DYNAMICS OF FINANCIAL AGENTS IN COMPLEX NETWORKS

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Money moves the world. It is what allows the free growth of entire civilizations. Allows specialization and individuals in a society. It allows the centralization of production and expansion of the distribution of goods and services, in addition to facilitating access to them. Those responsible for administration and logistics are called Employers, and those responsible for carrying out different activities in society are called Workers. In a society with a healthy economy, a high monetary flow is expected: Employers pay Workers who then buy from Employers, therefore a cycle. Political, social, economic and health uncertainties cause fear in the population, which in response reduces their spending. Reduction in monetary flow within a society reduces the ability of Employers to maintain their Workers and, therefore, end up closing their activities. Most major global crises have occurred and will occur due to high fear among the population, generating a large reduction in monetary flow, collapsing Employers. It is extremely important to study the relationship between a population's perception of the situation in society and the influence of this fear on the financial health of society itself. Econophysics is an area of interdisciplinary research that aims to apply physical and statistical methods to the study of economic systems. In this work, complex networks popularized by Barabási were used to model interaction networks between Employers and Workers. The dynamics of interactions between the system's agents were then modeled based on parameters such as the number of agents and currencies in the system, Workers/Employer and Salary/(Total coins) ratios, and the fear perceived by the population, called temperature. The system is then simulated for several iterations and, using statistical methods, indices are calculated to observe the situation of the economy for given parameters such as the temporal average of the money flow and the respective variance. The presence of phase transitions was observed in the proposed model, showing the existence of a critical temperature at which the system passes from a state of relative economic health to an economic crisis. The results of this work are important for understanding and possibly preventing serious socioeconomic problems.

Area of knowledge: Physics

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