Trade costs accumulation in global value chains: evidence based on OECD inter-country input-output tables

Topic: Trade Disruptions along Global Supply Chains
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This paper quantifies the accumulation of bilateral trade costs in global value chains (GVCs), focusing on the compounding effects that arise when intermediate goods cross borders multiple times before reaching final demand. While conventional trade analysis measures tariffs and other trade costs at the border on a gross bilateral basis, production fragmentation implies that the same unit of value added may face trade costs repeatedly along multi-stage production chains. As a result, nominal bilateral trade cost measures understate the effective protection in internationally fragmented production. By embedding bilateral trade costs into an inter-country input-output (ICIO) framework, this paper provides a systematic quantification of cumulative trade costs and identifies how protection is amplified through upstream and downstream linkages.

The empirical framework relies on the OECD ICIO tables (2025 release) and builds on the methodology developed in Miroudot et al. (2013) and Miroudot (2020). We create a tariff matrix using WTO data and we estimate overall bilateral trade costs with a top-down approach (capturing any type of trade cost related to geography, trade policy, regulatory differences, uncertainty, etc.). These bilateral trade costs are estimated through a gravity model fitting the input-output trade flows and taking advantage of the using industry dimension to calibrate the data. We then combine bilateral trade cost measures with the input-output data to compute cumulative trade costs along supply chains. Within this framework, we can distinguish: (i) the direct bilateral trade costs borne by exporters; (ii) the direct trade costs faced by importers of intermediate inputs; and (iii) the indirect trade costs transmitted through upstream suppliers embedded in intermediate goods. This decomposition allows us to isolate the relative contribution of each channel to overall trade cost accumulation.

The results provide cross-country and cross-sector estimates of the magnitude and structure of trade costs accumulation, identifying industries where multi-stage trade amplifies protection costs and illustrate how tariff shocks or other trade cost shocks propagate through interdependent production networks. Industries characterized by high import content of exports and multi-stage production -such as transport equipment, electronics and machinery- exhibit particularly pronounced compounding effects. Conversely, industries with shorter value chains or greater reliance on domestic inputs show more limited amplification. Cross-country heterogeneity is also substantial.

A key innovation of the paper is the estimation of bilateral trade costs using a structural gravity model calibrated at the industry level. By anchoring bilateral trade cost estimates in observed inter-industry (and inter-country) flows, the approach generates consistent measures of trade frictions that can be propagated through the global production network. The paper also highlights that trade cost accumulation depends not only on the number of border crossings, but also on sectoral production structure, input intensities and the topology of global supply chains. Finally, the findings carry important policy implications. They underscore that evaluating trade policy based solely on direct trade costs can be misleading in a world of fragmented production. Effective protection in GVCs is a network property, shaped by the cumulative layering of trade costs, with implications for the way trade agreements and trade policy can facilitate or restrict trade in sectors characterized by complex cross-border production.