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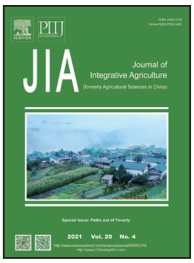

RESEARCH ARTICLE

Off-farm employment and poverty alleviation in rural China

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Abstract

Two phenomena in the history of China's economic growth during the last four decades are the increase in the share of off-farm employment and the progress in poverty alleviation in rural China. Although both of them have been well documented in the literature, less is known about the linkage between the two. To better understand the role that off-farm employment has played in poverty alleviation in rural China is critically important not only for China but also for those countries that are trying to reduce poverty. Here, we examine the impact of off-farm employment on poverty alleviation in rural China. Using the data from two nationally representative household panel surveys (China National Rural Survey and China Rural Development Survey), this paper provides supporting evidence that off-farm employment contributes to poverty alleviation in rural China. Specifically, if household participation in off-farm employment increases by 10 percentage points, the likelihood for a non-poor household to fall into poverty will decrease by 0.88 percentage point whereas the likelihood for a poor household to climb out of poverty will increase by 3.5 percentage points. In a word, off-employment can not only prevent rural residents to fall into poverty but also help those already in poverty climb out of it.

Keywords: off-farm employment, poverty alleviation, rural China

1. Introduction

The first United Nations Sustainable Development Goal (SDG) aims to "end poverty in all its forms everywhere". To achieve this goal, since 2015, many countries have made great efforts to enable people to improve their lives, which lifted more than 85 million people out of extreme poverty (World Bank 2018; 2020b). Despite this remarkable achievement, progress has been uneven. It is estimated that, by 2019, more than 651 million people still lived in extreme poverty around the world, with the majority of them concentrated in poor, rural areas of developing countries (World Bank 2020b). Therefore, a big challenge facing policymakers in pursuit of SDGs is how to end poverty in these poor rural areas.

China has achieved remarkable progress in poverty alleviation over the past four decades. Between 1978 and 2019, the poverty incidence in China decreased from 97.5 to 0.6%, making China the first developing country that

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has achieved the poverty reduction target set by the UN Millennium Development Goals. In terms of headcount, China's rural poor population dropped from 770 million to 0.6 million during the same period (NBSC 2020), contributing to more than 70% of global poverty reduction since the early 1980s (Ministry of Foreign Affairs of China and United Nations System in China 2013). Furthermore, China is committed to eradicating extreme poverty in its rural areas by 2020 through the "Targeted Poverty Alleviation Program (TPAP)".

Why has China been so successful in poverty reduction? There have been many explanations. One explanation is China's rapid economic growth, which is considered to be the most important cause of poverty reduction in China (Yao 2000; Ravallion and Chen 2007; Wang *et al.* 2007; Huang *et al.* 2008; Montalvo and Ravallion 2010). Theoretically, rapid economic growth contributes to poverty alleviation in two ways. On the one hand, the existence of a catch-up effect means that, compared with more developed areas, the less developed region will grow faster (Solow 1956). On the other hand, the trickle-down theory suggests that the accumulation of wealth by the rich is good for the poor since some of the increased wealth of the rich trickles down to the poor (Aghion and Bolton 1997; Dollar and Kraay 2002). Empirically, some scholars have found that there exists a causal relationship between economic growth and poverty reduction (Zhang *et al.* 2003; Ravallion and Chen 2007). Using both time-series and cross-sectional provincial data, Huang *et al.* (2008) show that economic growth is an essential and necessary condition for poverty reduction in China. However, they also caution that economic growth is not a sufficient condition for poverty reduction since economic growth may not be inclusive and thus fail the poor. As the economy grows, income inequality also increases, which dampens the impact of growth on reducing poverty (World Bank 2014). Besides, the impoverished people residing in certain regions are unable to fully share the gains from aggregate high growth (Ravallion and Jalan 1999).

Another explanation for China's success in poverty reduction is China's development-oriented poverty reduction programs since 1986 (Jalan and Ravallion 1998; Rozelle *et al.* 1998; Park *et al.* 2002; Meng 2013; Li *et al.* 2018). To fight against poverty, the Chinese government launched a series of targeted poverty reduction programs that cover broad areas, ranging from physical infrastructure, social development, to industrial development. Statistics show that during 1986–2018, more than 560 billion CNY were invested in these programs (about 70 billion USD) (MFC 2019).

Meanwhile, during the last four decades, besides remarkable progress in poverty alleviation, China also has witnessed a big increase in off-farm employment. Statistics show that the share of the rural labor force with off-farm employment experienced a steady increase, from 9.2% in 1978 to 84.4% in 2018, an average increase of 1.88 percentage points a year (Fig. 1). In other words, the number of the rural labor force with off-farm employment increased from 73 million to 476 million during this period.

Although a large body of literature has documented the phenomena of the increase in the share of off-farm employment and the progress in poverty alleviation in rural China (Luo *et al.* 2011; Zhang *et al.* 2018), less is known about the linkage between the two. Some argued that off-farm employment can help increase farmers' income and welfare (Parish *et al.* 1995; Rozelle 1996; Li 1999; Du *et al.*

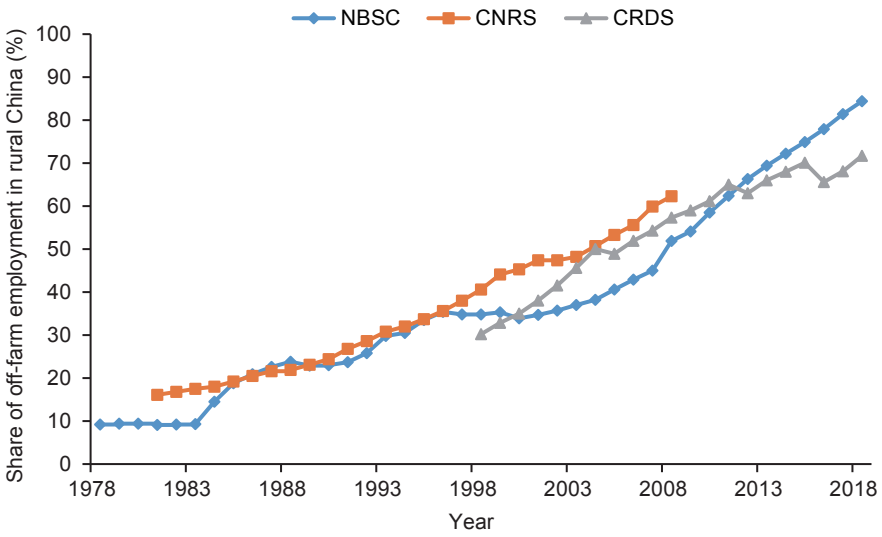

Fig. 1 The share of off-farm employment in rural China. Data source: National Bureau of Statistics of China (NBSC), China National Rural Survey (CNRS), and China Rural Development Survey (CRDS).

2005; Zhu and Luo 2008, 2010; Jia *et al.* 2017), while few directly linked off-farm employment to poverty reduction. So, how has off-farm employment affected poverty reduction? Answers to this question have important implications for not only China in its post–2020 development but also for the lessons that China can share with the rest of the world in the area of poverty reduction.

We contribute to the literature by examining the driving forces of poverty alleviation in rural China with a focus on off-farm employment, which has become one of the primary income sources of rural households. Armed with data from two nationally representative panel household surveys in rural China, we find supporting evidence that off-farm employment not only reduces the likelihood that rural households fall into poverty but also increases their likelihood of climbing out of poverty. Specifically, ceteris paribus, if household participation in off-farm employment increases 10 percentage points, the likelihood for a non-poor household to fall into poverty will decrease by 0.88 percentage point whereas the likelihood for a poor household to escape poverty will increase by 3.5 percentage points.

This study contributes to the literature in two ways. First, we examine the role that off-farm employment played in poverty alleviation, which is still less understood. Second, taking advantage of the panel nature of the dataset, the way we define off-farm employment enables us to better capture the accumulated effect of off-farm employment on poverty at the household level, which also has not been fully understood.

Our empirical findings have important policy implications. First, our results indicate that off-farm employment plays an important role in poverty reduction in rural China. This finding could help us better understand off-farm employment in the context of poverty alleviation. Second, some important experiences in poverty alleviation can also be learned from China for other developing countries. Our analysis reveals that the policies aimed at generating off-farm employment opportunities may be an effective option to fight against poverty.

2. Data and methods

To fully understand the relationship between off-farm employment and poverty alleviation in rural China, we use two main sources of data. The first source is macro data from the National Bureau of Statistics of China. Specifically, we draw on a dataset that we compiled from multiple *China Statistical Yearbooks* during 1978–2018 and the Migrant Worker Monitoring Surveys between 2008 and 2018. Armed with these datasets, we can get an updated picture of off-farm employment in rural China at the macro level. However, these macro datasets lack detailed information about off-farm employment by types. Therefore, we also need micro-level data.

Our second source is micro-level data from two rural household panel surveys conducted by the authors themselves. One is two waves (the waves 2000 and 2008) of panel data from the China National Rural Survey (CNRS), the other is five waves (the waves of 2005, 2008, 2012, 2016, and 2019) of panel data from the China Rural Development Survey (CRDS). Both surveys are almost nationally representative and cover detailed off-farm employment information at the individual level for nearly the past four decades.

The CNRS was collected from a randomly selected sample in six provinces of rural China selected as representative of China's major agricultural regions: Hebei, Liaoning, Shaanxi, Zhejiang, Hubei, and Sichuan. To reflect accurately varying income distributions within each province, one county was selected randomly from within each income quintile for the province, as measured by the gross value of industrial output. Two villages were selected randomly within each county. The survey teams used village rosters to choose twenty households randomly, both those with their residency permits (Hukou) in the village and those without. The CNRS (2000) was initially collected at the end of 2000 from 1 199 households in 60 villages, while 1 160 households were surveyed in the CNRS (2008) (40 households in two earthquake-damaged villages in Sichuan). It collects information on the off-farm employment history of sample households from 1981 to 2007. CNRS has been used in many studies of China's rural labor force (de Brauw *et al.* 2002; Zhang *et al.* 2004, 2006; Huang *et al.* 2011).

Similarly, the CRDS was also collected in a multi-stage stratified randomly selected sample in five provinces of rural China selected as representative of China's major agricultural regions: Hebei, Jilin, Shaanxi, Jiangsu, and Sichuan. The CRDS (2005) was initially collected in 2005 from 800 randomly selected households in 100 villages and covers a period that spans from 1995 to 2004. The CRDS (2008) was conducted in 2008 from the same 100 villages surveyed in 2005 and covers a period that spans from 2005 to 2007. From the CRDS (2008) onward, in addition to the 800 households surveyed in the CRDS (2005), we added 1 200 randomly sampled households, expanding the sample size to 2 000 households. The CRDS (2012, 2016 and 2019) covers periods that span from 2008 to 2011, 2012 to 2015 and 2015 to 2018, respectively. Both the CRDS (2016) and CRDS (2019) were conducted on the same 100 villages surveyed in 2005, 2008, and 2012. The CRDS datasets have been used in several studies of China's rural labor force as well (Li *et al.* 2013). The five waves of the CRDS between 2005 and 2019 provide us with the employment history of each household labor between 1998 and 2018.

The detailed information about the sampling methods of both surveys can be found in Zhang *et al.* (2018).

All waves of both surveys gathered detailed information on a wide number of variables covering many household characteristics and activities. In particular, several blocks of the survey focused on recording information on off-farm employment, such as off-farm employment participation, types of off-farm employment as well as wages. In other words, micro-level data from the CNRS and the CRDS provide us with more detailed and reliable information about off-farm employment in rural China. More importantly, since 2013 when China started the latest round of targeted poverty alleviation programs, each wave of the CRDS also collected information on the poverty status of each household each year and whether they have graduated from poverty if they were previously identified as the poor.

How is the off-farm employment of the rural labor force related to poverty alleviation in rural China? In the rest of the paper, we empirically estimate the relationship between off-farm employment and the poverty status of rural households. To do so, we specify an empirical model as follows,

$$Y_i=\alpha+\beta O_i+X_i'\gamma+H_i'\lambda+\mu_j+\varepsilon_i$$

where Y_i is poverty status for the household i, O_i represents off-farm employment in household i, X_i is a vector of characteristics of household i, γ is a vector of coefficients of the characteristics of household, H_i is a vector of the demographic structure of household i, λ is a vector of coefficients of the demographic structure of household, μ_j is the province effect, and ε_i is the error term.

Given the dynamic nature of household poverty status, we construct two variables to measure household poverty status. One is a dummy variable indicating whether a household is or was previously identified as being poor during 2013–2018. Following the literature (Luo *et al.* 2020), if a household has ever been identified as poor, we call it "ever poor"; otherwise, we call it "never poor". The other is a dummy variable indicating whether an ever poor household has climbed out of poverty or not. If a poor household has climbed out of poverty, we call it "graduated poor"; otherwise, we call it "remaining poor".

How is a poor household identified in rural China? A household is identified as the poor if its resources are short of the poverty threshold (Foster 1998). The threshold now in China is 2 300 CNY (or 339.6 USD at 2010 constant price) in terms of annual disposal income per capita. In other words, if a household has less than 2 300 CNY in annual disposal income per capita, the household should be identified as the poor. Similarly, a household is identified as graduated poor if its annual disposal income per capita increased to more than 2 300 CNY. In practice, there is a set of procedures for entry into and exit of poverty. For instance, if a household wants to be identified as the poor, they should first apply to the village committee. Then the application will be reviewed in turn by the village committee, township government, and county government (GPGO 2019). In the review process, besides disposal income, challenges faced by the applicant in housing, education, and medical services will also be taken into consideration (Zheng and Liu 2018).

Our detailed employment information from household panel surveys allows us to construct a more appropriate indicator to examine the relationship between off-farm employment and poverty alleviation. Specifically, for each sample household, we sum up the number of household members in the labor force over the years to get the denominator, and we also sum up the number of household members employed off-farm over the same years to get the nominator. The ratio of the two summations would capture household participation in off-farm employment during this period. It should be noted that when examining the relationship between off-farm employment and being the poor, "the years" mean all the years from 1998 to the year when the household was identified as the poor. When examining the relationship of off-farm employment and the likelihood of climbing out of poverty, "the years" mean all the years between 1998 and 2018, when we collected the latest information. Compared to the literature that focuses on participation in off-farm employment in a given year (Huang *et al.* 2011; Zhi *et al.* 2013), the way we define off-farm employment enables us to better capture the accumulated effect of off-farm employment on poverty at the household level, which has not been fully understood.

Following prior studies, we also include the following three vectors of control variables that might affect household poverty status. The first vector is "household characteristics", including age, gender (Kennedy and Peters 1992; Appleton 1996), and schooling of household head (Hu and Wang 2017; Han and Gao 2019; He *et al.* 2020). The second vector is the "household demographic structure" that includes two variables. One is the number of children aged less than 16 and enrolled in school. The other is the number of the elder aged more than 60 years (Yang 2009; He *et al.* 2020; Zhang and Li 2020). The third vector is *participation in poverty alleviation programs*. China adopted the Targeted Poverty Alleviation Strategy in 2013 in which a lot of programs have been undertaken to fight against poverty. Therefore, in our analysis of the effect of off-farm employment and whether poor household climbed out of poverty, to control the effects of these programs on household poverty status, we include a set of dummy variables indicating whether a household has ever participated in the following programs: entrepreneurship assistance, relocation, housing renovation, poverty reduction support loan, welfare job, guaranteed minimum income (Dibao), tuition waiver, and catastrophic medical

expenses waiver. In addition to these three vectors of control variables described above, we also include province fixed effects to control for factors at the provincial and above levels that might affect household poverty status (Cheng *et al.* 2020). After we delete missing observations in certain years in the CRDS, the final sample size for analyses in the rest of the paper is 1 647 households.

3. Results

3.1. Descriptive analyses

How about the poverty status of sample households? To answer this question, we examine the distribution of sample households across the four categories that we defined above: ever poor, never poor, remaining poor, and graduated poor households. As shown in Table 1, our sample households have a quite even distribution across the five sample provinces, which is understandable given the way that households were sampled. Our data show that one hundred households (6%) were ever poor. However, the distribution of ever poor households is not as even as sample distribution. Less than 3% of those ever poor households come from Jiangsu, while more than 40% of ever poor households reside in Shaanxi. This trend reflects the regional disparity in China. In fact, in 2018, the disposable income of rural residents in Shaanxi and Jiangsu was 22 528 CNY and 38 096 CNY, respectively, with the former being less than 60% of the latter (BSJ 2019; BSS 2019). Shaanxi had 56 nationally designated poverty counties before the launching of the Targeted Poverty Alleviation Strategy in 2013, while Jiangsu had no nationally designated poverty county. Our data also show that Jilin and Hebei perform better than Shaanxi and Sichuan in poverty alleviation. Only less than 3% of remaining poor households come from Jilin and more than 17% of graduated poor households reside in Jilin. In contrast, nearly half of the remaining poor households and less than 25% of graduated poor households come from Shaanxi.

Regarding to the off-farm employment, our data show that the level of participation in off-farm employment is 28.48% between 1998 and the year before the household was identified as poor (Table 2). In other words, nearly 30% of the labor force of rural households participated in off-farm employment between 1998 and the year before the household was identified as the poor. The level of participation in off-farm employment between 1998 and 2018 is 28.45%, which is very close to that of the former. This implies that the level of participation in off-farm employment in the sample households is very stable in these years.

Our sample households share certain characteristics that long-term household panel datasets exhibit. For example, when we look at the characteristics of household heads, their average age is 58.9 in 2018, which is older than that of the 2015 mini-census (50.19). Similarly, 94% of our sample households are male-headed in 2018, compared to 89% while in the sample of the 2015 mini-census. One possible reason is that the proportion of female-headed households decreased in recent years (Ren 2007). Moreover, the average schooling of household heads in our sample is a little more than primary school (7.26 years) in 2018, which is lower than that of the 2015 mini-census (junior high school).

Results from descriptive analysis also show that there is a positive relationship between off-farm employment and poverty alleviation. When we compare ever poor and never poor households, the levels of participation in off-farm employment of ever poor households and never poor households are 15.79 and 29.30%, respectively, with the latter being nearly twice of the former. The levels of participation in off-farm employment between 1998 and 2018 of ever poor households and never poor households are 15.22 and 29.30%, respectively, with the latter being also nearly twice of the former (Table 3).

When we compare the remaining poor and graduated poor, we find additional supporting evidence for the positive correlation between off-farm employment and poverty alleviation. The levels of participation in off-farm employment of remaining poor households and graduated poor households are 11.78 and 19.81%, respectively, and the former is less than 60% of the latter. The levels of participation in off-farm employment between 1998 and 2018 of remaining poor households and graduated poor

Table 1 Provincial distribution of the poverty status of sample households (%)

Province	Total	Ever poor	Never poor	Remaining poor	Graduated poor
	(1)	(2)	(3)	(4)	(5)
Jiangsu	20.04	3.00	21.14	4.11	8.51
Sichuan	19.49	24.00	19.20	28.77	14.89
Shaanxi	20.34	43.00	18.88	49.32	23.40
Jilin	20.52	9.00	21.27	2.74	17.02
Hebei	19.61	21.00	19.52	15.07	36.17
Number of observations	1647	100	1547	73	47

Data source: China Rural Development Survey (CRDS).

Table 2 Descriptive statistics

Variable	Mean (1)	S.D (2)	Min (3)	Max (4)
Level of participation in off-farm employment (%)	28.48	26.78	0	100
Level of participation in off-farm employment until 2018 (%)	28.45	26.77	0	100
Age of household head (years)	58.90	10.39	26	89
Gender of household head (1=Male)	0.94	0.24	0	1
Schooling of household head (years)	7.26	3.22	0	16
Number of children	2.13	0.97	1	7
Number of the elderly	0.72	0.83	0	3
Number of observations	1 647	1 647	1 647	1 647

Data source: China Rural Development Survey (CRDS).

Table 3 Comparison of different poverty statuses of sample households

Variable	Ever poor (1)	Never poor (2)	Difference 1 =(2)–(1) (3)	Remaining poor (4)	Graduated poor (5)	Difference 2 =(5)–(4) (6)
Level of participation in off-farm employment (%)	15.79	29.30	13.51***	11.78	19.81	8.04**
Level of participation in off-farm employment until 2018 (%)	15.22	29.30	14.09***	11.57	19.16	7.60*
Age of household head (years)	60.02	58.82	–1.20	60.51	60.04	–0.46
Gender of household head (1=Male)	0.95	0.94	0.01	0.90	0.96	0.05
Schooling of household head (years)	5.55	7.37	1.82***	5.58	5.70	0.13
Number of children	2.33	2.12	–0.21**	2.38	2.12	–0.26
Number of the elderly	0.85	0.71	–0.14	0.81	0.85	0.04
Number of observations	100	1 547		73	47	

***, $P<0.01$; **, $P<0.05$; *, $P<0.1$.
Data source: China Rural Development Survey (CRDS).

households are 11.57 and 19.16%, respectively, and the former is about 60% of the latter.

Our results from descriptive analysis also show some control variables matter in explaining household poverty status. For example, we find that households with more educated household heads are less likely to be identified as the poor. One possible explanation is that better education of household heads increases the level of participation in off-farm employment in a household (Li *et al.* 2020). In contrast, households with more children are more likely to be identified as the poor. These results are consistent with previous studies from inside or outside of China (Jolliffe 2002; He *et al.* 2020; Wei 2020).

3.2. Multivariate analyses

Off-farm employment and the likelihood of being identified as the poor To further examine the relationship between off-farm employment and poverty alleviation, we also conduct multivariate analysis by running a series of regressions. Table 4 shows the results from the model estimating the relationship between off-farm employment and the likelihood of being identified as the poor. Column 1 controls only the province effect. Column 2 adds the vector of household head characteristics. Column 3 adds the vector of household demographic structure. The results from these three specifications consistently indicate that the level of participation in off-farm employment is statistically significantly negative with the likelihood of being identified as the poor. Although the absolute magnitude of coefficients becomes smaller after controlling for those characteristics of household head and household, the statistically significant negative relationship still holds. Column 3 indicates that holding everything else constant, a 10-percentage-point increase in the level of participation in off-farm employment predicts a decrease in the likelihood of being identified as the poor by 0.88 percentage point. A 0.88-percentage-point decrease in the likelihood of being identified as the poor means, for instance, a drop of incidence of poverty from 1.6 to 0.72% in 2018.

Consistent with results from the descriptive analysis, regression results show that the schooling of household head has a statistically significant negative impact on the likelihood of being identified as the poor. Moreover, compared with households from other provinces, households from Shaanxi and Sichuan are also more likely to be identified as the poor.

Off-farm employment and the likelihood of being out of poverty We also examine the relationship between off-farm employment and the likelihood of climbing out of poverty. It should be noted that, compared to the definition of the poor household as those households that were identified as the poor (Jingzhun Fupin Household) during 2013–2018, while

Table 4 The effect of accumulated off-farm employment ratio on the likelihood of being identified as the poor

Variable	Dependent variable: whether the household is identified as poor (1=Yes; 0=No)		
	(1)	(2)	(3)
Level of participation in off-farm employment	–0.103***	–0.086***	–0.088***
	(0.032)	(0.026)	(0.028)
Age of household head		–0.000	0.000
		(0.001)	(0.001)
Gender of household head		0.027	0.028
		(0.026)	(0.026)
Schooling of household head		–0.007**	–0.007**
		(0.003)	(0.003)
Number of children			–0.012
			(0.010)
Number of the elderly			0.007
			(0.009)
Provinces			
Sichuan	0.062**	0.048*	0.047*
	(0.026)	(0.025)	(0.025)
Shaanxi	0.107***	0.100***	0.109***
	(0.031)	(0.029)	(0.032)
Jilin	0.001	0.000	–0.000
	(0.012)	(0.012)	(0.013)
Hebei	0.049	0.048	0.054
	(0.033)	(0.033)	(0.035)
Constant	0.047***	0.082	0.087
Number of observations	1 647	1 647	1 647
R-squared	0.043	0.052	0.054

Robust standard errors are in parentheses. ***, $P<0.01$; **, $P<0.05$; *, $P<0.1$.
Data source: China Rural Development Survey (CRDS).

in our analysis of the effect of off-farm employment on the likelihood of climbing out of poverty, here, to make full use of information of poor households, we redefine the poor households as those households that have been identified as the poor during our survey (1998–2018). To do so, in addition to those control variables that we used above, we added variables indicating whether a household has ever participated in any poverty alleviation programs (Table 5). Column 1 controls only the province effect and participation in poverty alleviation programs. As we did when examining the relationship between participation in off-farm employment and ever being identified as poor, in Columns 2 and 3, we in turn add vectors of household head characteristics and household demographic structure. Although the coefficient of interest is not statistically significant, after controlling for those characteristics of household head and household, the coefficients become statistically significant. The results indicate that household participation in off-farm employment has a statistically significant positive impact on the likelihood of climbing out of poverty. Specifically, Column 3 indicates that a 10-percentage-point increase in the level of participation in off-farm employment predicts an increase in the likelihood of climbing out of poverty by 3.5 percentage points. A 3.5-percentage-point increase in the likelihood of being out-of-poverty means, for instance, an increase of the likelihood of being out-of-poverty from 50 to 53.5% in 2019.

4. Discussion

While we believe that the findings of this study are important, admittedly, the study has several limitations. First, given the limitations of the dataset, we cannot investigate the causal relationship between off-farm employment and poverty alleviation. Second, our sample size is relatively small, with only 100 poor households. Studies involving a larger sample of households would provide further insight into the relationship between poverty alleviation programs and poverty alleviation.

Despite these limitations, however, our results call for more attention to those measures that can generate off-farm employment for rural poor households when developing poverty alleviation programs. Since 2015, the world has witnessed remarkable progress in poverty alleviation. However, not all regions have shared in the benefits of the global reduction in poverty. In Sub-Saharan Africa, the total count of poor people has been increasing. And one important contributor to it is that this region performed worse in pro-poor growth than other regions: the off-farm employment opportunities are rare for the poor (World Bank

Table 5 The effect of accumulated off-farm employment ratio on poverty alleviation[1)]

Variable	Dependent variable: whether the poor household is out-of-poverty (1=Yes; 0=No)		
	(1)	(2)	(3)
Level of participation in off-farm employment until 2018	0.356	0.377*	0.351*
	(0.229)	(0.208)	(0.207)
Age of household head		0.009*	0.010
		(0.005)	(0.007)
Gender of household head		–0.240	–0.231
		(0.146)	(0.140)
Schooling of household head		0.019	0.016
		(0.012)	(0.011)
Number of children			0.040
			(0.034)
Number of the elder			–0.067
			(0.075)
Provinces			
Sichuan	0.273	0.316	0.372
	(0.249)	(0.255)	(0.247)
Shaanxi	0.345	0.447*	0.455*
	(0.238)	(0.247)	(0.242)
Jilin	–0.197	–0.127	–0.090
	(0.267)	(0.275)	(0.273)
Hebei	–0.028	0.031	0.025
	(0.232)	(0.234)	(0.222)
Constant	0.413*	–0.098	–0.160
	(0.215)	(0.396)	(0.441)
Number of observations	119	119	119
R-squared	0.218	0.255	0.268

[1)] All models control the eight measures (entrepreneurship assistance, relocation, housing renovation, poverty reduction support loan, welfare job, guaranteed minimum income (Dibao), tuition waiver, and catastrophic medical expenses waiver) of poverty alleviation programs.
Robust standard errors are in parentheses. *, $P<0.1$.
Data source: China Rural Development Survey (CRDS).

2018). Moreover, as we speak, the COVID-19 shock and the containment measures are exerting a serious impact on poverty. According to projections by the World Bank (2020a), under the baseline growth scenario where a severe slowdown of the economy is followed by a strong recovery, nearly 24 million fewer people are estimated to escape poverty across developing countries in the East Asia and Pacific region in 2020 than would have in the absence of the pandemic. The call for measures generating off-farm employment for the poor would be even more salient when the COVID-19 pandemic subsides.

5. Conclusion

Consistent with the observed phenomenon of a big increase in the share of off-farm employment and a sharp decrease in the incidence of poverty in rural China, this study finds that there is a statistically significant negative relationship between off-farm employment and the likelihood of being identified as the poor and a statistically significant positive relationship between off-farm employment and the likelihood of being out-of-poverty. Specifically, a 10-percentage-point increase in the level of participation in off-farm employment predicts a decrease in the likelihood of being identified as the poor by 0.88 percentage point and an increase in the likelihood of climbing out of poverty by 3.5 percentage points.

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Declaration of competing interest

The authors declare that they have no conflict of interest.

References

Aghion P, Bolton P. 1997. A theory of trickle-down growth and development. *Review of Economic Studies*, **64**, 151–172.

Appleton S. 1996. Women-headed households and household welfare: An empirical deconstruction for Uganda. *World Development*, **24**, 1811–1827.

de Brauw A, Huang J, Rozelle S, Zhang L, Zhang Y. 2002. The evolution of China's rural labor markets during the reforms. *Journal of Comparative Economics*, **30**, 329–353.

BSJ (Bureau of Statistics of Jiangsu). 2019. *Jiangsu Statistical Yearbook*. China Statistics Press, Beijing. (in Chinese)

BSS (Bureau of Statistics of Shaanxi). 2019. *Shaanxi Statistical Yearbook*. China Statistics Press, Beijing. (in Chinese)

Cheng M, Li L, Zhang J. 2020. Spatial poverty of differentiation, trap formation and poverty factor. *China Population, Resources and Environment*, **30**, 1–10. (in Chinese)

Dollar D, Kraay A. 2002. Growth is good for the poor. *Journal of Economic Growth*, **7**, 195–225.

Du Y, Park A, Wang S. 2005. Migration and rural poverty in China. *Journal of Comparative Economics*, **33**, 688–709.

Foster E. 1998. Absolute versus relative poverty. *American Economic Review*, **88**, 335–341.

GPGO (Guizhou Provincial Government Office, China). 2019. Identification and withdrawal of poor households. [2020-12-29]. http://www.guizhou.gov.cn/zwgk/zcfg/zcjb/tpgj/201906/t20190604_2634676.html (in Chinese)

Han H, Gao Q. 2019. Community-based welfare targeting and political elite capture: Evidence from rural China. *World Development*, **115**, 145–159.

He J, Shen Y, Tang W. 2020. Social capital, risk resistance and poverty vulnerability of rural female-headed households: An empirical analysis based on CFPS. *Journal of Nanjing Agricultural University* (Social Sciences Edition), **20**, 146–157. (in Chinese)

Hu L, Wang S. 2017. Is China targeted poverty program facing the challenge of elite capture? *Management World*, **1**, 89–98. (in Chinese)

Huang J, Zhang Q, Rozelle S. 2008. Economic growth, the nature of growth and poverty reduction in rural China. *China Economic Journal*, **1**, 107–122.

Huang J, Zhi H, Huang Z, Rozelle S, Giles J. 2011. The impact of the global financial crisis on off-farm employment and earnings in rural China. *World Development*, **39**, 797–807.

Jalan J, Ravallion M. 1998. Are there dynamic gains from a poor-area development program? *Journal of Public Economics*, **67**, 65–85.

Jia P, Du Y, Wang M. 2017. Rural labor migration and poverty reduction in China. *China & World Economy*, **25**, 45–64.

Jolliffe D. 2002. Whose education matters in the determination of household income? Evidence from a developing country. *Economic Development and Cultural Change*, **50**, 287–312.

Kennedy E, Peters P. 1992. Household food security and child nutrition: The interaction of income and gender of household head. *World Development*, **20**, 1077–1085.

Li M, Gan C, Ma W, Jiang W. 2020. Impact of cash crop cultivation on household income and migration decisions: Evidence from low-income regions in China. *Journal of Integrative Agriculture*, **19**, 2571–2581.

Li Q, Huang J, Luo R, Liu C. 2013. China's labor transition and the future of China's rural wages and employment. *China & World Economy*, **21**, 4–24.

Li S. 1999. The labor migration, income growth and distribution in rural China. *Social Sciences in China*, **2**, 16–33. (in Chinese)

Li S, Li F, Dong Y. 2018. The impact evaluation of the policy of poverty alleviation in concentrated poverty-stricken areas: An investigation based on PSM-DID method. *Reform*, **12**, 142–155. (in Chinese)

Luo R, Liu C, Gao J, Wang T, Zhi H, Shi P, Huang J. 2020. Impacts of the COVID-19 pandemic on rural poverty and policy responses in China. *Journal of Integrative Agriculture*, **19**, 2946–2964.

Luo R, Zhang L, Rozelle S. 2011. Changes and challenges of off-farm employment of rural labor forces in China. *Issues in Agricultural Economy*, **32**, 18–24. (in Chinese)

Meng L. 2013. Evaluating China's poverty alleviation program: A regression discontinuity approach. *Journal of Public Economics*, **101**, 1–11.

Ministry of Foreign Affairs of China and United Nations System in China. 2013. *China's Progress Towards the Millennium Development Goals 2013 Report*. [2020-12-29]. https://www.undp.org/content/dam/china/docs/Publications/UNDP-CH-MDGs2013_english.pdf

MFC (Ministry of Finance of China). 2019. The central government spares no effort to guarantee the investment of poverty alleviation funds. [2020-12-29]. http://www.mof.gov.cn/zhuantihuigu/fpzjzczl/gzdt2/201907/t20190719_3303598.htm (in Chinese)

Montalvo J G, Ravallion M. 2010. The pattern of growth and poverty reduction in China. *Journal of Comparative Economics*, **1**, 2–16.

NBSC (National Bureau of Statistics of China). 2020. The population of rural poor decreased by 11.09 million in 2019. [2020-12-29]. http://www.stats.gov.cn/tjsj/sjjd/202001/t20200123_1724700.html (in Chinese)

Parish W L, Zhe X, Li F. 1995. Nonfarm work and marketization of the Chinese countryside. *The China Quarterly*, **143**, 697–730.

Park A, Wang S, Wu G. 2002. Regional poverty targeting in China. *Journal of Public Economics*, **86**, 123–153.

Ravallion M, Chen S. 2007. China's (uneven) progress against poverty. *Journal of Development Economics*, **82**, 1–42.

Ravallion M, Jalan J. 1999. China's lagging poor areas. *American Economic Review*, **89**, 301–305.

Ren Q. 2007. Thirty percent of Bingcheng household heads are women. [2021-1-7]. http://news.sina.com.cn/c/2007-03-07/001211352834s.shtml (in Chinese)

Rozelle S. 1996. Stagnation without equity: Patterns of growth and inequality in China's rural economy. *The China Journal*, **35**, 63–92.

Rozelle S, Park A, Benziger V, Changqing R. 1998. Targeted poverty investments and economic growth in China. *World Development*, **26**, 2137–2151.

Solow R. 1956. A contribution to the theory of economic growth. *Quarterly Journal of Economics*, **70**, 65–94.

Wang S, Park A, Chaudhuri S, Datt G. 2007. Rural poverty alleviation and village-level poverty targeting in China in the new period. *Management World*, **1**, 56–64. (in Chinese)

Wei J. 2020. Supporting intelligence: The logic of action to alleviate chronic poverty in ethnic areas. *Journal of Finance and Economics*, **46**, 155–168. (in Chinese)

World Bank. 2014. Prosperity for all: Ending extreme poverty. [2021-1-7]. https://www.worldbank.org/en/news/feature/2014/04/10/prosperity-for-all-ending-extreme-poverty

World Bank. 2018. Poverty and shared prosperity 2018: Piecing together the poverty puzzle. World Bank, Washington, D.C.

World Bank. 2020a. East Asia and Pacific in the time of COVID-19. East Asia and Pacific Economic Update (April). World Bank, Washington, DC. doi: 10.1596/978-1-4648-1565-2.

World Bank. 2020b. Poverty and shared prosperity 2020: reversals of fortune. World Bank, Washington, D.C.

Yang Z. 2009. Fragile poverty, sunk costs, separation of investment and beneficiary subjects — theoretical interpretation and countermeasures of peasant family's poverty caused by study. *The World of Survey and Research*, **6**, 14–17. (in Chinese)

Yao S. 2000. Economic development and poverty reduction in China over 20 years of reforms. *Economic Development and Cultural Change*, **48**, 447–474.

Zhang J, Zhang L, Rozelle S, Boucher S. 2006. Self-employment with Chinese characteristics: The forgotten engine of rural China's growth. *Contemporary Economic Policy*, **24**, 446–458.

Zhang L, de Brauw A, Rozelle S. 2004. China's rural labor market development and its gender implications. *China Economic Review*, **15**, 230–247.

Zhang L, Dong Y, Liu C, Bai Y. 2018. Off-farm employment over the past four decades in rural China. *China Agricultural Economic Review*, **10**, 190–214.

Zhang L, Huang J, Rozelle S. 2003. China's war on poverty: Assessing targeting and the growth impact of poverty program. *Journal of Chinese Economic and Business Studies*, **1**, 299–315.

Zhang T, Li S. 2020. Study on poverty caused by diseases and anti-poverty problems of rural residents in China. *Labor Security World*, **5**, 24. (in Chinese)

Zheng P, Liu C. 2018. Predicament in the precision identification of poverty-stricken households and the construction of identification mechanism in targeted poverty alleviation. *Economic Geography*, **38**, 176–182. (in Chinese)

Zhi H, Huang Z, Huang J, Rozelle S, Mason A D. 2013. Impact of the global financial crisis in rural China: Gender, off-farm employment, and wages. *Feminist Economics*, **19**, 238–266.

Zhu N, Luo X. 2008. *The Impact of Remittances on Rural Poverty and Inequality in China*. World Bank Publications, Washington, D.C.

Zhu N, Luo X. 2010. The impact of migration on rural poverty and inequality: A case study in China. *Agricultural Economics*, **41**, 191–204.

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