



## Impact of Childcare and Eldercare on Off-farm Activities in Rural China

Fangbin Qiao, Scott Rozelle, Linxiu Zhang, Yi Yao, Jian Zhang\*

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### Abstract

*Using individual data collected in rural China and adopting Heckman's two-step function, we examined the impact of childcare and eldercare on laborers' off-farm activities. Our study finds that having school-aged children has a negative impact on rural laborers' migration decisions and a positive impact on their decision to work in the local off-farm employment market. As grandparents can help to take care of young children, the impact of preschoolers is insignificant. Having elderly family to care for decreases the income earned by female members of the family. Although both men and women are actively engaged in off-farm employment today in rural China, this study shows that women are still the primary care providers for both children and the elderly. Therefore, reforming public school enrollment and high school/college entrance examination systems so that migrant children can stay with their parents, this will help rural laborers to migrate to cities. The present study also calls for more public services for preschoolers and the elderly in rural China.*

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Key words: childcare, China, eldercare, gender, migration

JEL codes: J11, J16, J22

### I. Introduction

Rural–urban migration plays an important role in China's economy. 163 million rural laborers migrated to urban areas for employment in 2012 (NBS, 2012a). This figure equates to approximately half of the total number of individuals in China's urban labor

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\*Fangbin Qiao, Professor, China Economics and Management Academy, Central University of Finance and Economics, Beijing, China. Email: fangbin.qiao@gmail.com; Scott Rozelle, Senior Fellow, Shorenstein Asia-Pacific Research Center, Stanford University, Stanford, USA. Email: rozelle@stanford.edu; Linxiu Zhang, Professor, Center for Chinese Agriculture Policy, Institute for Geographical Sciences and Natural Resource Research, Chinese Academy of Sciences, Beijing, China. Email: lxzhang.ccap@igsnrr.ac.cn; Yi Yao, Assistant Professor, China Economics and Management Academy, Central University of Finance and Economics, Beijing, China. Email: yiyao.cn@gmail.com; Jian Zhang, Associate Professor, School of Economics, Central University of Finance and Economics, Beijing, China. Email: jian32@gmail.com.

force. Many Chinese researchers agree that rural migration to cities played a vital role in raising rural welfare during the 1980s and 1990s (Rozelle, 1996; Young, 2003). According to the National Bureau of Statistics (NBS, 2012b), the share of off-farm income in the total income of the rural labor force increased from less than 10 percent in the early 1980s to more than 60 percent in 2011. Rural–urban migration has been identified as one of the major engines of China’s economic growth; rural migration has also played a key role in changing the structure of Chinese society (Cai and Wang, 2008).

Rural to urban migration is affected by many factors, including the rural–urban income gap, personal and household characteristics and social networks (Zhang and Li, 2003; Zhao, 2003; Zhang *et al.*, 2008). However, there is one factor which has not been well studied: childcare (Liu *et al.*, 2010; Cook and Dong, 2011). Summarizing the results of a number of studies that examine the impact of childcare on labor force participation, Kalb (2009) finds that having children has a negative impact on labor force participation. This is particularly true in the case of mothers who are the primary care providers.

However, when closer scrutiny is paid to these studies, the results are not consistent. The published studies find heterogeneous impacts of having a preschooler at home on off-farm employment. For example, Zhao (1997, 1999) and Song *et al.* (2009) do not find any effect from having a preschool-aged child. Zhao (1997) concludes that the absence of an impact was mostly because of the presence of grandparents who were able and willing to take care of their grandchildren. Other scholars find that having preschool-aged children at home has a significant and negative impact on the decision of the mother to migrate out (e.g. Li and Zahniser, 2002; Su and Liu, 2003).

The impact of households having school-aged children on off-farm participation in rural China also remains unclear. Zhao (1999) shows that having school-aged children actually had a significant and positive impact on migration. Consistent with Zhao (1999), Song *et al.* (2009) also find a positive relationship between having school-aged children and migration in rural China.

Similar to the impact of childcare on off-farm activities, there is also debate on the impact of having an elderly household member. Because of the general absence of pensions and health insurance in China and other developing countries, supporting the elderly remains, by and large, the duty of their adult children (Fang *et al.*, 1992; World Bank, 1994; Wang, 2006). Giles and Mu (2007) demonstrate that the presence of ill parents has a significantly negative impact on the probability of adult children being engaged in migration. Pang *et al.* (2004) show that migrants often have to end their employment in the city and return to their homes in the countryside when their parents became ill. In contrast, Maurer-Fazio *et al.* (2009) indicate that the presence of the elderly significantly increases the likelihood of young laborers’ working participation because the elderly are able to help to

take care of the children. Therefore, the impact of childcare and eldercare on off-farm activities remains uncertain. It is unclear what the impact of having a child (and having to care for him/her) is on the decision of a rural resident to work off the farm or in any local off-farm employment activity. There is also no evidence on the effect of having a preschool-aged child on off-farm employment. Is the impact of having a preschool-aged child the same (in terms of its effect on off-farm employment) as that of having a school-aged child? Are there any other effects beyond the impact on the probability of off-farm work participation? Similarly, the literature is also not clear about how the presence of an elderly individual in the household affects off-farm activities. In practice, answers to these questions may help policy-makers to provide more effective and efficient services to rural laborers, children left behind and rural elderly.

The purpose of the present paper is to answer these questions. To be more specific, we attempt to answer two questions. First, does the presence (or absence) of preschoolers, school-aged children and the elderly in a household have a significant impact on off-farm migration and local off-farm activities? Second, does caring for children and caring for the elderly have an unequal (or equal) effect on the off-farm employment decisions of male and female laborers? We believe that the answers to these two questions will contribute to the debate concerning the impact of childcare and eldercare on rural off-farm activities and have important policy implications for countries in which migration is common.

The rest of the paper is organized as follows. A simple conceptual framework and the empirical models are set up in Section II. Section III describes the data collection method and reveals what our data indicates about the associations among childcare, the need for care for the elderly and rural off-farm employment. Section IV presents our empirical results for off-farm participation and demonstrates the impact of childcare and eldercare on off-farm employment. Section V discusses the need for improved access to childcare and eldercare, and examines gender-specific effects on off-farm income. Section VI concludes.

## II. Conceptual Framework and Models

### 1. A Simple Conceptual Framework

A rural laborer is assumed to maximize his or her income by choosing from among pure farming, local off-farm employment and migration. With higher income available through migration, a laborer may prefer to migrate. However, some factors that have little or no impact on pure farming, for example, childcare and eldercare responsibilities, will actually deter rural workers from participating in off-farm work. For example, because of the underdeveloped childcare and eldercare markets, rural laborers have to take care of their

children and elderly parents, which may affect their decision of whether to migrate. Similarly, having children or elderly members in their households affects whether rural laborers decide to work in local off-farm employment markets. In addition, for those involved in off-farm employment, both the time and the effort they put in may be affected by having to take care of their children and parents, potentially having a negative impact on their income.

Childcare and eldercare may have different impacts on men and women. In China, women are traditionally the homemakers and care providers, while men are the breadwinners. Although, increasingly in recent years, men have begun to provide childcare and eldercare, especially in urban areas, women are still the main care providers for children and the elderly in rural areas. Therefore, the impact of childcare and eldercare on women may be larger than that on men.

## 2. Empirical Models

As outlined in the conceptual framework in the previous subsection, we expect to find rural laborers' off-farm work participation patterns to differ for those caring for children and those caring for the elderly. To estimate the impact of childcare and eldercare on the off-farm work participation decision of individual  $i$ , we choose a binary choice model:

$$OFW_i = b_0 + b_1 \times PRESCHOOLER_i + b_2 \times SCHOOL_i + b_3 \times ELDERLY_i + b_4 \times Z_i + b_5 \times X_i + b_6 \times Y_i + b_7 \times COUN_j + b_8 \times YEAR_t + u_i. \quad (1)$$

In this model, off-farm work ( $OFW$ ) equals 1 if the individual  $i$  has an off-farm job and equals 0 otherwise. We use two dummy variables for  $OFW$ : migration and local off-farm work. The variable  $ELDERLY$  represents the elderly members of the household of individual  $i$ . As in previous published studies (e.g. Zhao, 1997, 1999), we divide the children into preschoolers ( $PRESCHOOLER$ ) and school-aged children ( $SCHOOL$ ). In the present study, we define the three variables  $ELDERLY$ ,  $PRESCHOOLER$  and  $SCHOOL$  in two ways. First,  $ELDERLY$ ,  $PRESCHOOLER$  or  $SCHOOL$  is defined as a dummy variable, which equals 0 if there is no such person in the family and equals 1 otherwise. Second,  $ELDERLY$ ,  $PRESCHOOLER$  or  $SCHOOL$  is defined as the number of such individuals in the family.

Here,  $Z$  is a vector of individual characteristics. We include several characteristic variables in Equation (1) to pick up heterogeneity across individuals. For example, years of education is included as a measure of human capital, and age and age-squared are included to control for life-cycle effects that may influence the decision to participate in the migration or local off-farm employment markets. Finally, two dummy variables, marital status (married = 1) and gender (male = 1), are also included in Equation (1).

Here,  $X$  is a vector of household characteristics. Lagged land per laborer (land per laborer during previous time period) is used to control for factors affecting the farming

income, which consequently may affect the income from participation in off-farm employment. We include the presence of other laborers staying at home to capture the impact of other family members on the individual's off-farm work decision. Usually, farmers become grandparents in their 40s and have traditionally provided childcare for their grandchildren. Therefore, we include a dummy variable (which equals 1 if 45 years old or older and 0 otherwise) to consider this effect.

Here,  $Y$  is a vector of village characteristics. We include two variables to capture the impact of social and economic environments at the village level on laborers' off-farm work decisions. The first variable is the ratio of off-farm laborers to total laborers excepting this household, which is widely used to measure the impact of social networks in many previous studies (e.g. Zhang and Li, 2003; Zhao, 2003; Chen *et al.*, 2004). The second variable is the lagged distance to the nearest highway from the village. This variable is used to measure the impact of the local economy and transaction costs, especially for local off-farm work, and is also widely used in previous studies (e.g. Luo *et al.*, 2007).

Here,  $COUN$  and  $YEAR$  are county and year dummy variables.  $COUN$  is used to control for county-level fixed effects, while  $YEAR$  is used to control for time-varying macroeconomic shocks that affect demand for laborers and temporary differences in off-farm jobs. Adding these two types of dummy variables make Equation (1) a two-way fixed effect model. Finally,  $u$  is an error term.

Similarly, childcare and eldercare might also affect the working hours and earnings of farmers who engage in off-farm work. In accordance with other published studies (e.g. Zhao, 1999), the working hours, monthly wage and income equations can be written as follows:

$$MONTH_i = g_{10} + g_{11} \times CHILD_i + g_{12} \times ELDERLY_i + g_{13} \times Z_i + g_{14} \times YEAR_t + e_i, \quad (2)$$

$$WAGE_i = g_{20} + g_{21} \times CHILD_i + g_{22} \times ELDERLY_i + g_{23} \times Z_i + g_{24} \times YEAR_t + e_i \quad (3)$$

$$INC_i = g_{30} + g_{31} \times CHILD_i + g_{32} \times ELDERLY_i + g_{33} \times Z_i + g_{34} \times YEAR_t + e_i. \quad (4)$$

In Equations (2)–(4),  $MONTH$  is the total number of months spent on off-farm work by individual  $i$ ;  $WAGE$  is the monthly wage; and  $INC$  is the total off-farm income. When we estimate the income equation, we use both income from migration and income from local off-farm work as dependent variables separately.  $e$  is an error term.

If we simply estimate the above equations using OLS, we may run into a selection bias problem. According to Heckman (1974), a laborer will not enter the labor force market if his/her rural income is higher than the expected off-farm income. In practice, we only observe off-farm incomes of individuals who earned more than their rural incomes. Hence, without correction for selection bias, the estimated impact on off-farm work may be biased (de Brauw and Rozelle, 2008). In the present study, Heckman two-step functions are estimated to

account for such selection bias. We first estimate a probit model for all laborers in our sample. Then, using the results from the probit estimation, we compute an inverse Mills ratio to correct the possible truncation of the dependent variables. To identify the probit equation, we include some variables to measure the impact of household characteristics ( $Y$ ), village characteristics ( $Z$ ) and county-level dummies ( $COUN$ ), as in Equation (1). We believe these variables can identify the participation effect, because none of these variables would affect the off-farm income of a specific rural laborer, except through his/her decision about whether or not to engage in off-farm employment.

### III. Data

The data used in the present paper are from a nationally representative survey of 2832 households in rural China conducted by the Center for Chinese Agricultural Policy of the Chinese Academy of Sciences in 2005 and 2008. The sample was selected as follows. First, five provinces were randomly selected to represent five of China's major agroecological zones: Jiangsu in the eastern coastal region; Sichuan in the south-west region; Shaanxi in the north-west region; Hebei in the central region; and Jilin in the north-east region. Then, five counties were selected from each province, and one county from each quintile from a list of counties arranged in descending order by per capita gross value of industrial output (GVIO), because GVIO is one of the best predictors of standard of living and development potential, and is often more reliable than net rural per capita income (Rozelle, 1996).

Within each county, the survey team chose two townships, one from each half of a list of townships arranged in descending order by per capita GVIO. Following the same procedure, two villages were chosen in each township. Finally, approximately 8 households were randomly selected in each village in 2005. These households were re-visited in 2008. Besides revisiting these 8 households, approximately 12 more households were randomly selected and surveyed in each village in 2008. The final sample includes 11 744 individuals in 2832 households.<sup>1</sup>

In addition to collecting basic information on each household, such as wealth, land owned, labor endowment (e.g. labor size and composition) and other production-oriented activities (e.g. crop area and number of livestock), the survey team also gathered detailed

<sup>1</sup>More households were surveyed for at least two reasons. First, if we found that the adult child and his/her parents had divided up family property and lived apart when half of the questionnaire was finished, both his/her family and his/her parents' family were included in the survey as two separate households. Second, during the survey, if the family member who answered our questions did not know some information requested by the questionnaire, we had to replace the household with another. However, family members who knew the information sometimes became available before we left that village.

demographic information about each household member, including gender, age, education and marital status. Several parts of the survey were designed to learn about each individual's migration decision and his/her participation in local off-farm activities. The questionnaire recorded each individual's participation in the off-farm employment market, the main type of off-farm work performed, their place of residence while working, the location of off-farm employment, whether or not each individual was self-employed or earned wages, time spent on the job, and income from the job (including non-monetary income).

For the purpose of statistical analysis, a sample of laborers is constructed using the following criteria: (i) workers are between 15 and 60 years old and (ii) have valid personal data available. We then exclude from the workforce those who were still studying because they faced very different choices. Under these selection criteria, the final sample includes 2215 laborers in 2004 and 5642 laborers in 2007 (see Table 1). As shown in Table 1, the average labor size per family was 2.91 (family size was 4.05) in 2004 and 3.01 (family size was 4.19) in 2007. These figures are consistent with the national-level statistics (NSB, 2009) and other field surveys (e.g. Mu and Walle, 2009; de la Rupelle *et al.*, 2010).

As shown in Table 1, the percentage of family with off-farm work was 77.10 percent in 2004 and 79.15 percent in 2007. Among the total laborers with off-farm work, 52.24 percent migrated in 2007, which is a bit higher than in 2004 (47.88 percent). Among all the migrants, 76.52 percent left home for more than 7 months, and the average length of migration was 9.44 months in 2007. Characteristics of the migrants in 2004 are similar to those in 2007.

Following Maurer-Fazio *et al.* (2009), we define preschoolers as aged 0 to 5 and

Table 1. Characteristics of Surveyed Rural Households and Migrants

	2004	2007
Characteristics of household		
Number of household	808	2024
Total number of individuals	3272	8472
Total number of laborers (age 15–60 years)	2215	5642
Percentage of family with off-farm work (%)	77.10	79.15
Family size	4.05	4.19
	(1.42)	(1.57)
Number of laborers per family	2.91	3.01
	(1.25)	(1.40)
Number of laborers with off-farm work per family	1.41	1.53
	(1.12)	(1.16)
Share of migration (%)	47.88	52.24
Share of local wage work (%)	52.12	47.76
Characteristics of migrants		
Length of migratory work (months)	9.14	9.44
	(3.40)	(3.28)
1–2 months (%)	5.13	4.13
3–6 months (%)	22.63	19.35
7–12 months (%)	72.24	76.52

Source: Surveys of households in rural China conducted by the Center of Chinese Agricultural Policy of Chinese Academy of Sciences in 2005 and 2008.

Note: Standard deviations are in parentheses.

school-aged children as aged 6 to 15. Preschoolers and school-aged children require care from adults and cannot legally be hired by any company. In the present study, an elderly person is defined as one who is more than 75 years old, is usually not able to work, and needs care from their adult children. Similar definitions of preschoolers, school-aged children and the elderly are used in other studies (e.g. Taylor *et al.*, 2003).

The characteristics of laborers with and without off-farm work are summarized in Table 2. As shown in Table 2, laborers with off-farm work were predominantly male (more than 65 percent). In contrast, less than 40 percent of men were among the laborers without off-farm work (row 1 of Table 2). Of the laborers with off-farm work, 72 percent were married, while 88 percent of the laborers without off-farm work were married. Compared to laborers without off-farm work, laborers with off-farm work were younger (35.03 *vs* 43.13 years old) and more educated (8.87 *vs* 7.30 years of schooling). Table 2 shows that laborers with and without off-farm work had the same probability of having preschoolers, similar probabilities of having elderly members of their households, and similar probabilities of having school-aged children. Comparing the real numbers of preschoolers, school-aged children and the elderly at home for laborers with and without off-farm work, we obtain similar results (last three rows of Table 2).

In the present study, the off-farm work is categorized into local off-farm work (laborers work in or near their hometowns and live in their own houses) and migration (laborers work outside of their hometowns and live in the destination cities). As shown in Table 2, migrants are less likely to be married, are younger and are more educated than laborers with local off-farm work (rows 2–4 of Table 2). We also find that migrants have a smaller probability of having school-aged children than do laborers with local off-farm work, even though they have similar probabilities of having preschoolers and elderly members of their household (rows 5–7, Table 2). A comparison of the real numbers of preschoolers, school-aged children and the elderly yields similar results (rows 8–10, Table 2).

Table 2. Characteristics of Sampled Laborers with and without Off-farm Work

	Without off-farm work	With off-farm work		
		Total	Migration	Local
Characteristics of individuals				
Share of men	0.36	0.65	0.66	0.64
Marital status (1 = married)	0.88	0.72	0.55	0.89
Age	43.13	35.03	30.19	40.13
Years of education	7.30	8.87	9.06	8.48
Children and the elderly				
Presence of preschoolers (1 = yes)	0.31	0.31	0.33	0.29
Presence of school-aged children (1 = yes)	0.51	0.55	0.50	0.61
Presence of the elderly (age $\geq 75$ ) (1 = yes)	0.11	0.12	0.12	0.12
Number of preschoolers	0.35	0.35	0.37	0.36
Number of school-aged children	0.68	0.73	0.68	0.78
Number of the elderly	0.12	0.13	0.13	0.13

Notes: Standard deviations in parentheses. US\$1 = RMB6.82.



#### IV. Participation of Off-farm Workforce

The estimation results for migration and local off-farm participation are shown in Tables 3 and 4. To show the marginal effect of the independent variables, Tables 3 and 4 report the estimated coefficients of the probit models. Replacing the three dummy variables of having preschoolers, school-aged children and elderly at home with their actual numbers yields very similar results, indicating that our estimation results are robust.<sup>2</sup> For simplicity,

Table 3. Marginal Effect of Determinants of Migration Participation in Rural China

	Total	Female	Male
Presence of preschoolers (1 = yes)	0.0022 (0.0108)	-0.0105 (0.0111)	0.0135 (0.0177)
Presence of school-aged children (1 = yes)	-0.0946*** (0.0098)	-0.0509*** (0.0106)	-0.1429*** (0.0157)
Presence of the elderly (1 = yes)	0.0028 (0.0140)	-0.0061 (0.0138)	0.0129 (0.0233)
Age (years)	0.0233*** (0.0033)	0.0088** (0.0038)	0.0403*** (0.0053)
Age <sup>2</sup>	-0.0004*** (0.0000)	-0.0002*** (0.0001)	-0.0006*** (0.0001)
Marital status (1 = married)	-0.0957*** (0.0183)	-0.0855*** (0.0226)	-0.0914*** (0.0279)
Gender (1 = male)	0.1357*** (0.0090)		
Years of education	0.0182*** (0.0019)	0.0148*** (0.0021)	0.0169*** (0.0032)
Grandparent dummy <sup>a</sup>	-0.0401* (0.0227)	-0.0002 (0.0273)	-0.0784** (0.0355)
Land per laborer at previous time period	-0.0011* (0.0006)	-0.0001 (0.0007)	-0.0021** (0.0010)
Laborer at home dummy <sup>b</sup>	0.0749*** (0.0102)	0.0374*** (0.0102)	0.0944*** (0.0187)
Minimum distance from highway at previous time period	0.0016* (0.0009)	0.0008 (0.0010)	0.0024* (0.0014)
Ratio of migrant laborers in total laborers <sup>c</sup>	0.0048*** (0.0007)	0.0018** (0.0007)	0.0079*** (0.0012)
2007 year dummy	0.0246** (0.0098)	0.0034 (0.0105)	0.0463*** (0.0159)
County dummy	Yes	Yes	Yes
Observations	8430	4148	4282

Notes: The numbers reported in the table are the marginal effects. Standard errors are in parentheses. \*\*\*, \*\* and \* denote significance at the 1, 5 and 10-percent level, respectively. <sup>a</sup>We assume that farmers who are 45 years or older are grandparents. <sup>b</sup>The laborers at home dummy equals 1 if anyone else farms only in the family, and 0 otherwise. <sup>c</sup>The ratio of migrant laborers in total laborers is a village-level average (this is not included in the family).

<sup>2</sup>The estimation results when using the numbers of preschoolers, school-aged children and the elderly as independent variables are not shown for simplicity, but can be obtained upon request from the authors.

Table 4. Marginal Effect of Determinants of Local Off-farm Participation in Rural China.

	Total	Female	Male
Presence of preschoolers (1 = yes)	0.0060 (0.0105)	-0.0082 (0.0124)	0.0223 (0.0168)
Presence of school-aged children (1 = yes)	0.0253*** (0.0094)	0.0200* (0.0112)	0.0275* (0.0149)
Presence of the elderly (1 = yes)	0.0048 (0.0140)	0.0188 (0.0175)	-0.0121 (0.0218)
Age (years)	0.0381*** (0.0033)	0.0269*** (0.0042)	0.0521*** (0.0051)
Square of Age	-0.0005*** (0.0000)	-0.0004*** (0.0001)	-0.0006*** (0.0001)
Marital status (1 = married)	0.1135*** (0.0147)	0.0897*** (0.0172)	0.1192*** (0.0243)
Gender (1 = male)	0.1489*** (0.0091)		
Years of education	0.0078*** (0.0019)	0.0094*** (0.0022)	0.0044 (0.0030)
Grandparent dummy <sup>a</sup>	0.0077 (0.0199)	-0.0067 (0.0233)	0.0300 (0.0323)
Land per laborer at previous time period	-0.0009 (0.0006)	-0.0015** (0.0007)	-0.0001 (0.0009)
Laborer at home dummy <sup>b</sup>	-0.1090*** (0.0125)	0.0758*** (0.0133)	-0.1707*** (0.0226)
Minimum distance from highway at previous time period	-0.0022** (0.0011)	-0.0038** (0.0016)	-0.0011 (0.0016)
Ratio of local off-farm laborers in total laborers <sup>c</sup>	0.0056*** (0.0005)	0.0032*** (0.0005)	0.0082*** (0.0007)
2007 year dummy	-0.0164 (0.0100)	-0.0052 (0.0119)	-0.0295* (0.0160)
County dummy	Yes	Yes	Yes
Observations	8430	4148	4282

Notes: The numbers reported in the table are the marginal effects. Standard errors are in parentheses. \*\*\*, \*\* and \* denote significance at the 1, 5 and 10-percent level, respectively. <sup>a</sup>We assume that farmers who are 45 years or older are grandparents. <sup>b</sup>The laborers at home dummy equals 1 if anyone else farms only in the family, and 0 otherwise. <sup>c</sup>The ratio of local off-farm laborers in total laborers is a village-level average (this is not included in the family).

we focus our discussion on the estimation results when using the dummy variables of having preschoolers, school-aged children and elderly at home as independent variables. In general, all of the estimators perform well, and the coefficients are of the expected signs and statistically significant in most of the models. In the following subsection, we will first discuss the impact of childcare and eldercare on participation in off-farm work, and then discuss the impact of other factors, such as gender, age and education, on the decision of rural laborers to engage in the off-farm employment market.

### 1. Childcare and Off-farm Work Participation

The estimation results in Tables 3 and 4 show that the impact of having preschoolers on

the off-farm participation decision is insignificant. The coefficient of the presence of preschoolers is negative for female laborers and positive for male laborers in both migration and local off-farm work equations. However, none of these coefficients are statistically significant. This means that having a preschooler has no impact on rural laborers' off-farm work participation decisions. This finding is consistent with Zhao (1997, 1999). Zhao (1997) argues that this phenomenon might reflect the role of grandparents in raising young children. In China, both young couples and their parents share the same opinion that grandparents have a "responsibility" to take care of young children (Chen *et al.*, 2000). According to a field survey conducted by Zhong and Xiang (2013) in five provinces, more than half of the children who were left behind when their parents migrated for work were taken care of by their grandparents. Another national survey report released by the All-China Woman's Federation (ACWF) in 2008 also shows that grandparents are the main guardians for children who are left behind in rural China. As grandparents can help to care for young children, their parents tend not to change their off-farm work decisions.

However, the impact of having school-aged children on rural laborers' off-farm participation decision is significant. The estimated coefficients for school-aged children are significantly negative for migrants (see row 2 of Table 3) and positive for local off-farm workers (see row 2 of Table 4). The estimation results show that laborers with school-aged children are 9.46 percent less likely to migrate than those without school-aged children. In contrast, having school-aged children increases the likelihood of deciding to participate in local off-farm employment for both men (by 2.75 percent) and women (by 2.00 percent) (see row 2 of Table 4).

The key to understanding the different impacts of having preschoolers and school-aged children is to comprehend the difference of grandparents in providing care for preschoolers and school-aged children. Even though grandparents might like to take care of their grandchildren, many factors can impede them from providing adequate guardianship, especially for school-aged children. For example, as grandparents get older, their health status becomes worse, and, more importantly, most of them are less educated (ACWF, 2008). Therefore, they cannot successfully assist school-aged children with their homework. Consequently, the school performance of those children living with their grandparents is worse than those living with their parents (Zhou and Wu, 2004; Tian *et al.*, 2008).

In addition, the published literature shows that children who are left behind can experience various problems, relating to, for instance, personal safety, learning, morality and psychological development (Zhou *et al.*, 2005). For example, Yao and Mao (2008) show that children who are left behind not only exhibit worse study performance, but also worse psychological characteristics than those living with their parents due to the lack of parental care. Similarly,

Zhan *et al.* (2014) show that having parents migrate into cities significantly reduces rural children's self-esteem. In addition, Ye *et al.* (2005) point out that these psychological problems are likely to influence their future work and life.

Recognizing the adverse impacts of migration on the school-aged children they would be leaving behind, some parents may change their migration decision. According to the ACWF (2008), the ratio of parents to guardians for school-aged children is larger than that for preschoolers. In other words, rather than migrating to other cities and leaving their children behind in their hometowns, many parents prefer to find local off-farm work that allows them to take care of their school-aged children.

## 2. Eldercare and Off-farm Work Participation

Consistent with other published studies (e.g. Giles and Mu, 2007; Maurer-Fazio *et al.*, 2009), our research shows that the presence of elderly household members has no significant impact on rural laborers' decisions to participate in off-farm work. The estimated coefficient of the elderly variable is insignificant for both migrants and local off-farm workers (see row 3 of Tables 3 and 4). To test the robustness of our results, we re-ran the models using a different definition for the elderly variable. For example, rather than using the presence of the elderly (a dummy variable), we used the number of elderly in the family as the independent variable. We also redefined the elderly variable using new standards, such as "65 years old or older" and "70 years old or older." All of these attempts yielded similar results.

This estimation result may reflect the absence of eldercare in rural China. Unlike in the past, today in rural China the elderly tend to live separately from their adult children. As shown in Table 1, more than 75 percent of migrants stayed out of town for more than 7 months per year. Migration increases workers' income and, hence, improves their economic ability to support the elderly. However, these migrants cannot provide immediate care for the elderly when needed, and when they migrate, their elderly parents have to spend more time on farming, taking care of children left behind and other duties (Sun, 2006). Consequently, Herd *et al.* (2010) suggest that governments should provide more services to improve the welfare of those elderly who are left behind in rural areas.

## 3. Marital Status, Age, Years of Education and Off-farm Work Participation

The impact of age on the decision to engage in off-farm work is statistically significant. As in other published studies, we considered a nonlinear relationship between age and off-farm participation. Tables 3 and 4 show that the estimated coefficient of age is positive while the estimated coefficient of the square of age is negative, indicating that a rural laborer's off-farm work participation rate (both for migration and local off-farm work) first increases and then decreases as age increases.

However, the inflection point of the age of men is different from that of women. Based on the estimated coefficients (see rows 4 and 5 of Table 3), we calculated the inflection points of age for male and female laborers to show the difference for male and female migrants. For migration, the female laborers' inflection point is 21 years of age and the male laborers' inflection point is 32 years of age. In fact, 21 years of age is close to the legal age for marriage in China: the legal age for marriage is 20 years for women and 22 years for men). In other words, our estimation results show that a married woman is less likely to migrate as her age increases. However, a married man would still be likely to migrate as his age increases, until he reaches his early 30s.

For local off-farm work participation, the inflection point for women is similar to that for men. After the calculation, we find that the inflection points for women and men for local off-farm work are 38 and 41 years of age.<sup>3</sup> In other words, both men and women begin to decrease their participation in local off-farm work around 40 years of age. Taking care of farm land and their grandchildren, increasing health problems and other duties might impede them from participating in the local off-farm employment market.

The impact of marital status, gender, education and being a grandparent are as expected. After marriage, both female and male laborers are less likely to migrate, but more likely to find local off-farm work (see row 6 of Tables 3 and 4). Compared to women, men are more likely to participate in off-farm work (both migrant and local). As expected, education has a positive impact on both migration and local off-farm work participation (see row 8 of Tables 3 and 4), while being grandparents negatively affects men's migration decisions (see row 9 of Table 3).

In the present study, we use two variables to measure the impact of household characteristics on an individual's off-farm participation: land per laborer during the previous time period<sup>4</sup> and the presence of other laborers staying in the home. The land per laborer during the previous time period is used to avoid the potential endogenous problems with reverse causality (i.e. the off-farm participation might be associated with the land per laborer during the current time period). As expected, the land per laborer during the previous time period negatively affects a laborer's participation in off-farm migration employment. As shown in row 11, if there are other family members staying at home, both male and female laborers are more likely to migrate (see Table 3) and less likely to engage in the local off-farm employment market (see Table 4).

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<sup>3</sup>The calculations of inflection points for women and men are based on the estimation results of rows 4 and 5 in Table 4.

<sup>4</sup>The previous time of 2007 year data refers to year 2004, while the previous time of 2004 year data refers to year 1997.

To consider the impact of social networks and economic factors, we used four variables: the distance from a village to the nearest highway during the previous time period, the average share of laborers with off-farm work at the village level (except for the household), a 2007 year dummy, and county dummies. The distance from a village to the nearest highway during the previous time period is used to consider the impact of geographic and economic environmental conditions, while the share of laborers with off-farm work in a village is a proxy for social networks (Zhang and Li, 2003; Qiao *et al.*, 2014). As found in other published studies, migrants had suffered from missing their family members and facing other transaction costs (e.g. Zhao, 1999; Zhou *et al.*, 2005). Therefore, when the local economy develops (i.e. the distance from a village to the nearest highway during the previous time period becomes shorter), rural laborers prefer to find local off-farm work (see row 12 of Table 4). Social networks decrease the transaction cost, and, hence, increase the possibility of having off-farm work (see row 13 of Tables 3 and 4). This finding is consistent with Zhang *et al.* (2001).

## V. Total Income, Working Hours and Monthly Wage of Off-farm Work

As discussed above, childcare and eldercare affect not only the rural laborers' off-farm work participation, but also their working hours and earnings. The estimation results for off-farm income are shown in Table 5 (for migrants) and Table 6 (for local off-farm workers). All of the estimations perform well, and most estimated coefficients are of the expected signs and statistically significant. For example, the positive coefficient of age and the negative coefficient of the square of age indicate that the migrants' incomes first increase and then decrease as their age increases. As another example, the positive estimated coefficient of education means that migrants with more years of education receive higher incomes. Moreover, the coefficients of the inverse Mills ratio in most of the equations are statistically significant, which shows that correction for selection bias is necessary.

Interestingly, even though the presence of preschoolers has no significant impact on the decision to participate in off-farm work (see Tables 3 and 4), it has a significant positive impact on off-farm income (see Tables 5 and 6). The estimation results show that the presence of preschoolers has a significant positive impact on the income earned by male migrants (row 1, Table 5) and the income of women who work locally (row 1, Table 6). Further calculation shows that, on average, a male migrant with preschoolers at home earned US\$1231 per year, which is 13 percent higher than those without preschoolers at home. Similarly, the presence of preschoolers increases the income of a female laborer with

Table 5. Determinants of Income from Migration

	Natural log of income of migration		
	Total	Female	Male
Presence of preschoolers (1 = yes)	0.0910** (0.0446)	0.0524 (0.0794)	0.1224** (0.0533)
Presence of school-aged children (1 = yes)	-0.0843** (0.0423)	-0.1481** (0.0711)	-0.0484 (0.0530)
Presence of the elderly (1 = yes)	-0.0244 (0.0569)	-0.0527 (0.0965)	0.0038 (0.0699)
Age	0.0959*** (0.0150)	0.0963*** (0.0267)	0.0947*** (0.0189)
Age <sup>2</sup>	-0.0012*** (0.0002)	-0.0011*** (0.0004)	-0.0012*** (0.0003)
Marital status (1 = married)	-0.0187 (0.0612)	0.0002 (0.1118)	-0.0614 (0.0723)
Gender (1 = male)	0.0096 (0.0473)		
Years of education	0.0609*** (0.0075)	0.0390*** (0.0132)	0.0770*** (0.0089)
2007 year dummy	0.2337*** (0.0437)	0.1457* (0.0753)	0.2905*** (0.0536)
Inverse Mills ratio	-0.2357*** (0.0746)	-0.2003* (0.1131)	-0.1906** (0.0916)
Constant	4.8238*** (0.2874)	5.0038*** (0.4554)	4.6669*** (0.3576)
Observations	8430	4148	4282

Notes: Standard errors are in parentheses. \*\*\*, \*\* and \* denote significance at the 1, 5 and 10-percent level, respectively.

local off-farm employment by 21 percent (US\$792 vs US\$955 per year).<sup>5</sup>

The reason behind the positive impact of preschoolers might be the increase in life pressure that comes from raising children. As discussed earlier, because grandparents can help to take care of children, the presence of preschoolers has no impact on the decision for individuals to work off-farm. However, young parents are facing a high cost of raising a child in today's China (Shang and Li, 2005; Li, 2009). Under this pressure, they have to work harder and/or longer than those without children. This phenomenon has been widely reported in the media in recent years (e.g. Shao and Shen, 2008).

Different from the presence of preschoolers, the presence of school-aged children has a negative impact on the migration decision for both men and women (see Table 3) and also has a negative impact on the income of women, whereas when men migrate, their income is not affected. Further study shows that even though these female migrants' total working months

<sup>5</sup>Calculations are based on the estimation results, as shown in Table 6. The income of a female laborer with local off-farm employment is US\$792 when the presence of preschoolers is 0, while it is US\$955 if the presence of preschoolers is 1, holding all other variables constant at their mean.

Table 6. Determinants of Income from Local Off-farm Work

	Natural log of income of local off-farm		
	Total	Female	Male
Presence of preschoolers (1 = yes)	0.0670 (0.0497)	0.1875** (0.0879)	0.0021 (0.0603)
Presence of school-aged children (1 = yes)	0.0536 (0.0460)	0.1017 (0.0785)	0.0357 (0.0570)
Presence of the elderly (1 = yes)	-0.0437 (0.0655)	-0.1814* (0.1097)	0.0439 (0.0819)
Age	-0.0065 (0.0182)	0.0220 (0.0324)	-0.0250 (0.0224)
Age <sup>2</sup>	-0.0000 (0.0002)	-0.0003 (0.0004)	0.0002 (0.0003)
Marital status (1 = married)	-0.0654 (0.1000)	-0.0695 (0.1899)	-0.0252 (0.1179)
Gender (1 = male)	-0.0305 (0.0476)		
Years of education	0.0227** (0.0090)	0.0087 (0.0153)	0.0379*** (0.0110)
2007 year dummy	0.2067*** (0.0468)	0.2045** (0.0797)	0.2102*** (0.0579)
Inverse Mills ratio	-0.4049*** (0.0603)	-0.1564* (0.0930)	-0.4999*** (0.0756)
Constant	7.1721*** (0.3744)	6.3111*** (0.6293)	7.5047*** (0.4546)
Observations	8430	4148	4282

Notes: Standard errors are in parentheses. \*\*\*, \*\* and \* denote significance at the 1, 5 and 10-percent level, respectively.

have not been affected, they have a lower monthly wage than those without school-aged children.<sup>6</sup> In other words, even though they left their hometowns, they still have to take care of, at least partially, the school-aged children that they left behind. This study shows that women with school-aged children earn 14 percent less than those without school-aged children.

Finally, even though the presence of the elderly had no significant impact on the off-farm participation decision, it does have a significant negative impact on the income earned by women who work locally. Unlike migrants, female laborers with local off-farm jobs have to take care of the elderly as needed. Therefore, their incomes were negatively affected. Further calculations show that the presence of the elderly decreases the income of women by 17 percent (US\$715 vs US\$857).<sup>7</sup>

<sup>6</sup>For simplicity, the estimation results are not shown.

<sup>7</sup>Calculations are based on the estimation results, as shown in Table 6. The income of a female laborer with local off-farm employment is US\$715 when the presence of elderly is 0, while it is US\$857 if the presence of the elderly is 1, holding all other variables constant at their mean.



## VI. Conclusion

In the present study, we examined the impact of the need for childcare and eldercare on off-farm employment in rural China. Using a dataset with observations of more than 2500 individual rural laborers, our multivariate analysis shows that having school-aged children actually has a negative impact on the decision of rural laborers to migrate out and a positive impact on the decision to work in the local off-farm employment market. In addition, when families have school-aged children, it is shown that there is a negative impact on the income earned by female migrants.

However, the impact of having a preschooler on the decision of rural laborers to participate in the off-farm employment market is statistically insignificant. One explanation for this is that grandparents can help with childcare. The results for the presence of an elderly household member are also heterogeneous. On the one hand, having an elderly person at home had no significant impact on the decision of adult children to engage in off-farm employment. However, when there is an elderly individual at home, there is a negative effect on the income earned by female members of the family. Therefore, even though both men and women are actively engaged in off-farm employment today in rural China, our study shows that women are still the main care providers for both children and the elderly.

These findings have important policy implications. First, migrant children should be given equal access to public schools in destination cities. Because of the household registration (*hukou*) system and restrictions on access to public urban schools, it is difficult for rural migrants to access education for their children in the city (Zhao, 1999; Lai *et al.*, 2014). That's why most of migrant children have to be left in their rural families. Even when children go to the city with their parents, once they are 15 years old, they must return to their hometown to attend high school and take the college entrance examination. This system creates many educational barriers. In our study, we find that in some cases, rural individuals actually changed their decision to migrate to take care of their school-aged children. Based on our study, reforming public school enrollment and high school/college entrance examination systems could induce 37 million more rural laborers to migrate to cities.<sup>8</sup> In fact, this number might be even higher considering the better quality of public schools in destination cities than in the

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<sup>8</sup>According to the NBS (2013), there are 396.02 million laborers in rural China. Hence,  $396.02 \times 9.46\% = 37.46$  million.

hometowns (Song *et al.*, 2009).

Second, our study calls for more public services for preschoolers in rural China. Different from that in the cities, public services for preschoolers in rural areas are still limited. According to Luo *et al.* (2009), approximately two-thirds of rural students were not ready to enter elementary schools; this number is 3 percent for their urban counterparts. Therefore, providing more public services for those preschoolers left behind can not only reduce the childcare duties of the elderly but can also improve the quality of preschool education for rural children.

Finally, the present study provides useful information for policy-makers to improve the quality of life of the elderly in rural China. As young laborers migrate out, they are not able to provide care for the elderly when needed. In contrast, these elderly are not only being asked to take care of the children who are left behind, but also have their own on-farm jobs. This double burden may seriously affect the health status and the quality of life of the rural elderly. Therefore, the government should provide more services to improve the welfare of the rural elderly.

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