



#virus

Data Science and Investment Sciences

Worse, Worsening, But Maybe Not Worst

The US COVID-19 outbreak is still getting worse: The number of US active (confirmed – recovered – deaths) COVID-19 cases has continued to grow exponentially (Figure 5), with especially large jumps in recent days. Emergency visits for influenza-like and respiratory illnesses are now setting new records, at least in New York (Figure 6).

But the US might not be as far behind the curve as feared. Comparisons between the development of the outbreak in Italy and the US are easy to make, and certainly suggest a much worse path ahead. However, looking at per-capita adjustments suggests that the US has taken serious policy action earlier in its epidemic curve, raising the possibility that the peaks will put less stress on the health system. Even so, right now confirmed case growth is dominated by a few cities, and the localized burden on some of them (like New York) can still be much greater than on the country as a whole.

Even since the most significant “stay at home” (or “shelter in place”) orders were issued a week ago, confirmed case growth has continued or even accelerated, but some of the recent growth jumps are likely because of more testing. In New York City, a model that compares positive influenza tests to emergency room visits for flu-like illnesses suggests that the actual number of COVID-19 cases could still be a multiple of the number of confirmed cases.

This is a bad news/ good news situation. On the one hand, it means there are more cases out there (and perhaps many more) than previously thought. But those cases were already there, and now that they are being discovered it is easier to understand the true scale of the challenge and the likely response.

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INDUSTRY UPDATE

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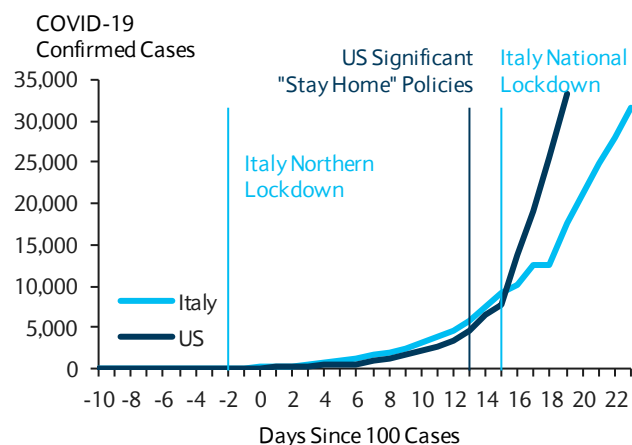
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The US Policy Response Started Earlier Than Italy's, But Dynamics Can Be Different State by State

This past week has been dominated by the potential economic fallout from US policies responding to the COVID-19 outbreak. By most reports, the direct cause of the turn in US policy response, at least in the most affected states, has been fears of overloading the health system.¹ We believe those fears have also been catalyzed by comparisons to Italy as the outbreak has worsened in the US.²

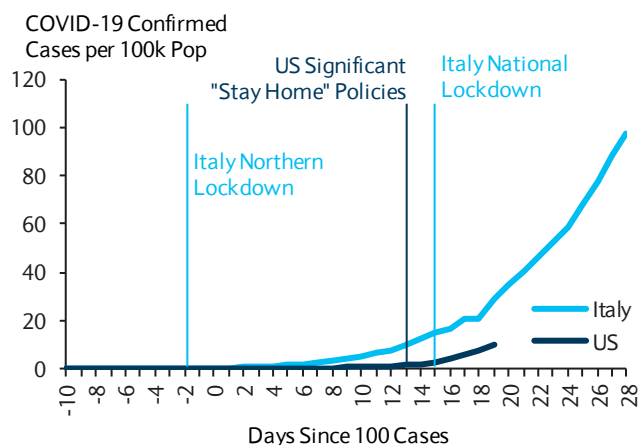
And at first glance, things look similar between the two countries, with potential that the US may be following an even worse path (Figure 1). However, most of these analyses fail to account for the difference in size between the two countries. Adjusting for population suggests that the US started its intensive policy response much earlier in its COVID-19 outbreak than Italy did (Figure 2). That could mean that the population-adjusted peak in infections (and resulting system stress) could be lower in the US than it was in Italy.

FIGURE 1
Analogies Between Case Growth in the US and Italy Are Appealing at First Glance



Source: Johns Hopkins, News Reports, Barclays Research

FIGURE 2
Population-Adjusting Suggests that the US Took Significant Social Distancing Steps Earlier in COVID-19 Outbreak



Source: Johns Hopkins, United Nations, News Reports, Barclays Research

¹ Behind the Virus Report That Jarred the U.S. and the U.K. to Action, NY Times, March 17, 2020

² A Message From Italy: It's Going to Get Worse. Much Worse, Slate, March 19, 2020

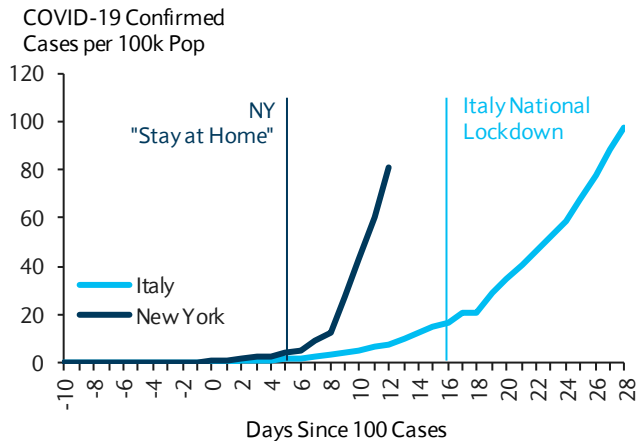
Italy's Coronavirus Response Is a Warning from the Future, The Atlantic, March 8 2020.

Italy's Health System Groans Under Coronavirus – A Warning to the World, March 12, 2020

Italy's Coronavirus Crisis is Possible in the US, Vox, March 12, 2020

FIGURE 3

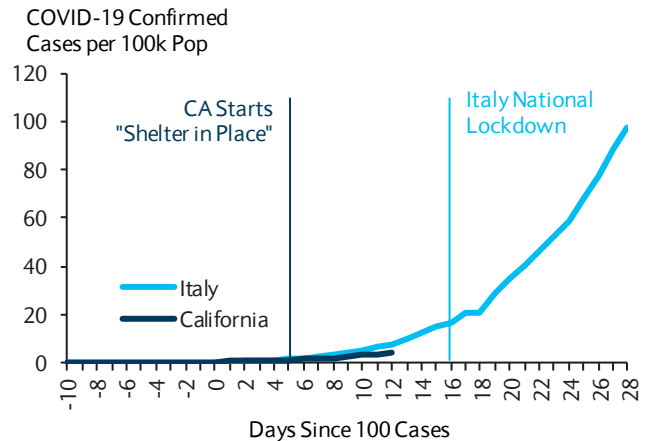
But Some States (like NY) Appear to Have a Faster Acceleration Despite an Earlier Start to Policy Response...



Source: Johns Hopkins, News Reports, Barclays Research

FIGURE 4

...While Others (Like CA) Are Seeing Better Case Trajectories



Source: Johns Hopkins, News Reports, Barclays Research

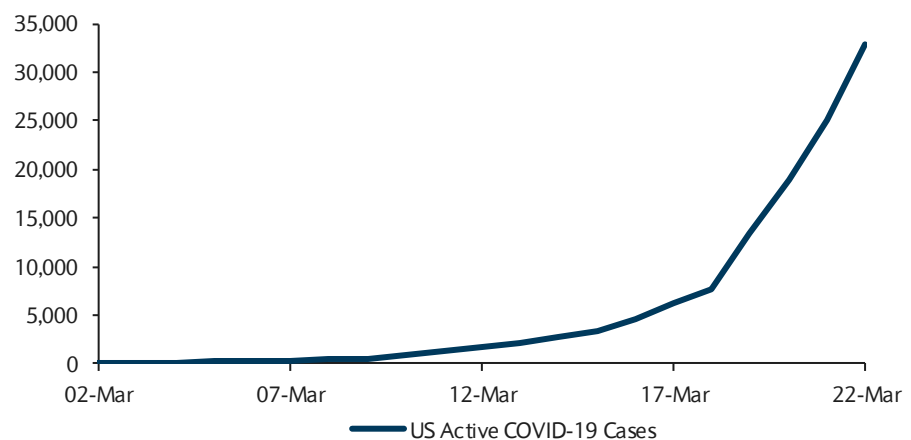
Of course, even with population adjustments, the details of the comparison can show how different things can be. For example, in New York, the governor has been clear that case growth was increased by a ramp up in testing: “Mr. Cuomo attributed much of the jump to an increase in testing. Of the 14,597 people to be tested so far, nearly 5,000 were tested on Tuesday.”³

Health System Stress is Here, and the US Epidemic Curve Has Steepened (But at Least Some is an Acceleration of Testing)

For the moment, however, the number of COVID-19 active cases has continued to grow exponentially, with a significant acceleration in the past several days (Figure 5).

FIGURE 5

The Number of US Cases Continues to Grow Exponentially



Source: Johns Hopkins, Barclays Research

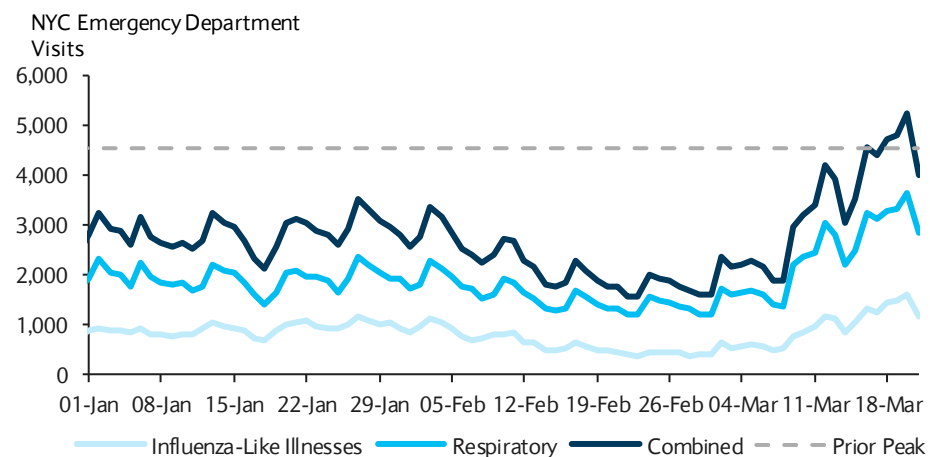
This is especially concerning, because we have also reached the point of sustained stress on the health systems of places where COVID-19 is most advanced, like New York City (NYC).

³ As Testing Expands, Confirmed Cases of Coronavirus in N.Y.C. Near 2,000, New York Times, March 19, 2020

In NYC, essentially every day of the past week has set new records for emergency room visits for influenza-like and respiratory illnesses (Figure 6).

FIGURE 6

NYC Emergency Departments Are Now Setting New Visit Records for Flu-Like and Respiratory Illnesses



Source: NYC Health, Barclays Research

The NYC emergency visit data is especially helpful, because we also have weekly influenza testing data from the city. That allows us to make a COVID-testing-independent estimate of the possible growth curve of the outbreak (and there are other similar estimates already published⁴). We can do that by estimating how many ER visits for flu-like or respiratory illnesses were accounted for by seasonal flu. Allowing our intercept to vary with time of the year, and allowing testing rates to vary with day of the week, we fit a least-squares regression on the week of the year, day of the week, and the number of positive flu tests to get a best model for past ER visits. This specification was

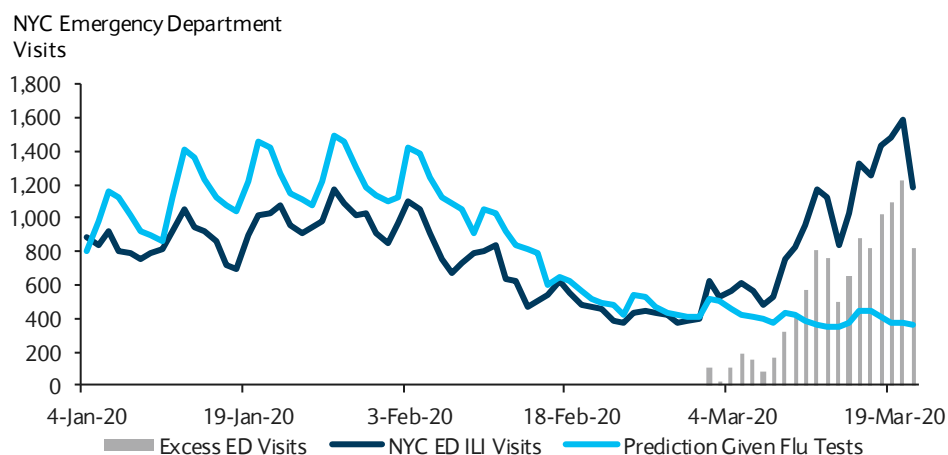
$$ILI\ Visits \sim flu\ test\ positives | day\ of\ week + flu\ test\ positives + week\ of\ year$$

This is a model for the expected number of influenza-like illness (ILI) visits on a given week given the number of flu test positives we've seen. Examining past years, our model usually over-estimates the number of visits.

When we predict out-of-sample forward in time from October 2019 toward the end of January 2020, the model has an R^2 of 0.85. Through the present, the R^2 drops to 0.48. Most of the error comes from the most recent weeks, where we see a large (and increasing) excess of ILI ER visits that we can't account for with positive flu tests. We've shown the excess for these weeks explicitly in Figure 7.

⁴ Real Time COVID-19 Tracking, March 14, 2020, Abe Stanway, Medium

FIGURE 7

NYC Emergency Department Visits

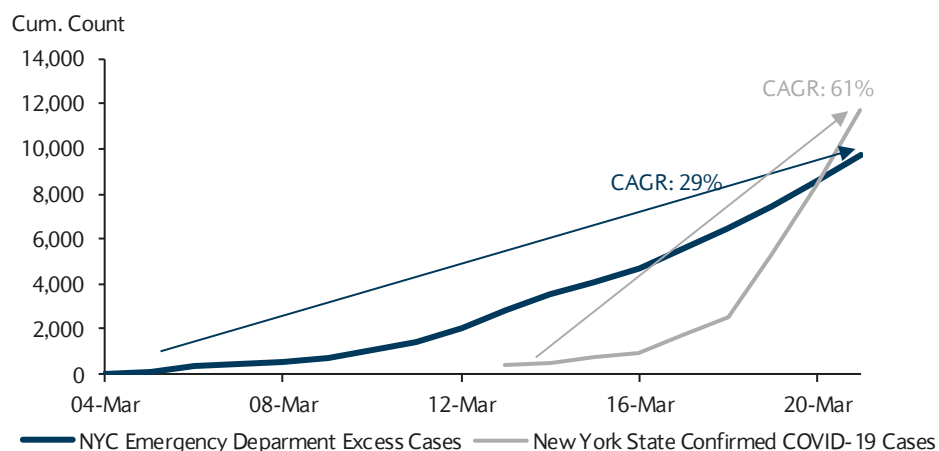
Source: NYC Health, Barclays Research

This difference represents ILI ER visits that aren't explained by common flu – we'll call them Excess Emergency Department Visits. These might be regarded as an upper bound on the visits due to other causes, like COVID-19. It is the upper bound because other factors could be driving people to emergency departments:

- There are other seasonal illnesses (like colds) that have similar symptoms, and;
- Media coverage of COVID-19 could have resulted in a higher visit rate to hospitals when people are sick (or think they might be). They may be quicker to seek out testing and medical treatment than they would have been in the absence of so much attention.

Even with those caveats, the growth rate of Excess Emergency Department Visits (our potential natural proxy for COVID-19 cases) has been only about 2/3 of growth in confirmed cases in New York State, with confirmed cases taking a distinct upward kink in the past few days.

FIGURE 8

NYC Excess Emergency Room Visits have Grown at About Half the Pace of New York State Confirmed COVID-19 Cases

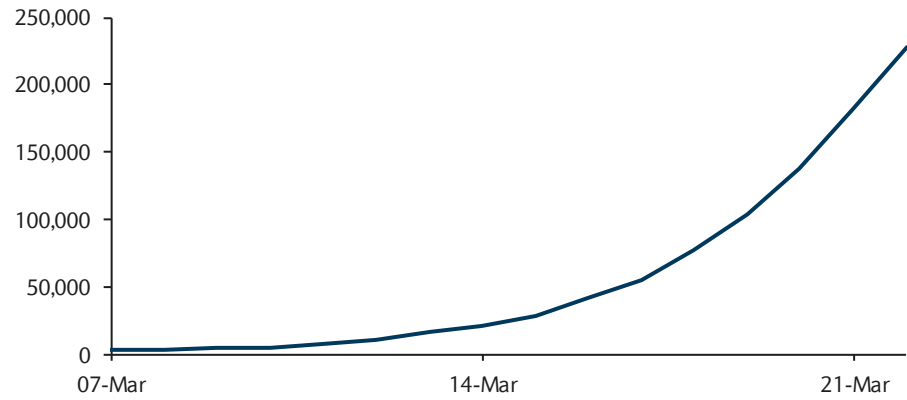
Source: NYC Health, Johns Hopkins, Barclays Research

In our view, it is reasonable to think that at least some of the turn up in case growth rates has been because of an acceleration in testing, which has grown by a factor of 73x in the past two weeks (Figure 9).

FIGURE 9

Testing Volumes in the US Have Ramped Up Exponentially As Well

US COVID-19 Tests



Source: covidtracking.com, Barclays Research

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