JOURNAL OF INTERNATIONAL AND AREA STUDIES 93
Volume 22, Number 1, 2015, pp.93-112

Firm Size and Economic Growth in China*

Keun Lee and Shanji Xin

This paper investigates the roles and significance of firms of various sizes in economic growth in China. This paper finds that the small firms have been the engine of growth in China, as increasing their share has been positively associated with economic growth. In contrast, we find that increasing the share as well as the number of big businesses have a significant and negative effect on economic growth, and that increasing the share of the medium-sized firms have negative or insignificant effect on economic growth in China. Most interestingly we find that the positive contribution of small firms and their increasing shares are largely owing to the expansion of the average size of them, rather than the increase in their absolute numbers of which the impact on growth is insignificant.

Keywords: China, firm size, economic growth, big business, small and medium-sized enterprises (SMEs), average size of firms

1. INTRODUCTION

Over the last 30 years, China has experienced unprecedented economic transition involving rapid economic growth and major shifts in industrial structure. China's recent growth has been record-breaking, especially given its huge size. Thus, numerous studies have tried to find out the sources of economic growth in China. In economic literature, the determinants of economic growth have been considered in diverse dimensions, such as institutions (Acemoglu et al., 2001; 2002), education (Barro, 1991), and openness of trade (Sachs and Warner, 1997). Firm size can be another dimension, involving the question of whether big or small firms would be more important. Actually, since the work of Schumpeter (1942), economists have constantly debated on the effects of firm size on growth. Different studies have examined the influence of firm size on job growth and stability (Davis and Haltiwanger, 1992; Davis et al., 1996; Rob, 1995), productivity growth (Pagano and Schivardi, 2003; Acs et al., 1999; Cheng and Lo, 2004), and income growth (Shaffer, 2002).

The roles of big businesses and SMEs in promoting economic growth have been explored in some literature. Studies that examine advantages of big businesses versus small businesses can be divided into two streams. One strand of debate focuses on the positive (Cassis, 1997; Fogel et al., 2008; Lee et al., 2013; Smyth, 2000) or negative (Caree and Thurik, 1998; Caree, 2002) role of big businesses in promoting economic growth. The other strand focuses on the merits of small firms (Beck et al., 2005; Audretsch et al., 2002; Robbins et al., 2000). All of these studies suggest that the net influence of firm size on macroeconomic performance is an important yet unresolved empirical question. However, the relation between firm size and economic growth in China remains unexplored.

To fill this research gap, this paper presents empirical evidence based on the nation-wide survey data of firms classified into their sizes and the origin provinces in China. Lee et al.

* The authors would like to thank the editor and referees of this journal for providing useful comments for revision. The corresponding author acknowledges the final support from the Korean government through the National Research Foundation of Korea (NRF-2013S1A3A2053312).

(2013) posited that gaining real understanding of dynamics development requires that the analysis be extended to the entire spectrum of firm size. We thus investigates the role of large, medium, and small-sized enterprises in China's economic growth.

In other words, this study investigates the role and significance of various size groups of enterprises in China's economic development. Specifically, we consider several hypotheses. First, while big, often state-owned, businesses used to occupy a big portion of the GDP, they have also been regarded as somewhat inefficient, and thus our first hypothesis is that China's economic growth is recently driven by emergence of a large number of small or medium-sized enterprises. Second, if newer firms are the sources of economic growth, it should be reflected in the increasing size per firm (average firms size), rather than just the growth of the number of firms. A third issue is whether this trend would be observed not only in more developed eastern provinces but also in the less developed or central and western provinces.

By classifying different-sized firms into their origin provinces, we have constructed a provincial-level data basis for the 2004 to 2009 period. Then, we conduct an econometric analysis that tracks down the possibly different effects of big business and SMEs through different channels. This model can calculate the contributions by big business and SMEs to economic growth in China.

This paper is organized as follows. Section 2 discusses the pattern of growth of firms of different sizes in Korea, Japan, and China. Section 3 discusses the research methodology and the data used in this research. Section 4 presents the main results from the empirical analysis. Section 5 presents the conclusion.

2. COMPARATIVE LESSONS

2.1. Roles of the Different-sized Firms in Economic Growth in Korea and Japan

Before discussing the case of China, let us first consider the experiences in neighboring countries in Asia. As is well-known, for South Korea, the high growth period is from the 1960s to the 1990s. While Korea is known for big business-oriented growth, compared to Taiwan, actual data show some interesting trend over time in the terms of precise share of the SMEs and big businesses.

Figures, 1A and 1B, show that in the early 1970s, the share of big businesses were as high as 70% in both gross output or value-added, and then it kept declining over the high growth period to the level of 50% by the mid-1990s or before the 1997 financial crisis. Of course, the mirror image is the steady increase in the share of the SMEs. This is somewhat striking, compared to somewhat common perception of the Korea's big business led growth. This pattern is consistent with an interpretation that while big business might have been the leading engine of growth, growth of big business have also led to growth of the SMEs, possibly in a buyer-supplier relationship. This reasoning makes sense, given the fact that the big businesses in Korea have tended to be the final assembler of the SME-supplied and imported parts and components.

With regard to exports in South Korea, small-sized firms' exports have also increased year by year, reaching 23% in 1965, 32% in 1970, 35% in 1977, and 39% in 1983.[1] The

[1] *Source*: Korea Federation of Small and Medium Business, Korea International Trade Association (in Korean).

pattern in Japan is not different from that of Korea. As is well-known, the high growth period in post-war Japan is from the mid 1950 to the mid-1970s. It is reported that SMEs had played important roles in economic growth in Japan, particularly exports. From the end of the Second World War to the early 1980s, the share of SMEs in total exports has rapidly increased, especially before the mid-1960s when the proportion reached more than 60% (Li, 1992).

Fig. 1A. Share of enterprises by size in total gross output in South Korea (1970~2006)

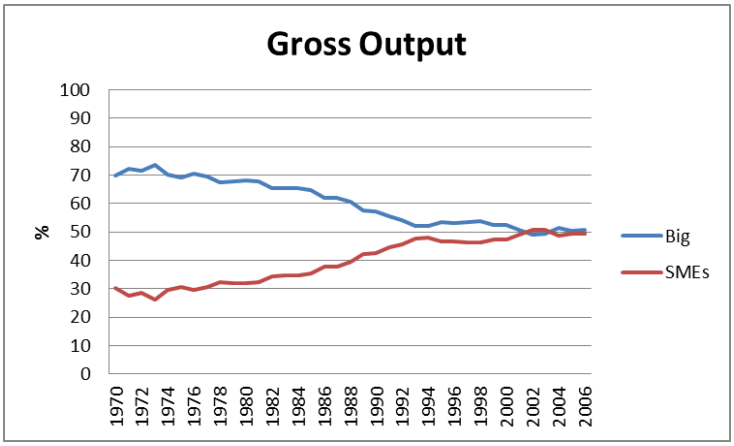
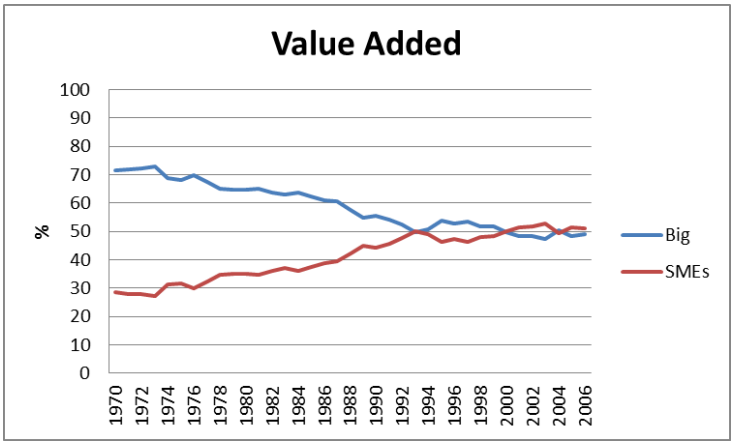


Fig. 1B. Share of enterprises by size in total manufacturing value added in Korea (1970~2006)



Note: Since 1974, thee small and medium-sized firms are defined as those with workers with 300 or less. Firms with workers with less than 5 persons are not covered in the survey.

Source: Data for 1970 – 1992 is from various issues of *Survey Report on Small and Medium-sized Enterprises in Korea* (*jungso giup siltae josa bogo* in Korean) which are published annually by Ministry of Trade, Industry & Energy and the Industrial Bank of Korea since 1967. Data for 1993-2006 is from the official database issued by Small and Medium Business Administration (http://stat2.smba.go.kr; Accessed in May, 2014).

While we cannot be sure to what extent this pattern can be generalizable, it seems really an interesting pattern, namely the trend of the share of the SME vs big business in the early stage of economic take-off in post-war period. If we consider the post-reform economic growth in China as another episode of economic take-off or catch-up, it is worthwhile to examine the trend in China.

2.2. Observed Patterns in China

For China, our dataset is obtained from the annual surveys of Chinese industrial firms conducted by the National Bureau of Statistics. Chinese Industrial Enterprises Database is one of the most heavily used dataset in researches on firm behavior and performance in China. The dataset has been widely used by scholars in such researches as Bai et al., (2009), Brandt et al., (2012), Cai and Liu (2009), Hsieh and Klenow (2009), Li et al. (2012), Lu and Tao (2009), Song et al. (2011) and Tong (2009). These annual surveys cover 'all' state-owned enterprises and non-state-owned enterprises with annual sales of over five million RMB (Chinese currency). In 2004, for example, the dataset covers 71.2% of total industrial employment in China, and 90.7% of total industrial output (Li et al., 2012). So, it can be argued that the firms covered in this dataset can be is nationally representative for China, given that very small micro firms are hiring the most of the remaining 30 percent of the employment.

We first consider the official definitions of large, medium, small, and micro-sized enterprises indicated in the "Announcement on Printing and Distributing Provisional Regulations on the Standard for Determining Small and Medium-sized Enterprises", which was formulated by China's National Bureau of Statistics in 2011 (Table 1A). However, given that data for very small, like micro-sized, firms are not that reliable and, also for the purpose of internationally comparable analysis, we have made a slight change in the definition of small-sized firms as explained in Table 1B. That was to narrow a bit the range of small firms to include only those with more than 30 employees, and to exclude the micro-sized firms. The definitions of large and medium-sized enterprises remain the same.

Table 1A. Definitions of large, medium and small enterprises in China

Sector	Index	Unit	Large	Medium	Small	Micro
Industry*	Employees(X)	Person	X≥1000	300≤X<1000	20≤X<300	X<20
	Business Income (Y)	Million Yuan	Y≥40000	2000≤Y<40000	300≤Y<20000	Y<300

Table 1B. Definitions of large, medium and small enterprises, modified by the authors

Sector	Index	Unit	Large	Medium	Small
Industry*	Employees(X)	Person	X≥1000	300≤X<1000	30≤X<300
	Business Income(Y)	Million Yuan	Y≥40000	2000≤Y<40000	500≤Y<20000

Note: "Industry*" contains mining, manufacturing, electricity generation, and the production and distribution of gas and water.

Source: China's National Bureau of Statistics

Fig. 2A. Share of firms by size in total sales in China

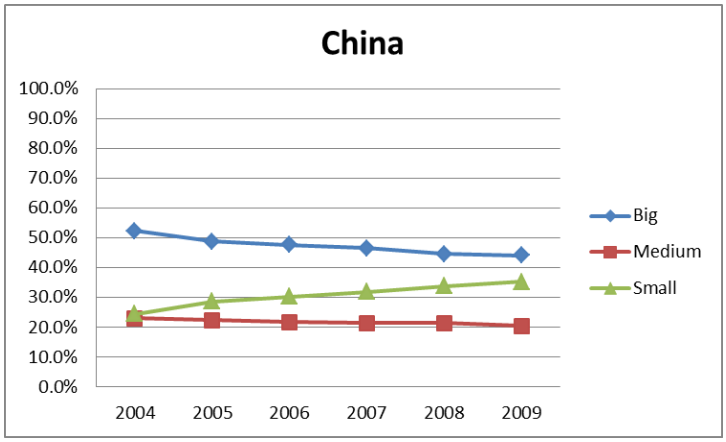


Fig. 2B. Share of firms by size in total sales in eastern region

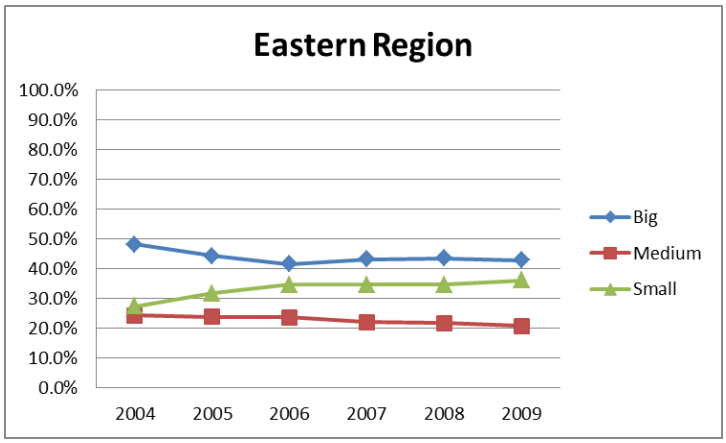


Fig. 2C. Share of firms by size in total sales in central region

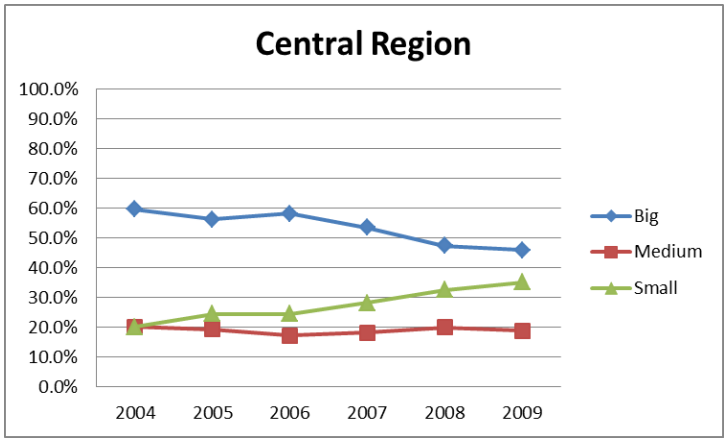
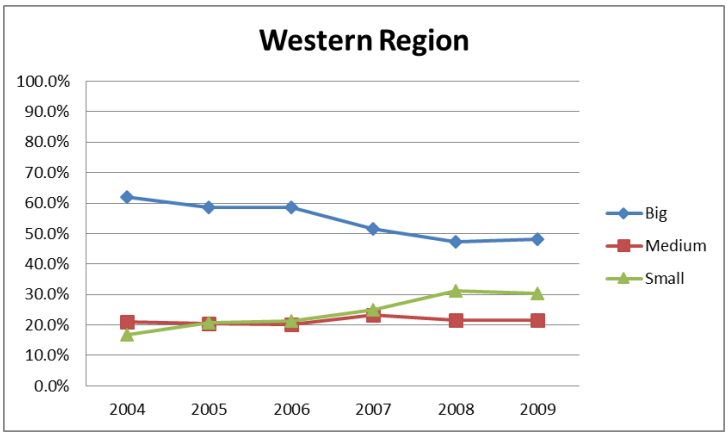


Fig. 2D. Share of firms by size in total sales in western region''



Source: Compiled by the authors based on Chinese Industrial Enterprises Database.

Fig. 3A. Share of firms by size in total number of firms in China

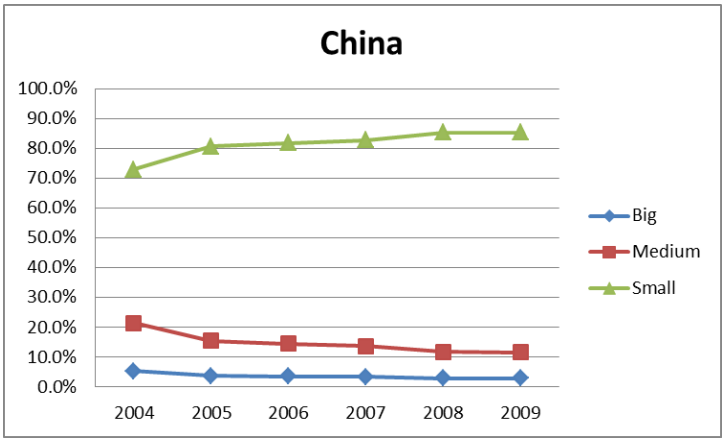


Fig. 3B. Share of firms by size in total number of firms in eastern region

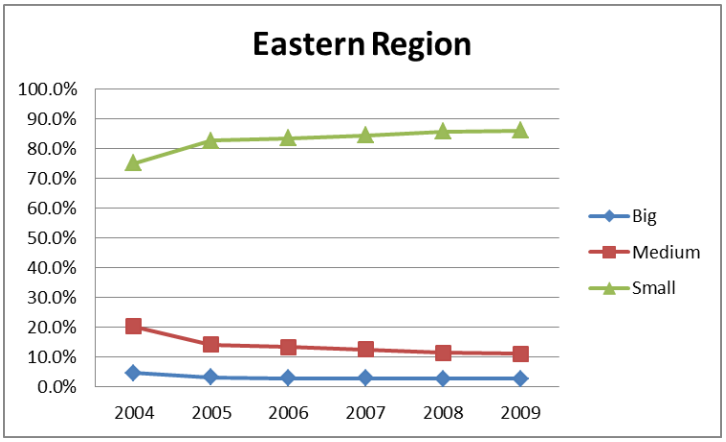


Fig. 3C. Share of firms by size in total number of firms in central region

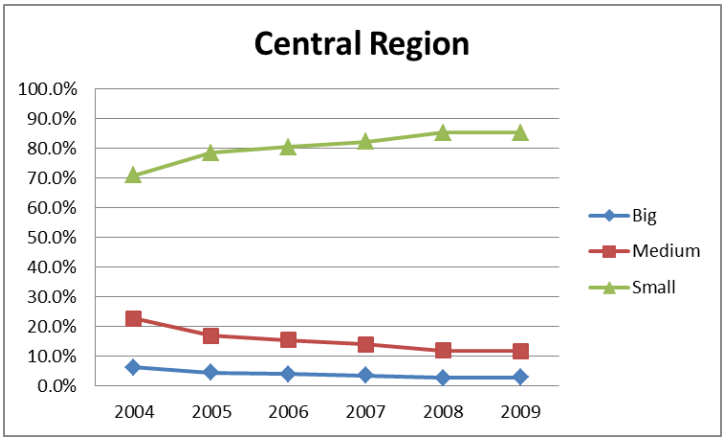
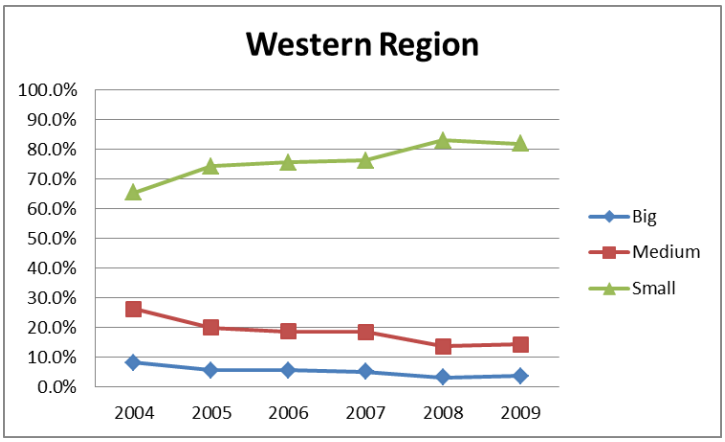


Fig. 3D. Share of firms by size in total number of firms in western region



Source: Compiled by the authors based on Chinese Industrial Enterprises Database.

Then, we classify firms by size and into their origin provinces and calculate their numbers and shares in each provinces and also at the national level. Specifically, we have calculated the following variables: (i) share of firms by size in total sales in each province and the whole nation; (ii) share of firms by size in total number of firms in each province and the nation; and (iii) absolute number of firms in each province and the nation.

Figures, 2A to 2D and 3A to 3D, present the share of different sized firms in total sales and the numbers of firms in the eastern, central, and western regions, as well as the whole China. Figures, 2A to 2D, show that during this period, 2004 to 2009, the shares of big businesses in sales exhibited a steady decline, whereas that of small firms showed significant increase. In addition, a slight change can be observed in the sales shares of medium-sized enterprises. The share of small firms in numbers also exhibited a significant increase, whereas that of large and medium-sized enterprises (LMEs) experienced a slight decline (Figures 3A to 3D). All of these phenomena exist not only in the highly developed eastern provinces but also in the less developed central and western provinces.

3. METHODOLOGY AND DATA DESCRIPTIONS

3.1. Regression Models

To investigate the contribution of firms of different sizes on economic growth in China, we run regressions to estimate economic growth equations, for which the basic form is as follows:

$$y_{it} = \alpha + \beta Z_{it1} + \gamma Basic_{it}^{'} + \delta Firmsize_{it} + \rho_{it} \quad (1)$$

where subscript i indicates that the variable refers to the *i*-th province and subscript *t* refers to time; y_{it} is the annual growth rate of real Gross Regional Domestic Product (GRDP) per capita in province *i* at time *t*; Z_{it1} is the log value of real GRDP per capita in 2004 (i.e., at its very beginning); $Basic_{it}^{'}$ is a vector of basic control variables often appearing in economic growth models, such as investment ratio, population growth rate, and basic human capital (secondary school enrollment) of province *i* at time *t*; $Firmsize_{it}$ denotes the key variable measured as share of firms by size in total sales, share of firms by size in total number of firms, or log of one plus the number of firms of different size in province *i* at time t; and ρ_{it} is the error term. The error term in the equation consists of two components: (i) the time-invariant heterogeneity across the provinces that is specific to the province but is not included in the explanatory variables, and (ii) the time-varying parameters that are likely to be associated with the regressors. In this study, the problem of time-invariant province-specific heterogeneity might be less severe because the data within China has been used. Nonetheless, a number of dummy variables have been incorporated into the empirical model to further address the heterogeneity issue.

We conduct not only OLS but also fixed effect and system-GMM estimations. The problem of an omitted variable bias can be alleviated by employing fixed effect panel estimation, as noted by Islam (1995). However, this approach cannot control time-varying province effects and endogeneity. Considering these problems and thus following Caselli et al. (1996) and Bond et al. (2001), we apply GMM method. In particular, a system-GMM, developed by Arellano and Bover (1995) and Blundell and Bond (1998), is supposed to reduce a small sample bias that characterized the first-differenced GMM used by Caselli et al. (1996). We use the following criteria for model specification tests: the Sargan test of over-identification and the test for second-order serial correlation AR (2), which detects autocorrelation in levels.

3.2. Variables used in the regressions

Definition of variables, which include the dependent variable, basic control variables, and geographic dummy variables, are reported in Table 2A, and descriptive statistics and data sources are reported in Table 2B. The initial dataset contained 1.68 million companies from 2004 to 2009. Table 2C shows the correlation among level of firm size, dependent variable, and basic control variables. Simple correlations indicate that the size of the LMEs and SMEs sector is negatively and positively correlated with the growth rate of GRDP per capita, respectively.

Table 2A. Variable definitions

Variable	Description	Variable Definition
Dependent Variable		
grdpgr	GRDP per capita growth rate	Annual real GRDP per capita growth rate (constant, preceding year=100)
Firm Variables		
big1	Large enterprises	Share of large enterprises in total sales (%)
medium1	Medium enterprises	Share of medium enterprises in total sales (%)
small1	Small enterprises	Share of small enterprises in total sales (%)
big2	Large enterprises	Share of large enterprises in the total number of firms (%)
medium2	Medium enterprises	Share of medium enterprises in total number of firms (%)
small2	Small enterprises	Share of small enterprises in total number of firms (%)
big3	Large enterprises	Log of one plus the number of large enterprises
medium3	Medium enterprises	Log of one plus the number of medium enterprises
small3	Small enterprises	Log of one plus the number of small enterprises
bsales	Average size of large enterprises	Log value of average sales per large enterprise (constant, year 2004)
msales	Average size of medium enterprises	Log value of average sales per medium enterprise (constant, year 2004)
ssales	Average size of small enterprises	Log value of average sales per small enterprise (constant, year 2004)
Basic Control Variables		
inigrdp	Initial GRDP per capita	Log value of real GRDP per capita in 2004
popgr	Population growth rate	Natural growth rate of population (%)
invt	Investment ratio	Total investment in fixed assets by status (% of GRDP)
infl	Inflation rate	Overall consumer price index in each province (%)
gov	Government expenditure	Total government expenditure (% of GRDP)
edu2	Secondary school enrollment	Share of the population with junior-secondary-school attainment in the total population aged 6 and above (%)
Dummy Variables		
central	Geographic dummy for central provinces	Dummy for Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan
western	Geographic dummy for western provinces	Dummy for Inner-Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang

Table 2B. Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max	Source
big1	174	52.00	12.61	27.08	82.84	Chinese Industrial Enterprises Database
medium1	174	20.77	5.50	6.02	37.61	
small1	174	27.23	9.05	9.24	54.54	
big2	174	4.26	1.71	1.48	9.72	
medium2	174	15.95	4.57	7.92	28.65	
small2	174	79.79	6.02	61.63	90.31	
big3	174	4.98	1.02	2.08	7.17	
medium3	174	6.33	1.10	3.40	8.50	
small3	174	7.98	1.19	4.82	10.22	
bsales	174	14.14	0.52	12.57	15.36	
msales	174	11.85	0.46	10.84	13.20	
ssales	174	10.46	0.34	9.67	11.47	
grdpgr	174	0.15	0.07	-0.02	0.33	Statistical Yearbook of China
inigrdp	174	9.41	0.54	8.37	10.71	
popgr	174	5.20	2.68	0.00	11.78	
invt	174	52.38	13.12	29.25	89.35	
infl	174	2.95	2.44	-2.30	10.10	
gov	174	17.23	6.70	7.92	45.02	
edu2	174	38.37	6.05	24.71	49.65	
central	174	0.28	0.45	0.00	1.00	
western	174	0.38	0.49	0.00	1.00	

Table 2C. Correlation matrix

	grdpgr	big1	medium1	small1	big2	medium2	small2
grdpgr	1						
big1	-0.3010	1					
medium1	0.0641	-0.7739	1				
small1	0.3805	-0.9230	0.4706	1			
big2	-0.4528	0.6170	-0.2346	-0.7170	1		
medium2	-0.5552	0.3869	0.0785	-0.5867	0.7936	1	
small2	0.5503	-0.4692	0.0072	0.6494	-0.8869	-0.9849	1
big3	-0.0257	-0.3892	0.3025	0.3585	-0.1001	-0.0168	0.0412
medium3	-0.0060	-0.4954	0.3895	0.4536	-0.2486	-0.0558	0.1131
small3	0.1572	-0.5863	0.3436	0.6081	-0.4773	-0.3522	0.4031
bsales	0.3698	0.2870	-0.4965	-0.0982	-0.4252	-0.5896	0.5686
msales	0.5746	-0.4020	0.2268	0.4223	-0.5912	-0.7273	0.7203
ssales	0.5482	-0.4281	0.0965	0.5378	-0.4925	-0.6024	0.5974
inigrdp	0.0245	-0.2503	0.1993	0.2277	-0.3618	-0.3479	0.3670
popgr	-0.1212	0.1533	-0.0895	-0.1593	0.2483	0.2698	-0.2755
invt	0.4335	-0.0972	-0.0803	0.1842	-0.1417	-0.2820	0.2544
infl	-0.3965	0.0320	-0.0292	-0.0268	0.1358	0.1155	-0.1263
gov	0.0827	0.4278	-0.3350	-0.3924	0.2255	0.0691	-0.1166
edu2	0.1878	-0.1283	-0.0817	0.2284	-0.0459	-0.1767	0.1472
central	0.0213	0.1010	-0.2326	0.0006	-0.0031	-0.0265	0.0210
western	-0.0721	0.2715	-0.0521	-0.3466	0.3946	0.3299	-0.3627
	big3	medium3	small3	bsales	msales	ssales	inigrdp
big3	1						
medium3	0.9772	1					
small3	0.9177	0.9534	1				
bsales	-0.2252	-0.2088	-0.0179	1			
msales	0.0685	0.0953	0.3077	0.6411	1		
ssales	0.1644	0.1754	0.3443	0.5473	0.8529	1	
inigrdp	0.3999	0.4261	0.5048	0.3070	0.4743	0.3638	1
popgr	-0.4314	-0.4325	-0.4885	-0.2033	-0.3065	-0.2058	-0.4890
invt	-0.4328	-0.4295	-0.3110	0.1938	0.2716	0.3033	-0.3962
infl	-0.1247	-0.1384	-0.1631	-0.1700	-0.1798	-0.1142	-0.1719
gov	-0.7995	-0.8190	-0.7873	0.2151	-0.0452	-0.1055	-0.4660
edu2	0.4390	0.3847	0.4093	0.0236	0.1229	0.2695	0.0640
central	0.0348	0.0316	0.0393	-0.0045	-0.1825	-0.1239	-0.2577
western	-0.5899	-0.6175	-0.6802	-0.1524	-0.2120	-0.2137	-0.5595
	popgr	invt	infl	gov	edu2	central	western
popgr	1						
invt	0.1610	1					
infl	0.1016	-0.1248	1				
gov	0.4035	0.4880	0.0481	1			
edu2	-0.2286	0.0059	0.0054	-0.4642	1		
central	-0.1144	0.0095	0.0431	-0.1538	0.4373	1	
western	0.4408	0.3740	0.1102	0.6724	-0.4875	-0.4825	1

4. EMPIRICAL RESULTS

4.1. The Bench Mark Results

First, the bench mark model verifies the key relationship between firm size and economic growth. This relationship is specified as follows:

$$grdpgr = f(big/medium/small, inigrdp, popgr, invt, infl, gov, edu2, central, western) \quad (2)$$

where the dependent variable is the growth rate of real GRDP per capita. Explanatory variables include the initial level of GRDP per capita (*inigrdp*), population growth rate (*popgr*, as a proxy of the change in the labor force participation rate) (Blomström et al., 1996), and investment ratio (*invt*, as physical capital) (Barro, 1991; 1997; Barro and Lee, 1994; Caselli et al., 1996; Levine and Renelt, 1992; Mankiw et al., 1992). These variables are standard economic-growth determinants directly predicted by the Solow economic-growth model. To capture the government's involvement in the economy, inflation rate (*infl*) (Barro, 1997; 2000; Clarke, 1997; Levine and Renelt, 1992; Kormendi and Meguire, 1985) and government expenditure (*gov*) (Barro, 1991; 1997; 2000; Clarke, 1997; Barro and Lee, 1994) are introduced to the equation. Inflation rate captures the macroeconomic conditions or business cycle effects, and government consumption represents the government interference in economic activities (Wan et al., 2006). Geographic variables such as central region (*center*) and western region (*western*) were also included in the economic-growth equation, in accordance with Levine and Renelt (1992) and Sala-i-Martin (1997).

Unlike the existing models in the literature, one of the key features of our model is the inclusion of the variable of firm size as regressors. In these models and in those that follow, firm size is measured by three different methods. In the bench mark model, the results are represented by the estimates of two methods (measured by the share of firms of different sizes in sales and the number of firms).

Table 3A presents the regression results using share of firms by size in total sales in each province, based on the OLS, FE, and GMM models. These results show the negative and significant coefficients of the variables of big firms as well as the positive and significant coefficients of the variables of small firms. The coefficients of medium-sized enterprises are insignificant and unstable. All of these results remain the same regardless of whether they are based on the OLS, FE, or GMM.

In the FE model, the coefficient of the share of big businesses in total sales with respect to the growth rate of GRDP per capita is stable at approximately –0.0023. In comparison, the magnitude of the effect of small enterprises on growth rates, according to the FE results, is approximately 0.0049. This result suggests that if the ratio of sales volume of small enterprises to total sales increases by 1% point (e.g., from 27% to 28%), then the growth rate of GRDP per capita increases by approximately 0.49% point (e.g., from a growth rate of 15% to 15.49%).

Table 3B shows the results with the share in the number of enterprises by size in each province, which is consistent with that based on the share of firms by size in total sales. The ranges of the coefficients of big businesses are stable in the range of –0.02 to –0.04 in all models. Regardless of whether OLS, FE, or GMM model is used, the results are still consistent with previous results. The coefficients of small firms are stable at approximately

0.01 across all of the models. Moreover, the above regressions (whether using the share of firms by size in total sales or share of firms by size in total number of firms) are quite consistent with each other.

Table 3C is the results with some modification for robustness tests, with both of small and medium-sized firm variables together in a single equation. The main results stand consistent with those in Table 3A and 3B. Other control variables, such as initial levels of GRDP per capita, population growth rate, or government expenditure, tend to show the

Table 3A. Basic results: using the share of firms by size in total sales

Model	OLS			Fixed effects			System GMM		
big1	-0.0012			-0.0023			-0.0030		
	(-2.64)***			(-2.82)***			(-3.56)***		
medium1		-0.0003			-0.0025			0.0073	
		(-0.30)			(-1.50)			(3.08)***	
small1			0.0027			0.0049			0.0037
			(4.11)***			(4.87)***			(4.08)***
inigrdp	-0.0131	-0.0141	-0.0109				-0.4476	-0.8594	-0.3754
	(-0.81)	(-0.85)	(-0.69)				(-4.82)***	(-6.62)***	(-5.00)***
popgr	-0.0015	-0.0011	-0.0017	-0.0014	-0.0057	-0.0030	-0.0439	-0.0517	-0.0567
	(-0.71)	(-0.52)	(-0.85)	(-0.14)	(-0.58)	(-0.33)	(-4.15)***	(-4.69)***	(-5.22)***
invt	0.0007	0.0013	0.0002	0.0013	0.0018	0.0002	-0.0018	-0.0014	-0.0009
	(1.35)	(2.89)***	(0.38)	(1.48)	(2.18)**	(0.25)	(-1.75)*	(-1.38)	(-1.04)
infl	0.0119	0.0126	0.0114	0.0122	0.0135	0.0109	0.0120	0.0112	0.0128
	(6.10)***	(6.35)***	(5.95)***	(5.71)***	(6.33)***	(5.3)***	(5.55)***	(4.56)***	(6.20)***
gov	-0.0006	-0.0023	-0.0003	-0.0026	-0.0020	-0.0026	0.0010	-0.0064	0.0006
	(-0.51)	(-1.84)*	(-0.27)	(-0.92)	(-0.70)	(-0.97)	(0.46)	(-2.82)***	(0.30)
edu2	0.0007	0.0001	0.0006	-0.0053	-0.0044	-0.0057	0.0026	0.0091	-0.0042
	(0.67)	(0.11)	(0.64)	(-1.50)	(-1.24)	(-1.72)*	(1.05)	(3.17)***	(-1.77)*
central	0.0120	0.0016	0.0182				-0.5129	-1.0170	-0.4248
	(0.65)	(0.09)	(1.02)				(-4.73)***	(-6.79)***	(-4.72)***
western	0.0255	0.0156	0.0406				-0.2248	-0.5110	-0.1723
	(1.17)	(0.71)	(1.86)*				(-3.37)***	(-5.63)***	(-2.81)***
constant	0.2434	0.2135	0.1045	0.4207	0.2969	0.2494	4.9263	8.6276	4.2145
	(1.38)	(1.17)	(0.61)	(2.92)***	(2.17)**	(2.04)**	(5.19)***	(6.57)***	(5.08)***
R^2	0.30	0.27	0.33						
R^2 (within)				0.27	0.24	0.34			
AR(2) test							0.602	0.969	0.777
observations	174	174	174	174	174	174	174	174	174
provinces	29	29	29	29	29	29	29	29	29

T-statistics are provided in parentheses. P-values are presented for AR (2) test. The instruments used in GMM are lags one and above of the dependent variable, investment ratio, and the share of firms by size in total sales.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 3B. Basic results: using the share of firms by size in total number of firms

Model	OLS			Fixed effects			System GMM		
big2	-0.0198			-0.0426			-0.0458		
	(-6.46)***			(-11.49)***			(-9.02)***		
medium2		-0.0097			-0.0155			-0.0158	
		(-8.89)***			(-13.77)***			(-9.28)***	
small2			0.0073			0.0126			0.0116
			(8.83)***			(14.78)***			(9.32)***
inigrdp	-0.0182	-0.0365	-0.0326				-0.0203	-0.0498	-0.0677
	(-1.23)	(-2.64)***	(-2.37)**				(-0.43)	(-1.59)	(-1.71)*
popgr	-0.0007	0.0001	0.000002	-0.0092	-0.0096	-0.0101	0.0052	-0.0050	-0.0100
	(-0.36)	(0.09)	(0.00)	(-1.31)	(-1.51)	(-1.66)*	(1.16)	(-0.84)	(-1.66)*
invt	0.000004	-0.0005	-0.0005	-0.0012	-0.0013	-0.0016	0.0004	-0.0018	-0.0017
	(0.01)	(-1.13)	(-1.24)	(-1.79)*	(-2.18)**	(-2.78)***	(0.51)	(-1.84)*	(-1.84)*
infl	0.0121	0.0115	0.0116	0.0111	0.0100	0.0100	0.0125	0.0102	0.0107
	(6.84)***	(7.03)***	(7.08)***	(7.16)***	(7.06)***	(7.34)***	(7.91)***	(6.24)***	(6.76)***
gov	-0.0015	-0.0033	-0.0028	-0.0041	-0.0079	-0.0074	-0.0060	-0.0048	-0.0035
	(-1.52)	(-3.53)***	(-3.00)***	(-2.01)**	(-4.12)***	(-4.04)***	(-3.13)***	(-3.01)***	(-2.29)**
edu2	0.0016	-0.0001	0.0005	-0.0051	-0.0053	-0.0053	-0.0068	-0.0026	-0.0033
	(1.78)*	(-0.08)	(0.65)	(-1.97)*	(-2.26)**	(-2.36)**	(-2.6)***	(-1.01)	(-1.43)
central	0.0195	0.0180	0.0206				0.0698	0.0879	0.0588
	(1.18)	(1.2)	(1.36)				(0.87)	(1.59)	(0.96)
western	0.0635	0.0628	0.0693				0.0967	0.1603	0.1175
	(3.02)***	(3.34)***	(3.63)***				(1.8)*	(3.64)***	(2.33)**
constant	0.3043	0.6649	-0.1433	0.6706	0.8212	-0.4204	0.7573	1.0562	0.0972
	(1.89)*	(4.25)***	(-0.93)	(6.57)***	(8.56)***	(-4.48)***	(1.57)	(3.56)***	(0.20)
R^2	0.41	0.50	0.50						
R^2 (within)				0.60	0.67	0.70			
AR(2) test							0.779	0.762	0.893
observations	174	174	174	174	174	174	174	174	174
Provinces	29	29	29	29	29	29	29	29	29

T-statistics are provided in parentheses. P-values are presented for AR (2) test. The instruments used in GMM are lags one and above of the dependent variable, investment ratio, and the share of firms by size in total number of firms.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

normal signs and levels of significance; although the levels of significance are not entirely the same across OLS, FE, and GMM estimations. The results also indicate some convergence of the growth rate of GRDP per capita, as shown by the negative sign coefficients of the initial income levels.

Table 3C. Medium-sized enterprises versus small enterprises in provincial economic growth

Model	OLS	Fixed effects	System GMM
medium1	-0.0022 (-2.24)**	-0.0039 (-2.54)**	-0.0018 (-1.02)
small1	0.0033 (4.71)***	0.0054 (5.34)***	0.0041 (4.73)***
inigrdp	-0.0093 (-0.60)		-0.1778 (-4.08)***
popgr	-0.0017 (-0.87)	-0.0061 (-0.69)	-0.0261 (-3.93)***
invt	0.0001 (0.25)	-0.0001 (-0.18)	0.0001 (0.06)
infl	0.0112 (5.94)***	0.0107 (5.31)***	0.0128 (6.57)***
gov	-0.0011 (-0.91)	-0.0023 (-0.88)	-0.0026 (-1.58)
edu2	0.0002 (0.20)	-0.0056 (-1.71)*	-0.0014 (-0.82)
central	0.0178 (1.01)		-0.2043 (-3.55)***
western	0.0495 (2.26)**		-0.0248 (-0.63)
constant	0.1491 (0.87)	0.3441 (2.74)***	2.0067 (4.20)***
R^2	0.35		
R^2 (within)		0.37	
AR(2) test			0.404
Sargan test			0.998
observations	174	174	174
provinces	29	29	29

T-statistics are provided in parentheses. P-values are presented for AR (2) test. The instruments used in GMM are lags one and above of the dependent variable, investment ratio, and the share of medium and small firms in total sales.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

4.2 Some Extensions: Absolute number of firms versus Average size of firms

Thus far, the regression results support our hypotheses that the increasing shares of small firms have contributed to economic growth in China, whereas that of big businesses have a negative effect on economic growth. In this section, we attempt to further investigate this phenomenon by determining whether the positive effect of small firms (or the negative effect

Table 4. The Number of firms and their Average Sizes in Economic growth

Model	OLS			Fixed effects			System GMM		
big3	-0.0042			-0.1189			-0.0922		
	(-0.61)			(-6.24)***			(-4.73)***		
bsales	0.0278			0.0480			0.0693		
	(2.55)**			(3.44)***			(3.81)***		
medium3		-0.0060			-0.1176			-0.0192	
		(-1.16)			(-5.17)***			(-1.90)*	
msales		0.0784			0.0702			0.1761	
		(6.24)***			(3.98)***			(8.29)***	
small3			-0.0014			0.0377			0.0237
			(-0.28)			(1.39)			(1.96)**
ssales			0.0892			0.1487			0.1746
			(5.11)***			(6.27)***			(6.12)***
inigrdp	-0.0299	-0.0584	-0.0469				-0.1202	-0.2891	-0.1933
	(-2.37)**	(-4.62)***	(-3.75)**				(-5.04)***	(-7.17)***	(-5.50)***
popgr	-0.0021	-0.0014	-0.0023	-0.0128	-0.0107	-0.0085	-0.0168	-0.0192	-0.0241
	(-0.98)	(-0.74)	(-1.11)	(-1.74)*	(-1.47)	(-1.00)	(-3.52)***	(-3.71)***	(-4.01)***
invt	0.0004	-0.0007	-0.0003	-0.0015	-0.0019	-0.0019	-0.0037	-0.0063	-0.0021
	(0.90)	(-1.56)	(-0.60)	(-2.50)**	(-3.00)***	(-2.43)**	(-4.49)***	(-6.50)***	(-2.27)**
infl	0.0124	0.0120	0.0118	0.0097	0.0091	0.0120	0.0074	0.0076	0.0130
	(6.27)***	(6.61)***	(6.30)***	(5.61)***	(5.20)***	(6.16)***	(3.50)***	(4.16)***	(6.35)***
edu2	0.0014	0.0007	-0.0004	-0.0034	-0.0054	-0.0089	0.0095	0.0027	-0.0103
	(1.41)	(0.84)	(-0.48)	(-1.29)	(-2.02)**	(-2.86)***	(3.49)***	(1.41)	(-3.31)***
central	-0.0130	-0.0022	0.0009				-0.1113	-0.0658	-0.0311
	(-1.04)	(-0.19)	(0.08)				(-3.97)***	(-2.05)**	(-0.94)
constant	-0.0398	-0.2118	-0.3245	0.3069	0.3966	-1.2569	0.6851	1.2280	0.5559
	(-0.23)	(-1.53)	(-2.07)**	(1.20)	(1.35)	(-4.59)***	(5.58)***	(4.04)***	(1.69)*
R^2	0.29	0.40	0.36						
R^2 (within)				0.56	0.56	0.41			
AR(2) test							0.235	0.972	0.595
observations	174	174	174	174	174	174	174	174	174
provinces	29	29	29	29	29	29	29	29	29

T-statistics are provided in parentheses. P-values are presented for AR (2) test. Since the correlation between the firm variables with government expenditure variable is relatively high, we remove government expenditure (*gov)* in this model. The instruments used in GMM are lags one and above of the dependent variable, investment ratio, and the log of one plus the number of differently sized firms.
*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

of big businesses) results from the increasing number of those firms or expansion of the average size of the firms. In other words, this subsection examines the hypothesis that increasing not the numbers of the firms but the size of firms mattered in China's economic growth. We use average sales per firm as the measure for the size of firms. We introduce this variable to determine whether the patterns in section 2 using the Figures, 2A to 2D and 3A to 3D, result from the increase in the number of firms of various size groups or from the increase in the average size of the firms in each pool.

The results are shown in Table 4, which are based on OLS, FE, and GMM estimators. We find that the coefficients of the absolute number of big or medium firms are all negative and significant, whereas that of small firms is positive but insignificant. In contrast, the coefficients of the average sales per firm of large, medium, and small enterprises are all positive and significant, regardless of whether we use OLS, FE, or GMM models.

Together with the results in Table 3, these results imply first that the confirmed contribution of small firms (measured by their shares) has more to do with their growth in average size, rather than increase in the absolute number of them. So, a possible scenario is that not just growth of the numbers of small firms but size growth of more efficient small firms are the real engine of growth in China. Second, the results supports the reasoning that while increasing the number of big or medium-sized firms are in general bad for economic growth, the expansion of more efficient ones tend to contribute to growth. In other words, an emerging picture is that the share of big firms are decreasing owing to many of them disappearing or closed down while the average size of remaining (surviving) ones are getting bigger and contribute to economic growth.

5. SUMMARY AND CONCLUDING REMARKS

This paper provides some empirical evidence on the linkages between firms of different sizes and economic growth in China. The main findings are as follows.

First of all, we find that increasing the share as well as the number of big businesses have a significant and negative effect on economic growth, and that increasing the share of the medium-sized firms have negative or insignificant effect on economic growth in China. In contrast, we find that the small firms have been the engine of growth in China, as increasing their share has been positively associated with economic growth. Now, most interestingly we find that the positive contribution of small firms and their increasing shares are largely owing to the expansion of the average size of them, rather than the increase of their absolute numbers of which the impact on growth is insignificant. Given that for every size group of enterprises, average sales per firm is shown to be positively linked to economic growth, we may conclude that not the number of firms but the average size of various size groups of enterprises mattered in economic growth in China.

What we have learned from this regression is that what matters in economic growth is size expansion of more efficient firms, regardless of sizes. In the Chinese context, this is partly happening in the process of dying away of inefficient firms of large size but expansion of survived firms of large size. In other words, the absolute number of large and medium sized firms have decreased, which contributed to economic growth, and with this process the average size of the remaining large and medium-sized firms had increased. Also, small firms are contributing to growth, not by the increase of their absolute numbers but by the expansion of their average size. This means that fostering the future growth of small firms

should be the matter of policy priority, which seems to be probably more important that fostering more start-ups, at least according to the results in this paper. Subsequently, a best scenario would be to enlarge the scale of various size groups of enterprises and to form a dynamic process of growing from small firms to medium enterprises, and from medium firms to big businesses.

This study has some limitations. First, the Chinese Industrial Enterprises Database only covers non-listed enterprises, which may cause some bias on the research on big business. Second, we have dealt with large, medium, and small-sized enterprises but excluded the micro-sized firms or start-ups. In recent years, the Chinese government tends to support micro-sized firms, and these firms may be equally important and are possibly different in many aspects from large, medium, and small firms. Third, the role and the importance of different sizes of firms may change over time. These limitations can be addressed by future research.

Article Received: 03-23-2015 Revised: 05-10-2015 Accepted: 06-28-2015

REFERENCES

Acemoglu, D. and S. Johnson, J. A. Robinson. 2001. "The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review* 91:1369-1401.

_____. 2002. "Reversal of Fortune: Geography and Institutions in the Making of the Modern World Income Distribution." *Quarterly Journal of Economics* 117:1231-1294.

Acs, Z. J., R. Morck, and B. Yeung. 1999. "Productivity Growth and Firm Size Distribution." In *Entrepreneurship, Small and Medium-sized Enterprises and the Macroeconomy*, ed. Z. J. Acs, B. Carlsson and C. Karlsson. Cambridge: Cambridge University Press.

Arellano, M. and O. Bover. 1995. "Another Look at Instrumental Variable Estimation of Error-Component Models." *Journal of Econometrics* 68:29-51.

Audretsch, D. B., M. A. Caree, A. J. van Stel, and A. R. Thurik. 2002. "Impeded Industrial Restructuring: The Growth Penalty." *Kyklos 55* (1):81-98.

Bai, C. E., J. Y. Lu, and Z. G. Tao 2009. "How Does Privatization Work in China?" *Journal of Comparative Economics* 37:453-470.

Barro, R. J. 1991. "Economic growth in a cross section of countries." *Quarterly Journal of Economics* 106(2):407–443.

_____. 1997. *Determinants of Economic Growth: A Cross-Country Empirical Study*. Cambridge: The MIT Press.

_____. 2000. "Inequality and Growth in a Panel of Countries." *Journal of Economic Growth* 5:87-120.

Barro, R. J. and J. W. Lee. 1994. "Sources of Economic Growth." *Carnegie-Rochester Conference Series on Public Policy* 40:1–46.

Beck, T., A. Demirguc-Kunt, and R. Levine. 2005. "SMEs, Growth, and Poverty: Cross-Country Evidence." *Journal of Economic Growth* 10(3):199-229.

Blomström, M., R. E. Lipsey and M. Zejan. 1996. "Is Fixed Investment the Key to Economic Growth?" *The Quarterly Journal of Economics* 111:269-276.

Blundell, R. and S. Bond. 1998. "Initial Conditions and Moment Conditions in Dynamic Panel Data Models." *Journal of Econometrics* 87:115-143.

Bond, S., A. Hoeffler, and J. Temple. 2001. "GMM Estimates of Growth." University of Bristol Working Paper.

Brandt, L., J. Van Biesebroeck, and Y. Zhang. 2012. "Creative Accounting or Creative Destruction? Firm-level Productivity Growth in Chinese Manufacturing." *Journal of Development Economics* 97(2):339-351.

Cai, H. and Q. Liu. 2009. "Competition and Corporate Tax Avoidance: Evidence from Chinese Industrial Firms." *The Economic Journal* 119(537):764-795.

Caree, M. A. and A. R. Thurik. 1998. "Small Firms and Economic Growth in Europe." *Atlantic Economic Journal* 26:137-146.

Caree, M. A. 2002. "Industrial Restructuring and Economic Growth, Small Business Economics" *Small Business Economics* 18:243-255.

Caselli, F., G. Esquivel, and F. Efort. 1996. "Reopening the Convergence Debate: a New Look at Cross-country Growth Empirics." *Journal of Economic Growth* 1:363-389.

Cassis, Y. 1997. *Big Business: The European Experience in the Twentieth Century*. Oxford: Oxford University Press.

Cheng, Y. S. and D. Lo. 2004. "Firm Size, Technical Efficiency and Productivity Growth in Chinese Industry." Working Paper, University of London.

Clarke, T. E. 1997. "Cross-Country Evidence on Long-Run Growth and Inflation." *Economic Inquiry* 35:70-81.

Davis, S. and J. Haltiwanger. 1992. "Gross Job Creation, Gross Job Destruction, and Employment Reallocation." *Quarterly Journal of Economics* 107(3):819–863.

Davis, S., J. Haltiwanger, and S. Schuh. 1996. "Small Business and Job Creation: Dissecting the Myth and Reassessing Facts. Small Business Economics" 8(4):297–315.

Fogel, K., R. Morck, and B. Yeung. 2008. "Big Business Stability and Economic Growth: Is What's Good for General Motors Good for America?" *Journal of Financial Economics* 89(1): 83-108.

Hsieh, Chang-Tai and Peter Klenow. 2009. "Misallocation and Manufacturing TFP in China and India." *Quarterly Journal of Economics* 124(4):1403-1448

Islam, N. 1995. "Growth Empirics: A Panel Data Approach." *Quarterly Journal of Economics* 110:1127-1170.

Kormendi, R. C. and P. G. Meguire. 1985. "Macroeconomic Determinants of Growth: Cross-Country Evidence." *Journal of Monetary Economics* 141-163.

Lee, K., B. Y. Kim, and Y. Y. Park. 2013. "Big Businesses and Economic Growth: Identifying a Binding Constraint for Growth with Country Panel Analysis." *Journal of Comparative Economics* 41(2):561-582.

Levine, R. and D. Renelt. 1992. "A Sensitivity Analysis of Cross-Country Growth Regressions." *American Economic Review* 82:942–963.

Li, P., Z. Jian, F. T. Jiang. 2012. "Entry-Exit, Competition, and the Productivity of China's Industry: Market-Opening as a Process of Enhancing Productivity." *The Journal of Quantative & Technical Economics* 9:3-21 (in Chinese).

Li, Yutan. 1992. *Theory and Policy of SMEs in Japan, US, and Europe*. Jilin University Press (in Chinese).

Lu, J. and Z. Tao. 2009. "Trends and determinants of China's industrial agglomeration." *Journal of Urban Economics* 65(2):167-180.

Mankiw, N. G., D. Romer, and D. N. Weil. 1992. "A Contribution to the Empirics of

Economic Growth" *The Quarterly Journal of Economics* 107:407–437.
NBS. http://www.stats.gov.cn
NBS (various years). Statistical Yearbook of China, China Statistical Publishing House, Beijing.
NBS (various years). Chinese Industrial Enterprises Database, Beijing.
Pagano, P. and Schivardi, F. 2003. "Firm Size Distribution and Growth." *Scandinavian Journal of Economics* 105(2):255-274.
Rob, R. 1995. "Entry and Exit of Firms and the Turnover of Jobs in US Manufacturing." *Federal Reserve Bank of Philadelphia Business Review* March/April:3-18.
Robbins, D. K., L. J. Pantuosco, D. F. Parker, and B. K. Fuller. 2000. "An Empirical Assessment of the Contribution of Small Business Employment to U.S. State Economic Performance." *Small Business Economics* 15:293-302.
Sachs, J. D. and A. M. Warner. 1997. "Fundamental sources of long-run growth." *American Economic Review* 87(2):184–188.
Sala-i-Martin, X. 1997. "Transfer, Social Safety Nets, and Growth." *IMF Staff Papers* No. 44, International Monetary Fund, Washington, DC.
Schumpeter, Joseph A. 1942. *Capitalism, Socialism and Democracy*. New York: George Allen & Unwin.
Shaffer, S. 2002. "Firm Size and Economic Growth." *Economics Letters* 76(2):195-203.
Small and Medium Business Administration (various years). Survey Report on Small and Medium-sized Enterprises in Korea (in Korean).
Small and Medium Business Administration. http://stat2.smba.go.kr
Smyth, R. 2000. "Should China be Promoting Large-scale Enterprises and Enterprise Groups?" *World Development* 28(4):721-737.
Song, Zheng, Kjetil Storesletten, and Fabrizio Zilibotti. 2011. "Growing Like China." *American Economic Review* 101:202-241
Tong, S. Y. 2009. "Why Privatize or Why Not? Empirical Evidence from China's SOEs Reform." *China Economic Review* 20(3):402-413.
Wan, G., L. Ming, and Z. Chen. 2006. "The Inequality-Growth Nexus in the Short and Long Run: Empirical Evidence from China." *Journal of Comparative Economics* 34:654-667.

Keun Lee, Professor, Department of Economics, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul, 151-742, Korea, Tel: +82-2-880-6367, E-mail: kenneth@snu.ac.kr

Shanji Xin, Ph.D. Candidate, Department of Economics, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul, 151-742, Korea, E-mail: sunny06126@snu.ac.kr