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Global economic damage of COVID-19 outbreak: Sectoral and country-level input-output analysis

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Abstract

The paper analyzed the economic damage of the COVID-19 outbreak around the world. It employed a multi-regional input-output modeling framework for 26 sectors in 187 countries under three scenarios. The empirical results indicated that the re-export & re-import and recycling sectors had the highest value-added decrease, and the hotels, restaurants, public administration, and retail trade experienced the highest demand decrease. Among countries, the United States, Russia, and Japan are suffered the least from the coronavirus outbreak. Besides, the total world GDP is forecast to decrease by 3.51% to 5.94%. Based on the results, the major hint is: that resilient supply chains must be provided so that even if another pandemic- even when more virulent than the last, comes along- the system can withstand it and be relied upon no matter the circumstances.

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Extended Abstract

Introduction

The corona virus has dealt a severe blow to the global economy. From the United States and Europe to Asian countries, no country has been spared from the devastating economic effects of this virus. In addition to economic problems, this disease imposed a lot of psychological pressure on the communities. Governments around the world have taken various measures to deal with this virus, which has brought huge costs to their economies. As soon as the first case of infection was observed in each country, governments took strict measures to prevent further spread of the virus. Closure of schools and universities, reduction of working hours in various jobs and severe restrictions on transportation were among these measures. These restrictions led to a significant reduction in economic interactions between countries, closing borders and, as a result, reducing the supply of goods and services. Also, stopping or reducing welfare assistance to needy families put a heavy financial burden on governments. Considering these cases, a comprehensive assessment of the economic effects of this epidemic on the global economy is essential.

Aims

In this research, an attempt has been made to evaluate and estimate the damage of this outbreak to the economic sectors of different countries of the world. For this purpose, a global Input-Output analysis table including 26 sectors in 187 countries was prepared in three scenarios: Worse, Medium and Conservative. The first area of the table contains 4915 rows and columns with more than 24,000 elements, the second area includes 1140 vertical vectors with 5,000 elements, and the third area consists of 6 Horizontal vectors with about 30,000 elements.

Methods

In this study, using the input-output analysis model, the impact of economic shocks caused by the Covid-19 pandemic on the performance of different production and service sectors at the global level has been evaluated. Also, using this model, three possible scenarios for the reduction of the gross domestic product (GDP) of the countries in the future are predicted: continuation of the current conditions, intensification of the crisis and gradual improvement by adopting conservative policies. In order to implement the input-output analysis model on a global scale, modifications were made to the structure of the basic model. Due to the large amount of required data, the use of the Chenery-Moses method was chosen as an efficient approach to estimate interregional interactions. This method, which is known as multi-region input-output (MRIO) model, is applicable in three different versions. In this research, the coefficient column version of the MRIO model was

used to analyze the data of 26 economic sectors in 187 countries. These sections are categorized according to the 2015 Eora26 classification.

Results

Surveys show that sectors such as export, import, recycling, hotel, restaurant and retail business have suffered the most from the Corona epidemic. Especially, the demand in the hotel and restaurant sector has decreased drastically. Among the big countries, the United States, Russia and Japan have suffered the least damage. Forecasts indicate a significant decline in global GDP, which could have serious consequences for the global economy. The results of this research highlight the critical importance of flexible supply chains. Sectors such as re-exports, re-imports and recycling, which are heavily dependent on global supply chains, have been hit the hardest. Also, the decline in demand in sectors such as hotels and restaurants shows that global crises can quickly affect local economies. Therefore, to deal with future crises, attention should be paid to strengthening supply chains and creating more resilient economic systems.

Conclusion

Based on the findings, it is suggested that: First, to mitigate the impact of the coronavirus outbreak, governments should focus on the most affected aspects of the economy, including supply chain disruptions, low demand for products and services, and trade across internal borders, both exports and imports, as well as local trade. Secondly, it should be noted that governments should not implement exactly the same restrictive policy in all economic activities, because not all activities have been affected by the corona virus to the same extent; Therefore, the application of restrictions should be gradual in such a way that each economic activity can maintain its proper conditions, depending on the amount of damage caused.

Conflict of interest

The authors declared no conflicts of interest.

Authors' contributions

All authors contributed to the original idea, study design.

Ethical considerations

The authors have completely considered ethical issues, including informed consent, plagiarism, data fabrication, misconduct, and/or falsification, double publication and/or redundancy, submission, etc.

Data availability

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

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