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Economic reforms and the evolution of China's total factor productivity

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ABSTRACT

This paper investigates the impact of economic reforms on China's growth in total factor productivity (TFP). I build a model with two sectors in production – the private and the state sectors – that features capital market imperfections on the private sector. Following the removal of prohibitive barriers to private entrepreneurship (reforms), TFP gains follow the expansion of the private sector and the closure of the least productive state enterprises. Although the distribution of production technologies in both sectors is identical, the model generates persistently higher TFP in the private sector via a selection mechanism arising from financial frictions.

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1. Introduction

Over the past 20 years, China has experienced one of the most remarkable growth episodes in modern economic history. Total factor productivity (TFP) has been a key engine of China's 7.6 percent annual rise in output per worker in the non-agricultural economy from 1992 to 2007. This rise followed major economic reforms that reduced barriers to entry on private businesses. China has since transitioned from a predominantly state-run to a mixed economy of both private and state sectors. At the time of economic reform in 1992, the private sector accounted for only 12 percent of non-agricultural employment. By 2007, this figure climbed to 52 percent. Additionally, TFP in the private sector has been 80 percent higher, on average, than the state sector.

The goal of this paper is to quantitatively assess the extent that the economic reforms in the non-agricultural sectors can account for China's aggregate TFP dynamics. I build a quantitative framework suggesting economic reforms that initiated the reallocation of resources given existing production technologies has been a key driver of China's TFP growth since reforms in 1992 to 2007. The model features two sectors in production – the private and the state sector – whose main difference is access to credit markets: the private sector faces financial frictions, modeled as a collateral constraint, while the state sector does not. I analyze the transitional dynamics of the model from the removal of prohibitive barriers to private entrepreneurship (reforms) to a new stationary steady state where financial markets remain undeveloped. Following reforms, entrepreneurs are able to utilize their existing talents, drawing resources to their new, productive businesses. The reallocation of capital and labor to the private sector leads to an overall increase in TFP, mirroring China's 1992 reforms and transition to a two-sector economy.

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The critical factors of the model are the inclusion of financial frictions, endogenous entry and exit, and heterogeneity in talent of operating a business. Individuals belong to either the private or the state sectors. All agents are endowed with an individual production technology (talent) which is identically distributed across both sectors. I refer to an agent's talent in the state sector as "managerial" talent and "entrepreneurial" talent for agents in the private sector. Agents choose the most lucrative option between managing/operating a business and working for a wage. Collateral constraints on private entrepreneurs from poorly developed financial markets distort their occupational choice and size of their business. Are they talented enough to viably operate a business? If so, do they have enough collateral to finance their business?

The removal of barriers to entrepreneurship in this environment leads to TFP dynamics consistent with China's economic transition. First, TFP gradually rises as entrepreneurs accumulate collateral and expand their business. Also, the inclusion of endogenous entry and exit leads to two additional implications. TFP is persistently higher in the private relative to the state sector via a selection mechanism arising from financial frictions, and TFP increases in the state sector from exit of the least productive state businesses.

The model endogenously generates 25 percent of the observed differences in TFP between the state and private sectors. Although the distributions of entrepreneurial talent and managerial talent are identical, the inclusion of financial frictions on the private sector leads to differences in the talent distributions of active entrepreneurs in the private sector and managers in the state sector. Since financial frictions force entrepreneurs to rely on self-financing to expand their operation, only the most talented are able to overcome the constraints and profitably start a business. Financial frictions essentially "prop-up" TFP in the private sector by limiting entry to only the most talented entrepreneurs. Conversely, state enterprises with managerial talents ranging from high to relatively low levels can all produce. This leads to differences in the composition of sector-level productivities: the state sector, although they do have productive managers, has disproportionately more low-productivity businesses than the private sector. I show that TFP gains in the private sector from this selection mechanism (extensive margin) are larger than the TFP losses on the intensive margin (distortion on individual capital use). That is, TFP is magnified in the sector facing incomplete financial markets (the private sector).

The model indicates that nearly one-quarter of TFP growth in the state sector arises from removal of entry barriers (reforms) on the private sector through endogenous exit of state enterprises. Expansion of the private sector after reforms places upward pressure on labor demand, and, hence, wages. The least productive state enterprises are unable to profitably operate at the higher wage level and thus exit, leaving only the most productive state enterprises in business. This mechanism captures China's "grasp the large let go the small" policy of the 1990s. The state privatized or closed its smaller, loss making enterprises while retaining the larger, more profitable ones in effort to increase the overall efficiency and competitiveness of the state sector in the new, market economy.

The theme of this paper is related to [Song et al. \(2011\)](#) who consider a small-open economy, transitional growth model to explain China's growth acceleration and acquisition of foreign assets since China's 1992 reforms. My paper provides additional insights into China's TFP dynamics. First, the private sector influences the equilibrium wage during the transition. Rising wages from private sector expansion induces ongoing exit of the least productive state businesses. Resource reallocation away from these establishments toward more productive ones raises TFP in both sectors. Second, by assuming an identical distribution of talent across both sectors, the model generates TFP differences arising from financial frictions.

The model is similar to [Buera and Shin \(2013\)](#) who also study transitional economies facing imperfect financial markets in an environment with entrepreneurial choice. I extend this framework by including a financially unconstrained sector (state) alongside a financially constrained sector (private). In Buera and Shin, financial frictions faced by all individuals keeps factor prices relatively low allowing entry of "incompetent but wealthy" entrepreneurs that can overcome the constraints, keeping TFP low. I show that the inclusion of the financially unconstrained state sector keeps factor prices high enough such that the "incompetent" entrepreneurs would never be able to enter regardless of wealth. In fact, TFP in the financially constrained sector remains higher than the financially unconstrained sector from selection into entry of only the most talented entrepreneurs. This result relates to [Hale and Long \(2013\)](#) who also explore the link between financial frictions and productivity differences between China's state and private sectors. The authors argue that private firms defy financial constraints by managing working capital more efficiently on the intensive margin. In my model, TFP differences arise primarily on the extensive margin from entry of a larger share of relatively less productive state businesses and more talented entrepreneurs in the private sector.

Recent work that connects growth and micro-level distortions include [Restuccia and Rogerson \(2008\)](#), [Buera et al. \(2011\)](#), [Guner et al. \(2008\)](#), and [Midrigan and Xu \(2014\)](#). My model indicates that distortions from financial frictions have a quantitatively larger effect on total output than TFP. Private sector TFP gains and state sector TFP losses from entry/exit distortions due to financial frictions largely offset each other. However, the majority of lost output comes from the restricted entry of the large number of less talented entrepreneurs due to financial constraints.

Explanations of the sources of China's productivity growth include the reallocation of labor from agricultural to non-agricultural sectors ([Dekle and Vandenbroucke, 2010](#)), the fall of micro-level distortions ([Hsieh and Klenow, 2009](#)), human capital accumulation ([Wang and Yao, 2003](#)), and direct and spillover effects from FDI ([Zhao and Zhang, 2010](#)). These mechanisms have all likely influenced China's productivity growth. In this paper, I investigate the effects of the reallocation of resources given existing production technologies on TFP.

The remainder of the paper is as follows. I next present the empirical facts. Section 3 presents the model economy and the characterization of economic reforms. I describe the model parameterization in Section 4 and analyze the simulation results in Section 5. Section 6 concludes.

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