Detecting early signs of the 2007-2008 crisis in the world trade

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Since 2007, several contributions have tried to identify early-warning signals of the financial crisis. The vast majority of analyses, however, has focused on financial systems and little theoretical work has been done, so far, on the economic counterpart, though the definition of better early-warning indicators for economic systems is advocated by many organizations, as the International Monetary Fund, the United Nations and the national central banks.

With the aim of filling this gap, and complementing the existing vast amount of literature on financial markets, in the present paper we analyse the bipartite World Trade Web (hereafter WTW), by employing a novel method to assess the statistical significance of a number of topological network properties across the period 1995-2010. We have, thus, explored the evolution of the bipartite WTW both before and after 2007. Our analysis suggests this year to mark a crossover from a phase characterized by a steep increase of randomness of the WTW topology (the WTW becomes increasingly compatible with the picture of a network where correlations between countries and products are progressively lost) to a phase during which a stationary regime seems to be finally reached. Indeed, the abundances of the considered family of motifs point out that the crisis explicitly manifests itself after a period of four years during which the WTW has undergone a dramatic structural change. Moreover, the WTW structural modification can be considered as concluded in 2010, after a seemingly stationary phase of three years. We have also refined our analysis by considering specific subsets of countries and products: our analysis evidences that some sectors/groups of countries are more sensitive to the cycles of the worldwide economy, providing robust early-warning signals of the 2007 crisis (and confirming the trends individuated at the global level); others, instead, provide little information on its build-up phase. Our study reveals also the existence of subsets of nodes which do not show any relevant internal correlation throughout the whole 1995-2010 window, thus questioning the correctness of the reasoning leading to the individuation of such groups as homogeneous sets. Anyway, the most statistically significant early-warning signals are provided by the most volatile macrosectors, especially when measured on developing countries, suggesting the emerging economies as being the most sensitive ones to the global economic cycles.

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