QUALIFYING EXAMINATION

WHAT DOES CROSS-COUNTRY DATA SPEAK ABOUT COVID-19?

ZHOU SHIHAO, ECONOMICS

Abstract

On 11 March 2020 WHO Director-General characterized COVID-19 as a pandemic. Globally, by the mid-June 2020, there have been more than 7.9 million confirmed cases of COVID-19, including 432,000 deaths, reported to WHO. Under the big picture of global pandemic, there is also a substantial variation in infections and deaths across different countries. The United States, for example, has lost more than 140,000 lives due to COVID-19, far more than any other country. Vietnam, on the other hand, has no reported COVID-19 death so far. Apparently, the transmission patterns if COVID-19 are heterogeneous across countries.

In this project, we aim to uncover the diffusion patterns of COVID-19 in each country and then, examine its long-run economic impacts. In particular, we first find important factors that are significant to the infections and deaths at the beginning of the pandemic outbreak. Secondly, based on the seminal work that studies the economic activities and spread of viral diseases by Adda (2016), we plan to explore the aviation data set covering 1,484 airports to examine the link between pandemic outbreak and economic activities from a global perspective. Third, with more and more COVID-19 data available, we aim to uncover its underlying spread patterns and network effects from road traffic by applying machine learning algorithms.

In the preliminary study, we find that Vietnam has the lightest outbreak with its highest daily infections of 0.3 per million people, while that of China is more than 30 times higher. However, the pandemic outbreak is markedly severer in the US and Luxembourg as their maximal daily infections are around 120 and 1,200, respectively. Based on country specific data, we discover that the vast heterogeneity among countries is due to demographic conditions, geographic locations, economic development, healthcare conditions, and public governance. Moreover, we categorize them into risk factors and protective factors of pandemic infections and deaths. Last but not least, we also provide a global ranking based on cost efficiency of pandemic containment by a stochastic frontier approach.

Wednesday 26 Aug 2020

11am

Venue: TEAMS Meeting

ALL ARE WELCOME!

SCHOOL OF SOCIAL SCIENCES

NANYANG TECHNOLOGICAL UNIVERSITY

WHAT DOES CROSS-COUNTRY DATA SPEAK ABOUT COVID-19?

ZHOU SHIHAO, ECONOMICS

continued………

This project contributes to the literature in few ways. Firstly, unlike studies that focus on an individual country (Acemoglu, 2020; Bjørnstad et al., 2002; Ng, 2003; Wu et al., 2020), we analyze the impacts of COVID-19 in a global context. More importantly, we address the underreporting issues which make cross-country comparison difficult and find robust results. Furthermore, our findings help policy makers to identify risk/protective factors, which are largely unknown to the literature. Also, our efficiency score provides policy makers a more direct comparison of containment policies from a global perspective.

Secondly, by linking the pandemic outbreak and international population flow using aviation data, we aim to take a close look at the economic resilience and risks associated with globalization and international trade. More specifically, this study aims to discuss the within and between region spread of viral diseases in a discrete SIR model framework. Also, it will account for common econometric issues such as endogeneity and spatial correlation.

Thirdly, by analyzing road traffic of each city/country, we could reveal the heterogeneity of COVID-19 outbreak in the context of complex network (Pastor-Satorras and Vespignani, 2003). Via machine learning approach, we aim to classify the risk level of each city/country based on the satellite map. Also, the property of different networks leads to different tolerance to random and targeted error or attack (Albert et al., 2000), which provides insightful suggestions to lockdown/border control policies to contain the transmission of virus under different networks.

Proceedings

Duration	Session
5 mins	Chair Welcome & Introduction of Panel
30-45mins	Presentation by Student
15 mins	Q&A (by audience – faculty / students)
Break	Audience to leave the meeting
30 mins	Q&A by Panel
15 mins	Chairperson to ask candidate to leave the meeting Private Panel Discussion and Decision on the Qualifying Examination
15 mins	Candidate invited back by Chairperson Feedback and Outcome of Qualifying Examination

Wednesday 26 Aug 2020

11am

Venue: TEAMS Meeting

ALL ARE WELCOME!

SCHOOL OF SOCIAL SCIENCES

NANYANG TECHNOLOGICAL UNIVERSITY