Did the Key Priority Forestry Programs affect income inequality in rural China?

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ABSTRACT

The Natural Forest Protection Program, the Sloping Land Conversion Program and the Desertification Combating Program around Beijing and Tianjing have been gradually launched since 1998 for ecosystem restoration. A large number of rural households have been enrolled in these programs, and the Government of China has designed different polices for these programs, such as subsidies and forbidden or restricted uses. How and how much these programs and policies have affected rural households' inequality are urgent questions to be answered. The paper used a unique panel data of 1458 sample rural households from 15 counties in China to examine the direct and overall contributions of the Key Priority Forestry Programs (KPFPs) to rural households' total income inequality. A fixed-effects model was used to estimate the impact of the KPFPs on land-based income and off-farm income. Our empirical results indicate that the direct contribution and overall (including direct and indirect) contribution have experienced a inverted U-shape. Specifically, the overall contributions of the KPFPs' subsidies to income inequality were less pronounced than that of the direct effects. Furthermore, both the direct contributions and overall contributions to total income inequality changed over time during the study period and differed from one county to another.

Introduction

China's progress in poverty reduction and economic development over the last 30 years or more has been truly remarkable (Ravallion and Chen, 2007). Along with rapid economic growth, the poverty rate fell from more than 65% to less than 10% (World Bank, 2012). However, China is no longer a low-inequality country, because income inequality in both rural and urban areas has risen, and climbed continuously over the past three decades (World Bank, 2009, 2012). China has been in the process of being transformed from an egalitarian society to a highly unequal country. In recent years, rapidly expanding income inequality in China has generated significant interest because of its importance as a growing national problem (Kanbur and Zhang, 1999; Ravallion and Chen, 2004, 2008;). The Gini coefficient in China was 0.32 in 1980 but increased to 0.45 in 2001 (World Bank, 2004), according to different estimates, 0.21 in 1978 and rose to 0.38 in 2010 (Zhang et al., 2011; Ministry of Agriculture of China, 2008). One decade ago, China's Gini coefficient ranked, in an ascending order, the 85th out of 120 economies (World Bank, 2004). Widening income inequalities in China's rural areas that are a subject matter of great concern beg the question whether the current development model is sustainable and equitable. Stiglitz (2012) warned: "We are paying a high price for our inequality—an economic system that is less stable and less efficient, with less growth, and a democracy that has been put into peril."

Most scholars would agree that past policies in China excessively compressed personal income differentials (Gustafsson et al., 2008). The impact of policies on inequality has been studied from the perspectives of public spending (Bourguignon et al., 2008; China Development Research Foundation, 2012). Narrowing income inequality has been listed as one of the policy priorities by the Government of China.

Some researchers have examined the linkages between forest resource management and local livelihood (Wunder, 2001; Angelsen and Wunder, 2002; Chomitz, 2007).

There are apparent linkages between ecosystem services and income distribution, especially for the rural areas. Despite the progress achieved in increasing the production and use of some ecosystem services, inequities are growing, and many people still do not have a sufficient supply of or access to ecosystem services (Millennium Ecosystem Assessment, 2005). China's current pattern of development has placed considerable stress on the environment and ecosystem. As a result, China suffered serious natural disasters

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in the late 1990s in addition to aggravated income inequality. Environmental degradation spurred new efforts to protect the country's fragile and fragmented environment. Widespread damages to the environment and ecological base that supports economic prosperity alerted the Chinese authorities, resulting in the adoption of a new strategy (World Bank, 2012). The crisis resulting from destructive exploitation was the stimulus for the introduction of new regimes of resource management as the crisis-response model has been suggested (Mather et al., 1999). In the wake of a number of serious floods and other natural disasters, the Government of China has launched a series of high-profile programs since 1998, such as the Natural Forest Protection Program (the NFPP), the Sloping Land Conversion Program (the SLCP) and the Desertification Combating Program around Beijing and Tianjin (the DCBT) (State Forestry Administration, 2005). These programs are known as the key Priority Forestry Programs (the KPFPs). The policies of the Government of China involve government subsidies for conversion of cropland to forest land under the SLCP and the DCBT whereas government restrictions are put in place on the use of natural forest land under the NFPP. The total investment of the three KPFPs has increased from 0.6 million USD in 1998 to 82.4 million USD in 2010 (State Forestry Administration, 2012), making them the largest forest ecological restoration programs in the world in terms of investment amounts. The ultimate aim of the KPFPs is to provide ecological services to China, and an auxiliary goal is to reduce the high poverty rates among rural households (Xu et al., 2002). Rural households have been involved in the implementation of these programs. For instance, by the end of 2008, 26.8 million rural households had been involved in the SLCP in 25 provinces, and 2.5 million rural households have been involved in the DCBT in 5 provinces (State Forestry Administration, 2008).

Given the significance of the KPFPs, particularly in the context of payment for ecosystem services program worldwide, the implementation of the KPFPs has direct and indirect impact on rural households' income. Specifically, the impact of the SLCP on rural households' income and income structure has been studied intensively (Zhao and Wang, 2006; Hu, 2005; Liu and Zhang, 2006; Yao et al., 2010; Liu et al., 2010; Xu et al., 2004, 2010; Uchida et al., 2005; Liu et al., 2010; Xu et al., 2010; Wang and Maclaren, 2011; Li et al., 2011). Other aspects have been examined, such as grain production (Xu et al., 2005), and environmental outcomes (Wang et al., 2008). Compared to the SLCP, there have been fewer studies concerning the income effects of the NFPP (Xu et al., 2002; Weyerhäuser et al., 2005) and the DCBT (Liu and Zhang, 2006). Some have found positive impact of the NFPP on rural households' income (Mullan et al., 2010), while Liu et al. (2010) detected conflicting effects. There are considerable discrepancies as to the income effects of these KPFPs.

We believe that the impact of the KPFPs on rural households' income and their income inequality needs to be examined to capture the dynamics of income change over time. Income inequality decomposition by income sources is of great importance because it could help to explain the entrenched nature of households' income and income inequality. To our best knowledge, a few studies about the impact of rural households' income inequality have been done. Li et al. (2011) used multiple-level cluster sampling in 20 villages of 4 selected townships with a total of 1078 households in Shaanxi Province. Their results indicate that income inequality is less among households participating in the SLCP than among those that do not after 7 years of the program. Liu (2010) used the dataset to estimate the impact of the KPFPs on sample rural households, but the indirect effects of the KPFPs on rural households' income inequality was not estimated. This paper seeks to narrow these gaps. We use a balanced longitudinal and panel dataset of 1548 sample rural households from 1995 to 2010 to estimate the overall effects (including direct and indirect) and direct effects from the KPFPs on

rural households' total income inequality on the whole and by the case study county.

The remainder of the paper is as follows: the mechanisms of the KPFPs and their impact on rural households' income inequality are presented in Section Two. Methodology and data are presented in Sections Three and Four. Section Five contains the empirical results, and the final section provides a discussion and conclusion.

Mechanisms of the KPFPs

The SLCP was piloted in Sichuan, Shaanxi and Gansu provinces in 1999, and implementation officially started in 2002. Its primary goal was to convert 14.67 million hectares of sloping or desertified cropland into forest and grass coverage from 2001 to 2010. When it was formally launched, the SLCP was extended to 25 provinces with a budget of 225 billion yuan. The central government subsidized rural households enrolled in the SLCP in the form of seeds or seedlings, grain, and cash. Subsidies last 8 years for ecological forest, and 5 years for economic forest (including fruit and nut trees), and 2 years for grassland. There were two periods in terms of the subsidy policies: from 1999 to 2007, households received 2400 yuan/ha in the Yellow River basin and 3450 yuan/ha in the Yangtze River basin (paid partially in grain before 2004). From 2007 onwards, the subsidies were reduced by half. They were also limited to those who had already converted cropland or were engaged in afforestation of barren land. In addition to the changes in subsidy levels and enrollment restrictions, special funds have been allocated since 2007 to directly address long-term livelihood concerns, for example, encouraging switching from open-grazing to pen raising of livestock (State Forestry Administration, 2005, 2010).

The DCBT, with the total projected investment of 57.7 billion yuan, is composed of the SLCP and a number of irrigation projects, resettling rural households away from ecologically fragile areas and transforming herding and animal husbandry practices to control overgrazing and rehabilitate degraded grassland. The SLCP is the most important component of the DCBT in which rural households have been enrolled, while irrigation projects and resettling rural households away from fragile areas have been implemented by local government agencies. The governmental subsidy policy for the SLCP in the DCBT areas is the same as that for the other SLCP areas in the Yellow River basin. In addition to sloping or desertified cropland conversion to forest or grass coverage, in both the SLCP and the DCBT areas, the households enrolled were required to plant trees on barren land of at least the same area of their converted cropland in size.

Following successful trials during 1998 and 1999, the NFPP was formally launched in 2000 with an initial investment of 96.4 billion yuan for the next decade. A key component of the NFPP was a ban on commercial logging over 30 million hectares of natural forests in the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River. In other areas, harvest restrictions were tightly imposed. All households with natural forests in the program areas were required to get involved in the NFPP. Since 2007, commercial logging bans in forest plantations have gradually been adjusted. Some households receive government subsidies for guarding natural forests.

Some households have been involved in the SLCP and the DCBT or the NFPP, while some others did not participate in any of the KPFPs. In the meantime, some households participated in the KPFPs in different years. Up to 95 sample households were enrolled in the DCBT in 2002, and the number increased to 171 from 2004 to 2010. The number of households enrolled in the SLCP increased from 138 in 1999 to 711 in 2010; the number of sample households enrolled in the NFPP increased from 447 in 1999 to 592 in 2010. One of the key reasons for the increase is the reform of collective forestland