Vertex Centralities in Input-Output Networks: A Comparative Analysis of Energy and Telecommunications Sectors between Mexico and OECD countries

Topic: Designing of Energy Policies with I-O
Author: Mariana Velazquez
Co-Authors: Eric HernÃ¡ndez RamÃ-rez, Jose Luis Mateos, Sergio Ignacio MuÃ±oz Iturralde, Rafael Bouchain

The aim of this paper is to apply network theory in the input-output analysis through vertex centrality measures based on random walks, among which are: random walk centrality and counting betweenness. A nodeâ€™s random walk centrality is the inverse of the mean number of steps it takes to reach it, averaged over all starting nodes. Counting betweenness measures is the expected number of times that a random walk passes a certain node before it reaches its target, averaged over all pairs of sources and targets. Both measures allow the analysis of weighted directed networks with self-loops. These measurements identify a central node as a sector that is affected most strongly by a random supply shock.Network theory flourished in the last decade and simultaneously increased the availability of international input output databases, this has allowed a better analysis of the production structure, since it has been shown that there is a direct relationship between the density of a network and economic development. Moreover, this theory has enabled improved measures of centrality, closeness and distance, among others, that help us understand the characteristics of individual branches, branches set and inter-branch networks as a whole. Among the new applications are: random walks, random graphs, small-world and scale-free networks. Due to the large size of input-output models, an advantage of applying network theory is that allow simplify and describe in detail the scheme of intersectoral relationships of an economy. It also has a relational character that allows separability analysis, segmentation of internal causality or structural interdependence. These measures apply to 45 OECD and non-OECD members using STAN IO (mid 2000) database for a comparative analysis of the energy and telecommunications sectors between Mexico and other countries. In this analysis we estimate the current status of these two sectors; the degree of domestic component in the energy sector and the degree of competitiveness and coverage in the telecommunications sector. This becomes important currently in Mexico for the design of public policies based on the implementation of structural reforms in these sectors in 2014 that intended to boost the national economy.