Entrepreneurship and Growth: Evidence from China*

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Abstract

This paper examines the impact of entrepreneurship on economic growth by using a panel data set of 29 provinces in China over 20 years. Two indicators of entrepreneurship are defined and introduced into the traditional growth regression framework that is estimated using the system generalized method of moments. We also use the ratio of staff and workers of state-owned enterprises and per capita sown land area as the instrumental variables to identify the causal effect of entrepreneurship on economic growth. Our results suggest that entrepreneurship has a significant positive effect on economic growth and this finding is robust even after we control for other demographic and institutional variables. Our study provides some evidence that may be used as a basis for evaluating the effect of China's policy on private business which has been increasingly relaxed since the late 1970s.

Key words: Entrepreneurship, Economic growth, China

JEL Classification: L26, O53, O53

1. Introduction

Since the publication of the famous book by Schumpter (1934) which emphasizes the role of the entrepreneur as the prime drive of economic development, a large amount of literature analyzing the impact of entrepreneurship on firm growth and survival has emerged. For example, it has been found that entrepreneurial enterprises are valuable sources of technological advancement, variety and dynamism (Acs and Audretsch, 1990; Audretsch and Feldman, 1996; Audretsch and Stephan, 1996; Caves, 1998). Generally speaking, two aspects of entrepreneurship are important. First, entrepreneurship plays a general innovative role in economic life as shown in the studies cited above. Second, entrepreneurship represents a "new entry" or the founding of new private businesses (start-ups). However, there has been little empirical research focusing on the second aspect of entrepreneurship and its contribution to economic growth. This lack of research is due in part to the difficulty of having a single consistent definition of entrepreneurship using cross-country data.

This paper focuses on the second aspect (the impact of entrepreneurship on economic growth) by drawing on provincial-level data from China. Few would argue against China's extraordinary growth performance since its reforms started in 1978, but the sources of its growth have been the subject of a heated debate. A number of studies have analyzed the growth patterns of Chinese provinces, with a focus on the role of openness, foreign direct investment (FDI), or infrastructure.[1] However, the impact of entrepreneurship on growth has received little attention, which is surprising given the importance of the issue for a transition economy like China. McMillan and Woodruff (2002) argue that the success or failure of a transition economy could be traced back in a large part to the performance of its entrepreneurs. According to

[1] Chen and Fleisher (1996), Jian et al. (1996), Raiser (1998), Jin et al. (2000), Bao et al. (2002).

Berkowitz and Dejong (2004), conditional on variations in initial conditions and policy reform measures, regional entrepreneurial activity exhibits a statistically and quantitatively significant relationship with the subsequent economic growth within post-Soviet Russia.

The provincial-level data from China allow us to solve two empirical problems. First, we could use a uniformly defined measure of entrepreneurship. Following Georgellis and Wall (2000) and Beugelsdijk and Noorderhaven (2004), we use the provincial entrepreneur ratio as our measure of entrepreneurship. Moreover, since the measure is uniformly defined in different regions within a country, we do not have to worry about the data inconsistency problem in cross-country regressions.

Second, to deal with the endogeneity arising from the lagged dependent variable in the panel data, we employ the System-Generalized Method of Moments (SYS-GMM),[2] which can also remove any provincial and year fixed effects. Moreover, entrepreneurship could be endogenous because economic growth may motivate entrepreneurs to seize economic opportunities. Entrepreneurship and growth may also be determined simultaneously by some unobserved variables. The unique data from China allow us to solve the potential endogeneity problem. We use the ratio of the 30-year lagged employment of state owned enterprises (SOEs) and the 30-year lagged per capita sown land area as the instrumental variables (IVs) for entrepreneurship. The limited natural resources, especially in rural areas, tend to push people to start their own businesses. Thus, entrepreneurs are more likely to appear in historically land-scarce areas. In urban areas, since the system of SOEs is anti-entrepreneurship, we expect more entrepreneurs in areas with fewer SOEs. To make

[2] See Bond et al. (2001) and Shioji (2001) for GMM estimation.

sure these lagged IVs work, we also control for the current SOE employment ratio and the per capita sown land size.

The regression results support our hypothesis. Our SYS-GMM estimations show that entrepreneurship has a positive effect on economic growth. This finding is robust after controlling for other institutional and demographic variables that may affect economic growth. This finding provides solid evidence for the importance of entrepreneurship to economic growth.

The rest of the paper is structured as follows. In Section 2, we describe the history of entrepreneurship in China. In Section 3, we specify the empirical strategy. In Section 4, we introduce the data set and in Section 5, we present the empirical results. Finally, we conclude the study in Section 6.

2. Entrepreneurship in China

Private business has a long drawn history in the context of China's economic and social activities. Until 1949, the year during which the People's Republic of China was founded, the number of self-employment was roughly 30 million, including 7.24 million urban self-employed. However, after the socialist transformation of private business, there were only 160 thousand urban self-employed in 1956, and they mainly engaged in handicraft, retailing, catering and services.

Greatly reduced after the collectivization in the mid-1950s and completely eradicated during the Cultural Revolution, private business regained its legitimacy because of the Third Plenary Session of the 11th Central Committee of the Communist Party in 1978. It was officially revived as an effective way of alleviating many problems: a sluggish economy with inadequate circulation of goods, failure to provide sufficient employment, consumer goods and services to the public, and so on. The

incentives have been different for urban and rural settings. State and collective enterprise employment has been regarded as the “iron rice bowl” offering lifetime security, which includes housing, access to childcare, education, health care, and retirement pension. In addition to economic risks, self-employed individuals have sustained discrimination and opposition in society. Thus, the majority of self-employed individuals in the late 1970s and early 1980s were retirees, dismissed employees, send-down youth, and ex-convicts, who were labeled as miscellaneous “idle personnel” unable to find a permanent niche in state and collective enterprises. In rural areas, natural resources such as cultivated areas weighed substantially in the decision toward self-employment. Peasants in provinces with limited natural resources and unpleasant natural conditions had struggled for survival because of the limited agricultural output. Taking Zhejiang Province as an example, peasants migrated into almost all of the areas of the country and made a living through various channels including patching shoes, making furniture and door-to-door vendition. Through these early preliminary self-employment activities, not only did they accomplish and experience capital accumulation but also acquire more profound insights into market opportunities, which could be a good explanation of their later success.

Although heavily restricted at the early stage, a set of regulations issued by the State Council in 1981 allowed the nonagricultural individual economy as a supplement to the state and collective sectors. The regulations promised that the state would protect the rights and interests of private operators but also imposed certain limits on the size and fields of operated businesses. With the economic development, the private business, being relatively independent, market oriented and competitive, is divided into two categories. Self-employed individuals are officially defined as

individually who owned businesses employing up to eight people, including the owner but often discounting family members. Private enterprises are businesses with eight or more employees, owned by individuals, partners, or groups of up to 30 shareholders. Both kinds of businesses are predominantly engaged in retailing, catering, services, repairs, construction, transport and light manufacturing.

Since the Fourteenth Party Congress that paved the way for establishing more daring economic policies in 1992, the policy decisions, laws and regulations released have made significant moves toward discarding ownership discrimination. Until the end of 2002, the number of self-employed individuals amounted to 47.4293 million and 378.235 billion yuan capital has been registered with the Bureau of Industry and Commerce (ICB) in China. In 2002 alone, private business created a gross output value of 796.761 billion yuan, made exports amounting to 6.192 billion yuan, paid taxes to the amount of 100.498 billion yuan and provided job positions for 735,400 laid-off workers.

Despite all the obstructions and ideology prejudice, private entrepreneurs reacted with passion to the new opportunities arising in the 1980s and interacted with the changing reform environment to produce a dynamic, fast-growing economic force. Combining the definition of the earlier literature with the characteristics of China's entrepreneurs, we define entrepreneurship as an aggregate-level variable in two ways.The first measure is defined as the ratio of the employment by self-employed individuals and private businesses to the total employment (to be called Private Employment Ratio or Measure 1). The second measure is the ratio of self-employed individuals and private business owners to the total employment (to be called Private Business Ratio, or Measure 2). Both measures are defined to capture the spirit of entrepreneurship in our analysis. The first measure captures the scale of employment

in the private sector, while the second measure reflects the size of the private sector in terms of the self-employed individuals and the private businesses themselves. Our hypothesis is that entrepreneurship has a positive effect on economic growth. The two measures serve as a good robustness test of our estimation results.

3. Econometric Strategy

We follow recent growth literature in specifying regression equations from the steady state of a growth model (see, e.g., Mankiw et al., 1992; Barro and Sala-i-Martin, 1995). Since we study the provinces of a country, the model is essentially an open economy growth model like that in Shioji (2001). Specifically, the growth regression is specified as follows

$$\log(y_{i,t} / y_{i,t-1}) = \gamma_1 \log y_{i,t-1} + \gamma_2 E_{i,t} + X_{i,t}\gamma_3 + u_i + \varepsilon_{i,t}$$

where $\log(y_{i,t} / y_{i,t-1})$ is the growth rate of real per capita GDP from time *t-1* to time *t*, $\log y_{i,t-1}$ is the logarithm of real per capita GDP lagged for one period, $E_{i,t}$ stands for entrepreneurship, $X_{i,t}$ represents other variables that determine the steady state,[3] and u_i and $\varepsilon_{i,t}$ are the provincial dummy variable and error term, respectively. The subscripts *i* and *t* represent the province and time. Although each study in the empirical growth literature usually uses a different set of right-hand side variables, most studies have four common variables: the initial level of real per capita GDP, the birth rate, the investment share (investment as a percentage of GDP) and the human

[3] Most empirical growth studies make this assumption either explicitly or implicitly. See, for example, Barro (1991), Mankiw et al. (1992) and Bloom and Williamson (1998).

capital stock variables. Aside from these variables, we also follow the literature and have a number of demographic and institutional variables in $X_{i,t}$.[4]

Following Islam (1995), we estimate the growth regression in a panel framework. For Measure 1, we divide the entire estimation period of 1983-2003 into four five-year intervals. It is common practice to take an average over an interval or period to iron out year-to-year fluctuations. The right-hand side variables are either initial levels or averages over the five-year interval. For example, in the period 1983-1988, the real per capita GDP was at the 1983 level; the entrepreneurship, human capital proxies, investment share and other demographic and institutional variables are five-year averages. Since we can only obtain data for Measure 2 from 1995 to 2003 (much shorter than Measure 1), we divide the data into four two-year intervals. The right-hand side variables are either initial levels or averages over the two-year interval.

Following Bond et al. (2001) and Shioji (2001), we employ the Generalized Method of Moments (GMM) estimator for the growth regression.[5] This GMM estimator can deal with the endogeneity associated with the lagged per capita GDP in the panel data. In this GMM framework, the first step is to take the first difference of the growth equation in order to eliminate the provincial fixed effect. Essentially, $(\log y_{i,t-1} - \log y_{i,t-2})$ is correlated with the error term $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$ and thus is an endogenous variable in the first-differenced equation we obtained in the first step. There are two GMM approaches implemented in the following step: the first difference GMM (DIF-GMM) approach and the system GMM (SYS-GMM) approach. Caselli et al. (1996) were the first to apply the DIF-GMM approach in estimating a

[4] Examples are the birth rate, population structure, FDI and government spending. See Levine and Renelt (1992), Chen and Fleisher (1996), Jian, Sachs and Warner (1996), Raiser (1998), and Bloom and Williamson (1998) for more detailed arguments.
[5] See also Arellano and Bond (1991), Caselli et al. (1996), and Blundell and Bond (2000) for more details of the GMM method.

growth regression. In the DIF-GMM estimation, GMM is applied to the first differenced equation with the first difference of lagged per capita GDP ($\log y_{i,t-1}$ - $\log y_{i,t-2}$) being instrumented by past levels of per capita GDP, which are $\log y_{i,t-2}$, $\log y_{i,t-3}$, and $\log y_{i,t-4}$ in our case. Bond et al. (2001) and Bond (2002) argue that the DIF-GMM could be subject to weak instrument and finite sample biases. The SYS-GMM estimator, which was developed by Arellano and Bover (1995) and Blundell and Bond (1998) to deal with these problems, may have superior finite sample properties. The SYS-GMM estimator combines the equations of the first differences instrumented by the lagged levels with an additional set of equations in levels instrumented by the lagged first-differences. Since the SYS-GMM estimator may be superior, we use it in this paper.

We use the 30-year lagged ratio of employment in state-owned enterprises (SOEs) and the 30-year lagged per capita sown land area as the IVs for entrepreneurship. These lagged variables could be valid IVs for the following reasons. First, before the economic reforms started in 1978, China's SOEs only needed to carry out the plan of the government which did not encourage entrepreneurship at all. Thus, we would expect that provinces with a large sector of SOEs before the reforms are less likely to have entrepreneurship or entrepreneurs. Second, in rural areas, entrepreneurs are more likely to appear in areas where there is not enough land for farmers. In this circumstance, farmers have to find alternative ways to support themselves. Therefore, we expect both of our IVs to be negatively correlated with our measure of entrepreneurship. Moreover, in order to have these IVs excludable from the growth equation, we include the current SOE employment ratio and per capita sown land area in the growth equation. Such a specification can assure that the IVs do not have any effect on growth except through the entrepreneurship.

4. Data

We employ the provincial-level data from China for the empirical test. Employing data from one country can avoid inconsistency of variable definition which cross-country regressions are usually prone to. In cross-country data, the variables may not be consistently defined across countries because different countries have different statistical methods (Barro, 1991; Romer, 1989). Using data from one country can avoid this problem, to a large extent, because the measures are consistently defined across provinces. Chinese provinces are also large enough for the purpose of this study with an average provincial population of 33 million, which is larger than the population of many countries in the world.

The data consist of the demographic and economic variables of 29 Chinese provinces for the period 1983-2003.[6] These data are collected from various issues of *the China Statistical Yearbooks* (SSB, 1984-2004) and the book *The Comprehensive Statistical Data and Materials on 50 Years of New China* (SSB, 1999). The real per capita GDP is measured at the 1952 price level.

Table 1 shows the summary statistics of the variables to be used. The data show that China's provinces have kept a very high growth rate within the sample period. The average annual growth rate of the real per capita GDP is around 8 percent. Entrepreneurship, as measured by the ratio of the scale of entrepreneurship to the total employment, is on the average 6.9 percent for Measure1 and 4.76 percent for Measure 2 with an uneven distribution across the country (with a standard deviation of 6 percent for measure 1 and 1.78 percent for measure 2). The data also show a substantial variation in other variables. For example, the two human capital proxies

[6] The starting data set consisted of 31 provinces in China, but we excluded two provinces, Tibet and Chongqing. Tibet was dropped due to incomplete data. Chongqing was a part of Sichuan before 1997, and thus we merged information for Chongqing into Sichuan from 1997 onward.

vary from only about 40 percent in Guizhou, Yunnan and Qinghai to almost 100 percent in Zhejiang, Shanghai and Beijing. The average share of total fixed investment is 32.5 percent with a standard deviation of 8.7 percent.

It is interesting to note the trends on real per capita GDP and entrepreneurship changes in China before we turn to our estimations. Figure 1 shows the annual growth rates of real per capita GDP. The large trough around 1990 was due to the political shock in 1989. Figure 2 indicates that there was a slight increase in the Private Employment Ratio (Measure1) from 1983 to 1988, and it dropped slightly from 1989 to 1992. However, it increased drastically after 1992 due to the famous 1992 Southern Tour by Deng Xiaoping who inspired a new round of economic reform throughout China. As for Private Business Ratio (Measure 2), it showed a slight increase from 1993-1998 but dropped from 1999-2001 followed by an increase afterwards.

Figure 3 shows the Private Employment Ratio (Measure 1) for each province during the entire sample period. An overall increasing trend can be seen even though there were some minor decreases during the very last period for some provinces (Hubei, Hunan, Shandong and Henan provinces). It was over 20 percent from 1998 to 2004 in some provinces (e.g., Jiangsu, Zhejiang and Shanghai) whereas it was below 0.5 percent from 1993 to 1998 in other provinces (e.g., Shandong and Hebei). Figure 4 indicates that the Private Business Ratio (Measure 2) in most provinces experienced a slight increase from 1995 to 2003, but it dropped in a few provinces from 1997(e.g., Jilin and Hebei).

5. Empirical Results

This section systematically tests whether entrepreneurship has a positive effect on

economic growth. Table 2 reports the GMM estimation results with the variable Private Employment Ratio (Measure 1), while Table 3 reports the GMM estimation results with the variable Private Business Ratio (Measure 2).

5.1 Basic Results

In Table 2, we report the GMM estimation with t-statistics that are heteroskedasticity robust[7]. To statistically examine the validity of our IVs, we conduct the Hansen over-identification restriction test.[8] The p-values for the Hansen's J-statistics reported in all regressions in Table 2 are larger than 0.1, which suggests that there is no evidence to reject the validity of the IVs for GMM. We also report the Arellano-Bond tests for the first-order and second-order serial correlations in the first-differenced residuals. The test statistics suggest that we cannot reject the null of the first-order serial correlation in the first-differenced residuals but that we can reject the null of the second order serial correlation (only the latter is a necessary condition for consistent estimates).

The regression results are consistent with the hypothesis that economic growth increases with entrepreneurship. In the first column, we report the regression with entrepreneurship, the five-year lagged real per capita GDP and time dummies as the independent variables. This regression shows that entrepreneurship has a positive effect on economic growth and this effect is significant at the five percent level. Some simple calculations using the estimated coefficients show that an increase of the entrepreneurship has a reasonably large contribution to China's economic growth. An

[7] We apply the Blundell and Bond (1998) two-step estimator using Windmeijer (2005) finite-sample corrections to the covariance matrix.

[8] The Hansen test is a test of over-identifying restrictions, with the Hansen J-statistic as the test statistic. The test relies on the assumption that at least one of the instruments is valid so that the structural equation is correctly specified. The joint null hypothesis is that the excluded instruments are correctly excluded from the structural growth equation and that the structural equation is correctly specified. For a further discussion, see, e.g., Hayashi (2000, pp.227-8, 407, 417).

increase of the entrepreneurship variable by one standard deviation (6) will raise the annual growth rate by 1.2 percentage points.

Column 1 may have omitted many important variables on the right-hand side of the growth equation. We now add these variables in Column 2. Following the literature (Barro, 1991; Levine and Renelt, 1992; Temple, 1999), we include the primary school enrollment rate, the secondary school enrollment rate, and the investment share as control variables. We keep a minimum number of control variables here and leave more comprehensive sensitivity tests to the next subsection.

After controlling for other variables that affect GDP growth, the development of entrepreneurship is still positively correlated with the economic growth (Column 2). Interestingly, the coefficient on entrepreneurship in column 2 has a marginal increase as compared to the coefficient in Column1. The coefficient of the lagged per capita GDP becomes larger in magnitude. Investment share is not significant at the 10 percent level, but the primary school enrollment rate is positive and significant at the one percent level.

5.2 Robustness Test

In this subsection, we test the robustness of our main estimates on the effect of entrepreneurship on economic growth. We conduct these tests by including other potential determinants of economic growth.

Prior research shows that demographic variables such as the birth rate and population structure have an effect on economic growth (Brander and Dowrick, 1994; Bloom and Williamson, 1998). Omitting demographic variables may affect our estimate of the effect of entrepreneurship on growth if the emergence of entrepreneurs is related to demographics. For example, it is possible that entrepreneurs are more

likely to appear in an area with a large population (Romer, 1986, 1990; Jones,1999) . It is also possible that the effect of entrepreneurship is through demographic variables if entrepreneurs have a larger opportunity cost to raise children.

The second set of variables that may co-vary with growth is comprised of institutional and openness variables. The empirical growth literature argues that institutional factors such as government size may have an effect on growth (Barro, 1991; Levine and Renelt, 1992). Foreign direct investment (FDI) is considered to be an openness measure that may affect growth. The literature on China's economic reforms argues that the "open-door" policy may have a crucial role in the country's fast-paced growth (Chen and Fleisher, 1996; Bao et al., 2002; Jin et al., 2000). To capture these institutional and reform effects, we follow the literature and include the investment, government spending and FDI shares as the control variables.

Growth regressions including these demographic and institutional variables continue to show that entrepreneurship has an independent effect on economic growth. Columns 3-5 of Table 2 show that the estimated coefficient of entrepreneurship is positive and significant at least at the five percent level in all three cases. The magnitude of the coefficient is even slightly larger in two cases. The birth rate has an expected negative effect on economic growth while the old dependency ratio has a significant positive effect. The government spending share has the expected negative sign, and the FDI share has the expected positive sign.

In interpreting the results in Columns 3-5, we should exert some caution. Some demographic, institutional and other variables could be endogenous. For example, economic growth affects fertility because with more income, parental human capital improves and thus raises the return to investment in the human capital of children relative to investment in the number of children (Becker and Lewis, 1973).

Endogeneity of this sort is well discussed in both the theoretical literature, such as Barro and Becker (1989), Becker et al. (1990), and the empirical literature, such as Wang et al. (1994). FDI could also be endogenous because foreign companies are more likely to invest in provinces with high growth potentials. Ideally, we should use IVs to identify all these variables, but empirically, it is very difficult to find the appropriate IVs for them. Nonetheless, the need for good IVs in this context is not too great because we are mainly interested in examining whether the correlation of these variables with entrepreneurship would largely reduce the partial correlation of growth with entrepreneurship and find that it is not the case.

To summarize, our GMM regressions consistently show that economic growth increases with entrepreneurship (Measure 1) in China during the sample period. This finding is robust even if we control for a number of demographic and institutional variables.

When we use the Private Business Ratio (Measure 2) in our estimation as shown in Table 3, the coefficients on entrepreneurship are not precisely estimated and are only marginally statistically significant (the t-values are between 1 and 1.33 in columns 3-5). Therefore, the potential endogeneity of the entrepreneurship variable should be more closely examined.

5.3 Accounting for Endogeneity of Entrepreneurship

The last exercise we conduct in this paper is to account for the potential endogeneity of the entrepreneurship variable. Specifically, as discussed before, we use the 30-year lagged ratio of employment in SOEs and the 30-year lagged per capita sown land area as IVs for entrepreneurship. In order to have these IVs excludable

from the growth equation, we also include the current-level SOE employment and per capita sown area in the growth equation.

SYS-GMM regressions with entrepreneurship being instrumented continue to show that entrepreneurship (Measure 1) has a large positive effect on growth (Table 4). The coefficient on the entrepreneurship variable is positive and significant at the one percent level. Moreover, the magnitude of the coefficients becomes larger compared to those in Table 2.

Table 5 reports the GMM estimation with the entrepreneurship (Measure 2) being instrumented. The estimated coefficient on the entrepreneurship variable (Measure 2) is both positive and significant at least at the one percent level, which further verifies that entrepreneurship has a large positive effect on growth.

The results of the regression using IVs strengthen the robustness of the significant positive causal effect of entrepreneurship on growth. We also conduct the Hansen over-identification restriction test, and find that the p-values for the Hansen J-statistics reported in all regressions in Tables 4 and 5 are larger than 0.1. This suggests that conditional on a correctly specified model, there is no evidence to reject the validity of these IVs.

6. Conclusion

In this paper, we examine the impact of entrepreneurship on economic growth using a panel data set of 29 provinces in China over the periods 1983-2003 (Measure 1) and 1995-2003 (Measure 2). We find that entrepreneurship has a positive impact on economic growth and this finding is robust even after controlling for a number of demographic and institutional variables. China's economic growth since the open-

door policy has been phenomenal and has caught worldwide attention, this paper offers one explanation for the mechanics of the country's great economic success.

China has gradually relaxed its policy towards entrepreneurship since 1970s. Our study is among the first to provide some evidence that can be a basis for evaluating the effect of such policies and also the first empirical exploration to highlight the important role of entrepreneurship in economic development in a transitional and developing country.

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Table 1: Summary Statistics of Variables

Variables		Number	Mean	Standard Deviation
Annual growth of real per capita GDP		116	0.08	0.04
Logarithm of real per capita GDP		116	7.95	0.99
Birth rate		116	15.97	4.50
Entrepreneurship	Measure 1	116	6.90	6.00
	Measure 2	116	4.76	1.78
Primary school enrollment rate		115	97.12	6.35
Second school enrollment rate		116	85.20	12.15
Old dependency ratio		116	9.21	2.39
Government spending share		115	13.41	5.36
Investment share		116	32.45	8.65
FDI share		116	2.34	3.35
Ratio of SOE labor		116	80.65	8.84
Per capita sown area		116	0.20	0.10

Table 2: SYS-GMM Estimates of the Effects of Entrepreneurship (Measure 1) on GDP Growth

Dependent variable: First difference of LogGDP					
	(1)	(2)	(3)	(4)	(5)
Entrepreneurship	0.010***	0.011***	0.012***	0.013***	0.011***
(Private Employment Ratio)	(3.02)	(4.68)	(6.31)	(5.59)	(5.59)
5-year lagged LogGDP	-0.030	-0.050	-0.107*	-0.203**	-0.154***
	(-0.60)	(-1.32)	(-1.66)	(2.52)	(-2.68)
Investment share		0.001	0.001	0.004*	0.002
		(0.29)	(0.88)	(1.79)	(0.91)
Primary school enrollment rate		0.003***	0.004***	0.002*	0.003***
		(4.08)	(5.65)	(1.72)	(3.83)
Secondary school enrollment rate		0.003*	0.003	0.005***	0.003**
		(1.78)	(1.59)	(2.58)	(2.39)
Birth rate			-0.004		-0.004
			(-1.26)		(-1.63)
Old dependency ratio			0.012*		0.009*
			(1.69)		(1.74)
Government spending share				-0.018*	-0.001
				(-1.68)	(-0.44)
FDI share				0.009*	0.006
				(1.80)	(1.34)
Period 1988-1993	0.107***	0.090***	0.115***	0.161***	0.147***
	(2.67)	(3.52)	(2.94)	(4.55)	(4.69)
Period 1993-1998	0.226***	0.174***	0.205***	0.263***	0.248***
	(4.28)	(5.19)	(3.64)	(5.98)	(6.29)
Period 1998-2003	-0.229**	-0.270***	-0.208**	-0.018	-0.102
	(-2.33)	(-4.30)	(-2.13)	(-0.15)	(-1.16)
Hansen test of over-identification restriction					
(Hansen J-statistics)	8.34	4.11	2.86	2.62	3.53
(p-value)	0.40	0.85	0.94	0.96	0.90
Arellano-Bond test for					
AR (1) in first difference (z-statistics)	-1.68	-1.61	-1.82	-1.84	-1.91
AR (1) in first difference (p-value)	0.09	0.11	0.07	0.07	0.06
AR (2) in first difference (z-statistics)	-0.93	-0.30	-0.13	0.99	0.94
AR (2) in first difference (p-value)	0.35	0.77	0.90	0.32	0.35
Provinces	29	29	29	29	29
Observations	116	115	115	114	114

Notes: Heteroskedasticity robust t-statistics are reported in parentheses. *, ** and *** represent significance levels at 10, 5 and 1 percent. LogGDP is the log of real per capita GDP. The SYS-GMM also requires to have three LogGDP level equations with the contemporaneous first difference of the lagged LogGDP as the IV for the lagged LogGDP on the right hand side. We lose two observations in regressions in Columns 4 and 5 because there are two missing values for the primary school enrollment rate (Hainan Province for the period 1983-1988) and government spending share (Sichuan province for the period 1993-1998) respectively.

Table 3: SYS-GMM Estimates of the Effects of Entrepreneurship (Measure 2) on GDP Growth

Dependent variable: First difference of LogGDP					
	(1)	(2)	(3)	(4)	(5)
Entrepreneurship	0.017	0.019	0.021	0.018	0.021
(Private Business Ratio)	(0.72)	(0.90)	(1.33)	(1.00)	(1.26)
2-year lagged LogGDP	-1.066	-1.101	-1.109	-1.123	-1.137
	(-0.45)	(-0.64)	(-0.79)	(-1.07)	(-1.18)
Investment share		-0.005	-0.008	-0.017	-0.021
		(-0.43)	(-0.53)	(-1.28)	(-1.47)
Primary school enrollment rate		-0.002	-0.045	-0.030	-0.063
		(0.22)	(-0.68)	(-0.50)	(-0.96)
Secondary school enrollment rate		0.039	0.045	0.040*	0.047
		(1.46)	(1.27)	(1.75)	(1.55)
Birth rate			0.016		0.017
			(0.33)		(0.39)
Old dependency ratio			0.093		0.110*
			(1.37)		(1.77)
Government spending share				0.018	0.028
				(0.63)	(1.04)
FDI share				0.041***	0.036**
				(2.69)	(2.31)
Period 1997-1999	-0.047	-0.095	-0.137	-0.037	-0.100
	(-0.31)	(-0.59)	(-1.25)	(-0.20)	(-0.65)
Period 1999-2001	-1.076***	-1.096***	-1.079***	-1.060***	-1.110***
	(-2.76)	(-3.18)	(-3.57)	(-3.61)	(-4.00)
Period 2001-2003	-0.063	-0.092	-0.210	-0.070	0.239
	(0.24)	(-0.25)	(-0.85)	(-0.18)	(-0.73)
Hansen test of over-identification restriction					
(Hansen J-statistics)	11.54	11.45	10.97	9.78	9.75
(p-value)	0.12	0.12	0.14	0.20	0.20
Arellano-Bond test for					
AR (1) in first difference (z-statistics)	-2.16	-2.20	-2.51	-2.64	-2.60
AR (1) in first difference (p-value)	0.03	0.03	0.01	0.01	0.01
AR (2) in first difference (z-statistics)	0.98	0.64	0.42	0.78	0.37
AR (2) in first difference (p-value)	0.33	0.52	0.68	0.44	0.71
Provinces	29	29	29	29	29
Observations	116	116	116	116	116

Notes: Heteroskedasticity robust t-statistics are reported in parentheses. *, ** and *** represent significance levels at 10, 5 and 1 percent. LogGDP is the log of real per capita GDP. SYS-GMM also requires to have three LogGDP level equations with the contemporaneous first difference of the lagged LogGDP as the IV for the lagged LogGDP on the right hand side.

Table 4: SYS-GMM Estimates of the Effects of Entrepreneurship (measure 1) on GDP Growth
(30 years Lagged Ratio of SOE Labor and Per Capita Sown Area as the IVs)

Dependent variable: First difference of LogGDP						
	(1)	(2)	(3)	(4)	(5)	(6)
Entrepreneurship	0.024***	0.028**	0.026***	0.023***	0.024***	0.025***
(Private Employment Ratio)	(3.84)	(3.08)	(3.36)	(3.98)	(3.45)	(3.44)
5-year lagged LogGDP	-0.077***	-0.124***	-0.191***	-0.203***	-0.214***	-0.246***
	(52.69)	(24.89)	(11.67)	(15.05)	(14.28)	(11.69)
Investment share		0.002	0.003**	0.004*	0.003	0.004
		(1.11)	(2.12)	(1.69)	(1.37)	(1.38)
Primary school enrollment rate		0.006***	0.006***	0.005***	0.005***	0.005***
		(2.82)	(3.38)	(3.79)	(3.75)	(3.99)
Secondary school enrollment rate		0.003	0.004***	0.005**	0.005***	0.006***
		(1.61)	(2.66)	(2.22)	(3.36)	(4.33)
Birth rate			-0.001		-0.0009	-0.00001
			(-0.17)		(-0.18)	(0.00)
Old dependency ratio			0.014**		0.010	0.006
			(2.40)		(1.44)	(0.86)
Government spending share				-0.006	-0.003	-0.005
				(-1.40)	(-0.67)	(-0.87)
FDI share				0.010	0.007	0.008
				(1.63)	(1.27)	(1.42)
Ratio of SOE Labor						-0.001
						(-0.67)
Per Capita Sown Area						-0.141
						(-1.63)
Period 1988-1993	0.130***	0.123***	0.151***	0.158***	0.164***	0.168***
	(6.53)	(4.88)	(3.21)	(5.74)	(5.72)	(5.96)
Period 1993-1998	0.158***	0.139**	0.192**	0.191***	0.201***	0.221***
	(4.29)	(2.10)	(1.99)	(3.38)	(3.84)	(4.73)
Period 1998-2003	-0.288***	-0.290***	-0.208	-0.133	-0.134*	-0.087
	(-5.12)	(-3.28)	(-1.47)	(-1.42)	(-1.90)	(-1.08)
Hansen test of over-identification restriction						
(Hansen J-statistics)	10.42	10.59	5.80	4.72	4.44	4.62
(p-value)	0.32	0.31	0.76	0.86	0.88	0.87
Arellano-Bond test for						
AR (1) in first difference (z-statistics)	-0.94	-1.42	-1.85	-2.28	-2.28	-2.34
AR (1) in first difference (p-value)	0.35	0.16	0.06	0.02	0.02	0.02
AR (2) in first difference (z-statistics)	-1.18	0.02	0.55	1.03	1.04	0.96
AR (2) in first difference (p-value)	0.23	0.99	0.58	0.30	0.30	0.34
Provinces	29	29	29	29	29	29
Observations	116	115	115	114	114	114

Notes: Heteroskedasticity robust t-statistics are reported in parentheses. *, ** and *** represent significance levels at 10, 5 and 1 percent. LogGDP is the log of real per capita GDP. All specifications in the table treat the first difference of the entrepreneurship and the first difference of the 5-year lagged LogGDP as endogenous variables. All specifications estimate the first differenced equations with the following IVs: first difference of the 30-year and 20-year lagged employment ratio in SOEs; first difference of the 30-year and 20-year lagged per capita sown area; and 10-year, 15-year and 20-year lagged LogGDP. SYS-GMM also requires three LogGDP level equations with the contemporaneous first difference of the lagged LogGDP as the IV for the lagged LogGDP on the right hand side. We lose two observations in regressions in Columns 4-6 because there are two missing values for the primary school enrollment rate (Hainan Province for the period 1983-1988) and government spending share (Sichuan Province for the period 1993-1998), respectively.

Table 5: SYS-GMM Estimates of the Effects of Entrepreneurship (Measure 2) on GDP Growth
(30 years Lagged Ratio of SOE Labor and Per Capita Sown Area as the IVs)

Dependent variable: First difference of LogGDP						
	(1)	(2)	(3)	(4)	(5)	(6)
Entrepreneurship	0.054***	0.064***	0.055***	0.062***	0.054***	0.026***
(Private Business ratio)	(3.86)	(4.70)	(4.64)	(4.39)	(4.54)	(2.73)
2-year lagged LogGDP	-1.257**	-1.370***	-1.390**	-1.382***	-1.423***	-1.239**
	(-2.32)	(-2.67)	(-2.66)	(-2.80)	(-2.98)	(-2.00)
Investment share		0.012	0.007	-0.009	-0.018	-0.024
		(0.72)	(0.33)	(-0.44)	(-0.76)	(-1.39)
Primary school enrollment rate		-0.069	-0.072	-0.071	-0.080	-0.047
		(-0.85)	(-0.78)	(-0.78)	(-0.85)	(-0.86)
Secondary school enrollment rate		0.109***	0.115**	0.108***	0.114***	0.065***
		(3.12)	(2.23)	(3.57)	(3.65)	(3.32)
Birth rate			0.043		0.047	0.020
			(0.49)		(0.58)	(-0.47)
Old dependency ratio			0.059		0.113	0.070
			(0.54)		(1.11)	(0.77)
Government spending share				0.055	0.055*	0.014
				(1.56)	(1.74)	(0.47)
FDI share				0.054**	0.051**	0.037**
				(2.57)	(2.37)	(2.26)
Ratio of SOE Labor						0.033**
						(2.55)
Per Capita Sown Area						-0.0004
						(-1.18)
Period 1997-1999	-0.29***	-0.527***	-0.463***	-0.522***	-0.470***	-0.094
	(-3.27)	(-3.64)	(-3.63)	(-3.01)	(-3.72)	(-0.64)
Period 1999-2001	-0.583**	-0.933***	-0.905***	-1.04***	-1.014***	-0.552*
	(-2.31)	(-3.98)	(-3.41)	(-3.65)	(-3.30)	(-1.86)
Period 2001-2003	-0.302**	-1.077***	-0.954***	-1.17***	-1.078***	-0.237
	(-2.15)	(-3.28)	(-3.59)	(-2.97)	(-3.57)	(-0.73)
Hansen test of over-identification restriction						
(Hansen J-statistics)	12.53	11.29	14.61	13.16	14.66	18.62
(p-value)	0.19	0.26	0.102	0.16	0.101	0.29
Arellano-Bond test for						
AR (1) in first difference (z-statistics)	-1.42	0.57	-0.21	0.36	-0.09	-1.66
AR (1) in first difference (p-value)	0.16	0.57	0.83	0.72	0.93	0.10
AR (2) in first difference (z-statistics)	1.31	1.44	1.31	1.84	1.45	1.41
AR (2) in first difference (p-value)	0.19	0.15	0.19	0.10	0.15	0.16
Provinces	29	29	29	29	29	29
Observations	116	116	116	116	116	116

Notes: Heteroskedasticity robust t-statistics are reported in parentheses. *, ** and *** represent significance levels at 10, 5 and 1 percent. LogGDP is the log of real per capita GDP. All specifications in the table treat the first difference of the entrepreneurship and the first difference of the 2-year lagged LogGDP as the endogenous variable. All specifications estimate the first differenced equations with the following IVs: first difference of the 30-year and 20-year lagged employment ratio in SOEs; first difference of the 30-year and 20-year lagged per capita sown area; 4-year, 6-year and 8-year lagged LogGDP. SYS-GMM also requires three LogGDP level equations with the contemporaneous first difference of the lagged LogGDP as the IVs for the lagged LogGDP on the right hand side.

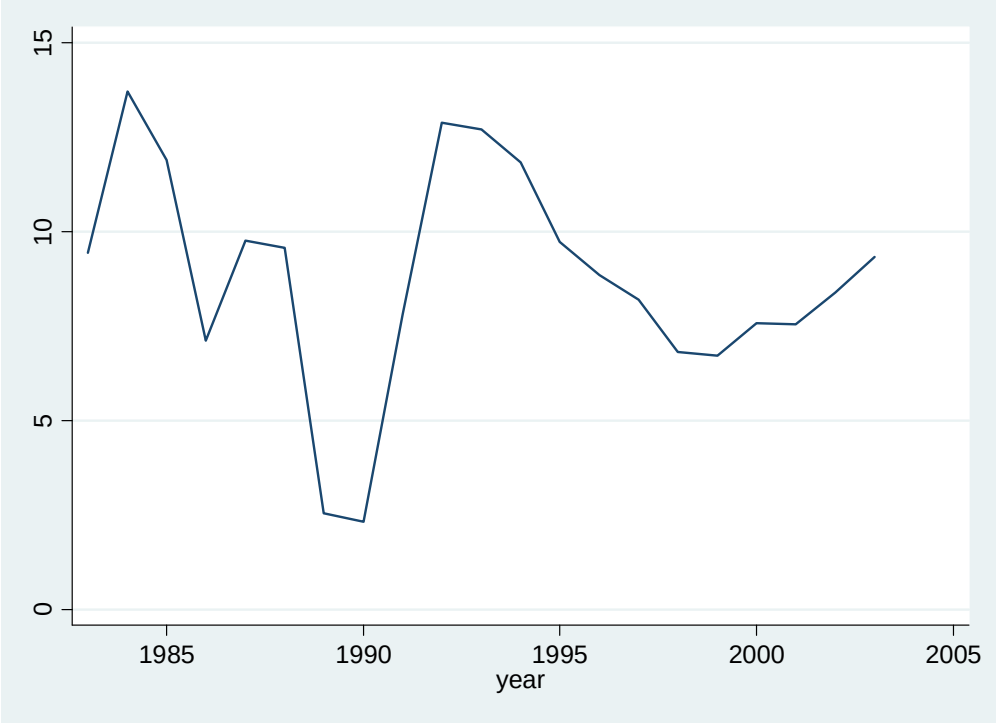


Figure 1: National Real Per Capita GDP Growth Rates (%), 1983 to 2003

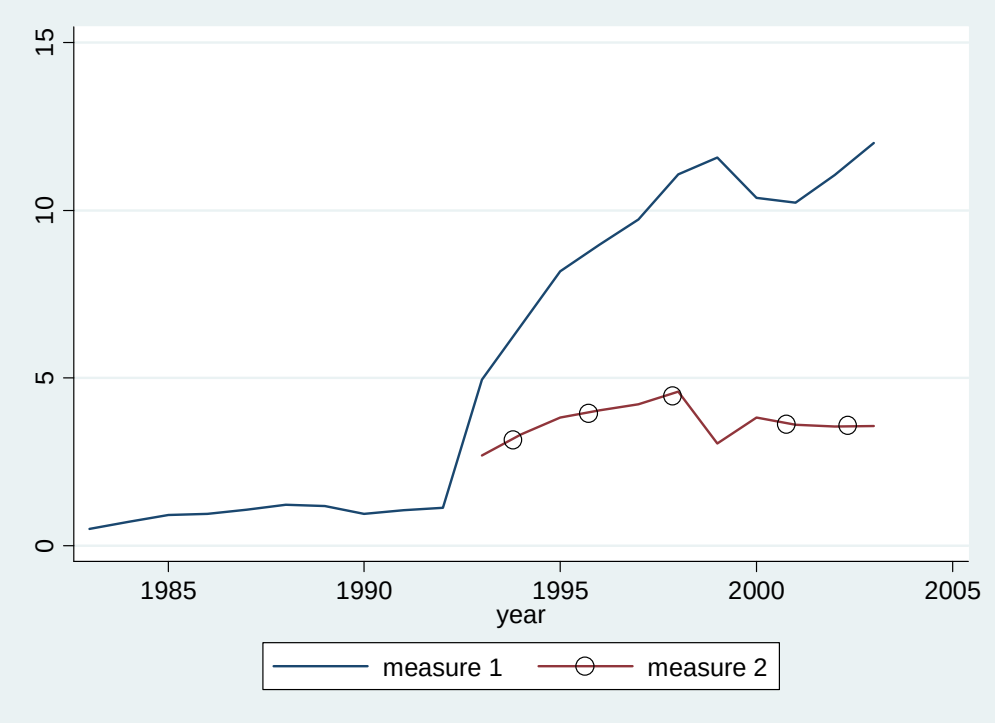
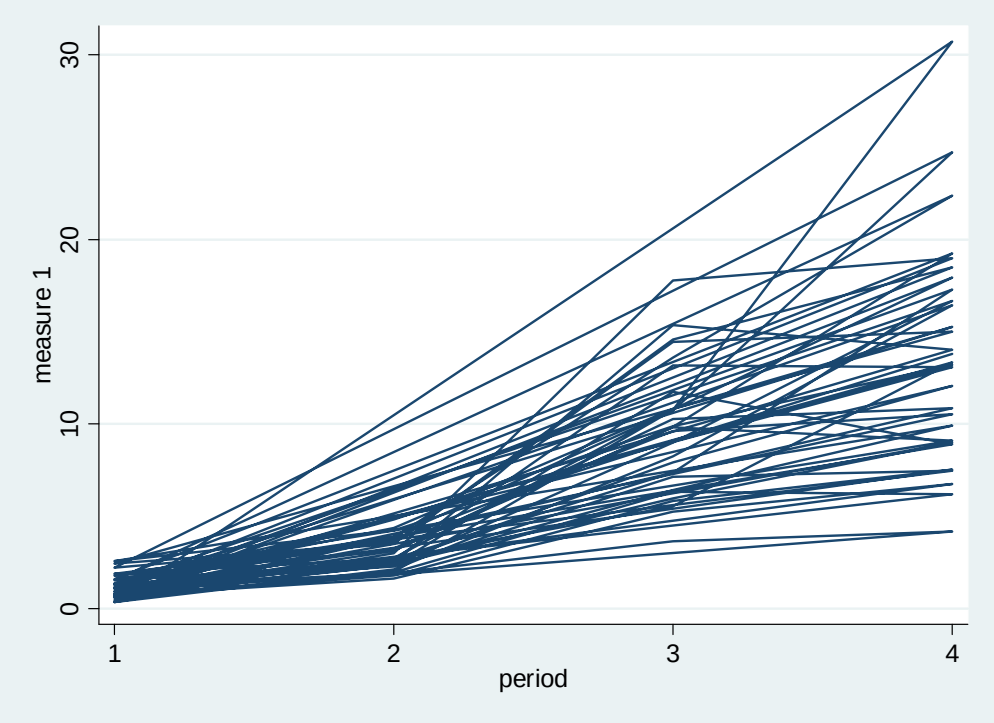
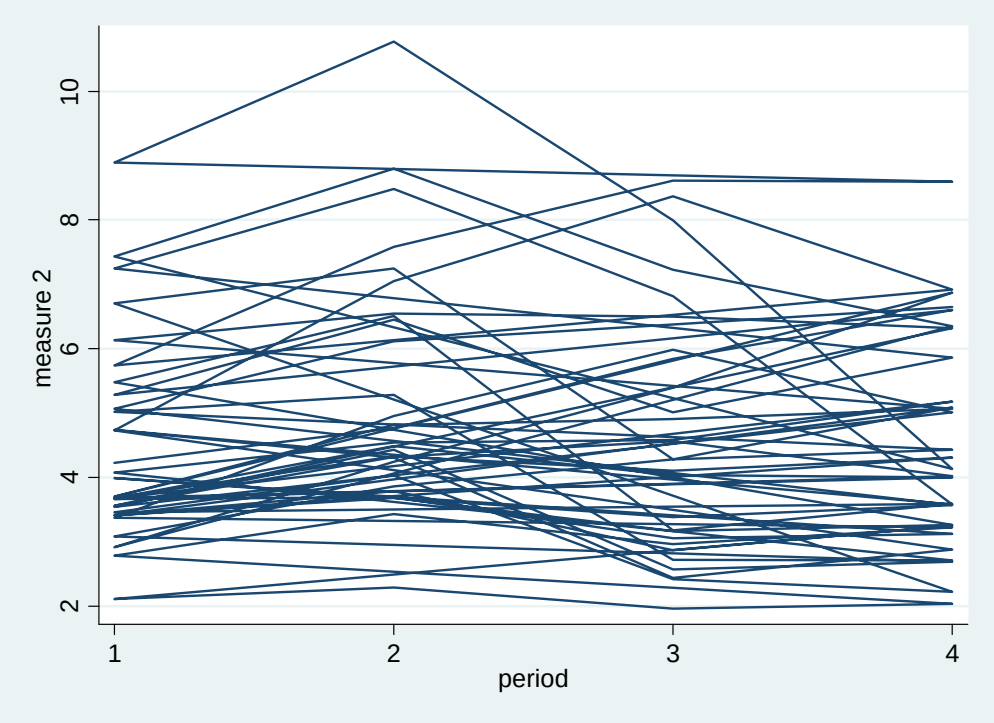


Figure 2: National Entrepreneurship (%), 1983 to 2003



Note: 1=1983-1988 2=1988-1993 3=1993-1998 4=1998-2003

Figure 3: Provincial Entrepreneurship (Measure 1) (%), 1983 to 2003



Note: 1=1995-1997 2=1997-1999 3=1999-2001 4=2001-2003

Figure 4: Provincial Entrepreneurship (Measure 2) (%), 1995 to 2003