



In the Numbers: How Lockdowns Prevent Breakouts By Michael Lieberman

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Patience in lifting coronavirus restrictions is paying off all over the United States. Travel data on lockdown states show that late reactions and lifting lockdowns too early can have deadly consequences.

In January it was a note in a foreign news story. In February we began to notice. While attending the Quirk's Event March 2-4 in Brooklyn no one was talking about it. On March 11 the World Health Organization declared an international pandemic.

Different states reacted differently. Some locked down immediately, closed their school districts, and ordered their residents to stay at home. Others states acted less decisively. Then re-opened more quickly.

As a result, the spread of the coronavirus, which we will refer to as Covid, has been profoundly different in varying states.

We are going to look at six states, gauge their different travel responses using tracking data supplied by Geopath, and then draw a conclusion from the tables we see that will draw a data-driven conclusion. Different reactions and attitudes, along with the travel data, will show bending the curve in New York State, maintaining a relatively low infection rate in Washington State, but surging new Covid cases in three southern states and Arizona. These have led to disaster-level rises in Texas and, particularly, Florida.

First, some explanations. We will be examining three travel statistics supplied by Geopath that cover the immediate pre-Covid and Covid period. These are:

- Median Miles Traveled Per Day
- % of People Not Leaving their home daily
- % of People traveling more than a mile from home daily

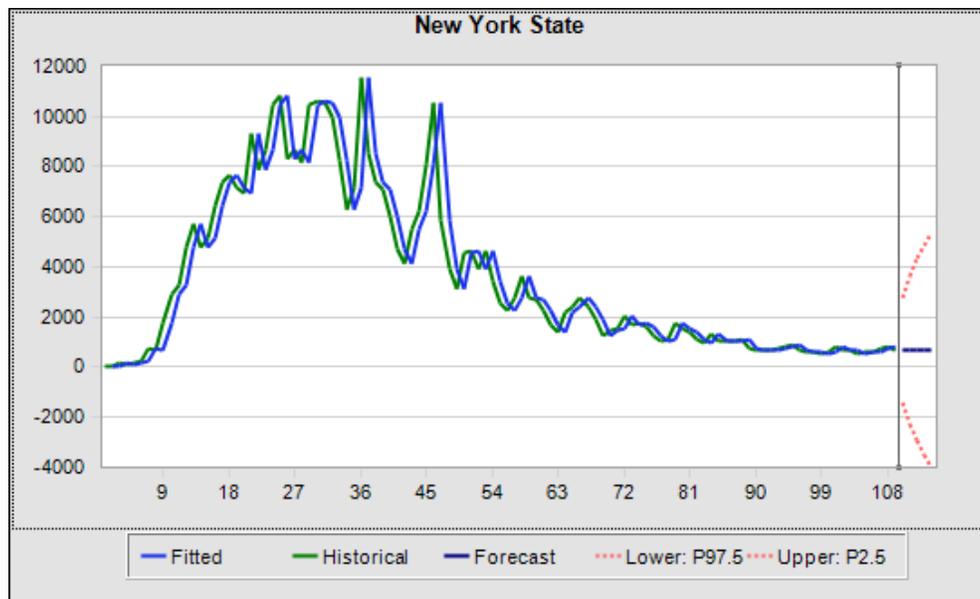
To analyze new cases, we use an Arima time-series model. This model takes new cases per state beginning March 11, 2020, and fits a statistical model based on New Covid Cases (blue lines in the charts), then estimates new cases for the next 5 days. When examining Arima charts, the shape illustrates the current trend of new Covid cases in the states we are examining.

New York and Washington State

Washington State was the first state to have a serious Covid outbreak. New York became a worldwide epicenter due to people traveling through New York airports from Europe, the source of the main Covid spread in the New York Metropolitan area.

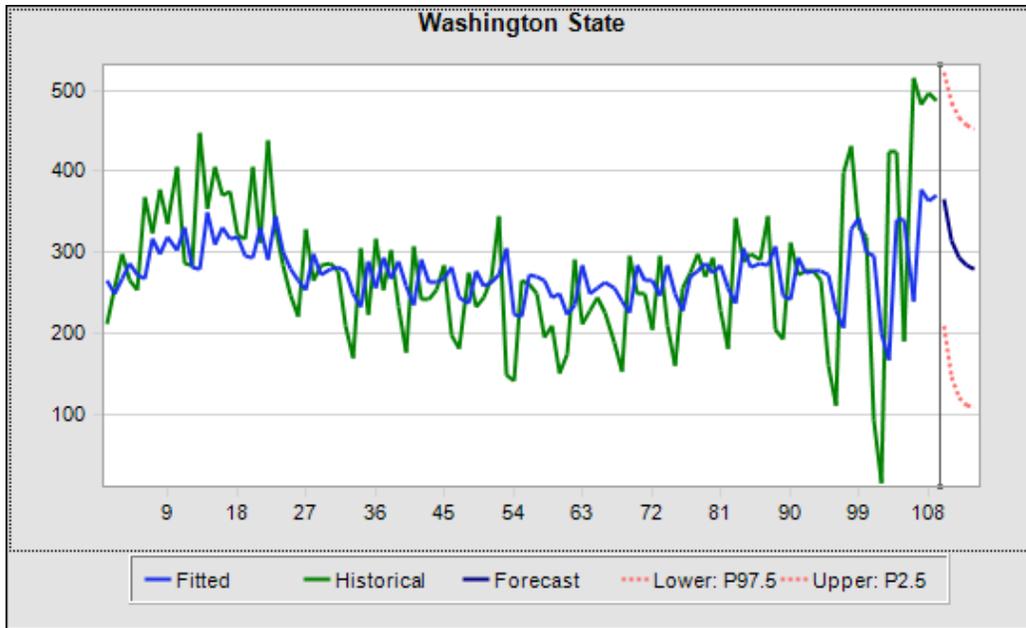
	New York State		Washington State	
	December 30, 2019 March 10 2020	Covid Period	December 30, 2019 March 10 2020	Covid Period
Median Miles Traveled Per Day	13.5	11.5	13.1	12.5
% of People Not Leaving their home daily	23.3%	33.8%	25.0%	32.7%
% of People traveling more than a mile from home daily	76.7%	66.2%	75.0%	67.3%

In New York State traveling and work from home percentage shifted profoundly from the pre-Covid to the Covid period. They drove on average less miles less per day—a significant change. People stayed at home. Working from home percentages rose dramatically (10.5%) and traveling more than a mile from home dropped dramatically (10%). This is not surprising in a densely populated area like New York City where work from home orders were quickly obeyed. Those with summer residences fled the city, and Governor Cuomo swiftly locked down the state. Nearly one-third of the state’s population have not traveled one mile from where they are hunkered down.



As a result, New York State has bent the curve. The model estimates approximately 700 new cases statewide, down from nearly 12,000 at the height of the epidemic.

Washington State is less dense than New York State. Still, there was a significant jump (7%) of people working from home and a significant drop (8%) of people traveling beyond a mile from their homes.



The Arima graphs shows that Washington State has leveled the curve, though there has been an uptick in the past month in the rural, eastern part of the state. Estimated new cases per day have remained steady around a modest 300 per day.

Arizona and Florida

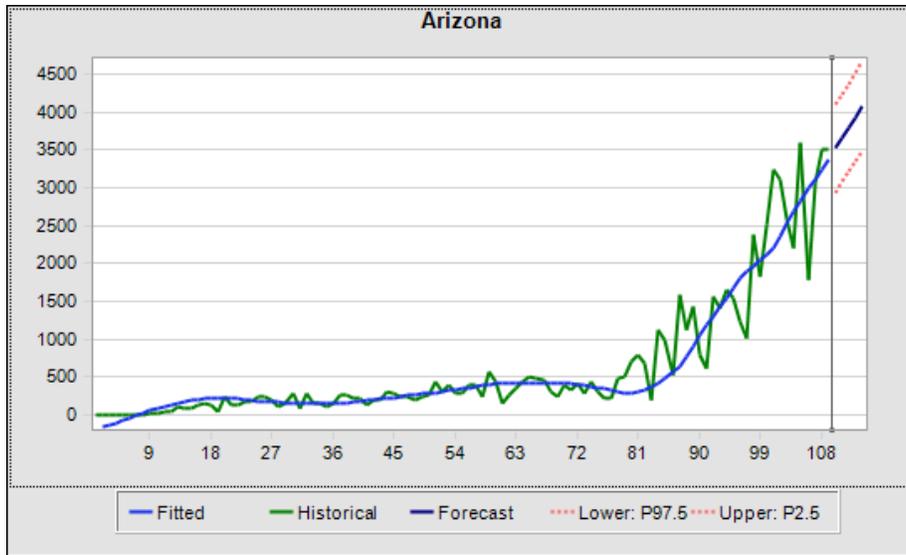
Arizona and Florida’s response to the pandemic was more tepid than New York State and Washington State. These states are more wide open and politically conservative. They have lower percentage of people working from home pre-than New York and Washington, and higher percentage traveling pre-Covid.

	Arizona		Florida	
	December 30, 2019 March 10 2020	Covid Period	December 30, 2019 March 10 2020	Covid Period
Median Miles Traveled Per Day	17.2	16.9	17.4	16.0
% of People Not Leaving their home daily	20.5%	28.6%	18.0%	24.8%
% of People traveling more than a mile from home daily	79.5%	71.4%	82.0%	75.2%

Changes in traveling behavior for these two states is not much different from Washington State. The percentage shifts in working from home for Arizona (8%) and Florida (7%) are close.

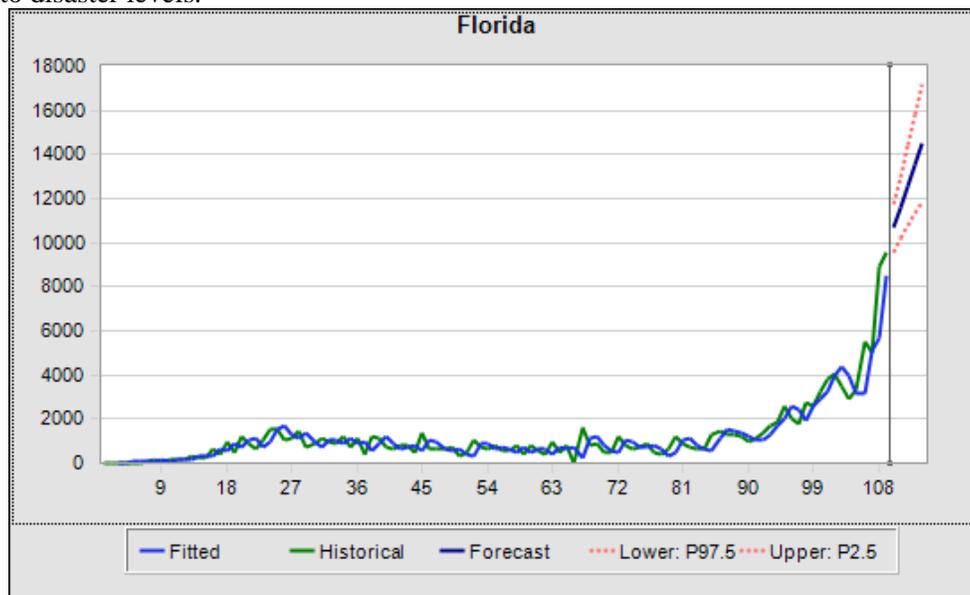
Arizona and Florida moved quickly to allow bars—now known to be particularly dangerous spreading events—to open. The results are explosions of the virus in both states.

Arizona was slower to close down and far quicker to open up than many other states. Also, it was far from the first great epicenter of the virus (New York City) and, thus, had a relatively slow growth rate until three weeks ago.



The estimated Arima curve shows an exponential explosion of the virus over the past 21 days. Estimated new cases in Arizona are begin at 3,500 per day, with the forecast showing 4,000 new cases per day five days later.

Florida has been the scene of the most intense resistance to mandatory mask wearing in public spaces. In addition, Florida was slow to close down and quick to re-open. It has also experienced a dramatic surge in new cases to disaster levels.



The Arima model shows a steep exponential rise in new cases in Florida at the end of June. The model estimates 10,688 on day one and 14,529 on day five.

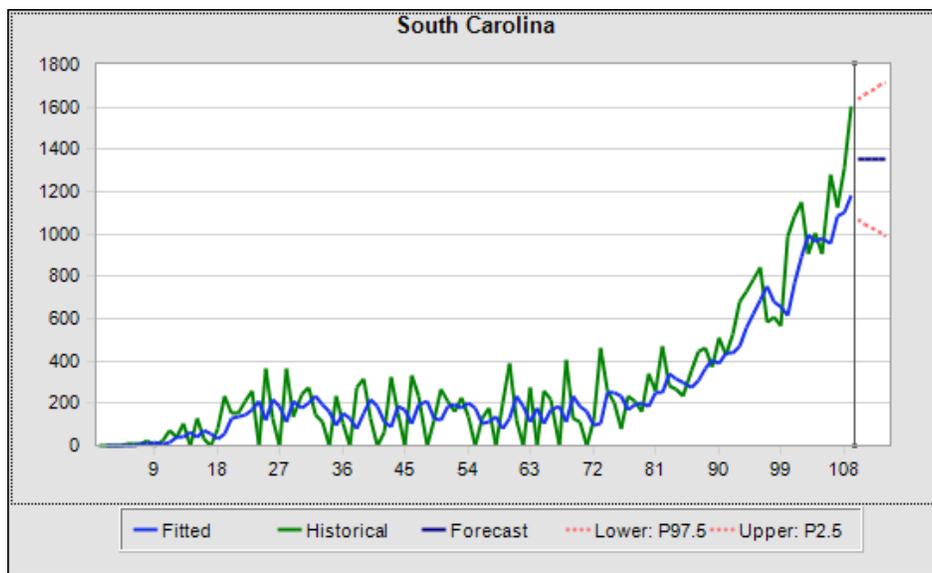
South Carolina and Texas

In South Carolina and Texas, travel changes were very small comparing the pre-Covid and Covid periods. In South Carolina 15% of people were working from home. That number grew to 20% during the Covid period. In Texas 17% of people worked from home; that grew to 22%.

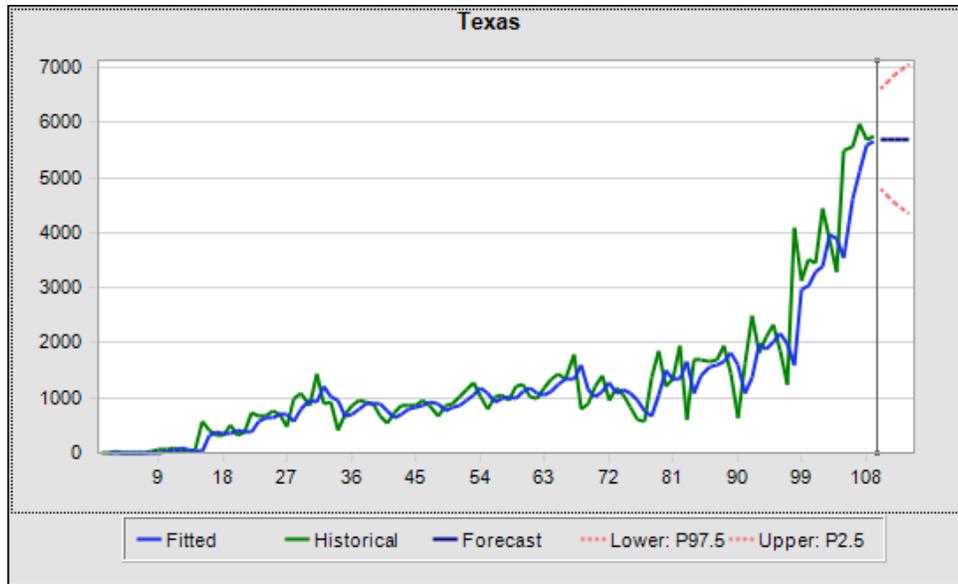
Both of these states are very heavily traveled. That only shifted down around 5% in the Covid period—not a profound change of behavior.

	South Carolina		Texas	
	December 30, 2019 March 10 2020	Covid Period	December 30, 2019 March 10 2020	Covid Period
Median Miles Traveled Per Day	17.2	16.8	20.0	19.9
% of People Not Leaving their home daily	15.4%	19.9%	16.7%	21.8%
% of People traveling more than a mile from home daily	84.6%	80.1%	83.3%	78.2%

The curve in South Carolina is exponentially distributed. The numbers of new cases, like in other conservative states, is growing. Estimated new cases in South Carolina are 1,350 per day.



In Texas cases are also growing. Estimated new cases per day in Texas are 5,700 per day.



As shops and schools shut and nearly all travel ceased, hundreds of millions of people across the country have suddenly found themselves locked down and unemployed. The impact on the economy and politically conservative leaders are one reason that states like Arizona, Florida, and Texas were slow to close down. Our travel data is consistent with these attitudes. It has led to new restrictions in Texas and disaster in Florida.

Editor's note: Michael Lieberman is founder and president of Multivariate Solutions, a New York consulting firm offering comprehensive statistical consulting. He can be reached at 646-257-3794 or at michael@mvsolution.com.