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Complex Network Approach to International Trade of Fossil Fuel

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Abstract : Energy has a prominent role for development of nations. Countries which have energy resources also have strategic power in the international trade of energy since it is essential for all stages of production in the economy. Thus, it is important for countries to analyze the weakness and strength of the system. On the other side, it is commonly believed that international trade has complex network properties. Complex network is a tool for the analysis of complex systems with heterogeneous agents and interaction between them. A complex network consists of nodes and the interactions between these nodes. Total properties which emerge as a result of these interactions are distinct from the sum of small parts (more or less) in complex systems. Thus, standard approaches to international trade are superficial to analyze these systems. Network analysis provides a new approach to analyze international trade as a network. In this network countries constitute nodes and trade relations (export or import) constitute edges. It becomes possible to analyze international trade network in terms of high degree indicators which are specific to complex systems such as connectivity, clustering, assortativity/disassortativity, centrality, etc. In this analysis, international trade of crude oil and coal which are types of fossil fuel has been analyzed from 2005 to 2014 via network analysis. First, it has been analyzed in terms of some topological parameters such as density, transitivity, clustering etc. Afterwards, fitness to Pareto distribution has been analyzed. Finally, weighted HITS algorithm has been applied to the data as a centrality measure to determine the real prominence of countries in these trade networks. Weighted HITS algorithm is a strong tool to analyze the network by ranking countries with regards to prominence of their trade partners. We have calculated both an export centrality and an import centrality by applying w-HITS algorithm to data.

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