

#virus

Data Science and Investment Sciences

Social Distancing Is Almost Everywhere, and Working...Slowly

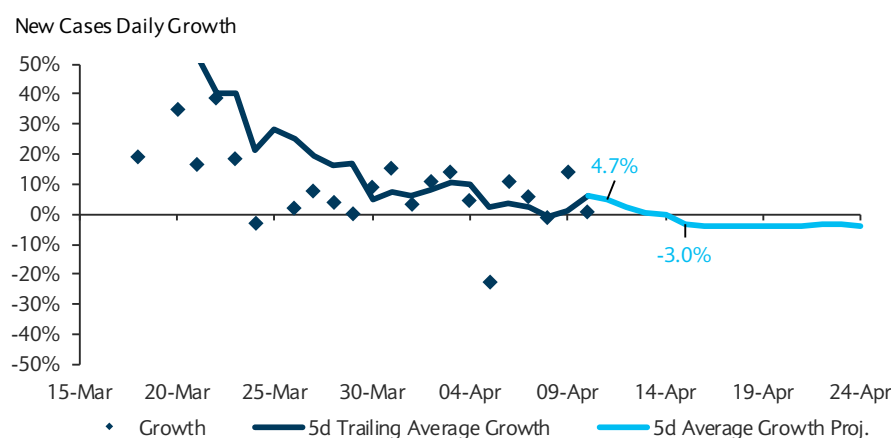
The relationship between social distancing and the growth in new cases of COVID-19 across US states suggests that social distancing has achieved critical scale in most states and that they should expect negative new case growth by late April. But variation in the degree and start date is likely to keep national numbers from turning down sharply for several weeks.

We used the evolution of foot traffic in more than 2mn public places (including restaurants, offices, schools, museums, and many others) as a measurement of social distancing for each state. Then, we compared the five-day cumulative daily growth rate of COVID-19 cases in the state to the reduction in traffic 17 days earlier (to account for average time from exposure to test reporting). There is a statistically significant relationship, as we would expect if social distancing is working.

That model suggests that almost every state has now implemented enough social distancing to turn their outbreaks from growth to decline. However, differences in start date and the degree to which they implemented social distancing mean some states will continue to have growth for several weeks. Even as cases fall for early distancers, in the near term, some of those will be made up for in growth from late starters.

FIGURE 1

Given the different dates that states started social distancing, it is conceivable that the US average new case growth could rise temporarily, even if policies are effective



Source: The COVID Tracking Project, Barclays Research

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Social Distancing All Over

Since the COVID-19 outbreak accelerated in the United States in March, there have been significant differences in the degree and start date of social distancing between states. As a result, it can be difficult to interpret state-level confirmed case growth data as they arrive and place them into the context of what is happening across the United States.

We therefore used geolocation data to create a consistent measure of social distancing for each state. Our starting point was to measure daily foot traffic in a more than 2mn different public places. These include stores, offices, public institutions (museums and tourist attractions), colleges and universities, and a variety of other locations. We exclude agriculture, healthcare, hotels, and postal services because they are likely not representative of the general population experience right now.

Then, we measure the change in daily traffic within each category relative to the baseline activity as of the end of January. We then take the median change across categories for each state. This helps to account for different distributions of activities in different places. For example, Nevada has many casinos, New York has many office towers, and Boston has many colleges. Using the medians identifies a representative experience that does not overweight one type of location.

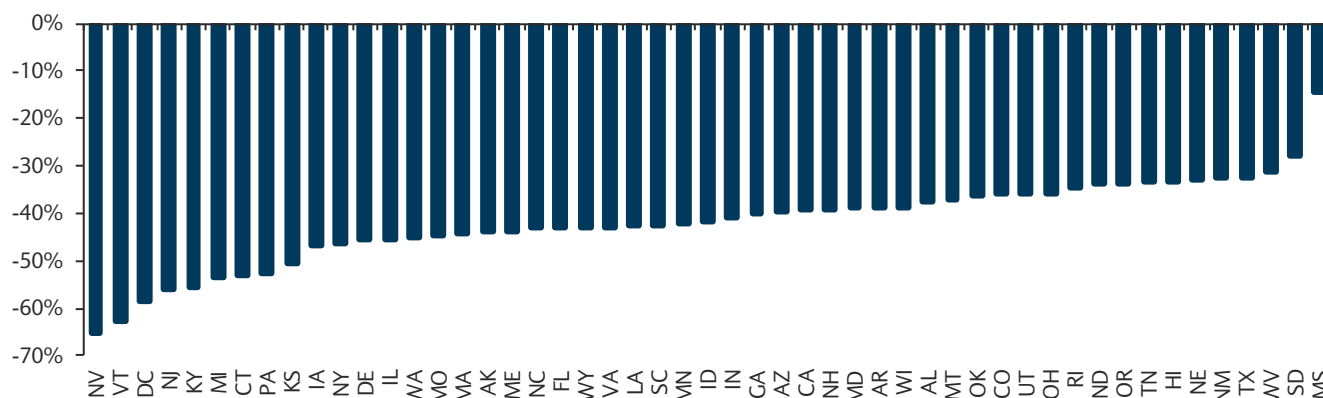
A Figure 2 shows, there has been significant social distancing, with daily traffic to the median public location falling more than 40% in the median state. In other publications, we have noted that with a basic reproductive rate (roughly the number of people who will be infected by each sick individual, R_0) of 2.5-3, to swing the COVID-19 epidemic from exponential growth to exponential decline requires a decline in social interactions of >60%. That is more than we see in almost any state, but this measure does not account directly for social interactions. For example, if a place used to have two people at a time in it, and then traffic falls by 50%, it is possible that it now has only one person at a time (and social interactions would have fallen by 100%). So in general, social contacts will fall faster than traffic in a given location.

Because we can track the evolution of our social distancing measure over time, we can compare it to the evolution of daily growth in confirmed COVID-19 cases. What we find is a statistically significant relationship between the five-day trailing compound daily growth

FIGURE 2

All states in the US except Mississippi have experienced a significant-enough decline in foot traffic in public places to reach negative expected case growth within 2.5 weeks

Public Place Foot Traffic Decline

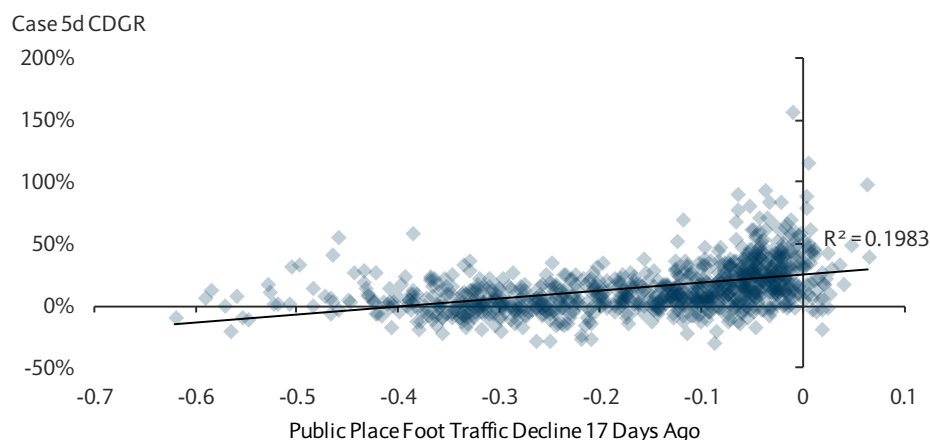


rate (CDGR) and the measurement of foot traffic decline from 17 days earlier (Figure 3). We believe that the 17-day lag is the most appropriate time to measure, given a progression of exposure + 5 days for symptoms, + 7 days to hospitalization (and testing), + 5 days to appear entirely in the average (*Data Science High Frequency Indicators Update: This Week Should Show If Social Distancing Policies Are Working*, March 31, 2020).

The relationship suggests that about a 38% decline in our measure of traffic to public places is the amount needed to tip new case growth into negative territory. Of course, this needs to be treated with some caution: we do not have a lot of data in sample, and in particular we are only now getting datapoints that correspond to the current degree of social distancing. Also, the growth rates are probably distributed more like log-normal than normal, but it is not a significant enough difference to change the results in this case.

FIGURE 3

There appears to be a relationship between case growth and traffic declines at the horizon that we think should show up in the data



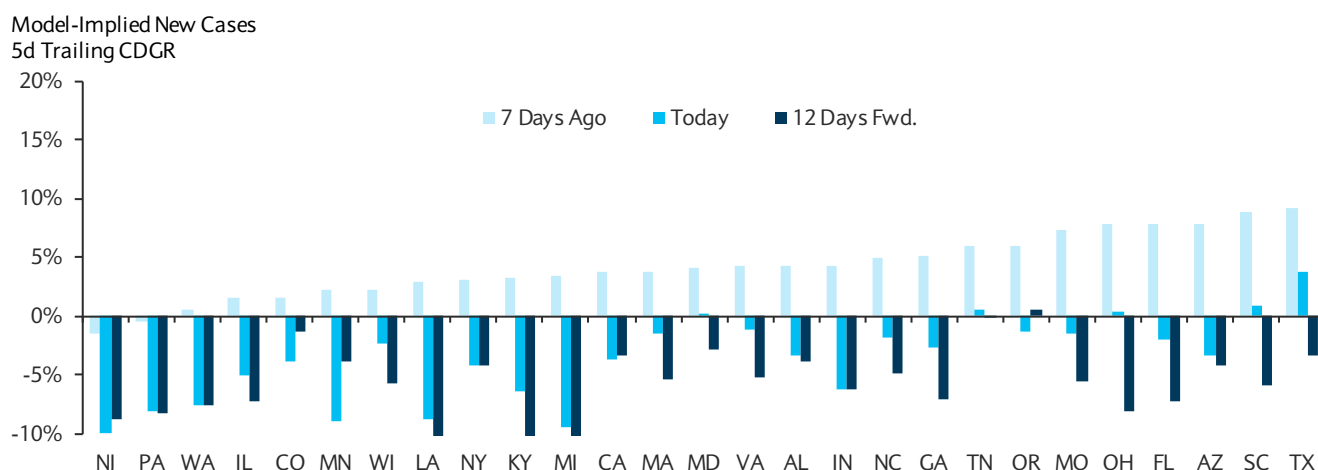
Source: The COVID Tracking Project, Complementics, Barclays Research

We can then apply the parameters of the regression in Figure 3 to the most recent values of public place traffic to estimate where we expect new case growth to be at future horizons (Figure 5). Although the virus entered the public consciousness very suddenly in mid-March, there was some diversity about the degree of social distancing mandated by policy-makers in states and when that distancing started. As a result, there is diversity in how that social distancing would be expected to show up in case growth.

The estimates suggest that all states will remain in positive case growth over the next week. Most would then be expected to tilt into negative territory by two weeks from now, and a few outliers would not be expected to turn down until later. But by early May, every state except Mississippi should have tilted into negative case growth.

FIGURE 4

Of the 27 largest states (accounting for >85% of the US population) none would be expected to experience negative average growth in the next week, but a majority would be negative next week, and most are negative by the following week

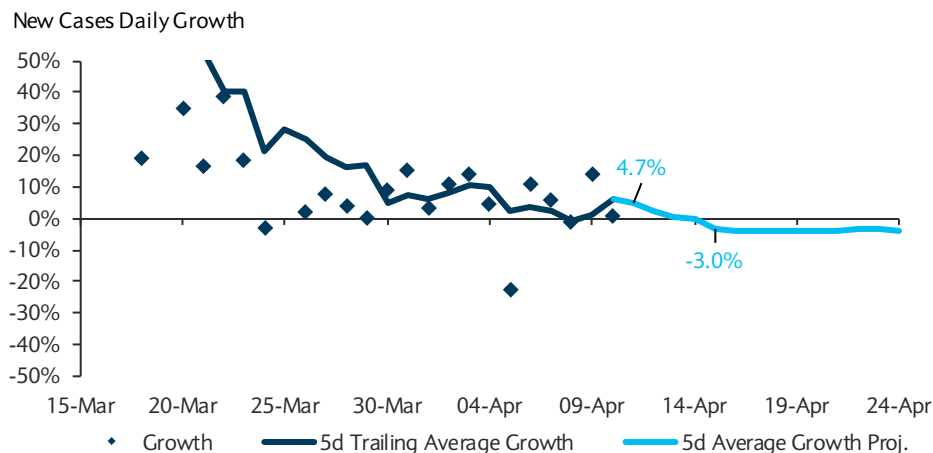


Source: Barclays Research

Many of the states that started social distancing earlier were those that had the earliest cases, in particular, New York. As case growth in those early-moving states has slowed, those declines have been enough to influence the path of growth nationwide. But as the growth in early-distancing states start to slow, some of those that started later will still be experiencing big increases in confirmed infections. As a result, our model suggests the US will experience a second peak in growth. Even though the bump should subside, overall new cases will decline only slowly for several more weeks. While we expect some of the most challenged states to have quicker improvement, a new wave of hotspots appears poised to keep the national picture from looking much better until the end of April.

FIGURE 5

Given the different dates that states started social distancing, it is conceivable that we are in the midst of a temporary bump in case growth, even if policies are effective

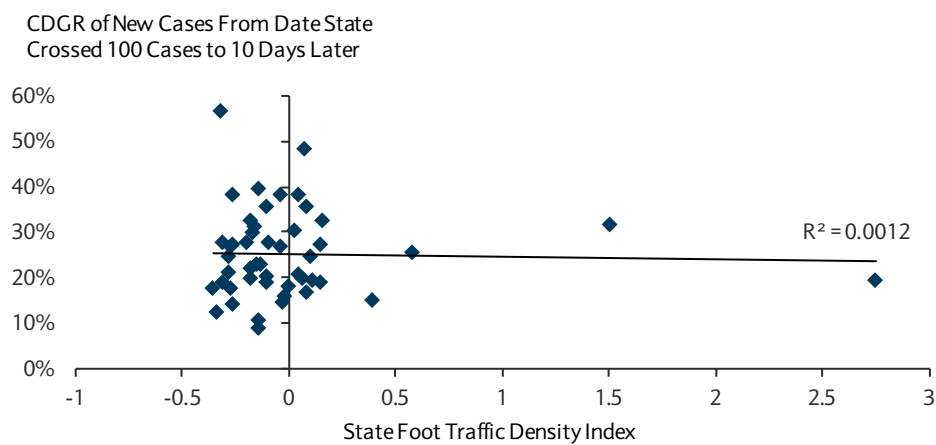


Source: The COVID Tracking Project, Barclays Research

One more observation from these data is that overall traffic density does not appear to be related to case growth prior to interventions (Figure 6, not statistically significant even under a robust regression model). It seems that in practice, even when people live less densely, their normal day-to-day activities provide similarly fertile ground for a virus to spread.

FIGURE 6

We found no clear relationship between density of foot traffic in a state and early (pre-social-distancing) case growth rates



Source: The COVID Tracking Project, Barclays Research

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