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How off-farm work drives the intensity of rural households' investment in forest management: The case from Zhejiang, China

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ABSTRACT

China's new round of forest tenure reform since 2006 has devolved the land-use rights of collective forests to individual households. Since then, policymakers have advocated household forestland transfers and large-scale forest holdings to increase the efficiency and returns from forest management. At the same time, there has been a rapid growth in off-farm working opportunities in urban areas of China. It is therefore important to analyze the impact of this increase in off-farm employment on the forest management investments of households with different scales of forestland holding. Based on the framework of the new economics of labor migration theory (NELM) and data obtained from surveying 300 households in 5 rural counties in Zhejiang Province, alternative econometric models were used to estimate how off-farm work drives the intensity of rural households' investments in forest management. The findings reveal that households with large-scale forestland holdings (LHs) are usually willing to increase their investments in forest management due to the remittance effect of their off-farm employment. In contrast, households with small-scale forestland holdings (SHs) prefer to decrease their investments in forest management due to the out-migration effect of the growing off-farm employment opportunities. The results provide a clear explanation about the necessity of large-scale forest management under the backdrop of increasing out-migration of the labor force in China's rural areas. The paper concludes with recommendations for policymakers to develop initiatives that will promote and support large-scale forest management by households in rural China.

1. Introduction

Since 2006, a new round of forest tenure reforms has been sweeping across rural China (Qin et al., 2011; Yin et al., 2013a). One consequence of the recent reform is that large-scale tracts of formerly collectively-owned forestland were divided into small plots and the rights to use these forests were granted to individual households. It has been estimated that the land-use rights for over 180 million ha of collective forestland have been allocated to millions of rural Chinese households, with over 176 million of them having received land-use certificates (SFA, 2017). The aim of the reform was to provide improved forestland tenure security and a more clearly defined and better aligned property rights system, thereby increasing the incentive for farmers to manage their forests and enhancing the productivity of the forest ecosystems

(Hyde et al., 2003; Zhang, 2003). However, the reform and associated allocation of scattered parcels to individual households also resulted in substantial forestland fragmentation for a huge rural population in China. For example, in China's southern collective forest area (SCFA), individual households were assigned an average of 1.8 ha of forestland (Hou et al., 2013). Additionally, various factors including uncertain land-use rights, harvest restrictions, the presence of unclear and disputed forestland boundaries between households, unfair compensation and insufficient financial support for forest management, and the rush to complete the reform process have meant that the fragmentation of forestlands has failed to increase the incentive for farmers to actively manage their small-scale holdings (Zhang and Wen, 2008; Wen et al., 2011; Yin et al., 2013a, 2013b; Xie et al., 2014; Liu et al., 2016). Also, given that forests in China already have a much lower timber stocking

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level than that commonly seen in forests internationally,¹ the fragmentation of forestland creates further challenges for improving forest productivity.

Rapid industrialization and urbanization has created growing off-farm employment opportunities and income for rural households all over the world (Reardon et al., 2000; Vanway and Vithayathil, 2013; Chhetri et al., 2015). In southern China, the acceleration of urbanization and the transition of labor out of forest management may increase the country's forestland transfer market. Over recent years, there has been a steady 0.6% average annual growth in the migration of workers from China's rural areas to urban centers, and by 2016 the number of out-migrated workers had reached nearly 150 million (China Statistics Bureau, 2017). In the SCFA, on average approximately 40% of each rural households' available labor force has migrated to urban areas in search of work (Liao et al., 2015). Due to the lower economic returns from forests compared to off-farm work, some studies have found that the increasing out-migration of rural labor and the associated increase in off-farm employment has had a positive impact on households' forestland rent-out decisions² in China (Liao, 2012; Xu et al., 2013; Xie et al., 2016). The Chinese central government has also recently implemented a series of policies designed to motivate forestland transfer among households in the country's SCFA (e.g. document No.83 issued by the central government in 2016 and document No.77 issued by the National Forestry Bureau in 2017) (State Council of People's Republic of China, 2016; State Forestry Administration, 2017). These policies are aimed at increasing the number of large-scale forest holdings and improving the sustainability of forest management and national timber security.

Under the different labor and finance constraints of households with different scales of forestland holding, off-farm work has differing impacts on household investment in forest management. In one commonly observed strategy, it will be less attractive for households with small-scale forestland holdings (SHs)³ to allocate labor to forest management activities when they face labor constraints as workers move away to seek better-paying off-farm work. In these cases, the households are likely to decrease their investment in forest management (Mehmood and Zhang, 2001; Butler and Leatherberry, 2004; Zhang et al., 2005; Haines et al., 2011; Hatcher et al., 2013). In many developed European countries, this scenario results in forests becoming more valued for recreational and cultural uses than timber production (Palo and Uusivuori, 1999). In some developing South American and African countries, studies have found that increasing off-farm work causes deforestation to decline as household income is increased and the dependence on subsistence agriculture is reduced (Holden, 1993; Godoy et al., 1997; Shively and Martinez, 2001). However, forest income remains an important income source for rural households in many developing countries, and some studies have found that households with labor migrants have lower forest productivity than those without migratory workers, and that this has induced a decline in traditional timber management (Schmook and Radel, 2008; Xie et al., 2014).

In contrast to SHs, households with large-scale forestland holdings (LHs) will pay more attention to forest management due to the potential for good returns from large-scale forest holdings. Different to the effect of labor force out-migration for SHs, the remittance effect from off-farm employment for LHs can result in an increase in the incentives to

actively manage their forests. Studies have found that these remittances from off-farm employment can enhance capital investments in agriculture (Haas, 2006; Hull, 2007). Also, compared with the agricultural sector, the activities of forest management are usually less seasonal and spread over a longer time period due to the long-term growth cycle. This means the labor inputs are mainly concentrated at the initial stage of the growing cycle, with subsequent inputs being more flexible dependent on individual household decision-making (Falconer and Arnold, 1988; Zhu et al., 2013). Hence, the out-migration effect may be less significant than in the agricultural sector, and will mainly occur during the first few years following afforestation. On the other hand, due to the lower present value of future returns and the significantly higher risks for multi-year production cycles, the remittances from off-farm works are more difficult to transfer to forest management than in other agricultural sectors.

While there has been much research into the impact of off-farm employment for agricultural investment, few studies have focused on the differences between SHs' and LHs' investments in forest management under the overall effect of labor force out-migration and remittances from off-farm work. Using data obtained from 300 household surveys in 5 counties in China's Zhejiang Province, this paper seeks to identify the effects of labor force out-migration and remittance from off-farm employment on SHs' and LHs' investments in forest management. The analysis is based on the theory of the new economics of labor migration (NELM) and econometric modelling. The research sought to understand how to motivate investments in forest management by rural households in China's SCFA given the growing opportunities for off-farm employment in this region. The findings provide evidence to support policies seeking to motivate large-scale forest management in the SCFA and insights that can assist policymakers in developing countries to target forest owner groups that will require financial support from government.

2. Conceptual model and econometric approach

2.1. Conceptual model

To identify how off-farm employment effects the households' forestry investment decisions, a conceptual model and econometric approach were developed. The analytical framework is based on Stark and Bloom (1985) theory of the new economics of labor migration (NELM). This NELM theory is usually used to analyze the multiple impacts of migration on household investment to avoid focusing on a single dimension of migration in isolation from others. It emphasizes that when a household decides to send out a migrant, it makes simultaneous short-term and long-term decisions about household production. Moreover, the household makes decisions regarding its present labor allocations and other inputs which affect the household's short-term production and investment in resources which affect the household's long-term production (Martin and Taylor, 2003; Taylor et al., 2003). Under the NELM framework, a number studies have examined the impacts of migration on agriculture, with common findings being that rural labor out-migration leads to a decline in agricultural production (Mazambani, 1990; Rozelle et al., 1999; Schmook and Radel, 2008), and that the remittance from migrants is usually invested in children's education and housing rather than agriculture (Brauw and Rozelle, 2008; Quisumbing and McNiven, 2010; Adams and Alfredo, 2010). Nevertheless, an opposite view contends that remittances generated from labor migration increase rural household incomes and enable rural households to make agricultural improvements (Taylor et al., 2003; McCarthy et al., 2006).

In this study, two possible rural household production activities are considered - a low-return forest management activity and a high-return off-farm activity. A household may invest its fixed resource \bar{W} (e.g. family labor and capital) in either low-return forest management activities or high-return off-farm work. However, households may face market constraints (e.g. the lack of a formal credit market) when

¹ In many provinces of China's SCFA, the timber stocking level is mostly in the range of 30–50 m³/ha, far lower than the international average of 131 m³/ha (FAO, 2010; Yin et al., 2013a,b).

² 'Rent-out decisions' mean that households rented their forestlands and associated use rights to other households or communities. On the other hand, 'rent -in decisions' mean that households rented forests from other local communities or households and also obtained the forest's use rights.

³ There is no consistent and clear range of forestland sizes to precisely define small - scale forestland holdings (SHs) and large - scale forestland holdings (LHs) in China. This is due to obvious differences in the size of forestland holdings between provinces or even counties. Hence, the distinction between SHs and LHs is highly context specific.

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