Mapping Knowledge Domains between Input-Output Analysis and Complex Network Analysis

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The input-output (IO) model characterizes the flows of products and services between industries in an economy. It is natural to relate IO analysis with complex network analysis given that an IO system can be considered as a network in which industries are nodes and inter-sectoral transactions are links. While it seems promising to applying methods in complex network analysis in IO analysis in the hope of revealing additional insights regarding economic systems, an IO network possesses features that are fundamentally different from networks that are commonly studied in complex network analysis such as social networks, protein interaction networks, and power grid networks. These commonly studied networks are often sparse, while an IO network is almost fully connected. In addition, nodes in an IO network are weighted, while links in an IO network are both weighted and directional. These features of IO networks represent the most complex network possible and call for deliberations on the suitability of apply existing complex network analysis tools in IO analysis. This study aims to map metrics, methods, and tools between complex network analysis and IO analysis to identify opportunities to apply complex network analysis in the IO domain.

In this study we conduct a critical review of current metrics, methods, tools, and applications of complex network analysis, and link each one of them with existing approaches in IO analysis if possible. Differences between similar tools from complex network analysis and IO analysis are documented. We expect to develop a map of knowledge connecting the two fields and provide a roadmap for developing network-based tools in IO analysis.