

Essays on Technology, Finance, and Macroeconomics

Lihong Han

Abstract

My dissertation evaluates technology adoption and transfer both theoretically and empirically, with the goal of providing new insights into the consequences of technology adoption -- an area that remains understudied in the macroeconomic literature.

I begin the investigation from the perspective of firms. The major aim of my first chapter is to analyze the mechanism of technology adoption across firms under a framework in which technology is transferred through mergers and acquisitions. In this paper I present a model that incorporates the cost of converting one firm's specific capital into that of another firm. I show that merger activity involves a pattern in which firms that have high-market valuations with respect to the book value of their assets (i.e., Tobin's Q) will merge with firms that have lower yet not the lowest valuations. I also show that the ratio of bidder to target Qs and the size differential between acquirer and target have a nonlinear effect on the probability of two firms being involved in a merger, and that the likelihood of a merger is positively and linearly related to the relative potential growth between acquirer and its target. In terms of potential growth, the typical merger pattern is 'high buys low'. Based on data for mergers among US firms available from the Securities Data Corporation from 1986 to 2005, a series of bootstrap probit regressions of the probability of an actual merger on the ratio of bidder to target Qs, the two firms' size differential, their relative potential growth, and other controls bear out the main implications of the model.

My second chapter analyzes the Cross-Country Historical Adoption of Technology (CHAT) dataset, introduced by Comin and Hobijn (2006), which covers the diffusion of about 115 technologies in over 150 countries since 1820. I estimate and compare the convergence speed of each technological adoption and that of income per capita across all countries, and then across the developed and developing countries. I then document four general facts about cross-country technology adoption and income inequality that emerge from these data: (i) Though developed countries always adopt a new technology earlier than developing countries, on average the convergence speed of technology adoption across developing countries is faster than that across developed ones. (ii) The convergence speed of the adoption of most technologies is non-monotone. (iii) The invention of the computer and the internet has not increased the average convergence speed of other technological adoptions. (iv) The relation between the average convergence speed of technological adoptions and that of per capita income is negative across all countries and across the less developed ones, but is positive across developed countries in the post-WWII period.

To evaluate the impact of technological diffusion on cross-country income inequality, in the third chapter I build a large dataset that includes other key variables such as educational attainment, the money supply, and exchange rates for each country. Since the dataset covers about 115 technologies, I introduce an index representing the extent of advance in each technology over successive 5-year periods. I then estimate the effect of technology differences on the cross-country dispersion of income per capita while controlling for these key variables, and compare the relative importance of these factors, which have long been believed to stimulate economic growth.