

Shuyi Yang

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## Literature Review for Project

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, two vital goals that seem incompatible. 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 and ordinary folk whose lives are disrupted. 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 severely as those reluctant to act.

The point may seem straightforward to explain but has not been thoroughly explained in past literature, partially since that pandemics of such a scale, hitting human activities this hard, are novel occurrences of this century. Earlier quantitative literature studying the economic consequences of epidemics argues that such effects are negligible. Bloom and Mahal (1995) study the effects of AIDS on certain African countries' economic growth by regressing GDP and population growth on HIV and AIDS parameters and concluded that little evidence exists showing that this epidemic negatively impacts growth; Beeson and Troesken (2006) studied multiple regional epidemics in the American history to explore how a bioterrorism attack may affect the economy and likewise concluded that such epidemics had neither short or long term economic effects. Clearly, these results do not apply to the world today where the increasingly convenient transport of people and goods makes economies more dependent on each other and epidemics more rapacious. The studies used data either too antiquated such as plagues in the 17th or 19th century, or too underrepresenting since the epidemic was confined to a rather limited region. If their reasoning is to be followed, then there is no real need for containment measures at all, which is quite absurd.

The late H1N1 influenza and recent COVID sparked more academic interests to investigate their consequences on the economy. Even with the previous data on historical pandemics, new models and fitting methods produced different implications. Barro, Ursua, and Weng (2020) compares the ongoing epidemic with the Great Influenza Pandemic (the Spanish Flu) and makes a probable prediction for the scale of COVID's economic repercussions. Jorda, Singh, and Taylor (2020) is a more systematic project that parametrizes the epidemics' macroeconomic effect by using data on interest rates. It examines many historical cases since the 13th century in England and by applying the local projection estimator, concludes that the aftermath of epidemics is associated with low asset returns and thus reduced investment levels.

These few mentioned above more or less focused on the broad economic picture, whereas my research goal is confined to a smaller scale and involves the influences of containment measures. I shall base my model on a series of economic models forecasting epidemics with the basic SIR model in their core. Yoo, Kasajima, and Bhattacharya (2010) devised a model to measure how various government interferences, including containment, vaccination development, and medical preparedness, impacted the spread of the H1N1, and later models used similar methods. Two recent papers are in particular attention: both Eichenbaum, Rebelo, and Trabandt (2020) and Avery et al. (2020) develop their unique variations of the SIR model to accommodate additional factors such as the containment. Eichenbaum, Rebelo, and Trabandt's model discerns how massive containments curtail the economy and makes predictions on the size of the change. I shall construct my model on its foundation as it is already quite comprehensive. In addition, Avery et al. take a step ahead in pointing out several crucial factors previously unnoticed: for instance, as the businesses struggle through the containment period there are costs for shutdown and reopen; another issue is that the intensity of containment is not only determined by how the government implements it but also by how the people abide it, which is more difficult to quantify. Summarizing all the above effects into a predictive model is a challenging yet fruitful work that many researchers are currently pursuing.

My project is to complement the literature in two important aspects. First of all, as impressive as many of the predictions made by these models are, they are largely constructed by

Markov simulations alone and are without the support of actual data collection. An analytical work that examines their theories is still missing and I wish this gap filled. And more importantly, while all the previous work interprets the containment measures as a negative factor only, I wonder if compared with a different baseline, where such measures are less effectively or ineffectively employed, containment measures would be proved to be protecting the economy from the further debacle.

For this project to be possible, it is essential that data for both the economic indicators and containment levels are properly gathered. Given the current unavailability of the data from the Bureau of Economic Analysis and its lack of frequent updates, a potential candidate for our economic indicator is a weekly economic index devised in Lewis, Mertens, and Stock (2020). The algorithm provided by Lewis, Mertens, and Stock takes into consideration a wide variety of sub-indices ranging from consumer and employment status to steel and fuel production, making the index impressively representative of the economic situation, as the robustness check on past data shows. And though it might be confusing on how to measure the containment levels at a glance, the method used in Hassan et al. (2020) could offer some inspiration. This study applies computational linguistic algorithms to analyze firms' earnings calls text and translate them into quantitative characters to determine to what degree the firms were hit by the epidemic. In a similar fashion, I can determine a certain region's containment level by applying the linguistic algorithm on both the local government's epidemic response briefing and a selected representative sample of the residents' social media posting. A combination of the two should more accurately reflect the effectiveness of the containment.

Much of the project's emphasis is to find empirical evidence to support or slightly adjust the theories in the existing literature. While the task may sound quite simple, it may take some innovation in the data gathering methods to make it viable. Hopefully, a work reinforcing its predecessors and inspiring further explorations can be produced.

## Reference

Bloom, David E. & Mahal, Ajay S., 1997. "Does the AIDS epidemic threaten economic growth?", *Journal of Econometrics*, Elsevier, vol. 77(1), pages 105-124, March

Beeson, Patricia E. , Troesken, Werner, "When Bioterrorism Was No Big Deal", NBER Working Paper No. 12636, Issued in October 2006

Yoo, Byung-Kwang , Kasajima, Megumi, & Bhattacharya, Jay, "Public Avoidance and the Epidemiology of novel H1N1 Influenza A", NBER Working Paper No. 15752, Issued in February 2010

Jordà, Óscar, Singh, Sanjay R., & Taylor, Alan M., "Longer-run Economic Consequences of Pandemics", NBER Working Paper No. 26934, Issued in April 2020

Atkeson, Andrew, "What Will Be the Economic Impact of COVID-19 in the US? Rough Estimates of Disease Scenarios", NBER Working Paper No. 26867, Issued in March 2020

Eichenbaum, Martin S., Rebelo, Sergio, & Trabandt, Mathias, "The Macroeconomics of Epidemics", NBER Working Paper No. 26882, Issued in March 2020, Revised in April 2020

Avery, Christopher, Bossert ,William, Clark Adam, Ellison Glenn, & Ellison, Sara Fisher, "Policy Implications of Models of the Spread of Coronavirus: Perspectives and Opportunities for Economists", NBER Working Paper No. 27007, Issued in April 2020

Lewis, Daniel, Mertens, Karel, & Stock, James H., "U.S. Economic Activity During the Early Weeks of the SARS-Cov-2 Outbreak", NBER Working Paper No. 26954, Issued in April 2020

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