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Is the income difference affecting off-farm employment decision?

Evidence from Chinese households

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Abstract

China is experiencing a rapid economic transformation, which witnesses a vast number of labourers moving out of agricultural sectors. In such a transformation, the effect of spatial income variance on labour's off-farm work decision is still unclear. Based on the cross-sectional data from the national survey conducted in 2012, this study finds the effect on two kinds of off-farm employment, wage employment and self-employment. The empirical result shows that local income will significantly influence both types of off-farm employment, while it positively affects the decision towards wage employment and negatively affects those in self-employment.

Keywords: Off-farm working, Agricultural Sector, Local income, Multinomial Probit Model

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Remaining mistakes are, however, my own.

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Contents

1	INTRODUCTION	- 1 -
2	BACKGROUND	- 3 -
2.1	Agricultural sector and off-farm works in China.....	- 3 -
2.2	Income differences and spatial variance in China	- 4 -
3	THEORY & PREVIOUS RESEARCH.....	- 5 -
3.1	Theories about off-farm work decisions.....	- 5 -
3.2	Off-farm work in a global context.....	- 6 -
3.3	Off-farm works in the context of China	- 7 -
3.4	Hypothesis	- 7 -
4	METHODOLOGY	- 10 -
4.1	Theoretical framework.....	- 10 -
4.2	Data.....	- 11 -
4.3	Off-farm employment in samples	- 12 -
4.4	Variables	- 13 -
4.4.1	Dependent variables	- 13 -
4.4.2	Independent variable	- 14 -
4.4.3	Control variables	- 15 -
4.5	Model Specification	- 18 -
5	ESTIMATION RESULT.....	- 18 -
5.1	Wage employment	- 18 -
5.2	Self-employment	- 20 -
5.3	Robustness	- 23 -
5.3.1	Lagged local average income	- 23 -
5.3.2	Specific regions excluded	- 24 -
6	CONCLUSION	- 28 -
7	REFERENCES.....	- 31 -
	Appendix A. Correlation Matrix	42
	Appendix B. Summary statistics to variables	43

1 INTRODUCTION

Since China embarked on economic reform, the inequality has increased rapidly. The Gini coefficient in 1988 was 0.38 and rose rapidly to almost 0.5 nowadays (Knight, 2013). The inequality, especially between rural and urban areas, is significant and expanding (Su & Heshmati, 2013). How to deal with the inequality between rural and urban region in China raises urgent concerns.

It becomes a consensus that off-farm employment is important for increasing rural labour's income and balancing its distribution (International Labour Conference, 2008; Knight, 2013). The off-farm employment not only increases rural labour's income but also meets the demand of labour-intensive enterprises (Du et al., 2005; Zhang et al., 2006; Lin, 2011); hence, creating non-agricultural employment for peasants can doubtlessly promote poverty reduction (International Labour Conference, 2008).

In addition, economic development in a sense can be defined by the reallocation of labour from the agricultural to more productive sectors (Huffman, 1911). More farmers nowadays work in the factories, set up their own businesses or move to cities. Whereas by the mid-2000s, estimated by Zhang et al. (2008), 265 million rural labour force had off-farm employment. In 2014, this number increased to 273.95 million with 168.21 million working out of their original residence and 105.74 million working locally (National Bureau of Statistics of China, 2015).

Following Todaro (1969), the expected income differences determine the allocation of labour between farming activities and off-farm work. Peasants can notice their expected income differences, by comparing the income from farming activities, with wage or profit procuring from off-farm employment. This in turn allows for a comparison of the resulting income of the available employment options, relative to the local average income.

As mentioned by Wang et al. (2011), the number of farmers participating in self-employment declined while wage employment increased steadily from 1990s to 2000s in rural China, as economy advanced and income levels increased throughout the country. Being the most intuitionistic factor affecting the expectation of income differences, the

average income, mainly taken as a given factor, should be paid more attention to. Exploiting Todaro's (1969) theory, this study is guided by the following question: "What is the effect of local average income to a labour's decision to participate in the off-farm works in China?" In addition, as showed by Shi et al (2007), factors affecting agricultural, wage employment, self-employment and migration behave differently, where the variable of household resources is only significant to the wage employment. This divergence is later confirmed by Rijkers and Costa (2012). These findings raise the subordinated question as addressed below: Does local average income behave differently towards off-farm employment and self-employment?

This study applies the empirical strategy and data presented in the national yearbook and survey conducted in 2012. The data is collected from China Labour Force Dynamic Survey, a nation-wide survey, conducted by Sun Yat-sen University in 2012. Additional data for the local average income is collected from the Chinese Statistics Yearbook 2013 (NBS, 2014).

The results from probit analysis show that the local average income significantly affects the labour's decision participating in off-farm work. In addition, rural labour living in the area with higher income per capita will are more likely to participate in wage employment but less likely to run their own business. Consequently, this can help the government to formulate and implement targeted policies in order to reduce rural poverty.

This paper is constructed as follows: Section 2 provides a brief introduction to the background information about the Chinese agricultural sector and off farm work in a Chinese context. Section 3 presents the theoretical foundation on labour movement and off-farm work. Section 4 introduces the dataset and provides descriptive statistics. The results are presented in section 5. Finally, a conclusion is give in section 6.

2 BACKGROUND

2.1 Agricultural sector and off-farm works in China

Before the Chinese Economic Reform in 1978, communism was the dominant ideology and the system of collectivization had been implemented since 1952 (Miller et al., 2011). This system discriminated against the agricultural sector in order to achieve rapid modernization and industrialization (Lin, 2011). Under this system, farmers were only allowed to participate in agricultural activities and labour mobility was hindered (Yang, 1997). In addition, Alchian and Demsetz (1972) found the incentive of workers working in a team will be lower, which has been modelled by Lin (1988). Agricultural productivity grew by 2.4% annually in the pre-reform era from 1952 to 1978, only 0.4% higher than the population growth rate (NBS, 1993), which strongly motivates Chinese rural labour to move out of the agricultural sector.

On the one side, the reform has improved the agricultural productivity and forged a new beginning for China's development. In 1983, collectivization was abolished, and the Household Responsibility System, which grants the farmers freedom to cultivate crops as they wish, was given full official recognition. Agricultural productivity was remarkably promoted whilst the growth rate rocketed from 2.9 percent before 1978 to 7.7 percent in 1990s (NBS, 1993), and it is measured to be a little bit lower yet still growing at respectable rates (Fan, 1997). In addition, profits could be claimed and labour mobility has been enhanced since then.

On the other side, the reform has promoted the labour mobility. In 1983, Chinese government first started to allow farmers to move out of provinces and transact their products in urban areas (He, 1987). One year later, the government motivated agricultural labour to seize opportunities in nearby towns or cities (FBIS, 1984). Until 1988, the central government officially allowed the rural citizens to move to wherever they wanted, on the condition they could earn their living or do business in urban cities (Forbes & Linge, 1990). Since then, the number of farmers engaged in off-farm employment rocketed dramatically. Estimated by Undie et al. (2009), 136 million people have moved from their original

residences. Knight and Song (1995) estimate the stock of rural migrants in cities in 1993 was about 39 million. According to the National Bureau of Statistics of China (2015), the total stock of rural workers (nong min gong) and citizens with rural Hukou yet working in non-agricultural sectors in 2014 was 273.95 million.

2.2 Income differences and spatial variance in China

China has a vast territory with various geographical characteristics, which leads to a huge spatial variation and income differences across provinces. The most developed and advanced areas are within the eastern part of China. In 2014, the gross domestic product (GDP) of Guangdong and Jiangsu Provinces were over 2,000,000 million US dollars, which was almost 20% of the national GDP output in total; while the GDP of Hainan, Ningxia, Qinghai and Tibet provinces were below 100,000 million US dollars (NBS, 2015). In the case of income per capita, Shanghai ranked the first with about 48,531 Chinese Yuan per capita (about 6,500 US dollars). However, the income per capita of Jiangxi provinces was about 15,000 Chinese Yuan per year, which was 1/3 of the income of Shanghai (NBS, 2015). These spatial varieties also lead to differences in off-farm work decisions. The farmers in eastern and coastal provinces like Jiangsu (Wei & Fan, 2000) and Guangdong (Fan, 1995), are more likely to have opportunities to have local off-farm jobs. However, the farmers in Tibet, Gansu and Yunnan provinces can hardly find a job in the local area. The income per capita for rural labour in Jiangsu, Zhejiang and Guangdong Provinces ranged from 10,000 to 14,000 Chinese Yuan while that in Yunnan, Guizhou and Tibet was below 6,000 Chinese Yuan in 2014 (NBS, 2015).

To capture the income variations, some studies include a city dummy controlling the spatial differences (Shi et al., 2007; Xia & Simmons, 2004; Feng & Heerink, 2008). Recently, scholars start paying attention to these differences. Démurger et al. (2010) controlled a set of characteristics embodied by a village including village diversification, village networks, and village infrastructure and found that village diversification was significant to local off-farm employment. De Janvry et al. (2005) also introduced a village fixed effects variable capturing the impact of local economic development on farm activities and income. The

villages were located in Hubei Province, and they found a metropolitan influence from Wuhan, the capital of Hubei Province. Qiao et al. (2014) included an indicator by gross value of industrial output to measure the local economy. They found that the local economy significantly affects the labour's working time allocation on local off-farm work, which provides evidence that a more advanced local economy with higher local average income will affect the rural labour's decision to engage in off-farm work.

3 THEORY & PREVIOUS RESEARCH

3.1 Theories about off-farm work decisions

Structural change is an inevitable precondition for economic development (Barrett, Carter & Timmer, 2010). One of the features of the structural change is the movement of labour out of agriculture. Japan witnessed it in 1950s and South Korea in 1960s (Knight, Deng & Li, 2011). In most developing countries, it is noticed that vast rural population engaging in farming transfers out of the agricultural sector (Yang, 1997).

The academic analysis on this transformation began in 1950s when W. Arthur Lewis constructed his widely-cited dual-sector model explaining labour transfer out of the agricultural sector (Lewis, 1954). Lewis explains the phenomenon that rural labour moves out of the sector because of geographical differences in labour supply and demand. This explanation is constructed on simple trade theory that the rural and urban areas develop through non-identical industry sectors, whilst labour in the urban area focuses on industry and the rural area engages in agriculture. Productivity differences in these two sectors lead to the differences in income, which provide the motivation for the labour transfer from the rural sector to the urban sector.

However, considering the unemployment in the urban area which cannot be explained by Lewis's theory, Harris and Todaro (1970) introduce expectation utility. They argue the choice made by a farmer is not a risk-free choice but a risky one. Therefore, the rural labour will measure the expected income gap adjusted by the probability of finding a non-agricultural job between rural and urban sectors (Todaro, 1969). They further consider that

the increasing expected income gap will drive rural labour out of the agricultural sector and increase the unemployment rate in non-agricultural sector.

At the micro-level, other than finding the equilibrium, scholars pay more attention to the process of individual decision-making. Lee's (1966) push-and-pull theory explains individual's decision to transfer out of the agricultural sector by various push-and-pull factors. Pull factors motivate labour or individuals to move out of the agricultural sector and push factors represent the difficulties engaging in local farm work. Dynamic effects of push and pull factors on labour's decisions finally lead to labour transferring at the macro-level.

3.2 Off-farm work in a global context

For decades, the phenomenon of rural labour flowing into the non-agricultural sector has been observed in many countries. Empirical research focusing on the labour transferring phenomena has analysed specific effects of income differences, entry cost, risks, family networks and household characteristics in Mexico, Vietnam and Canada (Winter, De Janvry, & Sadoulet, 2001; De Janvry & Sadoulet, 2001; Hoang, Pham & Ulubaşoğlu, 2014; Barrett, Reardon & Webb, 2001; Quinn, 2006, Alasia, Weersink, Bollman & Cranfield, 2009). Cole and Sanders (1985) exploit Todaro's two sectors model to analyse the labour transfer happening in developing countries. They found the migration behaviour in Tanzania, South Africa and Mexico follow Todaro's model. Knight, Deng and Li (2011) consider the experiences of Japan in 1950s to 1960s and South Korea in 1960s to 1970s have well-illustrated the economies' move from classical to neo-classical stage.

However, though increases in the off-farm work sector are conducive to the development, the role of self-employment is still ambiguous. In recent years, the rates of self-employment in rural areas are found to decline in many countries (Blanchflower, 2000, Atalay, Kim, & Whelan, 2014). In addition, Blancheflower (2000) found a negative relationship between self-employment rate and unemployment rate and no evidence that increase in self-employment rate will increase the real growth rate of the economy. In

United States, Rupasingha and Goetz (2013) show that the nominal returns or earnings from self-employment have been lagging behind the returns to wage-and-salary employment since 1970.

Recently, a trend is noticed that as per capita income increases across countries, the structure of employment shifts rapidly from agriculture to unsuccessful non-agricultural self-employment, and then mainly to non-agricultural wage employment (Gindling & Newhouse, 2014).

3.3 Off-farm works in the context of China

Tao Yang (1997) finds the level of education significantly affects both Chinese farm households' decision on off-farm employment and their income. Using the household data from three villages in Jiangxi Province, Shi et al. (2007) classified four sub-categories of off-farm employment, including local off-farm employment and migration. Similarly, in 2015, Wu, Robinson and Long (2015) selected 10 counties in five provinces and collected the labour and household migration data from the China's Second National Agricultural Census. They also included economic factors and found them to affect the household's decision. Much research includes several economic factors such as household assets and per capita income and found it significant to the off-farm work activities (Bowlus & Sicular, 2003; Giles, 2006; Qiao et al., 2014; Qingjie & Simmons, 2004; Van den Berg et al., 2007; Xia & Simmons, 2004, Démurger, Fournier & Yang, 2010), while they are positively correlated with the wage employment.

3.4 Hypothesis

After the reform began, it is believed that China has not yet moved into Lewis's 'turning point' (Knight et al., 2011; Garnaut, 2010; Kwan, 2009; Chen & Hamori, 2009). The period before Lewis's turning point will witness that the labour surplus in the relatively unproductive and stagnant agricultural sector moved into the highly productive industrial sector without hugely increasing the real wage in the sector (Lewis, 1954).

This research is inspired by the previous literature, which noticed and compared the characteristics between wage-and-salary employees and self-employed workers (Fairlie & Woodruff, 2010; Woodruff, 2007; De Mel, McKenzie & Woodruff, 2008).

Exploiting Lewis's (1954) and Todaro's theory (1969), the income differences between the agricultural sector and non-agricultural sector is the main force motivating farmers searching for non-agricultural opportunities. In addition, as shown by de Janvry et al. (2005), those who stay in agriculture as pure farmers have non-observable characteristics that make them have higher income growth than those who diversify to off-farm activities. They also show the income growth mainly comes from off-farm activities but not the farming activities. Therefore, holding other factors constant, the higher local average income should have a positive impact, enlarging the income gap and hence intensifying the motivation to seek the off-farm work.

This is supported by empirical work. Applying the data from the Chinese Household Income Project survey 2012, Sonoda (2014) shows the reason household heads in rural China do not work more in the market, finding the differences to the labour's decision in eastern, central and western China. Their model takes characteristics of the village, including the variable of real net income per capita, into account. This variable, real net income per capita, is found to have a significantly positive effect to work off the farm. As such, this study employs the following hypothesis:

Hypothesis 1: Holding other factors constant, the higher average income is, the more working opportunities will be presented and the more attractive the wage employment sector is. As a result, the average income is expected to have a positive impact on wage employment.

As for self-employment, it can be considered as a kind of entrepreneurship (Rijkers & Costa, 2012). It is found that the market in coastal China with higher average income is more mature with better institutions (Zhang & Zou, 2012). Pointed out by Rupasingha and Goetz (2013), on average, labour in self-employment is less-productive, compared to the one in wage-and-salary employment. Adopting Schumpeter's (1934) view of entrepreneurship, which explains it as the creation of the surplus profit by new

combination or innovation, it is more difficult for homogenous rural labour to innovate in a more mature market.

In China, pointed out by Nee and Oppen (2012), the geographical centre of private enterprise economy is in Zhejiang province, while people from Wenzhou, a city in Zhejiang where most of the population used to live in extreme poverty and harsh working condition, enjoys admiration nationwide for their enterprising character. The private enterprise economy is labelled “Wenzhou Model” and popularized to the whole nation.

Not all research takes a large self-employment sector as a positive sign of healthy economic development (Fairlie & Woodruff, 2010; Woodruff, 2007). It is found that the reason the majority of the labour force chooses self-employment is because they are rationed out of wage jobs (De Mel, McKenzie & Woodruff, 2008). They believe the reason labour participate in self-employment is due to lack of alternative options (Jia et al., 2013). The risk faced by firm owners is much higher than the risk in wage employment (Wang et al., 2011). It is demonstrated that in many developing countries, self-employment will not be the engine for overall development, but is rather a so-called dead-end livelihood strategy (Woodruff, 2007).

With the average income increasing, the expected income from risky self-employment will be lower than wage employment. Hence, there might be a negative correlation between self-employment and local average income.

A small portion of empirical literature reports on the negative correlation between average income and self-employment. Recently, Rijkers and Costa (2012) analysed the relationship between gender and non-farm entrepreneurship. They include the variable of logarithm form to the local wage and find a significantly negative impact on the farmers’ entrepreneurship.

Hypothesis 2: Holding other factors constant, the higher average income is, the fiercer the competitive environment will be and the more difficult it will be to set up business. The average income is expected to have a negative impact on self-employment.

4 METHODOLOGY

4.1 Theoretical framework

In this section, the theoretical framework provided by Mishra and Goodwin (1997) is presented to analyse the decision making process of rural labour. Based on the utility theory, it is assumed that a risk neutral pure farmer will decide to participate in off farm work, including self-employment and wage employment. Consider a farmer in the rural household who takes activities to create income. To build a model considering the risk, it is assumed this farmer is trying to maximise utility following the von Neumann-Morgenstern Utility function, which assumes the utility is the function compromising the income y and consumption c , given by

$$U = U(y, c)$$

where y represents the net income for the rural labour and c represents the consumption. Given that the consumption for each farmer in a rural labour is stable and constant, then the utility will be determined by the income only. Each activity, including farm work and off farm work, implemented by the labour will take the cost, time, capital and labour from the itself and generate income. In China, labour with a rural Hukou is engaged in farm work and provides the agricultural products. After the reform, the rural labour may then seize the off farm work opportunities. Hence, the labour can allocate their time and capital on off farm work by comparing the Net Present Value (NPV) of the expected benefit from the farm work and with that from off farm work. When NPV is higher than the cost, the labour will allocate time in different types of off farm work. This can be written by the function:

$$NPV = \int_0^T e^{-rt} (R_t - C_t)$$

where T is the periods a labour can allocate their capital, r is the discounted rate R_t is the expected return for the household, and C_t is the cost. This NPV function specifies the function for the labour generating income used in the utility function above.

In the empirical design, equation for the utility function can be rewritten as:

$$Y_t = Z_t\gamma + \varepsilon_t$$

Here, Y_t is no longer income for the labour but a dichotomous variable capturing the behaviour if a labour engages in any off farm work. Y_t is 1 if off farm work is witnessed and 0 otherwise. On the other side, Z_t , a vector, explains the variance within the labour capturing characteristics. γ demonstrates the impact of relating factors and ε_t gives the representation of residuals, which is supposed to be independent and identically distributed (i.i.d) with a normal distribution. Following the method applied by many previous studies (Mishra & Morehart, 2001; Démurger, Fournier & Yang, 2010; Xia & Simmons, 2004; etc.), to simulate this model, the probit approach is suitable hence implemented here.

$$P_i = f(Z_i) = \phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n)$$

In the equation specified by the probit model, P_i represents the probability for the labour engaging in the off farm work. As the explanatory variables, Z_i contains different factors X_n including key explanatory variable (soil fertility), household properties (education, marriage, local infrastructure), and agricultural activities (farmland size, estate value and land reallocation). The effect to these factors will be expressed by the parameters β_i where $i=1, 2, 3 \dots n$.

4.2 Data

Apart from one independent variable, the local average income, all data used in this paper is from the China Labor-force Dynamics Survey (CLDS) by the Center for Social Survey in Sun Yat-sen University in Guangzhou, China. The survey is conducted once every two years since 2012 and attempt to trace the trend and movements of households and labour in China. 6,910 households have been interviewed, out of which 3,604 are rural households that will be regarded as farmers in this research. The survey contains many research fields including education, employment, migration, health, social activities, economic activities and grass-root organizations. The sample of this survey applies multistage cluster, stratified and PPS sampling and covers most provinces and municipalities in China, except for Hong Kong, Macau, Taiwan, Tibet and Hainan. The

sampling strategy considers the population size and divides China into three parts, eastern, central and western China. The sample population is adjusted by provincial gross domestic product and each sample is selected randomly. After determining the population, inquirers are sent out to the sampling region handing out the survey and collecting the data from households, face to face.

Because of the following reasons, the data from 2012 survey is used. First, the most up to date data, which is from the 2012 survey, can provide the most relevant and consistent status compared to now. Second, the 2012 survey is recognized and utilized by many previous studies (Xu & Wang, 2015; Liu et al., 2015; Xu et al., 2015).

The data of local average income is collected from the provincial yearbook. First, residence data at the city level for each sample are collected from the survey. Then the information about city average income for rural labour are collected and matched to the residence data.

4.3 Off-farm employment in samples

Due to the data collecting procedure, previous research on rural off-farm employment mainly focuses on the specific regions in China (Rozelle, Taylor & DeBrauw, 1999; Yan et al., 2014). In this research, 3,604 observations from 29 administrative divisions are applied. With the observations, most of the off-farm behaviours are covered and can be representative of China's context. The distribution of all observations is listed below in Table 1.

As shown in Table 2, 1699 labour participate in wage employment and 390 labour have their own business, which indicates about 58% of rural labour (1699 of wage employment and 390 of self-employment out of 3604 of whole samples) participate in off-farm employment. This result is consistent with the national representative survey (NBS, 2015) and previous research (Wang et al., 2011).

Table 1. The sample distribution

Average income (Chinese currency)	Observations
< 5000	232
5000~10000	1,762
10000~15000	1,291
15000~20000	237
> 20000	82

Table 2. Labour participate in off-farm activities

Employment categories	Observations
Farming	1,515
Wage employment	1,699
Self-employment	390

4.4 Variables

4.4.1 Dependent variables

Two dependent variables indicate whether labour has salaries from the jobs they have or profits from their business. The survey has questions asking if the labour has income coming from wage employment or self-employment. The first question asks how much is the sum of income from wages, including remuneration, subsidies and bonus. The second one enquires how much is the sum of income from operating the shops, stores or restaurants. Two questions provide the data about the monetary income acquired from these forms of off-farm employment. It will be zero, being as a pure farmer, or any positive number, meaning engaging in off-farm employment. Defined by both hypotheses, the main focus of this study is the decision whether the labour will engage in off-farm employment. The dependent variable should be a dummy variable, which captures the consequence of the decision. Therefore, the monetary data of two questions is converted into a dummy, where all positive numbers are converted into 1.

Wage Employment: If it is reported that the labour has salary coming from the wage employment, including remuneration, subsidies and bonus, it will be labour participating in wage-employment.

Self-employment: If it is reported that the labour has profit coming from self-employment, including operating the shops, stores or restaurant, it will be labour participating in self-employment.

4.4.2 Independent variable

The independent variable in this research is local average income, which is collected from the China Statistics Yearbook 2013. The annual income per capita of rural labour from each city is picked and filled into the dataset corresponding to the residence information of the labour, named as LAI.

Table 3 and Table 4 provide a summary distribution of the average income to the labour participating in wage employment and self-employment. From these two tables, two observations stand out: First, for both kinds of off-farm employment, similar patterns can be found. Most of the labour participating in wage-employment and self-employment are living in the area where income per capita ranges from 5000 CNY to 15000 CNY per year. This pattern is consistent with the distribution of the whole sample provided in Table 1. Second, compared with the pattern of the labour participating in wage employment, the pattern of self-employment is more akin to the one of the whole sample. With wage employment, the number of observations living in the area where average income ranges from 10000 CNY to 15000 CNY is higher than the one where average income ranges from 5000 CNY to 10000 CNY. It shows that, on average, the labour engaging in wage employment lives in the richer area than the labour participating in self-employment and whole sample.

Table 3. Summary view of LAI to the labour participate in wage employment

Average annual income (Chinese currency)	Observations
< 5000	89
5000~10000	718
10000~15000	726
15000~20000	106
> 20000	60

Table 4. Summary view of LAI to the labour participate in self-employment

Average annual income (Chinese currency)	Observations
< 5000	26
5000~10000	197
10000~15000	135
15000~20000	26
> 20000	6

4.4.3 Control variables

To isolate the potentially confounding effects, a vector of control variables is specified and regressed. All the control variables are collected directly from the survey.

The variable, EDU, is used to capture the effect from the labour's education, and it is calculated by the years of schooling. Education can raise the quality of the labour and increase the possibility that the labour can find off-farm work. The survey provides the detailed information about the highest obtained academic degree to the labour. Tao Yang (1997) argues the chance of schooling for a rural household is an asset or human capital which will increase the possibility labour's maximum returns and, through the empirical result, he finds education affects the households' off farm work choice and their wages. Globally, empirical research finds education has various impacts on off farm work in the

cases of developed countries like France (Benjamin & Kimhi, 2006) and Israel (Ahituv & Kimhi, 2002), and developing countries like Ghana (Jolliffe, 2004). In terms of China, Shi et al. (2007) found that schooling years significantly positively affect the behaviour of migration, with a sample from Jiangxi province. In order to control the effect of education on labour's choice towards off farm work, the variable is introduced into the model.

The distance to local market may hinder the labour seeking off-farm opportunities. Hence, a variable, INFRA, is applied to capture the variance of local infrastructure within rural communities. The data for this variable is calculated by the sum of four kinds of distance: distance to the nearest bus station, distance to the nearest medic point, distance to the school, and distance to the nearest business centre. Sum of the distance to these local establishments represents the living standard of the local community. Existence of these establishments reduces the transportation cost and searching cost, hence, affects the possibility of off farm work. Lokshin and Yemtsov (2005) find the off farm employment rates increased in the villages affected by the road rehabilitation in Georgia. Same results that infrastructure improvement increases the off farm employment rate are also found in Madagascar (Minten et al., 2009), Senegal (Maertens et al., 2011), and other African countries (Barrett, 2008; Barrett et al., 2001). Other research on the case of China attempt to control for effects such as road distances and level of infrastructure (Wu, Robinson & Long, 2015; Giles, 2006).

Being the factor determining the income from farming activities, farmland size is doubtlessly a factor that should be controlled. The variable, SIZE, is collected from the survey and calculated as the area of the farmland possessed by the household. In several south-eastern states of US, it is found that increasing the farm size will also improve the productivity efficiency (Yee, Ahearn & Huffman, 2004) and income of the household (Heady & Sonka, 1974). The impacts of farmland size will finally affect the choice making of off farm work by rural labour. Benjamin and Kimhi (2006) apply the data from the French agricultural sector and confirm the result of previous studies that off farm labour is negatively associated with farm size. With the data collected from Zhejiang province in China, Van den Berg et al. (2007) use a simulation model and find that the change of farm size will also alter the rural household's behaviour. The empirical result also shows the

negative relationship between farm size and off farm work in China (De La Rupelle et al., 2009; Feng & Heerink, 2008).

As one of the capital stock, the factor of possessing farming implements is another control variable, IMPL, introduced to the model applied in this research. It is defined as the number of implements that one household possesses. Purchasing farming implements signals the increase in the capital stock owned by the household and increases the income margin, which is controlled by previous research (Qingjie & Simmons, 2004; Maertens, Colen & Swinnen, 2011; Babatunde & Qaim, 2010). Mishra and Morehart (2001) bring the asset factor measuring the value of vehicles and find the household with more expensive vehicles are more likely to invest in off farm opportunities in US. In the cases of Norway and Taiwan, the risk of agriculture production to the household is negatively associated with the investment in machinery and equipment (Lien et al., 2010; Chang & Wen, 2011). Studies focusing on China also find the investment in farming implement will be a negative factor to migration but positive to other off farm work (Shi et al., 2007; Démurger, Fournier & Yang, 2010).

Chinese farmers may encounter the danger of land reallocation, which dampens the rural labour leaving. A dummy variable, REALLO, is applied to capture the effect from the land right insecurity in rural China, calculated as if any reallocation of the farm land happened to the household. Deininger et al. (2012) hypothesize that reallocations may impede exit from agriculture and land reallocation may reduce the incentive for farmers moving out of their farm. With the data from two villages in Henan province, Yan et al. (2014) find land reallocation would promote the rural household to participate in migration, but it may significantly and remarkably reduce the duration of migration, which implied temporary migration. This result is confirmed by many other studies (De La Rupelle et al., 2009; Mullan et al., 2011).

The correlation matrix available in Appendix A shows the correlation between each variable. The correlation coefficients indicate no critical problems of multicollinearity.

Summary statistics for each variable are provided in Appendix B. Most of the labour characteristics show no significant difference among wage employment, self-employment and the whole sample. For instance, the probabilities if labour is married among three

sample groups are almost the same, 0.87 to 0.88. The length of education for the labour engaging in off-farm employment is slightly longer than the length in the whole sample and the value of the house is also higher in both cases.

4.5 Model Specification

Based on the model provided by Mishra and Goodwin (1997), the following model will be utilized to get the coefficient of all variables.

For WE,

$$WE = f(\beta_0 + \beta_1 LAI_i + \beta_2 EDU_i + \beta_3 MARRI_i + \beta_4 INFRA_i + \beta_5 AGE_i + \beta_6 SIZE_i + \beta_7 LHOUSE_i + \beta_8 IMPLI_i + \beta_9 REALLO_i + \varepsilon_i)$$

For SE,

$$SE = f(\beta_0 + \beta_1 LAI_i + \beta_2 EDU_i + \beta_3 MARRI_i + \beta_4 INFRA_i + \beta_5 AGE_i + \beta_6 SIZE_i + \beta_7 LHOUSE_i + \beta_8 IMPLI_i + \beta_9 REALLO_i + \varepsilon_i)$$

Where β_0 denotes the intercept for the wage employment and self-employment, β_1 to β_9 represent the coefficients of variables to be estimated and ε_i is the error term.

5 ESTIMATION RESULT

5.1 Wage employment

The probit analysis on wage employment and self-employment has been reported in Table 5.

Clearly, most results follow assumption. As expected, most coefficients are found to be statistically significant. In this part, the whole sample contains 3,604 observations and log likelihood is -2379.80. The Chi-square test is significant on a 1 percent confidence level where the null hypothesis can be rejected.

The independent variable, LAI or local average income, behaves in accordance with the hypothesis 1 assumed, which states that the local economic situation has a positive influence on the labour engaging in wage employment. The estimated result of this coefficient, as shown in the first column, measures the income per capita, which is positive

and statistically significant in the model of wage employment. The result confirms higher the local average income, indicating a profounder economic performance in that city, the more likely rural labour will participate in wage employment, which confirms hypothesis 1.

The result also follows with the finding shown by Chen and Démurger (2014) that the wealthier village will be more likely to witness more labour participating in wage employment. In addition, Rijkers and Costa (2012) also show a similar finding that the local income is positively affecting the labour's decision to participate in wage employment in Bangladesh and Ethiopia. Previous research demonstrates that in China, the developed areas, like Guangdong and Jiangsu, can provide more wage employment for the rural labour (Wei & Fan, 2000; Fan, 1995). Combined with the results in this study, it clearly shows that an increase in local income will motivate the rural labour to participate in wage employment.

As for education, which is significant in research focusing on off farm work (Tao, 1997; Benjamin & Kimhi, 2006; Ahituv & Kimhi, 2002), it is insignificant in the case of wage employment. The reason may be that, in 2012 the wage employment opportunities in rural areas were still in labour intensive sector, in which the years of education are not a necessary requirement for wage employment. This result is consistent with the one shown by Shi et al. (2007). Another factor, marriage, is also found to be insignificant to the off-farm work behaviour. It makes sense, because marriage will hinder the migrating behaviour due to the Hukou-system, while it may not be an important factor considering the off-farm employment. Poor infrastructure, in one way, restrains the movement of labour across regions (Xia & Simmons, 2004), and in another, limits the local employment opportunities (Shi et al., 2007). This is also confirmed in present study, where the coefficient on variable INFRA is significantly negative. Similarly, the variable AGE is found to be significantly negative to the off-farm employment. Besides, previous studies find that land reallocation is detrimental to the migration in China yet this factor is not statistically significant in the case of wage employment. Except for the factor of land reallocation, all the control variables related to the agricultural activities significantly influence the off-farm employment.

5.2 Self-employment

The number of observations is the same; 3,604 and Chi-square test is also rejected in the case of self-employment. The log likelihood of this model is -1163.65, higher than that of wage employment.

The estimated coefficient to the variable LAI, local average income in this model highlights the difference between itself and wage employment. In this case, the coefficient to LAI behaves oppositely with a significantly negative effect. The negative number confirms previous analysis that the higher local average income, showing a better economic performance, will reduce the labour's willingness to participate in self-employment. This result verifies hypothesis 2.

The second part of the result, on the other side, confirms the conclusion that a large self-employment sector may not be a positive sign of healthy economic development (Fairlie & Woodruff, 2010; Woodruff, 2007). It indicates that the self-employment in China is negatively associated with the local income or, in another word, poverty. De Mel et al. (2008) pointed out that the reason for these rural labour participating in self-employment is they are rationed out of wage jobs. Clearly, as income increased and local economy developed, more labour will leave the risky self-employment and seize the job opportunities in wage employment, with higher expected income than self-employment. Besides, this result is consistent with the "Wenzhou Model" in China (Nee & Oppen, 2012) and fortifies the labour mobility trend pointed out by Gindling and Newhouse (2014) that, as per capita GDP increases, workers transition out of agriculture and self-employment into wage employment.

As for other controlling variables, most of them, except the marriage, are significant in the case of self-employment. Consistent with the finding by Tao (1997), longer education offers human capital to the labour. Also, the poor infrastructure is a disadvantage, as market and business will be less publicly known and reached in the geographical remote villages. These two phenomena are confirmed by the results in the self-employment case.

Two variables of agricultural activities are still regarded as important influencing factors for self-employment, the value to the house and land reallocation. The value to the house is an indicator showing the asset owned by the labour. Wu (2010) considers the house value, setting it as a factor that would affect the occupation decision. People with high house value are more likely to participate in wage employment, and Wu (2010) also finds the house value a positive element motivating farmers to work in off-farm sectors. The appearance of land reallocation is found to be a reason inducing the temporary migration behaviour in China (De La Rupelle et al., 2009). But the result shows that land reallocation increases self-employment. This may be interpreted as the temporary migrations' reallocation to self-employment.

Table 5. Regression results of wage employment (WE) and self-employment (SE)

	WE	SE
LAI	0.0000124*** (0.0000058)	-0.00000466*** (0.00000785)
EDU	0.0018 (0.0053)	0.0043*** (0.0074)
MARRI	0.0026 (0.0647)	0.0034 (0.0884)
INFRA	-0.0029*** (0.0016)	-0.0013*** (0.0023)
AGE	-0.0053*** (0.0017)	-0.0013*** (0.0023)
SIZE	-0.0006** (0.0007)	-0.0001 (0.0008)
LHOUSE	0.0335*** (0.0044)	0.0345*** (0.0053)
IMPLE	-0.0834* (0.1325)	-0.0174 (0.1773)
REALLO	-0.0710 (0.1495)	0.0547* (0.1731)
Constant	-0.58	-1.1210
Observation	3,604	3,604
Pseudo R²	0.0451	0.0580
LL	-2379.8045	-1163.6599

Note: Standard error in the parenthesis. *** Significant at the 1 percent level; ** Significant at the 5 percent level; * Significant at the 10 percent level.

5.3 Robustness

The robustness test in this study pursues two dimensions. First, lagged value of local average income is applied to deal with the reverse causality. Second, data from several regions are excluded avoid the bias induced by policies.

5.3.1 Lagged local average income

The empirical analysis regresses off-farm works decision in 2012 against the simultaneous local average income, which may risk suffering from the reverse causality or endogeneity. If the data of samples and data of local average income are collected in the same period, even though the regression result shows the significance between off-farm works, as a dependent variable, and local average income, as an independent variable, it cannot figure out the causality.

To eschew the simultaneity bias, the lagged value of the local average income is applied. It is plausible to say an increase in off-farm employment will promote simultaneous local income, but it will not be possible to say the off-farm employment in 2012 will affect the local income in 2011. Therefore, the data of local average income is lagged by one year and the result from probit analysis is presented in Table 6.

Clearly, the result based on the local average income in 2011 strongly confirms the causality that higher local average income can cause an increase in wage employment and a decrease in self-employment. The first model regresses the decision on wage employment against the lagged value of local average income. The association between lagged value of local average income and wage employment is significant at 1 percent level, and the coefficient of independent variable is positive. The result of the second model states a negative association between self-employment and local average income, with significance level of 1 percent. The results of coefficient and its significance among the other control variables are also consistent with those of the original model.

5.3.2 Specific regions excluded

The robustness checking in this part is to analyse the effect of local average income after precluding the institutional bias induced by policies. Since 2004, every year's "No. 1 Central Document" proposed by the Central Committee of the Communist Party of China will draw much attention to the agricultural issues, which underscore the importance to the government. In 2008, the State Council enacted "The Outline of National Grain Security Mid-and-Long-Term Plan, 2008-2020", which specified three provinces, Jilin, Heilongjiang, and Henan, as the "grain production core area" (NDRC, 2008). Requested by the Outline, the yield and field size of grain are promised to increase in these specified provinces. To achieve this goal, these provinces have promulgated their own provincial agricultural plan supporting the grain production (State Council of People's Republic of China, 2008; 2008; People's Government of Heilongjiang Province, 2008). Grain farmers in these three provinces are subsidized to maintain their farming activities producing grain.

However, as shown by Fang and Beghin (1999), China has a disadvantage in producing land-intensive crops, whose production are socially unprofitable. Maintaining this strategy contradicts China's comparative advantage and is not sustainable. Subsidizing it will distort the market. The policies implemented in 2008 can be regarded as a kind of subsidy policy achieving grain self-sufficiency. The agricultural markets in these three provinces are distorted and the process of rural labour transfer is hampered.

To conduct the robustness checking, four regressions are first run with the data for Jilin, Heilongjiang, Henan excluded separately and the excluded jointly. Table 7 shows the result for the robustness checking of our models. The result shown can be compared with the original sample in Table 3.

Similar patterns can be observed in four regressions, while all the estimates remain largely unchanged. The variable local average income is found to be significantly positive to the wage employment and significantly negative to the self-employment in four cases. Factors such as local infrastructure and age, are negative and significant for the labour participating in both kinds of off-farm employment, while the coefficient to the house

value indicates that the asset owned by the labour has a significantly positive effect. EDU is only found to be significantly affecting the self-employment.

Table 6. Regression results, LAI lagged

	WE	SE
LAI, Lagged	0.000017*** (0.00000081)	-0.0000061*** (0.000011)
EDU	0.0018 (0.0054)	0.0043*** (0.00737)
MARRI	0.0106 (0.0647)	-0.0027 (0.08833)
INFRA	-0.0032*** (-0.0083)	-0.0013*** (0.00232)
AGE	-0.0056*** (0.0017)	-0.0013*** (0.0023)
SIZE	-0.0006** (0.00073)	-0.0001 (0.00089)
LHOUSE	0.0333*** (0.0044)	0.0344*** (0.0053)
IMPLE	-0.0833* (0.1325)	-0.0172 (0.1772)
REALLO	-0.0709 (0.1494)	0.0550* (0.1728)
Constant	-0.58	-1.1210
Observation	3,604	3,604
Pseudo R²	0.0448	0.0575
LL	-2380.4567	-1164.3212

Note: Standard error in the parenthesis. *** Significant at the 1 percent level; ** Significant at the 5 percent level; * Significant at the 10 percent level.

Table 7. Empirical result for the robustness checking, Specified Regions Excluded

Model	Jilin Excluded		Heilongjiang Excluded		Henan Excluded		Three Provinces Excluded	
	WE (1)	SE (2)	WE (3)	SE (4)	WE (5)	SE (6)	WE (7)	SE (8)
LAI	0.000012***	-0.0000041***	0.000122***	-0.0000041***	0.0000121***	-0.0000036***	0.000013***	-0.0000036**
	(0.0000081)	(0.000011)	(0.0000058)	(0.0000078)	(0.0000059)	(0.000008)	(0.0000059)	(0.0000079)
EDU	0.0013	0.0044***	0.0014	0.0042***	0.0021	0.0041***	0.0017	0.0040***
	(0.0054)	(0.00741)	(0.0054)	(0.00741)	(0.0056)	(0.0076)	(0.0057)	(0.0077)
MARRI	0.0049	-0.000092	0.0032	-0.0022	0.0041	-0.0069	0.0075	-0.0029
	(0.0649)	(0.0889)	(0.0651)	(0.0890)	(0.067)	(0.0902)	(0.0675)	(0.092)
INFRA	-0.0027***	-0.0014***	-0.0028***	-0.0013***	-0.0028***	-0.0012***	-0.0025***	-0.0012***
	(0.0016)	(.00235)	(0.0016)	(0.0023)	(0.0017)	(0.0023)	(0.0017)	(0.0024)
AGE	-0.0054***	-0.0013***	-0.0052***	-0.0013***	-0.0049***	-0.0013***	-0.0048***	-0.0013***
	(0.0017)	(0.0023)	(0.0017)	(0.0023)	(0.0017)	(0.0024)	(0.0018)	(0.0024)
SIZE	0.00063**	-0.00014	-0.00053*	-0.000157	-0.00068**	-0.00012	-0.00054*	-0.00015
	(0.00073)	(0.0009)	(0.0007)	(0.0009)	(0.00075)	(0.00085)	(0.0007)	(0.0010)
LHOUSE	0.0312***	0.0341***	0.0332***	0.0344***	0.0343***	0.0325***	0.0314***	0.0319***
	(0.0044)	(0.0053)	(0.0044)	(0.0053)	(0.0045)	(0.0054)	(0.0045)	(0.0055)

IMPLE	-0.0844*	-0.0159	-0.0704	-0.0131	-0.0871*	-0.0266	-0.0737	-0.0206
	(0.1344)	(0.1783)	(0.1347)	(0.1788)	(0.1372)	(0.1883)	(0.1419)	(0.1912)
REALLO	-0.0841	0.0561*	-0.0735	0.0553*	-0.0665	0.0440	-0.0829	0.0459
	(0.1508)	(0.1735)	(0.1494)	(0.17307)	(0.1515)	(0.1787)	(0.1528)	(0.1793)
Constant	0.4760*	0.1101***	0.4747***	0.1082***	0.4701***	0.1070***	0.4790***	0.1090***
Observation	3,518	3,518	3,531	3,531	3,354	3,354	3,195	3,195
Chi²	214.98***	139.12***	214.19***	138.10***	206.99***	119.92***	186.54***	110.54***
LL	-2326.9913	-1149.5215	-2335.9687	-1141.0341	-2215.3559	-1081.3172	-2118.5647	-1044.6157

Note: Standard error in the parenthesis. *** Significant at the 1 percent level; ** Significant at the 5 percent level; * Significant at the 10 percent level.

6 CONCLUSION

Raising farmers' income has been the most important issue concerned in the No.1 document of Chinese Communist Party in China. This study analyses the influence of local average income on off-farm employment, including wage employment and self-employment.

The main finding confirms two hypothesis proposed that the local average income is positively correlated with wage employment but it would hinder self-employment. The coefficient of local average income with wage employment is positive and negative with self-employment. Both cases are significant on a 1 percent confidence level. Other control variables are found to have influence affecting the rural labour engaging in off-farm work opportunities. This result is consistent with the trend shown by Gindling and Newhouse (2014) that as per capita income increases, the structure of employment shifts, first, out of agriculture into non-agricultural self-employment and then mainly into non-agricultural wage employment.

The empirical analysis of the factor motivating the rural labour participating in two types of off-farm employment shows the increase in local average income will boost the pure farmers' expected income and motivate them to seek wage employment. However, high average income also indicates the difficulty to find market niches and hinder the farmers setting up their own business. Besides, it also implies the increase in age and difficulty reaching the local market will reduce the farmers' willingness to participate in both types of off-farm employment.

There still may be limitations to this study. The first one is raised from the survey. Mentioned by the No.1 document 2012, several policies relating to agricultural technologies and rural area social welfare promotion were promulgated in 2012, which were re-announced in 18th National Congress of the Communist Party of China (Lou et al., 2014). These policies may lead to a short-term shock in the agricultural sector which may also affect the samples of the survey. Therefore, the short-term impact from the policies is ineluctable. The second one comes from the main independent variable, local

average income. Because of the privacy policy, the data collecting centre can only provide the information of locations detail to cities. This may have weaker effect on the labour's decision comparing to the average income in a more specific level.

According to Li et al. (2013) and Asian Development Bank (2007), the Gini coefficient of household income per capita of China was 0.49 in 2007, which was found to have the highest inequality in Asia. The inequality between rural and urban labour is found to be the main contributor to this problem (Li et al., 2013; Li & Luo, 2010). It is an urgent problem to balance the development between urban and rural areas.

With the superfluous rural labour and farming land scarcity, it will be difficult to raise the farmers' income from agricultural sector. As suggested by previous studies, a more effective way is to encourage the rural labour to engage in off-farm employment. The result of this study suggest that rural labour is more likely to engage in wage employment in advanced areas and more likely to engage in self-employment in developing areas.

This result is not to say that self-employment is inferior to wage employment with the development of the economy. Self-employment and entrepreneurship is beneficial to the economy by providing new products, production processes and source of employment for others. Some research points out the positive effect of self-employment in providing employment and increasing growth in lagging regions (Stephens, Partridge & Faggian, 2013; Bashir, Gebremedhin & Chawdhry, 2014)

The importance of off-farm employment, especially self-employment, has recently been receiving more attention and acknowledgement from the Chinese government. Since the new president, Xi Jinping, has come to office, he has highlighted the importance of innovation and entrepreneurship to the Chinese economy in the “new era” often. Responding to this appealing, the Chinese government has promulgated several policies promoting the “mass entrepreneurship and innovation” (State Council of PRC, 2015). As shown by this study, compared to the labour in developed areas with high average income, labour in less developed areas will be more promoted to participate in entrepreneurship activities. On the other hand, successful entrepreneurship activities can increase the local average income and create the vacancies of wage employment, which further contributes to the farmers moving into off-farm sectors. It is found that the rural entrepreneurship

activities are hampered by the poor infrastructure (Martin et al., 2013) and credit constraint (Han & Hare, 2013). Estimated by Gindling and Newhouse (2014), roughly one-third of the unsuccessful entrepreneurs have the potential to be successful, but face constraints to growth. To deal with it, the government can invest more in the rural infrastructure projects and accelerate the rural credit market construction. With more off-farm employment vacancies created in rural areas, the average income can be boosted, and excessive rural labour will leave the agricultural sector working off-farm, which will alleviate the problem of the rural-urban inequality.

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Appendix A. Correlation Matrix

	LAI	EDU	MARRI	INFRA	AGE	SIZE	LHOUSE	IMPLE	REALLO
LAI	1.0000								
EDU	0.0904	1.0000							
MARRI	0.0055	-0.0032	1.0000						
INFRA	-0.2595	-0.0586	-0.0237	1.0000					
AGE	0.0283	-0.2904	0.0399	-0.0190	1.0000				
SIZE	-0.0518	0.0284	-0.0282	0.0815	-0.0652	1.0000			
LHOUSE	0.1851	0.1507	0.0823	-0.1408	-0.2148	0.0122	1.0000		
IMPLE	-0.0267	0.0245	0.0418	-0.0274	-0.0555	0.0188	0.0467	1.0000	
REALLO	-0.0341	0.0069	-0.0065	0.0244	-0.0393	0.0021	0.0076	0.0112	1.0000

Appendix B. Summary statistics to variables

	Wage employment	Self- employment	Whole Sample
Average Local Income(CNY)	10702.55	10063.22	10158.75
Average Education (Year)	5.93	6.75	5.59
Marriage	0.88	0.87	0.87
Average distance to hospital/mall/pharmacy/bus station (Kilometre)	11.96	10.80	13.78
Average age (Year)	47.69	45.81	49.90
Average field size (Mu)	7.80	8.23	9.74
Average log value of the house	2.26	2.62	2.06
Farming implements	0.02	0.03	0.03
Reallocation	0.02	0.04	0.02