Reconstructing Production Networks

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Abstract

This paper presents an algorithm for computing the adjacency matrix of a production network based on sectoral flow data and firm sizes. Specifically, our algorithm generates a probability matrix that represents the likelihood of connections between firms. This matrix is used to generate numerous unweighted adjacency matrices, which are then converted into weighted adjacency matrices under the assumption that firm sizes are in equilibrium. The problem involves solving a complex nonlinear optimization problem, for which we employ GPU parallelization to ensure computational efficiency. The synthetic production networks generated by our algorithm can be used to run computational experiments to investigate micro and macroeconomic problems. We illustrate the workings of our algorithm by computing the production network encompassing all firms in the United States.