# Global supply chain risks under geopolitical tensions: A study based on manufacturing sectors

Topic: Input-output Modelling and Supply Chain Resilience (I)
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Note: This abstract is submitted to the Special session of Input-output Modelling and Supply Chian Resilience.

ï¼ˆ1ï¼‰Escalating geopolitical tensions have significantly disrupted global supply chains, elevating supply chain security to a growing priority on national policy agendas. This study highlights the need for differentiated risk mitigation strategies and underscores the importance of a rules-based international trade and investment framework to enhance the reliability and enforceability of multilateral cooperation.

ï¼ˆ2ï¼‰This paper constructs a comprehensive supply chain risk measurement framework that integrates international trade, cross-border investment, and geopolitical factors, enabling a systematic assessment of country-level risks and their underlying sources.

ï¼ˆ3ï¼‰Our data mainly consists of two components: First, global intermediate products trade data from 2000 to 2020, sourced from input-output tables distinguishing firm ownership (DOEs and FIEs) for 76 economies and 41 sectors provided by the OECD AMNE database. Additionally, the AMNE database contains information on output, value-added, and trade according to ownership. Therefore, relying on this information, we can compute the weight matrix using the method

ï¼ˆ4) This paper expands existing research by utilizing an intermediate products trade matrix that distinguishes firm heterogeneity to construct trade- and investment-related supply chain risk exposure indicators from both supply and demand sides.

We focus on the supply chain risks in manufacturing sectors and measure the supply chain risks from the aspects of Trade-related supply chain risks, Investment-related supply chain risks, Supply chain risks under geopolitical influences, and disseminate them by developing and developed economics. We use the cases of China, France, Germany, and the US to compare the different impact and mapping the results by global manufacturing supply chain networks and make them visible.

Analysis based on the manufacturing sector reveals that, overall, supply chains in developing economies are more sensitive to geopolitical tensions and face higher risk exposures than those in developed economies. In developed economies, supply chain risks arise primarily from cross-border investment activities, whereas in developing economies, risks from trade and investment are closely intertwined. At the sectoral level, the textiles sector demonstrates higher supply-side risk exposure, whereas computers, electronics, optical products, and basic metals show greater vulnerability on the demand side. Furthermore, under a scenario of security-oriented global supply chain restructuring, industrial linkages within geopolitical blocs are likely to strengthen, while those between geopolitical blocs will weaken considerably. This study highlights the need for differentiated risk mitigation strategies and underscores the importance of a rules-based international trade and investment framework to enhance the reliability and enforceability of multilateral cooperation.

We conclude that globally, the supply chains of the manufacturing sector in developing economies appear to be more susceptible to geopolitical influences than those in developed economies; from a national perspective, the impact of geopolitics on supply chain risk exposures of manufacturing sectors exhibits significant country heterogeneity; at the sector level, the textile sector shows higher supply-side risk exposure, whereas computers, electronics, optical products, and basic metals exhibit greater vulnerability on the demand side; we give some policies to reduce the risks to promote future supply chains.

Policy implications are that implement differentiated risk response measures for different types of countries. For economies like Korea and Mexico, whose supply risk exposure mainly lies in export

markets and import suppliers concentration, policy focus should be on actively developing emerging export markets through a combination of diplomacy, free trade agreements, and market subsidies. strengthen dispute consultation and resolution mechanisms based on international platforms such as WTO and the UN. On one hand, it is necessary to advance reforms of the WTO dispute settlement mechanism to restore its effective functioning and establish a â€œfast-track channelâ€• for trade in critical materials to efficiently resolve disputes and prevent supply chain disruptions. Third, firms, especially large MNEs, should develop both short-term response strategies and long-term strategic planning. Specific measures include: Employ cross-regional dispersion and dynamic layout strategies to establish critical nodes across different geopolitical zones, dynamically adjusting resource allocation ratios to implement a dual-configuration model of â€œprimary nodes plus backup nodes,â€• thereby enhancing overall resilience.