

## US Economics Analyst

## Reopening the Economy

- The US is now largely in lockdown mode and social distancing has increased nationwide. But with the daily number of new confirmed virus cases plateauing and big data measures indicating a sharp decline in the true number of new cases, discussion is turning to the plan for reopening. This week's *Analyst* asks what reopening will look like and what it means for the pace of the recovery.
- Absent a vaccine or treatment breakthrough, reopening will be gradual. New evidence suggests that the share of the population that has been infected is higher than test counts imply, but still too low to achieve herd immunity soon. As a result, the public will have to be persuaded that reopening is safe. We see a few prerequisites: further declines in confirmed new infections, sufficient hospital and testing capacity, and the ability to trace and quarantine those who might be infected. These look achievable in coming months, but there is much uncertainty about the feasibility of controlling virus spread during reopening.
- Several other countries have taken steps toward reopening. We see three lessons from their experiences. First, initial reopening timelines often prove too optimistic. Second, even countries at the forefront of reopening have gradual and conservative plans. Third, recovery is easier and quicker in manufacturing and construction than in consumer services.
- We expect the economy to begin improving in coming months, with the peak virus hit fading thanks to partial relaxation of shutdown orders, adaptation to social distancing, and wider antibody testing to identify those who are now immune. While longer-lasting economic damage that delays the recovery is possible, so far the news has been mostly reassuring: most layoffs appear to be temporary and there has been no major uptick in bankruptcies at this early stage.
- The growth path depends on the depth of the hit, the length of lockdown, and the pace of recovery. We estimate a 25% peak hit to manufacturing, a 30% hit to construction, a 60% hit to broker fees and home improvements, and a 14% hit to consumer services, with manufacturing and construction recovering more quickly. Our GDP growth forecast remains a quarterly annualized rate of -7% in Q1, -34% in Q2, +19% in Q3, and +12% in Q4, implying an annual average rate of -5.7% in 2020. We see both upside and downside risks to our forecast.

**Jan Hatzius**

+1(212)902-0394 | jan.hatzius@gs.com  
Goldman Sachs & Co. LLC

**Alec Phillips**

+1(202)637-3746 | alec.phillips@gs.com  
Goldman Sachs & Co. LLC

**David Mericle**

+1(212)357-2619 | david.mericle@gs.com  
Goldman Sachs & Co. LLC

**Spencer Hill, CFA**

+1(212)357-7621 | spencer.hill@gs.com  
Goldman Sachs & Co. LLC

**Daan Struyven**

+1(212)357-4172 | daan.struyven@gs.com  
Goldman Sachs & Co. LLC

**David Choi**

+1(212)357-6224 | david.choi@gs.com  
Goldman Sachs & Co. LLC

**Joseph Briggs**

+1(212)902-2163 | joseph.briggs@gs.com  
Goldman Sachs & Co. LLC

**Blake Taylor**

+1(202)637-3756 | blake.taylor@gs.com  
Goldman Sachs & Co. LLC

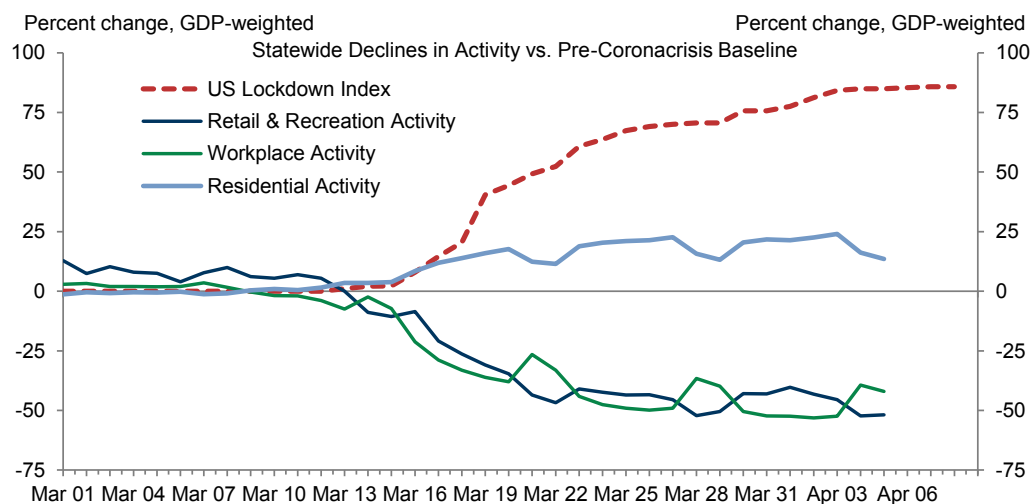
**Ronnie Walker**

+1(917)343-4543 | ronnie.walker@gs.com  
Goldman Sachs & Co. LLC

## Reopening the Economy

The US is now largely in lockdown mode and social distancing has increased nationwide. Our US Lockdown Index—a measure of the GDP-weighted share of the country that has shut schools, closed non-essential businesses, and issued stay-at-home orders—has now reached 86%, as shown in Exhibit 1. Virus fears and lockdown orders have led to much greater social distancing, with roughly 50% declines in the share of time spent at workplaces and retail stores and a 25% increase in time spent at home.

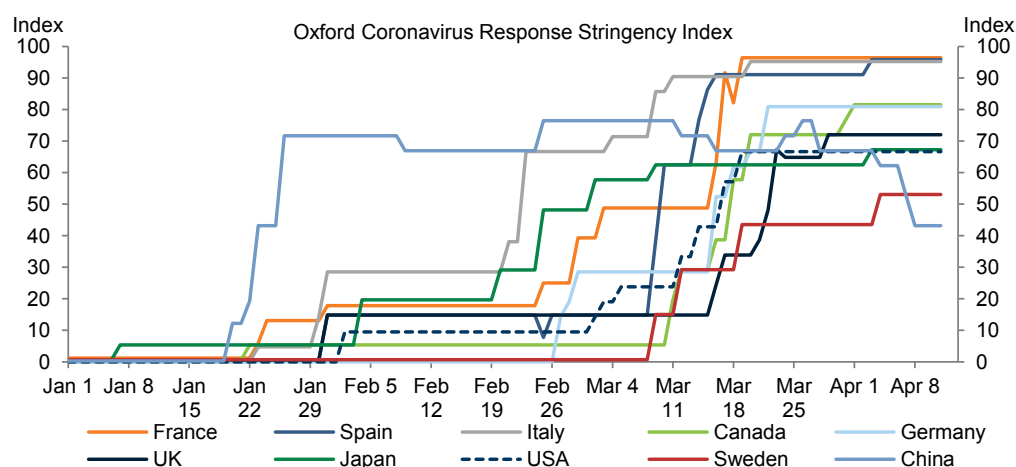
**Exhibit 1: Most of the US Is Now in Lockdown Mode and Social Distancing Has Increased Nationwide**



Source: National Governors Association, University of Washington IMHE, Google, Goldman Sachs Global Investment Research

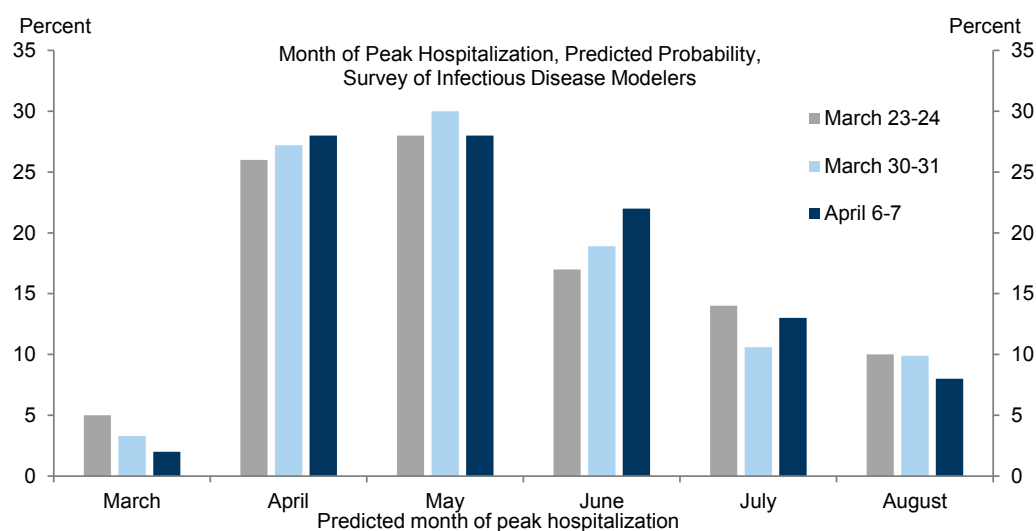
Relative to the lockdown measures in place in other major economies, current US measures are slightly less tight than average, according to an index developed by researchers at the University of Oxford. Exhibit 2 shows that the US response is currently much less stringent than in Italy, France, and Spain, but more stringent than in Sweden or China.<sup>1</sup>

<sup>1</sup> See <https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker>. We think that this measure understates the severity of the China lockdown for several reasons, most importantly that China did not have any international travel controls in place for most of this time (1/7 of the Oxford index) because there was no fear of international transmission.

**Exhibit 2: Current US Lockdown Measures Are in the Middle of the Pack in Terms of Stringency**

Source: University of Oxford, Goldman Sachs Global Investment Research

The timing of reopening depends first and foremost on controlling the virus. How far are we from reaching that point? In a survey last week, a panel of experts on infectious disease modeling predicted that the peak rate of COVID-19 hospitalizations is most likely to be reached this month or in May, though they assigned a probability of only slightly under 50% to a later peak, as shown in Exhibit 3. Reducing the spread to a comfortable level would then take at least a few weeks after that point.

**Exhibit 3: Experts on Infectious Disease Modeling Expect Peak Hospitalization in April or May**

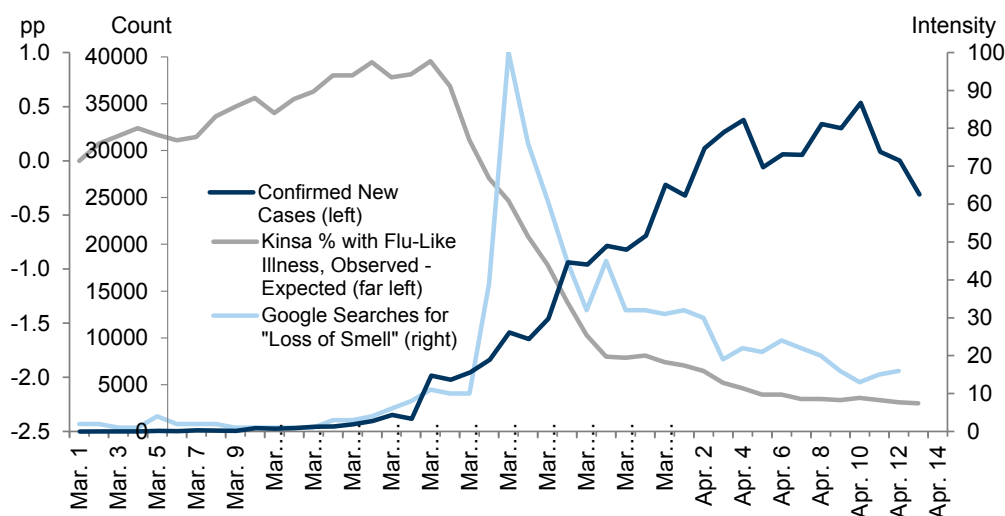
Source: UMass Amherst, Goldman Sachs Global Investment Research

The latest data on the pace of virus spread are encouraging, suggesting that lockdowns have paid large dividends. The count of confirmed new COVID-19 cases has plateaued and perhaps even begun to decline, as shown in Exhibit 4. Our model of the outbreak in the short run—based on a time series analysis using an international panel of case counts—projects a decline in the growth rate of active cases over the next week, in line

with the experiences of countries further along in their lockdown timelines.

Measures of virus spread based on big data are even more encouraging and suggest that the true number of new cases actually peaked a while ago, as shown in Exhibit 4. Data from Kinsa that aggregate readings from web-linked thermometers show that the nationwide rate of influenza-like illness is now well below normal seasonal patterns. In addition, Google searches for “loss of smell”—a symptom that has proven an effective way to track the virus spread<sup>2</sup>—have fallen to roughly one-seventh of their peak US level. These measures appear to lead the official count of cases confirmed by testing by 2-3 weeks.

**Exhibit 4: The Count of New Cases Confirmed by Testing Has Plateaued, and Big Data Measures Suggest the True Number of New Cases Has Been Falling Sharply for a While**



Source: Johns Hopkins University, Kinsa, Google, Goldman Sachs Global Investment Research

## What Will Reopening Look Like?

Absent a vaccine or scalable treatment breakthrough,<sup>3</sup> reopening will have to remain gradual.

There has been some enthusiasm recently about the possibility that far more people than initially believed have been infected but have remained asymptomatic or uncounted for lack of testing. While some hope that this means that “herd immunity” could be close at hand, this appears unlikely. New evidence from full population or random sample testing summarized in Exhibit 5 suggests that the share of the population that has been infected is indeed likely much higher than case counts confirmed by testing imply. But it still appears to be well below the level required for herd immunity—perhaps half of the population. Having already chosen to lock down, governments are very likely to discourage the rapid virus spread required to reach that threshold quickly.

<sup>2</sup> Seth Stephens-Davidowitz, “Google Searches Can Help Us Find Emerging Covid-19 Outbreaks,” The New York Times, April 5, 2020.

<sup>3</sup> For more on progress on vaccine and treatment development, see recent research by our Japan healthcare analysts, Akinori Ueda and George Zhou, “COVID-19 FAQ: Strong interest in progress on treatment/vaccine development, product positioning,” April 11, 2020.

because of the associated traumatic public health consequences. Moreover, while experience with past coronaviruses suggests that people who are infected will likely have at least some period of immunity, much remains unknown about immunity to Covid-19.<sup>4</sup>

**Exhibit 5: Full Population and Random Sample Testing Suggests the Infected Share of the Population Is Higher Than Official Case Counts Imply, but Still Too Low to Achieve Herd Immunity Anytime Soon**

Study	Results	Population Infection Rate
Diamond Princess	Over 700 out of 3,711 passengers on the Diamond Princess were infected, an infection rate of roughly 19%. There have since been 11 reported deaths.	19%
USS Theodore Roosevelt	Nearly all of the crew members of the USS Theodore Roosevelt were tested. As of Sunday, 585 sailors tested positive for the virus, while 3,921 tested negative.	13%
Gangelt	Preliminary results from a random sample of residents in Gangelt, a hard-hit town in Germany, suggest that roughly 15% of residents have been infected (either actively infected or having antibodies). The authors of the study estimated a 0.37% infection fatality rate.	15%
Vo	All 3,300 inhabitants of Vo, Italy, were tested. About 3% of residents were infected, with roughly 50% showing no symptoms. Following a strict lockdown and quarantine, only 0.25% of residents were infected thereafter, and soon there were no active cases.	3%
Austria	A random sample of Austrians suggests that 1% of the population has been infected. Austria currently has roughly 13,000 total confirmed cases, or about 0.15% of the population.	1%
Iceland	Iceland has conducted a large number of tests (roughly 10% of the population). It has reported roughly 1,675 cases so far, or about 5% of those tested. About half of those who tested positive reported no symptoms at the time of testing.	~5%
Denmark	A study of 1000 blood donations found that 3.5% of donors had been infected.	3.5%
Colorado	More than 6,000 out of roughly 8,000 residents of Telluride took an antibody test. So far 0.5% of those tested were positive, 1.5% "borderline," and 98% negative.	0.5%
Wuhan	Japan, Singapore, South Korea, Germany, Belgium and Malaysia tested all passengers returning from Wuhan on chartered flights between January 29 and February 4. There was a small number of confirmed cases, typically 0 to 2 percent. A few pre-symptomatic or asymptomatic cases were confirmed.	0-2%

Source: Goldman Sachs Global Investment Research

Because of the risk of renewed virus spread, the public will have to be persuaded that any plan for partial reopening is safe. After all, as we recently showed, most of the increase in social distancing in the US has been a voluntary reaction to virus fears, not a response to government lockdown orders.

We see a few prerequisites for reopening: further declines in confirmed new infections, some excess capacity in hospital systems, greater ability to test large numbers of people quickly, and the ability to trace<sup>5</sup> and quarantine those who have come into contact with infected people in order to control future outbreaks. These goals look achievable in the US in coming months, though there is still great uncertainty about the feasibility of controlling virus spread during reopening.

Once those conditions are met, reopening is likely to begin with a very gradual relaxation of lockdown measures. Because the initial spread was slowed by social

<sup>4</sup> Marc Lipsitch, "Who Is Immune to the Coronavirus?" New York Times, April 13, 2020.

<sup>5</sup> A challenge in the US is balancing tracing contact between people with privacy concerns. A cell phone app developed by mathematicians, NOVID, anonymously traces virus exposure by using Bluetooth radio waves and ultrasonic frequencies captured by the microphone to measure the distance between people and later alert people who have been near someone who self-reports as infected. Such technologies could enable the same tracing of potential new infections as more invasive approaches in other countries. See Novid.org.

distancing, the US will have to reverse course very cautiously to avoid a second wave of virus spread. The speed of reopening is likely to vary across the country based on local conditions such as virus prevalence and healthcare capacity.

Many possible adjustments to office and factory work arrangements, commercial activity, and social life can help to reduce the risk of virus spread as reopening gets underway. The middle column of Exhibit 6 highlights some options. Adjustments such as the use of masks, hand-washing, more frequent deep cleaning, routine health checks, maintaining physical distancing, and limitations on gatherings might apply to most areas of public life. Reduced density could be achieved through staggered shifts at work sites or lower capacity limits on public transit or at restaurants and other commercial and cultural locations. And life might reopen to a different degree for different groups, with those who are immune returning first, while those most at risk continue to limit social interactions until a vaccine is available.

**Exhibit 6: Partial Reopening Will Require a Number of Changes to Work, Commercial, and Social Life**

Prerequisites for Reopening	Adjustments to Permit Gradual Reopening	Ways to Accelerate Reopening
<ul style="list-style-type: none"> <li>- Slower pace of new cases</li> <li>- Hospitals are not overstretched</li> <li>- Ability to test large numbers quickly</li> <li>- Ability to trace and quarantine infected people</li> </ul>	<ul style="list-style-type: none"> <li>- Wider use of masks</li> <li>- Frequent hand-washing, disinfecting, and deep cleaning</li> <li>- Contact tracing and quarantining following breakouts</li> <li>- Restore lockdown policies if cases rebound too quickly</li> <li>- Encourage older/at-risk population to limit time in public</li> <li>- International and/or domestic travel restrictions</li> <li>- Increase to-go offerings and cashless transactions</li> <li>- Bring back workers who are immune</li> <li>- Maintain physical distancing measures and limitations on gatherings</li> <li>- Limit allowable capacity for public transportation, restaurants, museums, etc.; add protective barriers</li> <li>- Stagger shifts for employees, take turns eating lunch to reduce cafeteria crowding, add safety equipment</li> <li>- Surveillance systems, temperature checks, use of technology and data to identify areas of concern</li> <li>- State-by-state recovery, with reopening first starting in areas that have less cases</li> </ul>	<ul style="list-style-type: none"> <li>- Therapeutic or preventative treatments</li> <li>- Vaccine</li> <li>- Antibody testing</li> <li>- Favorable seasonal effects</li> <li>- Wider immunity than previously thought</li> </ul>

Source: Goldman Sachs Global Investment Research

We see two possible approaches to the order of reopening.

The optimal approach might start with activities whose reopening offers maximum economic benefit for a given “cost” of virus risk, with total permitted activity constrained to a level that keeps virus spread under control.<sup>6</sup> In practice, measuring this might be difficult. Our Asia economics team found that closings of workplaces and public transport and cancellation of public events show the greatest cross-country correlation with service-sector activity, while restrictions on internal and international

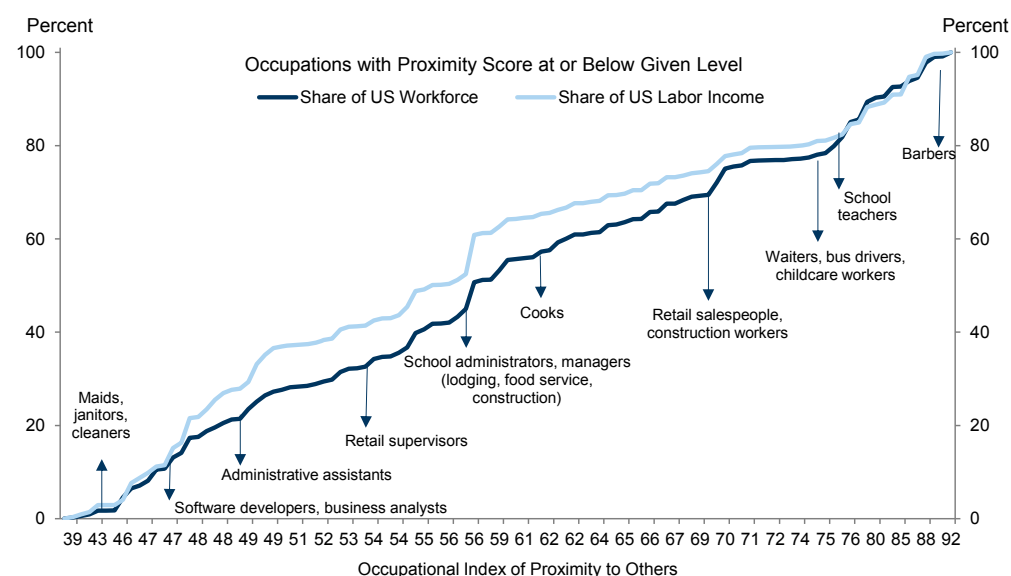
<sup>6</sup> Eric Budish, “ $R < 1$  as an Economic Constraint: Can We ‘Expand the Frontier’ in the Fight Against Covid-19?” April 1, 2020.

travel appear to matter less. But estimating the “cost,” virus transmission risk, might be more challenging. One implication of this approach is that economic activity that can be conducted nearly as well from home as from a work or commercial site should generally come later in the reopening order.<sup>7</sup>

The natural approach might instead proceed from the safest activities to the most dangerous, as people initially limit their out-of-home activities to those with the least risk of infection. Exhibit 7 illustrates how this might look from an occupational perspective. The exhibit ranks occupations from left to right based on how much physical proximity to others they require according to occupational survey data.

Absent strong government intervention, the actual path of reopening is likely to fall somewhere in between these two approaches. While the first approach might be optimal from a centrally organized perspective, the private economy would not necessarily arrive at that approach on its own because of incomplete information about virus risk and a failure of businesses and individuals to account for the virus transmission externalities of their own activities.

**Exhibit 7: Jobs and Activities That Require Less Physical Proximity to Others Will Likely Reopen Sooner**



Source: Federal Reserve Bank of St. Louis, Goldman Sachs Global Investment Research

<sup>7</sup> For examples see Jonathan Dingel and Brent Neiman, “How Many Jobs Can Be Done at Home?” March 26, 2020.

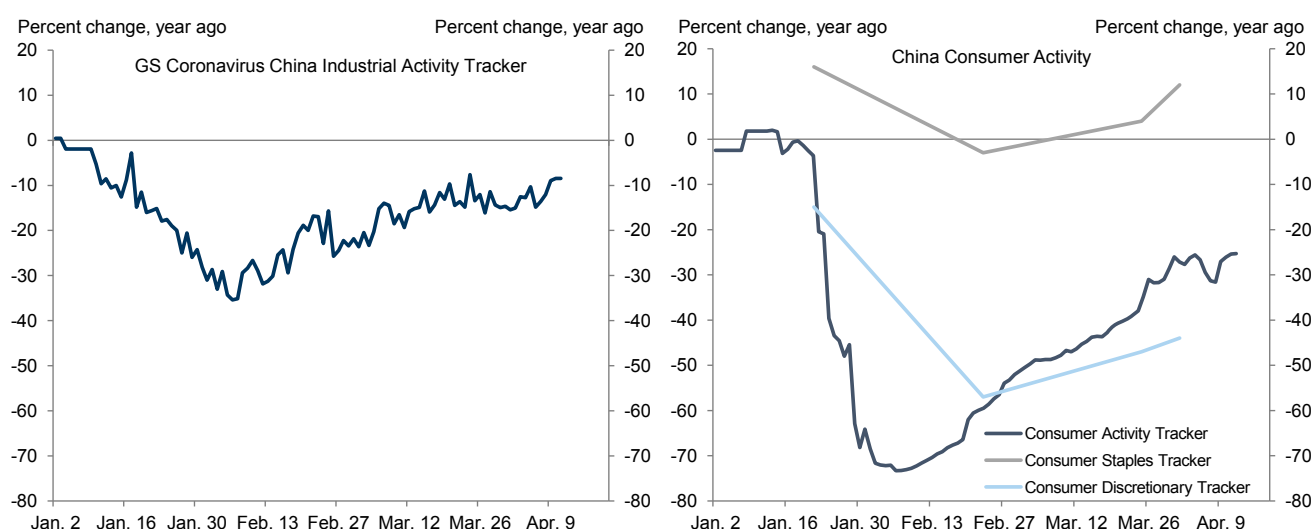
## Lessons from Foreign Experience with Reopening

Several countries have already started the process of gradually reopening their economies from virus lockdowns or have announced plans to start soon. These foreign experiences provide a glimpse of what reopening might look like in the US.

We look first at China, which is furthest along in the reopening process. The majority of provinces in China have now lowered emergency response levels, including Hubei province, the epicenter of the initial outbreak. However, precautionary measures remain in place, such as temperature checks at workplaces and restrictions on movement based on health status.

Industrial activity in China has recovered significantly as virus control measures have eased, with our Coronavirus China Industrial Activity Tracker now down just 8% compared to the year-ago level. Consumer activity has also rebounded quickly, though the level remains weaker, with our China Consumer Activity Tracker still 25% below the year-ago level (Exhibit 8) and spending on consumer discretionary categories particularly weak. We expect the US to exhibit similar patterns, with a quicker pace of recovery in manufacturing than in consumer services. However, we expect a slower overall pace of recovery in the US than in China because the US has a less manufacturing-focused economy, virus control is likely to be less thorough, and the reopening process will be less centrally directed.

**Exhibit 8: Industrial Activity in China Is Closer to Recovering than Consumer Activity**



Source: Goldman Sachs Global Investment Research

Other countries in Asia have imposed or extended lockdowns and enforced social distancing. Malaysia, the Philippines, and India recently extended lockdowns, and Singapore and Japan recently escalated their response to the virus due to spikes in infections, as noted in Exhibit 9. Most places have moved to more stringent policies over time, and those with relatively low new infection rates, such as Taiwan and South Korea, continue to heavily restrict international travel due to fear of importing new cases.

Several countries in Europe have also announced plans for a very gradual reopening.



Denmark, the Czech Republic, Austria, Spain, and Italy have lifted some restrictions, but the vast majority of restrictions remain in place, as described in Exhibit 9. In the US, governors from several East Coast states and governors from several West Coast states have each started joint discussions to plan a reopening, although neither group has provided public guidance on a timeline or a reopening plan thus far.

#### Exhibit 9: Many Regions Have Encountered Setbacks or Pushed Back the Date of Reopening

Foreign Experiences with Reopening or Attempted Reopening to Date	
Successes and Setbacks to Date	
China (Wuhan)	<p>Lockdown of Wuhan ended after 11 weeks.</p> <p>People can now leave after presenting an app indicating if they are a contagion risk.</p> <p>Officials continue to urge everyone to stay at home as much as possible.</p> <p>Schools remain closed.</p> <p>Public buses and subways have restarted.</p> <p>Most businesses have resumed operations.</p>
Singapore	<p>Appeared to have the virus under control, but the number of infections has jumped more than 80% over the past week.</p> <p>Has implemented a near total lockdown for one month after a surge in locally transmitted cases over the last several days, and has made it mandatory to wear masks in public.</p>
Hong Kong	<p>Officials in recent days have implemented new social distancing measures, restrictions on restaurants, and the temporary closures of bars and gyms as cases have gradually risen over the last several weeks.</p>
Malaysia	<p>National partial lockdown began on March 18 and was first scheduled to end on March 31; the lockdown was then extended to April 14, and once again to April 28.</p>
Philippines	<p>Partial lockdown scheduled to end on April 12 has recently been extended until April 30.</p>
Foreign Plans to Reopen in the Near Future	
Plans to Reopen	
Austria	<p>"Step-by-step" reopening.</p> <p>Small stores have reopened, with limits to capacity.</p> <p>All other stores are set to reopen on May 2.</p> <p>Restaurants, hotels, and schools will wait until mid-May.</p> <p>Large gatherings prohibited until the end of June.</p> <p>At-risk people should still be restricted.</p> <p>Mandatory usage of facemasks in public areas.</p>
Czech Republic	<p>Government has allowed reopening of certain small shops, and relaxed rules on activities such as running and cycling.</p> <p>More shops may be opened after Easter weekend.</p> <p>Social distancing measures, disinfection requirements still in place.</p> <p>Easing of some restrictions on leaving the country; people will have to present "reasonable grounds" to go, and observe a two-week quarantine upon return.</p> <p>Previously had considerably stricter lockdown than most other countries.</p>
Denmark	<p>Has opened daycare centers, kindergartens, and primary schools.</p> <p>Government will start talks with business leaders on gradually reopening.</p> <p>Any signs of an uptick in the number of cases would be followed by reapplying restrictions.</p> <p>Borders will remain closed, travel restrictions will remain in place, gatherings larger than 10 people will still be banned.</p> <p>Restaurants, bars, and cafes will remain closed.</p>
Germany	<p>No firm timetable yet on returning.</p> <p>Mandatory wearing of masks, strict quarantine for those infected, protection of high risk groups.</p> <p>Gradual reopening of stores and restaurants, with capacity limits and distance requirements.</p>
Spain	<p>Some nonessential workers are allowed to return, such as those in construction and manufacturing.</p> <p>Bars, shops, and public spaces will remain closed for at least two more weeks.</p>
Italy	<p>Several stores are now allowed to reopen, mainly bookstores and stationary stores. Customers are required to wear protective masks and gloves, and shops must be sanitized twice a day.</p> <p>Wider nationwide restrictions will remain until at least May 3.</p>
France	<p>Lockdown extended until at least May 11.</p> <p>After May 11, the current plan is to allow the reopening of factories, schools, and day-care centers.</p>

Source: Goldman Sachs Global Investment Research

Foreign experience offers three key lessons for the US. First, initial reopening timelines often prove too optimistic, and changes to initial plans have so far instead mostly involved moving toward more stringent restrictions and longer lockdowns. Second, even countries at the forefront of reopening have gradual and conservative plans. Third, recovery is quicker in manufacturing than in consumer services.

## The Economic Recovery: A Scenario Analysis

We conclude by looking at what various paths for reopening would mean for the growth outlook.

We strongly expect the economy to begin to recover from the current bottom over the next few months as the peak virus hit fades thanks to partial relaxation of shutdown orders, adaptation to social distancing, and wider antibody testing to identify those who are now immune. While longer-lasting economic damage that delays the recovery is possible, so far the news has been mostly reassuring. On the labor market side, most layoffs have been temporary, meaning that most employer-employee relationships remain intact. On the business side, there has been no major uptick in bankruptcies so far. Admittedly, it is still very early to know how both concerns will evolve in coming months.

The quarterly growth path largely depends on three key parameters: the depth of the peak decline, the length of lockdown, and the speed of recovery during the reopening process. We estimate a 25% peak hit in April to manufacturing, a 30% hit to construction, a 60% hit to brokerage fees and home improvements, and a 14% hit to consumer services. We assume that the recovery starts in May and June and thereafter proceeds at a gradual pace, with the manufacturing and construction drag fading by 15% each month, and the drag from services activity fading by 12.5% each month.

Our baseline forecast for GDP growth continues to put the quarterly annualized pace at -7% in Q1, -34% in Q2, +19% in Q3, and +12% in Q4. This implies 2020 growth of -5.7% on an annual average basis and -4.9% on a Q4/Q4 basis.

The last three charts compare our baseline forecast to plausible upside and downside scenarios in which the initial peak decline in GDP is either smaller or larger, the time spent in lockdown (during which we assume the recovery rate is halved) is longer, and the pace of recovery is either slower or faster.

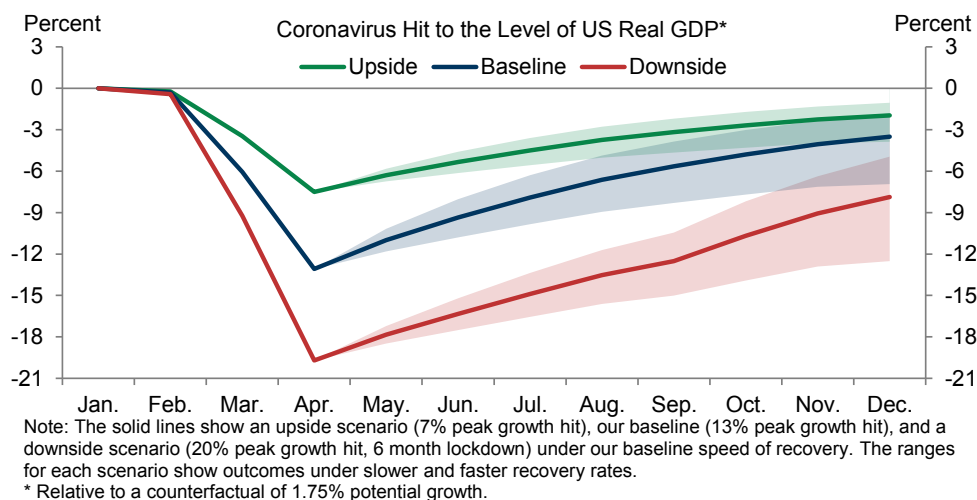
An upside scenario could involve greater progress on treatment, much slower spread in warmer weather, or more effective adaptation that makes social distancing measures less economically costly. A widely available vaccine would likely lead to an even sharper recovery of economic activity, but appears unlikely in the near future.

A downside scenario could involve a slower decline in the number of new infections, longer lockdowns, a second wave of infections that results in an oscillation between easing and tightening restrictions, larger second-round income effects, and more persistent avoidance of face-to-face interactions.

Exhibit 10 shows both the level (above) and growth rate (below) of output under our baseline assumptions and in an upside and a downside scenario. Specifically, we consider an upside case with a 7% peak hit to activity (vs. 13% in our baseline) and a downside case with both a 20% peak hit to activity and a lockdown that lasts for 6 months. The top chart shows the level of output for each scenario as a range corresponding to different recovery rates, from a very slow recovery in which the virus hit decays at a 5% monthly pace for manufacturing, construction, and services, to a faster recovery in which the hit decays at a 25% pace for manufacturing and

construction and a 20% pace for services. The bottom chart shows the implied quarterly growth rates for each scenario, assuming the baseline recovery rate.

#### Exhibit 10: We See Both Upside and Downside Risks to Our Baseline Path

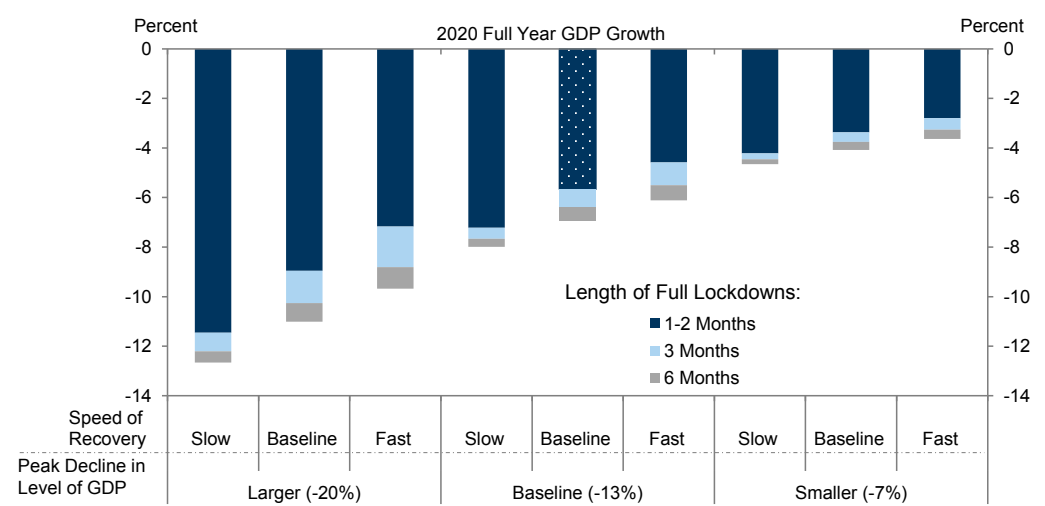


Scenario	2020 QoQ AR				2020 YoY				2020 Full-Year Growth
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Deep hit, 6 month lockdown, baseline speed of recovery	-7	-53	20	20	-0.3	-18.0	-14.6	-11.1	-11.0
<b>Baseline peak hit, baseline speed of recovery</b>	<b>-7</b>	<b>-34</b>	<b>19</b>	<b>12</b>	<b>-0.3</b>	<b>-10.5</b>	<b>-7.0</b>	<b>-4.9</b>	<b>-5.7</b>
Small hit, baseline speed of recovery	-7	-20	11	7	-0.3	-6.1	-4.1	-3.0	-3.4

Source: Goldman Sachs Global Investment Research

Exhibit 11 shows what an even broader range of scenarios that vary all three key parameters would imply for 2020 growth. In the most extreme cases shown on the left, the growth hit could reach double-digits. In the most optimistic case shown on the right, even a relatively small peak hit to activity, a 1-2 month lockdown, and a fast recovery would suggest 2020 growth of -3.3%, which would still be the lowest full-year pace since 1946. While we see both upside and downside risks to our baseline path, the numerical risks to full-year growth in 2020 skew downward.

Exhibit 11: 2020 Growth Depends on the Peak Decline, the Length of Lockdown, and the Speed of Recovery



Source: Goldman Sachs Global Investment Research

David Choi

David Mericle

# The US Economic and Financial Outlook

## Forecast Changes

We raised our Q1 GDP forecast from -9% to -7%. We estimate an even smaller decline of -4.5% in the advance reading of Q1 GDP on April 29th, with the wedge between the two forecasts reflecting non-response bias (the hardest hit firms are less likely to respond to the surveys) and incomplete source data. We expect downward revisions to some of these data in coming months.

## THE US ECONOMIC AND FINANCIAL OUTLOOK

(% change on previous period, annualized, except where noted)

	2018	2019	2020 (f)	2021 (f)	2022 (f)	2023 (f)	2020				2021			
							Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>OUTPUT AND SPENDING</b>														
Real GDP	2.9	2.3	-5.7	5.5	3.5	2.0	-7.0	-34.0	19.0	12.0	7.5	6.0	5.0	3.5
Real GDP (Advance Release)	--	--	--	--	--	--	-4.5	-19.0	9.0	12.0	7.5	6.0	5.0	3.5
Real GDP (Q4/Q4 or yoy)	2.5	2.3	-4.9	5.5	2.8	1.7	-0.3	-10.5	-7.1	-4.9	-1.4	11.0	7.6	5.5
Consumer Expenditure	3.0	2.6	-3.7	4.0	3.7	2.1	-3.8	-28.0	16.0	8.0	5.0	4.0	4.0	4.0
Residential Fixed Investment	-1.5	-1.5	-2.9	9.1	5.5	2.3	12.1	-45.0	25.0	15.0	15.0	12.0	10.0	5.0
Business Fixed Investment	6.4	2.1	-10.0	6.4	5.0	3.9	-15.3	-37.6	20.8	15.0	8.8	6.1	5.7	5.3
Structures	4.1	-4.3	-15.0	4.4	3.1	2.7	-15.8	-45.0	15.0	15.0	10.0	5.0	3.0	3.0
Equipment	6.8	1.3	-12.1	5.3	4.2	2.7	-19.2	-40.0	20.0	15.0	7.0	5.0	5.0	5.0
Intellectual Property Products	7.4	7.5	-4.2	8.7	7.0	5.7	-10.0	-30.0	25.0	15.0	10.0	8.0	8.0	7.0
Federal Government	2.9	3.5	4.2	2.6	0.1	0.0	2.5	6.0	6.0	3.0	3.0	1.0	0.0	0.0
State & Local Government	1.0	1.6	3.3	3.0	1.2	1.0	2.5	6.0	6.0	3.0	3.0	1.5	1.5	1.5
Net Exports (\$bn, '09)	-920	-954	-1,145	-1,349	-1,320	-1,341	-915	-1101	-1247	-1318	-1373	-1376	-1335	-1314
Inventory Investment (\$bn, '09)	48	67	-269	119	75	60	-126	-550	-300	-100	50	150	150	125
Industrial Production, Mfg.	2.3	-0.2	-12.4	7.6	4.7	1.2	-16.1	-43.7	8.9	17.4	14.9	12.2	8.4	5.5
<b>HOUSING MARKET</b>														
Housing Starts (units, thous)	1,250	1,298	1,294	1,500	1,578	--	1,483	1,130	1,218	1,344	1,477	1,420	1,492	1,610
New Home Sales (units, thous)	615	684	639	770	832	--	716	532	626	683	752	739	763	825
Existing Home Sales (units, thous)	5,334	5,330	4,716	5,450	5,564	--	5,280	3,928	4,617	5,040	5,268	5,496	5,510	5,525
Case-Shiller Home Prices (%yoy)*	4.1	3.2	-2.1	2.3	1.9	2.0	2.8	-0.5	-1.6	-2.1	-1.0	0.1	1.2	2.3
<b>INFLATION (% ch, yr/yr)</b>														
Consumer Price Index (CPI)	2.4	1.8	1.0	1.9	2.1	2.2	2.1	0.3	0.7	0.8	1.0	2.5	2.1	2.0
Core CPI	2.1	2.2	1.7	1.8	2.1	2.2	2.2	1.6	1.4	1.5	1.4	2.0	2.0	1.9
Core PCE**	2.0	1.6	1.4	1.5	1.8	2.0	1.8	1.4	1.2	1.3	1.2	1.5	1.6	1.6
<b>LABOR MARKET</b>														
Unemployment Rate (%)	3.9	3.7	10.5	7.4	6.0	6.0	3.8	13.3	15.1	9.7	8.3	7.7	7.1	6.5
U6 Underemployment Rate (%)	7.7	7.2	20.7	12.9	10.5	10.4	7.5	26.9	29.2	19.2	15.3	13.0	11.6	11.6
Payrolls (thous, monthly rate)	192	174	-669	550	350	213	124	-5,000	-800	3,000	850	450	450	450
<b>GOVERNMENT FINANCE</b>														
Federal Budget (FY, \$bn)	-779	-984	-3,600	-2,400	-1,500	-1,400	--	--	--	--	--	--	--	--
<b>FINANCIAL INDICATORS</b>														
FF Target Range (Bottom-Top, %)^	2.25-2.5	1.5-1.75	0-0.25	0-0.25	0.5-0.75	1-1.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25	0-0.25
10-Year Treasury Note^	2.69	1.92	0.75	1.35	1.75	1.90	0.70	0.40	0.55	0.75	0.90	1.05	1.20	1.35
Euro (€/€)^	1.15	1.12	1.13	1.17	1.20	1.22	1.10	1.08	1.10	1.13	1.14	1.15	1.16	1.17
Yen (\$/¥)^	110	109	105	104	102	101	108	102	105	105	105	105	104	104

\* Weighted average of metro-level HPIs for 381 metro cities where the weights are dollar values of housing stock reported in the American Community Survey.

\*\* PCE = Personal consumption expenditures. ^ Denotes end of period.

Note: Published figures in bold.

Source: Goldman Sachs Global Investment Research.

Source: Goldman Sachs Global Investment Research

# Disclosure Appendix

## Reg AC

We, Jan Hatzius, Alec Phillips, David Mericle, Spencer Hill, CFA, Daan Struyven, David Choi, Joseph Briggs, Blake Taylor and Ronnie Walker, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

Unless otherwise stated, the individuals listed on the cover page of this report are analysts in Goldman Sachs' Global Investment Research division.

## Disclosures

### Regulatory disclosures

#### Disclosures required by United States laws and regulations

See company-specific regulatory disclosures above for any of the following disclosures required as to companies referred to in this report: manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/co-managed public offerings in prior periods; directorships; for equity securities, market making and/or specialist role. Goldman Sachs trades or may trade as a principal in debt securities (or in related derivatives) of issuers discussed in this report.

The following are additional required disclosures: **Ownership and material conflicts of interest:** Goldman Sachs policy prohibits its analysts, professionals reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage.

**Analyst compensation:** Analysts are paid in part based on the profitability of Goldman Sachs, which includes investment banking revenues. **Analyst as officer or director:** Goldman Sachs policy generally prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director or advisor of any company in the analyst's area of coverage. **Non-U.S. Analysts:** Non-U.S. analysts may not be associated persons of Goldman Sachs & Co. LLC and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with subject company, public appearances and trading securities held by the analysts.

#### Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, except to the extent already made above pursuant to United States laws and regulations. **Australia:** Goldman Sachs Australia Pty Ltd and its affiliates are not authorised deposit-taking institutions (as that term is defined in the Banking Act 1959 (Cth)) in Australia and do not provide banking services, nor carry on a banking business, in Australia. This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act, unless otherwise agreed by Goldman Sachs. In producing research reports, members of the Global Investment Research Division of Goldman Sachs Australia may attend site visits and other meetings hosted by the companies and other entities which are the subject of its research reports. In some instances the costs of such site visits or meetings may be met in part or in whole by the issuers concerned if Goldman Sachs Australia considers it is appropriate and reasonable in the specific circumstances relating to the site visit or meeting. To the extent that the contents of this document contains any financial product advice, it is general advice only and has been prepared by Goldman Sachs without taking into account a client's objectives, financial situation or needs. A client should, before acting on any such advice, consider the appropriateness of the advice having regard to the client's own objectives, financial situation and needs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests and a copy of Goldman Sachs' Australian Sell-Side Research Independence Policy Statement are available at: <https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html>. **Brazil:** Disclosure information in relation to CVM Instruction 598 is available at <https://www.gs.com/worldwide/brazil/area/gir/index.html>. Where applicable, the Brazil-registered analyst primarily responsible for the content of this research report, as defined in Article 20 of CVM Instruction 598, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** Goldman Sachs Canada Inc. is an affiliate of The Goldman Sachs Group Inc. and therefore is included in the company specific disclosures relating to Goldman Sachs (as defined above). Goldman Sachs Canada Inc. has approved of, and agreed to take responsibility for, this research report in Canada if and to the extent that Goldman Sachs Canada Inc. disseminates this research report to its clients. **Hong Kong:** Further information on the securities of covered companies referred to in this research may be obtained on request from Goldman Sachs (Asia) L.L.C. **India:** Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (India) Securities Private Limited, Research Analyst - SEBI Registration Number INH000001493, 951-A, Rational House, Appasaheb Marathe Marg, Prabhadevi, Mumbai 400 025, India, Corporate Identity Number U74140MH2006FTC160634, Phone +91 22 6616 9000, Fax +91 22 6616 9001. Goldman Sachs may beneficially own 1% or more of the securities (as such term is defined in clause 2 (h) the Indian Securities Contracts (Regulation) Act, 1956) of the subject company or companies referred to in this research report. **Japan:** See below. **Korea:** This research, and any access to it, is intended only for "professional investors" within the meaning of the Financial Services and Capital Markets Act, unless otherwise agreed by Goldman Sachs. Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (Asia) L.L.C., Seoul Branch. **New Zealand:** Goldman Sachs New Zealand Limited and its affiliates are neither "registered banks" nor "deposit takers" (as defined in the Reserve Bank of New Zealand Act 1989) in New Zealand. This research, and any access to it, is intended for "wholesale clients" (as defined in the Financial Advisers Act 2008) unless otherwise agreed by Goldman Sachs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests is available at: <https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html>. **Russia:** Research reports distributed in the Russian Federation are not advertising as defined in the Russian legislation, but are information and analysis not having product promotion as their main purpose and do not provide appraisal within the meaning of the Russian legislation on appraisal activity. Research reports do not constitute a personalized investment recommendation as defined in Russian laws and regulations, are not addressed to a specific client, and are prepared without analyzing the financial circumstances, investment profiles or risk profiles of clients. Goldman Sachs assumes no responsibility for any investment decisions that may be taken by a client or any other person based on this research report. **Singapore:** Further information on the covered companies referred to in this research may be obtained from Goldman Sachs (Singapore) Pte. (Company Number: 198602165V). **Taiwan:** This material is for reference only and must not be reprinted without permission. Investors should carefully consider their own investment risk. Investment results are the responsibility of the individual investor. **United Kingdom:** Persons who would be categorized as retail clients in the United Kingdom, as such term is defined in the rules of the Financial Conduct Authority, should read this research in conjunction with prior Goldman Sachs research on the covered companies referred to herein and should refer to the risk warnings that have been sent to them by Goldman Sachs International. A copy of these risks warnings, and a glossary of certain financial terms used in this report, are available from Goldman Sachs International on request.

**European Union:** Disclosure information in relation to Article 6 (2) of the European Commission Delegated Regulation (EU) (2016/958) supplementing Regulation (EU) No 596/2014 of the European Parliament and of the Council with regard to regulatory technical standards for the technical arrangements for objective presentation of investment recommendations or other information recommending or suggesting an investment strategy and for disclosure of particular interests or indications of conflicts of interest is available at <https://www.gs.com/disclosures/europeanpolicy.html> which states the European Policy for Managing Conflicts of Interest in Connection with Investment Research.

**Japan:** Goldman Sachs Japan Co., Ltd. is a Financial Instrument Dealer registered with the Kanto Financial Bureau under registration number Kinsho 69, and a member of Japan Securities Dealers Association, Financial Futures Association of Japan and Type II Financial Instruments Firms Association.

Sales and purchase of equities are subject to commission pre-determined with clients plus consumption tax. See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

## Global product; distributing entities

The Global Investment Research Division of Goldman Sachs produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce research on industries and companies, and research on macroeconomics, currencies, commodities and portfolio strategy. This research is disseminated in Australia by Goldman Sachs Australia Pty Ltd (ABN 21 006 797 897); in Brazil by Goldman Sachs do Brasil Corretora de Títulos e Valores Mobiliários S.A.; Ombudsman Goldman Sachs Brazil: 0800 727 5764 and / or [ouvidoriagoldmansachs@gs.com](mailto:ouvidoriagoldmansachs@gs.com). Available Weekdays (except holidays), from 9am to 6pm. Ouvidoria Goldman Sachs Brasil: 0800 727 5764 e/ou [ouvidoriagoldmansachs@gs.com](mailto:ouvidoriagoldmansachs@gs.com). Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by either Goldman Sachs Canada Inc. or Goldman Sachs & Co. LLC; in Hong Kong by Goldman Sachs (Asia) L.L.C.; in India by Goldman Sachs (India) Securities Private Ltd.; in Japan by Goldman Sachs Japan Co., Ltd.; in the Republic of Korea by Goldman Sachs (Asia) L.L.C., Seoul Branch; in New Zealand by Goldman Sachs New Zealand Limited; in Russia by OOO Goldman Sachs; in Singapore by Goldman Sachs (Singapore) Pte. (Company Number: 198602165W); and in the United States of America by Goldman Sachs & Co. LLC. Goldman Sachs International has approved this research in connection with its distribution in the United Kingdom and European Union.

**European Union:** Goldman Sachs International authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority, has approved this research in connection with its distribution in the European Union and United Kingdom.

## General disclosures

This research is for our clients only. Other than disclosures relating to Goldman Sachs, this research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. The information, opinions, estimates and forecasts contained herein are as of the date hereof and are subject to change without prior notification. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Other than certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgment.

Goldman Sachs conducts a global full-service, integrated investment banking, investment management, and brokerage business. We have investment banking and other business relationships with a substantial percentage of the companies covered by our Global Investment Research Division. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (<https://www.sipc.org>).

Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients and principal trading desks that reflect opinions that are contrary to the opinions expressed in this research. Our asset management area, principal trading desks and investing businesses may make investment decisions that are inconsistent with the recommendations or views expressed in this research.

We and our affiliates, officers, directors, and employees, will from time to time have long or short positions in, act as principal in, and buy or sell, the securities or derivatives, if any, referred to in this research, unless otherwise prohibited by regulation or Goldman Sachs policy.

The views attributed to third party presenters at Goldman Sachs arranged conferences, including individuals from other parts of Goldman Sachs, do not necessarily reflect those of Global Investment Research and are not an official view of Goldman Sachs.

Any third party referenced herein, including any salespeople, traders and other professionals or members of their household, may have positions in the products mentioned that are inconsistent with the views expressed by analysts named in this report.

This research is focused on investment themes across markets, industries and sectors. It does not attempt to distinguish between the prospects or performance of, or provide analysis of, individual companies within any industry or sector we describe.

Any trading recommendation in this research relating to an equity or credit security or securities within an industry or sector is reflective of the investment theme being discussed and is not a recommendation of any such security in isolation.

This research is not an offer to sell or the solicitation of an offer to buy any security in any jurisdiction where such an offer or solicitation would be illegal. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients. Clients should consider whether any advice or recommendation in this research is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice. The price and value of investments referred to in this research and the income from them may fluctuate. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur. Fluctuations in exchange rates could have adverse effects on the value or price of, or income derived from, certain investments.

Certain transactions, including those involving futures, options, and other derivatives, give rise to substantial risk and are not suitable for all investors. Investors should review current options and futures disclosure documents which are available from Goldman Sachs sales representatives or at

<https://www.theocc.com/about/publications/character-risks.jsp> and

[https://www.fiadocumentation.org/fia/regulatory-disclosures\\_1/fia-uniform-futures-and-options-on-futures-risk-disclosures-booklet-pdf-version-2018](https://www.fiadocumentation.org/fia/regulatory-disclosures_1/fia-uniform-futures-and-options-on-futures-risk-disclosures-booklet-pdf-version-2018).

Transaction costs may be significant in option strategies calling for multiple purchase and sales of options such as spreads. Supporting documentation will be supplied upon request.

**Differing Levels of Service provided by Global Investment Research:** The level and types of services provided to you by the Global Investment Research division of GS may vary as compared to that provided to internal and other external clients of GS, depending on various factors including your individual preferences as to the frequency and manner of receiving communication, your risk profile and investment focus and perspective (e.g., marketwide, sector specific, long term, short term), the size and scope of your overall client relationship with GS, and legal and regulatory constraints. As an example, certain clients may request to receive notifications when research on specific securities is published, and certain clients may request that specific data underlying analysts' fundamental analysis available on our internal client websites be delivered to them electronically through data feeds or otherwise. No change to an analyst's fundamental research views (e.g., ratings, price targets, or material changes to earnings estimates for equity securities), will be communicated to any client prior to inclusion of such information in a research report broadly disseminated through electronic publication to our internal client websites or through other means, as necessary, to all clients who are entitled to receive such reports.

All research reports are disseminated and available to all clients simultaneously through electronic publication to our internal client websites. Not all research content is redistributed to our clients or available to third-party aggregators, nor is Goldman Sachs responsible for the redistribution of our research by third party aggregators. For research, models or other data related to one or more securities, markets or asset classes (including related services) that may be available to you, please contact your GS representative or go to <https://research.gs.com>.

Disclosure information is also available at <https://www.gs.com/research/hedge.html> or from Research Compliance, 200 West Street, New York, NY 10282.

© 2020 Goldman Sachs.

**No part of this material may be (i) copied, photocopied or duplicated in any form by any means or (ii) redistributed without the prior written consent of The Goldman Sachs Group, Inc.**