



Hierarchical structure of Turkey's foreign trade

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ABSTRACT

We examine the hierarchical structures of Turkey's foreign trade by using real prices of their commodity export and import move together over time. We obtain the topological properties among the countries based on Turkey's foreign trade during the 1996–2010 period by using the concept of hierarchical structure methods (minimal spanning tree, (MST) and hierarchical tree, (HT)). These periods are divided into two subperiods, such as 1996–2002 and 2003–2010, in order to test various time-window and observe the temporal evolution. We perform the bootstrap techniques to investigate a value of the statistical reliability to the links of the MSTs and HTs. We also use a clustering linkage procedure in order to observe the cluster structure much better. From the structural topologies of these trees, we identify different clusters of countries according to their geographical location and economic ties. Our results show that the DE (Germany), UK (United Kingdom), FR (France), IT (Italy) and RU (Russia) are more important within the network, due to a tighter connection with other countries. We have also found that these countries play a significant role for Turkey's foreign trade and have important implications for the design of portfolio and investment strategies.

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1. Introduction

Complex networks provide a very general framework, based on the concepts of statistical physics, for studying systems with large numbers of interacting assets. These networks have been able to successfully describe the topological properties and characteristics of many real-life systems such as multilocus sequence typing for analyses of clonality [1], scientific collaboration in the European framework programmes [2], international hotel industry in Spain [3], taxonomy of correlations of wind velocity [4], Brazilian term structure interest rates [5] and legislative election results [6]. We present, within the best of our knowledge, the first study using the MST on the basis of foreign trade data. Moreover, the most recent literature has studied networks generated by correlations of stock prices [7–16]. In this paper, we focus on foreign trade and the main objective is to characterize the topology and taxonomy of the country's network.

Foreign trade is recognized as one of the most significant determinants of economic development of country, all over the world. The foreign trade of a country consists of the inward and the outward movement of goods and services, which results into outflow and inflow of foreign exchange. The primary objective of foreign trade is to increase production and raise the standard of living of its people. If a country is deficient in some of the resources, it has also to import consumer goods to satisfy the rising expectations of the people with the improvement in their economic conditions. These imports have to

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