UNIVERSITAT ROVIRA I VIRGILI
DEPARTAMENT D'ECONOMIA

creip
CENTRE DE RECERCA EN ECONOMIA INDUSTRIAL I ECONOMIA PÚBLICA

WORKING PAPERS

Col·lecció "DOCUMENTS DE TREBALL DEL DEPARTAMENT D'ECONOMIA - CREIP"

Urban Employment in Small Businesses and the Level of Economic Development: Evidence from Chinese Cities

Ana I. Moreno Monroy
Shu Yu
Victoria Euse

Document de treball n.23- 2015

DEPARTAMENT D'ECONOMIA – CREIP
Facultat d'Economia i Empresa

UNIVERSITAT ROVIRA I VIRGILI

DEPARTAMENT D'ECONOMIA

creip
CENTRE DE RECERCA EN ECONOMIA INDUSTRIAL I ECONOMIA PÚBLICA

Edita:

Departament d'Economia
www.fcee.urv.es/departaments/economia/public_html/index.html
Universitat Rovira i Virgili
Facultat d'Economia i Empresa
Avgda. de la Universitat, 1
43204 Reus
Tel.: +34 977 759 811
Fax: +34 977 300 661
Email: sde@urv.cat

CREIP
www.urv.cat/creip
Universitat Rovira i Virgili
Departament d'Economia
Avgda. de la Universitat, 1
43204 Reus
Tel.: +34 977 558 936
Email: creip@urv.cat

Adreçar comentaris al Departament d'Economia / CREIP

Dipòsit Legal: T - 1089 - 2015

ISSN edició en paper: 1576 - 3382
ISSN edició electrònica: 1988 - 0820

DEPARTAMENT D'ECONOMIA – CREIP
Facultat d'Economia i Empresa

Urban Employment in Small Businesses and the Level of Economic Development: Evidence from Chinese Cities

Ana I. Moreno-Monroy[*]

Shu Yu[**]

Victoria Euse[***]

Based on a panel of Chinese cities over the period 2004-2009, we analyze the relationship between the level of economic development and the share of urban employment in small businesses. We find that this relationship can be described by an inverted U-shape. In cities with lower levels of economic development, the restructure of the state sector along with a booming service industry is associated with a higher share of employment in small businesses. On the other hand, in cities with higher levels of economic development, a more vibrant manufacturing sector is related to a lower share of employment in small businesses.

1. Introduction

The pattern and nature of urban employment in small businesses is expected to change during economic development. In particular, the amount and quality of urban labor employed in small business is different during the three stages of economic development identified by Porter et al. (2002). During the *factor-driven* stage, if the rural-urban migration rate outpaces the creation of urban employment in the manufacturing sector, unemployed migrant workers who wish to stay in cities resort to (self)employment in small-scale, low productivity activities (Harris and Todaro, 1970). If large-scale industrialization takes off during *the investment-driven* stage, a *first turning point* takes place, after which the presence of large enterprises with scale economies increases,

[*] Corresponding author. Marie Curie Research Fellow at the Economics Department and the Research Centre on Industrial and Public Economics (CREIP), Rovira i Virgili University. E-mail address: ana.i.moreno.monroy@gmail.com.
[**] Postdoctoral fellow, Skalny Center, University of Rochester, Rochester.
[***] International operations business graduate, Novo Nordisk A/S, Zürich.

leading to more demand for wage workers, an increase in the opportunity cost of self-employment and a consequent decrease in the share of urban employment in small businesses (Acs and Naude, 2011).

When opportunities in large-scale resource-intensive activities are exhausted, there is a shift towards activities with higher knowledge content during the *innovation-driven* stage. The predictions on the share of urban employment at this stage are ambiguous. On the one hand, specialization in innovative activities opens up the opportunity for business ownership, new specialized market niches for small businesses and a higher demand for entrepreneurship as an occupational choice. When these forces are sufficiently strong, a *second turning point* may take place, leading to a rising share of urban employment in small businesses (Gries and Naude, 2010; Wennekers et al., 2005). On the other hand, the share of employment in small businesses may keep decreasing or remain stagnant at higher levels of development because of technological progress (Gollin, 2007).

The purpose of this paper is to empirically study the relationship between urban employment in small businesses and economic development. This relationship is of interest because structural trends in employment in small businesses matter for the timing and choice of policies. Because of its effects on employment, innovation and welfare, entrepreneurship has gained an increasing role in economic development (Acs et al, 1994). Consequently, considerable resources are spent on small business and microenterprise development programs. A relevant question from a long-term policy perspective is: how is the share of urban employment in small businesses expected to change over the course of development? If it is the case that this share does not show a linear pattern over the course of development, relevant questions are *when* and *how* to promote employment creation in urban small businesses. For instance, a policy targeting brute urban employment creation in small businesses may not be appropriate in cities close to the first turning point. On the other hand, a policy that focuses on the quality of employment may be more appropriate for cities that are beyond the second turning point. Furthermore, given the benchmark of different turning points, a large discrepancy between the share of urban employment in small businesses and the level of economic development in a city may be a symptom of underlying institutional weaknesses and market failures, which policies can aim to correct (Gollin, 2007).

Related studies have analyzed the relationship between entrepreneurship and economic development using cross-sectional data and country-level panel data (Acs et al., 1994; Carree et al., 2002; Pietrobelli et al., 2004; Wennekers et al., 2005; Li and Zhao, 2011). These studies have established, theoretically and empirically, the existence of a U-shape relationship between entrepreneurship or self-employment levels and growth and the level of economic development. However, the empirical strategy used in these studies does not include a control for unobserved heterogeneity, which can represent a significant source of estimation bias.

In our empirical specification, we study the nature of the relationship between the share of urban employment in small businesses and economic development under the assumption of a non-linear association. To do so, we use a comprehensive panel of over 280 prefecture-cities in China for the period 2004-2009. China offers an exceptional testing ground for our purposes because it has not only experienced very rapid and sustained growth rates during the last two decades, but it has also shown large geographical disparities in the pace of this process. Given that empirically this association can display a monotonic, (inverted) U-shape or N-shape pattern, we specify an equation containing a third degree polynomial and relevant control variables and fixed effects. We start, however, by performing an OLS cross-section regression in order to assess the magnitude of the bias introduced by not controlling for unobserved heterogeneity, and compare the results with regressions using a fixed-effects (FE) panel data estimator. In line with previous studies, in the OLS cross-section results we find a U-shape relationship between the share of urban employment in small businesses and the level of economic development.

However, when using a panel data FE (or an Instrumental Variables (IV) estimator), we find an inverted U-shape pattern. We argue that this result is reasonable not only econometrically, but also in the context of China. The reasons are that, first, we focus on urban as opposed to aggregate employment, so an increasing share of urban employment in small businesses at low levels of development can be expected, and second, that an increasing share at higher levels of development is not to be expected in China, given the strong presence of large-scale activities and the rate of technological progress on the studied period.

Based on the results, we estimate that the *first turning point*, or the point where the share of urban employment in small businesses is at its maximum, occurs at an urban disposable income level between 8,476 and 9,765 CNY per capita (p.c.) (about $1,238 -$1,425 p.c. using the

average USD/CNY conversion rate for 2009). Additionally, as the effect of the control variables is expected to change over economic development, we establish a separate moderating effect of each control variable by creating an individual interaction with our proxy for the level of economic development. The separate estimations for different levels of economic development reveal that some cities may be still at the *factor-driven* stage, where the restructuring of the state sector along with more opportunities in the service sector have determined an upward trend of urban employment in small businesses. On the other hand, the development of a more vibrant manufacture industry has crowded out employment in small businesses in cities experiencing large-scale industrialization, or the *investment-driven* stage. We find no evidence of a higher share of employment in small businesses in cities at the top tier of the income distribution.

The article is organized as follows. The next section provides theoretical predictions on the nature of employment in small businesses during different stages of economic development. The third section introduces the case of China. We present styled facts on small businesses, industrial structure and spatial distribution. The fourth section describes the empirical strategy and results. The fifth section presents the econometric specification for different stages of economic development. The last section provides a discussion of the results and concludes.

2. Review of theoretical predictions and empirical findings

According to Porter et al. (2002), the process of economic development can be divided into three broad stages: factor-driven, efficiency-driven and innovation-driven. The pattern and nature of employment in urban small businesses are expected to be different in each of these stages (Figure 1). At the beginning of the *factor-driven* stage, most employment is absorbed by small-scale agricultural activities. The expansion of the modern sector causes a relocation of surplus labor in rural areas into the industrial sector of urban areas. However, as the migration rate of workers into cities outpaces the creation of wage employment, unemployed workers wishing to stay in cities become (self)employed in small-scale, low productivity (informal) activities with little capital requirements (Harris and Todaro, 1970). Thus, employment in urban small businesses as an occupational choice during the factor-driven stage reflects mostly the inability of individuals to access wage employment.

Most empirical studies do not make a distinction between urban and rural employment in small businesses. Consequently, the starting point at low levels of development is at a high share of employment in small businesses. Rural and urban small businesses are different in nature, however, given differences in the organization of production, production technology and labor productivity, among others. The distinction between rural and urban employment is important because during the first stages of development, the pace of urbanization varies greatly across countries and regions. An aggregate measure of employment is not able to capture the substitution between rural and urban small scale activities at low levels of development.

When large-scale industrialization takes off during the efficiency-driven stage, employment in small businesses increasingly becomes a less attractive occupational choice for marginal entrepreneurs given higher opportunity costs of managing compared to the alternative of wage employment in larger businesses (Lucas, 1978; Mesnard and Ravallion, 2001). Increasingly larger urban markets attract the presence of enterprises and industries with scale economies, which locate closer to their demand market and suppliers and engage in vertical integration, raising entry barriers for new small businesses (Glaeser et al., 2010; Haltiwanger et al., 2010). At *the first turning point*, these forces bring the once increasing share of employment in urban small businesses to decrease rapidly (Acs and Naude, 2011; Pietrobelli et al., 2004).

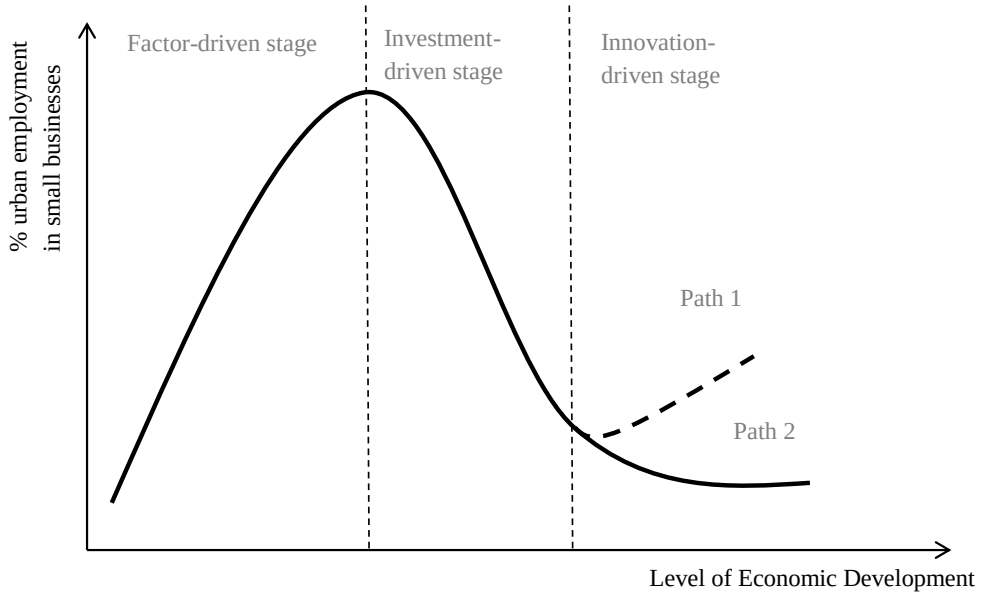


FIGURE 1. Share of Urban Employment In Small Businesses During Economic Development

At some point, due to increasing costs and competition, the profitability of investment-intensive activities comes to a halt and there is an increasing role of knowledge in generating value. This stage is accompanied by a sharp reduction in the share of manufacturing activities and an increase in the share of the tertiary sector, and in particular of modern industries such as financial and technology services (Acs et at, 1994). A *second turning point* may take place and the share of urban employment in small businesses increases again (Path 1 in Figure 1). This alternative has been proposed based on empirical studies finding a U-shape relationship between self-employment or entrepreneurial rates and the level of economic development (Wennekers et al., 2005; Acs et al., 1994; Li and Zhao, 2011). Several possible explanations have been offered. For starters, modern industries offer more opportunities for business ownership than large-scale manufacturing activities, which drives up urban self-employment rates. Additionally, there can be increasing demand for subcontracting with small units as large-scale businesses vertically disintegrate (Doi and Cowling, 1998). Other factors contributing to the increase of the share of urban employment in small businesses during this stage of development is increasing demand for non-standardized, specialized goods and services in wealthier urban areas, which small-scale entrepreneurs can satisfy (Glaeser et al., 2010), and a higher demand for self-employment as a superior occupational choice to wage employment in terms of autonomy and self-satisfaction (Wennekers et al., 2005).

Albeit these elements can indeed cause a resurge in small businesses, they may not be strong enough to drive a second turning point in the share of small businesses in urban employment. Available empirical evidence for development and developing countries gives good reasons to believe that the share of urban employment in small businesses can continue to decrease or stagnate at higher levels of economic development (Path 2 in Figure 1). For the U.S., Poschke (2014) reports that the share of small firms has steadily fallen over the period 1977-2009. Gollin (2007) finds that the self-employment rate falls with income per capita. In particular, for Japan he reports a steady fall in the share of self-employed in manufacturing and stagnant or decreasing shares for richer countries such as Denmark and Italy. According to his model, technical change alone can account for these trends, so the decrease in the share of self-employed occurs even in

the absence of country specific distortions, such as regulatory barriers and credit market inefficiencies.

3. Urban small businesses in China: history and trends

Before 1979, China had a specific policy that guaranteed employment to all workers. Jobs were directly allocated, wages were controlled and migration was severely restricted through the system of local registration, *hu kou*.[1] In urban areas, workers were assigned to work in State Owned Enterprises (SOEs) or collectively owned enterprises. In that context, private ownership and free allocation of labor were not allowed. This situation changed during the first period of the transition, with friendlier experimental policies towards Foreign Direct Investment (FDI), the de-collectivization of agriculture, and the legitimation of township and village enterprises (TVEs). This process led to a rapid growth of light industries and the re-emergence of private entrepreneurship (Gregory et al., 2000; Huang, 2008).

In the 1990s, further reforms were carried out to reactivate the economy, and the private sector experienced the largest expansion since the beginning of the transition. Between 1991 and 1997, the annual growth of private economic activity was nearly 71 percent, and urban employment in small businesses experienced its highest peak in 1998 (Figure A1 in Appendix 2).[2] While private enterprises flourished, SOEs faced a fierce struggle. Since 1995, a fall of total industrial output led to large scale privatizations and massive layoffs in SOEs (Eesley, 2009; Tan, 2007; Ghose, 2005). In this period, employment in small units was encouraged by local and national governments to deal with the temporary economic slowdown and high unemployment rates in urban areas (Li and Zhao, 2011; Wehrfritz and Seno, 2003). The steep decrease in SOEs activity together with lower growth rates of employment in small businesses contributed to an increasing employment share in larger private businesses (Figure A2 in Appendix 2).

During the following decade, some local governments further relaxed their restriction on private enterprises and new funds were created to encourage the creation of technologically intensive small businesses. Simultaneously, rural individuals were actively seeking off-farm jobs, especially in the migrant wage earning sector (Wang et al., 2011). This process was facilitated by important changes in the migration regulations (Chan and Buckingham, 2008; Chen and Coulson, 2002; Song and Zhang, 2002).

Since the early 2000s, and especially after China's accession to the WTO in 2002, policies have been formulated to emphasize the protection of private ownership in order to increase value added in industrial sectors and further expand employment opportunities through entrepreneurship. The new regulations of the late 1990s and 2000s gave rise to the proliferation of science parks,[3] technology business incubators, associated tax incentives for research and development, and an increasing emphasis on tertiary education (Cai et al., 2007). After a recovery in economic performance during the early 2000s, the national growth rate of larger private businesses surpassed that of employment in small businesses (Figure A2 in Appendix 2).

According to the 2009 Global Entrepreneurship Monitor (GEM) Global Report, in the period 2004-2009 China had one of the highest prevalence of growth-oriented entrepreneurs (i.e., those who expect to create 20 jobs or more) in the world. China's Early Stage Entrepreneurial Activity (TEA) rate in 2009 was 18.8, above the average of 11.2 percent for efficiency-driven economies. The optimism among entrepreneurs with respect to their growth potential evidenced in the period is in accordance with the institutional reforms benefiting entrepreneurship and the prevalent high-rates of economic growth. As Zhang (2013) notes, however, the GEM Global report uses data from large cities only, and is not representative of the situation across the country.

Indeed, small businesses have developed in a very uneven way across China. Early exposure to foreign markets, openness to FDI and industrialization have fueled rapid development in the Eastern coastline. These developments increased the opportunities for innovation-driven entrepreneurs, who also likely benefitted from the increased pool of educated workers in the period 2004-2009 (Zhang, 2013). Meanwhile, provinces in the West and North have remained mostly agricultural and reliant on natural resources (Ge, 2009). In these provinces, small businesses are likely to be driven by necessity rather than by opportunity. Figure A3 in Appendix 2 shows the distribution of average urban disposable income per capita and employment in small businesses for the urban areas of the prefectures in our sample (data sources and measurement are detailed in Appendix 1). Remarkably, the richest prefecture city has an average urban disposable income 4.5 times larger than that of the poorest prefecture city. The variation in the average share of urban employment is also significant, ranging from 4 to 51%. Some of the richest prefectures display low shares of employment in small businesses, whereas in some poor

prefectures concentrated in the northeast and south, this type of employment is an important component of the labor market.[4]

The nature of entrepreneurship is likely to be highly heterogeneous, with necessity-based and opportunity-based entrepreneurial activities coexisting across cities. The process of economic development in China has been so rapid and unevenly distributed that even a relatively short time period such as 2004-2009 evidences considerable structural transformation, making it an attractive case for empirical analysis.

4. Empirical analysis

Econometric specification. Given that theoretically the relationship between the share of urban employment in small businesses and the level of development can take different forms, we specify a third degree polynomial. Our empirical specification is:

$$se\_share_{it} = \alpha_0 + \alpha_1 \ln(inca)_{it} + \alpha_2 (ln(inca))^2_{it} + \alpha_3 (\ln(inca))^3_{it} + \boldsymbol{X}_{it}\boldsymbol{\beta}_i + c_i + y_t + \varepsilon_{it} \quad (1)$$

where *i* is an index for prefecture, *t* is an index for year, *se_share* is the share of urban employment in small businesses over total urban employment, ln*(inca)* is a measure of economic development, proxied by the natural logarithm of real urban household disposable income per capita and *X* is a matrix of control variables.[5] c_i represents prefecture-specific fixed effects that capture unobserved time-invariant effects on the share of urban employment in small businesses. These include geographical conditions such as ruggedness, access to coastline and natural resource endowments. y_t is a series of time dummies which capture unobserved time-specific effects common to all the prefectures-cities, such as changes in laws and (macro)economic shocks at the national level. Finally, ε represents a stochastic error term.

For the main controls, matrix *X* includes: 1) the ratio of urban employment in larger private businesses over the sum of this variable and SOEs employment, or "private share"; 2) the share of employment in secondary sector in total urban employment; and 3) the share of employment in tertiary sector in total urban employment.

The proposed flexible parametric model, which is widely used in the environmental Kuznets curve literature, captures three different possible relationships between the share of urban

employment in small businesses and the level of income (Shafik and Bandyopadhyay, 1992; Lieb, 2003): 1) N shape, if α_1, α_2 and α_3 are all statistically significant in the cubic estimation; 2) (inverted) U-shape, if α_1, α_2 and/or α_3 are statistically insignificant in the cubic estimation, but α_1 and α_2 are statistically significant in the quadratic estimation (and $\alpha_2 <0$) and; 3) monotonic, if α_2 is statistically insignificant in the quadratic estimation.

To further check for the robustness of the results we include additional control variables that have been identified in the literature as possible determinants of the share of employment in small businesses. These include: a variable measuring competing farm labor opportunities (Groom et al., 2006); the level of education of the workforce (Glaeser, 2007; Bartik, 2005; Wu, 2002), and population density (Bartik, 2005; Mueller, 2005; Glaeser, 2007). We use the share of cultivated area of total area as a proxy for job opportunities in the agricultural sector; the share of secondary school graduates per capita as a proxy for the level of educated workforce; and the number of inhabitants per square kilometer as a proxy for population density. Descriptive statistics of all the variables used in the empirical analysis are available in Table A1 in Appendix 2.

In order to estimate equation (1), we use a fixed effects (FE) panel estimator (or 'within' estimator). These FE estimates may be biased and inconsistent if the errors are not uncorrelated with the dependent variables, which may be the case if there is a two-way causal relationship between the level of income and the share of urban employment in small businesses, if there is measurement error or if there are omitted variables. To deal with these concerns, we implement a Two Stage Least Squares (TSLS) Instrumental Variables (IV) estimation of equation (1). As an instrument for urban disposable income per capita, we propose the use of a measure of external market potential for each prefecture *j* and year *t* (MP_{jt}), defined as sum of the real GDP per capita of all other prefectures in the sample, *excluding* own-prefecture GDP per capita, weighted by the inverse of the bilateral distance between each pair of cities (d_{ij}). This distance is calculated using the great-circle distance formula. In formal terms, the external market potential measure is given by:

$$MP_{jt} = \sum_{j \neq i \in N} \frac{GDP_{jt}}{d_{ij}} \quad (2)$$

For the case of China, it has been empirically shown that market potential significantly explains income differences across prefecture-cities (Moreno-Monroy, 2011; Bosker et al.,

2012). We argue that external market potential does not directly affect the share of urban employment in small businesses, and that can be expected to influence this variable only through its effect on income levels. The rationale is that small business performance is determined mainly by local economic factors. This is likely if small businesses produce non-tradable goods and services, if they are oriented towards local urban markets given a lower export capacity, or if the products and services offered by small businesses can be easily replicated across locations (a likely scenario for the case of standardized, low-value added products and services). We will establish the appropriateness of this instrument through a battery of tests.

Besides the fixed-effects (IV) estimations, we perform the following OLS cross-section regression in order to compare our results with previous studies and measure the extent of the bias introduced by not eliminating unobserved heterogeneity:

$$se\_share_i = \alpha_0 + \alpha_1 \ln(inca)_i + \alpha_2 (ln(inca))_i^2 + \boldsymbol{X}_i \boldsymbol{\beta}_i + \omega_i \quad (3)$$

Estimation results. Table A2 in Appendix 2 reports the estimation results for equation (1) using the TSLS estimator. As evidenced by the reported first stage F-values, the external market potential variable and its square are highly significant in explaining real urban disposable income and its square. The F-value of the Cragg-Donald Wald test indicates that the instruments are not weak.6 The Kleibergen-Paap LM statistic indicates that the equation is not underidentified. From this we can conclude that our instrument passes the relevance and exogeneity tests. However, based on the results of the Hausman endogeneity test, we cannot reject the null hypothesis that the specified endogenous regressors can actually be treated as exogenous, in which case the Fixed Effects (FE) panel estimator results are more efficient and are consequently preferred over the IV results. 7 We also perform Hausman tests for random vs. fixed effects. As can be seen in Table 1, all tests are significant at 1 percent level, which suggests that the Random-Effects (RE) estimator will produce biased estimates. Thus, FE estimator is the preferred estimator in our study.

Thus, we consider the FE results, reported in columns 4-6 of Table 1, as our baseline results. Columns (1) to (2) contain the results of estimating equation (3) using OLS. In line with previous studies using a similar methodology, the point estimate of urban household disposable income

per capita is significant and positive at the 99% level of confidence, giving support to the existence of a U-shape relationship between the share of urban employment in small businesses and the level of economic development.

Strikingly, this result is entirely reversed once we eliminate unobserved heterogeneity. As columns (4) to (6) show, both α_1 and α_2 are significant at the 95 percent level of confidence in the quadratic estimation. Given that α_2 has a negative sign, this result points to the existence of an *inverse* U-shape relationship between the share of urban employment in small businesses and the level of development. The share of employment in the tertiary sector and the private share have a *positive* significant effect on the share of urban employment in small businesses. The share of employment in the secondary sector has a *negative* albeit statistically insignificant effect. Regarding additional variables, cultivated land, education and population density are not statistically insignificant in explaining the share of urban employment in small businesses at the 95 percent level of confidence.[8]

Based on the estimates in columns (4) to (6), we can establish that the *first turning point*, or the point where the share of urban employment in small businesses is at its maximum, occurs at an urban disposable income level between 8,476 and 9,765 CNY p.c. (about $1,238 -$1,425 p.c. using the average USD/CNY conversion rate for 2009). Cities to the left of this turning point had over the period on average secondary, tertiary and private shares of 19, 28 and 22 percent respectively, while the values for those to the right of this first turning point were 27, 32 and 34 percent.

Finally, as column (3) shows, α_1, α_2 and α_3 are statistically insignificant in the cubic estimation, so we find no support for the occurrence of a second turning point at higher levels of economic development. [9]

In order to rule out possible non-stationarity problems, we performed a panel Fisher-type unit root test, where ADF unit-root tests are performed on each panel. The test results (not shown, but available upon request) reject the null hypothesis that all panels contain unit roots at the significant level of 1 percent and suggest the alternative that at least one panel is stationary. Furthermore, to rule out the possibility of omitted variables, we included a lagged dependent variable to Column (4) in Table-1 using FE estimator and IV estimator. Then, to deal with the potential over-significant t-statistics, we use a cross-sectional time-series FGLS estimator on the

model specification of Column (4) in Table 1. This estimator allows estimation in the presence of AR(1) autocorrelation within panels and cross-sectional correlation and heteroskedasticity across panels. The results (not shown here) do not invalidate our previous findings. They all have the expected signs and the FGLS estimator also gives significant results. We still consider the results on Table 1 as our preferred estimates because including lagged dependent variables forces us to drop 16 percent of our sample, largely reducing the efficiency of the estimators.

5. Econometric specification for different stages of economic development

As the control variables included in equation (1) may have a different effect at different stages of economic development, we interact each control variable with urban household income per capita. The specification is:

$$se\_share_{it} = \delta_0 + \delta_1 \ln(inca)_{it} + \delta_2 (\ln(inca))^2_{it} + \delta_3 Z_{it} \ln(inca)_{it} + \delta_4 Z_{it} + c_i + y_t + \pi_{it} \quad (4)$$

where Z is the analyzed control variable. The point at which marginal effect of Z changes sign is $\frac{-\delta_4}{\delta_3}$.[10]

We estimate equation (4) also using a FE panel estimator, and calculate and plot the marginal effects for each variable of interest. The regression results can be found in Table A3 in Appendix 2. Figure 2 plots the marginal effect of the private share, the share of employment in the secondary sector and the share of employment in the tertiary sector.

As panel panels a) and c) show, the private share and the share of employment in the tertiary sector have a positive effect on the share of urban employment in small businesses for low and middle levels of urban household income per capita. This effect is statistically significant up to approximately 13,000 CNY p.c. for the private share and 10,600 CNY p.c. for the tertiary share. For higher levels of income, this effect becomes insignificant.

TABLE 1. Regression Results

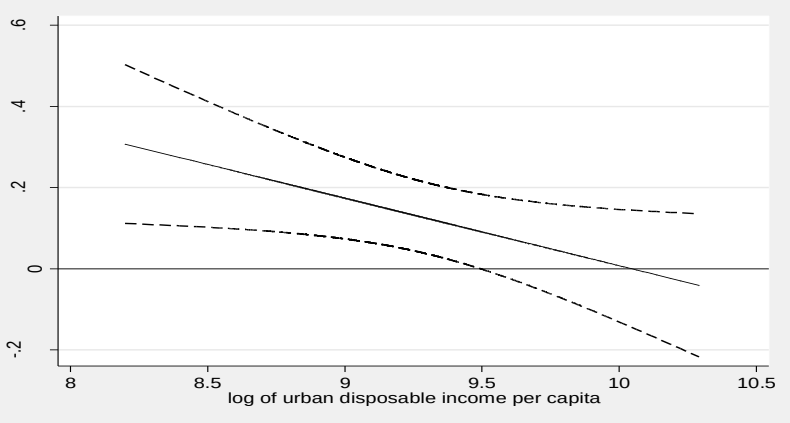
	Dependent variable: Share of urban employment in small businesses					
	OLS (1)	OLS (2)	FE (3)	FE (4)	FE (5)	FE (6)
Household Income	-2.261***	-2.046***	6.698	1.215***	1.364***	1.430***
	0.600	0.646	11.130	0.446	0.473	0.453
Household Income^2	0.116***	0.106***	-0.661	-0.067***	-0.075***	-0.079***
	0.032	0.035	1.194	0.025	0.026	0.025
Household Income^3			0.021			
			0.043			
Private share		0.048***			0.102**	0.101**
		0.017			0.048	0.043
Secondary share		-0.160***			-0.173	
		0.026			0.109	
Tertiary share		-0.068**			0.220***	0.245***
		0.029			0.075	0.078
Cultivated area		-0.120***			0.020	
		0.016			0.094	
Education		-1.191**			0.544*	
		0.468			0.330	
Population density		0.016***			-0.003	
		0.003			0.008	
Hausman test RE vs. FE p-value			0.000	0.007	0.000	0.000
Prefecture fixed-effects	No	No	Yes	Yes	Yes	Yes
Year fixed effects	No	No	Yes	Yes	Yes	Yes
Observations	2,016	1,944	1,843	1,843	1,568	1,745
R-squared	0.112	0.169	0.138	0.138	0.179	0.17

Note: Standard errors clustered (robust) by prefecture. A constant term is included but not reported. t values are reported below the point estimates; *** p<0.01, ** p<0.05, * p<0.1

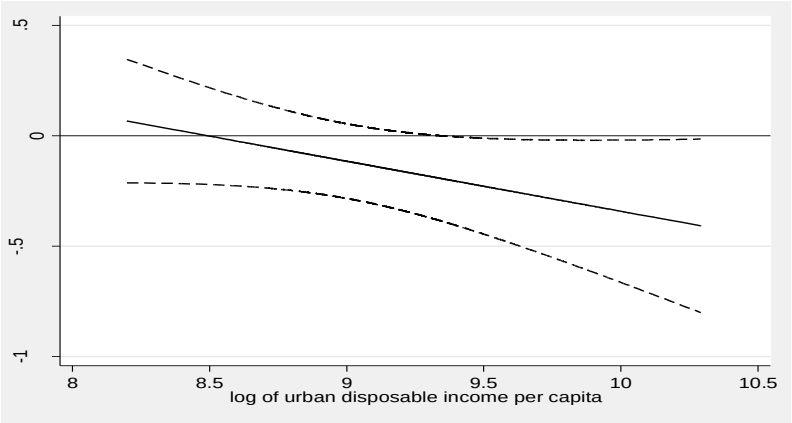
Regarding the private share, it is important to note that there are two means by which this share can increase: through an increase in private employment in larger businesses or through a decrease of employment in SOEs. As can be seen in Figure A4 in Appendix 2, for low and low-middle levels of urban disposable household income per capita, the decrease in employment in SOEs outpaces growth in private employment in larger businesses. For higher levels of disposable income per capita, the opposite is true. Thus, for low and middle levels of income, the positive sign of the private share's marginal effect is related to the increased availability of laid-off SOEs workers who are not absorbed by the private larger businesses. A crowding out effect where employment in small businesses is reduced because of a relative increase in employment in larger businesses happens only at the highest levels of income (23,535 CNY p.c.) but this effect is statistically insignificant.

FIGURE 2. Marginal Effect of the Different Determinants of Employment in Small Businesses For Different Levels of Household Income

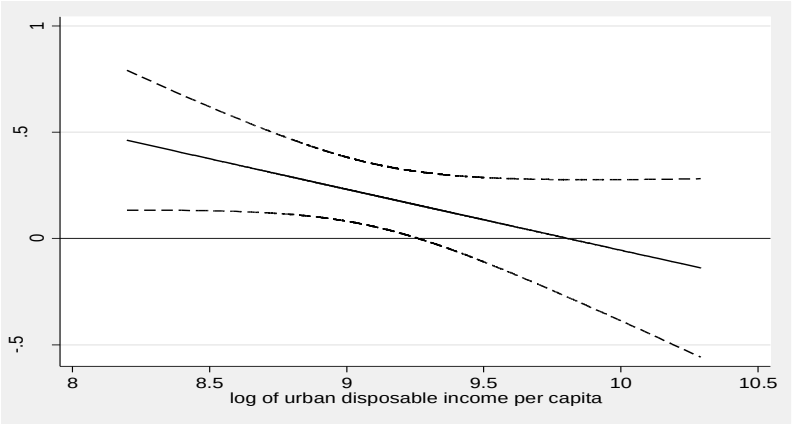
a) Marginal effect of private employment share



b) Marginal effect of employment in the secondary sector



c) Marginal effect of employment in the tertiary sector



According to the estimates in Table A3 in Appendix 2, the point at which the crowding-out effect of the secondary sectors starts operating (i.e., the point at which secondary employment share's marginal effect changes sign from positive to negative) occurs at 4,861 CNY p.c. However, as Panel b) in Figure 2 shows, the marginal (and negative) effect on the share of urban employment in small businesses is significant only for medium and high-levels of income (starting at around 10,938 CNY p.c.).

6. Discussion and conclusions

In this article, we have analyzed the nature of the relationship between employment in small businesses and the level of economic development based on a sample of over 280 Chinese prefecture-cities during the period 2004-2009. We find that this relationship can be represented by an inverted U-shape pattern. We estimate that the *first turning point*, or the point where the

share of urban employment in small businesses is at its maximum, occurs at an urban disposable income level between 8,476 and 9,765 CNY p.c. ($1,238-$1,425 p.c.). During the studied period, some cities in China have moved beyond this turning point and are experiencing a reduction in the share of urban employment in small businesses, while others are still experiencing increasing rates of this variable. Our results do not give support to the existence of a N-shape pattern in the proposed relationship for the case of China, where cities at the top of the income distribution would be experiencing again increasing shares of urban employment in small businesses. Furthermore, they suggest that previous findings of a U-shape do not longer hold once unobserved heterogeneity is eliminated.

In the light of the three stages of economic development, our results suggest that during the *factor-driven* stage when urban areas experience a takeoff in terms of income, there is a pool of urban workers not absorbed by larger businesses that find employment in small businesses as an alternative occupational choice. Matching the results, these workers most probably undertake activities in the service sector. The negative effect of the share of secondary employment is related to the *investment-driven* stage of economic development when, as the urban manufacturing sector expands, more people opt for wage employment in detriment of self-employment or employment in small businesses. Nevertheless, in reality the decrease of employment in small businesses in the midst of a more dynamic secondary sector may be overstated given that our estimations do not include employment in the informal economy.

On the other hand, the share of urban employment in small businesses may be still decreasing in the most developed cities in China (e.g. Beijing and Shanghai), as long as these cities continue to host a considerably large secondary sector and an underdeveloped modern service sector.[11] In this case, the technological progress model proposed by Gollin (2007) seems to better suit the case of China than alternative explanations related to extensive subcontracting or small business conglomerates.

Notes

[1] Under the *hu kou* system, each person was registered in a particular locality and the change of registration status was not possible because it granted people access to food rations, education and health services and social security (Ghose, 2005).

[2] See Appendix 1 for a definition of small businesses.

[3] As of 2007 there were nearly six thousand industrial parks and 58 national-level science parks.

[4] One clear example of heterogeneity within the province level is Guangdong. Out of 21 prefectures in this province, 12 are located in the low and low-middle income quartiles and 9 in the middle-high and high income quartiles. In terms of employment in small businesses, 19 have average shares above 20.5 percent (the only two exceptions are the cities of Guangzhou and Foshan).

[5] These variables have been winsorized to reduce the influence of extreme outliers.

[6] Given that our model is just identified, we report the results of the Cragg-Donald Wald test instead of the Hansen J.

[7] Alternatively, we used a two-step system-GMM estimator, where household income and household income square are treated as endogenous while the rest explanatory variables were treated as exogenous variables. For endogenous variables, two periods lags are used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation. The results are not significantly different from the ones presented below so they are not shown here, but they are available upon request.

[8] The same result is obtained when we proxy education by the share of tertiary school graduates per capita, or expenditure on education per capita.

[9] These results hold after including control variables.

[10] This point is given by the first order condition $(\delta(se\_share_{it}))/(\delta Z_{it})=\delta_3 \ln(inca)_{it}+ \delta_4 =0$

[11] Data from the City Statistical Yearbook reveals that the share of urban employment in modern services (i.e., banking and insurance, real state, ITC services, rent and business services and scientific research) was 4.23 percent in 2004 and 4.25 percent in 2007.

References

Acs, Z; Audretsch, D; Evans, D (1994) Why does self-employment rate vary across countries over time? Discussion Paper No. 871. *CEPR*. London.

Acs, Z; Naude, W (2011) Entrepreneurship, Stages of Development and Industrialization. Working paper N. 2011/80. *United Nations University:* Maastricht

Bartik, J (2005) Solving the Problems of Economic Development Incentives. *Growth and Change*. Vol. 36, N 2, pp 139-166.

Bosker, M., Brakman, S., Garretsen, H. and Schramm, M. (2012) Relaxing Hukou. Increased labor mobility and China's Economic geography. *Journal of Urban Economics*, 72: 252-266.

Cai, H; Todo, Y; Zhou, L. (2007) Do multinationals' R&D activities stimulate indigenous entrepreneurship? evidence from china's "Silicon valley". Working Paper, 13618. *National Bureau of Economic Research:* Cambridge, MA.

Carree, M; Van Stel, A; Thurik, R; Wennekers, S (2002) Economic Development and business ownership: An analysis using data of 23 OECD countries in the period 1976 – 1996. *Small Business Economics*. Vol. 19, N 3, pp 271-290.

Chan, K (2007) Misconceptions and Complexities in the Study of China's Cities: Definitions, Statistics, and Implications. *Eurasian Geography and Economics*. Vol. 48, N 4, pp 383-412.

Chan, K.; Buckingham, W (2008) Is China abolishing the Hukou System? *The China Quarterly.* Vol. 160, pp 818-855.

Chen, A; Coulson, E (2002) Determinants of Urban Migration: Evidence from Chinese Cities. *Urban Studies*. Vol. 39, N 12, pp 2189-2197.

Doi, N and Cowling, M (1998) The Evolution Of Firm Size and Employment Share Distribution in Japanese and UK Manufacturing: A Study of Small Business Presence. *Small Business Economics*, 10: 283-292

Eesley, C (2009) Entrepreneurship and China: history of policy reforms and institutional development. Working Paper. *Stanford University:* Stanford.

Ge, Y (2009) Globalization and Industry Agglomeration in China. *World Development*. Vol. 37, N 3, pp. 550 – 559.

Ghose, K (2005) Employment in China: recent trends and future challenges. Employment Strategy Papers. *International Labour Organization*: Geneva.

Glaeser, E (2007) Entrepreneurship and the city. Working paper 13551. *National Bureau of Economic Research:* Cambridge, MA

Glaeser, E; Rosenthal, S; Strange, W (2010) Urban Economics and Entrepreneurship. *Journal of Urban Economics*. Vol. 67, pp. 1- 14.

Gollin, D (2007) Nobody's business but my own: Self-employment and small enterprise in economic development. *Journal of Monetary Economics* 55, Vol. 2, pp. 219-233

Gregory, N; Tenev, S; Wagle, D (2000) China's emerging private enterprises: Prospects for the new century. World Bank: Washington DC.

Gries, T; Naude, W (2010) Entrepreneurship and structural economic transformation. Small Business Economics. Vol. 34, pp. 13-29.

Groom, B; Grosjean, P; Kontolean, A; Swanson, T; Zhang, S (2006) Relaxing constraints with compensation: evaluating off-farm labour responses to reforestation policy in China. Working Paper. *University of London:* London.

Haltiwanger, J; Jarmin, R; Miranda, J (2010) Who creates jobs? Small vs. Large vs. Young. Working Paper 16300. *National Bureau of Economic Research*: Cambridge, MA

Harris, J; Todaro, M (1970) Migration, unemployment and development: A two sector analysis. *The American Economic Review*. Vol. 60, N 1, pp. 126 – 142.

Huang, P (2009) China's neglected informal economy: reality and theory. *Modern China*. Vol. 35, pp. 405-440.

Huang, Y (2008) Capitalism with Chinese characteristics: Entrepreneurship and state during the reform era. Cambridge University Press: New York.

Lucas, R (1978) On the size distribution of business firms. *The Bell Journal of Economics.* Vol. 9, pp. 508-523.

Li, K; Zhao, C (2011) Determinants of Self-employment in China: Evidence from Cross-regional Data. *China and World Economy.* Vol. 19, N 3, pp. 49 -67.

Lieb, CM (2003) "Environmental Kuznets Curve: A Survey of the Empirical Evidence and of Possible Causes", *Discussion Paper Series* 391, University of Heidelberg

Mesnard, A; Ravallion, M (2001) Wealth Distribution and Self-Employment in a Developing Economy. Discussion Paper No. 3026. *Centre of Economic Policy Research – CEPR* -. 32

Moreno-Monroy, AI (2011) Market access and the heterogeneous effect of shocks on wages: evidence from Chinese cities. *Papers in Regional Science.* Vol 90, N 1, pp. 9-25

Mueller, P (2005) Entrepreneurship in the Region: Breeding Ground for Nascent Entrepreneurs?. *Small Business Economics*. Vol. 27, N 1, pp. 41-58.

Pietrobelli, C; Rabetolli, R; Aquilina, M (2004) An empirical study of the determinants of self-employment in developing countries. *Journal of International Development.* Vol. 16, N 6, pp. 803-820.

Porter, M; Sachs, J; McArthur, J (2002) Executive Summary: competitiveness and stages of economic development. *In Michael E. Porter, Jeffrey D. Sachs, Peter K. Cornelius and John W. McArthur, eds, The Global Competitiveness Report 2001-2002. Oxford University Press:* New York, pp. 16-25.

Poschke, M. (2014) The firm size distribution across countries and skill-biased change in entrepreneurial Technology. *IZA Discussion Paper* 7991, Bonn: Institute for the Study of Labor

Shafik, N; Bandyopadhyay, S (1992) "Economic Growth and Environmental Quality: Time Series and Cross-Country Evidence", *World Bank Policy Research Working Paper*, WPS 904, Washington DC: World Bank.

Song, S; Zhang, K (2002) Urbanization and City Size Distribution in China. *Urban Studies.* Vol. 39, N 12, pp. 2317-2327.

Tan, J (2007) Phase transition and emergence of entrepreneurship: The transformation of Chinese SOEs over time. *Journal of Business Venturing*. Vol. 22, pp. 77-96.

Wang, X; Huang, J; Zhang, L; Rozelle, S (2011) The rise of migration and the fall of self-employment in rural China's labor market. *China Economic Review.* Vol. 22, pp. 573-584.

Wehrfritz, G; Seno, A (2003) Chugging along; no one saw China as one of the big 'engines' that could drive the world out of a slump until now. *Newsweek (International Edition),* June 23rd, p42.

Wennekers, S; Van Stel, A; Thurik, R; Reynolds, P (2005) Nascent entrepreneurship and level of economic development. *Small Business Economics*. Vol. 24, pp. 293–309.

Wu, X (2002) Embracing the Market: Entry to Self-Employment in Transitional China, 1978 - 1996. Research Report No. 02-526. *Populations Study Center, University of Michigan:* Ann Arbor.

Zhang, Y. (2013) *Entrepreneurship development in China: A multilevel approach*. PhD dissertation, Eindhoven University of Technology.

Appendix 1 Data sources and measurement

We have gathered annual data on 280 cities at the prefecture and prefecture-city level for the period 2004-2009 from two available sources, the City Statistical Yearbook (CSY) and the Regional Statistical Yearbook (RSY). Unfortunately, there is no data available prior 2004 on private employment from these or other sources. Original data are collected from local and provincial statistical bureaus and reported by the National Bureau of Statistics. Even though both sources report values on some of the same variables, in some cases the numbers diverge. As we do not have information on the quality of each source, in order to test the quality of the two sources for comparable variables we aggregate the prefecture data to the province level and compare the resulting values with those statistics available at the National Statistical Yearbook (NSY). The RSY was chosen over the CSY as our source as it showed to be more consistent with aggregates from the NSY. This source also provides more relevant variables and is more comprehensive in terms of the number of prefectures included.

Within the administrative division of China, prefectures are at the second level after provinces. There are 333 divisions composed by 283 prefecture-cities, 17 prefectures, 30 autonomous prefectures and 3 leagues. Prefectures are subdivided into counties, autonomous counties and cities. In China, cities (*shì*) refer to the continuous core urbanized administrative area. Total urban area (市 区, *shìqū*) further includes city adjacent districts and sub-districts containing both residential and industrial suburbs. The main difference with the definition of the city as the metropolitan area is that the latter includes the commuting area to the city core. In this article we follow the definition of *shìqū* when we refer to the urban area of the city. This definition describes the city core with high-density built up area where the largest agglomeration of population within the prefecture is located (Chan, 2007).

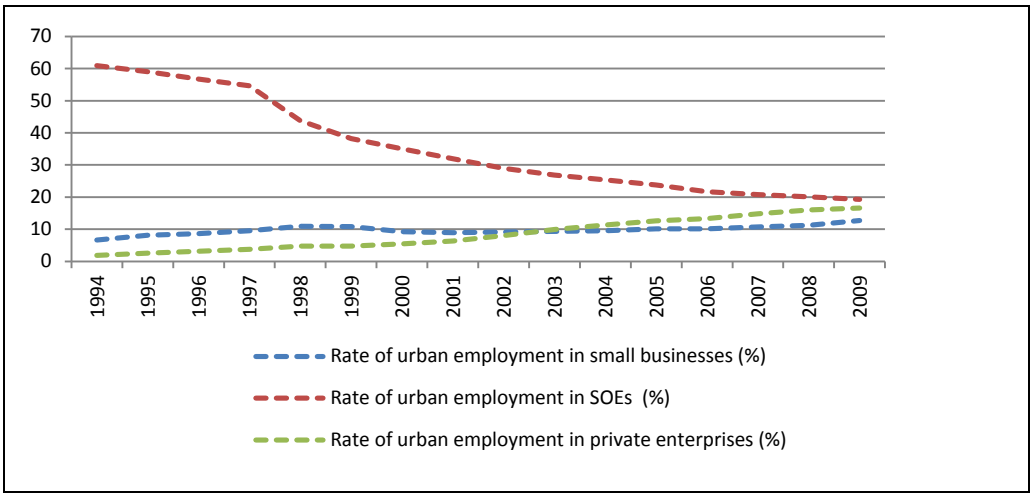
The national, provincial and prefecture-city statistics make a distinction between employment in private enterprises with less than eight workers (*getihu*) and employment in private enterprises with more than eight workers (*siying qiye*). Allegedly this cut-off of eight employees was attributed to Marxist theories on the maximum size a private business could have before it constituted exploitation of labor (Eesley, 2009). In any case, it served as a cut-off point for the important reforms approved in 1988 on The First Plenary of the Seventh People's Congress, which allowed the existence of private enterprises with more than eight employees. Given our interest in urban small businesses, we use data on urban employment in private businesses with less than eight workers. Although we cannot distinguish in the data the sectoral and quality composition of small businesses, our dependent variable in principle covers all economic activities, ranging from low-hierarchy services (such as retail trade) and artisanal manufacturing to high-hierarchy services (such as professional services).

Our variable of interest also includes one-person business or the self-employed. However, it does not include persons not officially registered as self-employed. The bulk of migrants (*nongmingong*) coming to the cities from rural areas do not have local registration and are missing from the official data (Huang, 2009). It is likely then that our data underestimates the real number of self-employed, possibly causing a bias in the estimations.

To construct our dependent variable, the share of urban employment in small business, we divide the number of urban employees in businesses with less than eight workers by the total number of urban employed persons. We use urban household disposable income per capita as our proxy for economic development. This and all other nominal variables introduced later on have been deflated using China's Provincial Annual CPI with 2000 as the base.

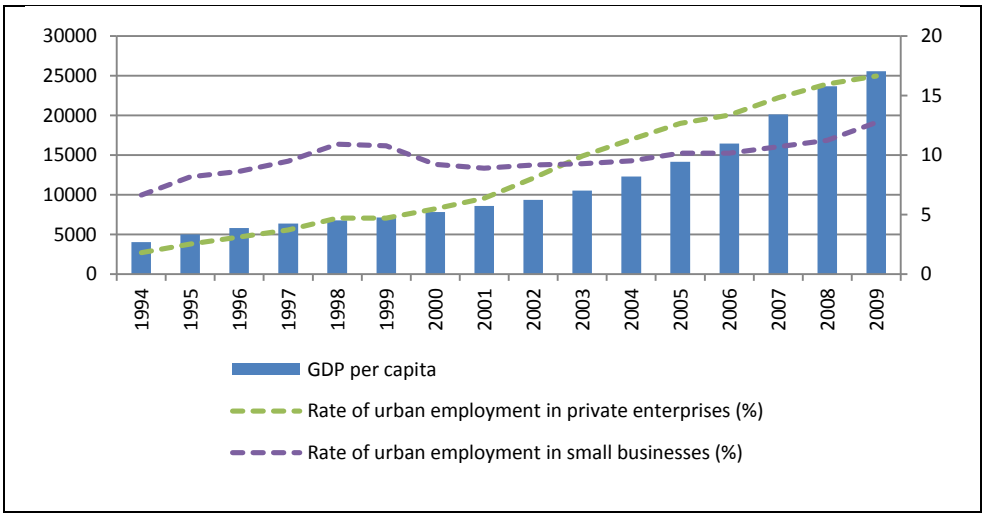
Appendix 2 Tables and Figures

FIGURE A1. Employment Share in SOES, Urban Private Larger Private and Small Private Businesses, 1994-2009



Source: China Statistical Yearbook. National Bureau of Statistics of China (1994-2010)

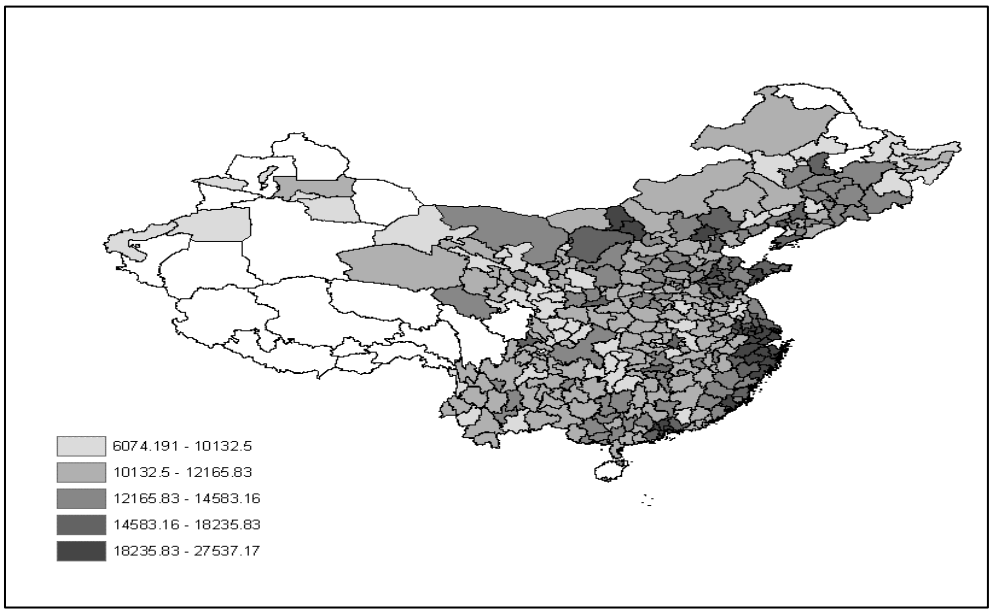
FIGURE A2. GDP per Capita and Rate of Urban Private Employment and Employment In Small Businesses, 1994-2009



Source: China Statistical Yearbook. National Bureau of Statistics of China (1994-2010)

FIGURE A3. Geographical distribution of variables of interest

a) Average household income per capita, 2004-2009



b) Average urban employment in small businesses, 2004-2009

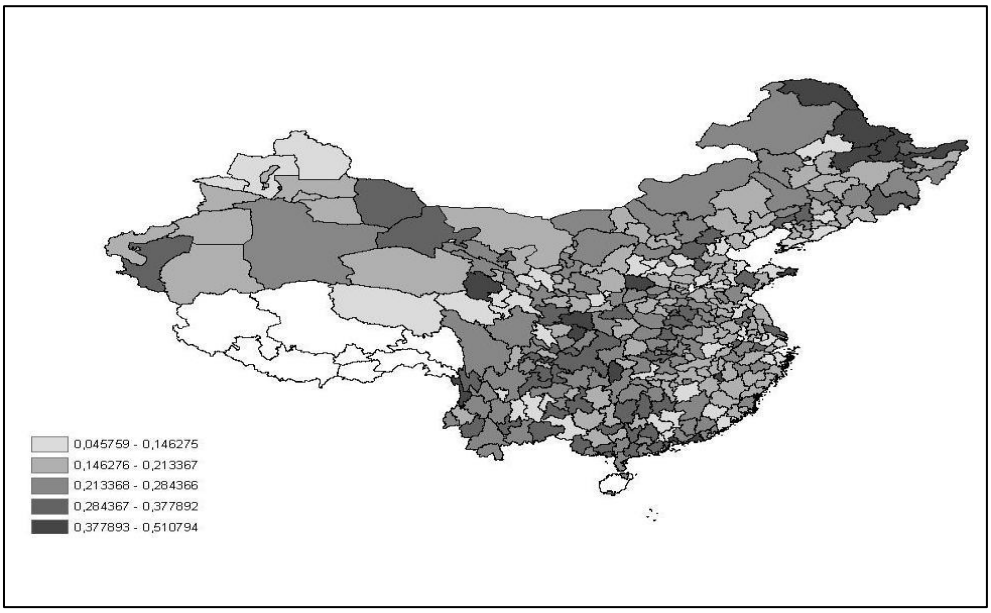


TABLE A1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Share urban employment in small businesses	1913	0.22	0.11	0.00	0.90
Real urban disposable income per capita	1929	10284	3319	3634	29467
Private share	1896	0.30	0.17	0.00	0.93
Share of employment in secondary sector	1873	0.24	0.11	0.00	0.46
Share of employment in tertiary sector	1873	0.31	0.08	0.06	0.49
Cultivated area	1769	0.22	0.16	0.00	0.61
Education	1981	0.02	0.01	0.00	0.07
Population density	1964	381.46	640.11	0.78	24880

TABLE A2. IV Regression Results

Dependent Variable: Share of urban employment in small businesses			
	(1)	(2)	(3)
Household Income	6.878***	6.281**	6.675***
	2.375	2.491	2.444
Household Income Square	-0.417***	-0.383***	-0.406***
	0.139	0.147	0.143
Private share		0.068	
		0.064	
Secondary share		-0.177	
		0.124	

Tertiary share		0.206**	0.277**
		0.100	0.110
Cultivated area		0.135	
		0.131	
Education		0.521	
		0.451	
Population density		-0.021	
		0.016	
Observations	1,818	1,551	1,747
Kleibergen-Paap LM statistic P-value	0.000	0.001	0.018
Cragg-Donald Wald F-value	13.74	8.24	11.98
First stage F-value (Household Income)	23.20	12.12	22.23
First stage F-value (Household Income Square)	19.23	9.75	18.25

Note: Clustered (robust) standard errors by prefecture. t values are reported below the point estimates; *** p<0.01, ** p<0.05, * p<0.1

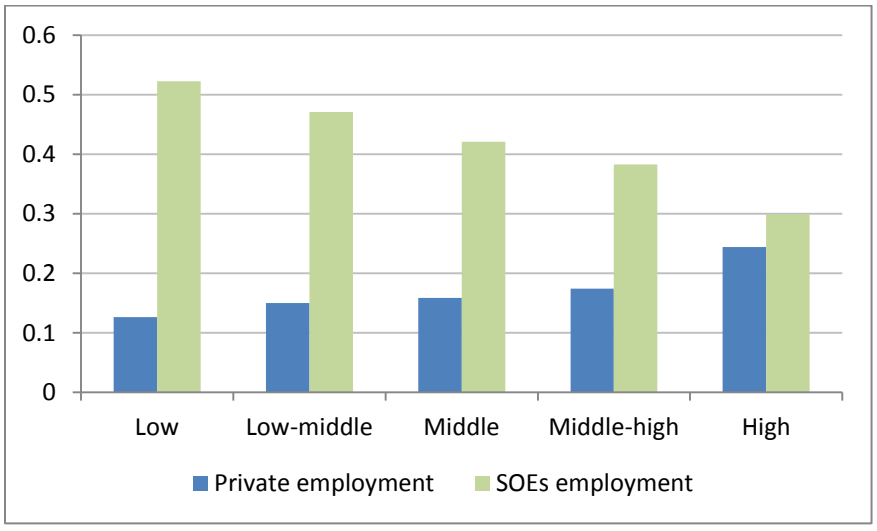
TABLE A3. Interaction Models Regression Results

Dependent variable: Share of urban employment in small businesses			
	(1)	(2)	(3)
Household Income	0.437	0.607	0.851
	0.615	0.559	0.534
Household Income Square	-0.022	-0.031	-0.042
	0.035	0.032	0.031
Private share	1.671**		
	0.747		
Private Share*Household Income	-0.166**		
	0.080		
Secondary employment		1.927	

		1.270	
Secondary employment*Household Income		-0.227	
		0.141	
Tertiary employment			2.815*
			1.527
Tertiary employment*Household income			-0.287*
			0.168
Constant	-2.008	-2.727	-4.105*
	2.741	2.454	2.327
Prefecture Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Observations	1,817	1,771	1,771
R-squared	0.161	0.152	0.161

Note: Clustered (robust) standard errors by prefecture. t values are reported below the point estimates; *** p<0.01, ** p<0.05, * p<0.1

FIGURE A4. Urban Employment in Private Enterprises and SOEs for Different Levels of Disposable Household Income per Capita



Source: China Regional Statistical Yearbook. National Bureau of Statistics of China (2004-2009)