Exploring the determinants of on-farm transitions: Evidence from rural China

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Abstract

To shed light on the sustainable development of rural areas, we study the determinants of transitions from subsistence farming into either formal agricultural employment or agricultural entrepreneurship based on a recent nationally representative survey dataset. We pay particular attention to the roles of different capital endowments broadly including human, financial, natural, social and political capital. Our results show that, human, natural, social and political capital are all important determinants of rural households' transitions to on-farm employment and entrepreneurship while financial capital plays a limited role. These findings are robust to fully controlling for off-farm transitions as part of the household occupational strategy.

JEL Codes: D13; O18; Q10; Q12

Keywords: Rural development; On-farm transitions; Capital endowments; Labor allocation

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1. Introduction

Traditionally, mainstream development literature has seen the rural sector primarily as a source of cheap migrant labor facilitating incipient industrialization in urban areas (e.g., Lewis, 1954; Harris and Todaro, 1970), rather than being interesting in its own right. Similarly, policy makers prioritized the development of urban areas. This long existing uneven interplay between rural and urban development has the potential to undermine economic and political stability, especially for developing countries like China.

Since the economic reforms initiated in 1978, China has undergone tremendous changes. Between 1978 and 2014, it has grown on average by just under 10% per year (Lau, 2015). This has been achieved by improving the productivity of rural agriculture so as to release workers into manufacturing in urban areas. Despite industrialization during the early Maoist period (in particular during the Great Leap Forward of 1958-62), 82% of the Chinese population remained in rural areas by 1978. Under Maoism, rural households were organized in people's communes (*RenMinGongShe 人民公社*) which shared both work responsibilities and fruits of their joint efforts. This resulted in poor incentives, low productivity and freeriding. In the early 1980s, the communes were disbanded and replaced by the Household Responsibility System (*JiaTingZeRenZhi 家庭责任制*)[1], which divided the commune's resources (including land) and its output quota among the individual households. The households thus regained responsibility for their output, and were free to keep any surplus left after delivering their share of the quota (Lin, 1992).

At the outset of reforms, in the early 1980s, the bulk of rural residents was therefore engaged in low-productivity agriculture on land controlled by their household. After the relaxation of *Hukou* restrictions[2], a migration from rural to urban areas started in the late 1980s, with rural migrants seeking better job opportunities alongside better education and medical services in urban centers. As with other emerging economies, there is an extensive body of research capturing this process in China, referred in the literature as *off-farm (or non-farm) transitions* (e.g., Zhang and Song, 2003; Shi et al., 2007; Li et al., 2016; Tian et al., 2016; Wang et al., 2011; Lei et al., 2013; Wang et al., 2016). However, in contrast to the attention given to the transformation of urban areas and rural to urban migration, there has been much less work on studying the *on-farm transitions*, which can be defined as transfers of workers from low-productivity subsistence farming to

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[1] Household Responsibility System was first adopted in agriculture in 1979. In the traditional Maoist organization of the rural economy, farmers were given a quota by the government specifying the quantity of goods to produce. They received a reward for meeting the quota. Going beyond the quota rarely produced a further economic reward.
[2] 'Hukou' is a household registration system, which designates all individuals as either rural or urban residents. In the past, individuals were expected to remain in the area stated in their Hukou, and changing either one's status (from rural to urban) or place of residence was difficult. Even at present, individuals with a rural Hukou have limited access to public goods and services in urban areas.

either formal agricultural employment or entrepreneurial activity in agriculture (as opposed to moving away from rural agriculture into manufacturing in the urban areas).

In this paper, therefore, we study what drives the livelihood decisions of on-farm transitions in rural China. Our empirical strategy is based on a comprehensive rural household survey dataset covering 9 provinces from East, Central and West China. In doing so, we focus on households rather than individuals as the decision making in livelihood transitions is a profit maximizing and risk minimizing process of a household (Stark, 1984, Taylor, 1987). In this sense, the allocation of household labor is a joint decision involving all family members as a whole. To preview the findings, we find that human, natural social and political capital are important determinants of rural households' transitions to on-farm employment and entrepreneurship while financial capital plays a limited role. These findings are robust to fully controlling for off-farm transitions as part of the household occupational strategy.

The contributions of our study are threefold. First, we shed light on the sustainable development of rural areas. Chinese government and President Xi proposed and adopted the "Rural Revitalization Strategy (*XiangCunZhenXin 乡村振兴*)" in the 19th Communist Party of China National Congress in 2017, which aims to promote the sustainable development of rural sector. The ability of rural households to undertake on-farm transitions is of crucial importance to facilitate this strategy for primary reasons. On the one hand, on-farm transitions stimulate agricultural productivity (Haggblade et al., 2010; Levine, 2014; Zhan, 2017), which in turn both increases the wellbeing of those who stay in rural areas, and releases labor from agriculture which can then move to urban areas and help sustain economic growth there. On the other hand, on-farm transitions promote rural livelihood diversity, which in turn helps suppress rural poverty and promotes rural sustainability (Bebbeington, 1999; Ellis, 1998; Ellis, 2000; Haggblade et al., 2010). We observe rural households in 2015, some 35 years after the reforms were initiated. Although we do not observe when the transitions happen, given that the vast majority of rural households shared the same initial situation in the early 1980s, our analysis captures the outcomes of any on-farm transitions that had happened since then.

Second, our study closely relates to the literature on agrarian changes. The diversity of rural livelihood strategies is central to the rural development (Bebbington, 1999; Scoones, 2009; Chambers, 2008). Such diversity, which is also beneficial to the households, is determined by various factors such as seasonality, risk, and credit markets (Ellis, 2000). Ellis's framework has been followed by a small number of studies centering on the Chinese context. By observing different types of rural households, Zhang (2015) develops a classification of agrarian class positions and argues that government plays an important role in rural

development. Similarly, Yan and Chen (2015) posit that on-farm entrepreneurship is driven by the government as engine of rural development. Zhan (2017) also contends that these agrarian changes are driven by government subsidies as a form of capital accumulation. These studies focus more on the role of government policies but overlook the internal factors such as the households' own capacity of driving agrarian changes. While the previous studies are mostly qualitative and case-study oriented, we add to the literature by providing a quantitative angle at the subject matter.

Third, the literature has explicitly recognized that capital endowments are pivotal determinants of household livelihood strategy (e.g., Bebbington, 1999; Bhandari, 2013; Moyes et al., 2015; Wang et al., 2016; Tregear and Cooper, 2017; Inwood, 2017). Rural households often differ considerably in their resources, reflecting different local circumstances, past effort, resources inherited from their elders, and even luck. Therefore, unlike extant research attributing the agrarian changes mainly to financial capital accumulation in rural China (Zhan, 2017; Yan and Chen, 2015), we elaborate on this literature by examining to what extent other types of capital endowments can contribute to on-farm transitions, with capital defined broadly. In addition, we explicitly consider social and political capital. The *Guanxi* (networks and relationships) matters enormously in the Chinese society, especially in rural areas (Zhang et al., 2012; Jin et al., 2014). Similarly, rural cadres are responsible for key political and administrative decisions affecting rural residents' off-farm employment (Zhang et al., 2003). Our study thus can show how different types of capital endowments contribute to the incidence of rural livelihood transitions.

The remaining part of this paper proceeds as follows. The next section reviews the relevant literature. Section 3 describes the data and outlines the methodology. Section 4 presents the results and discusses the findings. Section 5 conducts a robustness check by taking off-farm transitions into account and section 6 concludes.

2. Drivers of rural development in China

The process of economic development of an emerging economy is usually understood in the context of the interplay between rural and urban sectors (Lewis, 1954; Harris and Todaro, 1970). Economic transformation is set off by industrialization in the urban sector, which becomes the source of economic growth. The rural sector instead serves as a pool of abundant labor, with the bulk of rural workforce initially languishing in low-productivity subsistence agriculture. The plentiful supply of cheap rural labor supports the development of the urban sector: as manufacturing expands, rural workers move to the cities to take advantage of the higher wages

there. This continuous influx of new workers keeps urban wage growth in check (in addition, if the urban wages are downward sticky, involuntary urban unemployment can arise as a consequence or rural to urban migration of labor). Eventually, the pool of labor in the rural sector becomes exhausted. When this happens, both rural and urban wages start growing rapidly: this phenomenon is referred to as the Lewis turning point. When the developing economy passes the turning point, the resulting urban wage growth constraints further expansion of manufacturing: to continue growing, productivity improvements become necessary.

The jury is still out on the question whether China has already reached or even passed the Lewis turning point. On the one hand, Liu (2015) observes that both rural wages and agricultural productivity started to increase sharply around 2002-04. He therefore, argues that China reached the turning point around that time. On the other hand, Das and N'Diaye (2013) point out that the supply of low-wage labor in rural areas of China still remains large. They therefore anticipate China to arrive at the turning point only by 2020-2025.

In line with the literature's focus on the urban areas being where economic change takes place, the models of development are primarily concerned with off-farm transitions. However, Ranis (2004) argues that some countries experienced industrialization accompanied by concurrent dramatic improvements in agricultural productivity. He argues this was the case of England at the cusp of 18th century, Japan in the late 19th and early 20th century, and Taiwan during the 1950s and 1960s. Such productivity improvements helped release further labor from agriculture while keeping the agricultural wage at or close to the subsistence level. Therefore, successful on-farm rural transitions can restrain the pressure on wages to increase and thus help facilitate further growth of urban manufacturing.

At present, 41.5% of China's population live in the rural areas. The traditional sector's share in the economy, however, is relatively low: agriculture accounts for 27.7% of total employment but only 7.92% of GDP (NBSC, 2017). The disparity between the sector's contributions to employment and output are consistent with the observation that large stock of excess labor still remains in rural areas (Das and N'Diaye, 2013).

With the liberalization of capital accumulation and the implementation of favorable agricultural policies, rural China is experiencing a transition from a tightly regulated peasant economy to a more open market economy (Long and Liu, 2016). As a result, on-farm entrepreneurship and on-farm employment are emerging as alternatives to subsistence farming on household-held plots (Yan and Chen, 2015; Zhang, 2015; Zhan, 2017). Accordingly, rural residents who do not move to urban areas have three options: remaining in low-productivity subsistence farming (that is, continuing to work on the family farm), leaving the family farm by taking up formal employment in an agricultural firm, or setting up their own agricultural firm (Xia and Simmons, 2007;

Wang et al., 2016). Which of these options they choose crucially depends on the resources at their disposal: savings and access to loans, skills and training, connections (both social and political), and the like. In other words, the occupational strategy depends crucially on the resource they possess. These resources often display the characteristics of capital stocks: they are costly to build (both in terms of monetary outlays and time and effort) and, if not regularly maintained, they tend to lose their value gradually over time. The endowments considered in this study include both tangible and intangible capital stocks: human; financial, natural, social, and political capital. Below, we briefly discuss the classification of capital endowments and what effects we expect them to have.

Human capital can help facilitate on-farm transitions. It corresponds to the skills and knowledge (innate and acquired) embodied in labor (Tan, 2014; Bhandari, 2013; Inwood, 2017). As an important dimension of human capital, education plays a crucial role in decision making of rural households (Bhandari, 2013). For instance, Zhang et al. (2002) find that those who are more educated obtain more off-farm opportunities. Similarly, Wang et al. (2016) show that there is a strongly positive relationship between human capital investment and entrepreneurship as well as holding a managerial position. We expect education to have a similar impact on on-farm transitions: possessing formal education and having agricultural and/or entrepreneurial skills should help rural residents become agricultural entrepreneurs.

With respect to gender, most studies (based on experimental evidence or observing investment behavior of men and women) tend to find that women are generally more risk averse (Jianakoplos and Bernasek 1998; Eckel and Grossman, 2008; Sarin and Wieland, 2016). Becoming an owner of an agricultural business is associated with more uncertainty and risk than formal employment (Ahn, 2010; Hvide and Panos, 2013). Therefore, we expect that rural households with higher share of women will prefer formal on-farm employment rather than a transition into on-farm entrepreneurship.

Rural workers who migrated to urban areas in the past benefit from experience and skills that workers who never left the rural region lack. The migrant-worker experience can be helpful both with respect to finding formal on-farm employment as well as when it comes to setting up on-farm businesses. Thus, we expect household with former rural-to-urban migrants to be more likely to undertake either type of on-farm transition.

Financial capital should also be significantly associated with on-farm transitions. Income, bank deposits, bonds and equity, and bank loans are essential determinants of firm growth (e.g., Fowowe, 2017; Lee and Stebunovs, 2016). In the context of rural China, where a large portion of households fall in the low-income group, lack of access to bank loans and other types of external finance can restrain their ability to set up new

agricultural businesses. Agricultural subsidies can be another financial resource for rural households. Therefore, we expect on-farm transitions to be positively affected by the household's ability to benefit from government subsidies, especially so with respect to transitions into on-farm entrepreneurship.

Importantly, natural capital has the potential to be the most important determinant of on-farm transitions (Kimhi and Bollman, 1999; Goetz and Debertin, 2001; Bhandari, 2013; Li et al., 2016). By investigating the extend of farmland fragmentation, for example, Su et al., (2014) conclude that the quality, quantity and the fragmentation of farmland have significant impacts on migration decisions. We anticipate the effect of quantity of farmland to be negative with respect to transition into employment: more land requires greater labor input from the household members. In contrast, households with more land should be in a better position to start an agricultural business (and hire labor external to the household to work on the land). Finally, the expected impact of farmland fragmentation is negative for both types of transitions: fragmented land requires more time and effort from the household members.

Additionally, social capital can also play a role in on-farm transitions in the literature as it can facilitate transactions, reduce freeriding, influence goals and to expand access to better opportunities (e.g., Fidrmuc and Gërxhani, 2008; Bhandari, 2013; Moyes et al., 2015). As an important type of social capital in China, *Guanxi* represents the size of the network of relatives and acquaintances who can offer information and assistance in gathering resources and cementing business ties. Similarly, a common surname is considered as a sign of kinship with other bearers of the same name.[3] We expect social capital to boost the propensity to undergo on-farm transitions into both on-farm employment and entrepreneurship.

Similarly, political capital can also be tightly linked to on-farm transitions. It is similar to *Guanxi* or can be treated as a special form of *Guanxi* in its potential to improve business ties and open doors to new opportunities. It refers to networks established on the basis of political rather than social connections, such as being related to or friends with government officials. Political capital can have a profound impact on rural residents' labor market performance in the sense that helps them get have better information on occupational opportunities (Wang et al, 2016). Cadres, for example, hold most important political positions in China's rural communities. When attempting to start an on-farm business, the access to market information is of crucial

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[3] Unlike most other countries, China has a relatively few unique surnames, with 100 most common surnames accounting for 84.7% of the population of the country (see 公安部统计："王"成中国第一大姓，有 9288 万人 (Public Security Bureau Statistics: 'Wang' Found China's #1 Surname, Includes 92.88m People)." Available at: http://news.eastday.com/c/20070424/u1a2791347.html (accessed 28-01-2018). The three most common surnames, Wang (王), Li (李), and Zhang (张) account for 7.3%, 7.2% and 6.8%, respectively, of the Chinese population (92.9mn, 92.1mn and 87.5mn in absolute numbers). However, there are important regional differences in the popularity of surnames. For the purposes of our survey, respondents were asked only whether their name was popular in the village.

importance. The cadres can thus open door to success as entrepreneurs (Zhang et al., 2012). We therefore expect political capital to be particularly important in facilitating on-farm transitions into entrepreneurship.

3. Data and methodology

3.1 Data

Our data is based on the survey entitled "Cultivation and Reform of Land and Relevant Factors in Rural China" carried out by South China Agriculture University in 2015. The survey was conducted in the following steps. First, 31 provinces (including municipalities and autonomous regions) were classified into 3 groups by a cluster analysis of population, per capita GDP, agricultural acreage, proportion of agricultural acreage, proportion of agricultural population and proportion of agricultural production. Second, 9 provinces were selected randomly across Eastern, Central and Western China, namely, Guangdong, Guizhou, Henan, Jiangsu, Jiangxi, Liaoning, Ningxia, Shanxi and Sichuan. These provinces are listed in Table 1 and their locations within China are shown and Fig. 1. Counties were then randomly chosen from each province again. Finally, 240 households were randomly chosen in each of the selected areas to participate in the survey.[4] To ensure the quality of collected data, the final questionnaire was developed on the basis of a pilot survey. Survey was conducted through face-to-face interviews and 2880 households participated in the survey. Eliminating invalid questionnaires (those with incomplete or inconsistent responses), the final sample contains 2704 rural households. Table A in the Appendix details more information on the cluster analysis for the survey.

Table 1
Surveyed provinces.

Class	Eastern China	Central China	Western China
Class1	Beijing; **Guangdong**; Shandong; Tianjin; Shanghai	Heilongjiang; **Henan**; Hainan	**Ningxia**; Qinghai; Tibet
Class2	Zhejiang; **Jiangsu**; Fujian	Inner Mongolia; **Jiangxi**; Hebei; Anhui; Hubei; Hunan	Chongqing; **Sichuan**; Yunnan
Class3	**Liaoning**	**Shanxi**; Jilin; Guangxi	Shaanxi; **Guizhou**; Gansu; Xinjiang

	Sample Sizes								
	Guangdong	Guizhou	Henan	Jiangsu	Jiangxi	Liaoning	Ningxia	Shanxi	Sichuan
Sample	600	240	240	240	600	240	240	240	240
Valid N	547	239	230	239	587	221	226	201	214

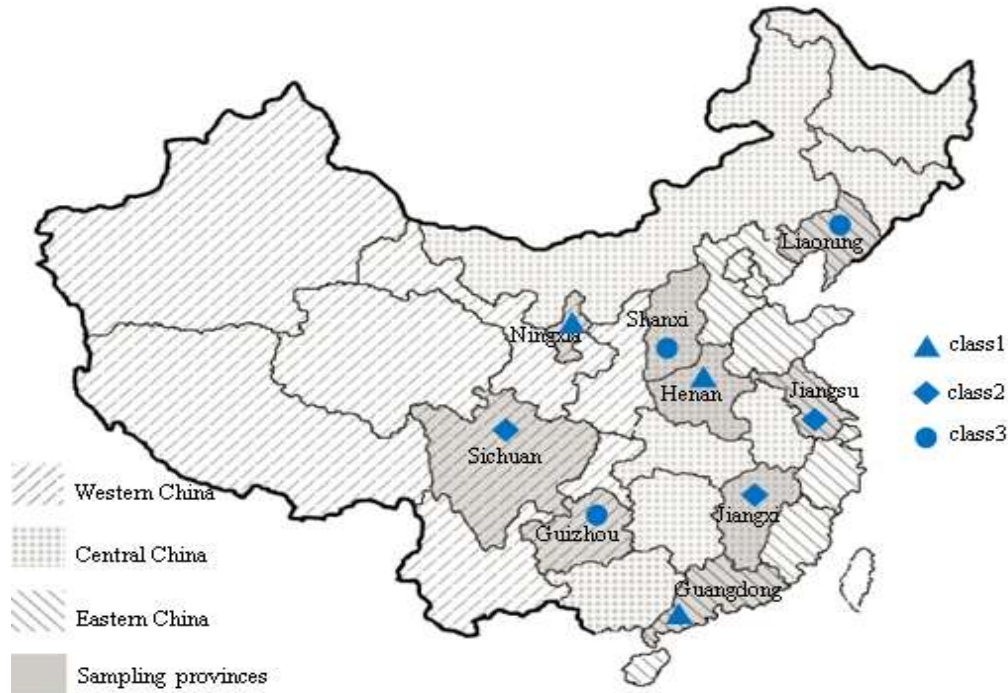[4] Larger samples were selected in two of the provinces.

Fig. 1. Location of surveyed provinces.

The dependent variable in our empirical analysis, the household's decision to undertake on-farm transition, takes four values, as given by the categorical choices shown in Table 2. No household members in formal on-farm employment or own an agribusiness is denoted with 0; one or more household members as on-farm workers (and none as business owners) is option 1; one or more household members becoming entrepreneurs (and none in formal employment) is valued with 2; household members in both on-farm employment and others concurrently as agribusiness owners is denoted with 3.

Table 2
Descriptive of dependent variable.

On-farm transitions.	N	Proportion
No household member as on-farm worker or agribusiness owner = 0	2147	79.40%
Household members as on-farm worker = 1	409	15.13%
Household members as agribusiness owner = 2	116	4.29%
Household members as both on-farm worker and agribusiness owner = 3	32	1.18%

The explanatory variables of interest, the capital endowments of the household are presented in Table 3. Note that the survey only collects information about the whole household, not about individual household members (with the exception of the household head).

Human capital is measured by the number of economically active household members, their gender distribution, average educational attainment, history of training, and experience of rural-to-urban migration.

Households with more workers and more educated and trained members are believed to have higher human capital endowments (Schultz, 1961; Wang et al., 2016; Muchomba, 2017). Specifically, we set the length of compulsory education in China, nine years, as the threshold level of education, and distinguish between households whose average education level is 9 or less and those with greater values. As for training, the Chinese government has funded non-profit organizations to offer training programs, which the farmers can receive for free (Pan et al, 2017). We therefore include a measure whether members of the household have received such training.

Financial capital is measured by household's income, savings, access to bank credit, and agricultural subsidies. Specifically, we include the household's total income, relative comparison of present income with the past and with other households, and having savings and/or bank loans.

Natural capital is measured as the household's contracted farmland, actual farmland used, land quality, and the relative size of land holdings. Farmland and land quality are indicators of the condition of the natural capital base. However, due to the limited farmland and the implementation of Household Responsibility System in the late 1970s and early 1980s that followed the principle of equality in farmland allocation (according to household size, the number of active members in a household, or both), farming operations in rural China are small and fragmented. Therefore, we use the farmland fragmentation as an additional measure of the condition of farmland.

Social capital is measured by the number of relatives/friends that the household has and whether the family surname is popular in the village. In rural China, due to the small scale of villages and limited geographical mobility, people sharing the same surname may belong to the same extended family or a wider clan. They may be more willing to help each other as a result. For the same reason, the authorities in the village are more likely to be selected from among those with the most popular surnames.

Political capital is measured as household members holding positions of village cadres, and membership of household members in the Communist Party of China (CPC). Both cadre status inside and outside the village is taken into accounts as on-farm transitions can take place both inside and outside the village. Being a CPC member can help by facilitating better political connections, which in turn can translate into economic gains.

Table 3
Descriptive statistics of explanatory variables and control variables.

Variables			N	Proportion	Variables			N	Proportion
Human capital	The number of active members of household		2704	100%	**Financial capital**	Household total income (yuan)	Less than 30,000 = 0	1348	49.85%
	Gender distribution	More female = 0	419	15.50 %			Between 30,000 to 50,000 =1	715	26.44%
		Equal = 1	1367	50.55 %			More than 50,000 = 2	641	23.71%
		More male = 2	918	33.95 %		Income compared with 2013	Lower = 0	372	13.76%
	Average education (of years)	Less than 9 = 0	1922	71.08%			Same = 1	1497	55.36%
		Greater than 10 =1	782	28.92%			Higher = 2	835	30.88%
	Training of agricultural technology	No = 0	2284	84.47%		Income compared with others	Lower = 0	525	19.41%
		Yes = 1	420	15.53%			Same = 1	1738	64.28%
	Entrepreneurial training	No = 1	2424	89.64 %			Higher = 2	441	16.31%
		Yes = 2	280	10.36 %		Savings	No = 0	653	24.15%
	Migrant experience	No = 1	2284	84.47%			Yes = 1	2051	75.85%
		Yes = 2	420	15.53%		Bank loan	Hard to access = 0	1702	62.94%
	Off-farm employment	No = 0	522	19.30%			Easy to access = 1	1002	37.06%
		Yes = 1	2182	80.70%		Agricultural subsidies	Low = 0	235	8.69%
	Off-farm entrepreneurial activity	No = 0	2509	92.79%			Average = 1	520	19.23%
		Yes = 1	195	7.21%			High = 2	1949	72.08%
Political capital	Family members as village cadre	No = 0	2039	75.41 %	**Social capital**	Popular surname in the village	Unpopular = 0	554	20.49%
		Yes = 1	665	24.59 %			Average = 1	797	29.47%
	Relatives/friends as village cadre	No = 0	1636	60.50 %			Popular = 2	1353	50.04%
		Yes = 1	1068	39.50 %		Number of relatives/friends	Few = 0	152	5.62%
	Family members as cadres outside village	No = 0	2571	95.08 %			Average = 1	1315	48.63%
		Yes = 1	133	4.92 %			Many = 2	1237	45.75%
	Relatives/friends as cadres outside village	No = 0	2125	78.59 %	**Natural capital**	Contracted farmland	Less than average = 0	1475	54.55%
		Yes = 1	579	21.41 %			Greater than average = 1	1229	45.45%
	Family members join the CPC	No = 0	2216	81.95 %		Actual Farmland	Less than contracted = 0	907	33.54 %
		Yes = 1	488	18.05 %			Equal to contracted = 1	1502	55.55%
Additional controls	Age of the household head		2704	100%			Greater than contracted = 2	295	10.91 %
	Gender of the household head	Male = 0	1723	63.72%		Land quality	Poor = 0	328	12.13%
		Female =1	981	36.28%			Average = 1	1285	47.52%
	Education of the household head (of years)	≤9 = 0	1951	72.15%			Good=2	1091	40.34%
		≥10 = 1	753	27.85%		Land fragmentation	Less than average=0	1494	55.25 %
	Household head's migrant experience	No = 0	1106	40.90%			Greater than average=1	1210	44.75 %
		Yes = 1	1598	59.10%		Productivity	Poor = 0	746	27.59 %
	Traffic condition in the village	Poor = 0	434	16.05 %			Average = 1	1678	62.06 %
		Average = 1	1230	45.49 %			Good = 2	280	10.36 %
		Good = 2	1040	38.46 %					
	Distance to town center (km)		2704	100%					

A number of additional control variables are included in the analysis. These mostly reflect the information available about the household head (the only member of the household whose details are reported in the survey). We therefore control the socio-economic characteristics of the household heads including their age, gender, educational level and migrant work experience. Furthermore, we also control traffic condition and distance to the center of township, which reflect the local conditions in the village.

3.2 Methodology

On-farm transitions are essentially a set of decisions on occupational choice with multiple options. We follow the studies on occupational choice and adopt the Multinomial Logit Model, which has been widely adopted in empirical analyses with categorical variables (Greene, 2007; Schmidt and Strauss, 1975; Barkley, 1990; Wang et al., 2016). The utility function for the household occupational choice is specified as follows.

$$U_{ij} = \alpha + GX_i' + \varepsilon_{ij} \qquad (1)$$

where U_{ij} is the utility of household i associated with choice j. X_i' is a vector of household characteristics and G is a vector of parameters to be estimated. The probability that option j is chosen by i can be written as follows.

$$P_{ij} = \text{Prob}(Y_{ij} = 1) = \frac{\exp(G_j X_i')}{\sum_{i=1}^{M} \exp(G_i X_i')} \quad j = 0, 1, 2 \dots N; \ i = 1, 2, 3 \dots M \quad (2)$$

Note that we set decision *j = 0* as denoting those household with no members as either on-farm workers or agribusiness owners as the base category; *j = 1* if at least one household member is and on-farm worker (and none are agribusiness owners); *j = 2* when at least one household member is a local agribusiness owner (and none are formally employed in agriculture); and *j = 3* when at least one household member is an on-farm worker and at least one is an agribusiness owner. Note that only 32 households fall into the last category; therefore, we take the results for this group with a grain of salt and focus in our discussion on households for which j equals 1 or 2.

The analysis proceeds in two steps. We first only include the capital endowments. Then, we also include the additional control variables (household head characteristics and local conditions) as well as province fixed effects, which can capture the effect of local-level factors that also affect rural on-farm transitions and whose effects are the same for all households in the same sampling location: policies put in place by the local

government (and the extent to which implementation of national policies differs across regions), local-level institutions, and access to market.

4. Results and discussions

Table 4 reports the marginal effect of different types capital endowments obtained in a multinomial logit households' on-farm transitions. Column 1 - 3 are estimated without additional controls and column 4 - 6 with additional control variables and province fixed effects.

Table 4
Determinants of on-farm transitions: multinomial logit, marginal effects. (N=2704)

	(1) On-farm employment	(2) On-farm entrepreneurship	(3) Both	(4) On-farm employment	(5) On-farm entrepreneurship	(6) Both
Panel A: Human capital						
The number of active members of household						
Gender distribution of active household members	0.015***	-0.002	0.001	0.020***	-0.004	0.003
	(0.005)	(0.003)	(0.001)	(0.005)	(0.004)	(0.002)
Females > males	-0.012	-0.017	-0.004	-0.009	-0.013	-0.002
	(0.019)	(0.013)	(0.006)	(0.020)	(0.013)	(0.006)
Females < males	-0.004	0.006	-0.007	-0.007	0.006	-0.009*
	(0.015)	(0.008)	(0.005)	(0.015)	(0.008)	(0.005)
Education level	-0.014	0.004	-0.004	-0.014	0.013	-0.004
	(0.015)	(0.008)	(0.005)	(0.015)	(0.009)	(0.005)
Training in agricultural technology	0.003	0.025***	0.010**	0.011	0.023***	0.010**
	(0.019)	(0.009)	(0.005)	(0.018)	(0.009)	(0.005)
Entrepreneurial training	0.043**	0.050***	0.016	0.049**	0.054	0.020
	(0.021)	(0.009)	(0.005)	(0.020)	(0.009)	(0.005)
Migrant worker	0.207***	-0.016	0.003	0.201***	-0.018*	0.002
	(0.023)	(0.010)	(0.006)	(0.023)	(0.010)	(0.006)
Off-farm employment	-0.280***	0.018	-0.007	-0.288***	0.019	-0.011*
	(0.022)	(0.012)	(0.006)	(0.022)	(0.012)	(0.006)
Off-farm entrepreneurial activity	-0.017	-0.032	-0.148	-0.017	-0.031	-0.148
	(1.533)	(0.783)	(6.713)	(3.326)	(1.499)	(12.395)
Panel B: Financial capital						
Household total income (yuan)						
30,000-50,000	0.033**	0.003	0.006	0.027*	0.002	0.004
	(0.016)	(0.010)	(0.006)	(0.016)	(0.01)	(0.006)
> 50,000	0.046***	0.008	0.014**	0.032*	0.002	0.013
	(0.017)	(0.010)	(0.006)	(0.017)	(0.010)	(0.006)
Income compared with last year (2013)						
Lower	-0.048**	0.017	0.006	-0.043	0.013	0.005
	(0.023)	(0.012)	(0.006)	(0.023)	(0.012)	(0.006)
Higher	0.000	-0.013	-0.003	0.002	-0.011	-0.002
	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)
Income level compared with others						
Lower	0.003	-0.018	0.006	0.001	-0.016	0.007
	(0.018)	(0.013)	(0.006)	(0.018)	(0.013)	(0.006)
Higher	-0.005	0.031***	0.000	-0.007	0.032***	-0.002
	(0.019)	(0.009)	(0.006)	(0.019)	(0.009)	(0.005)
Savings	-0.027*	0.012	-0.003	-0.032**	0.010	-0.001
	(0.016)	(0.011)	(0.005)	(0.016)	(0.011)	(0.005)
Bank loans	0.024*	0.007	-0.001	0.014	0.004	-0.004
	(0.013)	(0.008)	(0.004)	(0.013)	(0.008)	(0.004)
Agricultural subsidies						
Low	-0.108	-0.042	-0.978	-0.824	-0.177	-1.604
	(0.387)	(0.407)	(0.116)	(0.472)	(0.414)	(1.862)
High	-0.195	-0.326	0.342	-0.1943	-0.246	0.131
	-0.108	-0.042	-0.978	-0.824	-0.177	-1.604
Panel C: Natural capital						
Contracted farmland	0.041****	0.002	0.000	0.033**	0.007	-0.006
	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)
Actual farmland						
< Contracted	-0.014	0.005	0.004	-0.011	0.008	0.002
	(0.015)	(0.009)	(0.005)	(0.015)	(0.009)	(0.005)

	(1)	(2)	(3)	(4)	(5)	(6)
> Contracted	0.002	0.027***	0.017***	0.010	0.031	0.016
	(0.021)	(0.010)	(0.005)	(0.021)	(0.011)	(0.005)
Land quality						
Poor	-0.007	-0.002	-0.001	-0.007	0.000	-0.003
	(0.023)	(0.015)	(0.009)	(0.022)	(0.015)	(0.009)
Good	0.037***	0.016*	0.01**	0.030**	0.016*	0.010*
	(0.014)	(0.008)	(0.005)	(0.014)	(0.009)	(0.005)
Land fragmentation	-0.028*	-0.001	0.006	-0.023	0.011	0.008
	(0.015)	(0.009)	(0.005)	(0.018)	(0.010)	(0.006)
Productivity						
Low	-0.011	0.012	-0.009	-0.013	0.010	-0.009
	(0.016)	(0.009)	(0.006)	(0.015)	(0.009)	(0.006)
High	0.041*	0.021*	0.006	0.037*	0.020	0.006
	(0.021)	(0.012)	(0.006)	(0.021)	(0.012)	(0.006)
Panel D: Social capital						
Popular surname						
Unpopular	-0.05***	0.016	-0.004	-0.046**	0.016	-0.003
	(0.019)	(0.011)	(0.005)	(0.018)	(0.011)	(0.005)
Popular	-0.041***	0.018*	-0.011**	-0.037**	0.018*	-0.010**
	(0.015)	(0.01)	(0.005)	(0.015)	(0.010)	(0.005)
Number of relatives or friends						
Few	-0.054*	-0.014	0.002	-0.053*	-0.013	0.006
	(0.032)	(0.021)	(0.009)	(0.032)	(0.021)	(0.009)
Many	-0.044***	-0.004	0.004	-0.040***	-0.001	0.003
	(0.014)	(0.008)	(0.005)	(0.014)	(0.008)	(0.005)
Panel E: Political capital						
Family members as village cadres	0.039**	0.026***	0.001	0.042***	0.024***	0.001
	(0.016)	(0.009)	(0.005)	(0.016)	(0.009)	(0.005)
Relatives/friends as village cadres	0.015	0.000	0.008*	0.017	-0.003	0.010**
	(0.015)	(0.008)	(0.005)	(0.014)	(0.008)	(0.005)
Family members as cadres outside village	0.000	0.009	0.007	-0.004	0.002	0.008
	(0.031)	(0.015)	(0.007)	(0.030)	(0.015)	(0.007)
Relatives/friends as cadres outside village	0.012	0.002	0.001	0.002	0.004	0.002
	(0.017)	(0.009)	(0.005)	(0.016)	(0.009)	(0.005)
Family members join the CPC	-0.034*	-0.008	0.001	-0.030	-0.006	0.002
	(0.019)	(0.01)	(0.005)	(0.019)	(0.010)	(0.005)
Control variables						
Age of the household head				0.008***	-0.001	0.002*
				(0.003)	(0.001)	(0.001)
Age square				0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)
Gender				-0.016	-0.003	-0.006
				(0.014)	(0.008)	(0.005)
Household head's educational level				0.009	-0.020	-0.001
				(0.018)	(0.011)	(0.006)
Household head migrant experience				0.034	0.001	0.003
				(0.014)	(0.008)	(0.004)
Traffic condition in the village						
Poor				-0.055	-0.008	-0.005
				(0.021)	(0.013)	(0.008)
Good				0.019	0.012	-0.003
				(0.014)	(0.009)	(0.005)
Distance from home to town				0.001	0.000	0.000
				(0.001)	(0.001)	(0.000)
Province fixed effects	No	No	No	Yes	Yes	Yes

Notes: (1)-(3) are benchmark models and (4)-(6) are with additional control variables; Standard errors are in parentheses; Significant level: *p<0.1 **p<0.05 ***p<0.01.

The results for human capital shown in Panel A suggest that having more active household members increases the probability of transitioning into on-farm employment. Note that we control for the amount of land that the household can use: holding the area of farmland constant, larger households are more likely to have surplus labor that can move into formal employment elsewhere. In contrast, the number of active members of household has no influence on the probability of undergoing transition into agribusiness. Training plays an important role, as expected: entrepreneurial training exerts significantly positive influence on on-farm

transition into both employment and entrepreneurship while agricultural training fosters only moving into on-farm entrepreneurship. Migrant work experience of a household member has positive influence on transition into employment, while it has no impact on transition into entrepreneurship: former migrant workers probably have history of urban employment, and are likely to have acquired human capital that makes them more productive in rural employment as well. As expected, the number of household members employed off-farm has a negative effect on transitioning to on-farm worker status: with more household members working off-farm, there are fewer members available to work on-farm. Off-farm employment does not, however, have significant influence on on-farm entrepreneurship. Having household members owning off-farm business has no significant effect on either type of on-farm transition. Finally, gender balance of the household and education of household members do not significantly contribute to either type of transition, contrary to our expectations.

The effect of financial capital on on-farm transitions is reported in Panel B. The higher the income of a household, the more likely it is to transition into on-farm employment. This may reflect reverse causality: being employed outside the household brings in additional earnings, resulting in an overall increase in the household's income. This interpretation is consistent also with the finding that household with employed members are less likely to report falling earnings compared with the previous year. Current income does not have a direct impact on on-farm entrepreneurship. Nevertheless, households with higher than average incomes are likely to have members who are agribusiness owners. Having savings makes formal employment less likely; contrary to our expectations, savings do not affect the transition into entrepreneurship. Bank loans have the opposite effect, being positively correlated with on-farm employment but not with being an agribusiness owner. The coefficient of bank loans on entrepreneurship is somewhat surprising: it suggests that agricultural business owners rely little on external finance, or find it difficult to obtain it, unlike those in formal employment who can borrow from banks against future earnings from employment. In addition, the level of agricultural subsidies does not have a significant effect, which can be explained by the limited extent of government subsidies (Park et al., 1998; Meng, 2012).

In Panel C, we assess how natural capital contributes to on-farm transitions. Households with larger than average amount of farmland are more likely to transition into on-farm employment. Having access to more land than contracted, in turn, is associated with greater probability of entrepreneurship: this may be an effect of transitioning into entrepreneurial activity rather than a driver of it, as agribusiness owners may seek to acquire additional land. On the other hand, households with land of better-than-average quality and with better

than average productivity tend to have members transitioning into formal employment (after controlling for the amount of land). Land of better quality should be easier to work on, and this should help release some household members to seek employment elsewhere. Likewise, higher productivity of land means that less labor and other inputs are required to work on the given quantity of land, again helping release surplus labor into formal employment.

Panel D reports the effect of social capital on on-farm transitions. The results display an inverted U-shaped relationship between social capital and transitioning into formal employment. That is, both having a popular and unpopular surname is associated with lower probability of on-farm employment transition than having a surname of average popularity. Similarly, those with few and many friends are less likely to transition into on-farm employment than those with an intermediate number of friends. A popular surname probably means that many residents in the village share the same surname: this may result in weaker ties among those with that surname. In contrast, having an unpopular surname means that there are few kinsmen in the village. Interestingly, the effects of the two types of social capital on on-farm agribusiness transition are different: those with popular surnames are (weakly) more likely to move into rural entrepreneurship while having more than average number of friends has no effect on this type of transition.

Panel E outlines the effect of political capital on on-farm transitions. The results show that having a family member as a village cadre has a positive effect on the probability of both types of on-farm transition. Such cadres could potentially help their family members through different channels. For instance, rural cadres can use their position to help family members gain better access to higher-level bureaucrats, potential business partners and employers, credit sources, market information or technical expertise (Oi, 1999; Zhang et al, 2012, Jin et al., 2014). Interestingly, the positive effect only appears when a household member is a village cadre: having more distant relatives or friends as village cadres, or having a family member as a cadre outside the village, have no significant influence on on-farm transition. This finding is consistent with Zhang and Li (2003) who also find that having family members as cadre has a significant effect on off-farm employment while the impact of having ties outside the village is insignificant. This is captured also in a Chinese proverb: "Distant water will not quench a fire nearby (*YuanShuiJiuBuLeJinHuo* 远水救不了近火*). Hence, the depth of political capital is much more important than its width. It is also interesting that having household members in the Communist Party of China has a weakly negative effect on the likelihood of on-farm employment and no significant effect on on-farm entrepreneurship: this may either mean that CPC members receive few benefits,

or that the Party membership helps them move out of agriculture into off-farm employment or career in the civil service while having no impact on livelihood improvements while remaining in agriculture.

The results presented in column (4) -(6) when we control for additional variables and province fixed effects are well-aligned with the estimates in column (1) -(3). In particular, we find that the age of the household head has a positive effect on the decision to transition as on-farm worker (note that in this case, the age of household head is related to the probability of any household member transitioning into on-farm employment). We also note that poor traffic conditions in the village discourage on-farm transition into employment. Somewhat surprisingly, however, the gender and education level of the household head do not have a significant effect on either type of transition.

To sum up, we reproduce our prior expectations and compare them with our findings in Table 5. Our expectations have been broadly confirmed with respect to human and natural capital, and also, though less firmly, for social and political capital. Rather surprisingly, the results of our analysis suggest that financial capital plays a limited role as a catalyst of rural on-farm transitions.

Table 5
Expected effects of capital endowments vs empirical results.

Capital endowment	On-farm employment		On-farm entrepreneurship	
	Expectation	Finding	Expectation	Finding
Human capital				
Education	+	0	+	0
Training	+	+	+	++
Share of females	+	0	–	0
Former rural-to-urban migrants	0	+	+	0
Financial capital				
Income	0	+	+	+
Savings	0	–	++	0
Bank loans	0	+	++	0
Agricultural subsidies	0	0	+	0
Natural capital				
Quality of farmland	+	++	++	+
Quantity of farmland	–	++	+	+
Land fragmentation	——	–	——	0
Social capital				
Friends and relatives	+	+/–	++	0
Popular surname	+	+/–	++	++
Political capital				
Household members cadres	+	++	++	++
Friends/relatives cadres	+	0	++	0
Household CPC members	+	0	++	0

Notes: ++ and—— stand for expected strongly positive/negative effect. + and – stands for (weakly) positive/negative effect. +/– stands for non-linear effect, and 0 stands for no effect.

5. Robustness check: taking account of both on-farm and off-farm transitions

The above analysis is focused on on-farm transitions and to what extent they are driven by capital endowments. However, members of rural households can also migrate to urban areas to seek jobs or set up businesses there.

This is referred to as off-farm transitions (e.g., Wang et al., 2011; Wang et al., 2013; Wang et al., 2016). When household members move away to engage in off-farm transitions, the same person is no longer able to undertake on-farm transitions. Hence, on-farm transitions and off-farm transitions are both part of the households' occupational choice set as substitutes. So far, we account for this by constructing explanatory variables that capture whether household members have undertaken off-farm transitions. An alternative treatment is to include both on-farm and off-farm transitions among the household choice set: that is, to include off-farm transitions in the construction of the dependent variable.

Accounting fully for both on-farm and off-farm transitions yields 16 possible combinations as shown in Table 6. We designate undergoing neither off-farm transitions nor on-farm transitions (12.09% of households) as the base category. The most common outcomes are off-farm employment with no on-farm transitions (60.98%), off-farm employment with concurrent on-farm employment (9.06%), combination of off-farm employment and off-farm entrepreneurship with no on-farm transitions (5.70%), on-farm employment with no off-farm transitions (5.33%), and off-farm employment and on-farm entrepreneurship (3.51%). The remaining 3.33% are households undertaking other combinations of on-farm and off-farm transitions. Each of these remaining combinations is too small to be analyzed separately, therefore, we aggregate then into an *other* category. We thus estimate multinomial logit of the probability of choosing one of the aforementioned combinations (marked in **bold** type in Table 6), relative to the probability of the base option of no transition (in ***bold and italics***).

Table 6
Occupational choice matrix.

	No off-farm transitions	Off-farm employment	Off-farm entrepreneurship	Off-farm both	Total
No on-farm transitions	**327**	*1649*	17	**154**	2147
	(12.09%)	*(60.98%)*	(0.63%)	**(5.70%)**	(79.4%)
On-farm employment	**144**	**245**	8	12	409
	(5.33%)	**(9.06%)**	(0.30%)	(0.44%)	(15.13%)
On-farm entrepreneurship	17	**95**	0	4	116
	(0.63%)	**(3.51%)**	(0.00%)	(0.15%)	(4.29%)
On-farm both	9	23	0	0	32
	(0.33%)	(0.85%)	(0.00%)	(0.00%)	(1.18%)
Total	497	2012	25	170	2704
	(18.38%)	(74.41%)	(0.92%)	(6.29%)	(100%)

Table 7 reports the effect of capital endowments on combinations of off-farm and on-farm transitions. For the ease of comprehension, we denote the columns headings with combinations of letters indicating the presence of transition into employment (E) or into business (B), which can take place on-farm (in rural area, R) or off-farm (urban, U). The effects of human capital are presented in Panel A. The coefficient of agricultural

technology training in column (5) is positive and statistically significant, which means that receiving training in agricultural technology increase the probability of households undergoing on-farm entrepreneurial activity and off-farm employment. Entrepreneurial training lowers the probability of off-farm employment while it boosts on-farm transitions into both employment and agricultural entrepreneurship as shown in column (2) and (5). Column (1), (2) and (5) suggest that having migrant experience has an ambiguous effect: positive for on-farm and off-farm employment but negative for on-farm entrepreneurial activity.

The effect of financial capital is presented in Panel B. We observe that having household income between 30K and 50K is negatively associated with transitioning into off-farm employment but has a positive impact on moving into on-farm employment as shown in column (1) and (4). Households reporting lower income level compared to the previous year is negatively related to on-farm employment while having higher income compared to other household is positively related to on-farm transitions (both as on-farm workers and agribusiness entrepreneurs). Having higher savings leads to lower probability of being both off-farm and on-farm employed. Higher level of agricultural subsidies has a positive effect on the combinations with off-farm employment and on-farm transitions.

Panel C reports the effect of natural capital. As expected, column (1) shows that having more contracted land and land of better quality reduce the probability of off-farm employment while column (4) and (5) show that higher productivity, quality and more contracted land boost on-farm transitions. The effect of social capital, shown in Panel D, suggests that having a popular surname and many friends both have a negative effect on on-farm employment, which broadly corroborates our previous finding. As for the effect of political capital, in Panel E, what matters the most is again having family members who hold the post of a local cadre. Households that benefit from a family member being a cadre tend to initiate on-farm transitions of both types.

Table 7
Determinants of combination of off-farm and on-farm transitions: multinomial logit, marginal effect. .

	(1) UE	(2) UE & RE	(3) UE & UB	(4) RE	(5) UE & RB	(6) Others
Panel A: Human capital						
The number of active members of household	0.016**	0.013***	0.004	0.004	-0.001	-0.001
	(0.008)	(0.004)	(0.004)	(0.004)	(0.003)	(0.003)
Gender distribution						
Females > males	0.046*	-0.003	-0.011	-0.014	-0.002	-0.009
	(0.027)	(0.016)	(0.013)	(0.014)	(0.011)	(0.011)
Females < males	0.040**	-0.001	-0.013	-0.015	0.007	-0.010
	(0.020)	(0.012)	(0.010)	(0.010)	(0.008)	(0.008)
Education level	-0.018	-0.003	0.016	-0.004	0.011	-0.008
	(0.021)	(0.013)	(0.010)	(0.010)	(0.008)	(0.009)
Training in agricultural technology	0.017	0.015	-0.039***	-0.029**	0.019**	0.017**
	(0.026)	(0.015)	(0.014)	(0.014)	(0.008)	(0.008)
Entrepreneurial training	-0.105***	0.037**	0.056***	0.021	0.036***	0.035***
	(0.031)	(0.016)	(0.011)	(0.015)	(0.009)	(0.009)
Migrant working experience	0.204***	0.102***	0.013	-0.028***	0.003	-0.018***
	(0.024)	(0.017)	(0.010)	(0.008)	(0.007)	(0.006)

Panel B: Financial capital						
Household total income (yuan)						
30,000-50,000	-0.044**	0.007	0.013	0.022**	-0.004	0.008
	(0.022)	(0.013)	(0.011)	(0.010)	(0.009)	(0.009)
>50,000	-0.030	0.011	0.006	0.031**	-0.003	0.020**
	(0.024)	(0.014)	(0.012)	(0.012)	(0.009)	(0.009)
Income level compared with 2013						
Lower	0.042	-0.039**	0.003	-0.023	0.004	0.024**
	(0.029)	(0.020)	(0.015)	(0.014)	(0.011)	-0.010
Higher	0.017	-0.001	0.008	-0.006	-0.015*	0.000
	(0.020)	(0.012)	(0.010)	(0.010)	(0.008)	(0.008)
Income level compared with others						
Lower	-0.018	0.006	-0.014	0.009	-0.011	0.005
	(0.025)	(0.015)	(0.014)	(0.011)	(0.011)	-0.010
Higher	-0.029	-0.013	0.024**	-0.007	0.025***	0.010
	(0.026)	(0.016)	(0.011)	(0.012)	(0.009)	(0.009)
Savings	0.022	-0.029**	0.023*	-0.015	0.003	0.006
	(0.022)	(0.013)	(0.013)	(0.010)	(0.010)	(0.009)
Bank loans	-0.007	0.011	-0.016*	0.011	0.005	-0.013*
	(0.019)	(0.011)	(0.010)	(0.009)	(0.007)	(0.007)
Agricultural subsidies						
Low	0.812	0.724	0.821	0.608	0.605	1.228
	(0.297)	(0.331)	(0.405)	(0.317)	(0.343)	(0.748)
High	0.523***	0.435***	0.493**	0.608	0.394**	0.549
	(0.130)	(0.131)	(0.162)	(0.205)	(0.143)	(0.220)
Panel C: Natural capital						
Contracted farmland	-0.055***	0.041***	-0.021*	0.004	0.003	-0.003
	(0.021)	(0.013)	(0.011)	(0.010)	(0.008)	(0.008)
Actual farmland						
< Contracted	0.004	-0.015	0.027***	-0.009	0.010	0.009
	(0.021)	(0.012)	(0.010)	(0.010)	(0.008)	(0.008)
> Contracted	-0.060**	0.022	-0.009	-0.016	0.017*	0.032***
	(0.030)	(0.017)	(0.018)	(0.015)	(0.010)	(0.009)
Land quality						
Poor	-0.013	-0.014	0.017	0.023*	0.003	-0.024
	(0.030)	(0.020)	(0.015)	(0.013)	(0.013)	(0.015)
High	-0.053***	0.017	-0.001	0.021**	0.017**	0.006
	(0.020)	(0.012)	(0.010)	(0.010)	(0.008)	(0.008)
Land fragmentation	-0.007	-0.028*	0.025**	0.001	0.009	0.007
	(0.024)	(0.015)	(0.011)	(0.012)	(0.009)	(0.009)
Productivity						
Low	-0.027	-0.012	0.019**	0.002	0.007	0.003
	(0.021)	(0.013)	(0.010)	(0.010)	(0.008)	(0.008)
High	-0.025	0.005	-0.009	0.024*	0.009	0.019*
	(0.030)	(0.018)	(0.017)	(0.013)	(0.012)	(0.011)
Panel D: Social capital						
Popular surname						
Unpopular	0.013	-0.025	0.002	-0.018	0.021**	-0.014
	(0.026)	(0.016)	(0.013)	(0.011)	(0.010)	(0.010)
Popular	0.032	-0.005	0.007	-0.039***	0.015	-0.015*
	(0.022)	(0.013)	(0.011)	(0.011)	(0.010)	(0.008)
Number of relatives or friends						
Few	0.039	-0.038	0.018	-0.013	-0.028	0.006
	(0.042)	(0.028)	(0.020)	(0.019)	(0.024)	(0.017)
Many	0.022	-0.044***	0.017*	0.002	-0.001	0.000
	(0.019)	(0.012)	(0.010)	(0.009)	(0.008)	(0.007)
Panel E: Political capital						
Family members as village cadres	-0.066***	0.030**	-0.006	0.010	0.023***	0.011
	(0.023)	(0.013)	(0.011)	(0.011)	(0.008)	(0.008)
Relatives /friends as village cadre	-0.029	0.016	0.003	-0.002	0.000	0.014*
	(0.020)	(0.012)	(0.010)	(0.010)	(0.008)	(0.008)
Family members as cadres outside the village	0.038	-0.001	0.006	-0.041	0.007	0.025**
	(0.042)	(0.025)	(0.018)	(0.025)	(0.013)	(0.012)
Relatives/friends as cadres outside the village	-0.034	-0.010	0.016	0.014	0.010	0.006
	(0.023)	(0.014)	(0.010)	(0.010)	(0.008)	(0.008)
Family members join the CPC	0.030	-0.012	0.006	-0.012	-0.007	-0.001
	(0.025)	(0.015)	(0.011)	(0.013)	(0.009)	(0.009)
Control variables						
Age of the household head	-0.007**	0.005**	0.002	0.001	-0.001	0.001
	(0.004)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Age square	0.000*	0.000**	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender	0.017	-0.010	0.003	-0.004	-0.007	-0.005
	(0.019)	(0.012)	(0.009)	(0.009)	(0.008)	(0.007)
Household head's educational level	0.001	0.010	0.006	0.004	-0.023**	0.000

	(0.025)	(0.014)	(0.012)	(0.012)	(0.010)	(0.010)
Household head's migrant experience	-0.008	0.010	0.007	0.017*	-0.002	0.005
	(0.019)	(0.012)	(0.009)	(0.009)	(0.007)	(0.007)
Traffic condition in the village						
Poor	0.050*	-0.067***	0.000	0.018	-0.002	-0.008
	(0.028)	(0.020)	(0.014)	(0.012)	(0.011)	(0.011)
Good	-0.019	-0.005	0.020**	0.019*	0.010	0.006
	(0.020)	(0.012)	(0.010)	(0.010)	(0.008)	(0.008)
Distance from home to town	-0.001	-0.001	0.000	0.002***	0.000	0.001**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Province fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Base = no on-farm and off-farm transitions; UE = off-farm (urban) employment with no on-farm transitions; UE & RE = off-farm (urban) employment and on-farm (rural) employment; UB & UE = off-farm (urban) transitions (both) with no on-farm transitions; RE = on-farm (rural) employment with no off-farm transitions; UE & RB = off-farm (urban) employment with on-farm (rural) business; Others = the rest; Standard errors are in parentheses; Significant level: *p<0.1 **p<0.05 ***p<0.01.

6. Conclusions

China has long been attempting to shake off rural poverty and inequality. On-farm transitions, a pathway towards sustainable development of rural areas, therefore deserve greater attention. On the basis of a recent comprehensive survey of rural households, we investigate the effect of households' capital endowments on rural transitions from subsistence farming into either formal on-farm employment or on-farm entrepreneurship.

Contributing to the literature of rural development, our research confirms that capital endowments are important determinants of rural households' livelihood strategies. Yet, the role of financial capital, such as savings and access to bank loans, is limited. Similarly, the government's subsidies do not have a significant impact either. Instead, our results highlight the importance of natural, human, social and political capital. Specifically, investing in human capital, in the form of receiving training in either agricultural technology or entrepreneurial skills, increases the likelihood of transitioning into on-farm employment and entrepreneurship. Former migrant workers, who have returned to their home village, are more likely to find formal employment, suggesting that the experience of rural-to-urban migration improves their employability even in the rural labor market. Both the quality and quantity of farmland are important for on-farm transitions: having land of better quality helps release surplus labor into formal employment. Social capital has non-linear impact on on-farm employment, with intermediate values being more supportive of on-farm employment than either high or low values. Political capital such as having local rural cadres in the village also exerts positive influence on on-farm transition. However, only local political connections matter, whereas political capital outside of the village is less influential. Finally, poor road infrastructure poses a barrier to transition into on-farm employment. A further and deeper analysis with full account of off-farm transitions largely supports these findings.

The findings of our paper add credence to the argument put forward by Ranis (2004) that reaching the Lewis turning point can be postponed if the rural sector experiences productivity improvements in parallel with the growth of the urban sector. Accordingly, rising productivity in the rural areas helps release more labor from agriculture, which, in turn, helps keep rural wages low. Therefore, successful and on-going on-farm transitions can help maintain the high rate of economic growth in China in the years to come.

Our research yields a few policy implications. Our findings help identify factors that facilitate on-farm transitions: acquisition of human capital, both in the shape of formal education and further practical training, facilitating the return of rural-to-urban migrants who bring new skills (and social capital) with them back to

rural areas, and improvements in the quality of road infrastructure. Policy makers should focus on these areas to encourage on-farm transitions and to facilitate sustainable development of rural areas.

Acknowledgement

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Appendix

Table A
Descriptive statistics of 31 Provinces in China used in the cluster analysis.

Province	Population	per Capita GDP (ten thousand yuan)	Agricultural Acreage (thousand hectare)	Proportion of Agricultural Acreage (%)	Proportion of Agricultural Population (%)	Proportion of Agricultural Production (%)
Beijing	2069	8.64	231.7	13.79	13.8	0.93
Tianjin	1413	9.12	441.1	39.03	18.45	1.52
Hebei	7288	3.65	6317.3	33.66	53.2	11.65
Shanxi	3611	3.35	4055.8	25.95	48.74	7.00
Inner Mongolia	2490	6.38	7147.2	6.04	42.26	7.38
Liaoning	4389	5.66	4085.3	28.00	34.35	6.20
Jilin	2750	4.34	5534.6	29.52	46.3	9.77
Heilongjiang	3834	3.57	11830.1	26.01	43.1	16.91
Shanghai	2380	8.48	244.0	38.72	10.7	0.85
Jiangsu	7920	6.83	4763.8	46.43	37	5.49
Zhejiang	5477	6.33	1920.9	18.83	36.8	3.55
Anhui	5988	2.87	5730.2	41.02	53.5	10.85
Fujian	3748	5.26	1330.1	10.97	40.4	6.41
Jiangxi	4504	2.88	2827.1	16.93	52.49	7.75
Shandong	9685	5.16	7515.3	48.86	47.57	7.92
Henan	9406	3.15	7926.4	47.46	57.57	13.38
Hubei	5779	3.85	4664.1	25.09	46.5	11.18
Hunan	6639	3.34	3789.4	17.89	53.35	11.97
Guangdong	10594	5.39	2830.7	15.73	32.6	3.91
Guangxi	4682	2.78	4217.5	17.87	56.47	13.23
Hainan	887	3.22	727.5	21.40	48.4	16.13
Chongqing	2945	3.87	2235.9	27.17	43.02	7.38
Sichuan	8076	2.96	5947.4	12.35	56.47	11.58
Guizhou	3484	1.97	4485.3	25.48	63.59	12.62
Yunnan	4659	2.21	6072.1	15.84	60.69	13.56
Tibet	308	2.28	361.6	0.29	77.25	7.62
Shaanxi	3753	3.85	4050.3	19.70	49.98	10.56
Gansu	2578	2.19	4658.8	10.25	61.25	17.42
Qinghai	573	3.30	542.7	0.75	52.56	6.18
Ningxia	647	3.62	1107.1	16.67	49.33	10.27
Xinjiang	2233	3.36	4124.6	2.48	56.02	22.32

Source: China Statistical Yearbook 2013.