up of digital authoritarianism in China.

Allison Nathan: Generally speaking, much has been made of Xi Jinping's consolidation of political power. Is his grip as tight as is often portrayed?

Jude Blanchette: Yes, and no. Compared to previous general secretaries of the Communist Party, he has significantly more institutional and charismatic authority and has accomplished much more, and more quickly, from a bureaucratic and institutional perspective. This has enabled him to amass substantially more power than his predecessors, as best exemplified by his success in abolishing the term limit on the office of the presidency at the National People's Congress (NPC) in March 2018. You only do that if you're very darn powerful because every leader everywhere would like to get rid of term limits. But Xi Jinping had a singular ability to do so. This is what people are referring to when they say that Xi is the most powerful leader since Mao Zedong.

But despite this power, he too continues to struggle with getting the system to do what he wants. There's an old saying in Chinese: "the sky is high, the emperor's far away." This gets at the central conundrum that all Chinese leaders have faced, which is that it's very difficult to govern China given its size and complexity. Xi Jinping has not overcome that problem. Add to that the burden that all authoritarian leaders face, which is that they hold their position not because a vote gave them a clear legal mandate for a fixed amount of time, but because they have cobbled together a coalition that supports them in that position. Keeping that coalition happy is a full-time job.

For Xi to maintain this coalition, he must ensure that the economic pie continues to grow; that way, he can distribute rents to members of this base, which includes key members in the security services, the military, state-owned enterprises, the party state bureaucracy, and maybe even the private sector. This leads to a constant worry that someone won't think their slice is big enough. This is why authoritarian leaders tend to get very paranoid. So, I don't think Xi Jinping feels powerful, or even secure. To quote his favorite philosopher, Mao Zedong, this is a "constant struggle."

Allison Nathan: In that context, is the COVID-19 outbreak the biggest challenge that Xi Jinping—or even the Communist Party in modern China—has ever faced?

Jude Blanchette: This is now the third "biggest challenge" we've talked about for Xi Jinping in just one year. Remember, a year ago the biggest challenge was Hong Kong, then the biggest challenge was the resounding re-election of Taiwanese President Tsai Ing-wen, who has openly rejected the "one country, two systems" for Taiwan, and now we're talking about the biggest challenge being the COVID-19 outbreak. The reality is, as the leader of the second-largest economy and arguably the only other superpower besides the US, such challenges are going to be more frequent.

That said, Chinese leaders have certainly dealt with significant challenges in the past. The biggest challenge in recent history was the Tiananmen Square episode in 1989. Since then we've had the SARS outbreak in 2003, the Sichuan Earthquake in 2008, and the Wenzhou train crash in 2011—all of which also shook the people's confidence in the government's ability to provide a safe living environment for the Chinese population.

Without being too alarmist, I would say of the previous challenges, the magnitude of the COVID-19 crisis is closer to that of the 1989 episode than the more recent ones for a few reasons. First, Xi Jinping is under much greater scrutiny than his predecessors precisely because of his ambitious global goals; he is under a microscope because people see much higher stakes in his actions and the future direction of China more broadly. Second, the expectations of Chinese people are also higher. It's a wealthier country; Chinese people have seen more of the world and have greater aspirations. So they, too, have a bigger stake in the Communist Party living up to its promises. Third, the economic impacts of the outbreak are significantly larger than any of these past episodes. So I think climbing out of this hole will likely stress the leadership in a way that it hasn't been stressed since the 1989-1991 period.

Allison Nathan: Are there any signs that Xi Jinping's leadership could be challenged over this?

Jude Blanchette: No, we're not seeing any signs of that. Whenever one of these types of challenges arises in China, we tend to quickly ask the question: "Will this be the thing that unseats the leader?" Our prediction record on that is pretty abysmal. I think that's partly because even though we might think we're seeing cracks in the cement, we actually don't have a really good sense of what's in that cement to begin with—what legitimizes the Communist Party, and gives it its resilience. The Communist Party is turning 100 next year, and it has a good track record of stability, only very rarely purging senior leaders in the post-Mao era.

On top of that, Xi has insulated himself from leadership challenges in many ways, such as appointing only loyalists to key positions, ensuring he is the only civilian leader in contact with the military, and prohibiting one-on-one meetings between party leaders outside of official Communist Party settings—all of which is reinforced by the digital surveillance state. So I think the outbreak will undoubtedly exact a political cost on Xi Jinping, and will make life more difficult for him. Like any other leader, a hit to his popularity will make implementing policy that much more challenging. But given the power he has amassed and the sheer logistical difficulty in mounting a leadership challenge, one is extremely unlikely to occur.

Allison Nathan: Will these events put pressure on Xi to announce a successor, though?

Jude Blanchette: No. The iron law of power is that once you get to the throne you stay there for as long as possible. That's true for a few reasons, but the main one is that unless you're assured a safe and peaceful retirement, you don't come off the throne. Since Xi Jinping himself has violated the widespread understanding that retired Standing Committee members are immune from prosecution, he can't be assured of this. So, Xi Jinping can't retire.

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Coronavirus: equity analyst roundup

Consumer exposure

TRAVEL

Airlines

Catherine O'Brien, Ben Hartwright, Venetia Baden-Powell & Team

- Major US and European airlines have announced a suspension of all flights to China through late March/April, and total Chinese airline traffic has declined by almost 90% yoy in February. Looking ahead, we estimate total Chinese airline traffic will decline by 0.3% in 2020 (a 12pp drop vs. our prior estimate), with international traffic down 7.7% (21pp drop vs. prior estimate) and domestic traffic up marginally at 2.8% (6pp drop vs. prior estimate).
- Foreign airlines have more than halved their seat capacity to China following the coronavirus outbreak; many major international carriers have substantial capacity exposure in the Asia Pacific region, including Lufthansa (24%), Air France-KLM (21%), United (16%), Delta (9%), IAG (8%), and American (6%).
- Based on increased headwinds from reduced Asia-Pac revenues, we lowered our 1Q20E EPS forecasts for United, American and Delta by 75%, 40%, and 5%, respectively, though the downside for Delta was limited by higher prior fuel price assumptions, and we've since reduced the likely hit for United to 20% due to unrelated positive news.

Lodging, Leisure, and Travel

Stephen Gambling, Simon Cheung, & Team

- While the coronavirus is already weighing on Asia travel markets—with a more than 80% yoy decline in Macau visitations in recent weeks, the cancellation of regional cruise itineraries, and hotels reporting very low occupancy rates in parts of China—past experience suggests the impact on Global and US travel firms may occur with a lag.
- We see the biggest near-term drag for US gaming firms with sizable direct Greater China sales exposure, including Wynn Resorts (75% of total sales), Las Vegas Sands (62%), and MGM Resorts International (22%).
- Additionally, we see substantial downside for US lodgings firms with the largest Greater China exposure, including Wyndham Hotels & Resorts (19% of total rooms), IHG (15%), Hyatt (11%), and Marriott (9%).

CONSUMER CYLCICALS

General Retail

Kate McShane, Alexandra Walvis, Lincoln Kong, & Team

- The outbreak has led to industry-wide restaurant closures, including more than half of the Starbucks in mainland China (~2,000), several hundred McDonalds, and all KFC and Pizza Hut stores in Hubei Province. We think dine-in restaurants could suffer more than other retailers as losses are immediate while other goods consumption may just be delayed.
- There's been a noticeable uptick in online purchases, as consumers have generally limited their outdoor/offline activities. The surge in online demand has been largest for Food and Beverage, hygiene/medical products, and certain discretionary categories. In particular, masks (+3300%), fresh groceries (+2432%), instant food (+260%), and medical equipment (+200%) saw the largest yoy sales growth at their online flagship stores during the Chinese New Year (CNY), based on data from Tmall supermarket, China's largest B2C e-commerce platform.
- Select retailers have shown more resilience aided, at least initially, by the shift from offline to online purchases, with P&G (+179% in sales), Zara (+101%), and H&M (+51%) seeing the largest gains in flagship store sales during the 2020 CNY vs. 2019 and Estee Lauder (-57%), Adidas (-44%), and Nike (-28%) the largest reductions. But logistics issues have made it more challenging to fulfill online orders in the face of more prolonged disruptions.

Luxury

Louise Singlehurst & Team

- Chinese consumers are the largest group of luxury consumers globally, with about 36% of all global luxury purchases made by Chinese nationals today, according to GS estimates. We expect substantial demand disruption from the coronavirus, and now forecast 0% average growth for the industry in FY20 (vs +5% previously).
- Across our luxury retail coverage, we've lowered our 2020E EPS by 11% on average, and see the largest downside for Tod's (-47%), Swatch (-20%), Prada (-18%), Richemont (-17%), and Hugo Boss (-14%) vs our prior forecast (estimate for Richemont based on FY21).

Automobiles

Kota Yuzawa, George Galliers, & Team

- China is the world's largest auto market, accounting for 23% of total global sales, and is about 6x larger today than during the 2003 SARS outbreak. We forecast 0% year-on-year growth in demand for autos in China in 2020 and 2021 (vs.+8% in 2019), and the coronavirus presents downside risk to Q1 2020 global automobile sales.
- Depending on their exposure, we estimate that automakers' 2020 EPS could fall between 0-19%, corresponding to a 5-15% decline in annual China sales, if the coronavirus leads to a slowdown in China's auto industry.
- Of major manufacturers, Nissan (45% of total), Mazda (40%), BMW (39%), Daimler (35%), and Honda (30%) derived the largest share of their profits from China sales in FY18.

HEALTHCARE

Biotech and Pharma

Terence Flynn, Keyur Parekh & Team

- We expect to see the greatest impact on companies with large China sales exposure, signficant China-based supply chains (see below), and those involved in developing coronavirus treatments and/or vaccines.
- Among global biopharma firms, AstraZeneca (16-21% of total), Novo Nordisk (11%), Pfizer (10%), Sanofi (7%), and Merck (7%) have the largest China sales exposure.

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Consumer exposure

Medical Tech

Veronika Dubajova & Team

- The Chinese government has issued a public warning to avoid all non-essential medical procedures, with some hospitals instructing patients to stay home for the time being. We expect this to negatively impact the volume of elective medical procedures, and see potential short-term headwinds for the vast majority of our covered Medical Device universe.
- China accounts for around 7% of revenue on average for our covered MedTech firms, and we see 60bp downside to our original 2020E revenue growth forecasts assuming a 10% reduction in China revenues, though the magnitude of the hit will depend crucially on severity and duration of the outbreak.

TECH

Info Tech

Toshiya Hari, David Kostin & Teams

- Further negative news around the scale of coronavirus poses a tactical downside risk for US Info Tech, which generates 15% of its sales from Greater China (vs. 2% for S&P 500) and has 8% of its assets in Greater China (vs. less than 1% for S&P 500).
- US Semiconductor and Tech Hardware firms are particularly exposed to conronavirus-related risks, with the sub-sectors generating 47% and 14% of their revenues from Greater China, respectively.
- We view Apple's recent profit warning as reflecting both the demand and production impact of the coronavirus outbreak, and have lowered our FQ4' 20 to March revenue forecast while keeping our 12m price target unchanged based on expectations of increased revenue in subsequent quarters.
- For megacap tech stocks, Intel and Apple report 42% and 20% of their total revenue from Greater China, respectively, and in Semiconductors we find that Qorvo (74%), Qualcomm (67%), and Micron Technology (66%) have the highest regional exposure.

Supply chain exposure

CONSUMER CYCLICALS

Automobiles

Kota Yuzawa, George Galliers, & Team

- Auto factories in Hubei and surrounding provinces look set to remain shuttered until at least March 11, and we think that even once they re-open it will take time for production to return to normalized levels, leaving substantial uncertainty about the scale of likely production losses.
- Even with COVID-19, we expect around 28% of global automobile production will take place in China in 2020, up from 7.5% in 2003 during the outbreak of SARS. Within China, Hubei is the second-largest region for auto production, accounting for around 9% of total output, and Wuhan and surrounding vehicle producing regions account for roughly 47% of total 2020 production.
- We think most companies have generally secured inventories of key parts through end-February, though some have reported supply chain issues, even outside of China, and we cannot rule out the risk of a more pronounced disruption if the outbreak were to hamper the China supply chain through March.
- Among large manufacturers we cover, Toyota, Nissan, Renault, and PSA are most exposed to production disruptions given they all have substantial operations in Hubei, though we expect the impact on earnings from production losses to be limited.

HEALTHCARE

Biotech and Pharma

Terence Flynn, Keyur Parekh & Team

- The FDA estimates that 13% of active pharmaceutical ingredient (API) manufacturing facilities and 7% of finished dosage form manufacturing facilities were located in China as of August, 2019.
- Manufacturing in China is mostly focused on generic and over-the counter-drugs, and we see little risk of near-term supply shortages.

TECH

Tech Supply Chain

Toshiya Hari, Daiki Takayama, Allen Chang & Team

- Based on our checks, none of the companies we cover in the US semiconductor and memory/IT supply chain sectors have operations in Wuhan, China. In addition, we've found limited capacity disruptions and order revisions among China and Taiwan semiconductors based on our conversations with companies, which should limit the broader impact on the global tech supply chain.
- In the Asia tech supply chain, we see more significant production exposure among South Korean and Japanese firms, with a range of production weights among large-cap firms such as Nintendo (30% of total production), Panasonic (26%), LG Electronics (14%), and Samsung Electronics (4%).

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Q&A with Tim Moe

Tim Moe, Chief Asia Equity Strategist, answers key questions about Asian equity markets.

Q: Have the price moves in Asian equities in the wake of the COVID-19 outbreak been rational?

A: Yes. The market has clearly been pricing in the daily news flow on the rate of new infections. Most recently, the sharp sell-off has owed to the rise in the number of cases outside of China, which has increased fears about a global pandemic. But even before the sell-off, price action closely matched the pace of new cases, with the peak in the daily rate of new infections in China occurring on February 5, and the initial trough in the Asian equity market occurring on February 3, which was then followed by an 8% rally through February 17. These moves have been rational in the sense that they have essentially repeated the pattern of the past five viral outbreak episodes, starting with SARS in 2003, in which the market trough coincided with the peak of incremental new infections, and then rose by an average of 20-30% over the next 3-6 months.

That said, the speed and strength of the initial recovery this time around was too optimistic, in our view, because today's environment is different from that of past viral episodes. First, the macro backdrop is less supportive for earnings growth. The current growth rate in China—with real growth of roughly 5-6%—is nowhere near the pace during past outbreaks such as SARS in 2003, when real GDP was growing 9%-10%. Second, the starting point for valuations was much higher in the current episode, with the forward 12-month multiple for the regional index on January 17 trading at 14.4 times 12-month forward earnings—the highest level in two decades. Bottom line, there's just less upside for growth in both earnings and valuations today, which means less market upside. So while the recent sell-off has been large, I view it as a somewhat justified correction of an overly-optimistic market.

Q: Is the market now close to fair value post the sell-off?

A: The MSCI Asia Specific ex-Japan Index is currently trading at 13.5 times consensus forward 12-month earnings, versus our estimates of fair value around 13.2-times earnings. So valuations are closer to fair value, but still somewhat on the more expensive side of the range.

Q: So where do Asian equity market returns go from here in your base case? Upside case? Downside case?

A: Our base case for earnings and valuations suggests about 6% upside over the next twelve months, assuming a 13.5 P/E multiple and 10% earnings growth in 2020. Our optimistic case, which relies on slightly higher valuations and no further reduction in the consensus forecast to earnings growth, suggests upside of 15%. And our downside risk case, which embeds a 12.7 P/E multiple and earnings of 8% in 2020, suggests 11% downside from here for the broader region. So even with the recent market pullback, we think that the risk-reward here is fairly evenly balanced between a risk case and the more optimistic case.

Q: Where is the greatest value/opportunity today?

A: There are two broad themes that present opportunities. The first is a set of companies that have substantially underperformed the broader market but have fundamentally sound businesses and therefore should snap back once the operating environment improves. Most of these companies are in the Airline, Hotels, Restaurants & Leisure space. And the second theme we are focused on are those companies that are well positioned to benefit from the fiscal, monetary and macro-prudential policy accommodation that Chinese policymakers have increasingly signaled will be coming down the pipe to cushion the impact of the virus outbreak and bolster growth. This primarily includes companies exposed to infrastructure investment largely in the Machinery space, as well as financial companies, including Banks and Real Estate companies.

Q: It's striking that as of today China-A shares have been the least impacted by virus concerns in the region, and companies in Korea and Thailand have been impacted the most. What do you make of this?

A: Indeed, as of today the region is down net 9% since the pre-virus peak on January 17, whereas China A-shares are down only 4%, while Korea and Thailand are down 13% and 18%, respectively. So despite being at the epicenter of the outbreak, Chinese equities have ironically proven the most resilient of any market we cover. This outperformance since the early days of the outbreak, when China A-shares underperformed, reflects domestic investors' confidence in the clearly articulated policy support from the Chinese government that should spill over into support for equities. Given this policy boost, we, too, upgraded our view on China-A shares in mid-February. And even beyond the likely near-term policy support, we see longer-term structural drivers in the domestic market, including the "new China" themes as well as several "mega-liquidity" themes. For that reason, we see 7% upside for China-A share returns over a 12-month horizon.

In contrast, the underperformance of firms in Korea and Thailand is clearly a function of the recent rise in the number of domestic cases in the former, and substantial exposure to a collapse in tourism demand in the latter. For Korea in particular, which had a solid narrative around tech hardware/semi-conductors and relatively attractive valuations heading into the year, we see potential for a strong rebound once the virus outbreak is contained, on the order of 13% from current levels.

Q: How would you describe investor sentiment today?

A: Obviously, markets have been very volatile. But against that backdrop, the broad consensus seems to be to "buy the dip," which history supports. Ultimately, no matter how widespread or long-lasting the viral outbreak is, barring an extreme global pandemic, it's reasonable to expect economic activity will eventually recover. So, despite bouts of fear like we've seen this week, investors are likely to continue to look through very poor first quarter, and possibly even second quarter, numbers and focus on a more promising second half of 2020 and 2021.

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Glossary of GS proprietary indices

Current Activity Indicator (CAI)

GS CAIs measure the growth signal in a broad range of weekly and monthly indicators, offering an alternative to Gross Domestic Product (GDP). GDP is an imperfect guide to current activity: In most countries, it is only available quarterly and is released with a substantial delay, and its initial estimates are often heavily revised. GDP also ignores important measures of real activity, such as employment and the purchasing managers' indexes (PMIs). All of these problems reduce the effectiveness of GDP for investment and policy decisions. Our CAIs aim to address GDP's shortcomings and provide a timelier read on the pace of growth.

For more, see our CAI page and Global Economics Analyst: Trackin' All Over the World – Our New Global CAI, 25 February 2017.

Dynamic Equilibrium Exchange Rates (DEER)

The GSDEER framework establishes an equilibrium (or "fair") value of the real exchange rate based on relative productivity and terms-of-trade differentials.

For more, see our GSDEER page, Global Economics Paper No. 227: Finding Fair Value in EM FX, 26 January 2016, and Global Markets Analyst: A Look at Valuation Across G10 FX, 29 June 2017.

Financial Conditions Index (FCI)

GS FCIs gauge the "looseness" or "tightness" of financial conditions across the world's major economies, incorporating variables that directly affect spending on domestically produced goods and services. FCIs can provide valuable information about the economic growth outlook and the direct and indirect effects of monetary policy on real economic activity.

FCIs for the G10 economies are calculated as a weighted average of a policy rate, a long-term risk-free bond yield, a corporate credit spread, an equity price variable, and a trade-weighted exchange rate; the Euro area FCI also includes a sovereign credit spread. The weights mirror the effects of the financial variables on real GDP growth in our models over a one-year horizon. FCIs for emerging markets are calculated as a weighted average of a short-term interest rate, a long-term swap rate, a CDS spread, an equity price variable, a trade-weighted exchange rate, and—in economies with large foreign-currency-denominated debt stocks—a debt-weighted exchange rate index.

For more, see our FCI page, Global Economics Analyst: Our New G10 Financial Conditions Indices, 20 April 2017, and Global Economics Analyst: Tracking EM Financial Conditions – Our New FCIs, 6 October 2017.

Goldman Sachs Analyst Index (GSAI)

The US GSAI is based on a monthly survey of GS equity analysts to obtain their assessments of business conditions in the industries they follow. The results provide timely "bottom-up" information about US economic activity to supplement and cross-check our analysis of "top-down" data. Based on analysts' responses, we create a diffusion index for economic activity comparable to the ISM's indexes for activity in the manufacturing and nonmanufacturing sectors.

Macro-Data Assessment Platform (MAP)

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