1. Title

Lock-down or Let-it-flow: A Spatial Analysis of COVID-19 on Chinese Economy

2. Authors and affiliations and contact emails

Minjie Deng,
Ph.D. Candidate in Economics, Department of Economics, University of Rochester
Email: minjie.deng16@gmail.com

Min Fang,
Ph.D. Candidate in Economics, Department of Economics, University of Rochester
Email: min.fang@rochester.edu

Chang Liu,
Ph.D. Student in Economics, Department of Economics, University of Rochester
Email: changliu@rochester.edu

Tianchen Song,
Ph.D. Candidate in Economics, Department of Economics, University of Rochester
Email: tsong8@rochester.edu

3. Abstract

This paper studies the impacts of the outbreak of the COVID-19 and the lock-down policy on the Chinese economy. Combining the changes of daily migration flow data, industrial outputs data, population census data, and a spatial equilibrium model, we quantify the impact of the lock-down policy on the spatial spread of Coronavirus as well as regional economic outputs. We first show that the lock-down policy significantly reduces the economic outputs of cities that lost a massive number of migrant workers as well as the spread of Coronavirus in these larger cities. We then build a spatial equilibrium model featuring migration with heterogeneous skills, endogenous medical constraints, and endogenous virus spreading paths. The model combines the Gravity model in Ahlfeldt et al. (2015) and the SIR model in epidemic studies to quantify the welfare trade-off from different policies. Our quantitative results indicate that a very restrictive lock-down policy generates a massive economic loss initially comparing to what we call the let-it-flow policy, which almost does not restrain population flow. However, the let-it-flow policy causes much more persistent economic damage comparing to the lock-down policy. Therefore, the welfare gain from the lock-down policy depends on the medical constraints and the SIR characteristics of the virus. Feeding the current population flow, medical conditions, and virus characteristics data into the model, we show that the lock-down policy is superior to let-it-flow policy in China. Our quantitative results also indicate that there are distributional effects among workers with different skills, and there is room for potential welfare improvement from a counterfactual partial lock-down policy.

4. Data description
Baidu Map Daily Population Flow Data, Jan 2019 --- Apr 2020 (updating daily)

Population Census of People’s Republic of China, 2010

City Statistics Yearbook of China, 2018

Industrial Outputs at city/province-level, Jan 2019 --- Feb 2020 (updating monthly)

5. JEL codes for the project

E24, J24, J61, R23, R31;

6. Keywords

COVID-19, Epidemic, Lock-down, Migration, Gravity;

7. Primary Contact

min.fang@rochester.edu