Global Supply Chains in the Pandemic*

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May 2020

Abstract

Paper available at: https://www.nber.org/papers/w27224

This paper quantifies the role of the global supply chains in transmitting the economic impact of the Covid-19 pandemic. We use a quantitative model of world production and trade covering 64 countries on all continents and 33 sectors spanning all economic activities. We parameterize the model using the OECD Inter-Country Input-Output (ICIO) Tables, that provide matrices of domestic and international intermediate input and final use trade. We solve the model analytically using the techniques developed in Huo, Levchenko, and Pandalai-Nayar (2020).

We start by simulating a global lockdown as a contraction in labor supply. To discipline the size of the labor contraction, we use the Dingel and Neiman (2020) measure of the fraction of the work of different occupations that can be done at home. Variation across sectors in their usage of different occupations and of countries in their sectoral employment composition then results in heterogeneous incidence of the shock across countries. Countries also vary in the stringency of lockdown measures. To capture this, we interact the work from home intensity by occupation with an index capturing the country-level stringency from Hale et al. (2020).

Not surprisingly, the model produces a large contraction of economic activity, with an average 31.5% drop in GDP in our sample of countries for the duration of the shock. Our focus is on the role of the global supply chains in particular. To better understand how linkages between countries amplify or mitigate the effect of the shock, we report two results. First, using the tools from Huo, Levchenko, and Pandalai-Nayar (2020), we compute the share of each country's GDP

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contraction that is due to foreign, rather than domestic shocks. On average, about 34.7% of the contraction of GDP can be attributed to foreign shocks.

Second, we answer the more substantive question of whether participation in global supply chains exacerbated or alleviated the pandemic-induced contraction in labor supply. There is now a great deal of speculation in both policy circles and popular press that the experience of the pandemic will in the medium term lead to a "renationalization" of the supply chains. It is not clear whether supply chain renationalization will actually make GDP more resilient to pandemic-type shocks. Figuring this out requires comparing the pandemic-induced GDP change in the baseline model to the pandemic-induced GDP change in an alternative world without international trade, where supply chains have adjusted to use only domestic inputs. Naturally, renationalization of global supply chains would change the relative size of domestic sectors, as input users shift from foreign to domestic intermediates.

It turns out that on average in our 64 countries, the downturn would actually be slightly worse with renationalized supply chains (-32.3% on average) than under current levels of trade. The reason is that eliminating reliance on foreign inputs increases the reliance on domestic inputs. Since a pandemic-related lockdown also affects domestic sectors, there is generally no resilience benefit from renationalizing the international supply chains.

References

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