

Research Question

The Effects of COVID-19 on Global Economics

At the standpoint of China, estimate the potential short term (and long term) effects of COVID-19 on global economics, based on GTAP database.

Here domestic refers to China.

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Significance & My contribution

Significance

- Quantify the potential global economic costs of COVID-19
- Provide guidance to policy makers to the economic benefits of globally-coordinated policy responses to tame the virus. (McKibbin, W. J., & Fernando, R., 2020)

Contribution:

- Try to find out the short term (and long term) effects of COVID-19 on global economics, especially given the facts that COVID-19 has infected the world.
- Discuss the policy implementation given current circumstance.



Based on current information

Literature review

Major references:

- McKibbin, W. J., & Fernando, R. (2020). The global macroeconomic impacts of COVID-19: Seven scenarios.
- Lee J-W and W. McKibbin (2004) “Estimating the Global Economic Costs of SARS” in S. Knobler, A. Mahmoud, S. Lemon, A. Mack, L. Sivitz, and K. Oberholzer (Editors), *Learning from SARS: Preparing for the next Outbreak*, The National Academies Press, Washington DC (0-309-09154-3)
- Wen, Y., Zhang, T., & Du, Q. (2020). Quantifying the Covid-19 Economic Impact.
- McKibbin W. and A. Sidorenko (2006) “Global Macroeconomic Consequences of Pandemic Influenza” *Lowy Institute Analysis*, February. 100 pages.
- McKibbin W. and P. Wilcoxen (1999) “The Theoretical and Empirical Structure of the G- Cubed Model” *Economic Modelling* , 16, 1, pp 123-148 (ISSN 0264-9993)

Other references:

- Brahmabhatt and Dutta (2008).On SARS Type Economic Effects during Infectious Disease Outbreaks. World Bank Policy Research Working Paper 4466.
- Verikios, George & Mccaw, James & Mcvernon, Jodie & Harris, Anthony. (2010). “H1N1 Influenza in Australia and its Macroeconomic Effects,” Center of Policy Studies and the Impact Project, Monash University, Working Paper.
- etc.

Methods & Database

Basic methods:

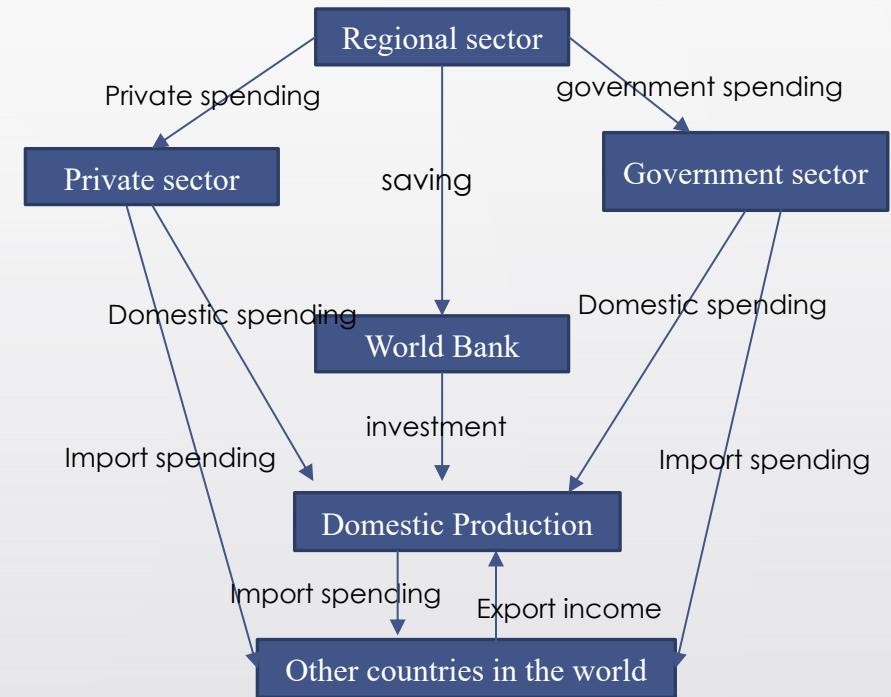
- **Computable General Equilibrium CGE model**
- **Global Trade Analysis Project GTAP model**

Possible Advanced methods:

G-cubed Model: a hybrid of DGSE and CGE

- weakness: data process becomes much more complicated
- strengths: able to explain more kinds of shocks, closer to reality

CGE Basic logic



G-Cubed Model



- McKibbin and Triggs (2018)'s version
- **6 sectors:**
 1. Energy
 2. Mining
 3. Agriculture (including fishing and hunting)
 4. Durable manufacturing
 5. Non-durable manufacturing
 6. Services
- **24 countries and regions**
- **Assumptions are different**

But relatively much more difficult

The most important:
Using G-cubed model can
estimate both short term and long
term effects

Database & Simulation



Database:

The latest GTAP10 database

- Contains data from 65 industries, of 121 countries (I/O tables)
- Plan to use part of data; Consider only 20 – 30 countries which have been influenced by COVID-19 most; Classify industries

CGE model:

- GAMS or GEMPACK software systems
- **Matlab**

Use of such systems has lowered the cost of entry to CGE modelling; allowed model simulations to be independently replicated; and increased the transparency of the models. (Wikipedia)

Shocks in this model

In my essay, I will mainly consider four kinds of shocks:

- **Shocks to labor supply**

Because of isolation, many companies haven't resumed work. Lots of firms in the tertiary industry closed.

- **Shocks to consumption demands**

The public stays at home everyday without much activities, so the consumption demands decrease a lot.

- **Shocks to tourism industry**

Although the Chinese government now has encouraged tourist attraction free of charge, the public rarely travels at far distance. The shocks to tourism industry is extremely large, and until now it hasn't been recovered.

- **Shocks to government expenditure**

On global!

My data may be
much different
because now COVID-
19 has infected the
whole world.

Shocks data looks like this...

Table 7 – Shocks to consumption demand

Region	S04
Argentina	- 0.83
Australia	- 0.90
Brazil	- 0.92
Canada	- 0.90
China	- 1.00
France	- 0.93
Germany	- 0.95
India	- 0.91
Indonesia	- 0.86
Italy	- 0.93
Japan	- 1.01
Mexico	- 0.89
Other Asia	- 0.95
Other oil producing countries	- 0.92
Republic of Korea	- 0.89
Rest of Euro Zone	- 0.98
Rest of OECD	- 0.92
Rest of the World	- 0.98
Russia	- 0.92
Saudi Arabia	- 0.74
South Africa	- 0.82
Turkey	- 0.88
United Kingdom	- 0.94
United States of America	- 1.06

Problem to be solved



How to calculate the shocks to be more realistic?

- Shock to labor supply

Possible solution:

1. mortality due to infection
2. morbidity due to infection
3. morbidity arising from taking care of infected family members

- Shock to consumption demands

Possible solution:

1. Sector Exposure Index ?

Other solution?

Index of
Vulnerability

How to scale and adjust
it to be more realistic?

Scale benchmark across countries, adjust across sectors

Problem to be solved



How to calculate the shocks to be more realistic?

- Shock to government expenditure

Possible solution:

1. Index of Governance
2. Index of Health Policy

- Shock to tourism industry

Possible solution ?

These four shocks are the most obvious ones.
What other shocks needs to be considered?

Possible results



- **Able to predict the output changes of various industries, at least in the short term**
The output of the tertiary industry sector (especially the catering and accommodation, leisure and entertainment, and leasing sectors) declines significantly, while the output of the medical supplies manufacturing industry increases slightly. Except for the tertiary sector, imports in the manufacturing and agricultural sectors decline.
- **Provide relevant policy recommendations based on simulation results.**