Effect of Key Priority Forestry Programs on off-farm employment: Evidence from Chinese rural households

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ARTICLE INFO

ABSTRACT

This paper examines how 3 Key Priority Forestry Programs (the KPFPs) influenced rural off-farm employment time using a long-term panel dataset that spans 18 years (1995–2012) and includes 6 provinces in China. The programs included the most significant forest policies, including the Sloping Land Conversion Program (SLCP), Desertification Combating Program around Beijing and Tianjin (DCBT), and Natural Forest Protection Program (NFPP). A labor supply model with both fixed and cluster effects were used to identify the programs' disparate impacts in the different regions and on various policy stages. We found the following results: (i) the overall effect of the SLCP was pronounced in relation to the off-farm participation time, but it weakened gradually after the first policy stage; (ii) the DCBT had less impact than the SLCP in increasing the work time of farmers who already had off-farm jobs, but it was better than the SLCP during the various subsidy policy stages; (iii) the NFPP's total effect was insignificant; (iv) forestry subsidies tended to be decoupled for farmers in China, since the substitution effect was greater than the income effect and increased the supply of non-agricultural labor hours. The researches and policy implications of our work are also discussed here.

1. Introduction

1.1. Key Priority Forestry Programs in China

In the late 1990s, China suffered severe natural disasters, including serious land degradation (Xu and Cao, 2001), the blockage of the flow of the Yellow River (276 days) (China State Forestry Bureau, 2001), sand storms (Liu and Zhang, 2016), and severe biodiversity loss (Li et al., 2007) that resulted in the destruction of the natural ecosystems' self-regulation and deterioration of the environment. To protect the fragile ecosystems, the Chinese government launched 6 Priority Forestry Programs (PFPs) in 1998 and integrated them with the existing forest resources. The Sloping Land Conversion Program, Desertification Combating Program around Beijing and Tianjin, Natural Forest Protection Program, Shelter-belt Development Program, Industrial Timber Plantation Program, and Wildlife Conservation and Nature Reserve Program were included in the PFPs. The first 3 programs have an impact on farmers' livelihood and are better than the rest of the programs (Liu et al., 2014). Our paper focuses on the SLCP, DCBT, and NFPP, which are also known as the Key PFPs (KPFPs).

These KPFPs are ongoing and operate as effective policies for the ecological restoration of these areas in China. The SLCP was started in Gansu province, Shaanxi province, and Sichuan Province in 1999. Until 2002, it was carried out formally across China. By the end of 2013, plantations on the restored farmland encompassed about 9.063 million hectares, 16.255 million hectares on barren hills and wasteland, and 2.881 million hectares of closing hills for forest conservation (China State Forestry Bureau, 2014a,b). Farmers received annual subsidies of food and cash worth 140 yuan 1 mu[1] of returned farmland in the Yellow River basin and 210 yuan in the Yangtze River basin. After the first allowance period of the SLCP ended, the annual subsidies in these 2 basins were cut in half to 70 yuan and 105 yuan, respectively, in the new round. Besides these subsidies, a 20-yuan subsistence allowance for the subsequent protection of the returned land was in effect. The different types of returned land had varying allowance periods: 8 years for an ecological forest, 5 years for an economic forest, and 2 years for grasslands (Liu et al., 2014).

In 2000, the DCBT executed measures to turn cultivated land into

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forests and grazing land into grassland; these measures were also used to harness the small watersheds and migration for ecological restoration in order to deal with the sandstorms in Beijing and Tianjin. By the end of 2013, the total controlled area reached 10.271 million hectares. The program then moved into the second stage, which had an initial range of 75 counties in 5 provinces that eventually extended to 138 counties in 6 provinces, with a total planned investment amounting to 877.92 billion RMB.

Like the DCBT, the NFPP also entered into the next stage of its project in early 2011. The key components of the new round of the NFPP program included forest tending and the strengthening of non-commercial forest protection, a plan for the policy on logging bans in the natural forest, and the reduction of the use of commercial wood by 50 million cubic meters (ITTO, 2015).

1.2. Key issues and research objectives

The original goal of the PFPs was to repair fragile ecosystems, so the total annual investment from the government is large. In 2013, the resources allocated to the PFPs went up to 31.4% of the entire forestry construction investment (China Forestry Statistical Yearbook, 2013). The implementation of the projects plays a positive role in addressing Chinese farmers' livelihood problems, such as low rural household incomes and the labor force structure (Liu et al., 2014; Ying and Shunbo, 2014). Over the past 3 decades, China has been experiencing the middle-income stage of development, with an annual GDP growth averaging 7.4% (World Bank, 2012; China State Statistics Bureau, 2015). In spite of this great achievement, China's demographic dividends are fading, which are crucial supports for the rapidly developing economy. By 2012, the annual increment of the working-age population shrunk by 3.5 million people (Cai and Wang, 2013). China's labor force supply is in a transition from excess to shortage. Therefore, the reasonable distribution of the labor force between the urban and rural areas is a means to solve the dualistic structural problems and construct a new socialist countryside (Cai, 2010; Cai and Duo, 2011). In the face of such difficulties, the PFPs' goal of solving ecological problems could release a significant proportion of the surplus labor force and change farmers' desires for employment in the non-agricultural market through subsidies; it could also limit logging. The PFPs could be an effective policy measure to solve the labor structure problems in China. They could also reduce the population pressure on the land, since the PFPs would promote local economic development (Yi and Chen, 2006) and decrease the urban-rural income gap with the household's off-farm income, which has been increasing in proportion to the total income (Findeis and Reddy, 1987; Mishra et al., 2002). What effect will the PFPs have on a labor force market that is undergoing profound change? Will it be positive or negative? Or will they have only a subtle impact on rural labor transfer?

1.3. Literature review

In the studies of the labor force distribution focusing on exogenous factors, government policy, as the adjusting instrument for market economy, cannot be ignored. Typically, policy research concentrates more on the evaluation of government agricultural projects. Agricultural policy subsidies are divided into 2 parts, the coupled and decoupled. The coupled subsidies are given to increase farmers' labor margin value in agricultural practices through the planting of particular species of "cash crops"; the decoupled subsidies are, to some extent, obtained without planting any crops (Ahearn et al., 2002; Burfisher and Hopkins, 2003). The decoupled subsidies have 2 kinds of potential impacts. One is the substitution effect, in which labor forces are redistributed between farm and off-farm production activities according to the principle of utility maximization, and this tends to favor work in the off-farm market. The other is the income effect, which relaxes budget constraints because the subsidies increase the household non-

labor income. In cases where the original consumption level is unchanged, the labor force's leisure time rises while the amount of time spent working decreases (Burfisher and Hopkins, 2003; Hennessy and Rehman, 2008). Before the enforcement of the 1996 Federal Agricultural Improvement and Reform (FAIR) Act, government agricultural subsidies were usually decoupled, and the income effect was greater than the substitution effect. As a result, they became stumbling blocks during the labor transference into the off-farm market process (EI-Osta and Ahearn, 1996; Mishra and Goodwin, 1997; Ahearn et al., 2002). Hennessy and Rehman (2008) evaluated the influence of the EU Common Agricultural Policy (CAP) on workforce allocation on Irish farms. They found that this government policy's subsidies, as the decoupling reform, had a greater effect on the substitution than income and increased the off-farm working time. With respect to government agricultural financial expenditures, D'Antoni et al., 2012 estimated the effect of these payments on labor migration (including the Loan Deficiency Payments (LDPs)) using time-series data from 1993 to 2007. The results indicated that there was a positive effect on farmers and their spouses, as well as an increase in hiring workers outside of the agricultural sector. Similarly, Chinese scholars drew the firm conclusion that there is a substitutional relationship between agricultural investment and labor force non-farming employment (Ran and Cao, 2007; Cheng and Ruan, 2010). Li and Xiang (2013) analyzed the dynamic influences of government fiscal expenditures for agriculture on rural labor migration by using the State Space Model and VECM (Vector Error Correction Model), and found that expenditures that supported agricultural production, public utilities, and agricultural technology had positive effects that lasted a long time (from 1978 to 2011 in China). The short-term effects were not obvious. The reform of the taxes and fees in China experienced a change, as well, moving from a tax-for-fee system to a cancelation of all agricultural taxes in 1997. In view of this reform, Xu et al. (2009) showed that it made farmers' labor input increase slightly, but not significantly. Farmers arranged the land and labor factors more reasonably to enhance productivity and household income, while there was a significant improvement in the agricultural production awareness.

In comparison to the studies on agricultural policy, the studies of environmental and forestry policy on the issues of labor distribution started relatively late. USDA officials announced that the Conservation Reserve Program (CRP), an environmental economic policy, would be carried out as the dual pressures of environmental problems and economic issues increased, including the excessive exploitation of land resources, serious soil erosion, over-supply of food and the associated price drops, and high budget deficits (Hyde et al., 2003). Although it helped to protect the ecological environment, the effect on off-farm employment was not positive (Ahearn et al., 2006). Unlike the American socioeconomic circumstances, China's Priority Forestry Programs have had more complicated effects on labor allocation. A number of studies have found that the SLCP does not play a significant role in labor force restructuring; in addition, labor force reflows occurred after the workers were no longer engaged in this program (Xu et al., 2004; Uchida et al., 2005; Yi et al., 2006). However, other studies showed that the SLCP freed up a significant proportion of the labor force to work in off-farm jobs because of the decrease in cultivated land (Yang, 2006; Yao et al., 2010). The NFPP has had a direct negative impact on local farmers' and workers' interests, which means that the supply of the labor force is greater than the demand. A new surplus labor force has been built (Liu et al., 1999), and this labor is being transferred to other industries (Hu, 2005; Guo et al., 2005; Yang and Xu, 2009; Zha and Lai, 2010).

Although the impact of environmental economic policy (especially the PFPs) on the labor force allocation has been analyzed in a certain number of studies, there are still some problems. Our paper takes a different approach from that found in previous perspectives on the income impacts of the PFPs (such as that found in Liu et al., 2014). This paper examines how the KPFPs change the labor factor distribution