A supply-driven framework using product-based structures to assess the vulnerability to imports' restrictions and improve economic performance through import substitution â€“ the case of Brazil, USA, EU27 and China.

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Supply restrictions such as those induced by the covid-19 pandemic, or the war in Ukraine, have stressed the importance of international trade to economies. Specifically, certain imports have the potential to disrupt production and consumption. Such issues are pervasive across countries and can be sparked by restriction of many products (e.g., food, energy, specialised electronic components, critical materialsâ€¦). Hence, identifying and characterising such vulnerability is a priority to build resilient economies without losing the advantages brought by international trade for the nationâ€™s economic development and well-being.

The literature has already explored similar issues. At the domestic level, the Ghosh model has been used to study supply restriction. Unfortunately, the Ghosh model does not reflect the actual functioning of the economy since it considers primary inputs as independent. Thus, such exercises do not reveal the actual productive disruptions caused by import restrictions. More recent literature used (Global) Multi-Regional Input-Output Tables (G)MRIOTs to capture and decompose the different impacts of Global Value Chains (GVC). However, most analyses and indicators rely on demand-driven models and the Ghosh model. Thus, it is still difficult to fully assess the consequences of supply restrictions.

Hence, currently, it is still not clear how specific import restrictions affect the productive capacity and structure of an economy, nor their impact on the countryâ€™s value added (VA) and employment. It is unknown how each sectorâ€™s imports may restrict the overall production and consumption of the country. Neither it is known the impacts on VA, employment, if specific import restrictions were to happen and cascade through the economy.

The first part of this paper uses a recently developed supply-driven model which consumes simultaneously all primary inputs to characterise a countryâ€™s vulnerability to imports using new indicators, unavailable through the Ghosh model. The new indicators are final demand, labour, imports and value-added supply-driven multipliers and total forward linkages, all considering the simultaneous consumption of all primary inputs. In this study, these indicators will be driven by imports and value added, resulting in a set of 10 different indicators. E.g., the final demand multipliers supply-driven by imports correspond to the total amount of final production associated with the consumption of a unit of import of a given sector.

However, using the new supply-driven model on the aggregate structure masks the actual functioning of the economic structure, whose inputs are consumed to produce specific final products/services. Therefore, this paper expands previous attempts to use the new supply-driven model by applying it to the n different product-based structures of the economy, constituted by the primary inputs and intermediate flows associated with each final product. Each product-based structure provides different results for the same indicator, resulting in a set of 10 x n indicators to analyse.

The model is applied to OECDâ€™s Inter-Country Input-Output (ICIO) tables to perform a comparative analysis. This method is especially suited to account for non-competitive imports, but variations of this methodology can also be applied to competitive imports. In particular, it is used to

calculate production multipliers associated with every import to identify their respective capacity to disrupt domestic production, VA and employment.

In a second part, this paper aims to assess the structural effects that imports have on the domestic productive structure. In particular, a new method of hypothetical extraction of imports is developed and applied to a conventional IOT, revealing the â€œpure domesticâ€• productive structure. The method extracts all flows associated to imports: i.e., imports accounted as primary inputs, their corresponding intermediate flow, and final outputs. Then, the structure is scaled to match actual fd using the original structure and the resulting structure is compared to the â€œconventional domesticâ€• productive structure, which includes imports by default. In our case, we calculate the total backward linkages, and value-added and employment multipliers, using the Leontief model of the â€œpure domesticâ€• and â€œconventional domesticâ€• structures. We assess the differences in results from both structures to deepen the understanding on how imports affect the domestic economic structure.

The results allow researchers to: 1) identify the importsâ€™ supply restrictions with most economic impacts, in terms of total production, value-added and employment; and 2) identify how the domestic structure of economies is altered due to their own import needs, providing key information to internalise the production of imports.