

The Changing Roles of Ownership in the Economic Growth in China

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Abstract

This paper examines the changing roles of ownership in the economic growth by using a panel data set of 30 provinces in China for the period (1999-2010). With the use of absolute and relative presence variables, this study shows that private enterprises have emerged as the engine of economic growth in China in the later period (2005-2010). The growing size and number of private enterprises are positively linked to growth. However, though foreign-invested enterprises have been acclaimed as the main contributors to economic growth in China, they have minimal effect on the economic growth in the later period. State-owned enterprises have a significant and negative effect on the economic growth in the later period.

The results can be interpreted that the engine of growth in China has been changed over time from other ownerships to private ownership. Private companies have developed a lot in every respect and started to lead the economy for long-run growth. China initiated its economic growth by adopting foreign capital and it is still the top destination for foreign direct investment among developing countries. However, to sustain the growth over a long period, private sector should be of great importance and perform a key role in the view of catch-up economics.

Keywords

Chinese economy, Economic Growth, Ownership, Private enterprises

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I. Introduction

Unlike most developed countries wherein the domestic private sector dominates the whole economy, China has a unique industrial structure in which state-owned, private, and foreign-invested companies co-exist and compete with one another. These companies comprise a substantial portion of the economy in the 21st century. The coexistence of these types of ownership is an important outcome originating from the gradual economic reform of China and its active induction policy for foreign capital (Naughton 2007). With these types of ownership, China has attained an unprecedented economic achievement for the last two decades, maintaining a comparatively stable growth rate of 7% to 8% even after the global financial crisis in 2007.

In connection with the distinct feature of the Chinese economy, very interesting questions have been brought up by many researchers: What are the roles of these ownerships in the economic growth of China? Which of the three candidates (private, foreign, and state ownership) has played a more dominant role in the economic growth of China in recent years? Many researchers contend that foreign-invested enterprises have played a key role in economic development since their entry into the local market. Meanwhile, others argue that it is the private enterprises, which are growing at a surprising rate, that have been driving economic growth. Finally, others pay attention to the role of state-owned enterprises, which have emerged as global players under government protection. As a developing economy, China is an ideal subject through which to discover the relationship between ownership and economic growth. The questions

above are also essential in explaining the process of economic development in emerging economies. In particular, we pay attention to the 1999-2010 period when private enterprises in China began to compete in earnest with state-owned and foreign-invested enterprises as they grew rapidly. This is also the time when the reform of state-owned enterprises in the 1990s was completed to some extent, and foreign-invested enterprises became more active with China's joining WTO in 2001. Therefore it is good time to examine the changing roles of ownership in the economic growth in China.

In the next section, we examine the existing literature to determine previous findings on the contribution of ownership to economic growth in China. Then, we devise key variables to represent the presence of ownership, and conduct a systematic empirical test to examine the roles that ownership play in the Chinese economy. Our empirical investigation uses provincial-level data from the National Bureau of Statistics of China. Employing the data from one country can avoid the inconsistency of variable definition, which cross-country regressions are usually subject to (Du et al. 2014). We apply panel data econometric techniques, such as fixed effects (FE) and generalized method of moments (GMM). These techniques are needed to control for endogeneity. High-growth economies tend to expand private sector and vice versa at the same time, and this phenomenon has a high probability. The GMM is known to handle the potential endogeneity of independent variables well (Caselli et al. 1996; Roodman 2009).

The rest of the paper is organized as follows: Section 2 reviews the literature on the roles of ownership on economic growth in China, Section 3 develops the main hypothesis, Section 4 describes the methodology

and dataset used in the research, Section 5 reports the econometric results, and Section 6 offers conclusions and implications.

II. Existing Literature

Among private, foreign, state ownership in China, the role of foreign capital first has drawn keen attention from academic world since China actively tried to inflow the foreign capital from the early stage of reform and initiated the economic take-off to compensate insufficient capital and technology (Zhang 1999, 2001).

However, although there are some negative views about the roles of foreign capital (e.g. Huang 1998, 2003; Braunstein and Epstein 2002), the role of foreign capital in economic growth in China have positively recognized. The proponents of FDI argue that it helps promote economic growth through various channels (Wei 1996; Dees 1998; Zhang 2001; Liu et al. 2002; Shan 2002). For example, Zhang (2001) asserts FDI enhances China's growth through direct and indirect effects by using cross section and panel data between 1984 and 1998. According to Zhang (2001) there are four important ways how FDI effects growth. First, FDI inflows enhance the capital formation and the employment possibilities. Second, FDI promotes export focused production. Third, FDI brings resources such as brand names, management skills and higher educated labor to China. Fourth, with the inflow of FDI technology transfers and spill-over effects occur. Wei (1996) uses city specific data between 1988 and 1990 and concludes that FDI inflows have a significant positive effect on growth rates on the city-level. Furthermore, he asserts

that foreign-invested firms are more focused on export than domestic firms but do not replace the export of Chinese firms. Liu et al. (2002) investigate the causal links between FDI, trade and economic growth in China at the aggregate level for the period 1981 to 1997 by using multivariate Granger causality in a co-integration framework. They found that there are long-run relationships between FDI, trade, export, import and economic growth. The long-run causality is bi-directional, and FDI has a positive impact on China's economic growth. Shan (2002) attain a similar result with Liu et al. (2002) by using a VAR model, variance decomposition and impulse response function techniques. Dees (1998) also investigates the effect of FDI on economic growth with a constant elasticity of a substitution production function and emphasizes that this partly happens through technology spill-overs and diffusion in the long run.

Second, private enterprises start to receive more public attention comparatively recently due to their rapid growth and growing contribution to the economy (ADB 2003; OECD 2005). Lots of researches indicate that a significant private business has emerged as one of the driving forces behind China's rapid economic development (Chen and Feng 2000; Atherton and Fairbanks 2006; Dobson and Safarian 2008; Li et al. 2012; Xia and Gordon 2014), but solid empirical analyses for the impact of private enterprises on economic growth seem to be rare. Chen and Feng (2000) conduct a pioneering study on investigating the source of cross-provincial variations of economic growth suggesting that private and semi-private enterprises lead to an increase in economic growth, but the findings are based not on the solid empirical test. One exception may be the work of Li et al. (2012), which tries to quantify the impact

of entrepreneurship by using a panel data set of 29 provinces in China over 20 years. They use the self-employment ratio and the private employment ratio to identify the causal effect of entrepreneurship on economic growth and find private enterprises have a significant positive effect on economic growth.

However, some gloomy reports about China's private enterprises indicate private businesses suffer from lots of obstacles for further growth, especially with respect to financing (Dollar and Wei 2007; Zhang 2008; Poncet et al. 2010). For example, using a micro-level data set over the period 1998-2005 on Chinese firms, Poncet et al. (2010) presents that private Chinese firms are credit constrained while state-owned firms and foreign-owned firms in China are not. And private enterprises are mostly small and medium enterprises, predominantly engaged in labor intensive industries such as retailing, catering, services, repairs, construction, transport and light manufacturing (Li et al. 2012). According to Schumpeter (1942), Chandler (1977; 1990), big firms can foster more rapid technical innovation and exploit economies of scale and scope, which might contribute to enhanced economic growth. However, SMEs do not have the resources to enhance efficiency, innovation and aggregate productivity, so they cannot make noticeable impacts on the economy (Deller and McConnon 2009).

Lastly, Chinese state-owned enterprises have been criticized for inefficiency and reckless management and a main target for progressive reformers to aim at for a long time. In 1994, SOEs ownership reform was eventually accelerated when the government decided to 'grasp the large, let go the small' SOEs (Cao et al. 1999). By the end of 2001 about 70 percent of all SOEs had been partially or fully privatized and it

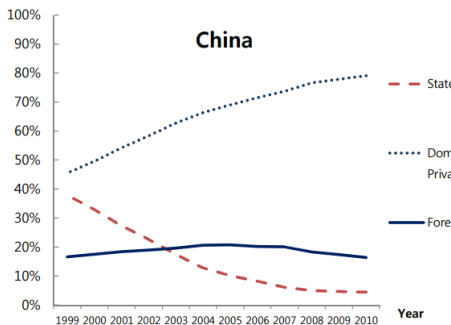
seemed that SOEs would fade into the mists of history and be replaced by private sector. However, SOEs reform cooled down soon after China's entry into the WTO, partly due to fears of losing state-owned assets to the non-state sector. Even the Government declared the state's "absolute control" of seven industries and "strong control" of nine industries in 2006. The global financial crisis in 2008 reinforced the view that the government should exert the ultimate influence to important SOEs (Chen 2013). Recently, not only Chinese SOEs have an increasing presence in the Fortune list, but also large Chinese SOEs are becoming the dominant force in both domestic and international markets (Elliott and Zhou 2013). The Economist (2011) and Du et al. (2014) point out that the Chinese government may have been muscling in on business in a variety of ways by tightening its grip on strategic industries and devising market-access rules to favor state companies, to the chagrin of private businesses. In addition, over a decade into the initial privatization reform, SOEs surprisingly remain active in a wide range of palpably non-strategic sectors, from textiles and papermaking to catering (Du et al. 2014). With a recent debate on "Guo Jin Min Tui (國進民退)" in China, translated as "the state sector advances and the private sector retreats", it is the time to explore again the role of SOEs in the Chinese economy.

The existing literatures above suggest that the impact of various types of ownership on economic performance in China is still an important unresolved empirical question. Despite numerous studies for explaining the relation between ownership and economic growth in China, there seems to be no general consensus among them. In the following section, we develop the main hypothesis with theoretical frameworks which have not been so focused in the previous studies.

III. Hypothesis Development: Changing Roles of Ownership

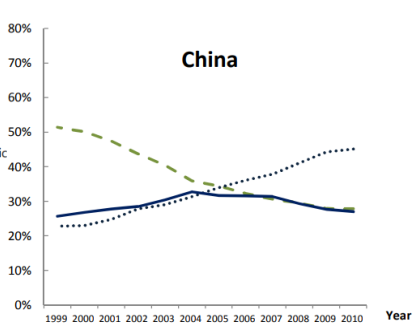
In term of ownership, Chinese economy has experienced a rapid structural change during the past decades although there was no other ownership except state-owned enterprises before the beginning of the economic reforms in 1978. And the change was accelerated by the dramatic surge of private firms and the start-up of full-scale reform of SOEs in the late 1990's (Lin 2012). All the measures which we can consider suggest that private industrial enterprises in China have experienced a rapid development during the period 1999-2010. Figs. 1 and 2 present the relative number and relative sales of industrial firms by ownership in China. As shown in Fig. 1, the number share by private enterprises grew dramatically during the period across China. And 45.1 % of the total sales were produced by the private industrial sector in 2010, an increase of 22.3 percentage points compared to the number in 1999.

Figure 1. Share of firms by ownership in total number



Source: National Bureau of Statistics of China.

Figure 2. Share of Firms by Ownership in total sales in China



Source: National Bureau of Statistics of China.

On the other hand, the relative share of state-owned industrial enterprises exhibits a rapid decline both in total number and total sales. In addition, no big share change can be observed in the shares of foreign-invested industrial enterprises. It means private ownership have become a largest player in the Chinese economy replacing foreign and state ownership. This phenomenon exists not only in the highly developed eastern provinces but also in the less developed central and western provinces.

Then, is the dramatic emergence of private sector good for economic growth in China? Does it indicate that private firms have actually improved in efficiency to drive the economic growth? Or, does it just mean the relative emergence caused by the decline of state-owned and the retreat of foreign-invested enterprises? On the other hand, what does the decreasing proportion of foreign enterprises mean to the Chinese economy? Whether has foreign capital lost its significance in economic growth in China over time or not? If so, how can we explain the phenomenon?

These questions are very essential to reveal the role of ownership in the developmental process of China in recent years. To build and develop our hypothesis about the questions, we could invite some theories which are much related to the roles of various types of ownership in the process of economic growth and development. Particularly, we think about the changing roles of private and foreign enterprises in China over time.

IV. Decreasing Contribution of Foreign Capital to Economic Growth

Dunning (1980, 1995) asserted that multinational companies (MNCs) with ownership advantages¹⁾ choose to invest capital abroad only if there are internalization advantages²⁾ and location advantages³⁾ together. However, MNCs tend to withdrawal from the host country or not to expand their oversea investment over time because they has lost the location advantage due to rising factor prices or no more tax break. For example, most of MNCs leading electronics industry in Taiwan moved their factories to other countries such as China with rising real wage in 1980's (Amsden and Chu 2003). Similar phenomena happened in Mauritius and the Republic of Ireland in 2000's (Mcnamana 2008; Horner and Aoyama 2009). If there were no more location advantages for MNCs to exploit in the countries, they are easy to fly out or unwilling to expand investment. Around the mid of 2000 In China, the real wage has been rising more rapidly and Chinese government has gotten rid of tax break for foreign enterprises. The number of foreign firms in labor intensive industry has been stagnant in recent years. We can expect that foreign contribution to economic growth from the industry has been decreasing.

Second, as private enterprises have developed and competition in the market becomes strong, foreign enterprises could be increasingly reluctant to transfer useful technology to maintain their competitiveness (OECD

1) Trademark, production technique, entrepreneurial skills and returns to scale.

2) Advantages by own production rather than producing through a partnership arrangement such as licensing.

3) Existence of raw materials, low wages, special taxes or tariffs.

2002; Ram and Zhang 2002; Huang 2003). One of the important paths where foreign capital has positive impact on a host country is to transfer technology explicitly through joint venture or implicitly through spillover effects. However, as local firms have accumulated their own capability and emerged as strong rivals in domestic market, foreign firms should be more cautious not to leak out their internal technology to local rivals in any way. In China, the number of wholly owned subsidiary has overtaken that of joint ventures around the mid of 2000's. Worry about the leakage of technology could be one of the reasons to explain the phenomenon (Chan, 2013). If foreign technology transfer has diminished, the positive contribution of foreign capital to Chinese economy should also have shrunk over time.

Lastly, there could also be one very fundamental reason that foreign capital may not have a continuously positive influence on a host country. As global players, MNCs have different business goals with local companies. They invest and pursuit profit 'on a global basis', so they move here and there seeking for more profit as situation changes (Shapiro 1999). They have no incentive to invest and run business continuously just in one specific host country. Therefore it is reasonable to that, in the long run, foreign capital seems to be cautious about doing long-term big investment compared with domestic capital which has its roots in the region. Rather, it tends to repatriate more profits over time and not to expand investment after it successfully put down roots in a host country (Seabra and Flach 2005).

V. Increasing Contribution of Private Enterprises to Economic Growth

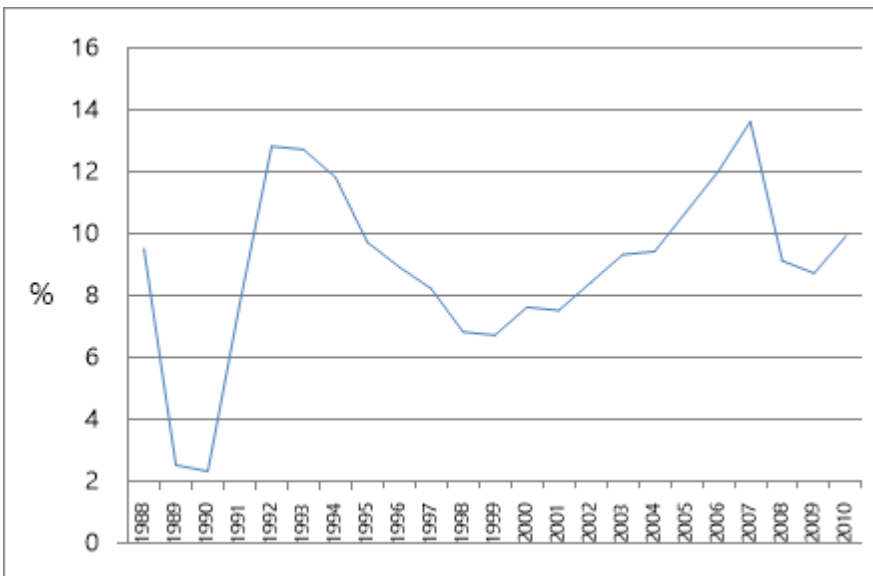
According to a group of development economists who have studied the East Asian development experience, a significant characteristic of successful catch-up economies is that private enterprises are flourishing compared with foreign-invested and state-owned enterprises as their economy grows up continuously to the higher-level (Amesden 1989; Amesden and Chu 2003; Wade 2004; Lee and Mathews 2010). Furthermore, Lee and Mathews (2010) emphasize that to grow capable private companies is the most important and fundamental criterion determining the success or failure of the late-comer's economic development or growth. At the initial stage of economic development without capable private firms, foreign (or state) ownership could be the large part of national economy and play a leading role in the economy, but to sustain the growth over a long period, private ownership should take the leading role in boosting the economy (Lee and Mathews 2010).

So now China is following the way which the theory above point out? In other words, are Chinese private enterprises with strong entrepreneurship having a significant and positive effect on economic growth in recent years, replacing foreign-invested and state-owned enterprises?

To get one clue to this question, we need to check the trend of economic growth in China during the period 1999-2010 when private enterprises have bounded forward with the decline of state-owned enterprises and the retreat of foreign-invested enterprises. As shown in Fig. 3, the average growth rate in the period 1999-2010 is about 9.4%, which is a

little larger than 8.5% in the previous period 1988-1998. Therefore we could think the uprising of private sector would not produce some negative effect on economic growth. But we need robust econometric analysis controlling other variables affecting economic growth to reveal the real impact on economic growth, which will be done in the next section. In sum, given the trend of growing private sector in China, testing its impact on the economic growth is worthwhile. Considering the discussion above, we hypothesize that the following: *Private ownership has become the engine of economic growth in China as the economy continues to develop to higher-level in recent years, whereas foreign (or state-owned) ownership has lost their dominant role which they could have in the past.*

Figure 3. Per Capita GDP Growth in China, 1988–2010



Source: National Bureau of Statistics of China.

VI. Methodology and Data

1. Estimation methodology

The baseline specification for estimating the growth effects of ownership on GRDP per capita growth rate follows a generic growth equation (Mankiw, Romer and Weil 1992; Barro 1997)

$$GR_{it} = \alpha + \beta Z_{it-1} + \gamma Basic_{it} + \delta X_{it} + \mu_i + \mu_t + \varepsilon_{it}$$

Where subscript i indicates that the variable refers to the i -th province and subscript t refers to time; GR_{it} is growth rate in real GRDP per capita, Z_{it-1} is the GRDP per capital at the previous year($t-1$), $Basic_{it}$ is a set of conventional control variables often appearing in economic growth models, such as population growth rate, investment ratio and human capital (higher education enrollment) of province i at time t ; X_{it} is key variables that measure the presence of ownerships as we identify in detail in next section; μ_i is the time-invariant heterogeneity that is specific to i -th province but is not included in the explanatory variables; μ_t is a full set of year dummies; and ε_{it} is the error term.

The first estimation method used to analyze the growth equation is the panel fixed effect or the panel random effect model. The methods control the country-specific shocks. Year dummies are also added in the equations to capture year-specific shocks. The more suitable model is chosen by the Hausman test. Although the panel approaches are the most frequently used and reliable estimation methods in the recent panel studies

(see for example, Islam 1995), there are still potential endogeneity problems which come from simultaneity, omitted variable bias, and measurements error in the estimation. A system-GMM estimation developed by Arellano and Bover (1995) and Blundell and Bond (1998) is applied to the growth equations for a robustness check to correct these potential problems. Then the results with two estimation models are compared. To evaluate the system-GMM estimation model specifications, the criteria include Hansen over-identification test, and test for second order serial correlation (AR2) of the residuals in the first differenced equation. The AR (2) test provides additional checks on the specification of the model and on the legitimacy of instrumental variables in the differenced equation.

The period 1999-2010 when we try to analysis shows very dramatic structural change in term of ownership in China. In 1998, led by the former Chinese premier Zhu Rongji, the bold reform of SOEs took effect step by step; the proportion of SOEs in Chinese economy has dropped sharply since then. While the sales of private sector has doubled both in number and sales, foreign-invested enterprises seems to be stagnated for the same period. We could expect that the roles of these types of ownership in economic growth of China have changed over this period. In other words, the engine of growth in China might have been changing over time (Jin et al. 2008; Lee and Kim 2007). To catch the change of role of ownership, empirical analyses are undertaken for two different periods: 1999-2004 and 2005-2010. The period are divided through the mid-2000s because several significant structural changes have started from the mid-2000s, such as the explosive increase of private sector, the full-scale real wage increase and the big change of FDI policy of Chinese government. There has also been a trend of the state sector expanding

market power and pushing private firms into the fringe in some sectors (Du et al. 2014).

2. Data and variables

The empirical work carried out in this paper utilizes the official provincial-level data of the China National Bureau of Statistics (NBS). These data cover 30 provinces in China over the 1999 to 2010 period.⁴⁾ Macro variables offered by the dataset include gross regional domestic product (GRDP), population, education enrollment, investment, trade, foreign direct investment, government expenditure and patents numbers. Industrial data are categorized according by ownership, offering main indicators such as total number, sales, assets, liabilities and so on. Ownership status is divided into three main groups which are state-owned and state-holding, private and foreign-invested enterprises (Hong Kong, Macao, Taiwan and foreign funds). They include all industrial enterprises with annual sales in current yuan of 5 million or higher and so represents a detailed insight into the development of the Chinese economy.

To investigate the relationship between ownership and economic growth, we employ the absolute and relative presence of ownership in each province as key variables. We devise the next 4 types of measures for ownership presence: (i) share in total sales by ownership; (ii) share in total number of firms by ownership; (iii) log of number of firms by ownership; (iv) log of average sales per firm by ownership. Type (i) and (ii) measures show the relative presence of ownership in total sales and

4) The starting data set consisted of 31 provinces in China, but we dropped Tibet due to incomplete data.

total number respectively, whereas type (iii) and (iv) represent the absolute presence of ownership in number and in firm size respectively. The first key variable used is the share in total sales by ownership. For a robustness check, we also use the share in total number by ownership in each province. Then we decompose the sales share variable by devising two absolute presence variables measured by the number of firms and the average sales per firm by ownership. By using these various sorts of measure, we can expect more robust estimation result on the growth impact of ownership in China.

The set of independent variables includes the basic control variables that are typically used in cross-country regressions. This set includes population growth rate (%), GRDP per capita (log value in constant terms) in the previous year, investment (% of GRDP), and higher education enrollment (% of population), openness (% of GRDP), foreign direct investment (% of GRDP), government expenditure (% of GRDP) and technology (log of number of patent applications granted).

Descriptive statistics are reported in Appendix 1. Correlations of key variables reported in Appendix 2 are pooled data correlations. In the period from 1999 to 2010, a wide variation exists in the share of ownership both in total sales and in number. A substantial variation also exists in macro variables such as the growth rate of GRDP per capita and openness among provinces.

VII. Estimation Result: Private Enterprises Lead to Faster Growth

1. Share in total sales and total number by ownership

Table 1 presents the regression results using the shares in total sales by ownership in each province based on both the fixed effect model and system GMM models. These results show the share of private enterprises in total sales is insignificant during 1999-2004, but is positive and significant over 2005-2010, regardless of whether they are based on the FE or GMM models. By contrast, the share of state-owned enterprises is negative and significant only in the later period while the share of foreign-invested enterprises is insignificant over the two periods. The Hansen test and AR (2) test are carried out in the GMM system while the Hausman test in the fixed effect model.

In the FE model, the coefficient of the share of private businesses in total sales with respect to the growth rate of GRDP per capita is stable at approximately 0.0010 in the later period. This result suggests that if the proportion of private ownership in total sales increases by 1% (e.g., from 51% to 52%), then the growth rate of GRDP per capita increases by approximately 0.1% (e.g., from a growth rate of 15% to 15.1%). In comparison, the magnitude of the effect of state-owned enterprises on growth rates, according to the FE results, is approximately -0.0012. This result suggests that if the ratio of sales volume of state-owned enterprises to total sales decreases by 1% (e.g., from 28% to 27%), then the growth rate of GRDP per capita increases by approximately 0.12% (e.g., from a growth rate of 15% to 15.12%).

Table 1. Estimation results: Share in Total Sales on Economic Growth (By ownership)

	Fixed Effect			System GMM		
	1999-2004	2005-2010	1999-2004	2005-2010	1999-2004	2005-2010
N=180						
Private enterprises	0.0003 (1.23)	0.0010 (2.83) ^{***}	-0.0001 (-0.17)	0.0017 (3.42) ^{***}	0.0001 (0.67)	-0.0004 (-2.24) ^{**}
Foreign-invested Enterprises	-0.0000 (-0.11)	0.0004 (0.9)	0.0000 (0.01)			
State-owned Enterprises	-0.0004 (-1.32)	-0.0012 (-3.46) ^{***}		-0.0004 (-1.08)		
per capita GRDP(t,t-1)	-0.0069 (-0.17)	-0.1297 (-3.32) ^{***}	-0.0121 (-3.34) ^{***}	0.0008 (0.0)	-0.0035 (-0.25)	-0.021 (-2.66) ^{***}
Population growth	-0.0101 (-22.05) ^{***}	-0.0082 (-7.32) ^{***}	-0.0082 (-7.51) ^{***}	-0.0104 (-4.89) ^{***}	-0.0102 (-15.71) ^{***}	-0.0085 (-4.88) ^{***}
Investment ratio	0.0674 (6.59) ^{***}	0.0546 (4.01) ^{***}	0.0557 (4.18) ^{***}	0.1003 (5.27) ^{***}	0.027 (1.66)	0.0401 (3.00) ^{***}
Higher education	0.0267 (1.17)	0.0326 (0.87)	0.0071 (0.2)	-0.0074 (-0.54)	0.1323 (2.87) ^{**}	-0.0128 (-0.74)
Openness	0.0003 (2.28) ^{**}	0.0002 (0.16)	-0.0001 (-0.58)	0.0004 (3.60) ^{***}	0.0002 (0.59)	0.0000 (-0.03)
FDI	-0.0011 (-1.50)	-0.0012 (-1.62)	0.0031 (1.67)	-0.0024 (-1.97) [*]	-0.0018 (-0.78)	0.0022 (1.48)
Government expenditure	-0.0001 (-0.21)	0.0011 (1.82)	0.0005 (0.91)	-0.0025 (-2.18) ^{**}	-0.0012 (-3.34) ^{***}	-0.0003 (-0.94)
Patent	-0.0028 (-0.57)	-0.0024 (-0.70)	0.0109 (1.67) [*]	0.0109 (1.7) [*]	-0.0002 (-0.10)	0.0018 (1.08)
R2 / AR(2)	0.89	0.91	0.63	0.470	0.548	0.208
Hansen test	0.88	0.6	0.681	0.225	0.391	0.139

Note: 1. The t-value is in parentheses. 2. ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively. 3. P-values are presented for AR(2) and Hansen tests. 4. Year and region dummy are included, but the results are not reported.

Table 2. Estimation results: Share in Total Number on Economic Growth (By ownership)

N=180	Fixed Effect			System GMM		
	1999-2004	2005-2010	1999-2004	2005-2010	1999-2004	2005-2010
Private Enterprises	0.0002 (0.93)	0.0011** (2.11)	0.0001 (0.17)	0.0031 (2.04)**		
Foreign-invested Enterprises	-0.0015** (-2.02)	-0.001 (-0.96)		0.0005 (0.47)		-0.0004 (-0.78)
State-owned Enterprises					0.0003 (0.67)	-0.0041*** (-2.98)
per capita GRDP(i,t-1)	-0.0064 (-0.16)	-0.0741** (-2.12)	-0.0008 (-0.04)	-0.0338 (-1.23)	-0.0048 (-0.35)	-0.0306 (-1.92)
Population growth	-0.0101* (-21.95)	-0.0085 (-7.55)	0.0581 (4.21)	-0.0058 (-1.56)	0.107 (3.24)	-0.0264 (-1.04)
Investment ratio	0.07 (7.09)	0.0569 (4.15)	-0.0086 (-7.62)	-0.0265 (-0.78)	-0.0102 (-38.00)	-0.0082 (-8.56)
Higher education	0.0268 (1.17)	0.0009 (0.03)	0.006 (0.16)	0.1758 (2.02)**	-0.0286 (-1.18)	0.1212 (3.14)
Openness	0.0003 (2.20)	0.0002 (2.08)	0 (0.12)	0.0003 (0.83)	0.0005 (5.12)	-0.0001 (-0.89)
FDI	-0.0013 (-1.86)	0.0027 (1.38)	0.0029 (1.41)	0.0047 (0.92)	-0.0026 (-2.13)	0.0028 (1.34)
Government expenditure	-0.0002 (-0.33)	0.0008 (1.4)	0.0011 (1.13)	-0.0004 (-0.28)	-0.0031 (-2.89)	-0.0007 (-0.75)
Patent	-0.0023 (-0.46)	0.0118 (1.73)	0.0077 (1.46)	-0.0175 (-1.50)	-0.0025 (-0.42)	0.0075 (1.73)
R2 / AR(2)	0.91	0.61	0.6	0.280	0.329	0.213
Hansen test	0.89	0.88	0.6	0.39	0.658	0.371

Note: 1. The t-value is in parentheses. 2. . . ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively. 3. P-values are presented for AR(2) and Hansen tests. 4. Year and region dummy are included, but the results are not reported.

Table 3. Estimation results: the absolute number and the average size by ownership

	Fixed Effect			System GMM		
	1999-2004	2005-2010	1999-2004	2005-2010	2005-2010	
Number of Private	0.0016 (0.38)	0.0415 ^{***} (4.02)	0.0078 (1.37)	0.0271 [*] (1.80)	0.0271 [*] (1.80)	
Size of Private	-0.0000 (-0.00)	0.0134 [*] (2.07)	0.0090 (1.33)	0.0264 ^{**} (2.38)	0.0264 ^{**} (2.38)	
Number of Foreign-invested	-0.0019 (-0.26)	0.0127 (0.82)	-0.0042 (-0.60)	0.0359 (1.09)	0.0359 (1.09)	
Size of Foreign-invested	0.0109 ^{**} (2.14)	0.0075 (1.61)	0.0148 ^{***} (2.57)	0.0457 (1.34)	0.0457 (1.34)	
Number of State-owned	0.0181 [*] (1.78)	0.0199 (1.26)	0.0363 ^{**} (2.00)	0.0334 (1.54)	0.0334 (1.54)	
Size of State-owned	0.0204 [*] (1.68)	0.0111 (0.73)	0.0134 (0.60)	-0.0090 (-0.31)	-0.0090 (-0.31)	
per capita GRDP _(t,t-1)	-0.0123 (-0.29)	-0.0058 (-0.14)	-0.0952 ^{**} (-2.51)	0.0001 (0.00)	-0.0279 (-1.14)	
Population growth	-0.0101 (-20.17)	-0.0101 ^{***} (-21.91)	-0.0084 (-7.14)	-0.0138 (-3.75)	-0.0065 (-3.44)	
Investment ratio	0.0727 (6.54)	0.0708 (7.15)	0.0592 (4.27)	0.1035 ^{***} (5.19)	-0.0422 (-1.42)	
Higher education	0.0337 (1.39)	0.0136 (0.58)	0.0154 (0.40)	-0.0454 (-1.53)	0.1544 (3.59)	
Openness	0.0001 (0.64)	0.0003 (2.14)	0.0000 (-0.21)	0.0005 (5.19)	0.2372 (3.59)	
FDI	-0.0017 (-1.99)	-0.0011 (-1.45)	0.0032 (0.94)	0.0005 (4.50)	-0.0002 (-0.43)	
Government expenditure	-0.0005 (-0.68)	-0.0002 (-0.31)	0.0007 (1.13)	-0.0029 (-3.11)	0.0073 (1.64)	
Patent	-0.0035 (-0.60)	-0.0026 (-0.53)	0.0066 (1.04)	-0.0061 (-0.98)	0.0024 (0.69)	
R2 / AR(2)	0.86	0.85	0.57	-0.0105 (-0.68)	-0.0105 (-0.68)	
Hansen test	0.88	0.88	0.57	0.368 (0.94)	0.368 (0.94)	
			0.580	0.583	0.623	
			0.330	0.943	0.636	

Note: 1. The t-value is in parentheses. 2. ., ***, **, and * in the cells indicate 1%, 5%, and 10% levels of significance, respectively. 3. P-values are presented for AR(2) and Hansen tests. 4. Year and region dummy are included, but the results are not reported

Regression using the different share variable by ownership shows similar results. In this method, the shares in total number by ownership in each province are regressed on per capita GRDP growth rate. The results are shown in table 2. Regardless of whether FE or GMM model is used, the results for private enterprises are still consistent with previous results in two periods. As for foreign-invested and state-owned enterprises, the regression results also show the similar patterns. The coefficients of foreign-invested enterprises are insignificant in all models during 2005-2010 and that of state-owned enterprises are negative and significant in system GMM model in the same period.

2. Absolute number and average size by ownership

This subsection examines whether the average size or the number of firms by ownership matters in China's economy. In the previous subsection, we find out that the share of private ownership in total sales has positive impact on economic growth in the later period. Since sales can be divided into number of firms and average sales per firm, we can examine the effects of them on economic growth respectively and identify more decisive factor in explaining the growth in China.

We use the log of the number of firms by ownership as the measure for changes in numbers and the average sales per firm by ownership as the measure for changes in sizes. With the present regression, we can test if provinces with a large number of each type of ownership firms (or growing size of each type of enterprises) can sustain rapid economic growth. The results are shown in Table 3, which are based on FE and GMM estimators.

We find that both the number and the average size of private enterprises generally affect growth positively during the later period 2005-2010, regardless of whether the FE or GMM model is used, although the levels of significance are not completely the same across two models. As for foreign-invested enterprises, interestingly, only the coefficients of the average sales per firm are positive and significant in the earlier period but the effect has disappeared in the later period. The coefficients of the number of foreign-invested enterprises are insignificant across all periods. These results do not change regardless of whether we use FE or GMM models. Furthermore, the effects of the number and the average size of SOEs on economic growth are weakly significant and positive in the earlier period, but even the positive effects vanished in the later period just as those of foreign-invested enterprises did.

VIII. Conclusions

In this paper, we examine the changing impact of ownership on economic growth using a panel data set of 30 provinces in China over the period 1999-2010. With 4 absolute and relative presence variables, we believe that this study could produce reliable results on the issue. The empirical findings are as follows.

First, private ownership has emerged as the engine of economic growth in China relatively recently. The empirical results from all of our models consistently show that private firms have a significant positive effect on economic growth in the later period 2005-2010, whereas they don't show

any significant effect in the earlier period 1999-2004. In other words, the economic growth in China is now driven by private enterprises. The increasing shares both in total sales and number of them have a positive impact on economic growth in China. The growing number and size of private enterprises are also positively linked to growth. Second, Foreign ownership has little effect on economic growth in the later period, while it has a positive size effect in the early period. Foreign-invested enterprises have been welcomed as a main contributor to economic growth in China, but the leading role has been transferred to private enterprises. Third, state ownership has a significant and negative effect on economic growth in the later period while the positive effects of number and size in early period do disappear later as well. In spite of the constant reform of the Chinese government, state-owned enterprises could be still too inefficient to contribute to economic growth.

The results can be interpreted that the engine of growth in China has been changed over time from other ownerships to private ownership. Recently private companies have developed a lot in every respect and started to lead the economy for long-run growth. Foreign (or state) ownership could be the large part of national economy and play a leading role in the economy at the initial stage. China initiated its economic growth by adopting foreign capital and it is still the top destination for foreign direct investment among developing countries. However, to sustain the growth over a long period, private sector should be of great importance and perform a key role in the view of catch-up economics (Lee and Mathews 2010). It also mean that private enterprises need to succeed in upgrading their capability and efficiency to contribute to economic growth (Lee, Jee, and Eun 2011).

Appendix table 1. Descriptive Statistics

Variable	Unit	Obs	Mean	Std. Dev.	Min	Max
Growth in GRDP per capita (constant)	yuan(RMB)	360	0.109348	0.031338	-0.07482	0.233821
GRDP per capita (constant, 1999)	yuan(RMB)	360	14396.27	10518.07	2544.788	61538.13
Population growth rate	%	360	0.877184	1.85425	-7.34959	18.98212
Investment ratio	% (of GRDP)	360	47.0891	15.22292	24.51595	93.39455
Higher education enrolment ratio	%	360	1.145532	0.723297	0.152291	3.56502
Openness	% (of GRDP)	360	32.13101	41.05252	3.204448	172.1482
Foreign direct investment	% (of GRDP)	360	2.527821	2.262984	0	10.43213
Government expenditure	% (of GRDP)	360	16.34148	6.843652	6.295938	55.04913
Patents accepted	counts	360	7828.711	15906.9	70	138382
Share of private enterprises in total sales	%	360	29.29782	16.00677	0.120734	67.17211
Share of foreign-invested enterprises in total sales	%	360	19.60579	17.33725	1.22048	65.6359
Share of state-owned enterprises in total sales	%	360	52.69101	20.80342	10.86219	91.53597
Share of private enterprises in total number	%	360	61.74999	19.04516	3.881701	92.72048
Share of foreign-invested enterprises in total number	%	360	12.34094	11.05821	1.122413	44.92251
Share of state-owned enterprises in total number	%	360	25.90907	19.7651	1.134174	84.07871
Number of private enterprises	counts	360	6490.764	9336.719	21	54509
Number of foreign-invested enterprises	counts	360	1746.836	3324.57	6	20258
Number of state-owned enterprises	counts	360	1127.847	720.7995	87	4337
Average sales: private enterprises	10,000 yuan	360	3818.231	2293.241	20.64343	15667.42
Average sales: foreign-invested enterprise	10,000 yuan	360	14391.52	10655.98	2000	68087.26
Average sales: state-owned enterprises	10,000 yuan	360	30679.56	25622.31	2271.933	116782.1

Appendix table 2. Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	
(1) Growth in GRDP per capita (constant)	1.000																					
(2) per capita GRDP(t-1) (constant, 1999)	-0.024	1.000																				
(3) Population growth rate	-0.579	0.473	1.000																			
(4) Investment ratio	0.470	0.092	-0.106	1.000																		
(5) Higher education enrollment ratio	0.237	0.786	0.280	0.314	1.000																	
(6) Openness	-0.192	0.774	0.537	-0.264	0.533	1.000																
(7) Foreign direct investment	-0.054	0.521	0.362	-0.128	0.366	0.627	1.000															
(8) Government expenditure	0.103	-0.114	-0.060	0.561	-0.010	-0.285	-0.364	1.000														
(9) Patents accepted	-0.029	0.542	0.195	-0.032	0.285	0.474	0.241	-0.221	1.000													
(10) Share of domestic private enterprises in total sales	0.430	-0.061	-0.256	0.395	-0.001	-0.290	-0.102	-0.165	0.237	1.000												
(11) Share of foreign enterprises in total sales	-0.085	0.686	0.419	-0.239	0.459	0.848	0.741	-0.342	0.401	-0.275	1.000											
(12) Share of state-owned enterprises in total sales	-0.286	-0.520	-0.136	-0.128	-0.381	-0.465	-0.532	0.421	-0.530	-0.600	-0.604	1.000										
(13) Share of domestic private enterprises in total sales	0.567	0.166	-0.225	0.577	0.341	-0.173	-0.150	0.102	0.191	0.762	-0.170	-0.490	1.000									
(14) Share of foreign enterprises in total number	-0.154	0.628	0.438	-0.312	0.337	0.838	0.753	-0.392	0.399	-0.253	0.948	-0.580	-0.224	1.000								
(15) Share of state-owned enterprises in total number	-0.460	-0.502	-0.028	-0.381	-0.518	-0.302	-0.278	0.121	-0.407	-0.593	-0.367	0.796	-0.838	-0.344	1.000							
(16) Number of domestic private enterprises	0.134	0.441	0.069	0.063	0.256	0.343	0.283	-0.363	0.810	0.557	0.293	-0.706	0.409	0.303	-0.564	1.000						
(17) Number of foreign enterprises	-0.032	0.519	0.265	-0.184	0.200	0.681	0.448	-0.356	0.800	0.123	0.649	-0.642	0.054	0.700	-0.444	0.753	1.000					
(18) Number of state-owned enterprises	-0.377	-0.012	0.150	-0.612	-0.161	0.275	0.263	-0.578	0.040	-0.164	0.211	-0.039	-0.381	0.282	0.209	0.035	0.180	1.000				
(19) Average sales: domestic private	0.427	0.074	-0.140	0.571	0.169	-0.234	-0.089	0.110	0.195	0.751	-0.210	-0.448	0.637	-0.198	-0.503	0.351	0.086	-0.374	1.000			
(20) Average sales: foreign enterprise	0.367	0.370	0.041	0.512	0.504	0.062	0.044	0.313	0.098	0.105	0.204	-0.257	0.440	-0.008	-0.420	0.045	-0.016	-0.385	0.411	1.000		
(21) Average sales: state-owned enterprises	0.322	0.566	0.066	0.592	0.574	0.156	0.059	0.160	0.480	0.400	0.111	-0.424	0.672	0.068	-0.685	0.520	0.325	-0.369	0.611	0.562	1.000	

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