A space-industry econometric filter: The A matrix as a measure of industry proximity

Topic: Regional Input-Output Economics - III
Author: Fernando de la Torre Cuevas
Co-Authors: Michael L. LAHR

Subnational economic development has at least three dimensions: time, space, and industry. Time is required for economies to develop following a sequence that goes from entrepreneurial discoveryâ€" either private, public or combinedâ€" towards structural change. Space is less obvious, but fundamental to regional science. Spatial interactions may influence economic development in two different directions. On the one hand, proximity favours interactions among agents yielding more intense economic and knowledge exchanges. On the other hand, capabilities sustaining economic development are not necessarily deployed and contained within strict regional boundaries. Regions influence each other by means of spatial spillovers effects caused by investments, trade, consumerism, commuting behaviour, etc. Analogously, inter-industry connections are also likely to facilitate exchanges between firms and territories. They can be expressed in input-output (IO) analysis parlance or supply chains in the field of logistics. Other industry-based agglomeration economies can also attach, springing up as other establishments and/or people locate within the same spatial sphere.

IO spillovers account both for spatial and industrial interactions affecting a regionÂ´s economic performance. They are typically calculated as the to the column sum of the Leontief inverse matrix excluding the entries of the region to be analysed. Hence, their measurement requires interregional IO tables to be available. Unfortunately, interregional IO models are seldom published on regular basis by statistical institutions. Their geographical coverage is also limited. IO and econometrics have a long-lasting and fertile collaboration record. Econometrics can be used to overcome practical limitations in IO analysis, such as data scarcity. In this vein, we propose a way to circumvent the described inconvenience. We present a slight modification of the space-industry filter as developed by Tian (2014) and applied by Tian, Gottlieb, and Goetz (2020). This way, we calculate estimates for spatial, interindustry spillover effects using an aggregated (e.g.: national) IO table, which is much more likely to be available, combined with a regression model. We account for cross-effects between spatial and industrial structures too. In essence, our point is to evaluate if national IO coefficients can be used as weighting factors in regression analysis.

To test our findings, we present a modest empirical application predicated upon the 53 shires of Galicia (NW Spain). We describe variations in value-added and productivity between 2010 and 2018 for 12 different sectors. As explanatory variables we consider agglomeration economies â€"location, urbanization and diversificationâ€"; average firm size; and market potential. We then include our space-industry filter in the model. To account for spatial structures, we use a distance measure between regions as an approximation to transportation costs. To account for industrial structure, we aggregate the 2011 survey-based Galician symmetric IO table into the mentioned 12 industries. The goal is to examine to what extent the inclusion of our spatial and industrial spillover measures improves the explanatory power of the model. Results will be reported considering both backward and forward linkages between industries.