Università degli Studi di Roma Tor Vergata

PhD in Economics and Finance

Introduction to Economic Complexity

2024-25 Session

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Course Outline

This course introduces some elements of Network Theory and discusses some of its economic applications. The first part of the course illustrates the basic mathematical tools for the study of networks, including measures to identify the key players. The second part of the course presents applications of the theory, and looks at comparative economic growth, at conflicts, and at the rôle of networks in the enforcement of sanctions.

Main Textbook References

Matthew O. Jackson (2008), Social and Economic Networks, Princeton, Princeton University Press.

Newman, Mark (2018), Networks, 2nd ed., Oxford, Oxford University Press.

Part 1 – Network Theory

1.1.   Fundamentals of network theory

Examples of social networks. Network fundamentals. Mathematics of networks. Metrics. Random graphs. Power laws and scale free networks. Measures of centrality.

1.2.   Strategic network formation

Pairwise stability. Efficient networks. Distance-based utility networks. Diffusion through networks. The Bass model. SIR and SIS models of diffusion.

Part 2 – Economic Applications

2.1.   Economic complexity and growth

The world economy as a complex system. The Product Space. Non-linear approaches: the economic fitness and product complexity approach. Economic fitness and comparative economic growth.

2.2   Networks and conflicts

The design of networks in the face of threats. Connectivity and network value. Contagious attack to a network. Infrastructure networks. Cybersecurity. Civil wars and armed conflicts. Strategic alliances.

2.3.   Networks and the effectiveness of economic sanctions

The economics of sanctions. Strategic complementarity and externalities. The rôle of third parties. Unilateral sanctions in the short and in the long run. Multilateral sanctions in the short and in the long run.