

The Impact of Marketization on Entrepreneurship in China: Recent Evidence

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ABSTRACT

We empirically test the relationship between marketization, i.e., economic freedom, and measures of entrepreneurship across Chinese provinces. Our primary measures of entrepreneurship are level changes in the number of “private enterprises” and “self-employed individuals”. We find that higher levels of marketization are positively related to higher levels of entrepreneurship. These positive effects are largely driven by three areas of marketization. “Government and market” drives both measures of entrepreneurship, while “legal frameworks” influences only private enterprises and “ownership structure” influences self-employment.

Keywords: entrepreneurship; marketization; economic freedom; regional science; China

JEL codes: L26; P25; P37

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Introduction

Since 1978, China has enjoyed substantial economic development through a freer economic environment - what some have called “marketization” - that has let loose the entrepreneurial spirit. In this paper, we empirically test the relationship between marketization, or what some have called economic freedom, and measures of entrepreneurship across Chinese provinces, using the newest data on provincial-level marketization from 2008 to 2014 obtained from Fan et al. (2017).

There are 31 province-level regions in Mainland China. Four are classified as municipalities, five are autonomous regions of minority ethnic groups, and 22 are regular provinces. Besides these areas, there are three other regions that are not classified as “Mainland China.” Hong Kong and Macau are designated as special administrative regions and Taiwan is claimed to be a province by the PRC but it does not have complete control of it and thus it is often excluded from provincial-level analyses.

The fact that there is considerable provincial level variation in policies is surprising to many outside China. Although China is a one-party state, and thus has a top-down political system, provinces have leeway on how to implement policies from the central government. In addition, they can make their own policies in some domains, such as the share of state-owned enterprises. It is this variation in “marketization” across provinces that Fan et al. (2017) measures and we exploit in our empirical work.¹

Identifying the net changes of number of enterprises in the private sectors as our measure of entrepreneurship, we use a panel approach with province and year fixed effects. The results show that entrepreneurship within a province is positively related to its overall marketization. We further analyze marketization by its five component parts. Among the five areas, we find that three of them play a role in promoting entrepreneurship. “Legal frameworks” contributes to the growing number of new private enterprises with more than eight employees, while “the development of non-state economy (ownership

¹ For readers interested in the regional differences within China, Coase & Wang (2012) and Xu (2015) have given an excellent overview.

structure)” is the main driver of the development of self-employed individuals (firms with no more than eight employees).² “Government and market” plays a positive role in promoting both measures of entrepreneurship.

The remainder of our paper proceeds as follows. Section 2 discusses the recent literature related to China’s entrepreneurship and the well-developed literature on marketization and entrepreneurship. Section 3 describes our data, while Section 4 discusses our empirical approach. Section 5 presents and discusses our baseline results, Section 6 does the same for our robustness checks, and we conclude in Section 7.

Chinese Entrepreneurship and Marketization

There is a growing literature on entrepreneurship in China that has been empirically linked to many factors such as personal attributes, regional growth, and the institutional environment. For example, with survey data for the 2004-2005 academic year from seven cities in China, Djankov et al. (2006) studied the influence of individual characteristics, family background, social networks, values, beliefs, and perceptions of the institutional environment on individuals decisions to become an entrepreneur. While they discuss institutional perceptions in their paper, they do not control for the actual institutional environment across the cities. They do find that perceptions about how positive the government is towards entrepreneurship are positively related to entrepreneurship.

Qian (2010) investigates the geographic distribution of talent and its association with innovation, entrepreneurship and regional economic performance in China. Talent is defined in the paper as human capital and creative class, both of which are associated with entrepreneurship. Focusing on the time period from 1997 to 2004, the author finds evidence that the presence of a university is the single most important contributor to the talent distribution observed across China, and consequently regional

² We only count firms registered with the government. A “self-employed individual” might only have 1 person employed but can have up to seven workers. Mobile vendors are not required to register with the government, thus they are not included in the “self-employed individual” definition.

entrepreneurship and economic performance.

Lu & Tao (2010) use survey data on life-histories for 2,854 respondents from twenty cities in China, and find strong support for a good institutional environment being positively related to the development of private entrepreneurial activities. Their measure of institutions is a binary variable regarding the legality of private-ownership businesses. They find that “the institutional environment has statistically significant interactions with the personal attributes of would-be entrepreneurs”, implying that the determinants of entrepreneurship are structurally changed by private-ownership businesses being legal. More recently, Song & Winkler (2014) study the entrepreneurship statistics of 31 Chinese provinces from 2005 to 2010 using a panel approach, focusing on the relationship between entrepreneurial activities and regional supply and demand factors. They find that technology and employment have positive impacts on regional entrepreneurial activities, which highlights the importance of technology to the development of entrepreneurship.

While all of these studies tell us something about entrepreneurship in China, they do not link entrepreneurship to economic institutions or do so in a very limited way (as in as in Lu & Tao (2010)). Given the larger literature relating economic institutions to entrepreneurship across countries (Nyström, 2008; Bjørnskov & Foss, 2008; Gohmann, 2012; Stenholm et al., 2013; Bjørnskov & Foss, 2013; Thai & Turkina, 2014; Kuckertz et al., 2016) and within countries (Kreft & Sobel, 2005; Hall & Sobel, 2008; Gohmann et al., 2008; Powell & Weber, 2013; Gohmann et al., 2013; Coomes et al. 2013), the need for a more formal look at the relationship between provincial-level institutions of market-oriented policies and entrepreneurship is needed. Marketization, or economic freedom, is thought to lead to higher levels of positive sum entrepreneurship (such as opening a business) as economic freedom gives individuals the freedom to bring new ideas, products, and organizations to the market (Kreft & Sobel, 2005). From the opposite side, the absence of economic freedom encourages individuals to engage in non-productive entrepreneurship not oriented towards the market (Baumol, 1990; Coyne et al., 2010). Given China’s

unique transition to a more market-oriented economy, and the great diversity in economic outcomes across provinces, it is important to explore whether marketization differences across provinces help to explain the differences in entrepreneurship across provinces.

The publication of the most recent edition of a provincial marketization index by Fan et al. (2017), representing the degree of economic freedom in different provinces, presents an opportunity to bring another institutionalist perspective to the study of regional economic performance and entrepreneurship in China. This index is published intermittently, and the latest one for years 2008 - 2014 is the 2017 report (Fan et al., 2017). It has been widely linked to the study of Chinese trade (Lu et al., 2009) and growth (Fan et al., 2011), and there is also a growing but still small literature linking Chinese provincial regional entrepreneurship with it. For example, using provincial panel data from 1998 to 2003, Zhou (2011) creates a regional deregulation index using the NERI Index and defines the numbers (rather the changes of them) of private enterprises and self-employed individuals as the measures of entrepreneurship. Zhou (2011) finds that entrepreneurship and deregulation are positively correlated at the provincial level. With the help of a firm-level data set including 1946 Chinese entrepreneurial firms in 1996 and the NERI Index, Zhou (2014) further investigates the relationship between entrepreneurial activities and two institutional indexes constructed from the NERI Index, “legal protection of property rights” and “market development”. His results reveal that there are positive correlations between the institutional indexes and entrepreneurial activities. It is important to note that Zhou (2014) measures entrepreneurial performance by the return on capital and firm profit margins.

More recently, using provincial-level panel data from 1997 to 2008, Hasan et al. (2015) defines small business development as the percentage change in small firms (defined as firms with fewer than 300 employees) and the percentage changes in their total output. This paper is closest to ours in terms of measuring entrepreneurship, although they primarily focus on the effect of banking structure on small business development. However, in conducting their analysis they find evidence of marketization

promoting small business growth. Specifically, they find that the overall Marketization Index has a positive (albeit, weak) influence on the growth in number of small businesses, with the main drivers being “development of non-state economy”, “factors market development”, and “legal frameworks”.

None of these studies using the NERI Index mentioned above employs the most recent version, thereby missing the last several years of continued market development. In this paper, we investigate the relationship between marketization (economic freedom) and the development of entrepreneurship in China, employing the newest systematically provincial economic institutions index by Fan et al. (2017) and using two different definitions of entrepreneurship (following Deskins & Ross (2018)). Due to changes in the structure of the marketization index that make it not comparable over time, we can only look at the years 2008 to 2014.

Data

The data sets used in this study come from two sources. The first data set includes the annual marketization index of 31 provincial regions in the mainland China from 2008 to 2014. This is from the latest *Marketization of China's Provinces: NERI Report 2016* (Fan et al., 2017). This data set has a similar structure as that of the *Economic Freedom of the World: Annual Report* by Fraser Institute (Gwartney et al., 2016). For an overview of this data set and the literature on the effects of economic freedom, Hall & Sobel (2008) provide a good overview. The latest NERI Index includes a total index, constituted of 18 components in 5 major areas. We will now further explain the index, including all its areas and components, in detail.

NERI Index

The latest NERI Index takes Year 2008 as the base year, when all the components are scaled from 0 to 10: the higher the grade of a component is, the better the region performs in terms of

marketization.³ The grades from 2009 to 2014 employ those in 2008 as the baselines, with the same methodology. Thus, some of the components in the later years may be smaller than 0 or greater than 10, while most of the grades still fall between 0 and 10.

The five major areas of the NERI Index are: (1) “relationship between government and market”, the size of the government in the regional economy; (2) “development of non-state economy (ownership structure)”, concerning the growth of the non-state sector and provincial-level reform of state enterprises; (3) “goods market development”, trade barriers and the regional-level price control; (4) “factors market development”, the development of mechanisms of allocation of resources including capital and labor; and (5) “legal frameworks”, includes data on the setting-up of a legal framework for property-rights protection and contract enforcement.

The “relationship between government and market” area has three components: the role of market in resources allocation, using (1 - government expenditure as share of GDP) to indicate it; reducing the intervention to firms by government, by the survey data of firms on “the convenience of the administrative examination and approval procedures”; and reducing the size of government, using the employees in public administration, social security and social organization as share of the total population as the indicator of the size of government.

The “development of non-state economy (ownership structure)” area has three components: the share of non-state sectors’ in contributions to industrial value-added; the share of non-state sectors’ in fixed assets investment; and the share of non-state sectors’ in urban employment.

The “goods market development” area has two components: price controls, which is largely time-invariant⁴ in the index, measuring the share of goods with prices decided by the government; and reducing the trade barriers and local protection, which is from survey data.

³ This data described in this section is all of the data contained in Fan et al. (2017).

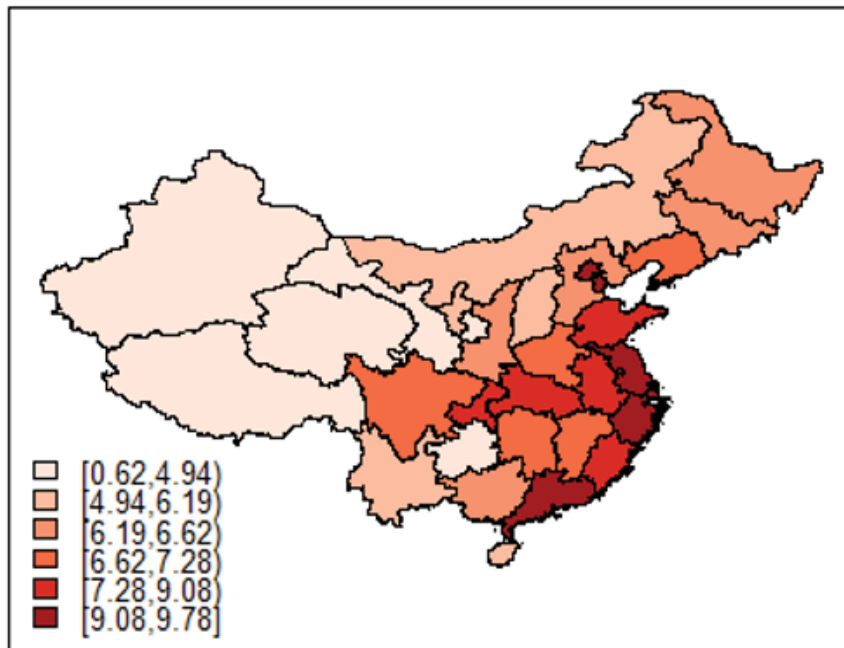
⁴ Given their methodology and the data available, this component has the same value for every province from 2008 to 2013; it changed in 2014.

The “factors market development” area has six components: the marketization of the financial sector, indicated by the share of deposits in private banks to total; the marketization of credit allocation, indicating the share of credit allocated to non-state sectors; the supply of technical staff; the supply of administrative staff; the supply of skilled workers; and the marketization of technological achievements. The third to the fifth components are measured by survey data, and the last component is measured by the ratio of technology market order flow to the number of local science and technology staff.

“Legal frameworks” has four components: intermediate institutions such as law firms, accounting offices, and independent auditing offices; assistance to firms from guilds; defense of the rule of law in markets; and intellectual property rights protection. The first three components are from survey data, while the last one is measured by the ratio of patterns approved to the number of science and technology staff.

The “government and market” area is the only one of the five which decreased from 2008 to 2014 for the country as a whole. In the seven years of the post Supreme Crisis period, Chinese government has been imposing more and more intervention to the market. As Higgs (1997) suggests, crisis is a great opportunity for government to expand. The “development of non-state economy (ownership structure)” area has been increasing over the seven years: the general trend of privatization process in China is still positive. “Goods market development” does not change much over the seven years, while “factors market development” and “legal frameworks” have risen considerably.

Figure 1: NERI Marketization Index for Mainland China in 2014



Sources: NERI Index of Marketization of Chinas Provinces (Fan et al., 2017). The six different degrees of colors stand for the six class intervals of the marketization levels across provinces in 2014. The darker the color, the higher the marketization level. Hong Kong, Macau, and Taiwan are not included as they are not in our data set.

3.2 NBSC Data

All other data used in the empirical analysis - measures of entrepreneurship and control variables - were directly accessed or calculated based on data from the National Bureau of Statistics of China (NBSC).⁵ It is the best available and most widely used source of Chinese province-level data. Since the data of each region is calculated and reported by the same statistical method, any potential systematic bias should not matter because our focus is on the relative difference.

The measures of entrepreneurship in every province are the annual changes of the numbers of the “private enterprises” and “self-employed individuals”. In looking at annual changes we are following Deskins & Ross (2018). Our control variables were chosen with the idea that each of should be related to the entrepreneurial environment in China. The first control variable we include is the value added by

⁵ <http://data.stats.gov.cn/english/>

industry to GDP (%). The more productive industry is in a province, the more likely there are to be entrepreneurial spin-offs and related activity. Second, we include amount of foreign trade (imports plus exports) relative to GDP (%). Provinces that are more open to foreign trade, we hypothesize, are more likely to have higher rates of entrepreneurship.

To these variables we add two demographic variables. First, the percentage of the population with a post-secondary degree (%) (Bjørnskov & Foss, 2008). Second, the gross dependency ratio (%). The gross dependency ratio is often used in studies related to China due to the long-term effects of China's unique one-child policy. The gross dependency ratio is measured as the population under 14 years old and above 65 divided by the number between 15 and 64. Our hypothesis is that the dependency ratio is inversely related to entrepreneurship, since risk-averse working-age citizens would be less likely to start their own business if supporting more people.

Table 1. Summary Statistics

Statistic	Mean	St. Dev.	Min	Max
Marketization Index	5.82	1.93	-0.30	9.95
Modified Marketization Index	5.71	1.97	-0.90	10.09
Ownership Structure	6.27	2.30	0.94	10.38
Government and Market	5.99	2.43	-6.75	9.65
Goods Market Development	7.62	1.38	1.46	9.79
Factors Market Development	4.62	2.23	-1.21	12.23
Legal Frameworks	4.61	3.52	-0.70	16.19
Private Enterprises Change (k)	45.86	51.00	0.60	418.30
Self-employed Individuals Change (k)	103.34	118.66	-224.70	852.30
Post-secondary Ratio (%)	9.86	6.00	1.57	39.30
Foreign Trade to GDP (%)	31.02	37.12	3.58	169.88
Industry Value Share (%)	39.98	9.74	7.19	53.04
Dependency Ratio (%)	36.25	7.10	19.30	61.55

Notes: Table values reflect yearly averages of 31 provincial regions from 2008 to 2014. Thus, the total observations for every variable is 217. The marketization indexes are from the NERI Report (Fan et al., 2017), and all the other data is from NBSC. All the NBSC data, with the exception of post-secondary and age composition data in 2010, was obtained from the National Bureau of Statistics of China (NBSC) Annual Data by Province Database at: <http://data.stats.gov.cn/english/easyquery.htm?cn=E0103>. Post-secondary and age composition data in 2010 is not available in that database and was obtained from the 2010 census from NBSC, available online at: <http://www.stats.gov.cn/tjsj/pcsj/rkpc/6rp/indexch.htm>.

Table 1 displays summary statistics and data sources. The average total marketization index of a province in the last seven years is 5.82, with the minimum as -0.30 and the maximum as 9.95. The scores of the five different areas vary considerably. The average level changes of private enterprises and self-employed individuals are both positive. Although most provinces have positive growth of entrepreneurship as defined, the negative minimum of the change of self-employed individuals indicates that some provinces have decreased growth of self-employed individuals in the last years.

4. Empirical Model

The empirical model used is indicated in Equation (1), a panel approach with province and year fixed effects

$$EN_{nt} = \beta_1 EI_{nt} + \beta_2 X_{nt} + P_n + Y_t + \mu_{nt} \quad (1)$$

where EN_{nt} is the measure of entrepreneurship for province n in year t . EI_{nt} are the economic institutions variables (the marketization index and its areas) of province n in year t , and X_{nt} are the control variables of economic performances of province n in year t . P_n is the province fixed effect, which controls for the variations across provinces. Y_t is the year fixed effect, which controls for the variations over time. μ_{nt} is the error term.

Our primary interests are the estimators of the coefficients for the economic institutions, β_1 . As explained in the data section, the “development of non-state economy (ownership structure)” area captures the size of private economy from three different perspectives. Although none of these three components is directly related to our measures of entrepreneurship, they might boost the correlation between the measures of entrepreneurship and the total marketization index. Thus, we calculate a “modified marketization index”, which is the arithmetic mean of the other four areas excluding the “ownership structure”.

Therefore, using the same empirical formula, we have nine models with different marketization indexes included for each measure of entrepreneurship. The first model only includes the “modified marketization index”. The second model uses the original total index instead. The third model includes the four areas used in the “modified marketization index”. As shown in Table 1, the modified marketization index does not deviate from the original one very much. The fourth model includes all the five areas of the total index. Each of the fifth to the ninth models includes only one area of the five as the economic institutions variable, in order to investigate the exact relationship between each area and the entrepreneurship. These nine models shall jointly provide evidences of the effects of the

marketization to the entrepreneurship development across Chinese provinces over time.

5. Empirical Results

Table 2 displays the results for measuring entrepreneurship by the level changes of the number of private enterprises. Model 1 only includes the modified marketization index as the economic institutions variable. The results suggest that the overall marketization level (economic freedom) of a province is positively related to the development of entrepreneurship. Model 2 only includes the total marketization index as the economic institutions variable, and the result verifies the findings of Model 1. The only difference between the two indexes is whether ownership structure is included, which does not influence the overall correlation between entrepreneurship development and marketization level.

Model 3 includes the four areas of the modified marketization index. However, among these four areas, “legal frameworks” is the only one that is statistically significant. The higher the adherence to the “rule of law” a province has, the more new private enterprises it has. Similarly, Model 4 includes all five areas and provides similar evidence for the importance of “rule of law” as that of Model 3. Model 4 also suggests positive effects of “government and market” to the development of entrepreneurship: smaller governments promote entrepreneurship. Models 5 - 9 in Table 3 jointly verify the evidences found in Models 3 and 4 in Table 2 by inserting each of the five areas one at a time. Again, “legal frameworks” and “government and market” are the two areas having statistically significant effects to the development of entrepreneurship, while the other areas do not have any statistically significant impact.

Table 2. Private Enterprises - Level Changes (k)

	Model 1	Model 2	Model 3	Model 4
Modified Marketization Index	12.505*** (4.444)			
Marketization Index		13.322** (5.369)		
Government and Market			6.199 (3.998)	8.858* (4.504)
Goods Market Development			-8.244 (6.738)	-7.352 (6.762)
Factors Market Development			-2.739 (3.273)	-2.252 (3.290)
Legal Frameworks			6.006*** (2.050)	4.987** (2.198)
Ownership Structure				-8.899 (6.989)
Post-secondary Ratio (%)	-1.602 (1.615)	-1.413 (1.617)	-2.364 (1.634)	-2.436 (1.632)
Foreign Trade to GDP (%)	-0.403 (0.356)	-0.468 (0.354)	-0.253 (0.357)	-0.139 (0.367)
Industry Value Share (%)	0.384 (1.024)	0.294 (1.027)	0.793 (1.027)	0.978 (1.035)
Dependency Ratio (%)	0.275 (1.116)	0.262 (1.122)	0.726 (1.125)	0.781 (1.124)
Province FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
R ²	0.061	0.052	0.097	0.106
Num. obs.	217	217	217	217

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

Table 3. Private Enterprises - Level Changes (k)

	Model 5	Model 6	Model 7	Model 8	Model 9
Government and Market	7.899** (3.635)				
Goods Market Development		-7.944 (6.935)			
Factors Market Development			2.842 (2.909)		
Legal Frameworks				6.274*** (1.879)	
Ownership Structure					-6.749 (6.012)
Post-secondary Ratio (%)	-1.001 (1.606)	-0.873 (1.620)	-0.836 (1.621)	-2.211 (1.632)	-0.960 (1.626)
Foreign Trade to GDP (%)	-0.482 (0.356)	-0.571 (0.356)	-0.574 (0.357)	-0.354 (0.353)	-0.534 (0.362)
Industry Value Share (%)	0.384 (1.037)	0.227 (1.044)	0.128 (1.040)	0.480 (1.017)	0.220 (1.044)
Dependency Ratio (%)	0.491 (1.134)	0.270 (1.139)	0.118 (1.140)	0.345 (1.107)	0.191 (1.137)
Province FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
R ²	0.044	0.026	0.024	0.077	0.025
Num. obs.	217	217	217	217	217

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

Table 4 shows the results for measuring entrepreneurship by the level changes of the number of the self-employed individuals. Model 1 in Table 4 suggests a significantly positive correlation between the overall marketization level and the development of entrepreneurship, which is verified by Model 2. Models 3 and 4 display the detailed areas of the index in Models 1 and 2, respectively. Model 3 indicates that only “government and market” has a statistically significant effect to the development of entrepreneurship. However, in Model 4, this significance goes away once “ownership structure” is included. With respect to self-employment, “government and market” seem to be closely related to “ownership structure.” Models 5 - 9 in Table 5 jointly provide further verification of the findings from

Models 3 and 4 in Table 4. Among the five areas, both the “government and market” and the “ownership structure” have statistically positive effects to the development of entrepreneurship.

Table 4. Self-employed Individuals - Level Changes (k)

	Model 1	Model 2	Model 3	Model 4
Modified Marketization Index	24.964* (14.490)			
Marketization Index		36.580** (17.348)		
Government and Market			27.606** (13.182)	15.433 (14.785)
Goods Market Development			-2.697 (22.218)	-6.778 (22.199)
Factors Market Development			-0.514 (10.793)	-2.744 (10.799)
Legal Frameworks			1.902 (6.761)	6.569 (7.215)
Ownership Structure				40.748* (22.945)
Post-secondary Ratio (%)	-6.478 (5.267)	-6.572 (5.224)	-6.057 (5.389)	-5.724 (5.359)
Foreign Trade to GDP (%)	1.617 (1.159)	1.600 (1.145)	1.750 (1.177)	1.229 (1.206)
Industry Value Share (%)	5.389 (3.339)	5.356 (3.319)	5.972* (3.386)	5.123 (3.399)
Dependency Ratio (%)	3.548 (3.640)	3.575 (3.624)	4.515 (3.709)	4.263 (3.689)
Province FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
R ²	0.050	0.058	0.066	0.083
Num. obs.	217	217	217	217

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

Table 5. Self-employed Individuals - Level Changes (k)

	Model 5	Model 6	Model 7	Model 8	Model 9
Government and Market	28.335** (11.651)				
Goods Market Development		-1.181 (22.385)			
Factors Market Development			10.005 (9.351)		
Legal Frameworks				5.997 (6.216)	
Ownership Structure					46.619** (19.081)
Post-secondary Ratio (%)	-5.623 (5.148)	-4.858 (5.230)	-5.026 (5.210)	-6.208 (5.399)	-3.626 (5.162)
Foreign Trade to GDP (%)	1.675 (1.141)	1.197 (1.149)	1.341 (1.147)	1.442 (1.169)	0.619 (1.147)
Industry Value Share (%)	5.844* (3.323)	4.838 (3.371)	4.925 (3.342)	5.184 (3.363)	3.979 (3.313)
Dependency Ratio (%)	4.457 (3.635)	3.392 (3.676)	3.123 (3.665)	3.527 (3.662)	3.378 (3.608)
Province FE	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y
R ²	0.065	0.034	0.040	0.039	0.066
Num. obs.	217	217	217	217	217

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses.

It is interesting to note that “government and market” has positive effects to both the large firms (“private enterprises”) and the small ones (“self-employed individuals”). However, the core institutional environment of the “rule of law” is the other driving factor of more net new large firms, while “privatization” is the main reason for the new set-ups of new small businesses. The idea that the rule of law is necessary for investment to occur that would allow smaller firms to become larger firms is consistent with our results.

6. Robustness Checks

The results above come from ordinary least squares (OLS) reduced form estimates where the marketization enters linearly. While this approach has been used extensively in the literature on institutions and entrepreneurship (Nyström, 2008; Bjørnskov & Foss, 2008; Gohmann, 2012; Powell & Weber, 2013), it has the limitation of assuming that marketization affects self-employment and private enterprises linearly. Wennekers et al. (2010) show that income can have non-linear effects on entrepreneurship in cross-country analyses. Building on their approach, we look to see if marketization affects entrepreneurship non-linearly by introducing a quadratic term into our earlier regressions in Columns 1 and 2 of Table 2 and Table 4. These results are presented in Table 6. For readability and because our primary interest is on marketization, we include but do not report the controls variables present in Tables 2 and 4.

Table 6. Non-Linear Effects on Private Enterprises and Self-employed Individuals

Level Changes (k)	PE	PE	SEI	SEI
Modified Marketization Index	-9.817 (11.079)		54.891 (36.533)	
Modified Marketization Index ²	1.837** (0.837)		-2.462 (2.759)	
Marketization Index		-26.848** (12.747)		53.842 (42.551)
Marketization Index ²		3.299*** (0.956)		-1.418 (3.190)
Province FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
R ²	0.086	0.112	0.054	0.059
Num. obs.	217	217	217	217

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses. The dependent variable in columns 1 and 2 is private enterprises. Dependent variable in columns 3 and 4 is self-employed individuals. All regressions include the following controls: Post-secondary ratio, Foreign Trade to GDP, Industry Value Share, and Dependency Ratio. Observations equal 217 in all specifications.

The dependent variable in the first two columns of regression results in Table 6 is private enterprises. In the first column, we include the modified marketization index as described earlier along with its squared term. The results show that low levels of marketization have a negative effect on private enterprises but that as marketization levels increase the effect becomes positive, sometime just before the mean of the marketization index. This is roughly true for the unmodified marketization index in Column 2 as well. This is not true in columns 3 and 4, where the dependent variable is self-employed individuals. In both Columns 3 and 4 the results are flipped, although not statistically significant. Marketization appears to be positive for self-employment initially but as provinces increase in institutional quality self-employment declines (although it is never positive in the range of possible marketization scores). While not statistically significant, the results for self-employment are consistent with bad institutional environments leading to more “necessity” entrepreneurship (Powell & Weber, 2013).

Another concern could be spatial spillovers across provinces. Economic activity or policies in one area are known to influence policies in another area (Hall & Ross, 2010). At a minimum, there are often spatially autocorrelated factors not directly accounted for in the regression that get picked up in the error term that could lead to biased estimates. For example, Hall & Sobel (2008) find no spatial dependence in entrepreneurship but do find spatially correlated error that needs to be accounted for. A recent paper by Hall et al. (2016), however, finds no evidence of spatial spillovers related to institutions and entrepreneurship.

To see whether there are spatial spillovers, we estimate the spatial autocorrelation (SAC) model. The SAC model allows for spatial autocorrelation in the dependent variable and error term of the model (Elhorst, 2014). The model takes the form:

$$EN = \rho WENT + X\beta + \mu, \text{ where } \mu = \lambda W\mu + \varepsilon \quad (2)$$

W is a 31×31 matrix specifying the spatial relationship of Chinese provinces. In our case, we

choose rook contiguity, although the form of the spatial weight structure has been shown to not matter for estimates or inferences (LeSage & Pace, 2014). Our primary interest is on ρ and λ . A statistically significant value for ρ , the coefficient on the spatially-lagged dependent variable, tells us if there is spatial autocorrelation in private enterprise formation or self-employment. A statistically significant value for λ , the coefficient on the spatially-weighted error term, would indicate spatially-correlated errors.

We present our SAC estimates in Table 7. We follow the approach in Table 6 and only present the results for our primary measures of marketization and the estimates of ρ and λ . The statistical significance of ρ and λ indicate that spatial spillovers exist. An increase in private enterprises in one province is negatively associated with the number of private enterprises in surrounding provinces. There is also positive spatial correlation in the error term, indicating that there likely exist regional factors not explained in our empirical model that are positively influencing private enterprise formation. Looking at Columns 3 and 4, however, we see no spatial spillovers. Both of our measures of marketization remain positive and statistically significant.

Table 7. SAC Model Estimates of Marketization on Private Enterprises and Self-employed Individuals

Level Changes (k)	PE	PE	SEI	SEI
ρ	-1.128*** (0.083)	-1.130*** (0.083)	-0.380 (0.334)	-0.384 (0.326)
λ	0.837*** (0.039)	0.841*** (0.039)	0.195 (0.291)	0.190 (0.284)
Modified Marketization Index	7.145*** (1.996)		26.058** (11.686)	
Marketization Index		8.132*** (2.370)		37.131*** (14.230)
Province FE	Y	Y	Y	Y
Year FE	Y	Y	Y	Y
R ²	0.624	0.622	0.551	0.555
Num. obs.	217	217	217	217

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors in parentheses. The dependent variable in columns 1 and 2 is private enterprises. Dependent variable in columns 3 and 4 is self-employed individuals. All regressions include the following controls: Post-secondary ratio, Foreign Trade to GDP, Industry Value Share, and Dependency Ratio. Observations equal 217 in all specifications. Spatial weight matrix is row-normalized based on contiguous neighbors. Guangdong and Hainan provinces are treated as neighbors across the narrow Qiongzhou Strait. ρ is the coefficient on the spatial lag of the dependent variable and λ is the coefficient on the spatial error term.

Conclusion

In this paper, we empirically test the relationship between marketization and measures of entrepreneurship across Chinese provinces. Using the newest data from the National Bureau of Statistics of China Annual Data by Province Database and the index of marketization by Fan et al. (2017), we find statistically positive effects of different marketization indexes to the development of entrepreneurship in China. Measuring entrepreneurship by the annual changes of “private enterprises” and “self-employed individuals”, the results reveal that the level of overall marketization is positive related to the level of entrepreneurship. Among the five areas, the “legal frameworks” plays an important role in promoting new private enterprises, and the “ownership structure” is essential for the development of new self-employed individuals. Meanwhile, the “government and market” has positive effects to entrepreneurship by both measures. We also find non-linear effects for large private enterprises as well

as negative spatial spillovers of private enterprises in one province on its neighbors.

The evidence found in this paper give four main policy implications. First, for larger private enterprises the institutional environment does seem to matter. In particular, the more “rule of law” a region has the higher the growth of larger private enterprises. Second, privatization seems to be the main driving factor of the growth rate in self-employed individuals. Third, smaller governments promote the development of entrepreneurship according to both measures. Fourth, increases in large private enterprises in one area depress large enterprises in neighboring provinces.

References

- Baumol, W. J. (1990). Entrepreneurship: Productive, unproductive, and destructive. *Journal of Political Economy* 98 (5), 893–921.
- Bjørnskov, C., & Foss, N. (2013). How strategic entrepreneurship and the institutional context drive economic growth. *Strategic Entrepreneurship Journal* 7 (1), 50–69.
- Bjørnskov, C., & Foss, N. (2008). Economic freedom and entrepreneurial activity: Some cross- country evidence. *Public Choice* 134 (3–4), 307–328.
- Coase, R., & Wang, N. (2012). *How China Became Capitalist*. Palgrave Macmillan.
- Coomes, P. A., Fernandez, J., & Gohmann, S. F. (2013). The rate of proprietorship among metropolitan areas: The impact of the local economic environment and capital resources. *Entrepreneurship Theory and Practice* 37 (4), 745–770.
- Coyne, C. J., Sobel, R. S., & Dove, J. A. (2010). The non-productive entrepreneurial process. *Review of Austrian Economics* 23 (4), 333–346.
- Deskins, J., & Ross, A. (2018). Economic freedom and racial differences in entrepreneurship: Evidence from US states. *Public Finance Review* 46 (2), 177-204.
- Djankov, S., Qian, Y., Roland, G., & Zhuravskaya, E. (2006). Who are China’s entrepreneurs? *American Economic Review* 96 (2), 348–352.
- Elhorst, J. P. (2014). Spatial panel data models. In J. P. Elhorst (Ed.), *Spatial Econometrics*, pp. 37–93. Springer.
- Fan, G., Wang, X., & Ma, G. (2011). Contribution of marketization to China’s economic growth. *Economic Research Journal* 9, 4–16.
- Fan, G., Wang, X., & Yu, J. (2017). *NERI Index of Marketization of China’s Provinces: 2016 Report*. Social Sciences Academic Press.

Gohmann, S., Hobbs, B., & McCrickard, M. (2013). Economic freedom, entrepreneurial activity, and the service sector. *Journal of Entrepreneurship and Public Policy* 2 (2), 144–159.

Gohmann, S. F. (2012). Institutions, latent entrepreneurship, and self-employment: An international comparison. *Entrepreneurship Theory and Practice* 36 (2), 295–321.

Gohmann, S. F., Hobbs, B. K., & McCrickard, M. (2008). Economic freedom and service industry growth in the United States. *Entrepreneurship Theory and Practice* 32 (5), 855–874.

Gwartney, J., Lawson, R., & Hall, J. (2016). *Economic Freedom of the World: 2016 Annual Report*. The Fraser Institute.

Hall, J. C., Lacombe, D. J., & Pokharel, S. B. (2016). Freedom and entrepreneurship: A spatial econometric approach. *Journal of Entrepreneurship and Public Policy* 5 (3), 404–411.

Hall, J. C., & Ross, J. M. (2010). Tiebout competition, yardstick competition, and tax instrument choice: Evidence from Ohio school districts. *Public Finance Review* 38 (6), 710–737.

Hall, J. C., & Sobel, R. S. (2008). Institutions, entrepreneurship, and regional differences in economic growth. *Southern Journal of Entrepreneurship* 1 (1), 69–96.

Hasan, I., Kobeissi, N., Wang, H., & Zhou, M. (2015). Banking structure, marketization, and small business development: Regional evidence from China. *Pacific Economic Review* 20 (3), 487–510.

Higgs, R. (1997). Regime uncertainty: Why the Great Depression lasted so long and why prosperity resumed after the war. *The Independent Review* 1 (4), 561–590.

Kreft, S. F., & Sobel, R. S. (2005). Public policy, entrepreneurship, and economic freedom. *Cato Journal* 25 (3), 595–616.

Kuckertz, A., Berger, E. S., & Mpeqa, A. (2016). The more the merrier? Economic freedom and entrepreneurial activity. *Journal of Business Research* 69 (4), 1288–1293.

LeSage, J. P., & Pace, R. K. (2014). The biggest myth in spatial econometrics. *Econometrics* 2 (4), 217–249.

- Lu, J., & Tao, Z. (2010). Determinants of entrepreneurial activities in China. *Journal of Business Venturing* 25 (3), 261–273.
- Lu, J., Xu, B., & Liu, X. (2009). The effects of corporate governance and institutional environments on export behaviour in emerging economies. *Management International Review* 49 (4), 455–478.
- Nyström, K. (2008). The institutions of economic freedom and entrepreneurship: Evidence from panel data. *Public Choice* 136 (3), 269–282.
- Powell, B., & Weber, R. (2013). Economic freedom and entrepreneurship: A panel study of the United States. *American Journal of Entrepreneurship* 6 (1), 67.
- Qian, H. (2010). Talent, creativity and regional economic performance: The case of China. *The Annals of Regional Science* 45 (1), 133–156.
- Song, L., & Winkler, C. (2014). China's trans-regional entrepreneurship: A panel data analysis of 31 provinces. *Journal of Entrepreneurship in Emerging Economies* 6 (3), 202–222.
- Stenholm, P., Acs, Z. J., & Wuebker, R. (2013). Exploring country-level institutional arrangements on the rate and type of entrepreneurial activity. *Journal of Business Venturing* 28 (1), 176–193.
- Thai, M. T. T., & Turkina, E. (2014). Macro-level determinants of formal entrepreneurship versus informal entrepreneurship. *Journal of Business Venturing* 29 (4), 490–510.
- Wennekers, S., Van Stel, A., Carree, M., & Thurik, R. (2010). The relationship between entrepreneurship and economic development: Is it u-shaped? *Foundations and Trends in Entrepreneurship* 6 (3), 167–237.
- Xu, C. (2015). China's political-economic institutions and development. *Cato Journal* 35 (3), 525.
- Zhou, W. (2011). Regional deregulation and entrepreneurial growth in china's transition economy. *Entrepreneurship and Regional Development* 23 (9-10), 853–876.
- Zhou, W. (2014). Regional institutional development, political connections, and entrepreneurial performance in China's transition economy. *Small Business Economics* 43 (1), 161–181.