

Gravity in a world of global value chains. The international input-output structure as a determinant of bilateral trade.

Topic: The Value of Trade

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The gravity model has been the workhorse of trade analysis in the past 50 years. As an analogy to Newtonian physics, the model relates bilateral trade to the product of economic mass (the sales and expenditures in each country) and the inverse of the square of the distance separating them (a proxy for trade frictions). The model started as an empirical relationship but was then given solid theoretical micro-foundations.

For many years, researchers have estimated the gravity equation with trade flows in gross terms and GDP figures as a proxy for "economic mass". This is only recently with the new literature on global value chains (GVCs) and trade in value added that it was pointed out that both the left side and the right side of the gravity equation should be in gross terms (or in value added terms). When trade in intermediate inputs is pervasive, bilateral flows in value-added and gross terms can significantly differ.

In addition, the model itself may no longer provide a correct assessment of the determinants of bilateral trade. When trade is not limited to final goods but includes many intermediate products, bilateral trade is also a function of the economic mass of third countries and the trade frictions between these third countries and other countries through which inputs may travel before reaching final consumers. A first attempt at deriving a gravity equation fully incorporating the global value chain can be found in Noguera (2012). In addition to the traditional variables of the model, the estimation of a value-added gravity equation requires to know all the input-output relationships between the trading economies and their partners, as well as the partners of their partners. It can only be achieved with an international input-output table.

Against this backdrop, the paper compares estimates of gravity equations in gross terms and value-added terms and assesses to what extent the analysis of trade now requires a global input-output table. Using the new OECD-WTO TiVA ICIO and the WIOD dataset, it discusses the key parameters that have to be derived from input-output analysis and the bias introduced in trade analysis when omitting to take into account the input-output structure. The results differ across countries based on their size and their involvement in global value chains. But especially for small open economies, a significant share of bilateral trade is not explained by bilateral trade frictions or the economic mass of their partners. Third countries sometimes matter more to explain the volume of their trade. This result has important implications for trade policy.