1. Title: COVID-19 and Testing

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3. Abstract
The coronavirus disease 2019 (COVID-19) epidemic began in Wuhan, China in December, 2019, and has spread worldwide. To evaluate possible intervention policies, many economic COVID-19 studies are done based on the SIR framework, which is a Markov model of the spread of an epidemic. A standard SIR framework captures successive transition from being susceptible to catching the virus (S), to exposure to the virus (E), becoming infected (I), and to being recovered or die (R). When applying to data, official record of infection is treated as the actual counts. In countries where testing rate is high, such as Denmark and South Korea, this framework is suitable in guiding intervention policy. Figures 1 and 2 show the number of tests administered per thousands of people from the first day of a known infection and death respectively. A casual glance tells that testing rate is far from being uniform across countries. The slow testing speed in the U.S. in the early days may set stage to the severity of viral transmission: for those who are not tested and particularly asymptomatic, they may unknowingly spread the virus and/or may be less conscientious in quarantining themselves.(e.g. hold covid-parties).

This paper aims to shed light on the extent of the testing speed in contributing to the spread of the pandemic in the U.S. in an upgraded SIR framework. I use this simple framework to match the U.S. data. I collect information on the counts of tests, infection, recovery, and death in the U.S. at the county-level for the period of Mar 22 to April 18, 2020. I merge this information with with demographic information from the American Community Surveys. I calibrate the model, evaluate alternative assumptions in the SIR framework, and then assess alternative intervention policies.
4. Data description
I collect information from the John Hopkins University on the counts of tests, infection, recovery, and death in the U.S. at the county-level for the period of Mar 22 to April 18, 2020. I merge this information with demographic information from the American Community Surveys.

5. JEL codes for the project: I10, C61

6. Key-words: testing, U.S., Epidemic, COVID-19, reproduction number, SIR model