Key Countries Identification in the World Production Networks through Intercentrality Measures

Topic: Input-Output Tables as a Network I
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In this paper we used a set of measures of "group centrality" to identify groups of countries with a relative independence of global trade activities. These measures take into account the global and regional nature of international trade and are derived from Social Networks Analysis (SNA). The information framework for these purposes are the input-output matrices of the countries considered in the World Input Output Database (WIOD). In recent years, within the general framework of multilateral agreements for foreign trade, there are discussions on regional economic integration and regional trade agreements, as a response to more specialized problems facing by many countries to mobilize their goods, such as standardization process, health regulations, qualification of labor and other issues. It is unclear to what extent the fragmentation of international trade is mostly regional or global. The available evidence is not conclusive. Case studies such as electronics suggests that these chains are global in nature, however in the case of the automotive industry, for example, companies that manufacture cars prefer to locate their assembly activities near the end markets, often driven by government policies of host countries. Some specialized suppliers tend to form clusters around these assembly activities, however, some more standardized parts can be made internationally to capitalize on increasing returns. The automotive production chains show that the fragmentation of these processes is simultaneously global and regional character. In other cases, as the case some food commodity chains, the chains are regional.

These facts require new measurement tools that could distinguish the dual nature of international trade: global and regional. In traditional SNA there are measures that emphasize the relative importance of countries in a purely global context, i.e. without taking into account the relative importance of a country that can be very prominent regionally and not globally. In this case a tool that measures only the overall importance of some activities is not useful for discussions of regional economic policy. On the other hand, the use of exclusively regional measurements do not allow the design of policies for growth of markets and other phenomena of global character that must be taken into account in the design of policies for regional trade.
Recently there have been measures named â€œgroup centrality" which take into account the position of an actor within a group and the group within the whole net. It has been shown that a measure of centrality that qualifies a particular player from a global perspective is different to that obtained, for the same player, from a group perspective to whom he belongs in the same network. Identifying actors that are the most important individuals in a network is different from the selection of a set of actors who are, as a group, the key players. Thus the role of an actor seen individually can be very different from his role in a subset of actors of the whole network. The measure of inter-centrality applied to the WIOD Input-Output matrices allowed us to identify the contribution of a group of countries to the cohesion of the global production network, and also the contribution of a particular country to the cohesion of a group of countries. The measure implies strategic complementarities among countries and groups. One of the interesting aspects of the new estimates of the centrality between groups is that their development is based on an application of the games theory to social networks, in which the interdependence of the players through their strategy can reach a unique Nash equilibrium.

Keywords: input-output, key player problem (KPP), centrality measures, group centrality, cohesion, intercentrality measures.