

# Return to Education for China's Return Migrant Entrepreneurs

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**Summary.** — This paper examines the return to education for entrepreneurs in rural China with a large return migrant survey dataset. By exploiting the unique culture of male dominance in Chinese society, we use women's education to instrument their husbands' schooling. The results show that the return to one additional year of schooling ranges between 12.6% and 18.8% for China's return migrant entrepreneurs, much larger than the estimated returns to education for off-farm wage workers documented in the literature. We also find that the return to education for entrepreneurs who hire paid workers more than doubles that for own-account workers.  
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**Key words** — return to education, entrepreneurship, self-employment, China, return migration

## 1. INTRODUCTION

Entrepreneurs are perceived as an important driver of economic growth by contributing many benefits, including incomes, jobs, and innovations, to the society (Djankov, Qian, Roland, & Zhuravskaya, 2006; van der Sluis, van Praag, & Vijverberg, 2008). However, although the labor economics literature (Card, 1999) has extensively studied the return to education for wage earners, little is known about the relationship between human capital and entrepreneurship, specifically, the return to education for entrepreneurs. This paper aims to contribute to the literature by studying the private return to education for China's return migrant entrepreneurs.

According to the human capital theory (Becker, 1964; Mincer, 1974; Schultz, 1961), education can increase individual productivity, and thus lead to more efficient activities. In this sense, education might be able to help entrepreneurs learn and accumulate new knowledge and make good decisions, and thus it contributes to business success (Davidsson & Honig, 2003). On the other hand, the signaling theory (Spence, 1973; Wolpin, 1977) states that education can be used to signal employees' job qualifications to potential employers who cannot explicitly observe their ability in labor markets without complete information. Like employees who are screened by employers, entrepreneurs (especially small business owners) may also be screened by other agents such as customers, capital suppliers, and government agencies. Hence, education is not only acknowledged for its productive effect, but also viewed as a signal of ability for entrepreneurs (Borjas & Bronars, 1989; Parker, 2009). That is, the theories suggest that education plays an important role in entrepreneurial activities as it does for employees.

The related scant literature, however, is mainly about the return to education for entrepreneurs in developed countries.<sup>1</sup> To the best of our knowledge, only several studies (Laszlo, 2005; Smith & Metzger, 1998; Vijverberg, 1995) have examined the return to education for entrepreneurs in developing countries, where the majority of workers are self-employed and entrepreneurial activities provide livelihood for billions of people (Gindling & Newhouse, 2014; La Porta & Shleifer, 2014).<sup>2</sup> Furthermore, few studies on the return to education for entrepreneurs have accounted for the endogeneity of schooling. It appears to be surprising since doing so is a common practice in the literature regarding the return to

education for employees (van der Sluis, van Praag, & Vijverberg, 2005; van Praag *et al.*, 2013).

As the largest developing country, China is an ideal setting to study the return to education for entrepreneurs. It is commonly observed that some very successful entrepreneurs in China have low education levels, especially those who started their businesses in the 1980s or 1990s when China began to implement its reform and opening up policies (Yueh, 2009; Zhang, Zhang, Rozelle, & Boucher, 2006). Now China is still on its track of transforming from a centrally planned economy to a market economy, and it is argued that other factors such as market opportunities, risk attitudes, and social networks rather than human capital, might be much more important for the success of entrepreneurs (Djankov *et al.*, 2006; Tan, 2001). So, the following question is raised: is formal education important for entrepreneurial performance in transition economies like China?

However, we cannot find the answer to the above question from the literature, despite a growing interest among researchers concerning the return to education for wage earners in China.<sup>3</sup> For instance, de Brauw and Rozelle (2008), Heckman and Li (2004), and Li, Liu, and Zhang (2012) all suggest that the return to education for employees has increased since the early 1980s. But how about the return to education for China's entrepreneurs? This issue is arguably more important, as investment in education would be more rewarding due to the positive externality of entrepreneurial activities (Djankov *et al.*, 2006; Fossen & Buttner, 2013; van der Sluis *et al.*, 2008).

This paper examines the return to education for China's return migrant entrepreneurs by using a unique survey dataset. Considering the heterogeneity of entrepreneurs, we also do the empirical analysis separately for own-account workers and entre-

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preneurs who employ paid workers, with the latter group being viewed as more opportunistic and successful. The survey was conducted by the Development Research Center, the State Council of the People's Republic of China to study the entrepreneurial activities of return migrants in rural China. To date, it may be the most comprehensive survey concerning China's rural entrepreneurs, with more than one half of them being returnee entrepreneurs (Démurger & Xu, 2011; Han & Cui, 2007).

The major challenge in our study is how to address the endogeneity of education when studying the return to education for returnee entrepreneurs. The literature typically uses the twins method or exploits exogenous variation in education due to some natural experiments (for example, the staggered rollout of compulsory education laws) to establish the causal relationship between schooling and employees' earnings (Card, 1999; Li *et al.*, 2012; Liu & Zhang, 2013). But the twins datasets on China are not publicly available and we cannot find appropriate natural experiments for one's schooling in the setting of China.<sup>4</sup> In this paper, we exploit China's unique cultural background and use women's education to instrument husbands' education since our main analysis is limited to China's male entrepreneurs. Women's education is arguably a valid instrument in the setting of rural China due to the long tradition of male dominance in the society. Even if the direct effect of spousal education on earnings may exist, it should mainly run from husbands to wives, but not the other way around (Huang, Li, Liu, & Zhang, 2009). Hoogerheide, Block, and Thurik (2012) and Wang (2013) further show that using women's education as the instrument variable in the income regression does not lead to severe estimation bias even if the strict exclusion restriction assumption is substantially violated.

To provide a preview of the main findings, our results show that after accounting for the endogeneity problem, the return to one additional year of schooling for China's return migrant entrepreneurs ranges between 12.6% and 18.8%, much larger than the estimated returns to education for employees documented in the literature. We also find that the return to education for employers more than doubles that for own-account workers in rural China. The estimated return to one year of schooling is between 14.5% and 26.1% for employers, but is only between 4.9% and 8.5% for own-account workers, highlighting the importance of differentiating the two groups when studying the return to education for entrepreneurs.

The main contributions of this paper are at least twofold. On the one hand, it is the first paper to study the return to education for entrepreneurs in China, and it also contributes to the limited literature on the return to education for entrepreneurs in developing countries. On the other hand, this study has accounted for the endogeneity of education, which has been largely neglected in the literature on return to education for entrepreneurs.

The rest of the paper is structured as follows. Section 2 provides the background on entrepreneurial activities in rural China and return migration. Section 3 introduces the survey data used in the analysis, followed by empirical strategies discussed in Section 4. Section 5 presents both OLS and IV estimation results, and explores the heterogeneity of the return to education for return migrant entrepreneurs. The final section concludes.

## 2. ENTREPRENEURSHIP IN RURAL CHINA AND RETURN MIGRATION

Before China's reform and opening up in late 1970s, individual employment and income were linked to the

commune-based production system and non-agricultural activities were almost non-existent in rural China (Meng, 2012; Zhang, de Brauw, & Rozelle, 2004). Only after the Household Responsibility System was implemented in the early 1980s, have rural laborers been gradually freed from the traditional agriculture to non-agricultural activities, thus promoting the growth of the non-farm sector in China. The share of rural industries represented by township and village enterprises (TVEs) and other rural private enterprises has increased rapidly from 9% to 36% of the national industrial output during 1979–93 (Jin & Qian, 1998). By the end of 2012, the rural non-farm sector employed 138 million workers, representing about one third of the total rural labor force (National Bureau of Statistics of China, 2013b).

The rural enterprises in China usually start off with a small scale and are based on household operation. But they have been increasing markedly and have made great contributions to China's transformation from an agricultural economy to an industrial one (Mohapatra, Rozelle, & Goodhue, 2007; Zhang *et al.*, 2006). According to de Brauw and Rozelle (2008), the self-employed accounted for 16.2% of the total rural labor force, highlighting the possible contributions of rural entrepreneurs to local economic activities. As indicated by Figure 1, the share of non-agricultural income from household business in per capita rural household income has grown steadily from about 2% in 1978 to 12% in 2012, despite the trend of slowing down after 2000 (National Bureau of Statistics of China, 2013a).

Rural–urban migration in China progresses almost at the same pace as the development of rural enterprises. The size of rural–urban migration has grown from less than 16 million in the 1980s to about 166 million in 2013 (Chan, 2001; National Bureau of Statistics of China, 2014). However, due to institutional barriers such as the hukou system, rural migrants have to move circularly between home and cities. Consequently, the majority of them have not been fully assimilated to the way of urban life and cannot settle down permanently in cities (Chan, 2001; Démurger & Xu, 2011; Hu, Xu, & Chen, 2011; Meng, 2012). According to the estimation by Han and Cui (2007) who used the same dataset as we do in this paper, the size of China's rural return migration accounts for nearly one quarter of the total rural migration flow and 10% of the total rural labor force in recent years.

Given the large size of return migration, we can imagine how much returnees could potentially contribute to the development of rural regions in China. As they might represent the flows of both financial and human resources to origin communities (Dustmann & Kirchkamp, 2002; Zhao, 2002),

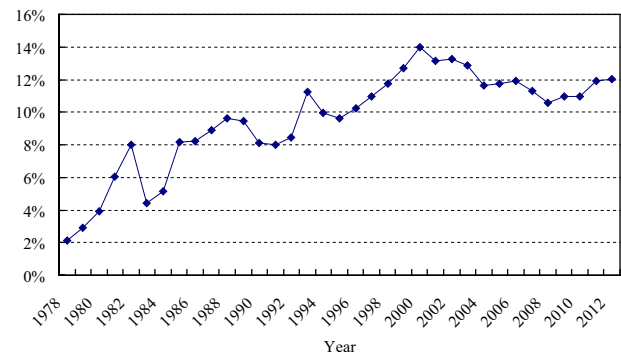


Figure 1. Share of non-agricultural income from household business in per capita rural household income (1978–2012). Data source: China Household Survey Yearbook 2013.

they can bring a lot of benefits such as creating job opportunities and building new infrastructure to their hometowns. According to [Démurger and Xu \(2011\)](#), about one half of China's return migrants engage in entrepreneurial activities in their home towns. In fact, many local governments in less developed central and western regions of China have made great efforts to attract the returning of rural migrants ([Démurger & Xu, 2011; Murphy, 1999](#)).

### 3. DATA

Our analysis is based on the China Return Migrant Survey (CRMS) conducted by the Development Research Center, the State Council of the People's Republic of China in May and June of 2007. The aim of this survey was to enhance the understanding of entrepreneurial activities of return migrants in rural China, and thus to provide relevant policy recommendations for the central government. It is a nationally representative returnee survey, covering 99 counties in 28 out of 31 municipalities, provinces, and autonomous regions in China.<sup>5</sup> The number of sampled counties for each province was determined in accordance with the rural population size of each province to guarantee the representativeness of the survey.<sup>6</sup> From each chosen county, one town with the average development level was selected. From each selected town, three villages were randomly chosen and all returnee entrepreneurs in the selected villages were surveyed.<sup>7</sup> The number of interviewed individuals mostly ranges from 10 to 30 for each village, totaling 3,026 individual cases.

To the best of our knowledge, the China Return Migrant Survey (CRMS) is the most comprehensive survey regarding rural entrepreneurs in China, with more than one half of them being returnee entrepreneurs ([Démurger & Xu, 2011; Han & Cui, 2007](#)). Because we are primarily interested in the return to education for non-agricultural entrepreneurs, we restrict our analysis to those individuals who engaged in non-agricultural entrepreneurial activities. This leaves us with a sample of 2,075 cases.<sup>8</sup> We define entrepreneurs to contain two sub-groups: those who are self-employed without other paid workers ("own-account workers") and those who employ paid workers ("employers"), with the latter group being viewed as more opportunistic and successful ([Gindling & Newhouse, 2014; Parker, 2009](#)).<sup>9</sup> Since the survey was originally intended for understanding entrepreneurial activities of returnees in rural China, it collected detailed information on the incomes of returnee entrepreneurs, such as their self-reported personal annual earnings and received profits from the operation of their businesses. In order to minimize the potential income underreporting problem, the enumerators tried to assure the respondents that the survey information was confidential and would never be divulged to local authorities. In addition, the enumerators were very careful in collecting the entrepreneurial income information by only using their assessment of the current business operation of sampled entrepreneurs.<sup>10</sup> The enumerators attempted to include all incomes related to entrepreneurial activities in the personal annual earnings and also elicited information on the share of profits entrepreneurs have obtained from the business operation in 2006.

We also have information on the education and other demographic characteristics of returnee entrepreneurs. [Table 1](#) reports the summary statistics of main variables used in our analysis. Entrepreneurs have an average of 9.51 years of schooling, with the majority of them having middle school education. They tend to be male and middle-aged. About one quarter of them had self-employment experience before

returning home. Some of them (14.51%) have even learned the managerial skill during the migration period and they on average sent home an annual remittances of 59 thousand yuan before returning, suggesting that some of them have prepared well for the business startup after returning ([Zhao, 2002](#)). Their spouses also have an average of middle school education. The majority of spouses have previous migration experience and about 40% of them currently engaged in off-farm activities.

Compared with own-account workers, employers are more likely to be male and more educated. They seem to prepare better for business startups since they are more likely to have self-employment experience and have accumulated more managerial skills and capital before returning. Accordingly, employers earned much more and reaped more profits from their businesses than own-account workers. However, there are no large differences in spousal education and spouses' labor market performance between own-account workers and employers.

The CRMS survey also asks the respondents why they returned home. As [Table 2](#) shows, about two thirds of return migrant entrepreneurs seek business opportunities in home towns, while family-related reasons are also important for their return migration decision. The results also show that employers are more likely to return home for seeking business opportunities and less likely to return for family reasons such as taking care of other family members and marrying or giving birth. This is consistent with the descriptive evidences in [Table 1](#), suggesting that employers may be more "entrepreneurial" or successful than own-account workers.

### 4. EMPIRICAL STRATEGY

To examine the return to education for return migrant entrepreneurs in rural China, we start with estimating the simple Mincer-type specification by the OLS method ([Mincer, 1974](#)):

$$Y_i = S_i\beta_1 + X_i\beta_2 + \delta_e + \varepsilon_i \quad (1)$$

where  $Y_i$  is the logarithm of entrepreneurs' personal annual earnings in 2006,  $S_i$  represents individual's schooling in years,<sup>11</sup> and  $X_i$  is the set of other pre-determined individual characteristics, including their age, age squared, and marital status. We also include in  $X_i$  several migration-related variables: self-employment experience during the migration period, dummy for mastering the managerial skill during the migration period, and amount of accumulated savings before returning. Those migration-related variables are assumed to be closely related to returnees' business performance because those accumulated human capital and savings are necessary inputs for business startups after returning ([Parker & van Praag, 2006; van Praag et al., 2013; Zhao, 2002](#)). We control for those variables, especially accumulated managerial skill and savings, to account for the fact that determinants of entrepreneurial incomes may differ largely from those of employee's earnings ([Parker & van Praag, 2006; Smith & Metzger, 1998; van Praag et al., 2013](#)).<sup>12</sup> But those variables may be endogenous because more able returnee entrepreneurs are more likely to accumulate human capital or savings during the migration and they may also perform better after returning. Therefore, in the following analysis we present the results with and without those migration-related variables and we prefer the specifications without migration-related variables. Finally, to account for unobserved regional factors that may be correlated both with individual education and with

Table 1. *Summary statistics of main variables*

	Total	Own-account workers	Employers
<i>Entrepreneurial income</i>			
Personal annual earnings (1,000 <i>yuan</i> )	88.27	23.18	159.89
Received net profit (1,000 <i>yuan</i> )	59.09	16.63	96.89
<i>Education</i>			
Years of schooling	9.51	9.25	9.79
Elementary school and below (%)	9.50	11.22	7.61
Middle school (%)	63.60	67.63	59.19
High school (%)	22.78	17.72	28.32
Professional school (%)	2.57	2.88	2.23
College (%)	1.07	0.09	2.13
Age	38.69	37.55	39.94
Male (%)	90.70	86.73	95.05
Married (%)	97.72	96.67	98.88
<i>Migration experience</i>			
Whether to have accumulated managerial skill before returning (%)	14.51	10.05	19.39
Amount of yearly remittances before returning (1,000 <i>yuan</i> )	58.74	56.72	60.95
Self-employment during the migration (%)	25.72	22.07	29.66
<i>Spousal education</i>			
Years of schooling	8.61	8.54	8.69
Elementary school and below (%)	19.45	20.81	18.01
Middle school (%)	65.41	66.01	64.78
High school (%)	9.75	8.50	11.09
Professional school (%)	1.74	1.74	1.73
College (%)	1.12	0.76	1.50
Whether spouse migrated before (%)	77.52	76.79	78.31
Whether spouse currently engaged in off-farm activities (%)	40.58	41.94	39.09
Observations	2,075	1,085	990

Notes: 1 *yuan* = about 0.16 US dollar. The amount of yearly remittances before returning has been deflated to the year 2006 by using historical CPIs.

Table 2. *Reasons for returning (%)*

	Total	Own-account workers	Employers
Seeking business opportunities at home	65.98	56.61	76.17
Taking care of other family members	15.81	21.65	9.47
Marrying or giving birth at home	7.22	9.65	4.58
Having difficulties in finding a job in cities	5.03	5.43	4.58
Being too old	4.20	3.94	4.48
Land farming	0.34	0.47	0.20
Being ill or wounded	0.29	0.28	0.31
Others	1.12	1.97	0.20
Observations	2,049	1,067	982

entrepreneurial incomes, we include village fixed effects ( $\delta_v$ ) in the model.<sup>13</sup>

However, the OLS estimates may still suffer the omitted variable bias because some unobserved individual factors may be correlated with both one's schooling and entrepreneurial performance. For example, more able people tend to be more educated and they are also expected to perform better as entrepreneurs. As a result, the unobserved ability may lead to an upward bias for the coefficient on the schooling variable ( $\beta_1$ ). But other unobserved individual factors such as risk attitudes may be negatively correlated with one's schooling and at the same time be positively correlated with entrepreneurial performance (Barsky, Juster, Kimball, & Shapiro, 1997; Cucculelli & Ermini, 2013; Outreville, 2014; Tan, 2001). Therefore, the direction of the estimation bias induced by unobserved individual factors can not be *a priori* determined.

On the other hand, the OLS estimates may be downward biased due to the measurement error associated with the education variable used in this paper if we assume that the measurement errors are classical. The schooling information in the CRMS dataset is provided in degree levels rather than in years. For example, people may report their education level as middle school even if they have dropped out of school before middle school graduation.<sup>14</sup>

The existing literature attempts to use the panel data (including twins data) or exploits exogenous variation in education due to some natural experiments (for example, the staggered rollout of compulsory education laws) to establish the causal relationship between schooling and earnings (Card, 1999; Liu & Zhang, 2013). For example, in the setting of China, Li *et al.* (2012) use the twins dataset to estimate the return to education for urban employees, but the dataset is



not publicly available. Fang *et al.* (2012) exploit the variation in the dates of effective implementation of China's compulsory education law across provinces to instrument the education, but this instrument may not be credible because the law actually allows local county governments to decide the timing of implementation of the nine years of compulsory education in accordance with local conditions even after the law was officially announced by provincial governments.

A good instrument variable should be correlated with one's education, but not directly affect one's entrepreneurial incomes, except through the channel of one's education. In this paper, we use women's education to instrument husbands' education and our main analysis is restricted to males.<sup>15</sup> We argue that women's education should be a valid instrument for husbands' education in the setting of rural China. First of all, it is expected that spousal education is positively correlated with one's schooling due to the assortative nature of marriage (Arabsheibani & Mussurov, 2007; Chen & Hamori, 2009; Pencavel, 1998; Trostel, Walker, & Woolley, 2002), thus satisfying the relevance requirement. Nevertheless, people may cast doubts on the validity of spousal education as the instrument due to its cross-productivity effect. This effect suggests that spousal education may directly affect one's income by increasing one's human capital that is not fully captured by one's education (Huang *et al.*, 2009). For instance, wives may share with their husbands the ideas that they learn from their labor market activities, and those ideas may help promote entrepreneurial activities. Therefore, using women's education as the instrument for husbands' education may violate the exclusion restriction requirement.

However, this is arguably a minor issue when we limit our analysis to married males in rural China, where there is a long tradition of clarified gender roles in the family – “*nan zhu nei nv zhu wai*” (men's responsibilities are interacting with people outside the family while women's responsibilities are dealing with affairs within the family including doing house work and providing care for children or elders). Although there has been an overall increase in the female off-farm participation rate in the past decades, most of the increase has been driven by the migration of unmarried young women (Fan, 2003; Zhang *et al.*, 2004). For married women who do not migrate and stay in rural regions, their main responsibilities are dealing with affairs within the family or farming.<sup>16</sup> According to the survey results by Zhang *et al.* (2004), the off-farm labor participation rate was about 20% for rural women who are aged between 36 and 50 years old in the 2000s. If we limit the sample to the women who do not migrate out of the home village, the off-farm labor participation rate should be even much smaller for rural women.

Our calculation based on the information from the CRMS survey also provides suggestive support to the above argument. This survey asks interviewed entrepreneurs to evaluate the role that spouses played in business activities. The simple calculation exercise shows that only about 20% of women played an active role in their husbands' businesses, with the rest being of limited help to or having no direct relationship with their husbands' businesses. The latter group of rural wives was engaged in farming, house work, or taking care of kids and elders, suggesting their marginal roles in entrepreneurial activities and reflecting the long tradition of male dominance in Chinese society (de Brauw *et al.*, 2013; Fan, 2003; Huang *et al.*, 2009; Ma, 2001).

Furthermore, by applying the Bayesian analysis, Hoogerheide *et al.* (2012) suggest that the use of family background variables as instruments in income regression may not lead to severe estimation bias even if the strict exclusion

restriction assumption is substantially violated. They show that the size of the bias is typically smaller than the width of the 95% posterior interval of the coefficient on schooling in the IV model. The validity of using spousal education as the IV for one's education has also been confirmed in the context of China (Wang, 2013). In addition, by using the China's twins dataset, Huang *et al.* (2009) find that the direct effect of spousal education on earnings (the cross-productivity effect) mainly runs from husbands to wives, but not the other way around. That is, spousal education is a valid IV for the male sample even if it may be problematic for the female sample. The above studies give us confidence in using women's education to instrument their husbands' education in the setting of rural China.

Finally, to further argue against the possibility that women's education directly affects their husbands' entrepreneurial activities through their off-farm labor market activities, we additionally control for women's previous migration experience and the dummy for whether women are currently engaged in off-farm activities. If our estimates of the return to education for male entrepreneurs are insensitive to the inclusion of the two variables, and the estimated coefficients on the two variables are small, this will suggest that the channel of women's labor market activities is unlikely to be a major driver of our estimated return to education for male entrepreneurs.

## 5. EMPIRICAL RESULTS

In this section, we first examine the return to education for China's male returnee entrepreneurs using the OLS method. Second, we report the IV results using spousal education as the instrument for one's schooling. Third, we show the heterogeneity of the return to education for the two groups of entrepreneurs: own-account workers and employers. Finally, we use received net profits instead of personal annual earnings as the outcome variable to show the robustness of our results. To account for possible correlation between model errors across individuals within the same village, the standard errors of all regression coefficients are clustered at the village level.

### (a) OLS results

Table 3 reports the OLS results with the dependent variable being the logarithm of entrepreneurs' personal annual earnings. As indicated by the first column, one additional year of schooling leads to 11.4% rise in personal annual earnings.<sup>17</sup> When we control for village fixed effects in the equation, the estimated return to one year of education drops largely to 7.8%. This may suggest that some unobserved time-invariant village-level factors (for example, local infrastructure conditions) are correlated with both one's schooling and entrepreneurial activities.

Except for their education, other human capital such as managerial skills and cash capital may also be important for entrepreneurial success (Parker & van Praag, 2006; Smith & Metzger, 1998). In Columns 3–5, we add the three migration-related variables into the model. The results show that both accumulated human capital and savings during the migration period are important determinants of entrepreneurial incomes. Even after accounting for those productive inputs, the return to one year of schooling remains almost unchanged. However, because those migration-related variables may be endogenous as we mentioned in the method section, we will

Table 3. OLS estimates of the return to education for returnee entrepreneurs

	(1)	(2)	(3)	(4)	(5)
Years of schooling	0.108*** (0.016)	0.075*** (0.016)	0.072*** (0.016)	0.070*** (0.016)	0.069*** (0.016)
Age	0.066** (0.027)	0.029 (0.024)	0.028 (0.024)	0.016 (0.026)	0.016 (0.026)
Age squared/100	-0.061* (0.033)	-0.022 (0.030)	-0.022 (0.030)	-0.013 (0.033)	-0.013 (0.033)
Married	0.114 (0.195)	0.084 (0.186)	0.096 (0.183)	0.053 (0.199)	0.041 (0.196)
<i>Migration experience</i>					
Whether to have accumulated managerial skill			0.239*** (0.086)	0.143* (0.083)	0.117 (0.085)
Log of yearly remittances before returning				0.420*** (0.069)	0.406*** (0.069)
Self-employment during the migration					0.126 (0.079)
Village fixed effects	No	Yes	Yes	Yes	Yes
Constant	7.525*** (0.486)	10.452*** (0.460)	10.439*** (0.462)	10.407*** (0.502)	10.439*** (0.508)
R-squared	0.048	0.486	0.490	0.520	0.524
Observations	1,783	1,783	1,783	1,720	1,687

Notes: Standard deviations are in parentheses. The standard errors of all regression coefficients are clustered at the village level.

\*\*\* Significant at 1%.

\*\* Significant at 5%.

\* Significant at 10%.

present the results with and without those variables in the following analysis.<sup>18</sup>

The above estimates for returnee entrepreneurs are higher than other studies that use the OLS method to estimate returns to education for off-farm wage workers in rural

China (Liu & Zhang, 2013). The estimates are also larger than the average return to education for entrepreneurs (5.5%) in other developing countries (van der Sluis *et al.*, 2005). The higher estimated returns to education documented in this paper may stem from the fact that our returnee entre-

Table 4. IV estimates of the return to education for returnee entrepreneurs

	(1)	(2)	(3)	(4)	(5)	(6)
Years of schooling	0.172*** (0.066)	0.171** (0.068)	0.164** (0.066)	0.160** (0.068)	0.170*** (0.065)	0.170** (0.067)
Age	0.017 (0.026)	0.006 (0.027)	0.019 (0.026)	0.006 (0.028)	0.018 (0.025)	0.007 (0.027)
Age squared/100	-0.008 (0.031)	0.002 (0.034)	-0.009 (0.032)	0.001 (0.034)	-0.009 (0.031)	0.000 (0.034)
<i>Migration experience</i>						
Whether to have accumulated managerial skill		0.096 (0.084)		0.110 (0.084)		0.098 (0.084)
Log of yearly remittances before returning		0.350*** (0.067)		0.359*** (0.064)		0.350*** (0.067)
Self-employment during the migration		0.088 (0.083)		0.085 (0.080)		0.083 (0.083)
<i>Spousal off-farm activities</i>						
Whether spouse migrated before			0.050 (0.086)	0.071 (0.084)		
Whether spouse is currently engaged in off-farm activities					0.057 (0.060)	0.066 (0.060)
Village fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Constant	9.578*** (0.667)	9.503*** (0.701)	9.542*** (0.655)	9.502*** (0.693)	9.520*** (0.664)	9.437*** (0.698)
R-squared	0.466	0.502	0.473	0.511	0.468	0.503
Observations	1,549	1,479	1,529	1,460	1,549	1,479

Notes: Standard deviations are in parentheses. The standard errors of all regression coefficients are clustered at the village level.

\*\*\* Significant at 1%.

\*\* Significant at 5%.

preneur sample contains a relatively larger proportion (47.7%) of employers who may be more productive than own-account workers. But our OLS estimates are somewhat comparable to the studies that estimate returns to education for China's rural migrants. For example, [de Brauw and Rozelle \(2008\)](#) show that the return to one additional year of education is 8% for rural migrants though the estimated return is only 3.3% for local off-farm wage workers. However, because the OLS estimates of the return to education may suffer endogeneity problems, we next turn to the IV results.

#### (b) IV results

This subsection presents the IV estimation of returns to education for returnee entrepreneurs. The first-stage estimation results are provided in [Table 7](#) of the [Appendix](#). As expected, spousal education is positively correlated with one's education, and the first-stage *F* statistics are more than 50, much higher than the rule-of-thumb threshold value of 10 proposed by [Staiger and Stock \(1997\)](#).

As shown by the first two columns of [Table 4](#), even after controlling for other inputs (managerial skill and savings), the IV estimates of the return to education for returnee entrepreneurs are still more than double the corresponding OLS estimates in [Table 3](#).<sup>19</sup> According to our preferred specification in Column 1, the return to one additional year of schooling is 18.8% for returnee entrepreneurs. As we

mentioned in the method section, the higher IV estimates of the return to education may reflect the downward OLS estimation bias. One possible underlying reason is that education is inversely associated with some unobserved individual characteristics that lead to successful entrepreneurship. For example, the empirical evidences ([Barsky et al., 1997](#); [Outreville, 2014](#)) show that more risk-loving individuals are likely to leave schooling earlier before they attend college. On the other hand, more risk-loving individuals are more likely to succeed in entrepreneurship, especially in transition economies like China ([Cucculelli & Ermini, 2013](#); [Tan, 2001](#)). Another possible reason is related to the attenuation bias due to measurement errors if we assume that the measurement errors are classical. The schooling information used in this paper is provided in degree levels rather than in years, therefore the measurement error might be more likely than in the case of reported years of schooling. For example, individuals may report their education level as middle school even if they have dropped out of school before middle school graduation. Finally, the much higher IV estimates may suggest that the LATE (Local Average Treatment Effect) is much larger for the "treated" subgroup whose education is closely related to the education of their wives.

Our IV estimated return to education for entrepreneurs are also much larger than the estimated return to education for wage workers in China ([de Brauw & Rozelle, 2008](#); [Liu & Zhang, 2013](#)). Except for the fact that we have accounted for the endogeneity of the education variable, at least the following

Table 5. *Estimates of the return to education for own-account workers vs. employers*

	OLS		IV	
	(1)	(2)	(3)	(4)
<i>Panel A: own-account workers</i>				
Years of schooling	0.031** (0.015)	0.029* (0.016)	0.082 (0.064)	0.074 (0.068)
Migration experience				
Whether to have accumulated managerial skill		0.114 (0.111)		0.064 (0.105)
Log of yearly remittances before returning		0.225** (0.102)		0.217** (0.095)
Self-employment during the migration		-0.060 (0.089)		-0.106 (0.083)
<i>R</i> -squared	0.493	0.519	0.480	0.513
Observations	898	845	764	728
<i>Panel B: employers</i>				
Years of schooling	0.074*** (0.025)	0.072*** (0.025)	0.232** (0.104)	0.233** (0.106)
Migration experience				
Whether to have accumulated managerial skill		0.102 (0.138)		0.075 (0.133)
Log of yearly remittances before returning		0.347*** (0.092)		0.280*** (0.092)
Self-employment during the migration		0.207 (0.151)		0.135 (0.153)
<i>R</i> -squared	0.544	0.558	0.499	0.520
Observations	885	842	785	751

Notes: We control for age, age squared, and village fixed effects for all specifications. Standard deviations are in parentheses. The standard errors of all regression coefficients are clustered at the village level.

\*\*\* Significant at 1%.

\*\* Significant at 5%.

\* Significant at 10%.

three reasons may merit attention.<sup>20</sup> First, entrepreneurs usually work longer per day than wage workers, but our income measure is based on the annual earnings, which do not account for the difference in work hours between the two groups. This may lead to overestimated returns to education for entrepreneurs (de Brauw & Rozelle, 2008). Second, our empirical analysis is based on the returnee entrepreneur sample who are likely to be positively selected compared with non-migrants in rural China (Zhao, 2002). Therefore, the returns to education for those returnees may be higher than for non-migrants due to the positive migration selection. Finally, most previous studies on China's returns to education use data collected before 2000, and the return to education has increased as the economic reform progresses (Liu & Zhang, 2013). Therefore, the gap

between our estimates and previous studies on wage workers may be partially due to a timing effect.

Finally, we attempt to check whether women's education directly affects their husbands' entrepreneurial performance by including women's previous migration experience and current off-farm labor participation in the model. As shown in the final four columns of Table 4, our estimated return to education remains almost unchanged and the estimated coefficients on the two variables are small and statistically insignificant. This indicates that the channel of women's labor market activities is unlikely to be a major driver of our estimated return to education for male entrepreneurs, suggesting the validity of using women's education as the IV for their husbands' schooling.

Table 6. *Estimates of the return to education for entrepreneurs: received net profits*

	OLS		IV	
	(1)	(2)	(3)	(4)
<i>Panel A: All cases</i>				
Years of schooling	0.075*** (0.021)	0.058*** (0.020)	0.119* (0.061)	0.104* (0.062)
Migration experience				
Whether to have accumulated managerial skill		0.305*** (0.105)		0.211** (0.087)
Log of yearly remittances before returning		0.329*** (0.079)		0.314*** (0.075)
Self-employment during the migration		0.121 (0.079)		0.090 (0.075)
R-squared	0.509	0.553	0.513	0.549
Observations	1,388	1,325	1,231	1,182
<i>Panel B: Own-account workers</i>				
Years of schooling	0.010 (0.015)	0.008 (0.016)	0.048 (0.060)	0.056 (0.063)
Migration experience				
Whether to have accumulated managerial skill		0.114 (0.093)		0.065 (0.095)
Log of yearly remittances before returning		0.080 (0.066)		0.087 (0.062)
Self-employment during the migration		-0.105 (0.067)		-0.070 (0.067)
R-squared	0.410	0.413	0.394	0.394
Observations	629	597	547	523
<i>Panel C: employers</i>				
Years of schooling	0.080** (0.031)	0.059* (0.031)	0.135* (0.071)	0.092 (0.072)
Migration experience				
Whether to have accumulated managerial skill		0.355** (0.146)		0.233* (0.133)
Log of yearly remittances before returning		0.325*** (0.117)		0.354*** (0.111)
Self-employment during the migration		0.219* (0.116)		0.178* (0.108)
R-squared	0.589	0.603	0.547	0.590
Observations	759	728	684	659

Notes: We control for age, age squared, and village fixed effects for all specifications. Standard deviations are in parentheses. The standard errors of all regression coefficients are clustered at the village level.

\*\*\* Significant at 1%.

\*\* Significant at 5%.

\* Significant at 10%.



(c) *Own-account workers vs. employers with paid workers*

In this subsection, we explore the heterogeneity of the returns to education for two subgroups of entrepreneurs: own-account workers and employers, with the latter group being viewed as more “entrepreneurial” or successful (Fossen & Buttner, 2013; Gindling & Newhouse, 2014; Parker, 2009).

As exhibited by the Panel A of Table 5, the OLS estimates of the return to education for own-account workers are only about 3%. When we account for the endogeneity of men’s schooling, the IV estimates increase to 7–8%, but they are statistically insignificant due to the reduced precision. By contrast, as shown in the Panel B, the OLS estimates of the return to education for employers are about 7%, more than double those for own-account workers. When we account for the endogeneity problem, the IV estimates increase to about 26%, still much higher than those for own-account workers. The above results are robust to the inclusion of migration-related variables such as accumulated managerial skill and savings before returning.

Therefore, pooling the two types of entrepreneurs may underestimate the value of education for employers’ business success and overestimate the role of education for own-account workers (Fossen & Buttner, 2013). As Table 2 (in Section 3) shows, own-account workers are more likely to return home for family reasons such as taking care of other family members and marrying or giving birth, while employers are more likely to return home for seeking business opportunities. This suggests that employers may make their specific human capital, including their formal education, more productive than own-account workers.

(d) *Net profit as the outcome variable*

In rural China, people tend to engage in both farming and off-farm activities, and thus their income sources may not be only limited to the benefits from running the business, especially for own-account workers (Gindling & Newhouse, 2014). Therefore, the self-reported personal annual earnings variable used in this paper may exaggerate the benefits from entrepreneurial activities although the survey enumerators have tried to collect income information only relating to entrepreneurial activities. On the other hand, the net profit from the business operation is also a widely used measure of entrepreneurial income (Hamilton, 2000; Parker, 2009; van der Sluis *et al.*, 2008). In addition to the information on personal annual earnings, the CRMS survey also asked the respondents about how much they received from the enterprise profits. Therefore, in this subsection we use instead the received net profit indicator as the outcome variable and the estimates may serve as the lower bound of the return to education (Hamilton, 2000; Parker, 2009).<sup>21</sup>

As indicated by the Panel A of Table 6, after accounting for the endogeneity problem, the return to one additional year of education for rural entrepreneurs is 12.6%, much lower than the previous results reported in Table 4.<sup>22</sup> The results are consistent with our expectation that received net profits may only be part of one’s annual earnings. When we take into account the heterogeneity of entrepreneurs, the results show that the return to education is 14.4% for employers, still much higher than that for own-account workers. It is also interesting to note that accumulated human capital and savings during the migration period seem to contribute a lot to business success

of employers after returning, but do not affect the business performance of own-account workers.

To summarize, the OLS estimate of the return to one additional year of schooling ranges between 6% and 7.8% for entrepreneurs in rural China. After using women’s education to instrument their husbands’ schooling, our results show that the return to education for China’s rural entrepreneurs ranges between 12.6% and 18.8%, much larger than the OLS estimates and than the estimated returns to education for off-farm wage workers documented in the literature. We also find that the return to education for employers more than doubles that for own-account workers in rural China. The estimated return to one year of schooling is between 14.5% and 26.1% for employers, but is only between 4.9% and 8.5% for own-account workers, highlighting the importance of differentiating the two groups of entrepreneurs when studying the return to education.

## 6. CONCLUSIONS

Human capital and entrepreneurship are both regarded as important growth engines for developing countries. However, little attention has been given to the relationship between education and entrepreneurship in developing countries and there are no studies concerning the return to education for entrepreneurs in the setting of China. This paper attempts to fill this gap by examining the return to education for entrepreneurs in rural China with a unique return migrant survey dataset.

By exploiting the unique culture of male dominance in Chinese society, we use women’s education to instrument their husbands’ schooling. Our results show that after accounting for the endogeneity problem, the return to one additional year of schooling for China’s return migrant entrepreneurs ranges between 12.6% and 18.8%, much larger than the estimated returns to education for employees documented in the literature. We also find that the return to education for employers more than doubles that for own-account workers in rural China. The estimated return to one year of schooling is between 14.5% and 26.1% for employers, but is only between 4.9% and 8.5% for own-account workers, highlighting the importance of differentiating the two groups when studying the return to education for entrepreneurs.

We view this paper as the beginning of an inquiry into the relationship between human capital and entrepreneurship in China. Although our results are not directly comparable to estimates in the setting of other countries due to different backgrounds and different empirical methods employed in related studies, some interesting findings are still worth stressing. According to the literature review by van der Sluis *et al.* (2005), the return to education for entrepreneurs (5.5%) is on average lower than the return to education for wage earners (7.2–11%) in other developing countries. However, our results show that the return to education for entrepreneurs is much higher than the average return to education for off-farm wage earners in rural China documented in the literature. Except for the timing effect,<sup>23</sup> the other two possible reasons for the higher return to education for entrepreneurs in rural China may relate to the annual income measures and the selective returnee sample used in this paper.<sup>24</sup> In future work, we anticipate using less selective sample and more detailed labor market information to provide a further understanding of entrepreneurial activities in rural China.

## NOTES

1. For example, Bates (1990), Evans and Leighton (1989), and van Praag, van Witteloostuijn, and van der Sluis (2013) for U.S.; Fossen and Buttner (2013) and García-Maina and Montuenga-Gómez (2005) for Europe. See van der Sluis *et al.* (2008) for a detailed literature review on developed countries.
2. One possible reason for the few studies is the difficulty with correctly measuring entrepreneurial incomes in developing countries (De Mel, McKenzie, & Woodruff, 2009; García-Maina & Montuenga-Gómez, 2005). As we mentioned in the data section, the survey used in this paper has carefully collected the data on incomes. Another possible reason may be that it is difficult to measure the return only to entrepreneurs' education and not to other productive inputs such as managerial skills and capital (Parker & van Praag, 2006). We have tried to account for this concern in the empirical analysis.
3. See Liu and Zhang (2013) for a recent review of the return to education for wage workers in China.
4. See Liu and Zhang (2013) for an extensive literature review on possible natural experiments used when studying China's return to education. For example, Fang, Eggleston, Rizzo, Rozelle, and Zeckhauser (2012) exploit the variation in the dates of effective implementation of China's compulsory education law across provinces to instrument the education, but this instrument may not be credible because the law actually allows local county governments to decide the timing of implementation in accordance with local conditions.
5. The three missing province-level regions are Beijing, Shanghai, and Tibet. Beijing and Shanghai are megacities with few rural people, while Tibet is an autonomous region with a small population of less than three million. Hence, neglecting these three regions will not affect the national representativeness of the survey because we are interested in returnee entrepreneurs in rural areas.
6. Specifically, for those provinces with the rural population of more than 40 million, five or six counties were selected, while one or two counties were selected for those provinces with the rural population of less than five million. For the rest of the provinces, three or four counties were chosen.
7. This survey also interviewed some returnees who were not entrepreneurs for comparison purposes.
8. The dropped sample includes 720 returnees who are engaged in agricultural production, 127 returnees who were wage earners, and 104 returnees who had missing information on their job statuses.
9. In developing countries, jobs show a clear pecking order, with education and household income highest for employers, followed by wage workers and non-agricultural own-account workers (Gindling & Newhouse, 2014).
10. However, just like other existing surveys (Bound, Brown, & Mathiowetz, 2001, chap. 59), the income underreporting problem in our survey cannot be avoided and due caution should be exercised when interpreting our empirical findings. In fact, the income underreporting rates for non-farm entrepreneurs in developed countries are usually more than 30% according to the literature review by Parker (2009), and this figure might be even higher in developing countries like China due to the less developed information collection infrastructure.
11. The survey provides information on education levels. According to China's educational system, we assign 16 years to college graduates, 12 years to high school or professional school graduates, 9 years to middle school graduates, 6 years to elementary school graduates, and 0 year to illiterates or semi-illiterates. Considering the possibility that the return to education may not be perfectly linear for years of schooling, we also repeat the analysis with education level dummies. The results are not presented here due to the space limit. They are available upon request.
12. For example, the capital used in the business will affect entrepreneurial performance and should also be affected by the education of entrepreneurs. Not controlling for such factors will result in omitted variable bias. But accumulated savings may not be important for those off-farm wage workers or agricultural workers.
13. For instance, some villages have better infrastructure conditions, including school facilities, which may benefit both individual schooling and local entrepreneurial activities.
14. That is, we will have the nine years of schooling for those people according to the calculation method in footnote 9, but the "true" years of schooling may be seven or eight.
15. We restrict the analysis to male entrepreneurs because (1) female entrepreneurs only constitute a very small share (less than 10%) of returnee entrepreneurs; and (2) as we argue next, women's education is a valid instrument for husbands' schooling, but not vice versa.
16. Since the late 1990s, women have been assuming more roles in both supplying farm labor and managing farms. Now China's agriculture is more likely to be managed by women, indicating the trend of agricultural feminization in recent years (de Brauw, Huang, Zhang, & Rozelle, 2013).
17. We calculate the accurate estimated return to education by using  $\exp(0.108) - 1$ . This calculation method also applies to other estimates of returns to education in the following analysis.
18. The accumulated skills or wealth may also reflect the channels through which the education affects entrepreneurial incomes. For example, the regression of accumulated managerial skills on individual education shows that one more year of schooling is associated with an increase in the proportion of accumulating managerial skills by 1.4%, suggesting that education may improve the productivity of returnee entrepreneurs. A back-of-an-envelope calculation suggests that a high school graduate is about 8% ( $= 6 \times 1.4\%$ ) more likely to accumulate managerial skills than a primary school graduate. This productiveness enhancing effect is rather large considering that only 14.3% of sampled returnee entrepreneurs claim that they have accumulated managerial skills during the migration period.
19. The existing literature shows that the IV estimates of returns to education are usually higher than the OLS estimates (Card, 2001; van der Sluis *et al.*, 2008).
20. It should also be noted that our IV analysis is limited to male entrepreneurs. If the return to education is larger for male entrepreneurs, then our estimates will be overestimated when compared with other studies. But the literature shows that the return to education is larger for female wage workers than for males (Liu & Zhang, 2013).

21. However, only about 78% (1,388 out of 1,783) of male entrepreneur respondents reported their incomes from the enterprise profits. Those who didn't report their net profits from running the business might be those entrepreneurs whose net profits were negative or very large. They are reluctant to report the relevant information to strangers like enumerators due to some psychological reasons. It appears that there are no clear-cut reasons for the high no-response rate of net profits in our survey and no judgment about the direction of measurement error bias can be made. Moreover, the reported net profits may be more likely to suffer from the underreporting error than salaries included in the reported personal earnings.

22. Column 3 of Table 6 is our preferred specification.

23. Most previous studies on China's returns to education for wage workers use data collected before 2000, and the return to education has increased as the economic reform progresses (Liu & Zhang, 2013). Therefore, the gap between our estimates and previous studies on wage workers may be partially due to a timing effect.

24. Entrepreneurs usually work longer per day than wage workers, therefore we may overestimate the return to education for entrepreneurs based on annual earnings rather than on hourly earnings. Another important possible reason might be due to the returnee survey data used in this paper as returnees are usually more competitive than their non-migrant counterparts in the labor market (Zhao, 2002).

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## APPENDIX

Table 7. The first-stage results of IV estimation

	(1)	(2)
Years of schooling	0.271*** (0.036)	0.255*** (0.036)
Age	0.177*** (0.043)	0.159*** (0.047)
Age squared/100	−0.209*** (0.051)	−0.188*** (0.056)
<i>Migration experience</i>		
Whether to have accumulated managerial skill		0.151 (0.162)
Log of yearly remittances before returning		0.124 (0.131)
Self-employment during the migration		0.106 (0.162)
Village fixed effects	Yes	Yes
Constant	3.933*** (0.997)	4.303*** (1.018)
First-stage <i>F</i> statistic	57.88	51.62
<i>R</i> -squared	0.319	0.317
Observations	1,593	1,511

Notes: Standard deviations are in parentheses. The standard errors of all regression coefficients are clustered at the village level.

\*\*\* Significant at 1%.