Extraction-cum-substitution and the mapping of bilateral trade conflicts

Topic: Trade in Value Added and "servicification" of the Global Value Chains
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1. Objectives

A new production and trade business model arose in the late 1980's, based on the geographical fragmentation of complex production processes. In this process, trade in intermediate goods grew in importance, increasing economic interdependency within the World economy.

The purpose of this submission to the IIOA is to present a new approach that derives directly from traditional input-output analysis to derives plausible scenarios. The method remains exploratory in nature: it offers a series of "markers" corresponding to extreme or expected points that should help mapping what remain largely unchartered waters: the direct and indirect effects of bilateral trade conflicts on global production networks.

The paper counts with three parts, besides introduction and conclusion. The first one is theoretical, including a review of the literature and a formal exposition of methodology. The second is didactic, applying the method to a small model designed to mimic inter-industry interactions between hypothetical countries with different comparative advantages. The third part applies the new methodology to the bilateral trade conflict that arose between China and the USA in 2018.

The data used for the real-case study are the World Input-Output Tables from the WIOD project. The methodology is developed in R language. The source code will be made publicly available in the paper, to foster replication, revision and improvement.

Work is well advanced and I expect the paper to be completed by mid-March.

2. The methodology

The empirical method builds on two interrelated strands of research, both of them based on input-output models. The first one is the "Extraction Method", which has been used in national and regional input-output analysis to identify relevant sectors or regions. Miller and Lahr (2001) provide a review of the different approaches; Dietzenbacher and Lahr (2013) generalize them. A recent application to the regional implications of BREXIT is found in Chen, Los, McCann, Ortega-Argilés, Thissen and van Oort (2017).

The second strand of research is the analysis of "Trade in Value Added". It is closely associated with new dimensions in trade statistics, following the concept of Vertical Specialization proposed in Hummels, Ishii and Yi (2001). One of the pioneering studies along this new line of trade analysis using international input-output models is Daudin, Rifflart and Schweisguth (2009). The first application using official data was published in 2011 by WTO and IDE-JETRO for Eastern Asia. World-wide data bases were developed by WIOD and OECD-WTO and released in 2012.

A recent paper by Los and Timmer (2018) shows that these "Trade in VA" measures can be derived with the method of hypothetical extraction. This paper provided the motivation and the starting point of my work. Indeed, in commenting their approach, Los and Timmer (2018) state page 10 something that is of upmost importance for the present paper: "We would like to emphasize that GDPr*s should not be seen as the GDP level that would result if exports to s would be prohibitive. In a general setting with more flexible production and demand functions, substitution effects will occur. As a consequence, the total production structure and final demand levels will change and the global production structure after the shock will not be represented by As* and Ysr*. VAXDrs should therefore be regarded as an upper limit of the loss in GDPr* and is most meaningful if compared to other scenarios of extracted transactions".

Follow the suggestion of Los and Timmer (2018), I include substitution effects after extraction to

develop a new extraction-cum-substitution method. In this scenario, competitors fill the gaps opened by the extracted industry. At the difference of Computable General Equilibrium models (CGE), the substitution will not result from a complex optimization process; the additional sales will be reassigned in proportion of the existing market shares before the extraction. Actually, the simulation is more akin to analysing the shock from a partial equilibrium approach.

I consider this new methodology as an â€œexploratoryâ€• device that help mapping the relatively unchartered waters of global production network when the weather is stormy. At the difference of CGE models, my proposed algorithm is relatively simple and implementable step-by-step, which allows understanding the mechanism at work. Actually, all the complexity is in todayâ€™s inter-industrial network (something that is captured by the database) but not in the methodology. As all partial-equilibrium methods, it should be not used for predicting or forecasting, but only as a tool for understanding.