Entrepreneurship or Necessity? Credit Constraint and Self-Employment in China

Lulu Liu[*]

Department of Economics, University of Pittsburgh

March 31, 2017
Preliminary, please do not cite

Abstract

Credit constraint and the lack of access to formal sources of external finance are often considered as a major deterrent to business formations around the world. In this paper, I analyze a major policy change in China—the 2007 Property Rights Law that improved the access to credit—and examine its impact on the formations of different types of self-employment—opportunity entrepreneurship and necessity entrepreneurship. Opportunity entrepreneurs are owner-managers who exploit business opportunities, hire workers, and promote overall economic activity. Necessity entrepreneurs are individuals who turn to self-employment as a last resort. I construct a structural model that incorporates both liquidity constraint and employee hiring choices, and use it to make predictions on the corresponding self-employment rates after a relaxation of the credit constraint. I test the predictions empirically, finding that the 2007 Property Rights Law promotes entrepreneurship as measured by the number of owner-mangers in the economy, but has little impact on necessity entrepreneurs.

JEL Classification: O12; O17; J21

Keywords: Self-employment; Entrepreneurship; Credit Constraint; Development

[*]Email: lulu.liu@pitt.edu; Address: 4519 Posvar Hall, 230 South Bouquet Street, Pittsburgh, PA, 15260

1   Introduction

According to traditional economic models, entrepreneurship spurs innovation, creates jobs, and promotes overall economic activity (Schumpeter, 1934). More recently, however, economists have come to suggest that traditional thinking about entrepreneurial activity is overly optimistic, particularly in developing countries, where often people turn to self-employment when other employment opportunities are scarce or non-existent (Acs, 2006). Self-employment rate, the most common measures of entrepreneurship, fails to distinguish different types of entrepreneurs. A self-employed worker can be an *opportunity entrepreneur*, who fits the traditional economic model, exploits new opportunities and improves product; or he/she can be a *necessity entrepreneur* or *entrepreneur by default*, who uses self-employment as a last resort when regular jobs become scarce or pay poorly. The importance of this distinction lies in its welfare implication. While a rising population of opportunity entrepreneurs may accelerate economic growth, higher rate of necessity entrepreneurs can simply indicate that the economy is creating too few conventional wage-earning jobs. Thus, it is essential to discuss the effect of some commonly used policy tools on different types of entrepreneurs, such as improving the access to credit and financial market.

Credit constraint is often considered a major deterrent to the formation of self-employment (Taylor, 2001). This paper analyzes different types of self-employment in urban China, and examines how a major policy change, China's 2007 Property Rights Law that improved the access to credit, affects the formation of different types of businesses. Utilize China Health and Nutrition Survey and Chinese Private Enterprises Survey data, and difference-in-difference models, I investigate whether the improvement of credit constraint is internalized by these two types of self-employed workers in their labor market decisions.

China provides an excellent laboratory for this analysis because of the presence of large heterogeneity among self-employed workers, the recent rise of the private sector, and the exogenous change in policy that relax the credit constraint. Official statistics show the number of self-employed workers in urban China increased from 0.15 million in 1978, the beginning of the economic transition, to 61.42 million in 2013. Some of the newly self-employed are true entrepreneurs seeking opportunities in the transition economy, but others are forced into self-employment out of necessity. There are also striking regional variations in the level of economics development and self-employment rate. These variations, both over time and across regions, enable me to estimate the impact of policy interventions statistically.

In this paper, I first establish a model of employment decision that incorporates credit con-

straint and employee hiring choices. At equilibrium, individuals who choose self-employment are separated into two distinctive types: the ones with highest ability and the ones with the lowest. These two types of self-employed workers correspond to the notion of opportunity entrepreneurs and necessity entrepreneurs. My model also predicts that high ability entrepreneurs hire labor while low ability entrepreneurs do not.[1] Thus, empirically, I separate urban self-employed workers into two types – *self-employed own-account workers* and *self-employed owner-managers with paid employee(s)*. This separation criteria is also used in Earle and Sakova (2000), showing that in six transition economies, owner-managers with employees tend to be true entrepreneurs, but at least some own-account workers are somehow constrained and are involuntarily self-employed.

I then examine the impact of credit constraints on the formation of different types of private businesses by looking at the differences before and after the passage of the 2007 Property Rights Law. For small businesses in China, the type of assets which can be used as collateral is heavily restricted. This constraint was relaxed in 2007, when China's Property Rights Law was enacted. The law expands the scope of collateral that can be used by borrowers to secure loans. To obtain the causal effect of this relaxation of credit constraints, I employ a difference-in-differences strategy, comparing the differences in self-employment rate before and after 2007, and for provinces with different marketization levels. I use the Index of Marketization by Fan et al. (2003) as the measure of the marketization level. I found that the relaxation of credit constraint significantly increases the formation of opportunity entrepreneurs, but has little impact on necessity entrepreneurs.

My study has two distinctive contributions. First, it contributes to the credit constraint literature that examines the individual-level decision to enter into entrepreneurship. Carpenter and Petersen (2002) and Banerjee and Duflo (2014), among the others, found evidence of severe credit constraint for private businesses. I took advantage of a nationwide policy change to provide more empirical evidence on whether the improvement of credit constraint through collateral is internalized by self-employed workers.

Second, I address the heterogeneity among self-employed workers. More specifically, I separate them into necessity entrepreneurs and opportunity entrepreneurs, and formalize it in a theoretical model. I then examine the heterogeneous effect of credit constraint on them. Necessity entrepreneurs prevail in less developed countries, where self-employment rate is higher than developed countries (Parker, 2004). La Porta and Shleifer (2008) presented evidence

---

[1]Models by Kihlstrom and Laffont (1979) and Van Praag and Cramer (2001), among the others, also link entrepreneurship to labor demand, predicting a positive relationship between entrepreneurial ability and the number of employees they hire.

that many of the self-employed in developing countries run low-productivity, commonplace businesses. Mohapatra et al. (2007) evaluated the role of self-employment in China's rural economy, finding that self-employers with low level of capital invested tend to be necessity entrepreneurs. Tokman (1992) also showed that in Latin America, self-employment is primarily a refuge for people that are excluded from formal labor markets. In my paper, I found that credit constraint is a major deterrent for opportunity entrepreneurs, but not so much for necessity entrepreneurs.

The rest of this paper is organized as follows: Section 2 introduces the institutional background and the passage of the 2007 Property Rights. Section 3 constructs a model and present propositions on the impact of credit constraint. Section 4 discusses data source and presents the basic patterns in the study population. Section 4 also analyzes the characteristics of the two types of self-employment. Section 5 presents the empirical strategies and 6 the corresponding results. Section 7 discusses the results and concludes.

2   Institutional Background

Credit constraint and the lack of access to formal sources of external finance are often considered as a major deterrent to business formation around the world (Beck and Demirguc-Kunt, 2006). In China, one peculiar problem for small businesses is that the type of assets which can be used as collaterals is heavily restricted. According to Han (2007), while 70% of small business financing was secured by movable property in the U.S., the figure for China was less than 15%. World Bank (2007) estimated that small and medium sized enterprises and farmers in China have approximately $2 trillion in "dead capital" – assets that can not be used to generate loans to fund investment and growth.

Rules regarding collateral requirements in China are established in 1995 through the Collateral Law. Twenty years later, following legislative debates that had lasted for over a decade, China passed its first Property Rights Law. This Property Rights law was passed on March 16, 2007 and went into effect in October 1, 2007.[2] The 2007 Property Law emphasizes, for the first time, the equal protection of state, collective and individual property. Moreover,

---

[2]On December 29, 2006, the 25th session of the 10th standing committee of the National People's Congress accepted a draft of the Property Rights Law of the People's Republic of China. Once the Standing Committee approved the draft of the law, its formal passage was almost a done deal. Berkowitz et al. (2015) showed that the pass of this law came as a surprise, because at the time it was uncertain whether the law would go forward to the full session of the National People's Congress.

it reforms the collateral requirements, and relaxes the credit constraint for entrepreneurs in three major ways.

First, the law expands the scope of collaterals that can be used by borrowers to secure loans (Marechal et al., 2009; Berkowitz et al., 2015; Du, 2010). It enables borrowers to use a broader level of movable collateral, such as present and future-acquired equipment inventory, accounts receivable and a combination of assets (Clause 181). For example, in the 1995 Collateral Law, only properties proved by law or regulation can be used as collaterals; correspondingly, the 2007 Property Rights Law states in Clause 180 that "properties other than those that shall not be mortgaged according to any law or administrative regulation" can be used as collateral. Second, the law improves the process and simplifies the formalities required to obtain a loan. Third, the law reduces the liquidation cost for banks which incentivizes them to lend (Liu, 2008). For example, previously, when the obligor fails to pay his/her due debts and the mortgagee and the mortgagor fail to conclude an agreement on the means of realizing the right to mortgage, the mortgagee need to go through lengthy law suits. However, Clause 195 of the Property Law states that in these scenarios, the mortgagee may request the people's court to auction or sell off the property under mortgage. This improvement is recognized by the World Bank: China moved up 20 places (out of 181 economies) on the "Getting Credit – Legal Rights" ranking in its *Doing Business* Index in 2008.

3 Theoretical Framework

I develop a static partial equilibrium model of employment choice that incorporates both liquidity constraint and employee hiring choices. I then visualize the equilibrium of this model by simulating it in Figure 1. The model shows that individuals who choose self-employment are separated into two distinctive types: the ones with highest ability (opportunity entrepreneurs) and the ones with the lowest (necessity entrepreneurs). The simulation shows that the relaxation of credit constraint promote entrepreneurship, however, this effect is significant for the opportunity entrepreneurs but trivial on necessity entrepreneurs.

In this model, individuals choose whether to be self-employed or work for a wage. Suppose individuals differ in ability θ and wealth z, and they know their own ability before committing to their occupational choices. Both θ and z are normalized to range between 0 and 1. I assume that wage w and capital rent (i.e. one plus interest rate) r are exogenous.

Optimization for Self-employers

Self-employers choose the amount of capital invested in the business and the number of employees to maximize their profit, given the level of r and w. I assume the production function is in the form of $g(\theta)f(k,n) = e^{\theta}k^{\alpha}(n+\epsilon)^{\beta}$. Individual's ability θ affects productivity exponentially because of the "superstar" theory – high ability entrepreneurs earn exponentially more than low ability entrepreneurs. k is the amount of capital used and n is the number of "skill unit" hired. Entrepreneurs themselves count as ϵ unit of labor, so the total amount of labor is $n + \epsilon$. Following Buera et al. (2013), α and β are the elasticities of output with respect to capital and labor and $\alpha + \theta < 1$, implying diminishing returns to scale in variable factors at establishment level.

The self-employed workers face capital constraint similar as Evans and Jovanovic (1989). Each person can borrow up to an amount that is proportional to his/her wealth: $(\lambda-1)z$, so the most a person can invest in the business is $z + (\lambda-1)z = \lambda z$. The 2007 Property Rights law broadened the extent of collateral and improved the access to credit, thus increased λ.

To summarize, the optimization problem for self-employed workers is as follow:

$$\max_{k,n} \ e^{\theta}k^{\alpha}(n+\epsilon)^{\beta} + r(z-k) - wn \tag{1}$$

$$s.t. \ 0 \le k \le \lambda z, n \ge 0 \tag{2}$$

Note that $k = 0$ will never be the optimal choice for the entrepreneurs, so the constraint $k \ge 0$ will never bind. I can then derive the solution (k^*, n^*) to this maximizing problem in four cases:

1. None of the constraints are binding, i.e. $k^* < \lambda z, n^* > 0$:

$$\begin{cases} k^* = (\frac{\alpha^{1-\beta}\beta^{\beta}}{r^{1-\beta}w^{\beta}}e^{\theta})^{\frac{1}{1-\alpha-\beta}} \\ n^* = (\frac{\beta^{1-\alpha}\alpha^{\alpha}}{w^{1-\alpha}r^{\alpha}}e^{\theta})^{\frac{1}{1-\alpha-\beta}} - \epsilon \end{cases} \tag{3}$$

Solving the non-binding condition $k^* < \lambda z$ and $n^* > 0$ gives us the following inequalities:

$$k^* < \lambda z \Leftrightarrow \theta < (1-\alpha-\beta)ln(\lambda z) - ln(\frac{\alpha^{1-\beta}\beta^{\beta}}{r^{1-\beta}w^{\beta}}) \tag{4}$$

$$n^* > 0 \Leftrightarrow \theta > (1-\alpha-\beta)ln(\epsilon) - ln(\frac{\beta^{1-\alpha}\alpha^{\alpha}}{w^{1-\alpha}r^{\alpha}}) \tag{5}$$

The intuition behind these two inequalities is that entrepreneurs will only hire employees when their own ability θ is larger than a threshold value, and they will be unconstrained in capital if their ability is relatively small compared to their wealth.

2. The constraint on labor binds but the constraint on capital does not:

$$\begin{cases} k^* = (\frac{\alpha\epsilon^\beta}{r}e^\theta)^{\frac{1}{1-\alpha}} \\ n^* = 0 \end{cases} \tag{6}$$

3. The constraint on capital binds but the constraint on labor does not:

$$\begin{cases} k^* = \lambda z \\ n^* = (\frac{(\lambda z)^\alpha\beta}{w}e^\theta)^{\frac{1}{1-\beta}} - \epsilon \end{cases} \tag{7}$$

4. Both constraints are binding:

$$\begin{cases} k^* = \lambda z \\ n^* = 0 \end{cases} \tag{8}$$

Plugging (k^*, n^*) into the income structure equation, we can obtain the optimized income for self-employed workers Y_{SE}^*:

$$Y_{SE}^* = \begin{cases} (1-\alpha-\beta)(\frac{\alpha^\alpha\beta^\beta}{r^\alpha w^\beta}e^\theta)^{\frac{1}{1-\alpha-\beta}} + w\epsilon + rz & \text{if } \theta \text{ satisfies equations 4 and 5} \\ (1-\alpha)(\frac{\alpha}{r})^{\frac{\alpha}{1-\alpha}}(\epsilon^\beta e^\theta)^{\frac{1}{1-\alpha}} + rz & \text{if } \theta \text{ satisfies equations 4 but not 5} \\ (1-\beta)(\frac{\beta}{w})^{\frac{\beta}{1-\beta}}((\lambda z)^\alpha e^\theta)^{\frac{1}{1-\beta}} + r(1-\lambda)z + w\epsilon & \text{if } \theta \text{ satisfies equations 5 but not 4} \\ (\lambda z)^\alpha\epsilon^\beta e^\theta + r(1-\lambda)z & \text{if otherwise} \end{cases} \tag{9}$$

Income for Wage-earners

For wage-earners, they get paid w based on their skill as workers, and can get capital return on their endowment z. I assume that individuals' skill as wage workers is the same as their ability θ. There is a probability P that they can not find a job. I assume that this probability is a power function of their ability θ. This setting allows me to incorporate the existence of "necessity entrepreneurs". Some individuals will gladly work for wages but could not find jobs

with payment matching their expectation, so they turn to self-employment out of necessity. The income structure for wage earners Y_W is as below:

$$Y_W = P(\theta)\theta w + rz = \theta^{\tau+1}w + rz \tag{10}$$

Optimal Occupational Choices

Knowing their entrepreneurial income, individuals select into self-employment by comparing their optimal income as self-employed workers Y_{SE}^* and as wage-earners Y_W. An individual will only choose to start a business if and only if his/her expected income from doing so exceeds that from wage work:

$$e^\theta(k^*)^\alpha(n^* + \epsilon)^\beta + r(z - k^*) - wn^* \geq \theta^{\tau+1}w + rz \tag{11}$$

I analyze inequality 11 in four scenarios based on whether the capital constraint and hiring constraint are binding. The occupational choices for individuals with ability θ and wealth z are as below:

1. For individuals who do not subject to capital constraints and have high ability above the threshold to hire employee(s), they choose self-employment if and only if the following equations are satisfied:

$$\begin{cases} (1 - \alpha - \beta)(\frac{\alpha^\alpha\beta^\beta}{r^\alpha w^\beta}e^\theta)^{\frac{1}{1-\alpha-\beta}} + w\epsilon \geq \theta^{\tau+1}w \\ \theta \geq (1 - \alpha - \beta)ln(\epsilon) - ln(\frac{\beta^{1-\alpha}\alpha^\alpha}{w^{1-\alpha}r^\alpha}) \\ \theta \leq (1 - \alpha - \beta)ln(\lambda z) - ln(\frac{\alpha^{1-\beta}\beta^\beta}{r^{1-\beta}w^\beta}) \end{cases} \tag{12}$$

2. For those who are unconstrained in capital but have low ability below the threshold to hire employee(s), they choose self-employment if and only if the following equations are satisfied:

$$\begin{cases} (1 - \alpha)(\frac{\alpha}{r})^{\frac{\alpha}{1-\alpha}}(\epsilon^\beta e^\theta)^{\frac{1}{1-\alpha}} \geq \theta^{\tau+1}w \\ \theta < (1 - \alpha - \beta)ln(\epsilon) - ln(\frac{\beta^{1-\alpha}\alpha^\alpha}{w^{1-\alpha}r^\alpha}) \\ \theta \leq (1 - \alpha - \beta)ln(\lambda z) - ln(\frac{\alpha^{1-\beta}\beta^\beta}{r^{1-\beta}w^\beta}) \end{cases} \tag{13}$$

3. For those who are constrained in capital but have high ability above the threshold to hire employee(s), they choose self-employment if and only if the following equations

8

are satisfied:

$$
\begin{cases}
(1-\beta)(\frac{\beta}{w})^{\frac{\beta}{1-\beta}}((\lambda z)^\alpha e^\theta)^{\frac{1}{1-\beta}} - r\lambda z + w\epsilon \geq \theta^{\tau+1}w \\
\theta \geq (1-\alpha-\beta)ln(\epsilon) - ln(\frac{\beta^{1-\alpha}\alpha^\alpha}{w^{1-\alpha}r^\alpha}) \\
\theta > (1-\alpha-\beta)ln(\lambda z) - ln(\frac{\alpha^{1-\beta}\beta^\beta}{r^{1-\beta}w^\beta})
\end{cases}
\tag{14}
$$

4. For those who are constrained in capital and have low ability below the threshold to hire employee(s), they choose self-employment if and only if the following equations are satisfied:

$$
\begin{cases}
(\lambda z)^\alpha \epsilon^\beta e^\theta - r\lambda z \geq \theta^{\tau+1}w \\
\theta < (1-\alpha-\beta)ln(\epsilon) - ln(\frac{\beta^{1-\alpha}\alpha^\alpha}{w^{1-\alpha}r^\alpha}) \\
\theta > (1-\alpha-\beta)ln(\lambda z) - ln(\frac{\alpha^{1-\beta}\beta^\beta}{r^{1-\beta}w^\beta})
\end{cases}
\tag{15}
$$

I simulate all four scenarios in a (θ, z) space, and plot them in Figure 1, which shows the nature of selection.[3] Two yellow parts represent individuals who chose self-employment and subject to no capital constraint. Two blue parts are self-employed workers who are capital constrained. The remaining white parts are wage workers.

When there is no capital constraint, i.e. $\lambda = \infty$, there are only unconstrained individuals. The solution simplified to $\theta \in (-\infty, \bar{\theta}_1] \cup [\bar{\theta}_2, \infty)$, where $\bar{\theta}_1$ and $\bar{\theta}_2$ are the value of the two solid red vertical lines in Figure 1. Thus, anyone with ability above $\bar{\theta}_2$ or below $\bar{\theta}_1$ will choose self-employment, while others will chose to work for wage.

Although both high ability people and low ability people are potential self-employed workers, they are different. The would-be self-employed individuals on the upper end (right side) of the ability distribution hire employees, while the ones on the lower end (left side) of the ability distribution do not hire employees. The results from this model is consistent with models by Kihlstrom and Laffont (1979) and Van Praag and Cramer (2001), among the others, which link entrepreneurship to labor demand, predicting a positive relationship between entrepreneurial ability and the number of employees they hire. The self-employed workers with low ability choose self-employment because they have low probability of getting a wage job, resulting in low expected wage earning. The self-employed workers with high ability choose self-employment because they have high potential entrepreneurial earning. Correspondingly, they are "necessity entrepreneurs" and "opportunity entrepreneurs". This

---

[3]I assigned values to the parameters following Buera et al. (2013): $\alpha = 0.2$, $\beta = 0.59$, $r = 1.07$, $w = 1$, $\tau = 0.3$, $\lambda = 2$

separates my work from other labor market choice models.

Now consider a relaxing in credit constraint that λ increased by $\Delta\lambda$. The blue lines in Figure 2 shows the new occupational choices after this change. Some self-employers' constraint become not binding; some wage workers choose to switch to self-employment because they can borrow more and invest more which increase their potential entrepreneurial income. The green shades mark the new self-employed workers after the relaxing of credit constraint: the shade on the right corresponding to "opportunity entrepreneurs" is substantial, while the shade on the left corresponding to "necessity entrepreneurs" is minimal. This is because necessity entrepreneurs usually have very low ability so the amount of optimal capital they required is limited.

Based on Figure 2, I have the following three propositions on the changes in self-employment after credit constraint changes from λ to $\lambda + \Delta\lambda$:

Proposition 1. *For the same $\Delta\lambda$, the lower the initial λ, the higher the increase in the self-employment rate.*

Proposition 2. *For the same λ, the higher the $\Delta\lambda$, the higher the increase in the self-employment rate.*

Proposition 3. *When λ is increased, the increase in the rate of owner-manager is much larger than the increase in the rate of own-account workers.*

I test these three propositions by taking advantage of the passage of the 2007 Property Rights in China, which broadened the extent of collateral which relaxes the credit constraint, corresponding to an increase in λ in my model. I predict that a relaxing in credit constraint will increase self-employment propensity, but it will affect opportunity entrepreneurs more than necessity entrepreneurs.

4 Data

4.1 Data Source

I utilize several different datasets: the China Health and Nutrition Survey (CHNS), the Chinese Private Enterprises Survey (CPES), the National Economic Research Institute Marketization Index (NERI Index), and data from the China Statistics Bureau.

I use five waves of the CHNS data: 2000, 2004, 2006, 2009, and 2011. CHNS is a nationally representative dataset that covers both urban and rural areas, collected by the Carolina Population Center at the University of North Carolina at Chapel Hill and the National Institute of Nutrition and Food Safety at the Chinese Center for Disease Control and Prevention (Zhang et al., 2014). I exclude data from rural sites since our area of focus is the urban labor market. Before 2011, this survey was conducted in nine provinces including Liaoning, Heilongjiang, Jiangsu, Shandong, Henan, Hubei, Hunan, Guangxi, and Guizhou. In the 2011 wave, Beijing, Shanghai, and Chongqing were added. I exclude these late additions from our analysis. CHNS is a panel dataset and the same individuals were interviewed in each wave. The annual attrition rate is around 30% and new individuals were added to maintain the representativeness of the sample (See Appendix A for a detailed discussion on attrition and data representativeness).

Chinese Private Enterprises Survey (CPES) is a firm level dataset, conducted every two year from 2000 to 2012 by the Privately Owned Enterprises Research Project Team. All the subjects are owner-managers, and the dataset contains detailed information both on the firm and on the personal background of the owner-manager.

The National Economic Research Institute Marketization Index is an extensively used database containing the institutional index developed by the Nevin Economic Research Institute to reflect the regional institutional environment (Fan et al., 2003, 2011). The index is constructed annually for each province based on five aspects: relationship between government and market, development of non-state sector, development of commodity market, development of factor market, and development of market intermediaries and legal environment. The index value ranges between 0 and 28, higher representing more market-oriented.

4.2   Two Different Types of Self-Employment

My model shows that one main distinction between the two types of self-employment is the number of employees they hire. Thus, I differentiate urban self-employed workers into two types based on whether they have paid employees: *self-employed own-account workers* and *self-employed owner-managers*. The former work on their own, while the latter have at least one paid employees. Figure 3 presents the time trend of the self-employment rate in China between 1989 and 2011 using all waves of CHNS data. Here, the self-employment rate is defined as the proportion of these two types of self-employed individuals among all study subjects in each wave. The percentage of self-employed owner-managers increased over time,

while the percentage of self-employed own-account workers reached a peak around 1997 then started to decline after 2000.

I use education level as a crude indicator for individual's ability, and plot the time trend of average years of schooling for owner-manager and own-account workers in Figure 4, along with their 95% confidence interval. Consistent with my model, there is a persistent 3-year gap in years of schooling among them, with own-account workers being less educated. More analysis in Appendix B also shows that own-account workers are often not from well-educated families and with low income. Own-account workers earned lower salary when they were wage workers compared to the remaining wage earners. After their transition into self-employment, their income decreased even further. For owner-mangers who were salary workers in the past, there is no difference in their wage compared to the remaining wage earners. After the transition, their income increased significantly. All evidence I found are consistent with my theory and my model, suggesting that self-employed own-account workers are "necessity entrepreneurs", while self-employed owner-manger's entrepreneurship is an unconstrained choice.

Empirically, it is also natural to use the number of employees as the separation criteria for different types of self-employment in China, since it is an important feature in the separation of different enterprise categories: *Getihu* are private businesses that are registered with no more than seven people hired as employees; *Siyingqiye* are those with more than seven employees. Besides the difference in the maximum number of employees, Getihu also receives more lenient policy regarding the assets they could use for running the firms (Zhang and Van Stel, 2016).

This separation criterion is also used by Earle and Sakova (2000) in their analysis on six former Soviet countries. They found that the own-account workers tend to be necessity entrepreneurs which characterized by negative traits, like low education, low household income and low family income. I can not deny that there might be some true entrepreneurs with no employees, but my analysis provided in this paper shows that, this crude separation already sheds light on the distinctive characteristics of different kinds of self-employment.[4]

---

[4]This is not the only separation criterion used in the literature. Levine and Rubinstein (2015) disaggregate the self-employed in the U.S. into incorporated and unincorporated. Their results suggest that the incorporated ones are true entrepreneurs with distinctive cognitive and noncognitive traits, and they earn much more per hour than their salaried and unincorporated counterparts. However, their criterion does not suit developing countries. In the U.S., the self-employment rate is about 11%, a third of which are incorporated. In the developing countries, the vast majority of self-employment are one man firms and the number of incorporated ones are very small. What's more, the legal system in most developing countries are less complete, making it difficult to interpret the implication of being incorporated and unincorporated.

4.3 Covariates

Guided by the literature on the empirical studies of entrepreneurship (Le (1999) etc.), I control for various individual characteristics and provincial characteristics. Individual characteristics include gender, age (and age squared), education (measured by years of schooling), marriage status (1 indicating married and 0 otherwise), individual annual income, and whether the spouse works. I also test alternative indicators, such as using the level of completed education instead of using years of schooling, and the results are similar. Provincial characteristics include regional gross domestic production (1000 USD), province population, number of industrial enterprises above designated size, disposable income of urban residents, total value of import and export from the region (1000 USD), and value added of the manufacturing industry.

Summary statistics for different samples in CHNS are shown in Table 1. Consistent with Figure 4 and Appendix B, own-account workers are the least educated and earn the least amount of money.

5 Empirical Strategy

5.1 Impact on Self-employment Propensity

I intend to show the causal effect of credit constraint on self-employment propensity after the passage of the 2007 Property Rights Law. Since different provinces can vary in their original status of the financial market and the execution of the law, the degree of relaxation in credit constraint due to the passage of the law can be different. Thus, I utilize a difference-in-differences strategy by taking advantage of the provincial variations, measured by the NERI Marketization Index.

I focus on three different dimensions of the NERI index that are directly related to the collateral channel: credit market marketization level, financial marketization level, and the protection of producers. Credit marketization level represents the share of loans to non-state-owned businesses. Financial marketization level is a weighted average of the credit

---

Mohapatra et al. (2007) evaluate the role of self-employment in China's rural economy, separating the self-employed into two types based on the level of capital invested in the self-employed business. They find that the high productivity type is a sign of development while the low productivity type is a sign of distress. This criterion is hard to apply here because of data restriction.

marketization level and the competitiveness of the financial market. Protection of the producers represents whether the local legal system execute the law justly.

Figure 5 shows the NERI marketization indexon financial marketization level in 2007 and 2008 for the provinces in my sample. Using the model presented in Section 3, I predict that: (1) Controlling for the change in NERI index, self-employment rate is higher for provinces with tighter initial constraint in 2007, i.e. lower initial value in 2007; (2) Controlling for 2007 NERI index, self-employment rate is higher for provinces with larger increase in the NERI index; (3) The impact on owner-managers is larger than own-account workers.

Empirically, I estimate the following two models: one with DID interaction terms of post 2007 indicator and the NERI index, and another with the interaction terms of post 2007 indicator and the change in the NERI index $\Delta NERI$:

$$
\begin{aligned}
OwnAccount_{ict} = {} & \beta_{10} + \beta_{11}Post_t + \beta_{12}NERI_c * Post_t + \beta_{13}\Delta NERI_c + \\
& \beta_{14}X_{ict} + \beta_{15}Province_{ct} + \beta_{16}Year_t + \beta_{17}City_{it} + \epsilon_1 \\
OwnerManager_{ict} = {} & \beta_{20} + \beta_{21}Post_t + \beta_{22}NERI_c * Post_t + \beta_{23}\Delta NERI_c + \\
& \beta_{24}X_{ict} + \beta_{25}Province_{ct} + \beta_{26}Year_t + \beta_{27}City_{it} + \epsilon_2
\end{aligned}
\tag{16}
$$

$$
\begin{aligned}
OwnAccount_{ict} = {} & \beta_{30} + \beta_{31}Post_t + \beta_{32}\Delta NERI_c * Post_t + \beta_{33}NERI_c + \\
& \beta_{34}X_{ict} + \beta_{35}Province_{ct} + \beta_{36}Year_t + \beta_{37}City_{it} + \epsilon_3 \\
OwnerManager_{ict} = {} & \beta_{40} + \beta_{41}Post_t + \beta_{42}\Delta NERI_c * Post_t + \beta_{43}NERI_c + \\
& \beta_{44}X_{ict} + \beta_{45}Province_{ct} + \beta_{46}Year_t + \beta_{47}City_{it} + \epsilon_4
\end{aligned}
\tag{17}
$$

where $OwnAccount_{ict}$ and $OwnerManager_{ict}$ are indicators for individual i being own-account workers or owner-manager in province c at year t. $Post$ indicates after China's 2007 Property Rights Law. $NERI_c$ is the marketization index for province c in 2007 and $\Delta NERI_c$ is the change in NERI index from 2007 to 2009 for province c. X_{ict} and $Province_{ct}$ are the individual characteristics and province characteristics introduced in Section 4. Year fixed effect and city fixed effect are also included. Standard errors are clustered at the provincial level.

If my model predictions are correct, β_{22} should be negative and β_{42} should be positive, while β_{12} and β_{32} might be statistically insignificant. For necessity entrepreneurs, the policy has less impact, thus I hypothesize β_{12} to be insignificant.

14

5.2 Impact through Collateral Channel

In order to verify that the effect indeed comes from the relaxation of credit constraint, I conduct an additional exercise using CPES data. I create a binary index $BankBorrow$ that represents the credit channel. Subjects were asked whether they borrowed from the banks when starting their businesses. If the answer is "yes" for owner-manager i who founded his/her business in year t in province c, then $BankBorrow_{ict} = 1$; and 0 otherwise. I use $BankBorrow$ as the outcome variable and run a similar difference-in-differences model as below:

$$
\begin{aligned}
BankBorrow_{ict} = \gamma_{10} &+ \gamma_{11}Post_t + \gamma_{12}NERI_c * Post_t + \gamma_{13}\Delta NERI_c + \\
&\gamma_{14}X_{ict} + \gamma_{15}Province_{ct} + \gamma_{16}Year_t + \gamma_{17}City_{it} + \epsilon_1 \\
BankBorrow_{ict} = \gamma_{20} &+ \gamma_{21}Post_t + \gamma_{22}\Delta NERI_c * Post_t + \gamma_{23}NERI_c + \\
&\gamma_{24}X_{ict} + \gamma_{25}Province_{ct} + \gamma_{26}Year_t + \gamma_{27}City_{it} + \epsilon_2
\end{aligned}
\tag{18}
$$

If the 2007 Property Law indeed relaxed the credit constraint and encouraged more entrepreneurs to borrow from the banks, provinces with lower initial NERI value and with larger increase in the NERI index should observe more increase in bank loans. Thus, γ_{12} should be negative and γ_{22} should be positive.

6   Results

I utilized a difference-in-differences strategy in order to show the causal effect of credit constraint on self-employment propensity. Results for this model are reported in Table 2. Three columns correspond to the three NERI indexes. In Panel A, the outcome variable is $OwnerManager$, the indicator for being owner-manager. The coefficients for the interaction terms $Post * NERI$ are all significantly negative, ranging from 1.23% to 2.24%. The coefficients for the interaction terms $Post * \Delta NERI$, however, are all significantly positive. This implies that the larger the relaxation in credit constraint, the larger the increase in self-employment propensity for opportunity entrepreneurs. The results are consistent with Proposition 1 and Proposition 2. In Panel B, the coefficients for all the interaction terms are not significant, suggesting that the law has little impact on own-account worker, consistent with Proposition 3.

To verify that the channel is through the relaxation of credit constraint, another difference-in-

differences model is used and the results are reported in Table 3. As predict, the coefficients are all negative on the interaction terms $Post * NERI$ and positive on $Post * \Delta NERI$. This implies that the would-be owner-managers living in provinces with initial worse credit market or provinces experienced larger expansion in credit market, borrowed more from the banks after the 2007 Property Rights Law.

All the evidence suggest that the 2007 Property Rights Law improved the credit constraint, which promotes entrepreneurship represented by the amount of owner-manger in the economy, but it has little impact on necessity entrepreneurs.

7   Discussion and Conclusion

This paper builds upon unique Chinese circumstances to explore the prevalence and origins of different types of entrepreneurs, and how limited access to credit might impair them in different ways. I distinguish and analyze two different types of self-employment in urban China—self-employment—opportunity entrepreneurship and necessity entrepreneurship. I construct a structural model that incorporates both liquidity constraint and employee hiring choices, and use it to make predictions on the corresponding self-employment rates after a relaxation of the credit constraint. I test the predictions empirically, finding that the 2007 Property Rights Law promotes entrepreneurship as measured by the number of owner-mangers in the economy, but has little impact on necessity entrepreneurs.

The widely recognized links between entrepreneurship, innovation and productivity growth make it essential to critically analyze individuals' self-employment decisions. Studying the formerly neglected distinction between "true entrepreneurs" and "entrepreneurs by default" opens the door to more insightful analyses of enterprise formation that are valuable for China and many other countries.

References

Acs, Z. (2006). How is Entrepreneurship Good for Economic Growth? *Innovations 1*(1), 97–107.

Banerjee, A. V. and E. Duflo (2014). Do Firms Want to Borrow More? Testing Credit Constraints Using a Directed Lending Program. *The Review of Economic Studies 81*(2), 572–607.

Beck, T. and A. Demirguc-Kunt (2006). Small and Medium-Size Enterprises: Access to Finance as a Growth Constraint. *Journal of Banking & Finance 30*(11), 2931–2943.

Berkowitz, D., C. Lin, and Y. Ma (2015). Do Property Rights Matter? Evidence From a Property Law Enactment. *Journal of Financial Economics 116*(3), 583–593.

Buera, F. J., J. P. Kaboski, and Y. Shin (2013). The Macroeconomics of Microfinance. *Federal Reserve Bank of St. Louis Working Paper Series* (2013-034).

Carpenter, R. E. and B. C. Petersen (2002). Is the Growth of Small Firms Constrained by Internal Finance? *Review of Economics and statistics 84*(2), 298–309.

Du, W. (2010). The Impact of Financing of SMEs for Property Law System Innovation. *Journal of Henan Administrative Institute of Politics and Law 4*, 023.

Earle, J. S. and Z. Sakova (2000). Business Start-Ups or Disguised Unemployment? Evidence on the Character of Self-Employment from Transition Economies. *Labour Economics 7*(5), 575–601.

Evans, D. S. and B. Jovanovic (1989). An Estimated Model of Entrepreneurial Choice under Liquidity Constraints. *The Journal of Political Economy*, 808–827.

Fan, G., X. Wang, and H. Zhu (2003). NERI Index of Marketization of China's Provinces. *National Economic Research Institute, Beijing*.

Fan, G., X. Wang, and H. Zhu (2011). The Marketization Index of China: The Process of Regional Marketization Report. *Beijing: Press of Economic Science [in Chinese]*.

Hamilton, B. H. (2000). Does Entrepreneurship Pay? An Empirical Analysis of the Returns of Self-Employment. *Journal of Political Economy 108*(3), 604.

Han, S. L. (2007). Secured Transactions Law Reform in China: Can a Commercial Law Serve the Needs of the Market? *Secured Lender 63*(4), 30.

Kihlstrom, R. E. and J.-J. Laffont (1979). A General Equilibrium Entrepreneurial Theory of Firm Formation Based on Risk Aversion. *The Journal of Political Economy*, 719–748.

La Porta, R. and A. Shleifer (2008). The Unofficial Economy and Economic Development. *Brookings Papers on Economic Activity* (2).

Le, A. T. (1999). Empirical Studies of Self-Employment. *Journal of Economic Surveys 13*(4), 381–416.

Levine, R. and Y. Rubinstein (2015). Smart and Illicit: Who Becomes an Entrepreneur and Does It Pay. *NBER Working Paper Series* (19276).

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

Liu, G. (2008). Change in Collateral System: From 1995 Collateral Law to 2007 Property Law [in Chinese]. *The Pacific Journal*.

Marechal, V., P. Tekin, and H. Guliyeva (2009). China's New Property Rights Law – an Important Step Towards Improving Access to Credit for Small and Medium Enterprises. *The World Bank Doing Business Case Study: China*.

Mohapatra, S., S. Rozelle, and R. Goodhue (2007). The Rise of Self-Employment in Rural China: Development or Distress? *World Development*.

Parker, S. C. (2004). *The Economics of Self-employment and Entrepreneurship*. Cambridge University Press.

Schumpeter, J. A. (1934). *The Theory of Economic Development: An Inquiry into Profits,Capital, Credit, Interest, and the Business Cycle*, Volume 55. Transaction Publishers.

Taylor, M. P. (2001). Self-Employment and Windfall Gains in Britain: Evidence from Panel Data. *Economica*, 539–565.

Tokman, V. E. (1992). *Beyond Regulation: The Informal Economy in Latin America*.

Van Praag, C. M. and J. S. Cramer (2001). The Roots of Entrepreneurship and Labour Demand: Individual Ability and Low Risk Aversion. *Economica 68*(269), 45–62.

World Bank (2007). Reforming Collateral Laws and Registries International Best Practices and the Case of China. *FIAS/IFC PEP Report*.

Zhang, B., F. Zhai, S. Du, and B. Popkin (2014). The China Health and Nutrition Survey, 1989–2011. *Obesity Reviews 15*(S1), 2–7.

Zhang, Y. and A. Van Stel (2016). Who should be Running Ahead? The Roles of Two Types of Entrepreneursh in China's Contemporary Economy. *Working Paper*.

Figure 1: Selection into Self-employment
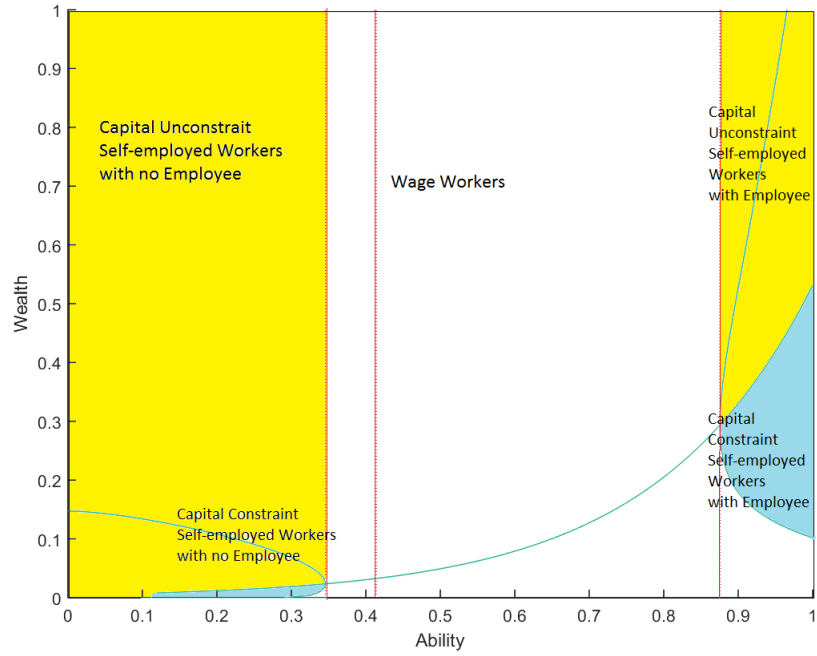
Figure 2: Change in Credit Constraint
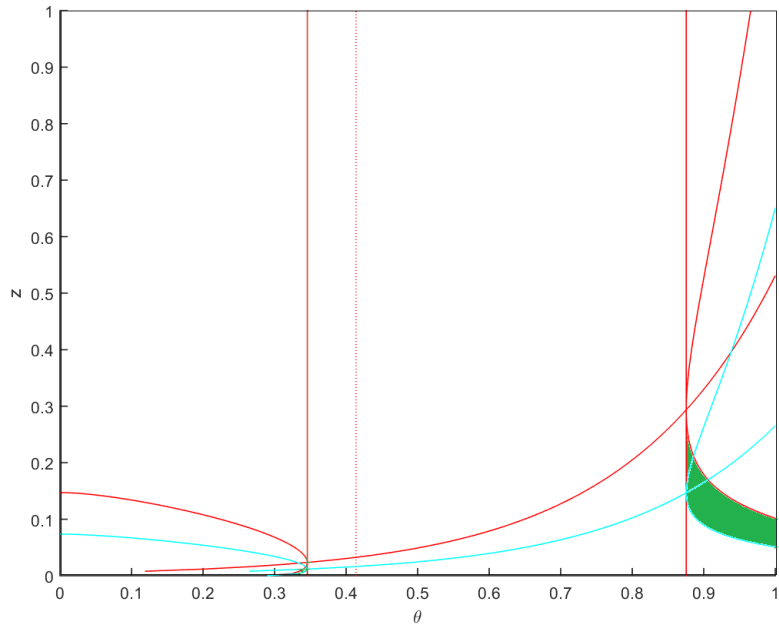
Note: The red lines represent the occupational choices under original credit constraint, and the blue lines represent after relaxing the credit constraint. The green shades mark the new self-employed individual who switch from wage workers.

Figure 3: Self-employment Rate (%): 1989-2011

Note: Self-employment rate for own-account worker is defined as the proportion of own-account workers among all study subjects in each wave. Similarly, self-employment rate for owner-manager is the proportion of owner-managers among all study subjects in each wave.

Figure 4: Gaps in Average Years of Schooling: 1989-2011

Table 1: Summary Characteristics (1989-2011 Combined)

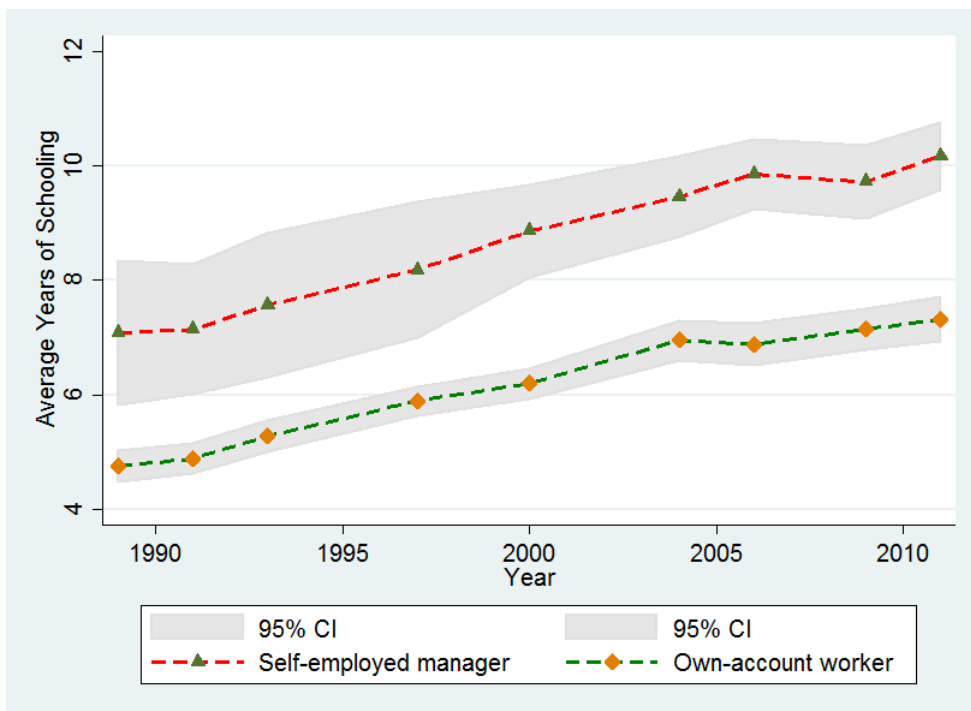|	All Sample	Salary Worker	Own-account	Manager
Female Ratio (%)	47.12	45.73	51.08	38.53
	(49.92)	(49.82)	(49.99)	(48.71)
Age (year)	40.29	39.97	41.14	38.92
	(13.63)	(13.50)	(14.13)	(11.00)
Education (year)	8.342	9.430	5.877	9.022
	(4.365)	(4.133)	(3.920)	(3.449)
Marriage Rate (%)	79.76	78.44	82.25	84.76
	(40.18)	(41.12)	(38.21)	(35.97)
Urban Hukou (%)	64.01	83.97	20.21	66.37
	(48.00)	(36.69)	(40.16)	(47.29)
Change Job (%)	12.49	15.23	5.509	21.28
	(33.06)	(35.93)	(22.82)	(40.98)
Annual Income (RMB)	8063.2	9044.4	4904.3	17717.4
	(15570.0)	(16123.1)	(10815.3)	(30849.5)
Annual HH Income (RMB)	20432.9	22844.9	13506.4	35638.0
	(29733.2)	(31538.2)	(20601.4)	(46782.1)
Work Hour (hour)	2205.3	2179.1	2259.8	2623.1
	(616.2)	(468.3)	(1080.3)	(793.8)
Spouse Has Job (%)	54.50	50.54	63.11	57.71
	(49.80)	(50.00)	(48.25)	(49.45)
Observations	20170	13568	6018	584

 Notes: Mean values are reported, and standard deviations are in parenthesis. All samples are for adult residents living in the urban areas.

Figure 5: NERI Financial Marketization Index in 2007 and 2008
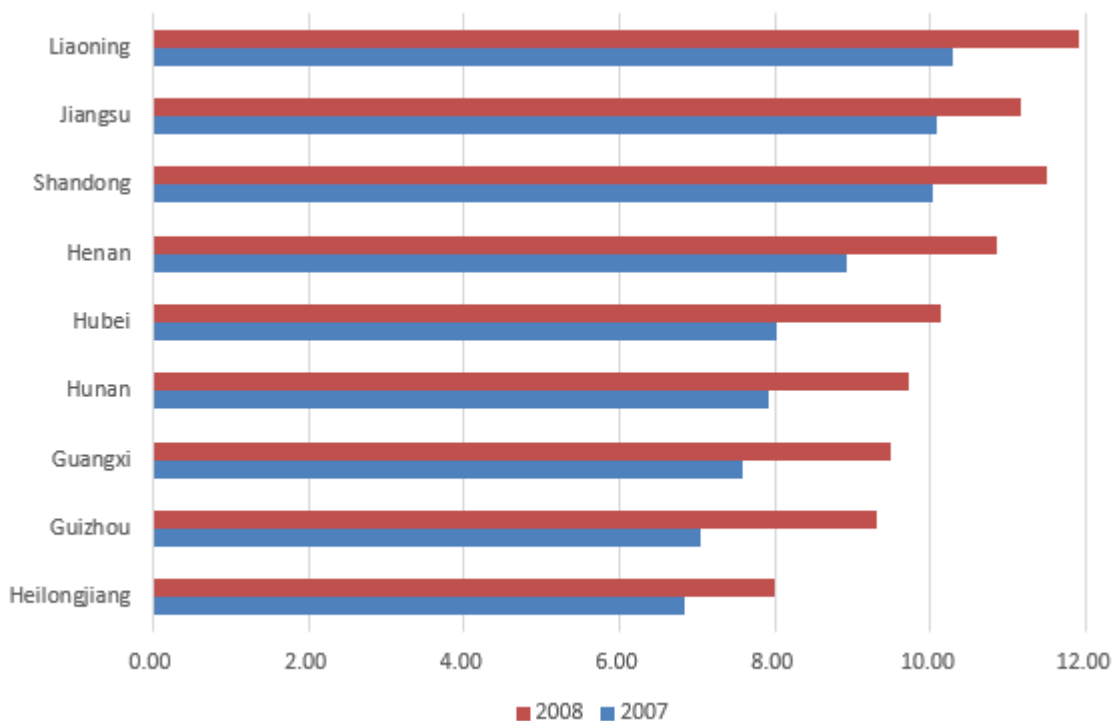
Table 2: Impact on Self-employment Propensity

	(1)	(2)	(3)
Panel A: Outcome is being owner-manager			
Post*$NERI$	-0.0209*	-0.0224**	-0.0123*
	(0.0104)	(0.00933)	(0.00619)
Post*$\Delta NERI$	0.0345**	0.0439***	0.0302***
	(0.0126)	(0.0129)	(0.00649)
Panel B: Outcome is being own-account workers			
Post*$NERI$	0.0332	-0.00608	0.0161
	(0.0296)	(0.0298)	(0.0110)
Post*$\Delta NERI$	0.0107	-0.0283	-0.0117
	(0.0613)	(0.0452)	(0.0236)
NERI Type	Financial Market	Credit Marketization	Producer Protection
Observations	7,567	7,567	7,567

Notes: Each cell is a different regression. Standard errors are clustered at provincial level: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 3: Impact through Collateral Channel

	(1)	(2)	(3)
Post*$NERI$	-0.00828	-0.0144**	-0.0213**
	(0.0117)	(0.00492)	(0.00677)
Post*$\Delta NERI$	0.104***	0.0369**	0.0171*
	(0.0251)	(0.0113)	(0.00873)
NERI Type	Financial Market	Credit Marketization	Producer Protection
Observations	1,493	1,493	1,493

 Notes: The outcome is an index for whether borrowed from the banks when founding the business. Each cell is a different regression. Standard errors are clustered at provincial level: *** p<0.01, ** p<0.05, * p<0.1

Appendix

A Data Discussion

I use five waves of the China Health and Nutrition Survey (CHNS) data: 2000, 2004, 2006, 2009, and 2011. It is a panel dataset and individuals were interviewed in each wave. Due to attrition, new individuals were added to maintain the representativeness of the sample. 91.37% of the observations appeared in more than one wave, and 38.57% appeared in all five waves, as shown in Figure A.1. The annual attrition rate is around 30%, which is high relative to U.S. datasets. I show in Table A.1 the comparative statistics for individual characteristics between consecutive waves. The value reported is the mean value for the baseline year, and the significance level is for the t-test comparison between the baseline year and the next consecutive wave. For example, column (1) reports the mean values for observations in the 2000 wave, and the comparison is between 2000 wave and 2004 wave. Besides 2000 wave, the other waves all look very similar, thus the representativeness of the sample is generally maintained.

Futher, Figure 3 presents the time trend of the self-employment rate in China between 1989 and 2011 using all waves of CHNS data. The pattern is similar to Li and Zhao (2011) presented using data from the China Census: the proportion of own-account workers continued to rise in the 1980s and 1990s, and then reached the highest point in 1999. This confirms the representativeness of the CHNS data of China's overall population.

B Characteristics of the Two Types of Self-Employment

I analyze the characteristics of the two types of self-employment–own-account workers and owner-managers. I examine their income profile and address the selection in the occupational choice. I separate the population into three categories: wage earners, self-employed own-account workers, and self-employed owner-managers. I found that: (1) Under a multinomial logistic model, own-account workers and self-employed owner-managers show vastly different characteristics. The former are often not well educated, not from well-educated families, and with low income. On the opposite, the owner-managers are richer and come from more educated families. (2) Using a similar method as Hamilton (2000), I found that

own-account workers earned lower salary when they were wage workers compared to the remaining wage earners. After their transition into self-employment, their income decreased even further. For owner-mangers who were salary workers in the past, there is no difference in their wage compared to the remaining wage earners. After the transition, their income increased significantly. Both findings are evidence that self-employed own-account workers' entrepreneurship reflects some distress or survival necessity, while self-employed owner-manger's entrepreneurship is an unconstrained choice.

B.1   A Multinomial Logistic Model

I utilize a multinomial logit model, and particularly focus on characteristics that tent to associate with either the "necessity entrepreneur view" or the "opportunity entrepreneur view"– education, family background, and household income. I further conduct pooling tests for the differences across the categories, which suggests that the difference within self-employment sectors is even bigger than the difference between sectors.

The multinomial logit model uses salary workers as the baseline category.

$$log\frac{P_{ijt}}{P_{iWt}} = \alpha_j + \beta_j X_{it} + \gamma_{1j}City_{it} + \gamma_{2j}Year_{it} + \epsilon_{ijt} \tag{19}$$

P_{ijt} stands for the probability that person i is own-account self-employed worker ($j = 1$), or self-employed owner manager ($j = 2$) at time t, and P_{iWt} denotes the probability that the person is a wage worker in time t. X_{it} is a vector of regressors that includes demographics (age, age square, gender, marriage status), years of schooling, the average number of hours worked per year, whether have health insurance, occupational status, log of household income, log of individual income, and parents' education status. City and year fixed effects are included.

I also estimated similar model using characteristics of the previous wave since there are concerns that current occupational status is determined by previous characteristics (denoted in Table A.3 as with time lag):

$$log\frac{P_{ijt}}{P_{iWt}} = \alpha_j + \beta_j X_{i,t-1} + \gamma_{1j}City_{it} + \gamma_{2j}Year_{it} + \epsilon_{ijt} \tag{20}$$

Results for the marginal effect are reported in Table A.3, showing significant differences

among each group. For own-account workers, the coefficients on own education, Hukou status, household income, individual income, and health insurance status are all significantly negative. This means that compared to salary workers, they are less educated, poorer, rural Hukou and no health insurance. Thus individuals associated with disadvantaged characteristics are more likely to become own-account workers. For owner-managers, although they are more likely to be less educated and have no health insurance, they have higher household income. The effect for each covariates is also smaller. For example, when I increase one year of school, my probability of being own-account workers decreases by 0.24%, and my probability of becoming owner-manager only decreases by 0.12%. The results are robust for city residents with urban Hukou.

I further conduct Cramer-Ridder pooling test to check whether the differences between each category in the previous multinomial logit model are significant. The null hypothesis is that the two states have the same regressors coefficient apart from the intercept.[5] Results in Table A.2 show that this hypothesis ($prob(P > \chi^2) = 0.000$) is rejected for every group, i.e. the three categories are very different from each other. What is phenomenal is that the biggest difference is between own-account workers and owner-managers. This means that the difference within self-employment sectors (own-account workers v.s. owner-managers) is even bigger than the difference between sectors (employee v.s. self-employment).

B.2   Income Profile and Selection

Figure A.2 shows the distribution of annual individual income (1989-2011 combined). We can see that the income of own-account workers is the lowest, and owner-managers earn at least the same amount as salary workers. I further plot the income distribution for each year in Figure A.3. The annual income increased over the years, but the patterns are similar for every year: own-account workers earn the least, and owner-managers earn at least the same amount as salary workers.

However, the differences in income can come from differences in return to self-employment, or it can come from selection of individuals into different sectors. Here, I use a similar strategy as in Hamilton (2000) to show that selection plays an important role in the income difference between sectors in urban China. I find that individuals who transit from salary workers to

---

[5]To test this hypothesis, the following test statistics can be used: $LR = 2(lnL - lnLr)$ where lnL is the maximum log likelihood of the original model and $lnLr$ the maximum log likelihood, if the estimates are constrained to be equal. LR asymptotically has a chi-square distribution with k degrees of freedom where k is the number of restrictions implied.

own-account workers have lower income compared to the remaining salary workers. Their income decreases further after the transition. These two findings indicate that own-account workers' productivity is low in both wage sector and self-employed sector, which further rejects that own-account workers are true entrepreneurs.

In order to emphasize selection, I compare the population who transitioned from wage earners in one wave to self-employment with individuals who remain to be employees. I define the transition rate as the proportion of wage-earners in one wave who became new own-account workers (or new owner-managers) in the next consecutive wave. This is done for each two-wave panels: 1989-1991, 1991-1993, 1993-1997, 1997-2000, 2000-2004, 2004-2006, 2006-2009, and 2009-2011. I also add another category–unemployed individuals–to help illustrate the results. Transition rate within different employment status are shown in Table A.4 and summary statistics for individuals with different transition status are shown in Table A.5. From Table A.4, we can see that 87.99% of original wage-earners remain as wage-earners, 7.69% transition to be own-account workers and 1.74% transition to be self-employed owner-managers. Based on the mean annual income in the summary statistics, workers remaining in paid employment earn much more than those who transit to be own-account workers (7076 v.s. 4677 RMB), but lower than the would-be entrepreneurs prior to entering self-employment (7076 v.s. 8905 RMB).

To further examine the statistical significance of this relationship, I implement a post-program estimator as in Hamilton (2000). In particular, I estimate wage regressions for paid employees including a dummy variable that indicating their sector status in the next consecutive wave:

$$logwage_{it} = \alpha_0^1 + \alpha_1^1 OwnAccountNext_{it} + \beta_1 X_{it} + \gamma_1 City_{it} + \eta_1 Year_{it} + \epsilon_{it} \qquad (21)$$

$$logwage_{it} = \alpha_0^2 + \alpha_1^2 ManagerNext_{it} + \beta_2 X_{it} + \gamma_2 City_{it} + \eta_2 Year_{it} + \epsilon_{it} \qquad (22)$$

$$logwage_{it} = \alpha_0^3 + \alpha_1^3 UnemployNext_{it} + \beta_3 X_{it} + \gamma_2 City_{it} + \eta_3 Year_{it} + \epsilon_{it} \qquad (23)$$

$UnemployNext_{it}$, $OwnAccountNext_{it}$ and $ManagerNext_{it}$ equals 1 if the individual transitions from a salary worker in wave t to unemployed/own-account worker/owner-manager in wave $t+1$, and equals 0 if remaining to be a salary worker. I use two measures for the dependent variable log of wage income: log of hourly wage and log of annual wage. X_{it} is a vector of individual characteristics in wave t. City and year fixed effects are included.

Results are shown in Table A.6. The coefficients of $OwnAccountNext_{it}$ and $UnemployNext_{it}$ are significantly negative, while the coefficients of $ManagerNext_{it}$ are insignificant. This

28

means that those who transit to be own-account workers or become unemployed originally earn much less salary than the remaining wage-earners. The would-be owner-managers originally had about the same amount of salary income as the workers remaining in paid employment. The patterns are consistent whether using annual wage or hourly wage as dependent variables, and whether for the overall population or for urban Hukou only. If wage can be considered as an indicator for labor productivity in the wage sector, then the new own-account workers are the less productive original employees. Notice that the wage distribution of own-account workers are very similar to the unemployed, it is very likely the new own-account workers turn to self-employment because they were forced out of the main sector.

However, this still cannot prove that these new own-account workers become self-employed out of survival necessity, since self-employment can require different skills than being employees. A lousy employee might be a good entrepreneur. Thus, I check the changes in income after people change sectors. More specifically, I estimate the following model:

$$\Delta log(Income_{it}) = \alpha_1^j \sum Transittype_{it}^j + \beta_1 X_{it} + \gamma_1 City_{it} + \eta_1 Year_{it} + \epsilon \qquad (24)$$

$$\Delta log(HourInc_{it}) = \alpha_2^j \sum Transittype_{it}^j + \beta_2 X_{it} + \gamma_2 City_{it} + \eta_2 Year_{it} + \epsilon \qquad (25)$$

Change in log of annual income ($\Delta log(Income_{it})$) and change in log of hourly income ($\Delta log(HourInc_{it})$) are used as dependent variables. $Transittype_{it}^j$ is a set of dummy variable for individual i with different transition types j from wave t to wave $t+1$: from wage earner to own-account worker, from wage earner to owner-manager, from own-account worker to wage earner, from own-account worker to owner-manager, from owner-manager to wage earner, and from owner-manager to own-account worker.

Results are reported in Table A.7. The first two rows reveal a clear pattern: compared to remaining wage earners, individuals' income decreased (or increased less) after changing jobs from salary workers to own-account self-employers, while individuals' income increased more after changing jobs from salary workers to self-employed owner-managers. $\Delta log(Income_{it})$ is centered around 0.303 ($sd = 1.2$), and $\Delta log(HourInc_{it})$ has a mean of 0.334 ($sd = 0.98$). Thus magnitude wise, the differences in income changes among different transition types are not trivial.

Table A.1: Comparative Statistics for Different CHNS Waves

	(1) 2000 vs 2004	(2) 2004 vs 2006	(3) 2006 vs 2009	(4) 2009 vs 2011
Age (year)	39.45**	40.62*	41.62	41.97
Female Share (%)	46.93	45.10	44.14	42.63
Education (year)	8.72***	9.79	9.98	10.14
Marriage Rate (%)	79.78**	83.74	85.48	84.16
Poor Health (%)	11.14***	21.26***	16.40	16.88
Log(Income)	7.65	7.58***	8.07***	8.88
Spouse Works (%)	66.06***	59.32	60.14*	56.13
Urban Hukou	0.60***	0.68*	0.64	0.65
Senior Professional (%)	6.47	7.78	8.17	8.28
Junior Professional (%)	6.69	6.40	6.00	6.52
Administrator (%)	7.23*	9.56	8.50	7.56
Office Staff (%)	8.42	8.51	9.95	10.76
Skilled Worker (%)	11.92	11.74	9.82	10.56
Non-skilled Worker (%)	9.62	11.08	12.46	11.41
Police or Army (%)	1.11	0.79	0.33	0.46
Driver (%)	2.97*	4.35	4.61	3.91
Service Worker (%)	11.30	12.40*	15.29	17.47**

Notes: The value reported is the mean value for the baseline year, and the significance level is for the t-test comparison between the baseline year and the next consecutive wave. For example, column (1) reports the mean values for observations in the 2000 wave, and the comparison is between the 2000 wave and the 2004 wave. Significance level: *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure A.1: Frequency of Appearance in Five CHNS Waves
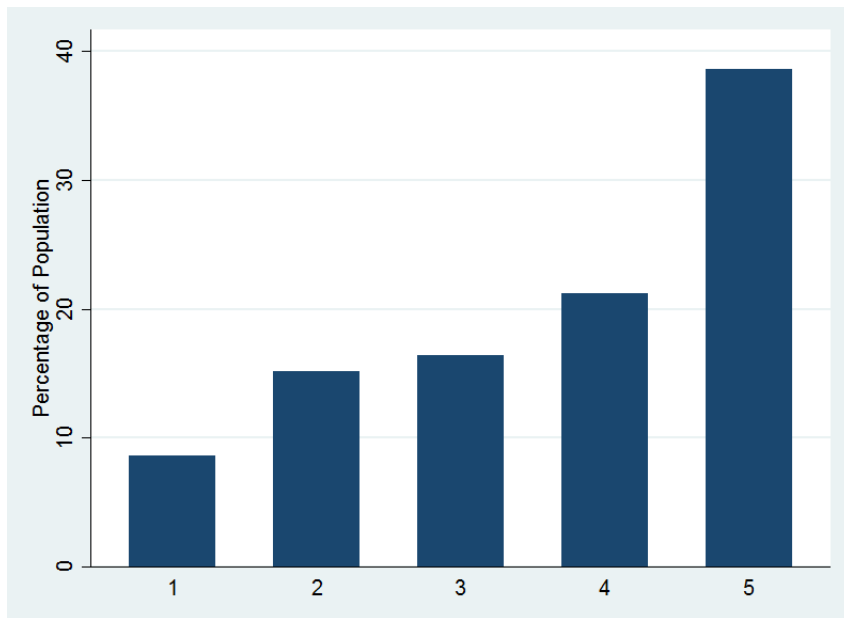
Table A.2: Cramer-Ridder Test

	lnL	$lnLr$	LR	$P > \chi^2$
Own-account vs Owner-Manager	-4949	-7975	6051	0.000
Own-account vs Salary Worker	-4949	-5164	428	0.000
Owner-manager vs Salary Worker	-4949	-5170	441	0.000

Table A.3: Marginal Effect of Multinomial Logit Regression

	(1) Own-account	(2) Owner-manager	(3) Own-account	(4) Owner-manager	(5) Own-account	(6) Owner-manager
Education	-0.00239***	-0.00120*	-0.00166**	-0.00128*	-0.00516***	-0.000477
	(0.000675)	(0.000630)	(0.000715)	(0.000666)	(0.00112)	(0.000684)
Age	0.00147	0.000388	0.000813	-0.000944	-0.00199	0.00198
	(0.00136)	(0.00121)	(0.00151)	(0.00123)	(0.00215)	(0.00158)
AgeSq	-1.41e-05	-9.07e-06	-7.16e-06	4.76e-06	3.74e-05	-2.78e-05
	(1.56e-05)	(1.42e-05)	(1.75e-05)	(1.42e-05)	(2.50e-05)	(1.91e-05)
Urban Hukou	-0.0277***	-0.00529			-0.0859***	-0.00393
	(0.00517)	(0.00402)			(0.00813)	(0.00480)
Female	-0.00892*	-0.00133	-0.00388	-0.000108	-0.00280	-0.00957**
	(0.00459)	(0.00351)	(0.00455)	(0.00370)	(0.00718)	(0.00435)
Insurance	-0.0365***	-0.0330***	-0.0340***	-0.0344***	-0.0705***	-0.0289***
	(0.00505)	(0.00395)	(0.00486)	(0.00426)	(0.00798)	(0.00474)
Log(Ind Income)	-0.00216	0.0107***	-0.00193	0.0105*	0.00120	0.00144
	(0.00197)	(0.00403)	(0.00212)	(0.00537)	(0.00179)	(0.00153)
Annual Work Hour	1.95e-05***	1.69e-05***	2.39e-05***	1.73e-05***	1.97e-05***	7.70e-06***
	(2.75e-06)	(2.26e-06)	(3.10e-06)	(2.79e-06)	(4.07e-06)	(2.44e-06)
Married	0.0172	-0.0106	0.00516	-0.00682	-0.0105	0.00753
	(0.0127)	(0.0101)	(0.0134)	(0.00981)	(0.0188)	(0.0120)
Parent Self-emp	0.0136	0.00753	0.0248	0.0118	-0.00993	0.00180
	(0.0134)	(0.0104)	(0.0152)	(0.0117)	(0.0199)	(0.0118)
Parent Education	-0.0178*	0.00856	-0.0279***	0.0162**	-0.0474**	0.0269***
	(0.0103)	(0.00663)	(0.0101)	(0.00734)	(0.0193)	(0.00849)
Spouse Has Job	0.0222***	0.00199	0.0133**	-0.00274	0.0203**	-0.000585
	(0.00587)	(0.00429)	(0.00543)	(0.00449)	(0.0104)	(0.00543)
Observations	11,398	11,398	8,662	8,662	7,622	7,622
Time Lag	No	No	No	No	Yes	Yes
Hukou			Urban	Urban		

Notes: Base Category is Salary Worker. Marginal effect is reported. Time and city fixed effect are added. Significance level: * $p <$ 0.1, ** $p < 0.05$, *** $p < 0.01$

Figure A.2: Income Distribution (1989-2011 Combined)
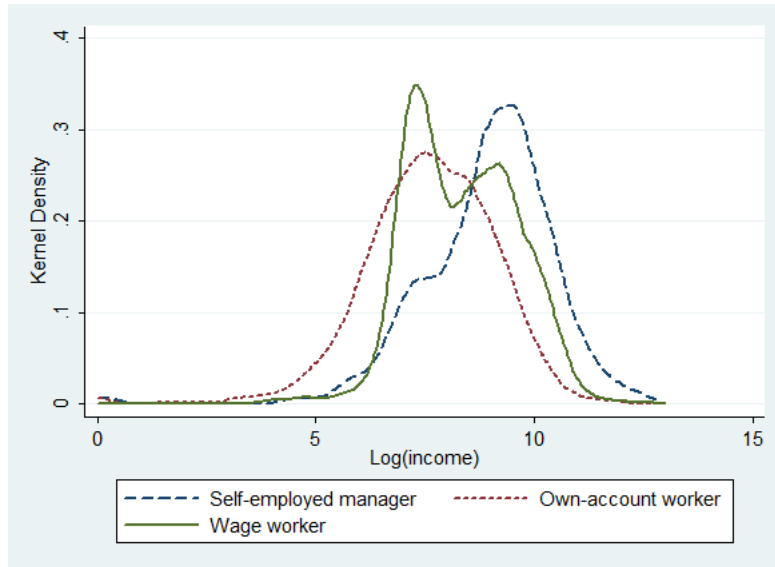
Note: This graph shows the overall annual income distribution of self-employed owner-managers, self-employed own-account workers, and wage earners. Annual income is measured in RMB.

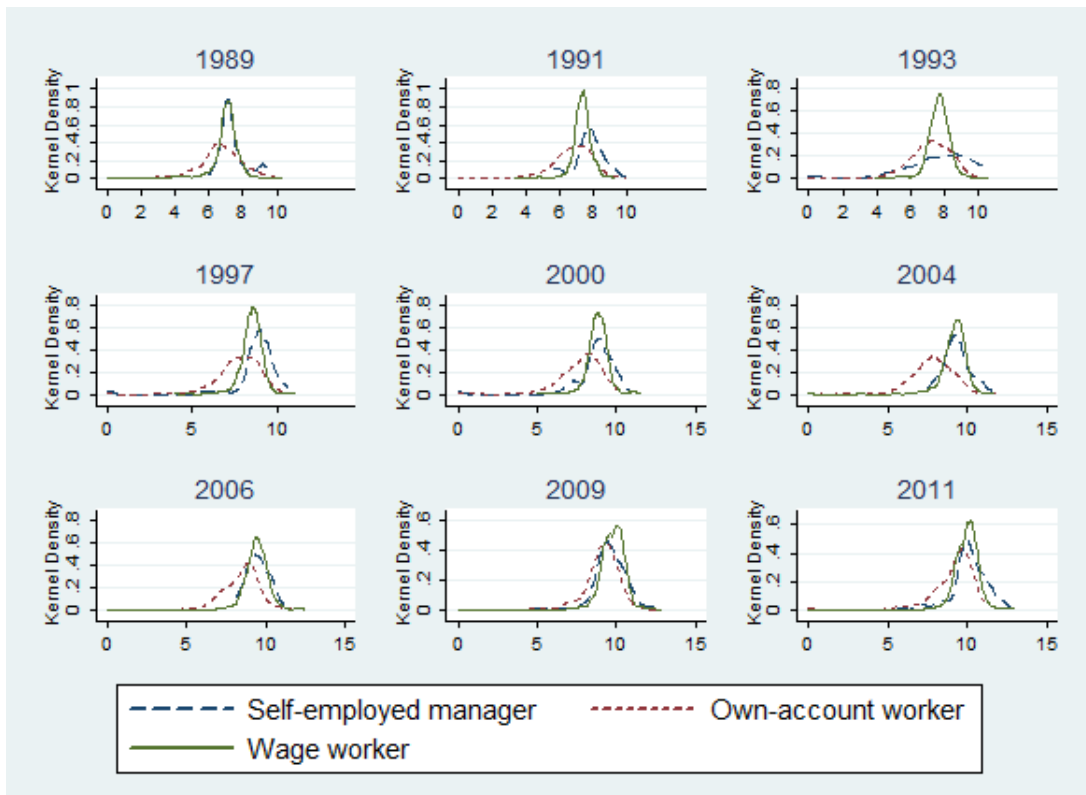Figure A.3: Income Distribution by Year

Table A.4: Transition Rate within Employment Status (%): 1989-2011 combined

| | Employment Status Next Wave | | | | |
	Unemployed	Salary Worker	Own-account	Owner-Manager	Total
Unemployed	26.6	52.39	15.43	5.59	100
Salary Worker	2.59	87.99	7.69	1.74	100
Own-account	2.08	16.25	78.64	3.02	100
Owner-manager	5.35	39.46	28.09	27.09	100
Total Percent	4.06	62.34	31.18	2.42	100
Total Count	668	10,265	5,134	398	16,465

Table A.5: Summary Statistics for Different Transition Status

	Individual Income	Annual Work Hour	Age	Education
remain salary	7076.25	2057.36	39.23	9.43
salary to ownaccount	4577.34	2078.31	38.02	6.86
salary to manager	8905.28	2133.32	38.23	9.10
remain ownaccount	3586.00	1898.60	40.44	5.30
ownaccount to salary	5139.61	1884.65	36.74	7.19
ownaccount to manager	6569.99	2354.14	36.51	7.64
remain manager	15127.43	2729.14	38.23	9.26
manager to salary	9256.94	2382.80	37.27	8.79
manager to ownaccount	14212.81	2561.08	38.07	8.12

Table A.6: Self-selection with Post-program Estimator

	(1)	(2)	(3)	(4)	(5)	(6)
Outcome Variable: Log(Hourly Wage)						
Own-account	-0.145***			-0.130***		
	(0.0402)			(0.0488)		
Owner-manager		-0.0422			-0.0127	
		(0.0646)			(0.0728)	
Unemployed			-0.152***			-0.174***
			(0.0579)			(0.0616)
Education	0.0241***	0.0243***	0.0236***	0.0227***	0.0224***	0.0220***
	(0.00287)	(0.00290)	(0.00287)	(0.00306)	(0.00309)	(0.00306)
Age	0.0356***	0.0314***	0.0329***	0.0394***	0.0370***	0.0393***
	(0.00581)	(0.00585)	(0.00582)	(0.00632)	(0.00630)	(0.00624)
Female	-0.133***	-0.138***	-0.132***	-0.126***	-0.133***	-0.130***
	(0.0165)	(0.0167)	(0.0167)	(0.0173)	(0.0174)	(0.0174)
Married	0.126***	0.121***	0.111***	0.123***	0.116***	0.106**
	(0.0398)	(0.0399)	(0.0397)	(0.0422)	(0.0424)	(0.0417)
Recent Change Job	-0.237***	-0.215***	-0.216***	-0.215***	-0.207***	-0.214***
	(0.0366)	(0.0377)	(0.0373)	(0.0392)	(0.0397)	(0.0391)
Parent Education	-0.0316	-0.0389	-0.0481	-0.0158	-0.000619	-0.00548
	(0.0399)	(0.0394)	(0.0392)	(0.0417)	(0.0420)	(0.0415)
Spouse Has Job	0.0432	0.0443	0.0411	0.0301	0.0423	0.0339
	(0.0313)	(0.0318)	(0.0319)	(0.0324)	(0.0327)	(0.0327)
Outcome Variable: Log(Annual Wage)						
Own-account	-0.104***			-0.110**		
	(0.0391)			(0.0491)		
Owner-manager		-0.0447			-0.0291	
		(0.0579)			(0.0586)	
Unemployed			-0.167**			-0.152***
			(0.0653)			(0.0569)
Education	0.0253***	0.0262***	0.0256***	0.0250***	0.0248***	0.0247***
	(0.00309)	(0.00312)	(0.00312)	(0.00341)	(0.00341)	(0.00341)
Age	0.0462***	0.0443***	0.0464***	0.0529***	0.0515***	0.0536***
	(0.00616)	(0.00628)	(0.00639)	(0.00679)	(0.00681)	(0.00675)
Female	-0.155***	-0.162***	-0.162***	-0.150***	-0.158***	-0.158***
	(0.0166)	(0.0168)	(0.0169)	(0.0176)	(0.0177)	(0.0177)
Married	0.0978**	0.0941**	0.0774**	0.0991**	0.0942**	0.0857**
	(0.0387)	(0.0386)	(0.0395)	(0.0413)	(0.0413)	(0.0405)
Recent Change Job	-0.200***	-0.188***	-0.183***	-0.182***	-0.179***	-0.185***
	(0.0345)	(0.0354)	(0.0354)	(0.0366)	(0.0367)	(0.0363)
Parent Education	-0.0418	-0.0548	-0.0600	-0.0360	-0.0269	-0.0259
	(0.0383)	(0.0382)	(0.0393)	(0.0404)	(0.0407)	(0.0402)
Spouse Has Job	0.0192	0.0208	0.0194	0.00460	0.0120	0.00996
	(0.0299)	(0.0305)	(0.0307)	(0.0317)	(0.0318)	(0.0320)
Observations	5,913	5,693	5,715	5,067	4,993	5,009
Sample	All	All	All	Urban Hukou	Urban Hukou	Urban Hukou

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

Table A.7: Differences in the Change of Income

	(1) Δlog(Income)	(2) Δlog(Hourly Income)	(3) Δlog(Income)	(4) Δlog(Hourly Income)
wage to ownaccount	-0.248***	-0.109	-0.112	0.0523
	(0.0776)	(0.0744)	(0.114)	(0.101)
wage to manager	0.340**	0.133	0.423***	0.204*
	(0.135)	(0.0989)	(0.163)	(0.105)
ownaccount to wage	0.101	0.0738	0.131	0.0179
	(0.0870)	(0.0844)	(0.106)	(0.0951)
ownaccount to manager	0.202	-0.00957	0.184	0.149
	(0.166)	(0.164)	(0.203)	(0.183)
manager to wage	-0.251**	-0.137	-0.310**	-0.177*
	(0.0984)	(0.0871)	(0.123)	(0.103)
manager to ownaccount	-0.892***	-0.281	-0.922***	-0.433
	(0.223)	(0.202)	(0.305)	(0.311)
Education	0.00685	0.00595	0.00368	0.00656*
	(0.00422)	(0.00383)	(0.00388)	(0.00380)
Age	-0.0243***	-0.0195***	-0.0210***	-0.0126*
	(0.00745)	(0.00755)	(0.00736)	(0.00748)
Urban Hukou	0.0995**	0.0915**		
	(0.0392)	(0.0364)		
Female	-0.0342	-0.0201	-0.0184	-0.0246
	(0.0235)	(0.0215)	(0.0206)	(0.0209)
Married	-0.0497	-0.0532	-0.0476	-0.0392
	(0.0591)	(0.0504)	(0.0516)	(0.0513)
Recent Change Job	-0.0288	-0.0231	-0.0401	-0.0336
	(0.0462)	(0.0487)	(0.0475)	(0.0491)
Parent Education	-0.0511	-0.0260	-0.0109	-0.0298
	(0.0563)	(0.0516)	(0.0577)	(0.0505)
Spouse Has Job	-0.0261	-0.0223	-0.0698*	-0.0688*
	(0.0420)	(0.0399)	(0.0421)	(0.0404)
Observations	7,000	6,501	5,637	5,294
Sample	All	All	Urban Hukou	Urban Hukou

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1