

From Local to Global: Climate Vulnerability of the Supply-Chain

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The global supply chain and the coordinated system of networks that link socio-economic elements localized in different countries are paradigmatic examples of factors making the present economic system globally interconnected. The optimization of production, the comparative advantages and the cost reductions are some of the main elements that during the last decades lead to the success of the so-called “globalization” process. If from one side the increasing economic interconnections allow to reduce costs and to increase the consumption possibilities, on the other side the large complexity and the spatially distributed networks of activities make modern society largely vulnerable to any kind of disturbance. Terroristic attacks, local conflicts, earthquakes or natural disasters taking place in a specific area can generate disruptions along the chain, with domino effects on the global supply.

Climate change related events are one of the most important elements influencing the efficiency of the present economic networks. During the last decades an increasing number of studies investigated the main elements of risk and vulnerability, together with the possible impacts in terms of human life, recovery expenses, productivity loss and natural environment degradation. The largest part of these studies focused on the main direct impacts generated in a specific sector of analysis or in a specific geographical area. More recently, however, an increasing attention has also been devoted to analyze the overall vulnerability of the socio-economic system and a particular focus has been placed on the domino effects that a disruption in a specific part of the supply chain can generate along the system. A good understanding of the most vulnerable entities is in fact a fundamental step to avoid, reduce and mitigate the potential costs generated all over the world. A combination of climate modelling, data and intra-regional and intra-sectoral analysis are the fundamental elements needed for this kind of analysis. At the present stage, however, the lack of up-to-date international databases able to capture the trading relationships among countries and sectors, and the consequent limited use of inter- regional models make it difficult to estimate the cascading and the domino effects resulting from the disruption of the international supply chain. In addition, the large data gap existing for developing countries and small island developing states, where climate change related events are expected to generate the largest catastrophic impacts, makes even more difficult to estimate the costs generated all over the world. The present paper provides an overview of the main studies, methodologies and databases used to investigate the climate vulnerability of the supply chain. In general terms a wide data gap exists for developing countries. In addition, the lack of updated and detailed information covering the trade links between economic sectors and geographical areas is one of the main limits for the quantification of the potential impacts that climate change related events can generate along the global supply chain. A flexible methodology able to include the different elements that compose the global supply chain, together with the possibility to include complexity and uncertainty are

some of the main features that would be needed to quantify the domino and cascading effects generated along the chain. In addition, reliable information on the links between economic activities and countries, covering data related to developing and vulnerable areas are some of the most important elements that are needed to quantify the potential costs that climate change related events can generate in the present economic network. A clear identification of the most vulnerable elements together with a good understanding of the transmission mechanism is one of the fundamental steps to design effective mitigation and adaptation strategies.