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A Dynamic Network Analysis of Energy Commodities Trade

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The Russo-Ukrainian war has brought to the centre of the debate the strategic role of energy commodities (coal, petroleum and natural gas) and, consequently, of those countries which are pivotal in trading these commodities. In this paper, we build the Commodity World Trade Network where countries are nodes and the bilateral exports properly weighted are the links between two countries.

Our goal is to obtain useful information from the reconstruction of the network to understand not only the evolution of this sector, but above all to identify the main players and as well as those countries that may suffer from a reduction in trade relations.

We analyse its topological evolution between 1995 and 2020, detecting the main hubs and computing different centrality measures. The three markets present hub and spoke and they are strongly incomplete with low density and small diameter in the overall time interval considered. Moreover, in order to evaluate the systemic risk, we remove some nodes and links looking at the achieved effects both in terms of neighbourhood and the aggregate level. Through the spectral clustering we identify communities which could replicate the real geopolitical alliances. Then, we compute the Gini index of the main centrality measures in order to look not only at the degree of inequality of the distributions in each year but also to its evolution. To conclude, centrality measures are used also to recognize main players of the markets in order to understand the economic and geographic reasons for which they play such a central role.

Keywords

energy commodities, interaction, centrality, international markets, evolution, network analysis

Topics

• Economic and geographic networks

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