

# Containment policy certainly reduces death, but does it also mitigate recession?

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## Introduction

The recent COVID-19 crisis presented tremendous challenges for policymakers of governments around the globe, as they struggled to balance between public health and economic recovery. Stringent lockdowns that effectively curb infections and death tolls also put most economic activities to a halt, inciting doubts and repercussions among both government officials, as well as, ordinary folk whose lives are disrupted. Increasing opposition, even in forms of protests towards lockdowns are being observed across the country.

My project aims at showing with analytical evidence that the containment measures are necessary sacrifices to make, even for the purpose of the economy: the administrative bodies that take proper containment measures, though superficially paying a huge economic cost, would overall be hit not as hard as those reluctant to act.

## Theory and Methods

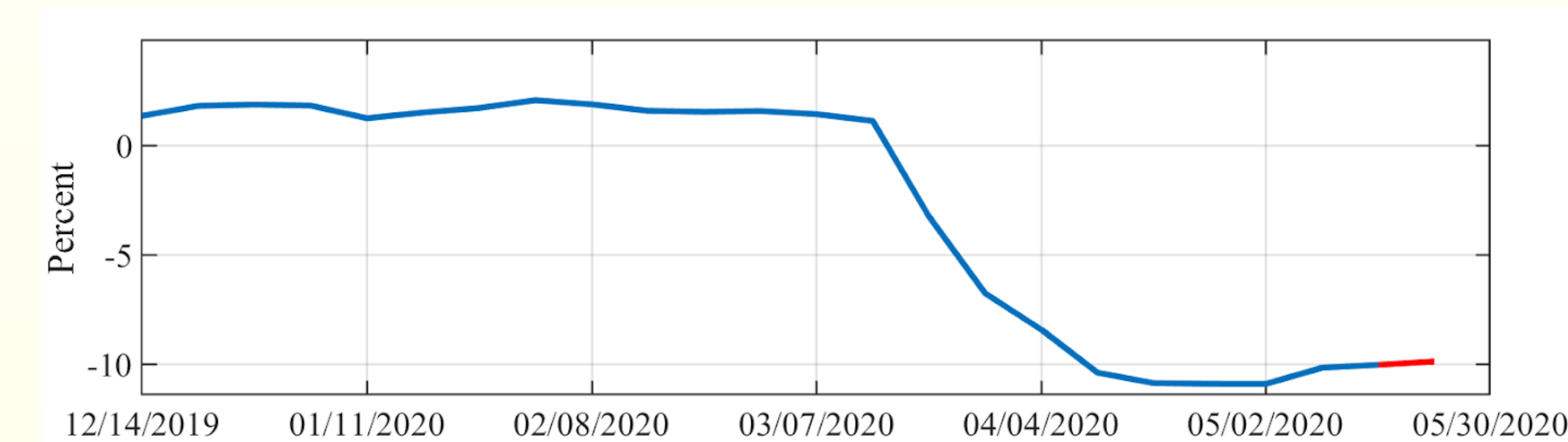
The base frame of the study is based on the macroeconomic SIR(susceptible-infected-recovered) model where each type of people still completes their own version of consumer maximization problem while the government still needs to balance its budget constraint. Consumption and labor markets still have to be cleared:

$$S_t C_t^s + I_t C_t^i + R_t C_t^r = A N_t$$
$$S_t N_t^s + I_t N_t^i \phi + R_t N_t^r = N_t$$

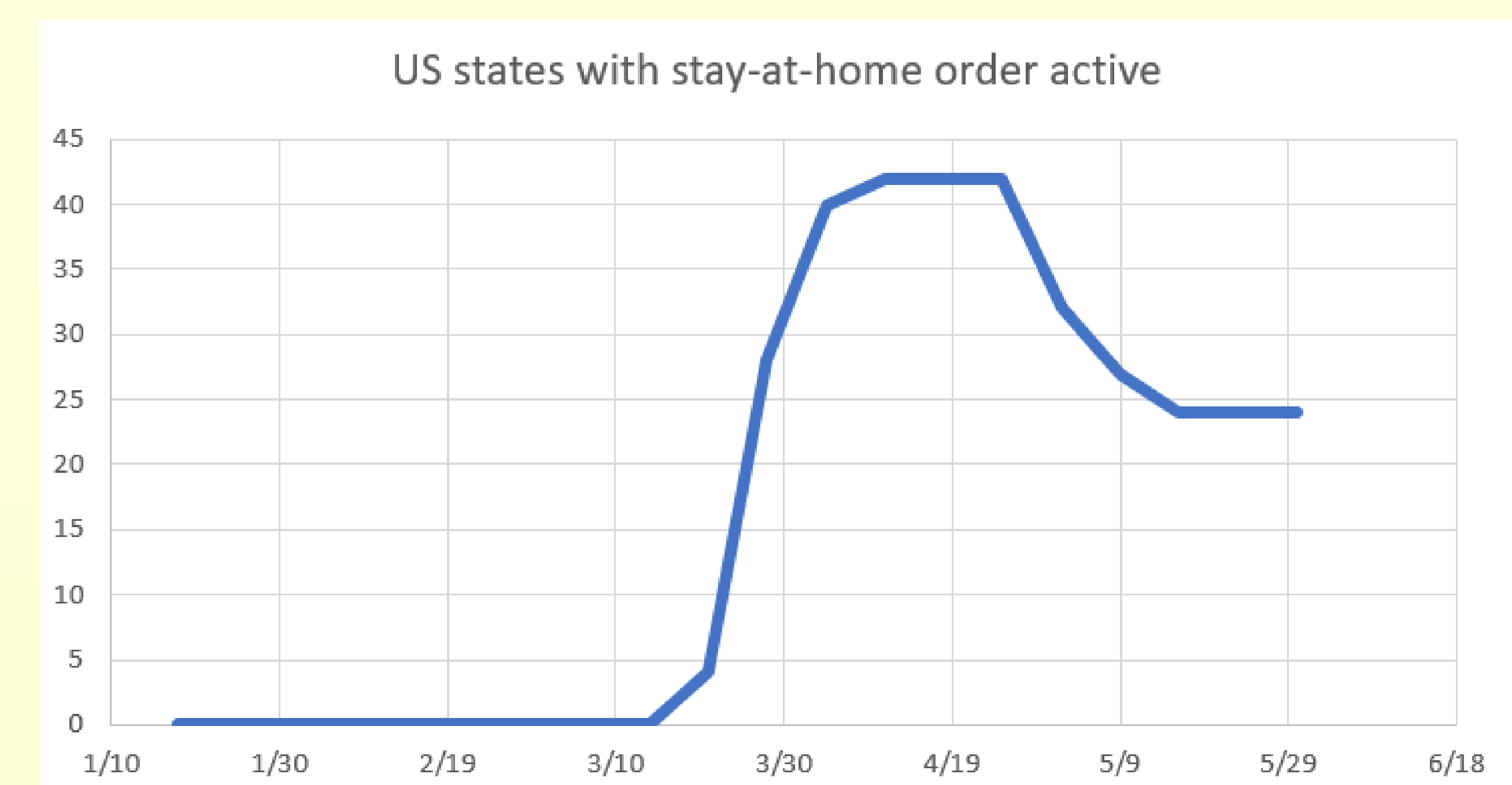
here  $S_t$ ,  $I_t$ ,  $R_t$  are proportions of the each people type and  $C_t^s$ ,  $C_t^i$ ,  $C_t^r$  are their corresponding demand functions;  $N$  refers to the working hours whereas the productivity of the infected is discounted by constant  $\phi$ .

The containment measure impairs the economy by reducing the working hours of the susceptible and the recovered; however, it must be noticed that it not only in the short run reduces the proportion of the infected but also in the long run curtails the duration of the epidemic. Thus in addition to discerning its negative effects, I hope to identify its positive effects to the economy.

The statistical experiment is designed to apply tree-based methods on economic indicator data and containment indicator data in the United States to tell if the latter positively effects the economy under controlled variables. The data is longitudinal over a 20-week period since the end of January 2020, when the outbreak first occurred in Washington and an State of emergency was declared. The economic indicator employed is the Weekly Economic Index by Jim Stock:



While the containment indicator is reflected by the national intensity of lockdown, calculated by the fraction of states with lockdown orders implemented, and the people's support/comply level to the orders, calculated by word processing of scraped social media news and counting of positive/negative response to the orders.



## Results and Discussions

With the current construction, though an association between high levels of lockdown and smaller economic decline can be established using a classification tree with random forest built in, same can be said for low levels of lockdown. Ideally after ruling out the effects of lockdown on the healthy population, the model should indicate that high levels of lockdown would point to less decline. Unfortunately given the small duration of the data covered, only an ambiguous statement that lockdowns do have some positive effects can be reached. However, it cannot be determined that the overall net effect is positive.

The next step to improve the shortcomings of this basic model is to apply geographic data as soon as the BEA releases the first season economic data for each US states. Then more sophisticated distinctions can be made across different states as each varies greatly in details of the containment measures. As of now the limitations of data access forces a rather inaccurate approximation on the national level where using the proportions of states with lockdown is quite flawed in many ways. Obviously, it only counts the administrative bodies and neglects the demographic or geographic parameters covered; it also does not reflect specific infection numbers within each states. Essentially it is a compromise made under the given circumstance.

## References

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The weekly update of the weekly economic index is accessed on <https://www.jimstock.org/>

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