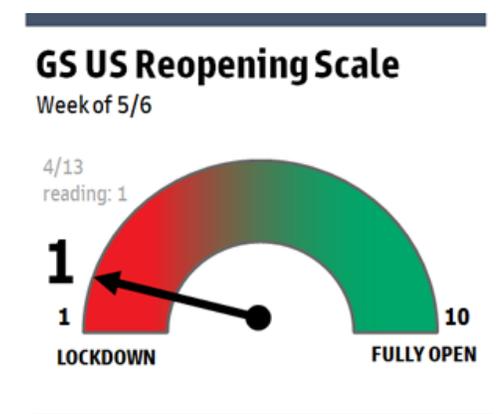


Note: The following is a redacted version of the original report published May 7, 2020 [18 pgs].

Measuring the Reopening of America

Introducing the GS US Reopening Scale: Starting at 1 (Week of May 6)

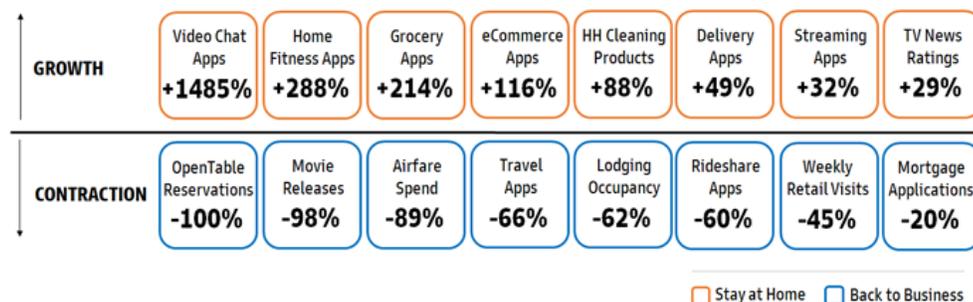


As cities and states across the U.S. begin to reopen at different paces and with different processes in place, we're introducing a new weekly series that will attempt to provide tools to measure the pace this reopening is happening by looking at a wide range of data from "Stay at Home" (food delivery, eCommerce, streaming media, grocery sales, etc.) to "Back to Normal" (commuting, box office, travel, etc.) and business activity (freight, housing,

equipment sales, etc). While there is economic data being used for this purpose (see *Measuring the Impact of Lockdowns and Social Distancing on Global GDP*), we look to a broader set of high frequency sources (app downloads, point of sale, restaurant reservations, etc). We expect to expand and refine these data sets over the course of the coming weeks as more data becomes available and the profile of the reopening evolves.

Exhibit 1: Reopening at a glance: Back-to-business segments still deep in contraction, stay at home growing strong

% change yoy for week ending April 26



This exhibit summarizes data from sources listed in Exhibit 5, 6 and 7.

Source: Goldman Sachs Global Investment Research

Heath P. Terry, CFA
+1(212)357-1849 | heath.terry@gs.com
Goldman Sachs & Co. LLC

Noah Poponak, CFA
+1(212)357-0954 | noah.poponak@gs.com
Goldman Sachs & Co. LLC

Jason English
+1(212)902-3293 | jason.english@gs.com
Goldman Sachs & Co. LLC

Stephen Grambling, CFA
+1(212)902-7832 | stephen.grambling@gs.com
Goldman Sachs & Co. LLC

Catherine O'Brien
+1(212)357-8285 | catherine.m.obrien@gs.com
Goldman Sachs & Co. LLC

Jordan Alliger
+1(212)357-4913 | jordan.alliger@gs.com
Goldman Sachs & Co. LLC

Kate McShane, CFA
+1(212)902-6740 | kate.mcshane@gs.com
Goldman Sachs & Co. LLC

Katherine Fogertey
+1(212)902-6473 | katherine.fogertey@gs.com
Goldman Sachs & Co. LLC

Brett Feldman
+1(212)902-8156 | brett.feldman@gs.com
Goldman Sachs & Co. LLC

Drew Borst
+1(212)902-7906 | drew.borst@gs.com
Goldman Sachs & Co. LLC

Kate Wang
+1(212)902-7929 | kate.wang@gs.com
Goldman Sachs & Co. LLC

Adam Hotchkiss
+1(212)902-3941 | adam.hotchkiss@gs.com
Goldman Sachs & Co. LLC

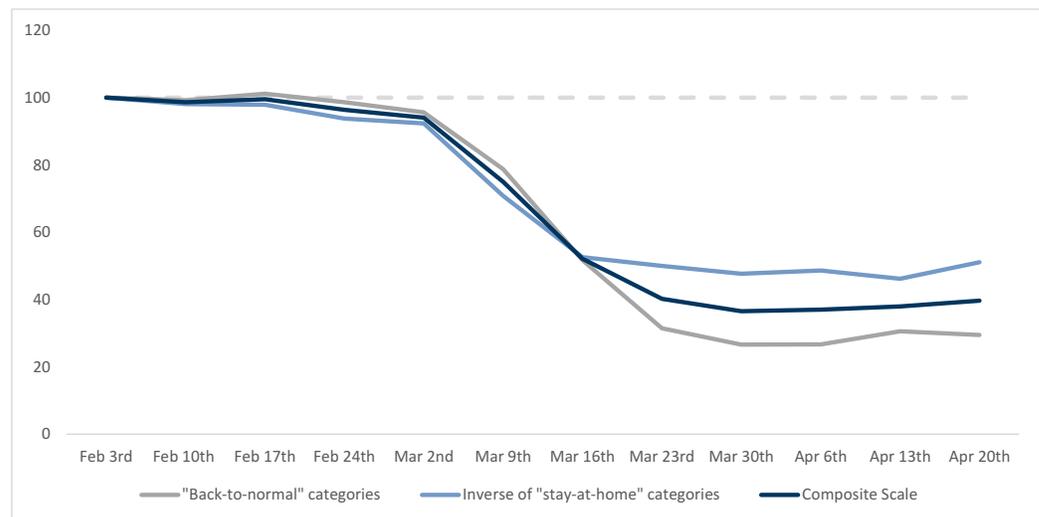
Vivek Srivastava
+1(212)902-7042 | vivek.srivastava@gs.com
Goldman Sachs & Co. LLC

Daniel Powell
+1(917)343-4120 | daniel.powell@gs.com
Goldman Sachs & Co. LLC

Goldman Sachs does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision. For Reg AC certification and other important disclosures, see the Disclosure Appendix, or go to www.gs.com/research/hedge.html. Analysts employed by non-US affiliates are not registered/qualified as research analysts with FINRA in the U.S.

Aggregating this data, we create the Reopening Scale, an attempt to quantify where the balance of the scale sits between “Stay at Home,” the state we currently find ourselves in, and “Back to Normal,” relative to a benchmark that we chose as Feb 3rd. To determine the position of the scale (1-10) we calculate growth or decline in each category relative to pre-Crisis levels, and equal-weight each category into our Composite Scale (Exhibit 9). From there, we assign a Reopening score reflecting these quantitative inputs (Exhibit 8). No surprise, the scale currently reads “1”; as all of the “Stay at Home” categories (Exhibit 5) have increased dramatically over recent weeks and “Back to Normal” categories (Exhibit 6) have declined materially, with many down 90%+. Similarly, many of the business activity categories (Exhibit 7), which we see as somewhat independent of the other two categories given businesses’ ability to adapt, are currently mostly lower. As progress toward reopening begins, we expect that will show up in the Reopening Scale moving higher and plan to monitor that progress here.

Exhibit 2: Our Composite Scale shows that consumers are still near the trough of impacts from COVID-19



This exhibit summarizes data from sources listed in Exhibit 5, 6 and 7.

Source: Goldman Sachs Global Investment Research

Key Findings

Our initial read across these data sources describe a landscape we’re all very familiar with: lots of eCommerce deliveries, streaming media, and video chats taking the place of commuting, travel, and trips to the store. While that picture is still very one sided in the data (Exhibit 4), with cities and states beginning to look for ways to reopen, we expect to see the scale shifting higher over time, showing less “Stay at Home” activity and more signs of “Back to Normal”.

Highlights

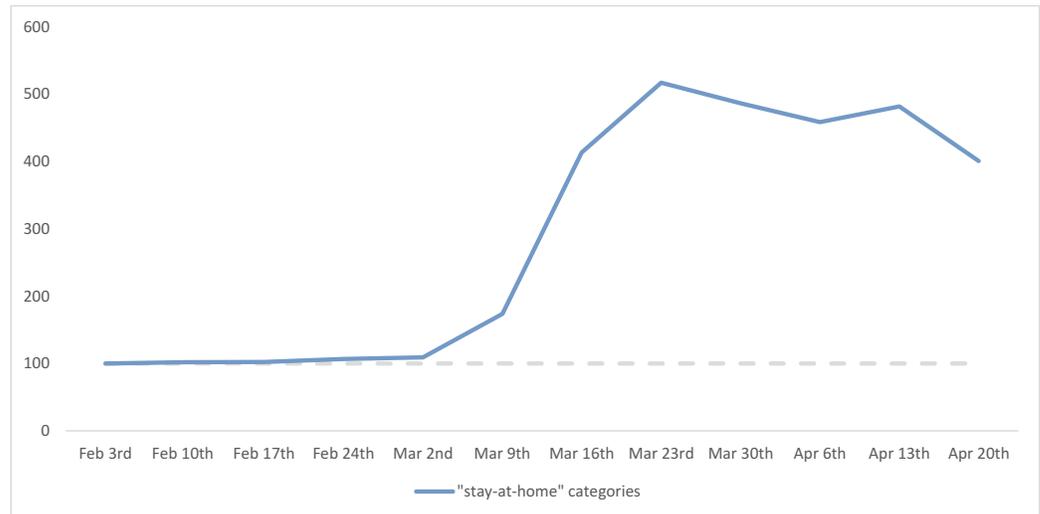
- **eCommerce adoption is accelerating through the end of April after averaging**

>65% y/y growth in app downloads for each week in the month. We chose companies including Amazon, Walmart, Target, Ebay, Wayfair and Etsy to represent this category, although there are many others also benefiting from higher demand. We think this adoption is significant and sustainable. For example, **Wayfair saw 90% growth in April accelerating through the period** as people focus on home decoration and improvement while relying on the convenience of having bulky furniture shipped to the door.

- **The grocery category is up broadly but split between products that are benefiting in this environment (flour, cleaning products, alcohol) versus those that are not (beauty aids, shaving, deodorant).** The **\$ spend per store on flour peaked at +250% y/y at the end of March** when people stocked up in anticipation of a lockdown, while **deodorant spending was down 20% last week.** We expect these categories to trend back towards normal levels as businesses reopen and people begin spend more time outside of the household.
- **Within Industrials,** we are evaluating **(1) the Industrial consumer:** where we monitor air travel, auto sales and ethanol blending which is a measure of gas consumption; **(2) Industrial housing:** where we follow mortgage applications, new & existing home sales and prices, state permitting activity and cement shipments, all of which should indicate house shopping and construction activity; **(3) Industrial equipment:** including Boeing aircraft orders, CAT retail sales and industrial distributor sales; and **(4) Industrial trade:** including what is carried by rail and truck and what is coming through major ports. Across all four categories, including across nearly each singular metric, the data has deteriorated sequentially each month through the year thus far, with no major positive second derivatives yet. We believe the consumer and housing related data could improve first, as stay-at-home orders are lifted; while equipment and trade could recover after consumer and housing, given the longer cycle nature of the economic activity.
- **Travel** is clearly one of the most heavily impacted sectors, and we focus on the most representative companies in airlines, lodging and OTAs. Air travel domestically, as represented by **TSA checkpoint passengers, was down 95% y/y last week** and **international passenger arrival from the top 5 US airports was down 99%** this past week. Notably, extended stay companies, which we did not include in our lodging data, actually saw growth during this period as an option for people sheltering in place.
- **There are some small, early signs that life is resuming some form of normalcy.** While all commuting metrics in our data set have fallen since February, including **gas demand declining ~50% in the latter half of March and first week of April, and Starbucks app downloads trending similarly,** gas demand has improved this past week to -36% from a trough of -48% y/y. Google Community Mobility Reports are also showing workplace and transit movements down roughly 50% at the trough, although there are small upticks in the most recent weeks, indicating an increase in general mobility as some states begin to reopen.
- **Restaurant traffic, as measured by the number of seated diners on OpenTable, is slowly picking back up in recent days from -100% since the end of March.**

Overall dollar sales at restaurants, meanwhile, have improved from a -60%+ run rate in late March to -40% in early May as take-out and delivery orders increase in the wake of stimulus check disbursement. Similarly, we have seen spend tick-up across retail concepts that remain open (e.g., discount stores, wholesales clubs, etc.). We expect these small signs of recovery to continue as the country gradually reopens and consumers resume their daily activities.

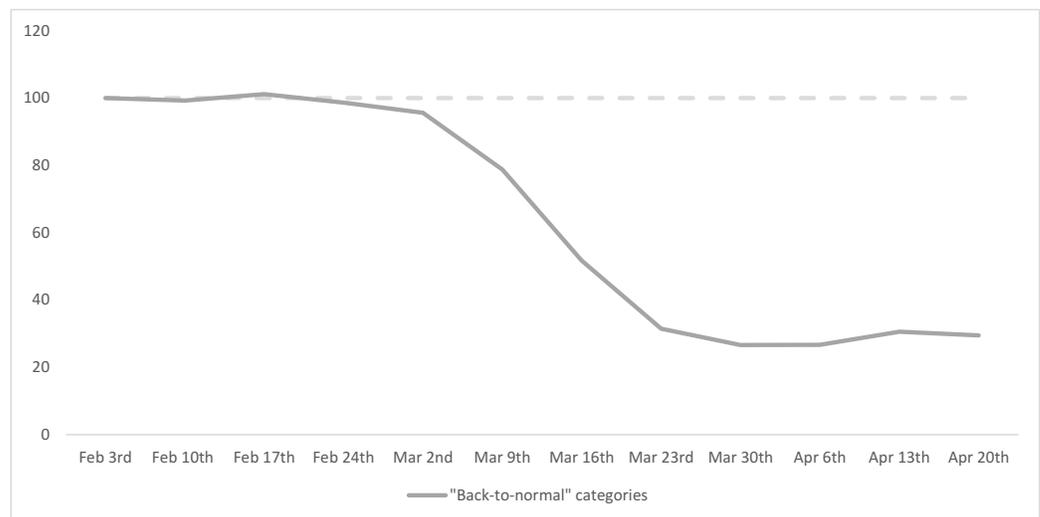
Exhibit 3: Stay Home categories still near peak level



This exhibit summarizes data from sources listed in Exhibit 5, 6 and 7.

Source: Goldman Sachs Global Investment Research

Exhibit 4: Back to Normal categories on average down 70% from February levels



This exhibit summarizes data from sources listed in Exhibit 5, 6 and 7.

Source: Goldman Sachs Global Investment Research

Weekly Trends

Stay Home

While it is no surprise that companies like Netflix, Zoom and Amazon are in high demand during a time when many states are implementing shelter-in-home policies, we collect and track data across a number of sources and verticals to understand the extent to which different categories are being impacted. In our “Stay at Home” scale, demand surges are most prominent for Video chat apps with weekly downloads growth up ~1700% y/y on average in April. Grocery apps including Walmart Grocery, Kroger and Instacart have seen 314% y/y app download growth in the same period of time, while dollars per store spent on flour, household cleaning compounds and alcohol grew 50% y/y on average. At the same time, online gaming engagement continues to increase, with the number of hours of Twitch streams doubling in April y/y to reach ~1.8bn.

Many of these categories saw the highest growth rates in the second half of March/first half of April when lockdowns in the US began, including news TV such as CNBC which saw ratings grow 60-70% y/y in the latter half of March as people tuned in to hear daily updates on COVID-19. We expect elevated demand into the summer months for this basket of “Stay at Home” metrics, although many of them are already seeing more moderated growth in the most recent 2 weeks.

Exhibit 5: “Stay at Home” metrics surging reflect demand for these categories during lockdowns and sheltering in place

Basket	Sector	Company/App	Metric	y/y % change, unless otherwise noted																Source
				Feb 3 - Feb 9	Feb 10 - Feb 16	Feb 17 - Feb 23	Feb 24 - Mar 1	Mar 2 - Mar 8	Mar 9 - Mar 15	Mar 16 - Mar 22	Mar 23 - Mar 29	Mar 30 - Apr 5	Apr 6 - Apr 12	Apr 13 - Apr 19	Apr 20 - Apr 26					
Stay Home	eCommerce	Amazon	US App Downloads	-3%	-18%	-14%	-2%	-1%	2%	4%	19%	25%	35%	91%	59%	Sensor Tower				
		Walmart Shopping	-24%	4%	-5%	11%	13%	29%	37%	33%	61%	60%	91%	89%						
		Target	11%	-4%	4%	6%	34%	115%	88%	114%	187%	212%	150%	182%						
		Etsy	9%	19%	5%	21%	21%	-8%	6%	-3%	32%	46%	86%	69%						
		Wayfair	-10%	6%	-6%	7%	12%	18%	10%	29%	35%	30%	130%	130%						
		Etsy	19%	20%	22%	15%	14%	2%	3%	13%	58%	93%	193%	164%						
	Groceries	Walmart Groceries	-14%	-7%	-19%	-22%	-9%	126%	242%	249%	402%	337%	161%	42%	Catalina					
		Instacart	8%	24%	0%	1%	22%	130%	378%	372%	798%	828%	444%	347%						
		Costco	124%	128%	157%	130%	166%	428%	489%	466%	524%	485%	576%	356%						
		Kroger	12%	24%	16%	12%	-13%	20%	83%	114%	166%	174%	86%	70%						
		Flour	-2%	0%	-1%	8%	17%	150%	247%	143%	142%	125%	42%	143%						
		Household cleaning compounds	4%	6%	6%	34%	168%	284%	158%	92%	81%	70%	62%	88%						
	Online Media	Alcohol	2%	3%	6%	8%	5%	11%	37%	74%	30%	42%	45%	17%	Sensor Tower					
		Staples	0%	0%	0%	1%	10%	67%	79%	19%	22%	28%	1%	29%						
		Food	-1%	1%	0%	2%	9%	88%	114%	38%	40%	47%	9%	51%						
		Netflix	-20%	-16%	-12%	-3%	-3%	6%	30%	40%	36%	41%	37%	37%						
		Disney+	-46%	-41%	-34%	-23%	-25%	6%	103%	74%	65%	32%	-35%	-42%						
		Hulu	11%	7%	5%	9%	-2%	-14%	14%	12%	-10%	-1%	13%	15%						
	News TV	Amazon Prime Video	12%	10%	6%	8%	6%	11%	60%	67%	49%	35%	43%	45%	Nielsen					
		CNN	12%	7%	18%	31%	-5%	36%	42%	58%	57%	43%	107%	38%						
		Fox News Channel	75%	11%	16%	8%	11%	18%	14%	6%	-10%	7%	37%	10%						
	Online Gaming	MtNbc	22%	12%	19%	16%	9%	21%	42%	47%	49%	50%	75%	38%	Sully Gnome					
		Twitch Streams			11%				29%				100%							
		Steam	8%	9%	11%	14%	12%	17%	38%	48%	55%	52%	55%	53%						
	Food Delivery	Users	24%	23%	16%	21%	18%	17%	57%	62%	50%	39%	30%	35%	Sensor Tower					
		iOS app downloads							21%	63%	51%	95%	102%	111%		70%				
		Consumer Spend	-38%	-39%	-40%	-31%	-27%	-35%	10%	16%	33%	40%	86%	77%						
		Grubhub	-22%	-10%	-18%	-22%	-35%	-38%	2%	14%	11%	12%	17%	13%						
		UberEats	-30%	-24%	-31%	-22%	-22%	-27%	25%	100%	49%	62%	105%	71%						
		DoorDash	-20%	-13%	-16%	-20%	-2%	-13%	24%	100%	33%	11%	50%	35%						
At-home Fitness	Dominos	65%	57%	118%	111%	51%	70%	804%	818%	541%	431%	470%	500%	Sensor Tower						
	Peloton	-18%	-14%	2%	8%	16%	-6%	67%	112%	133%	156%	140%	156%							
	Map My Run	0%	-4%	-33%	-24%	-20%	-22%	252%	439%	582%	378%	304%	335%							
Video Chat Apps	Nike Training Club	-30%	-30%	-33%	-20%	-24%	57%	1768%	1176%	1514%	723%	369%	321%							
	Yoga Down Dog	-18%	-13%	-15%	-12%	-14%	-8%	107%	190%	182%	184%	191%	131%							
	Workout for Women	33%	24%	15%	38%	66%	707%	2956%	3936%	3238%	3061%	3422%	2978%							
Video Chat Apps	Zoom	-22%	-18%	-19%	-22%	-19%	31%	330%	357%	279%	230%	162%	155%							
	Skype	-47%	-47%	-43%	-44%	-41%	-2%	713%	1928%	1787%	2002%	2272%	1322%							

Source: Sources in exhibit, Goldman Sachs Global Investment Research

Stay home category updates

- Verizon management noted that their Consumer segment saw some change in activity over the last two weeks as government stimulus checks came in, including a greater inflow of payments and some early signs of increased retail volumes (gross adds and upgrades).
- Target management suggested that there was a significant pick up in the home category in the beginning of April as people adjusted to more home cooked meals.
- PayPal saw a 135% y/y increase in net new active accounts as holdouts in the

digitization of money were forced to find alternatives to cash.

Back to Normal

The “Back to Normal” category includes some of the most heavily impacted consumer segments, including commuting, dining and all aspects of travel. The Google Global mobility report suggests that both transit and workplace movement trends are down roughly 50% from the baseline (roughly similar to the 40%+ decline in gasoline demand), while most box office and dining metrics are down 100%, since movie theaters and restaurants were some of the first places to be shut down. Beauty product sales are also suffering sharp declines and sales of deodorants at grocery stores have now fallen double-digits for four consecutive weeks as people shelter at home. On the travel side, TSA checkpoint passenger count has been down >90% y/y since the second half of March, with the number of passengers in the US falling to 750K in the week of April 20, 2020, compared to >16 million in the same week in 2019. US occupancy rates continue to be down 62% y/y in the week of April 20th, though rates are off lows of -70% in the first week of April.

Exhibit 6: “Back to Normal” metrics are down significantly, although starting to see small signs of recovery

Basket	Sector	Company/App	Metric	y/y % change, unless otherwise noted												Source	
				Feb 3 - Feb 9	Feb 10 - Feb 16	Feb 17 - Feb 23	Feb 24 - Mar 1	Mar 2 - Mar 8	Mar 9 - Mar 15	Mar 16 - Mar 22	Mar 23 - Mar 29	Mar 30 - Apr 5	Apr 6 - Apr 12	Apr 13 - Apr 19	Apr 20 - Apr 26		
Back to normal	Gym Attendance	Planet Fitness	US App Downloads	69%	78%	69%	55%	49%	34%	156%	-33%	-57%	-22%	92%	19%	Sensor Tower	
		Crunch Fitness		55%	72%	51%	58%	59%	24%	22%	80%	-86%	-88%	-90%	-92%		
		Anytime Fitness		20%	10%	-9%	-10%	-25%	-13%	67%	-16%	-50%	-77%	-84%	-85%		
		Classpass		63%	52%	45%	36%	46%	1%	-68%	-55%	-64%	-63%	-78%	-82%		
		Uber		-19%	-17%	-11%	-14%	-20%	-32%	-56%	-70%	-71%	-72%	-64%	-63%		
	Commuting	Lift	Gas Demand	-11%	-2%	4%	2%	-9%	-27%	-80%	-70%	-76%	-72%	-66%	-62%	EIA	
		Waze		-40%	-18%	-12%	-10%	-15%	-28%	-57%	-63%	-70%	-69%	-66%	-56%		
		Google Community Mobility Reports		Transit % change from baseline	1%	1%	1%	1%	3%	3%	-3%	-27%	-48%	-46%	-44%		-36%
		Google Community Mobility Reports		Workplaces % change from baseline			1%	4%	3%	-6%	-33%	-48%	-50%	-52%	-50%		-48%
		Google Community Mobility Reports		Startups			-2%	3%	3%	-3%	-29%	-42%	-46%	-49%	-45%		-44%
	Box Office	US App Downloads	Movies Released	-6%	37%	20%	25%	51%	-7%	-31%	50%	54%	55%	40%	41%	Sensor Tower	
		ESPN		27%	-19%	26%	-21%	-10%	-54%	-68%	-100%	-100%	-100%	-100%	-100%		
		NBCSN		-22%	-24%	-8%	6%	-9%	-15%	-42%	-98%	-98%	-98%	-98%	-98%		
	Sports TV	Box Office Mojo	Ratings	16%	21%	-4%	-9%	11%	28%	-38%	14%	15%	18%	8%	11%	Nielsen	
		FS1		-18%	57%	142%	58%	-27%	-14%	-29%	2%	-28%	2%	11%	-8%		
	Dining	OpenTable	Seated diners	45%	31%	29%	16%	14%	36%	27%	10%	22%	46%	60%	76%	ShopperTrak RCT Corporation	
		Weekly Visits		2%	1%	-6%	-29%	-90%	-100%	-100%	-100%	-100%	-100%	-100%			
		Beauty Ads \$/store		-8%	-6%	-7%	-8%	-7%	-16%	-33%	-49%	-49%	-49%	-49%	-49%		
	Retail	Shaving \$/store	Consumer spend	0%	-8%	-6%	-7%	-8%	-8%	-8%	-12%	-28%	-40%	-29%	21%	24%	Facteus
		TSA checkpoints		-4%	-6%	-8%	-2%	-4%	1%	10%	11%	-10%	-2%	-4%	-7%		
		Deodorants \$/store		7%	2%	5%	2%	3%	9%	39%	39%	-10%	-13%	-13%	-19%		
		Department stores							-27%	-66%	-67%	-64%	-61%	-42%	-47%		
		Google Community Mobility Reports		% change from baseline			4%	8%	8%	2%	-28%	-42%	-42%	-46%	-42%	-40%	
	Retail and Recreation	Amusement Parks	Consumer spend						-33%	-82%	-85%	-81%	-83%	-71%	-87%	Facteus	
		Tourist Attractions							-27%	-70%	-83%	-73%	-73%	-86%	-76%		
Airlines	United Airlines	Consumer spend						-12%	-43%	-79%	-88%	-92%	-94%	-94%	Facteus		
	Alaska Airlines							-57%	-81%	-89%	-92%	-84%	-90%	-85%			
	Top 5 US Airports (Int Passenger Arrive)		-1%	-2%	-3%	-6%	-14%	-23%	-41%	-76%	-95%	-98%	-99%	-99%			
Lodging	US Occupancy	US ADR													GS Economics Team		
	Hilton		-1%	0%	-2%	-2%	-7%	-24%	-56%	-67%	-69%	-70%	-64%	-62%			
	Marriott		1%	1%	1%	2%	-5%	-11%	-30%	-39%	-42%	-46%	-42%	-43%			
Online Travel	Booking.com	Google Search Traffic													STR		
	Expedia		-7%	1%	0%	-7%	-3%	-14%	-38%	-55%	-60%	-60%	-56%	-56%			
	TripAdvisor		-12%	-6%	-6%	-9%	-22%	-31%	-51%	-69%	-74%	-76%	-76%	-74%			
	Booking.com	US App Downloads	64%	55%	42%	46%	36%	46%	-4%	-67%	-72%	-70%	-65%	-65%	Sensor Tower		
	TripAdvisor		13%	9%	-8%	-9%	-14%	-30%	-66%	-75%	-79%	-79%	-73%	-73%			
			35%	51%	46%	24%	14%	6%	-63%	-75%	-73%	-71%	-64%	-60%			

Source: Sources in exhibit, Goldman Sachs Global Investment Research

Back to normal category updates

- Some of the most anticipated movies are expected to release later in the year, with the exception of Mulan: Wonder Woman (8/12 release), Black Widow (11/6), Top Gun Maverick (12/23), Mulan (7/24), No Time to Die (Bond) (11/25).
- While Opentable data indicates reservations are down 100% y/y for the country, early restaurant reopenings in select cities like Atlanta, Tampa and Dallas show diner declines of 80-97% y/y versus 100% in the rest of the country. Restaurants are reopening with modified hours and with significantly lower density than before, seating 25%-50% of the tables with many keeping bars closed to allow for social distancing.
- United Airlines noted that searches for spring break 2021 exceeded searches for spring break 2020 at this time last year, indicating pent-up demand, although they do

not expect many of those to turn into real bookings until the virus is sufficiently contained.

Business Activities

Business activities have also been heavily impacted by COVID-19, including real estate and industrial trade. Mortgage applications were down over 30% y/y for the first three weeks of April as real estate transactions and home constructions also slow. Homebuilders reported an approximate 50% decline in order rates for April, with local economies that are more reliant on travel and tourism (i.e. Las Vegas) down 60+ % while areas of the Southeast and Texas are off ~25%. Encouragingly, activity at the end of April had more than doubled off the lows seen earlier in the month as consumers look to take advantage of historically low mortgage rates. As peoples' mobility continues to be restricted across a number of states, auto sales and ethanol blending are both down y/y, though we expect these activities to resume fairly quickly as restrictions begin to be lifted and consumer demand recovers. On the equipment side, there has been no recovery yet in Boeing aircraft orders or CAT retail sales, though we expect both could start to move off the bottom over the next few months.

Exhibit 7: Business Activity metrics are also falling to reflect the economic impact of the crisis

Basket	Sector	Company/App	Metric	y/y % change unless otherwise noted											Source	
				Feb 3 - Feb 9	Feb 10 - Feb 16	Feb 17 - Feb 23	Feb 24 - Mar 1	Mar 2 - Mar 8	Mar 9 - Mar 15	Mar 16 - Mar 22	Mar 23 - Mar 29	Mar 30 - Apr 5	Apr 6 - Apr 12	Apr 13 - Apr 19		Apr 20 - Apr 26
Business Activity	Industrial consumer		TSA passenger throughput					-12%	-29%	-69%	-90%	-94%	-96%	-96%	-95%	TSA
			N.A. Airline forward schedules (1 month out)			-1%									-65%	OAG
			Actual air traffic growth			-14%										IATA
			Passenger aircraft in service		-2%	-4%	-4%	-5%	-7%	-10%	-33%	-53%	-59%	-61%	-61%	-59%
	Autos	3M	Monthly sales													Company data
			Auto SAAR			1%									down mid-teens	Wards
			Domestic ethanol blending	1%	1%	1%	3%	3%	-3%	-27%	-48%	-46%	-44%	-37%	-35%	EIA
	Industrial housing		Google Search Traffic	-3%	7.7%	1%	1%	-3%	-9%	-28%	-26%	-29%	-27%	-28%	-21%	Google
			Mortgage Applications	17%	11%	11%	11%	12%	11%	-11%	-23%	-33%	-35%	-31%	-20%	Mortgage Bankers Associates
			State Permits			23%					13%					Census Bureau
			New Home For-Sale Inventory (Months of Supply, SAAR)			-15%					10%					Census Bureau
			Existing Home For-Sale Inventory (Months of Supply, SAAR)			-14%					-13%					National Association of Realtors (NAR)
			New Home Prices (Median)			3%					3%					Census Bureau
			Existing Home Prices (Median)			8%					8%					NAR
			New Home Sales (Units, SAAR)			11%					-10%					Census Bureau
			Existing Home Sales (Units, SAAR)			7%					1%					NAR
			Texas cement shipments			8%					3%					
	Online Real Estate	Redfin	Homes Sold	13%	4%	7%	0%	14%	-2%	8%	-27%	-12%				Redfin
		Thumbtack	Customer Projects on Home Construction					3%	0%	-27%	-36%	-28%	-22%			Thumbtack
		Thumbtack	Customer Projects on Moving					-5%	-13%	-22%	-34%	-40%	-43%			Thumbtack
	Industrial equipment	Caterpillar	Retail sales			-11%					-17%					Company data
		Boeing	New aircraft orders			(28)					(137)					Company data
			US industrial distributor sales (avg.)			2%					1%					Company data
	Industrial trade	Michelin	North America replacement tire volumes			-6%					1%					Company data
			Weekly rail economically sensitive carloads (US rails)	-6%	-6%	-3%	-9%	-8%	-6%	-9%	-15%	-16%	-21%	-21%	-20%	AAR
			Weekly rail intermodal carloads (US rails)	-9%	-8%	-6%	-12%	-14%	-9%	-11%	-14%	-16%	-20%	-19%	-16%	AAR
			Truck spot pricing	-8%	-7%	-6%	-6%	0%	9%	10%	4%	-9%	-14%	-14%		Truckstop
			DAT load to van ratio			1.85					2.89			0.99		DAT
			Cass freight index			-8%					-9%					CASS
			Big 3 west coast ports inbound loaded containers			-19%					-16%					Port data
Multi-Industry	FAST	Daily sales			5%					0%			7%		Company data	
	MISL				-5%					-6%					Company data	
	QWW				7%					9%					Company data	

Source: Sources in exhibit, Goldman Sachs Global Investment Research

Business activity category updates

- Some recent rail carload data, while still sharply negative, is perhaps stabilizing. We look at data including Economically Sensitive Rail Carloads to assess the industrial economy, rail intermodal and West Coast Port data to get a sense for both global trade and the consumer economy and the Cass Shipment Index, DAT Load to Van Ratio, and Truckstop Spot Prices to ascertain general freight demand.

- Facebook noted on their Q1 earnings call that after an initial steep decrease in ad revenue in March, they have seen signs of stability reflected in the first three weeks of April.
- Building product companies saw sales off 30-35% YOY in April, as the strength seen in housing earlier this year comes through. With people staying home, Whirlpool reported April sales off 20-25%, with demand for secondary fridges and freezers (for home food storage) as well as small countertop appliances (i.e. stand mixers) rising, as people are increasingly cooking and baking at home.

The GS Reopening Scale

To look at all these metrics in aggregate and quantify where consumers are on the path to economic recovery, we created a composite scale that is based on the inverse average of growth in all the sectors within “Stay at Home” categories and the normal average of “Back to Normal” categories relative to the week of February 3rd, reflecting where the consumer is between the two categories. We index a value of 100 to consumer activity in the week of February 3rd, before the impact of COVID-19 in the US, and the minimum value that the composite scale has reached is 37. We then translate the composite scale onto a GS reopening scale of 1-10 ([Exhibit 8](#)), where values below 50 represent a 1 and a return to Feb 3rd levels would represent a 10.

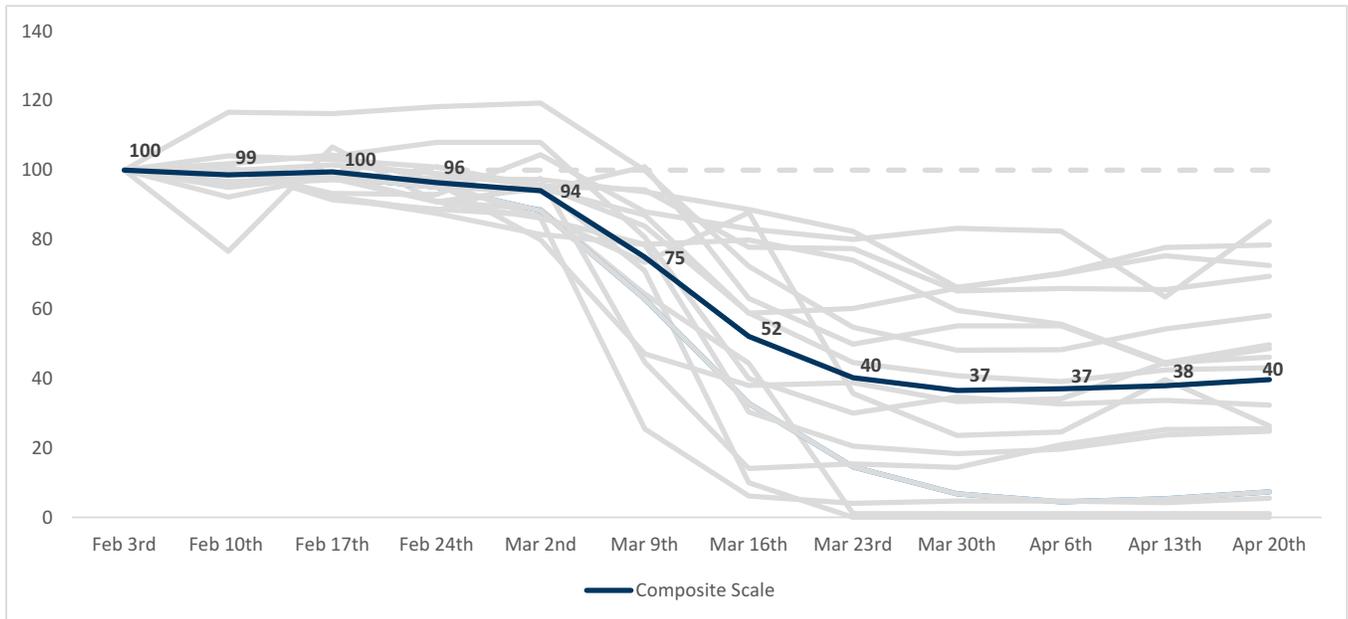
The GS reopening scale, based on the trajectory of the Composite Scale ([Exhibit 9](#)), first reached 1 in the week of March 23rd, where it has remained for the 5 weeks since, indicating that consumers are still at the trough of impacts from COVID-19. We expect that as states begin to reopen for business, these metrics will slowly begin to recover, bringing to scale back up. However, we would expect the recovery to a 10 to take at least a number of months during which period the “Stay at Home” category will show significantly slower growth, while the “Back to Normal” category will likely moderate declines as people resume daily activities of dining, commuting and travel, among others.

Exhibit 8: Composite scale to Reopening Scale

Composite Scale	Reopening Scale
100+	10
91-99	9
86-90	8
81-85	7
76-80	6
71-75	5
66-70	4
61-65	3
51-60	2
<50	1

Source: Goldman Sachs Global Investment Research

Exhibit 9: Composite Scale, Feb. 3 - April 20



This exhibit summarizes data from sources listed in Exhibit 5, 6 and 7.

Source: Goldman Sachs Global Investment Research

We plan to update and refine this data weekly as a tool to measure the pace of reopening, measure consumer behavior and highlight sectors that may be benefiting or disproportionately impacted from the shape of that process.

Disclosure Appendix

Reg AC

We, Heath P. Terry, CFA, Noah Poponak, CFA and Jason English, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

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

GS Factor Profile

The Goldman Sachs Factor Profile provides investment context for a stock by comparing key attributes to the market (i.e. our coverage universe) and its sector peers. The four key attributes depicted are: Growth, Financial Returns, Multiple (e.g. valuation) and Integrated (a composite of Growth, Financial Returns and Multiple). Growth, Financial Returns and Multiple are calculated by using normalized ranks for specific metrics for each stock. The normalized ranks for the metrics are then averaged and converted into percentiles for the relevant attribute. The precise calculation of each metric may vary depending on the fiscal year, industry and region, but the standard approach is as follows:

Growth is based on a stock's forward-looking sales growth, EBITDA growth and EPS growth (for financial stocks, only EPS and sales growth), with a higher percentile indicating a higher growth company. **Financial Returns** is based on a stock's forward-looking ROE, ROCE and CROCI (for financial stocks, only ROE), with a higher percentile indicating a company with higher financial returns. **Multiple** is based on a stock's forward-looking P/E, P/B, price/dividend (P/D), EV/EBITDA, EV/FCF and EV/Debt Adjusted Cash Flow (DACF) (for financial stocks, only P/E, P/B and P/D), with a higher percentile indicating a stock trading at a higher multiple. The **Integrated** percentile is calculated as the average of the Growth percentile, Financial Returns percentile and (100% - Multiple percentile).

Financial Returns and Multiple use the Goldman Sachs analyst forecasts at the fiscal year-end at least three quarters in the future. Growth uses inputs for the fiscal year at least seven quarters in the future compared with the year at least three quarters in the future (on a per-share basis for all metrics).

For a more detailed description of how we calculate the GS Factor Profile, please contact your GS representative.

M&A Rank

Across our global coverage, we examine stocks using an M&A framework, considering both qualitative factors and quantitative factors (which may vary across sectors and regions) to incorporate the potential that certain companies could be acquired. We then assign a M&A rank as a means of scoring companies under our rated coverage from 1 to 3, with 1 representing high (30%-50%) probability of the company becoming an acquisition target, 2 representing medium (15%-30%) probability and 3 representing low (0%-15%) probability. For companies ranked 1 or 2, in line with our standard departmental guidelines we incorporate an M&A component into our target price. M&A rank of 3 is considered immaterial and therefore does not factor into our price target, and may or may not be discussed in research.

Quantum

Quantum is Goldman Sachs' proprietary database providing access to detailed financial statement histories, forecasts and ratios. It can be used for in-depth analysis of a single company, or to make comparisons between companies in different sectors and markets.

Disclosures

Coverage group(s) of stocks by primary analyst(s)

Heath P. Terry, CFA: America-Internet. Noah Poponak, CFA: America-Commercial Aerospace, America-Defense. Jason English: America-Food: Packaged & Manufacturing, America-Household Products/Personal Care. Stephen Grambling, CFA: America- Non-Discretionary Broadlines Retail & Supermarkets, America-Gaming, America-Hotel REITs, America-Leisure, America-Lodging. Catherine O'Brien: America-Airlines, Americas-Aircraft Leasing. Jordan Alliger: America-Airfreight, America-Logistics, America-Railroads, America-Trucking. Kate McShane, CFA: America-Retail Specialty Hardlines, Supermarkets and Discount Stores. Katherine Fogertey: America-Restaurants. Brett Feldman: America-Data Centers, America-Telco, Cable & Satellite, America-Towers. Drew Borst: America-Media and Entertainment. Daniel Powell: America-Internet. Alexandra Walvis, CFA: America-Apparel Retail, America-Discretionary Brands.

America- Non-Discretionary Broadlines Retail & Supermarkets: Aramark Holdings.

America-Airfreight: FedEx Corp., United Parcel Service Inc..

America-Airlines: Alaska Air Group Inc., Allegiant Travel Company, American Airlines Group, Delta Air Lines Inc., Hawaiian Holdings Inc., JetBlue Airways Corp., SkyWest Inc., Southwest Airlines Co., Spirit Airlines Inc., United Airlines Holdings.

America-Apparel Retail: Burlington Stores Inc., Kohl's Corp., Macy's Inc., Nordstrom Inc., Ross Stores Inc., TJX Cos..

America-Commercial Aerospace: Boeing Co., Bombardier Inc., Embraer, Hexcel Corp., Raytheon Technologies Corp, Spirit AeroSystems Holdings, Textron Inc., TransDigm Group, Triumph Group.

America-Data Centers: Equinix Inc., QTS Realty Trust Inc., Switch Inc..

America-Defense: FLIR Systems Inc., General Dynamics Corp., Huntington Ingalls Industries Inc., Kratos, L3Harris Technologies Inc., Lockheed Martin Corp., Mercury Systems Inc., Northrop Grumman Corp..

America-Discretionary Brands: Canada Goose Holdings, Canada Goose Holdings, Capri Holdings, Casper Sleep Inc., Gap Inc., Kontoor Brands Inc., L Brands Inc., Levi Strauss & Co., Lululemon Athletica Inc., Nike Inc., PVH Corp., Ralph Lauren Corp., Tapestry Inc., Tiffany & Co., Under Armour Inc., VF Corp., YETI Holdings.

America-Food: Packaged & Manufacturing: Bellring Brands Inc., Campbell Soup Co., Conagra Brands Inc., General Mills Inc., Hershey Co., J. M. Smucker Co., Kellogg Co., Kraft Heinz Co., Mondelez International Inc., Nomad Foods Ltd., Post Holdings, The Simply Good Foods Co..

America-Gaming: Accel Entertainment, Las Vegas Sands Corp., MGM Resorts International, Red Rock Resorts Inc., VICI Properties Inc., Wynn Resorts Ltd..

America-Hotel REITs: DiamondRock Hospitality Co., Host Hotels & Resorts Inc., Park Hotels & Resorts Inc., Pebblebrook Hotel Trust, Sunstone Hotel Investors Inc..

America-Household Products/Personal Care: Church & Dwight Co., Clorox Co., Colgate-Palmolive Co., Edgewell Personal Care, Energizer Holdings, Estee Lauder Co., Freshpet Inc., Kimberly-Clark Corp., Procter & Gamble Co., Reynolds Consumer Products Inc., Valvoline Inc., VVV International Inc..

America-Internet: Amazon.com Inc., Booking Holdings Inc., CarGurus Inc., Cars.com Inc., Criteo SA, eBay Inc., Etsy Inc., Eventbrite Inc., Expedia Group, GrubHub Inc., LendingClub Corp., Lyft Inc., Netflix Inc., PayPal Holdings, Peloton Interactive Inc., Pinterest Inc., Redfin Corp., Snap Inc., Spotify Technology S.A., Stitch Fix Inc., TripAdvisor Inc., Trivago N.V., TrueCar, Twitter Inc., Uber Technologies Inc., Wayfair Inc., Zillow Group.

America-Leisure: Carnival Corp., Norwegian Cruise Line Holdings, Royal Caribbean Cruises Ltd..

America-Lodging: Extended Stay America Inc., Hilton Grand Vacations Inc., Hilton Worldwide Holdings, Hyatt Hotels Corp., Marriott International, Wyndham Destinations Inc., Wyndham Hotels & Resorts.

America-Logistics: C.H. Robinson Worldwide Inc., Expeditors Int'l of Washington, J.B. Hunt Transport Services Inc., Landstar System Inc., XPO Logistics.

America-Media and Entertainment: AMC Entertainment Holdings, AMC Networks Inc., Cinemark Holdings, Discovery Inc., Fox Corp., Fox Corp., iHeartMedia Inc., IMAX Corp., Interpublic Group of Co., Lamar Advertising Co., Liberty Formula One Group, Liberty Formula One Group, Lions Gate Entertainment Corp., Live Nation Entertainment Inc., Omnicom Group, Outfront Media Inc., ViacomCBS Inc., Walt Disney Co..

America-Railroads: Canadian National Railway Co., Canadian National Railway Co., Canadian Pacific Railway Ltd., Canadian Pacific Railway Ltd., CSX Corp., Kansas City Southern, Norfolk Southern Corp., Union Pacific Corp..

America-Restaurants: Bloomin' Brands Inc., Brinker International Inc., Cheesecake Factory Inc., Chipotle Mexican Grill Inc., Darden Restaurants Inc., Domino's Pizza Inc., Dunkin' Brands Group, Jack in the Box Inc., McDonald's Corp., Restaurant Brands Intl Inc., Restaurant Brands Intl Inc., Shake Shack Inc., Starbucks Corp., Texas Roadhouse Inc., The Wendy's Co., Wingstop Inc., Yum! Brands Inc..

America-Retail Specialty Hardlines, Supermarkets and Discount Stores: Advance Auto Parts Inc., AutoZone Inc., Bed Bath & Beyond Inc., Best Buy Co., BJ's Wholesale Club Holdings, Container Store Group, Costco Wholesale, Dick's Sporting Goods, Floor & Decor Holdings, Genuine Parts Co., Home Depot Inc., Lowe's Cos., Michaels Cos., National Vision Holdings, O'Reilly Automotive Inc., RH, Target Corp., Tractor Supply Co., Ulta Beauty Inc., Walmart Inc., Williams-Sonoma Inc..

America-Telco, Cable & Satellite: Altice USA Inc., AT&T Inc., CenturyLink Inc., Charter Communications Inc., Cogent Communications Holdings, Comcast Corp., DISH Network Corp., Frontier Communications Corp., Intelsat SA, Sirius XM Holdings, T-Mobile US Inc., Uniti Group, Verizon Communications, Windstream Holdings.

America-Towers: American Tower Corp., Crown Castle International Corp., SBA Communications Corp..

America-Trucking: Knight-Swift Transportation Holdings, Old Dominion Freight Line Inc., Schneider National Inc., Werner Enterprises Inc..

Americas-Aircraft Leasing: AerCap, Air Lease Corp, Fly Leasing Ltd.

Distribution of ratings/investment banking relationships

Goldman Sachs Investment Research global Equity coverage universe

	Rating Distribution			Investment Banking Relationships		
	Buy	Hold	Sell	Buy	Hold	Sell
Global	46%	39%	15%	65%	57%	52%

As of April 9, 2020, Goldman Sachs Global Investment Research had investment ratings on 3,023 equity securities. Goldman Sachs assigns stocks as Buys and Sells on various regional Investment Lists; stocks not so assigned are deemed Neutral. Such assignments equate to Buy, Hold and Sell for the purposes of the above disclosure required by the FINRA Rules. See 'Ratings, Coverage groups and related definitions' below. The Investment Banking Relationships chart reflects the percentage of subject companies within each rating category for whom Goldman Sachs has provided investment banking services within the previous twelve months.

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.

Distribution of ratings: See the distribution of ratings disclosure above. **Price chart:** See the price chart, with changes of ratings and price targets in prior periods, above, or, if electronic format or if with respect to multiple companies which are the subject of this report, on the Goldman Sachs website at <https://www.gs.com/research/hedge.html>.

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: 198602165WV). **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.

Ratings, coverage groups and related definitions

Buy (B), Neutral (N), Sell (S) -Analysts recommend stocks as Buys or Sells for inclusion on various regional Investment Lists. Being assigned a Buy or Sell on an Investment List is determined by a stock's total return potential relative to its coverage. Any stock not assigned as a Buy or a Sell on an Investment List with an active rating (i.e., a stock that is not Rating Suspended, Not Rated, Coverage Suspended or Not Covered), is deemed Neutral. Each region's Investment Review Committee manages Regional Conviction lists, which represent investment recommendations focused on the size of the total return potential and/or the likelihood of the realization of the return across their respective areas of coverage. The addition or removal of stocks from such Conviction lists do not represent a change in the analysts' investment rating for such stocks.

Total return potential represents the upside or downside differential between the current share price and the price target, including all paid or anticipated dividends, expected during the time horizon associated with the price target. Price targets are required for all covered stocks. The total return potential, price target and associated time horizon are stated in each report adding or reiterating an Investment List membership.

Coverage groups: A list of all stocks in each coverage group is available by primary analyst, stock and coverage group at <https://www.gs.com/research/hedge.html>.

Not Rated (NR). The investment rating and target price have been removed pursuant to Goldman Sachs policy when Goldman Sachs is acting in an advisory capacity in a merger or strategic transaction involving this company and in certain other circumstances. **Rating Suspended (RS).** Goldman Sachs Research has suspended the investment rating and price target for this stock, because there is not a sufficient fundamental basis for determining, or there are legal, regulatory or policy constraints around publishing, an investment rating or target. The previous investment rating and price target, if any, are no longer in effect for this stock and should not be relied upon. **Coverage Suspended (CS).** Goldman Sachs has suspended coverage of this company. **Not Covered (NC).** Goldman Sachs does not cover this company. **Not Available or Not Applicable (NA).** The information is not available for display or is not applicable. **Not Meaningful (NM).** The information is not meaningful and is therefore excluded.

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. Available Weekdays (except holidays), from 9am to 6pm. Ouvidoria Goldman Sachs Brasil: 0800 727 5764 e/ou 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: 198602165WV); 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.

The analysts named in this report may have from time to time discussed with our clients, including Goldman Sachs salespersons and traders, or may discuss in this report, trading strategies that reference catalysts or events that may have a near-term impact on the market price of the equity securities discussed in this report, which impact may be directionally counter to the analyst's published price target expectations for such stocks. Any such trading strategies are distinct from and do not affect the analyst's fundamental equity rating for such stocks, which rating reflects a stock's return potential relative to its coverage group as described herein.

We and our affiliates, officers, directors, and employees, excluding equity and credit analysts, 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.

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 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. 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.