

# DISSERTATION PROPOSAL

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## **Economies in Networks**

In contrast to the classic assumption of i.i.d. shocks, most economic activities in reality are connected and their influences propagate to others through economic networks in an uneven way. This dissertation studies how the connections among economic entities affect each individual firm and industry in the network, and how the difference in economic network the performance of the system as a whole.

The first chapter investigates how industries and firms are affected by the human capital spillover through industrial networks in cities. There are three factors that decide the influence of human capital spillover on an industry: the general quantity of educated workforce in the city, the concentration of human capital in an industry's input-output network and the ability of an industry to absorb the spillover. I create a human capital network index to measure the level of human capital in the local environment of an industry. The index is high for an industry not only when the general level of human capital level in the city is high but also when human capital is more concentrated in economically closer nodes in town for an industry. Results show that productivity of different industries have different levels of sensitivity to human capital spillover from its urban environment. Robustness checks indicate that in general the human capital network environment in cities is an important factor to explain productivity variance in industries across cities.

The second chapter develops a general equilibrium model to show that the difference in input-output production network can explain the productivity growth variance of cities across the country. By combining classic trade model with the Leontief input-output model, I can show that structurally better organized cities can grow faster not only because of the higher productivity and demand of its own, but also through winning the national price competition and exporting to other locations. Economic structures of cities are characterized by node sparsity and arch sparsity of their production network. Taking the model to the data, I can show that between 2001 and 2015, the level and growth difference of city production networks explains the level and growth difference of city productivities.

The third chapter looks at the difference in default behaviors of middle market firms and big public firms. The empirical exercise uses the default records of commercial loans from a private bank and macro economic data from 2005 to 2015. The results can show that firm's own financial conditions, conditions of the labor market and conditions of economic neighbors in production networks can influence the probability of default for middle market firms. The influence of these factors is different for big public firms. The paper will develop a structural model to explain why two types of firms are affected differently by these characters.