

Indicators of Bilateral Trade Dependence in Global Production Networks

Topic: Feedback Session 3b

Author: Bart LOS

Co-Authors: Marcel Timmer

Recently, trade dependencies between countries have gained center stage in economic debates, as a consequence of political developments. In the present world, gross exports statistics are no longer a reliable guidance on assessing such dependencies: the export value contains a lot of value that has been added in more upstream production processes in other countries (see, e.g. Koopman et al., 2014). With the availability of global input-output tables like the World Input-Output Database (WIOD, Timmer et al., 2015) and the OECD Trade in Value Added database (OECD-TiVA) new measures have been proposed. They showed that early proxies to bilateral trade dependence which were based on single country input-output tables could be replaced by more accurate measures. A "dominant design" of these new set of measures has not emerged yet, as several different measures were proposed. While related, these alternatives have different and specific interpretations, which initially led to confusion, which is still lingering. This paper aims to provide a systematic discussion of the similarities and differences between three types of bilateral trade dependencies and proposes indicators for each of these.

The first type of bilateral dependence between countries A and B considered by us is the value added of A that is induced by B as the country where the consumption activities take place (B as the country-of-consumption), irrespective of the location of production activities that are more downstream than those executed by A and the country where the finalization takes place. Quantifications of this type of bilateral dependence can e.g. shed light on questions about the extent to which the GDP of a country is affected by increasing demand in emerging countries. The approach has been pioneered by Johnson and Noguera (2012).

The second type of bilateral dependence measures the value added of A that is induced by B as the country-of-finalization. Indicators like these would give insights into, for example, the consequences for Western European economies of the fact that China has managed to perform larger subsets of the activities in the GVCs for its final products within China itself (see Kee and Tang, 2016). The value of such a measure is not dependent on whether the final product is sold to B's consumers or exported. The first paper adopting this approach was Timmer et al. (2013).

The third type of measure looks at A's value added in its exports sold directly to B. This measure is not affected by what happens in more downstream stages than those performed by A. In this approach, B is considered to be the country-of-purchase. This approach (pioneered by Wang et al., 2013, Koopman et al., 2014, and refined by Los et al., 2016) is relevant for research questions related to the effects of barriers to trade. It could, for example, be used to get insights into the potential effects of the introduction of bilateral tariff barriers by the US on value added generation in Mexico.

In this paper, the concepts will be carefully introduced and their proper interpretation will be discussed. Furthermore, a common framework for computing indicators for the three types of bilateral trade dependence is presented. It is based on "hypothetical extraction", a popular technique in input-output analysis (see Miller and Blair, 2009). Finally, bilateral dependencies of the three types are quantified for a number of interesting pairs of (groups of) countries, using WIOD. We will also discuss and outline how newly developed data (such as extended supply-and use tables) will improve the accuracy of the indicators.

References:

- Hummels, D., J. Ishii and K.-M. Yi (2001), "The Nature and Growth of Vertical Specialization in World Trade", *JIE*, 54(1), 75-96.
- Johnson, R.C., and G. Noguera (2012), "Accounting for Intermediates: Production Sharing and Trade in Value Added", *JIE*, 86(2), 224-236.
- Kee, H.L. and H. Tang (2016), "Domestic Value Added in Exports: Theory and Firm Evidence from China", *AER*, 106(6), 1402-1436.
- Koopman, R., Z. Wang and S.-J. Wei (2014), "Tracing Value-Added and Double Counting in Gross Exports", *AER*, 104(2), 459-494.
- Los, B., M.P. Timmer and G.J. de Vries (2016), "Tracing Value-Added and Double Counting in Gross Exports: Comment", *AER*, 106(7), 1958-1966.
- Miller, R.E., and P.D. Blair (2009), *Input-Output Analysis; Foundations and Extensions* (2nd ed.), Cambridge: CUP.
- Timmer, M.P., B. Los, R. Stehrer and G.J. de Vries (2013), "Fragmentation, Incomes and Jobs: An Analysis of European Competitiveness", *Economic Policy*, 28(3), 613-661.
- Timmer, M.P., E. Dietzenbacher, B. Los, R. Stehrer and G.J. de Vries (2015), "An Illustrated User Guide to the World Input-Output Database: The Case of Global Automotive Production", *RIE*, 23(3), 575-605.
- Wang, Z., S.-J. Wei and K. Zhu (2013), "Quantifying International Production Sharing at the Bilateral and Sector Levels", NBER WP 19677, Cambridge MA.