BARCLAYS

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31 March 2020

#virus

Data Science High Frequency Indicators Update

This Week Should Show If Social Distancing Policies Are Working

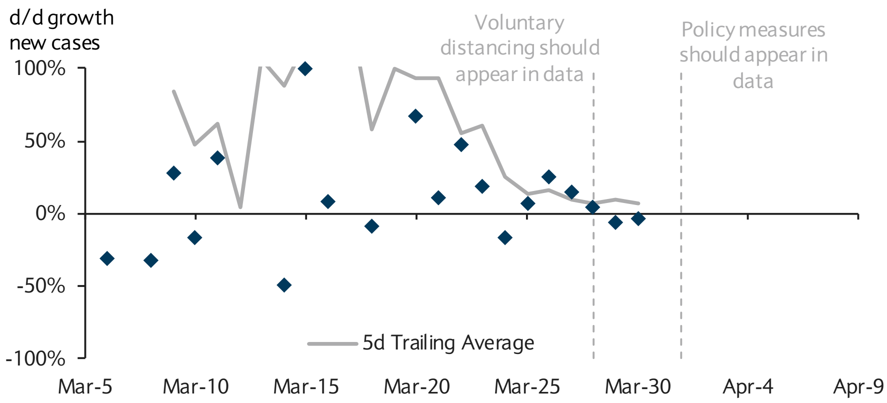
Early hints that social distancing is starting to moderate the COVID-19 epidemic may now be starting to show up in confirmed case data.

In New York, the current epicenter, there appears to be a decline in new case growth this week, just as early social distancing measures should be appearing in the data. If the current “stay at home” policy (which took close to its current form starting around March 16) has been sufficient to reduce the virus’s reproductive rate below 1, the data should show a sustained decline in new case growth after April 1.

Even as some of the earliest states to act, such as New York and California, might be experiencing case growth deceleration, some states (Texas and Florida in particular) are still seeing accelerations. That could mean that even if case growth in the current hotspots starts to slow, it may rise in others, which could extend the time the outbreak affects the US economy.

While there is distinct bottoming in many of the activity metrics we track – subway ridership, airport traffic, and S&P 500 HQ staffing – there is no real sign of a thaw yet. And our early indicator for jobless claims suggests that this week has had a further acceleration in new claims, even after last week’s record, so it may be some time before we have a firm sense of the economic damage and how quickly it might reverse.

FIGURE 1
New York case growth has slowed just as social distancing should show up in data



Source: Johns Hopkins, Barclays Research

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Tentative Signs of Improvement, Maybe More This Week

Last week, there were some early signs that acceleration in the US COVID-19 epidemic was starting to slow, with fewer visits to the CDC website and fewer calls about the virus to NYC's 311 line. Those series continued to moderate this week.

More important, early evidence of a slowdown is finally starting to show in the confirmed case data. And because of the time required for policy actions to show up in data, this week the effects of the early "stay at home" declarations should start to be visible.

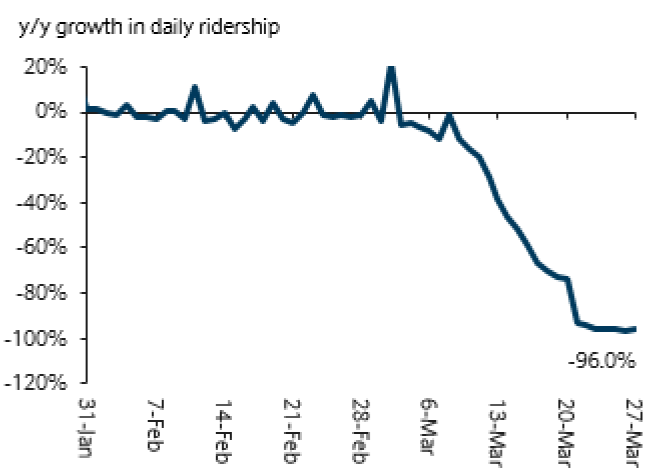
The idea behind social distancing is straightforward: as people reduce their physical proximity, the effective reproductive rate (Ro, roughly the number of people who will become infected from each sick person) of an infection drops. Given the basic Ro estimate for COVID-19 of 2.5-3, social distancing needs to reduce contacts by 0.60-0.66 to tilt the outbreak from exponential growth into exponential decline. In New York, the current epicentre of the outbreak, we have several measurements that are correlated to the degree of social distancing.

- One is straightforward: subway ridership. This measure is now down 96% from normal levels (Figure 2). If it is representative of the degree of social distancing, the COVID epidemic should have started to decline by March 12 and tipped into exponential decline after New York "stay at home" policies were announced on March 16.
- Another way to think about social distancing is to measure social contact, or proximity, and see how it has declined. We have done that by using geolocation data to measure the "betweenness" or "degree" of places in New York (*Has Social Distancing Worked? Geolocation Data Has Answers,* March 27, 2020). One implication of the model is an estimate of the average number of other people a given person will pass within 50 feet of in a typical day. While that number is likely incomplete, by indexing it (Figure 3), we can see that the number of contacts in New York fell by about half by the week of March 16. But if it is representative, then the current policies might need to be extended or expanded to bring the outbreak under control.

The infection and testing cycle is why this week is a critical one for data on whether the outbreak is on a path to containment. The place to look for that is in the evolution of new case growth, but that requires some interpretation of timing.

FIGURE 2

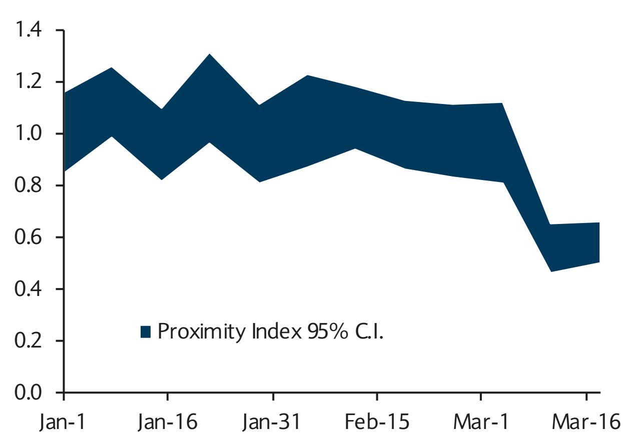
If subway ridership is representative of social distancing, effective Ro should have dropped below 1 on March 16



Source: New York MTA, Barclays Research

FIGURE 3

But if our measure of average proximity is more representative, current policy might need to extend

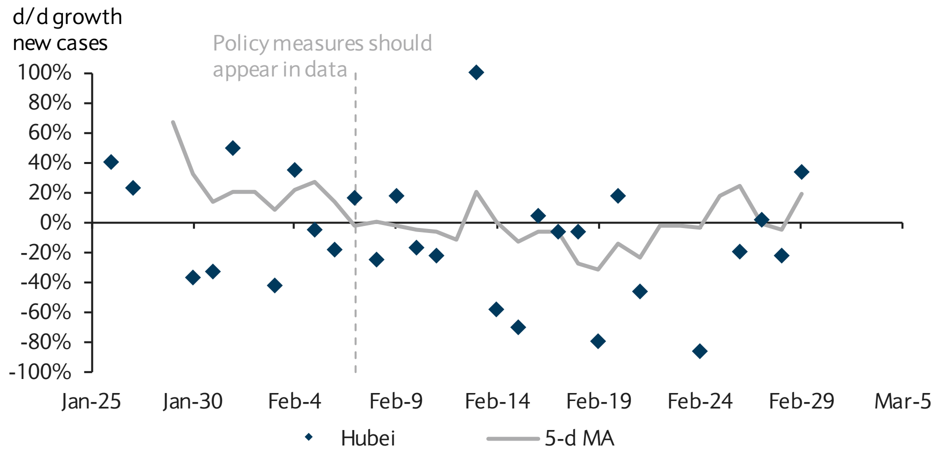


Source: Complementics, Barclays Research

Most of the tests in New York occur when ill people come to a hospital.[1] But that means the test results as reported now reflect infections that occurred some time ago. The average progression is:[2] exposure +5 days to first symptoms, +7 days to hospitalization (receive test), +2 days to test results, +1 day for reporting. So, on average, people are tested at exposure +12 days, results are available at +14 days, and policy influence appears in the data at +15 days. In addition, there is a degree of randomness in the data, so we likely need a few days to have full clarity about what we are seeing. Data for Hubei province (the center of the epidemic in China) show how this looks, with the 5-day moving average of new case growth falling to zero a bit more than two weeks after the lockdown went into effect (Figure 4).

FIGURE 4

For Hubei, the five-day moving average of new cases fell to zero right around the expected date, given the lockdown rollout on January 23



Note: Growth capped at 100%/day to reduce influence of significant outliers in mid-January. Source: Johns Hopkins, Barclays Research

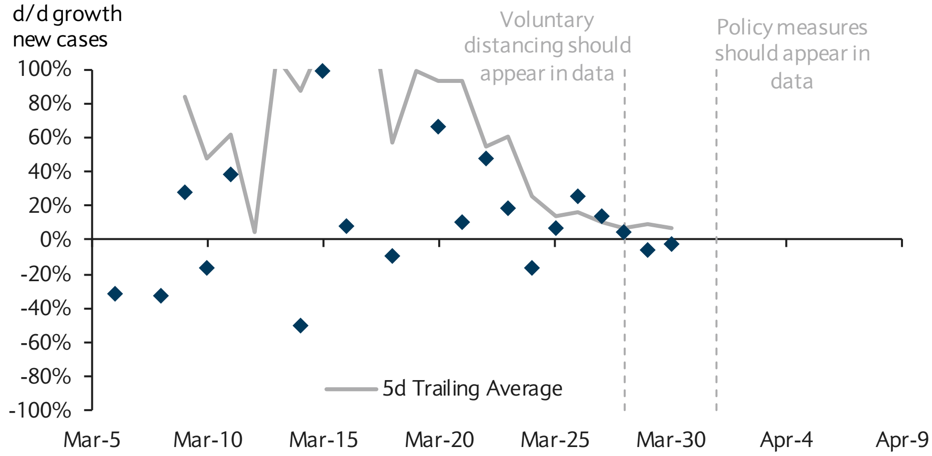
In New York, the subway ridership data and betweenness model suggest that social distancing could have reduced case growth as early as March 12, but reached key thresholds closer to the start of “stay at home” policies on March 16 (which began in earnest on March 17). Therefore, if social distancing were working, we would expect data to start to show declining new case growth on March 28 and take a further turn down after April 1. And in fact, the data do show early signs of just that (Figure 5). The five-day moving average of new case growth is lower, and there have now been two consecutive days of modestly declining new case growth. The real test will be whether this can continue and accelerate in the post-April 1 data. But if it does, it suggests that policies have been effective and an end may be in sight in places that started social distancing by mid-March.

[1] “NYC Only Testing for COVID-19 in Patients Needing Hospitalization,” *NBC News*, March 20, 2020.

[2] “Coronavirus model shows individual hospitals what to expect in the coming weeks,” *STAT*, March 16, 2020; “A day-by-day breakdown of coronavirus symptoms shows how the disease, COVID-19, goes from bad to worse.” *Business Insider*, March 18, 2020.

FIGURE 5

The five-day moving average of case growth in New York State suggests that voluntary measures have been successful at reducing infections and the effect of policy-driven data should start to appear by April 1

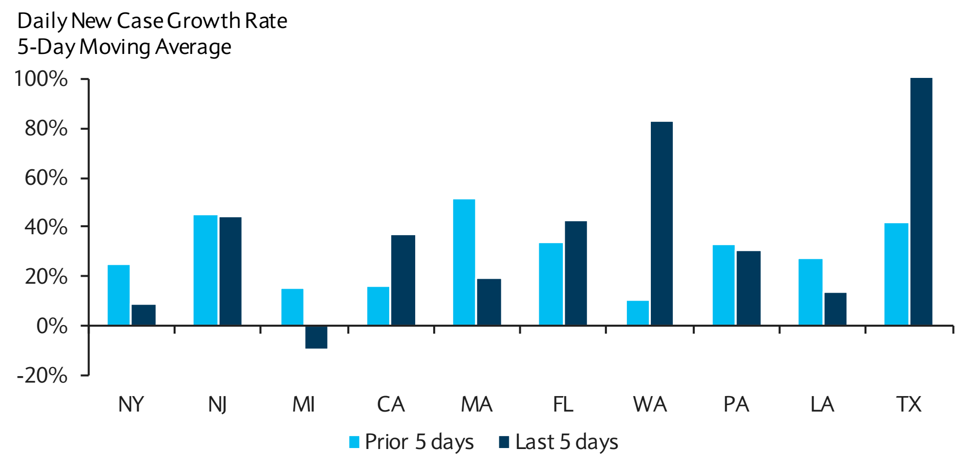


Source: Johns Hopkins, Barclays Research

This potential turn towards a resolution in New York might not extend across the full US, however. While New York and some of the other most affected states appear to be improving, the situation is not as clearly on the right path in other states (Figure 6). Given that there was significant diversity in when (or even whether) “stay at home” policies were implemented, there could still be significant pockets of growth that could cause a second wave of national case growth if these states have spikes in case growth even as the earlier affected states experience the case declines from social distancing.

FIGURE 6

Many states with the most COVID-19 cases have decelerating case growth, but some continue to accelerate



Note: States sorted by volume of COVID-19 confirmed cases. Source: Covid Tracking Project

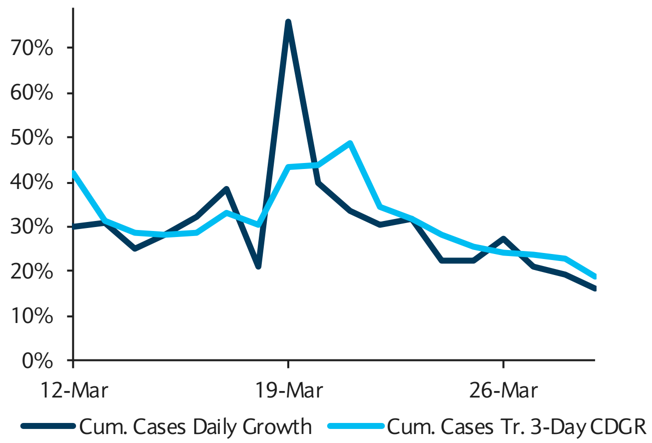
High Frequency Series Updates

Tracking COVID-19 Confirmed Cases

There were 20,921 confirmed new cases of COVID-19 in the US yesterday, an increase of 1,513 from 19,408 new cases the day before. Cumulative total cases grew to 161,807, from 140,886 the day before. The three-day trailing daily CDGR in cumulative cases was 17%.

FIGURE 7

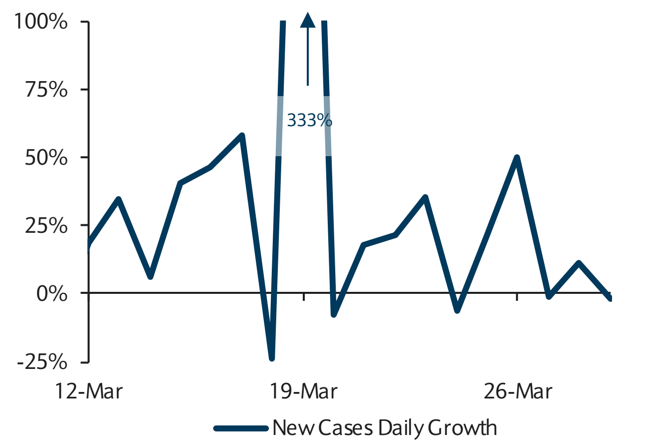
US Daily Growth in Cumulative Total Cases



Note: Chart since the US crossed the 100-case threshold. Source: Johns Hopkins, Barclays Research

FIGURE 8

US Daily Growth in New Cases



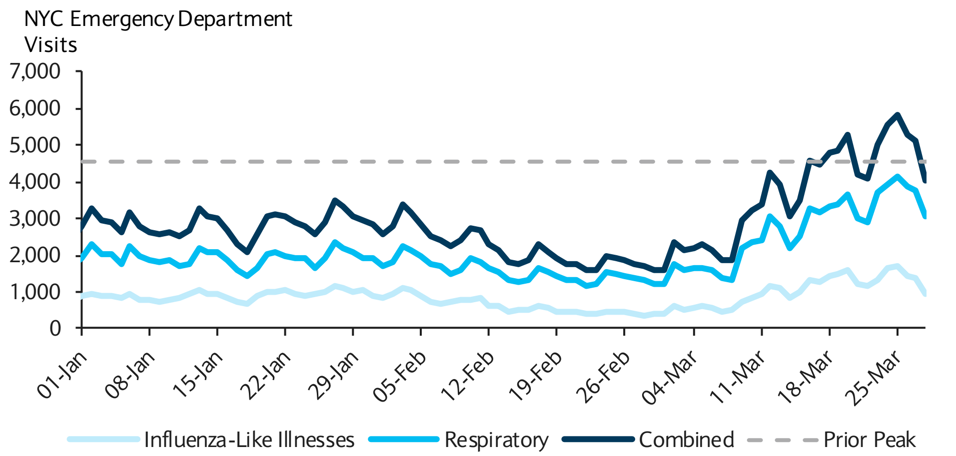
Note: Chart since the US crossed the 100-case threshold. Source: Johns Hopkins, Barclays Research

New York City Hospital Emergency Room Admissions

In New York City, the number of emergency room visits has shown no sign of moderation, hitting a new all-time peak last week. Because of the time needed for patients to progress to needing critical care (reported to average about 7 days after first requiring hospitalization), peak stress on NYC hospitals has likely not yet occurred.

FIGURE 9

NYC hospital emergency room visits for combined flu-like and respiratory illnesses hit a new peak last week and have shown no sustained moderation



Source: New York City Department of Health, Barclays Research

For details about how we look at emergency room admissions, see *Data Science High Frequency Indicators: NYC Emergency Room Admissions Are Already at Peaks*, March 16, 2020.

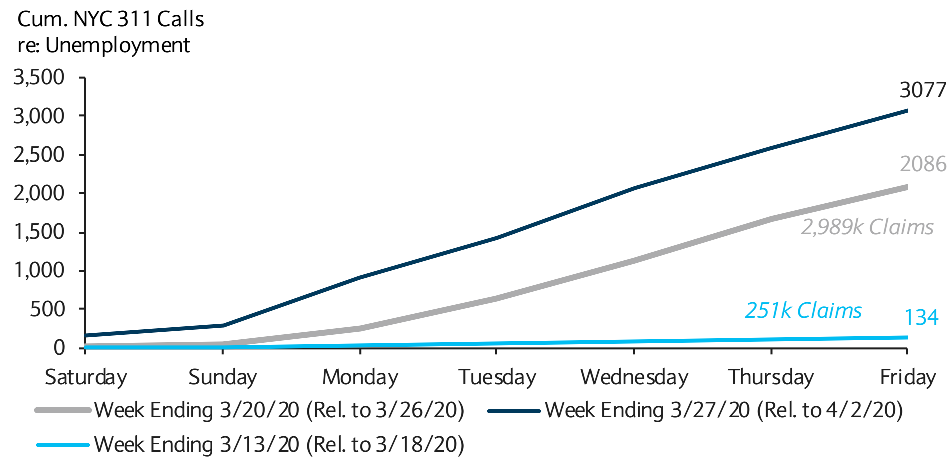
Jobless Claims

NYC 311 calls about unemployment have historically been useful for forecasting jobless claims because people call the line to ask about filing for unemployment benefits.

After an 16x spike last week, which went along with a 12x increase in jobless claims, call volume has climbed another 48% this week. We think that the historic relationship is not useful for calibrating a point estimate, given how far outside the range of values current volumes are. However, we think that the significant swings in the data are indicative of similar swings in the initial jobless claims number. In this case, we would expect a further significant jump in new claims when the numbers are reported on Thursday of this week.

FIGURE 10

Calls to 311 about unemployment insurance started the week pacing about 2x higher than even last week's huge jump, moderated towards the end, but still finished almost 50% higher



Source: NYC Open Data, Barclays Research

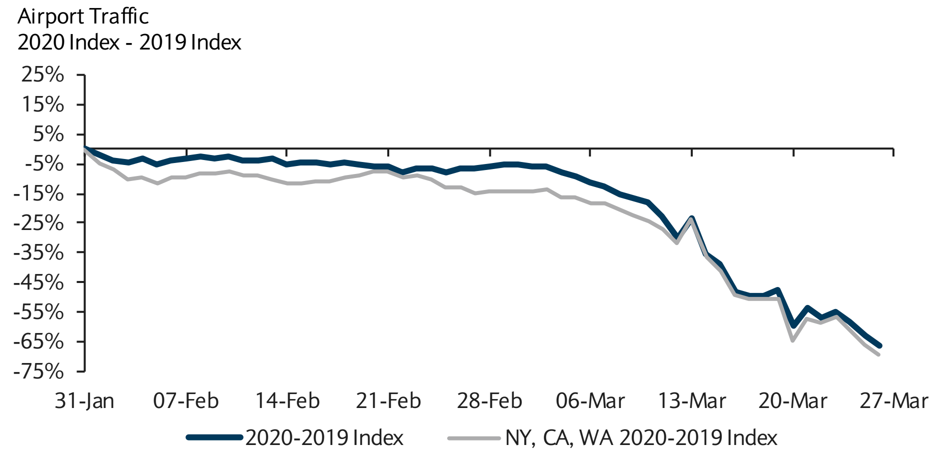
For details about how we look at the relationship between 311 unemployment calls and initial jobless claims, see *311 Calls About Unemployment Lead Weekly Jobless Claims*, March 24, 2020.

Airports

Nationally, airport traffic has declined nearly 70% year-over-year. Given the likelihood that some of the total traffic at airports represents workers, it is all but certain that passenger volumes have declined even further.

FIGURE 11

Traffic at airports was down almost 70% nationally through the end of last week



Source: Complementics, Barclays Research

For details about how we look at airport traffic, see *Data Science High Frequency Indicators: US Airport Traffic Is Down and Falling*, March 12, 2020.

NYC Subways

Subway ridership has now flattened at a steady-state of down 96% (Figure 13).

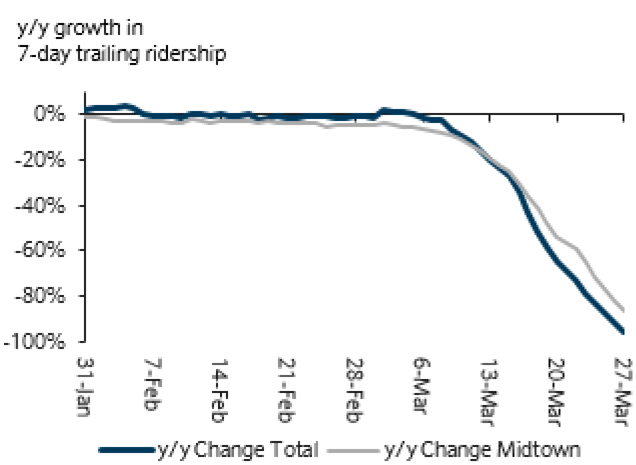
For details about how we look at subway ridership, see *Data Science High Frequency Indicators: NYC Subway Ridership Is Declining*, March 10, 2020.

S&P 500 Headquarters

S&P 500 headquarters staffing is also starting to flatten as it approaches zero. The median company has reduced headquarters staffing by almost 90%.

FIGURE 12

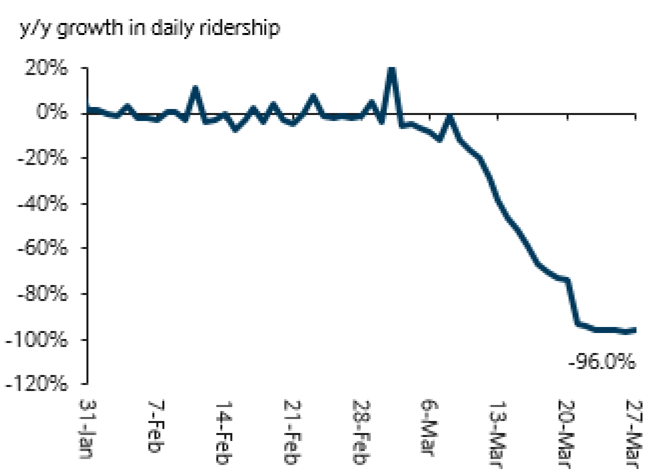
NYC subway ridership is down nearly 70%



Source: MTA, Barclays Research

FIGURE 13

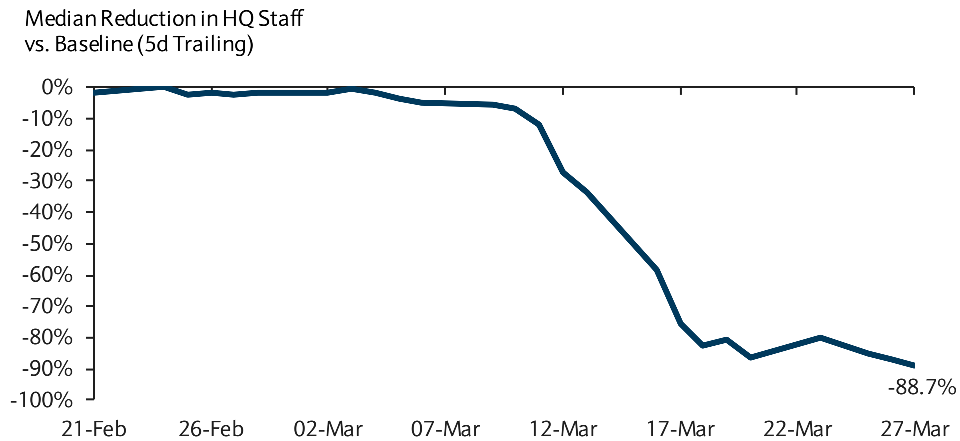
Volumes continued to fall through the end of last week



Source: MTA, Barclays Research

FIGURE 14

S&P 500 company HQ staffing is holding steady at very reduced levels

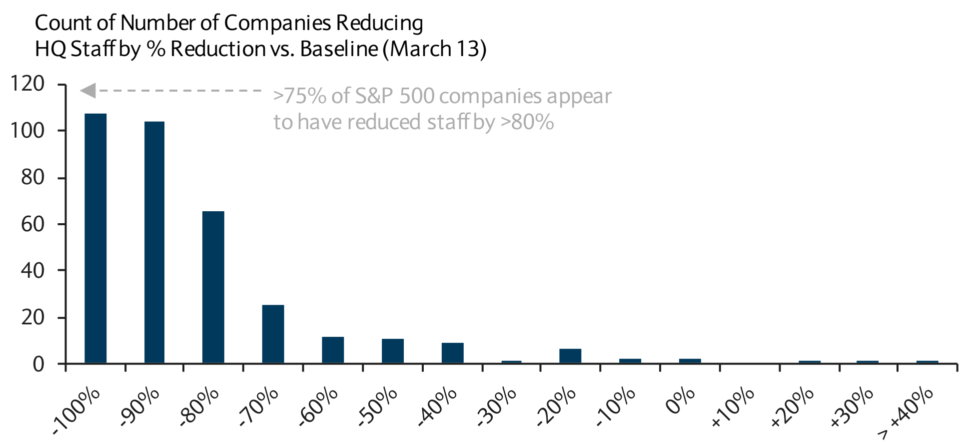


Source: Complementics, Barclays Research

And >90% of S&P 500 constituents have cut staffing by more than 50% (Figure 15).

FIGURE 15

More than 75% of S&P 500 companies have reduced headquarters staff by 80% or more



Source: Complementics, Barclays Research

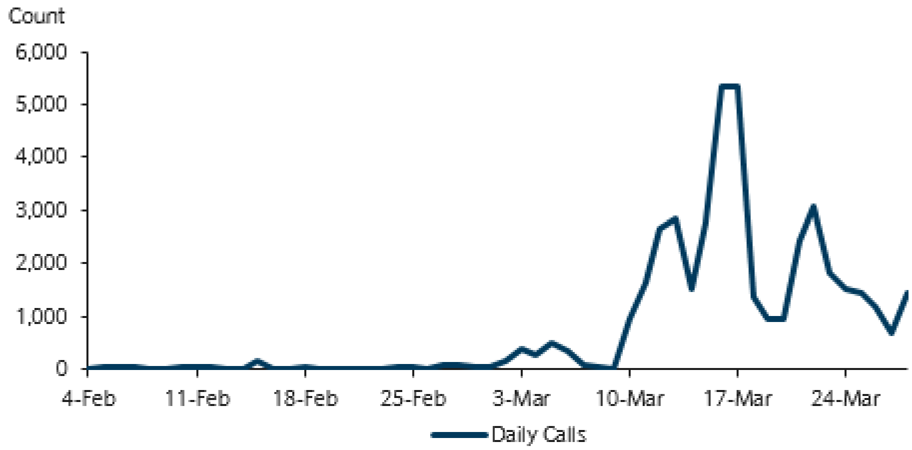
For details about how we look at S&P HQ staffing, see *Data Science High Frequency Indicators: S&P Companies Have Committed to Social Distancing*, March 16, 2020.

NYC 311 Calls for COVID-19 Information

Last week's dip in the number of New Yorkers calling 311 seeking information on COVID-19 has continued into this week and may be an early sign of declining numbers of new infections. The numbers are still substantial, however, suggesting that it remains a significant topic.

FIGURE 16

NYC 311 calls seeking information about COVID-19 have sustained a decline first seen last week



Source: NYC Open Data, Barclays Research

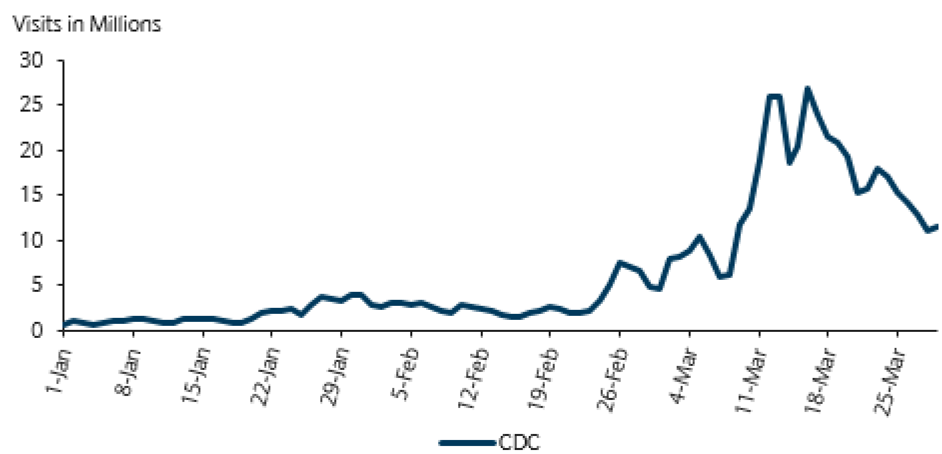
For details about how we look at 311 call volume, see *Data Science High Frequency Indicators: COVID-19 Calls to NYC's 311 Are Starting to Spike*, March 13, 2020.

Visits to the CDC Website

Visits to the CDC website have sustained a decline from their peaks, though (like 311 COVID-19 calls) they remain elevated (Figure 17).

FIGURE 17

Visits to CDC website have now sustained a multi-week decline from their peak



Source: analytics.usa.gov, Barclays Research

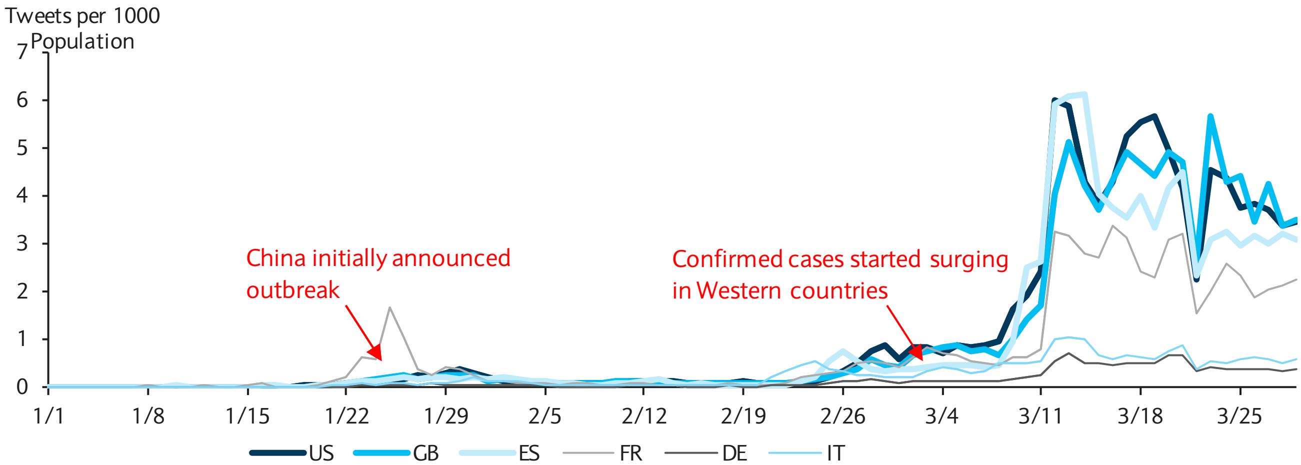
For details of how we look at CDC website traffic, see *Data Science High Frequency Indicators: Visits to CDC Websites Have Spiked*, March 16, 2020.

Twitter

Tweets that are "virus" or "covid" related have continued their steady decline after a sharp uptick for several weeks (Figure 18). They remain at a much higher level than usual, however, suggesting that engagement remains high even if no longer accelerating as sharply. Note that the number of tweets tends to decline during weekends.

FIGURE 18

Population normalized count of “virus” or “covid” related tweets, by country



Source: Twitter, United Nations, Barclays Research

For details about how we look at tweet volume, see *Data Science High Frequency Indicators: COVID-19 Tweet Surges Vary by Country*, March 16, 2020.

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