

## Measuring exposure to network concentration risk in global supply chains: Volume versus frequency

Topic: Trade and Global Value Chains Policies (2)

Author: Satoshi INOMATA

Co-Authors: Tesshu Hanaka

In this paper, we present new referential statistics for the degree of supply chain exposure to network concentration risk. The study's contribution rests on the development of a metric that indicates network concentration in terms of the frequency of supply chain engagement with the regions of analytical concern, alongside the traditional approach based on volume measurement of value-added concentration.

Japan, a country with a high propensity to encounter natural hazards, and China, under mounting geopolitical tensions with the United States, were chosen as the target regions for the analysis. The study followed a line of techniques in input-output economics yet with methodological augmentation employing a compatible analytical framework in network theory. Using the multi-country input-output tables constructed by the OECD, the following findings were presented. The supply chains of the selected industrialized economies are generally more concentrated in China than in Japan. For Japan as a target region, Taiwanese industries stand out for being dependent on the country, especially in regard to the share of value-added origins.

Focusing on the ICT equipment industry, the supply chains of Korea and Chinese Taipei are most exposed to concentration risk in China, both in terms of volume and frequency. In contrast, the US supply chains present an interesting case; the low concentration of its value-added origin in China may be a straightforward reflection of the sheer size of the US economy, while its frequent exposure to China's geographic territory is associated with the likelihood of being caught by contingencies in the country.

In general, the two metrics of network concentration in the volume and frequency terms were positively correlated. However, the above US case suggests that only considering the volume side may lead to a significant underestimation of the overall exposure to a country risk in supply chain management.

Finally, the analysis of mutual risk positions for the US and China's supply chains revealed a notable asymmetry in the dependence structure between the two countries, posing a significant concern on the feasibility of the "friend-shoring" strategy by the US government.