

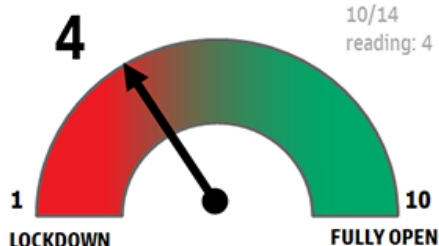
Note: The following is a redacted version of the original report published October 21, 2020 [19 pgs].

Measuring the Reopening of America

The GS US Reopening Scale: Range of recovery paths widen for different categories, remain a '4' (Week of Oct 21)

GS US Reopening Scale

Week of 10/21



New this week: We hear from our Real Estate and REITs team on the state of the return to work through the lens of office markets, sublease rates, asking rent trends and residential suburban migration, which have reflected a slower than expected return, leading to high vacancies and declines in new leasing activity.

In week 25 of the *Measuring the Reopening of America* series, several

back-to-normal categories that had improved over the past few weeks reversed trends, including lodging and dining, while stay-at-home vertical growth largely decelerated. Net, our composite score remains the same as last week as the pace of reopening continues to fluctuate across different categories but the overall trend fails to show progress for essentially the third month.

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

Richard Skidmore, CFA
+1(801)741-5459 | richard.skidmore@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

Bonnie Herzog
+1(212)902-0490 | bonnie.herzog@gs.com
Goldman Sachs & Co. LLC

Alexandra Walvis, CFA
+1(212)357-6283 | alexandra.walvis@gs.com
Goldman Sachs & Co. LLC

Susan Maklari
+1(212)357-3906 | susan.maklari@gs.com
Goldman Sachs & Co. LLC

Jordan Alliger
+1(212)357-4913 | jordan.alliger@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

Ankit Prasad
+1(212)934-6394 | ankit.prasad@gs.com
Goldman Sachs India SPL

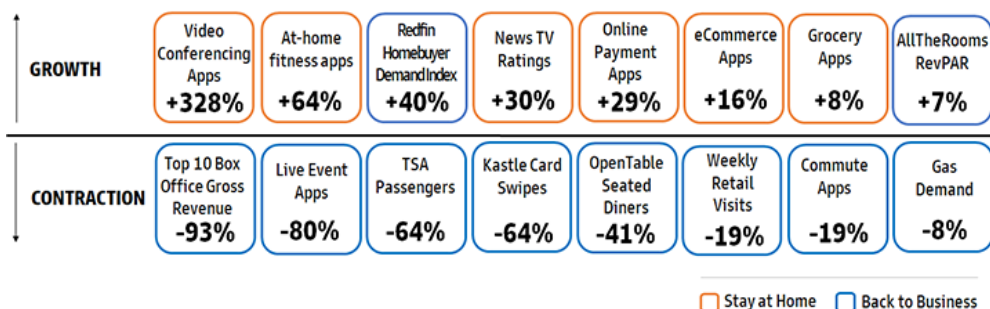
Katherine Fogertey
+1(212)902-6473 | katherine.fogertey@gs.com
Goldman Sachs & Co. LLC

Nathan Rich
+1(212)357-2710 | nathan.rich@gs.com
Goldman Sachs & Co. LLC

Joe Ritchie
+1(212)357-8914 | joseph.ritchie@gs.com
Goldman Sachs & Co. LLC

Exhibit 1: Reopening at a glance: Back-to-business segments see declines, stay-at-home see re-acceleration

% change y/y for week ending October 18



This exhibit summarizes data from sources listed in Exhibits 5, 14 and 15.

Source: Goldman Sachs Global Investment Research

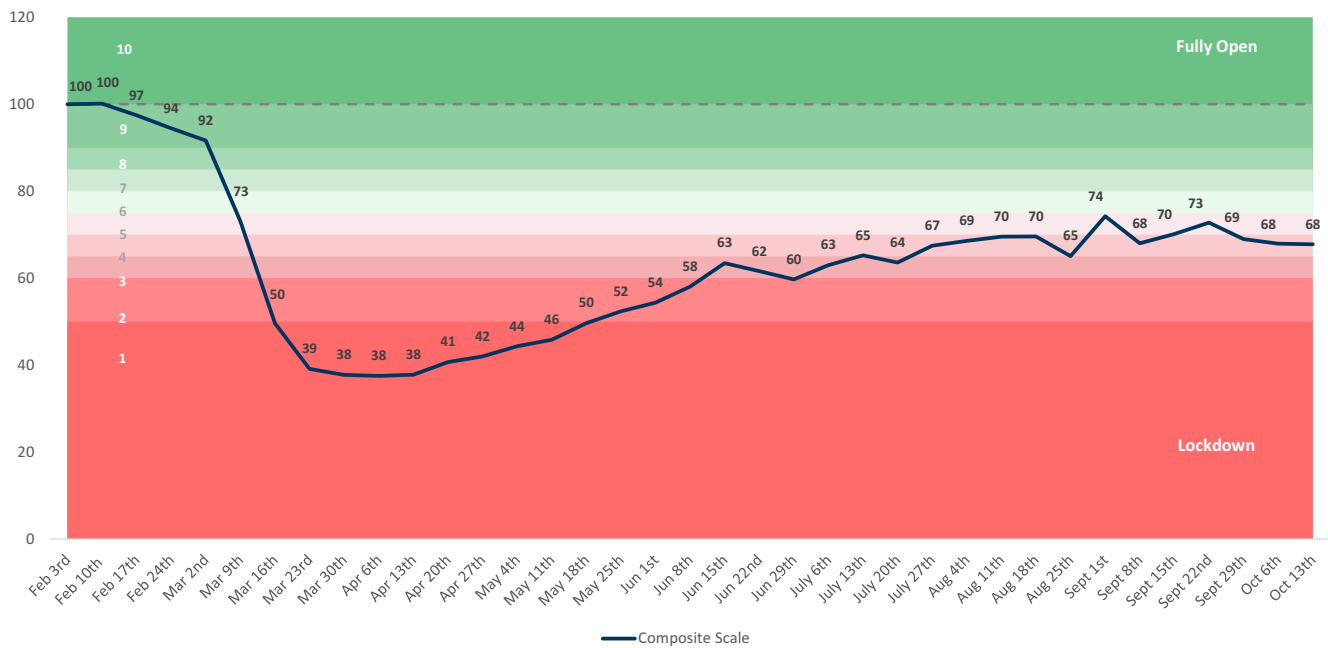
Goldman Sachs does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their 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.

The Composite Score that underlies the Reopening Scale ([Exhibit 2](#)) stayed flat at 68 (vs. 68 and 69 in the prior two weeks, respectively). Our GS US Reopening Scale remains a '4' this week reflecting this.

To determine the position of the scale (1-10) we calculate growth or decline in each category relative to a pre-Crisis baseline (week of Feb 3rd), and equal-weight each category into our Composite Scale. From there, we assign a Reopening score reflecting these quantitative inputs ([Exhibit 16](#)). As progress towards reopening continues, we expect that will show up in the Reopening Scale moving higher.

Exhibit 2: Our Composite Scale stayed at a 68 this week

Date on x-axis represents first day of week measured



This exhibit summarizes data from sources listed in Exhibits 5, 14 and 15. Modest historical revisions as we refine included data sets and account for minor data revisions.

Source: Goldman Sachs Global Investment Research

Key Findings

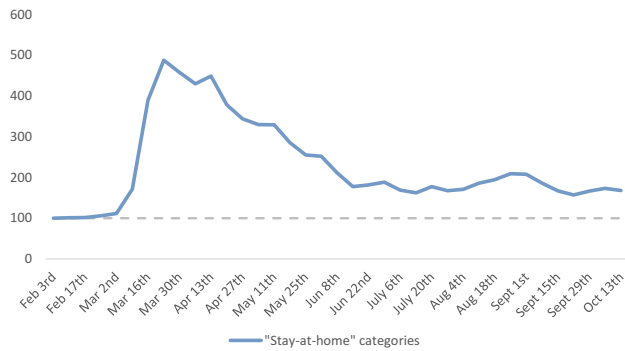
Our read of these data sources continues to describe a landscape we're all very familiar with: lots of eCommerce deliveries, streaming media, and video chats taking the place of theater visits, travel, and trips to the mall. As that picture changes ([Exhibit 4](#)), with a larger number of cities and states fluctuating between various stages of reopening and individuals charting their own path independent of much of that fluctuating guidance, the distinction between the red slipping onto the "Stay at Home" heatmap and the green showing up on the "Back to Normal" heatmap becomes increasingly blurry. Measures of Business Activity, which tend to be available on a more delayed basis, are beginning to show improvement in key categories like transportation, housing and machinery as businesses adapt to this reality.

This week, we hear from our Real Estate and REITs team on the state of office markets, sublease rates, asking rent trends and residential suburban migration, as return to office rates have been slower than expected leading to high vacancies and declines in new leasing activity.

Highlights

- **Increased road travel over summer leads to spike in gas station visits.** GasBuddy published its latest report on 3Q20 gas station foot traffic and consumer ratings, based on more than 9 million consumer visits and 1 million ratings on the Gas Buddy consumer app, during the three month period between July and September. Over the summer months, total gas station visits saw a spike, and were 17% higher on an average compared to GasBuddy's footfall index (indexed against weekly visits over 1/5/20-2/22/20), as warm weather, and stronger preference for cars over air travel resulted in increased road travel over the summer. As of September 19, total gas station visits were back in line with pre-Covid levels, as seen in 1Q20.
- **Total US mortgage purchase applications rose 24% y/y for the week ended October 9 as housing activity reaccelerated sequentially and remains strong through early October.** On 10/20, home builder NVR reported 3Q results with orders up 40% y/y, led by the Northeast +68% and Southeast +56%. We note this compares to low single digit norms, especially for the Northeast given its mature profile and broader geographic shift towards more affordable regions of the country. In our view, the more recent growth is reflective of the **ongoing secular shift resulting from the pandemic as buyers seek out suburban locations and look to take advantage of historically low rates**. As reflected in our channel checks—along with NVR's results—housing is among the leaders of the economic recovery and still has legs to it.
- **Trends in apparel and accessories continue to point to a recovery.** Tiffany & Co. released positive preliminary August and September results last week, with preliminary net sales down slightly QTD, as the US sequentially improved and mainland China remained strong. The company called out that **the positive trends have continued into October**. VF Corp also reported last week and pointed to sequentially stronger momentum across brands and geographies in the quarter, with growth accelerating in mainland China (up 19% ex-FX), continued momentum in digital (up 42% ex-FX), and strengthening performance in September at both retail and wholesale. The company expects to return to low single digit growth in 2H20 driven by positive growth in 4Q20.

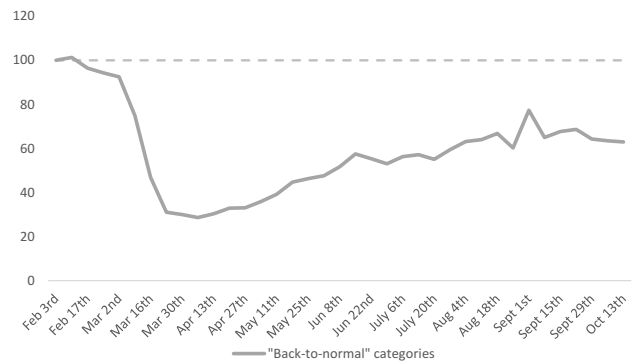
Exhibit 3: Stay at Home categories decelerate slightly
Date on x-axis represents first day of week measured



This exhibit summarizes data from sources listed in Exhibits 5, 14 and 15.

Source: Goldman Sachs Global Investment Research

Exhibit 4: Back-to-Normal categories on average down 37% from February levels, but up 34pts from trough
Date on x-axis represents first day of week measured



This exhibit summarizes data from sources listed in Exhibits 5, 14 and 15.

Source: Goldman Sachs Global Investment Research

Weekly Trends

Stay Home

While it is no surprise that services like Zoom, Amazon and Peloton remain in high demand during a time when many states and cities have uneven degrees of reopening policies, we track data across a number of sources and verticals to understand the extent to which different categories are being impacted.

This week, stay-at-home categories mostly decelerated with the notable exceptions of eCommerce and online payments. Among the stay-at-home grocery products, household cleaning agents remain in the lead with sales accelerating to +33% y/y. At-home fitness app and video conferencing app growth continues to decelerate, while food delivery and online streaming download volumes have essentially returned to 2019 levels on average. New TV ratings continue to be high as we near elections, with all the news TV channels we track showing significant positive y/y growth.

Exhibit 5: “Stay at Home” metrics have re-accelerated
 Feb 10 - July 26 excluded for presentation purposes; see prior reports for data

Basket	Sector	Company/App	Metric	y/y % change, unless otherwise noted												Source		
				Feb 3 - Feb 9	July 27 - Aug 2	Aug 3 - Aug 9	Aug 10 - Aug 16	Aug 17 - Aug 23	Aug 24 - Aug 30	Aug 31 - Sep 6	Sep 7 - Sep 13	Sep 14 - Sep 20	Sep 21 - Sep 27	Sep 28 - Oct 4	Oct 5 - Oct 11		Oct 12 - Oct 18	
Stay at Home	eCommerce		US App Downloads	0%	18%	-4%	-18%	-8%	-3%	0%	-2%	-6%	-5%	4%	14%	13%	8%	Sensor Tower
			US App Downloads	-4%	18%	-2%	22%	19%	18%	12%	17%	21%	24%	24%	17%	12%		
	Groceries		Refrigerated dough	-2%	4%	18%	25%	21%	23%	16%	20%	26%	30%	24%	29%	33%		IRI Worldwide
			Household cleaning	4%	3%	14%	14%	16%	16%	4%	23%	16%	14%	14%	15%			
			% growth	0%	8%	9%	9%	9%	3%	10%	9%	9%	9%	6%	8%			
			Alcohol	1%	11%	11%	11%	12%	13%	5%	11%	12%	13%	12%	8%			
			Staples	1%	11%	11%	11%	12%	13%	5%	11%	12%	13%	12%	8%			
	Online Media		US App Downloads (m/m change)	-46%	-47%	-21%	-13%	-9%	-8%	88%	88%	59%	7%	-6%	-54%	-37%	-9%	Sensor Tower
			US App Downloads	1%	4%	3%	0%	3%	11%	14%	17%	15%	3%	2%	-2%	4%		
	News TV	CNN	US App Downloads	-5%	-9%	55%	81%	141%	83%	35%	80%	57%	-4%	113%	109%	19%		Nielsen
			Fox News Channel	46%	6%	22%	33%	33%	101%	31%	36%	30%	20%	78%	40%	55%		
			MSNBC	-15%	40%	29%	51%	91%	81%	48%	33%	40%	-19%	34%	20%	13%		
	Online Gaming	Twitch Streams	Total Hours Watched	11%	67%	31%	32%	35%	37%	39%	40%	43%	45%	45%	48%	47%		Sully Gnome
			Users	9%	28%	31%	32%	35%	37%	39%	40%	43%	45%	45%	48%	47%		
	Online Gaming	Steam	IOS app downloads	24%	1%	7%	7%	7%	2%	8%	20%	5%	-2%	-8%	2%	3%		Sensor Tower
			Consumer Spend		32%	68%	89%	83%	74%	41%	20%	43%	41%	57%	83%			
			Users	-27%	7%	0%	-5%	-5%	-8%	6%	0%	4%	7%	11%	54%	17%		
	Food Delivery	AtHome Fitness	-1%	88%	57%	48%	67%	100%	80%	85%	111%	90%	88%	86%	54%			
Video Chat Apps		-12%	364%	365%	501%	597%	599%	602%	436%	282%	276%	294%	342%	326%		Sensor Tower		
Online Payment Apps			16%	27%	22%	15%	16%	30%	27%	23%	18%	24%	23%	23%	29%			

Source: Sources in exhibit, compiled by Goldman Sachs Global Investment Research

Stay home category updates

- At Square’s annual partner and developer conference this week, the company announced the release of Terminal API, which is a card payment device that developers can connect to their POS. Square also noted that it has more than quadrupled its base of managed partners since 2018, and is expected to reach 1mn total partner-connected sellers in 2021.
- Zoom released the public beta for OnZoom last week, a platform for paid Zoom users to create and monetize events. OnZoom has added event discovery and monetization features, including the ability to list and sell tickets, share and promote events via social media and favorite events.

This week, we hear from our Real Estate and REITs analyst Richard Skidmore on the state of office markets, sublease rates, asking rent trends and residential suburban migration, as return to office rates have been slower than expected leading to high vacancies and share declines in new leasing activity.

Bottom line: Office market fundamentals have weakened during the pandemic, especially in high-density urban and coastal locations, as the economy slowed and employers transitioned to working from home. Even as the economy begins to recover, employees have not yet returned to the office in large numbers. A vaccine and reduced concerns about the virus are likely needed to drive a meaningful recovery in a return to the office. We believe WFH will have a marginal impact on office demand partially offset by economic growth and a reversal of densification.

The trend of WFH has led to increased urban to suburban migration. For example, Mymove.com reported

US Postal Service (USPS) data indicated New York City (NYC) and San Francisco (SF) had ~111,000 and ~27,000 net move outs from February to July 2020 compared to only ~19,000 and ~9,700 in 2019 (see [report](#)). The urban to suburban trends have negatively impacted multifamily fundamentals in urban coastal markets, while sunbelt markets have been more resilient. Multifamily asking rents and occupancy have declined sharply in urban coastal markets, but have been more resilient in sunbelt markets. We expect the sunbelt multifamily markets to continue to outperform urban coastal multifamily markets until employees (e.g. prospective multifamily tenants) begin returning to urban office markets in greater numbers. We also expect the recent trends in migration to further support the strength in the single family rental market as well.

Latest Trends

Office: Employees' return to the office has been slower than expected. Prior to Labor Day, office companies reported that office utilization (percent of employees in the office) was in the mid to high single digits across key urban markets (e.g. NYC, SF, Boston). Landlords expected utilization to increase after Labor Day; we had been expecting utilization to improve to 20%-25%. However, companies at the Goldman Sachs Private Real Estate Conference in early October noted that office utilization increased to the mid-teens in September - a slower pace than expected. Based on Google mobility to the workplace data, employee mobility to the workplace had been relatively stable through 3Q2020 with a modest uptick after Labor Day (see [Exhibit 6](#)). San Francisco and New York remain the furthest below pre-covid baselines. Card swipe data from Kastle Systems, which tracks the number of building security card swipes and fob taps, also points to a similar trend ([Exhibit 7](#)) and only modest improvement relative to pre-Labor Day attendance. Increased numbers of employees in the office will be an important catalyst for office companies, in our view, but will likely be limited absent a vaccine and/or decline in the virus. As employees return, we believe employees and employers will see productivity improve, collaboration and idea generation increase, greater mentoring/training and culture building, which will in turn lead to increased office utilization.

As office utilization has been slow to recover and work from home has proven functional to keep businesses operating, office fundamentals (e.g. vacancies, asking rents, sublease space) in key urban markets have deteriorated since the beginning of the pandemic according to CoStar data.

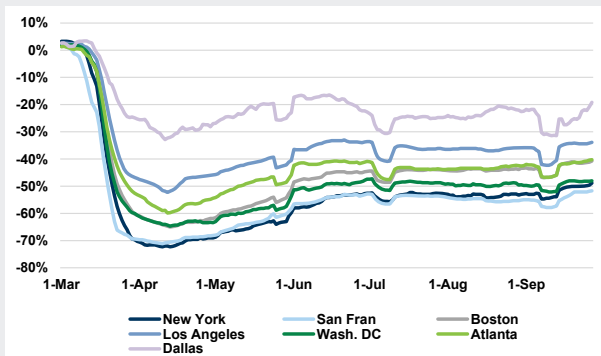
- **Vacancies and net absorption (a measure of demand):** Office vacancies in NYC and SF have increased 120bps and 370bps to 9.2% and 9.5%, respectively, since early March 2020. Vacancies are at five-year highs in both NYC and SF. The rise in vacancies and sharp decline in new leasing activity have led to negative office space absorption in 3Q2020 with trailing 12-month absorption falling to negative 5.3mn sq ft in NYC ([Exhibit 8](#)) and negative 3.8mn sq ft in SF ([Exhibit 9](#)) as reported by CoStar - levels not seen since the Great Financial Crisis in 2009.
- **Sublease space:** As WFH continues and companies try to reduce their office space, companies have looked to sublet their office space. Available sublease space has increased sharply in SF year-to-date with sublease space accounting for 40% of the total 21mn sq ft of available space, up from 30% of only 12.2mn sq ft at yearend 2019. In NYC, sublease space stands at nearly 23% of available space, up from 22% at yearend. While the percent of sublease space has increased only 100bps since yearend, total absolute sublease space in NYC has increased to 20mn sq ft, up from 15.6mn at yearend as total

available space has increased by 21% YTD.

- Asking rents:** Increased vacancies and available sublease space has begun to pressure office asking rents. Office asking rents in SF have declined 4.2% since early March and are down 1.5% YoY. In NYC, office asking rents have fallen 3.2% since early March and 1.3% from a year ago. Comments from industry participants at the Goldman Sachs Private Real Estate Conference in early October indicated that net effective rents (asking rents minus concessions) are down 10%-12% in NYC.

Exhibit 6: Return to office activity was relatively stable through 3Q2020 with a modest uptick in early September after Labor Day

Mobility to the workplace, relative to pre-covid baseline

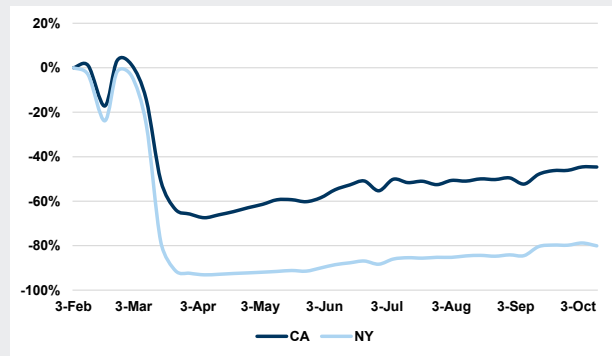


Google LLC "Google COVID-19 Community Mobility Reports".
<https://www.google.com/covid19/mobility/> Accessed: Oct. 16, 2020

Source: Google COVID-19 Community Mobility Reports

Exhibit 7: As of mid-October, card swiping in New York was down 80% from the first week of February

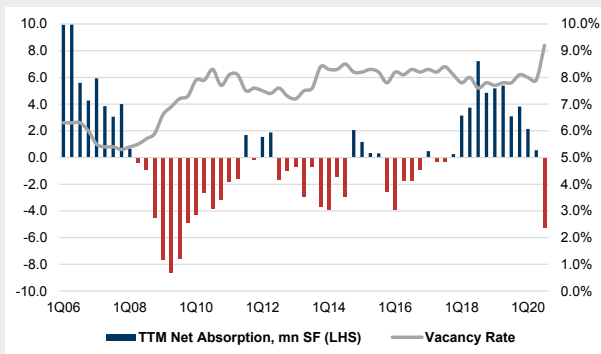
Building security card swipes, relative to pre-covid baseline



Source: Kastle Systems

Exhibit 8: New York's vacancy rate reached a high of 9.2% in 3Q2020

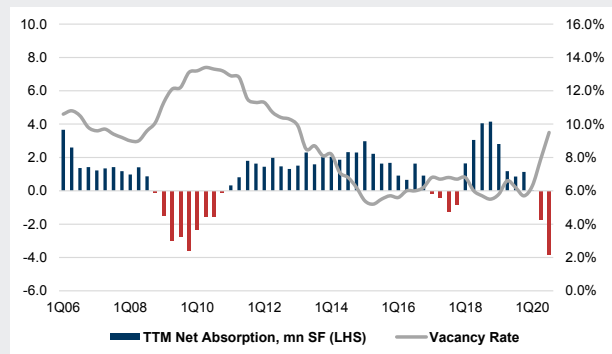
New York City TTM Net Absorption and vacancy rate



Source: CoStar

Exhibit 9: San Francisco's vacancy rate spiked to 9.5% in 3Q, the highest level in a decade

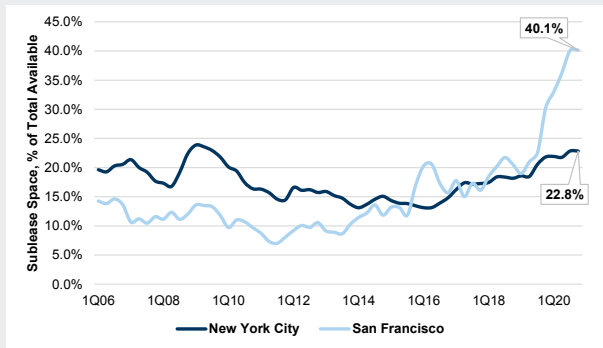
San Francisco TTM net absorption and vacancy rate



Source: CoStar

Exhibit 10: Sublease space now comprises 40% of available inventory in San Francisco

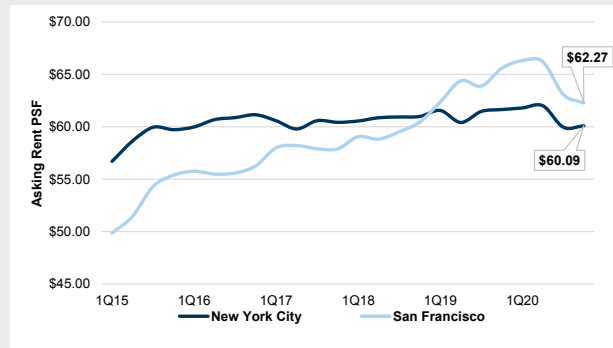
Office sublease space as a percent of total available space, 4QTD



Source: CoStar

Exhibit 11: San Francisco asking rates are now 5.0% lower than a year ago

Asking rent per square foot, 4QTD

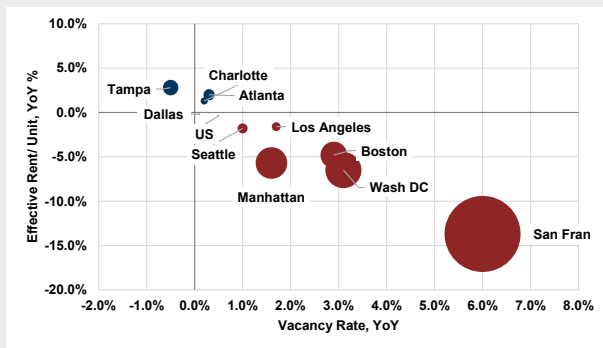


Source: CoStar

Residential (multifamily and single family rentals): Operating fundamentals within multifamily and single family rentals (SFR) have been impacted by migration trends towards suburban and sunbelt markets and out of urban and coastal locations. Comments from industry participants at the Goldman Sachs Private Real Estate Conference indicated that migration trends continue to favor suburban and sunbelt markets relative to urban and coastal markets. Multifamily vacancies have risen more in coastal markets than in sunbelt markets, which has led to greater declines in effective rents (asking rents minus concessions) in coastal markets. For example, San Francisco has experienced the largest increase in multifamily vacancies and the largest decline in net effective rents (Exhibit 12). Within SFR, companies noted that occupancy has risen to record or near record levels in 3Q2020 and blended lease rates have accelerated through August to 3.6% YoY (Exhibit 13) as they have benefited from customer demand for increased space in more suburban markets.

Exhibit 12: Sunbelt multifamily markets are outperforming urban coastal markets

Year-over-year change in vacancy and effective rent per unit by city

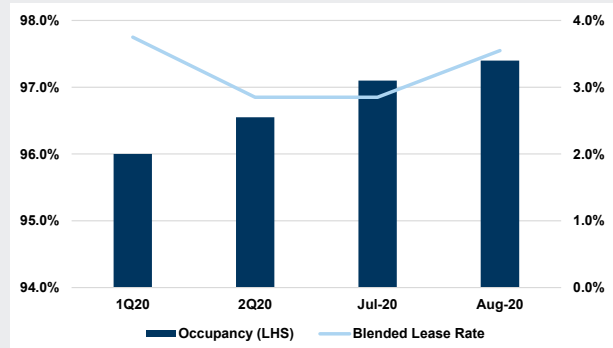


Bubble size and color represent magnitude and direction of change in effective rent per unit.

Source: CoStar, Goldman Sachs Global Investment Research

Exhibit 13: Single family rental occupancy at record levels in August driving blended lease rates higher

Occupancy (%); blended lease rate YoY percent change



Data is the average of AMH and INVH's reported occupancy and blended lease rates

Source: Company data, Goldman Sachs Global Investment Research

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.

Back-to-normal categories were mixed this week, with OpenTable seated diner figures (-41% y/y) reversing its significant holiday weekend improvement last week (-36% y/y) as case counts rise and temperatures cool. Retail and travel figures, including weekly retail visits, outlet mall retail visits, lodging metrics and airline data, were all roughly flat from the prior week. However, within lodging there is still a clear preference for alternative accommodations, with AllTheRooms RevPAR +7% in the week ending October 11th, compared to US Hotel Occupancy at -29% y/y and ADR -26% y/y. Kastle card swipes, a measure of the pace of return to work, have remained at -64% y/y since mid-September, after improving steadily since April. Gas demand also reversed its course of improvement this week to reach -8% y/y (compared to -6% and -7% in the two prior weeks).

Exhibit 14: “Back to Normal” metrics seeing mixed trends, though mostly still down y/y
 Feb 10 - July 26 excluded for presentation purposes; see prior reports for data

Basket	Sector	Company/App	Metric	y/y % change, unless otherwise noted																	Source
				Feb 3 - Feb 9	July 27 - Aug 2	Aug 3 - Aug 9	Aug 10 - Aug 16	Aug 17 - Aug 23	Aug 24 - Aug 30	Aug 31 - Sep 6	Sep 7 - Sep 13	Sep 14 - Sep 20	Sep 21 - Sep 27	Sep 28 - Oct 4	Oct 5 - Oct 11	Oct 12 - Oct 18					
Back to Normal	Gym Attendance	Foursquare	US App Downloads	-42%	-51%	-43%	-56%	-59%	-53%	-46%	-44%	-33%	-49%	-50%	-45%	-44%		Sensor Tower			
			Gym Foot Traffic	-42%	-41%	-40%	-39%	-37%	-34%	-37%	-34%	-31%	-31%	-30%				Sensor Tower			
	Commuting	Google COVID-19 Community Mobility Reports	US App Downloads	-18%	-48%	-42%	-48%	-49%	-45%	-40%	-33%	-40%	-41%	-37%	-44%		EIA				
			Gas Demand	1%	-11%	-11%	-10%	-8%	-7%	-14%	-5%	9%	-7%	-9%	-9%		Google				
	Commuting	Kastle Card Swipes	Transit % change from baseline		-28%	-28%	-29%	-29%	-29%	-27%	-30%	-29%	-30%	-30%	-29%		Google				
			Workplaces % change from baseline		-31%	-31%	-31%	-30%	-30%	-34%	-27%	-26%	-26%	-26%		Google					
	Box Office	ESPN	US Top 10 Gross	0%	-88%	-88%	-68%	-67%	-66%	-67%	-69%	-64%	-64%	-64%	-64%		Kastle				
			Movies Released	27%	-100%	-100%	-99%	-98%	-92%	-80%	-76%	-91%	-88%	-94%	-95%	-93%		Box Office Mojo			
	Sports TV	NBCSN	Ratings	-22%	-92%	-91%	-88%	-78%	-81%	-79%	-80%	-78%	-78%	-70%	-65%		Box Office Mojo				
			ESPN	-9%	15%	16%	-29%	-10%	-45%	-38%	45%	16%	-2%	12%	-34%	-33%		Nielsen			
	Dining	OpenTable	Seated diners	-28%	83%	87%	117%	180%	89%	407%	72%	95%	95%	-43%	-30%	-46%					
			Weekly Visits	15%	-9%	-12%	-9%	-26%	-61%	-63%	-38%	-43%	-38%	-63%	-67%	-31%		OpenTable			
	Retail	Total Retail	Shaving	-59%	-59%	-56%	-54%	-50%	-48%	-44%	-44%	-44%	-42%	-41%	-38%	-41%		ShopperTrak RCT Corporation			
			Outlet Malls	-27%	-27%	-25%	-22%	-22%	-19%	-12%	-15%	-15%	-17%	-19%	-19%		ShopperTrak RCT Corporation				
			Cosmetics	-9%	-57%	-56%	-54%	-51%	-52%	-50%	-20%	-34%	-30%	-34%	-38%	-40%		IRI Worldwide			
			Shaving	0%	-13%	-10%	-14%	-13%	-14%	-11%	-14%	-10%	-9%	-16%	-13%						
	Retail	Department stores	Shaving	-5%	-9%	-5%	-8%	-8%	-3%	-6%	-5%	-6%	-7%	-4%							
			Fragrance	2%	-9%	-8%	-10%	-13%	-13%	-8%	-14%	-13%	-14%	-19%	-16%						
	Retail and Recreation	Google COVID-19 Community Mobility Reports	Consumer spend		3%	11%	24%	33%	6%	18%	26%	16%	19%	26%	12%		Factus				
			% change from baseline		-14%	-14%	-15%	-14%	-14%	-13%	-16%	-15%	-15%	-14%	-15%		Google				
	Airlines	Tourist Attractions	Consumer Spend		-64%	-61%	-56%	-57%	-64%	-49%	-54%	-54%	-53%	-53%	-57%		Factus				
			TSA checkpoints		-18%	-9%	3%	-1%	-27%	22%	2%	7%	7%	5%	9%		TSA				
	Lodging	Hilton	Consumer spend		-74%	-73%	-71%	-71%	-70%	-66%	-67%	-69%	-68%	-67%	-64%		Factus				
Domestic flight search volume				-69%	-68%	-63%	-63%	-60%	-67%	-60%	-53%	-50%	-53%	-50%		Factus					
Lodging	Marriott	US Occupancy		-85%	-61%	-61%	-56%	-53%	-51%	-50%	-49%	-49%	-50%	-47%	-46%		Kayak				
		US ADR		-1%	-35%	-33%	-30%	-30%	-28%	-19%	-30%	-32%	-32%	-29%		STR					
Lodging	AllTheRooms	Google Search Traffic		1%	-25%	-25%	-23%	-23%	-23%	-17%	-25%	-28%	-30%	-25%		STR					
		RevPAR		-7%	-31%	-28%	-25%	-21%	-25%	-19%	-8%	-6%	-11%	-14%	-9%	-11%		Google			
Online Travel	Live Events	US App Downloads		-12%	-48%	-44%	-39%	-38%	-36%	-33%	-33%	-39%	-40%	-33%	-30%		AllTheRooms				
		US App Downloads		-10%	-2%	-3%	1%	11%	-5%	19%	9%	4%	10%	12%	7%		AllTheRooms				
Card Payments	Mastercard	US Switched Volume		37%	3%	17%	25%	17%	17%	24%	17%	31%	26%	28%	23%	14%		Sensor Tower			
		US Switched Volume		32%	-85%	-86%	-87%	-86%	-85%	-87%	-83%	-82%	-82%	-80%	-80%		Company data				

Source for Google Community Mobility data: Google LLC “Google COVID-19 Community Mobility Reports”. <https://www.google.com/covid19/mobility/> Accessed: <16th October 2020>; Google search data from Google Trends

Source: Sources in exhibit, compiled by Goldman Sachs Global Investment Research

Back to normal category updates

- AMC has begun to offer private theater rentals at select locations starting at \$99. Rental customer can invite up to 20 people to a screening, and additional pricing depends on the title chosen for the screening.
- After decelerating over the past several months, recent IRI data (through Oct 11) indicates that Consumer Packaged Goods growth has stabilized at a high-single-digit growth level since August (excluding weekly fluctuations). That said, while Household and Personal Care has largely sustained its low-single-digit growth momentum over this period, Food posted high-single-digit growth for second consecutive week, which points to a deceleration relative to low double-digit growth seen earlier. Within Beverages, Non-Alcoholic Beverages accelerated to low

double-digit growth, while Alcoholic Beverages saw steady, but strong double-digit growth for the week. Tobacco sales improved to low single digits for the week.

Business Activities

TSA passenger volumes were flat this week after the significant improvement last week over Columbus Day weekend. In our most recent GS Air Travel Restriction Tracker, we noted that data as of 10/18 indicates that 41 states fall above thresholds that would lead to travel restrictions by NY/NJ/CT, up from 36 in our last update and leaves just 10 states (including DC) that would not be subject to travel restrictions. We expect to see additional states added to the NY/NJ/CT travel restriction lists and no states removed in our two-week forecast. Redfin's homebuyer demand index is up 40.3% from pre-pandemic levels for the week ending October 11, as active listings fell to an all-time low on the platform, highlighting the high demand and interest in homebuying.

Exhibit 15: Business Activity metrics recovering to reflect the economic impact of the crisis
 Feb 3 - July 26 excluded for presentation purposes; see prior notes for data

Basket	Sector	Company/App	Metric	y/y % change unless otherwise noted												Source	
				July 27 - Aug 2	Aug 3 - Aug 9	Aug 10 - Aug 16	Aug 17 - Aug 23	Aug 24 - Aug 30	Aug 31 - Sep 6	Sep 7 - Sep 13	Sep 14 - Sep 20	Sep 21 - Sep 27	Sep 28 - Oct 4	Oct 5 - Oct 11	Oct 12 - Oct 18		
Business Activity	Industrial consumer	TSA passenger throughput	TSA passenger throughput	-74%	-73%	-71%	-71%	-70%	-66%	-67%	-69%	-67%	-64%	-64%		TSA	
			Actual air traffic growth	-60%	-61%	-61%	-61%	-61%	-61%	-62%	-62%	-62%	-57%	-58%	-58%		OAG
		3M	Passenger aircraft in service	-28%	-26%	-26%	-26%	-26%	-25%	-25%	-24%	-24%	-24%	-24%	-24%		Cirium
			Monthly sales (organic)			2%											Company data
			US Refinery Utilization %	-17%	-15%	-16%	-14%	-15%	-25%	-17%	-17%	-12%	-10%	-10%			Wards
	Autos	Auto SAAR	Auto SAAR	-10%							-4%					EIA	
			Domestic ethanol blending	-11%	-11%	-11%	-11%	-10%	-11%	-7%	-10%	-9%	-10%			EIA	
		Google Search Traffic	Google Search Traffic	1%	0%	-1%	-1%	-2%	-6%	-3%	1%	3%	2%	2%		Google	
			Mortgage Applications	22%	22%	27%	33%	28%	40%	6%	25%	22%	21%	24%	3%		Mortgage Bankers Association
	Industrial housing	Single-Family Housing Permits	NSA	15%			16%									Census Bureau	
			Months of Supply, SAAR	-40%			-40%									Census Bureau	
		New Home For-Sale Inventory	Months of Supply, SAAR	-27%			-28%									National Association of Realtors (NAR)	
			Median	6%			-4%									Census Bureau	
		Existing Home Prices	Median	9%			11%									NAR	
			Units, SAAR	46%			43%									Census Bureau	
Existing Home Sales		Units, SAAR	9%			10%									NAR		
		Purchase Loan Rate Lock Activity	32%	45%	50%	61%	51%	42%	42%	78%	36%	51%	43%		AEI		
Online Real Estate		Redfin	Texas cement shipments	-3%					21%	23%	28%		35%			Texas Comptroller	
			Home-buying demand	29%												Redfin	
	Caterpillar	Retail sales	-35%												Company data		
Industrial equipment	Boeing	New aircraft orders	(20)						(3)						Company data		
		Komtrax	Komtrax operating hours	-12%						-6%						Komtrax	
	Sandhills Global	Used construction equipment inventories	-7%													Sandhills Global	
		Michelin	North America replacement tire volumes	-3%												Company data	
Industrial trade	US rails	Weekly rail economically sensitive carloads	-6%	-4%	-3%	-1%	-2%	16%	-8%	2%	0%	3%	4%		AAR		
		Weekly rail intermodal carloads	2%	2%	2%	5%	3%	25%	-5%	6%	5%	7%	8%		AAR		
	Truck spot pricing	Truck spot pricing	34%	37%	37%	35%	43%	43%	37%	44%	43%	50%	47%		Truckstop		
		DAT load to van ratio	5.22	5.23	5.02	5.15	5.69	5.78	5.29	5.19	5.28	5.51	4.24	4.24		DAT	
	Truck Load Availability Index (2014=100)	Truck Load Availability Index	166	181	176	192	205	218	175	213	214	237	209			Truckstop	
Cass Freight Index									-2%						CASS		
Multi-Industry	Big 3	west coast ports inbound loaded containers	15%													Port data	
		Daily sales	3%							2%						Company data	
Personal Health	Fastenal	Dental volumes (vs. baseline)	-27%		-27%		-26%		-26%		-18%		-19%		ADA		
		Elective procedures (vs. baseline)	-13%	-15%	-13%	-13%	-12%	13%	-33%	-16%	-22%				IQVIA		
		Generic Nrx volumes (mn)	3.1	3.2	3.6	4.5	4.9	5.7	6.2	7.9	8.2	8.8	9.0			IQVIA	
Power & Utilities	Electricity Demand	Generic Nrx volumes (mn)	38.6	38.8	38.8	38.8	38.9	39.7	35.8	40.0	39.8	39.8	40.1			IQVIA	
		Growth y/y	1%	-5%	2%	-4%	10%	0%	-8%	-8%	-12%	-12%	-1%			EI	
Advertising	Facebook / Instagram	Cost per 1,000 Impressions	-7%	-1%	1%	2%	-14%	-18%	-8%	-3%	-9%	19%	7%	13%		Gupta Media	

Google search data from Google Trends

Source: Sources in exhibit, Goldman Sachs Global Investment Research

Business Activities category updates

- Elevated trendlines persist in transports; with rail intermodal and economically sensitive carloads (ex coal and ag) staying in positive territory. While some sequential slippage in truck trends is to be expected after sharp run-up, we stress that trendlines remain well above normal and indicate a very tight market.
- Google Cloud announced the launch of Lending DocAI, a dedicated service for the mortgage industry. The tool is designed to help mortgage lenders and borrowers with a smoother transaction experience, including automated document reviews.

The GS Reopening Scale

To look at all of 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 38. We then translate the composite scale onto a GS reopening scale of 1-10 ([Exhibit 16](#)), where values less than or equal to 50 represent a 1 and a return to Feb 3rd levels would represent a 10. This week, we add an interactive version of our composite scale graph, which shows the contributions from each of the ‘Stay-at-home’ and ‘Back-to-normal’ verticals we include in the composite scale.

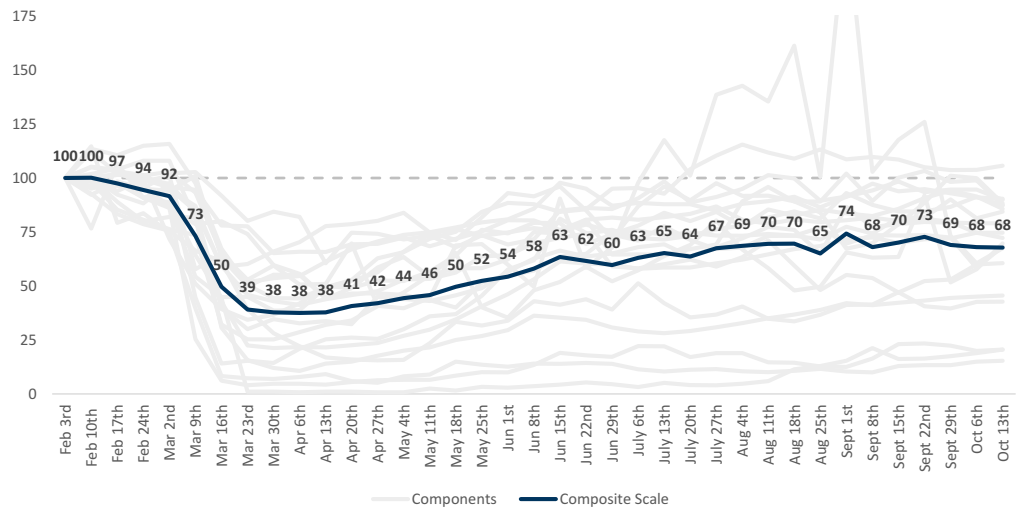
The GS US reopening scale, based on the trajectory of the Composite Scale, first reached 1 in the week of March 16th, where it remained for 10 weeks, indicating that consumers were still at the trough of impacts from COVID-19. This week our composite score of 68 supports a Reopening scale of ‘4’, the same as last week. We expect that as states continue to reopen for business these metrics will recover more meaningfully, bringing the scale to higher levels over time, though recent spikes in COVID-19 cases and associated state government actions may limit or reverse the pace of reopening. We would expect the recovery to a 10 to still take 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 16: 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 17: Composite Scale, Feb. 3 - October 18
 Date on x-axis represents first day of week measured



This exhibit summarizes data from sources listed in Exhibits 5, 14 and 15.

Source: Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

We, Heath P. Terry, CFA, Richard Skidmore, 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

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	49%	35%	16%	64%	57%	54%

As of October 1, 2020, Goldman Sachs Global Investment Research had investment ratings on 3,122 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 universe 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 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 U7140MH2006FTC160634, 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:** Goldman Sachs (Singapore) Pte. (Company Number: 198602165W), which is regulated by the Monetary Authority of Singapore, accepts legal responsibility for this research, and should be contacted with respect to any matters arising from, or in connection with, this research. **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 universe 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 universe. 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 Universe: A list of all stocks in each coverage universe is available by primary analyst, stock and coverage universe 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 Brasil: 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: 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.

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 universe 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.