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The Sloping Land Conversion Program in China: Effect on the Livelihood Diversification of Rural Households

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Summary. — Through addressing the motivations behind rural households' livelihood diversification, this paper examines the effect of the Sloping Land Conversion Program (SLCP) on livelihood diversification using a longitudinal household survey data set spanning the overall implementation of the SLCP. Our results show that the SLCP works as a valid external policy intervention to increase rural livelihood diversification. In addition, the findings demonstrate that the implementation of the SLCP has had heterogeneous effects on livelihood diversification across different rural income groups. The lower income group was more affected by the program in terms of income diversification.

Key words — Sloping Land Conversion Program, China, livelihood diversification, income diversity index, identification condition, difference in differences

1. INTRODUCTION

The contradiction of rural poverty and the environment has been the subject of discussion since the end of the previous century (Leonard, 1989; World Bank, 1992). Environmental resources can be broadly utilized by rural populations in various ways, such as gathering, grazing, and other managed planting. It would be advantageous if people could regulate the use of certain resources. However, this balance is fragile and can easily break down in rural areas in developing countries. Leonard (1989) points out that rural poverty is intimately connected with environmental degradation, and poverty is seen as both a cause and a result of natural resource depletion.

From the point of view of the poverty–environment nexus, a lack of an income source and land resource due to population growth drives rural populations to rely heavily on the extraction of environmental resources, such as gathering (firewood, building materials, and fodder for animals), overgrazing grasslands, and the overuse of marginal land (Brundtland, 1987). On the other hand, environmental degradation such as soil erosion, the over-grazing of pastures and the loss of watershed protection further intensifies the degree of poverty experienced by rural households. In response to this, Ellis (2000) indicates that rural livelihood diversification [1] is of significance in solving the poverty–environment equation, because it can directly switch the time allocation of the household from activities based on environmental resources, to off-farm or non-farm income-generating activities by providing alternative sources to relieve the pressure on the environment. In China in 1999, the central government initiated the SLCP, which introduced a fixed-payment incentive mechanism to compensate rural households that convert sloped arable land to forest- or grassland. The main objective of the program is to reverse the adverse poverty–environmental connection, improve environmental conditions and alleviate poverty through inducing structural economic change at the local level by means of financial incentives (Grosjean & Kontoleon, 2009). By converting arable land to forest or grassland, the program could directly shift rural surplus labor from activities based on sloped cropland to off-farm or non-farm income-generating activities, which tends to alleviate rural poverty by diversifying livelihoods. However, in this process, rural households have difficulties in overcoming entry barriers to off-farm and non-farm income-generating activities, which include both human capital constraints such as education, skill and health, and financial capital constraints (Ellis, 2000; Smith, Simard, & Sharpe, 2001). These barriers could be overcome by policy intervention which aims to improve the asset holdings of the rural, either by endowing them with additional financial, fixed, human, natural, or social assets, or by increasing the productivity of the assets they already hold, or both (Barrett, Reardon, & Webb, 2001). This paper introduces the Sloping Land Conversion Program (SLCP) as an example to illustrate the effects of policy intervention on livelihood diversification by switching rural surplus labor to off- and non-farm income-earning activities as well as overcoming the entry barriers, both of which contribute to the sustainability of rural livelihoods.

According to the 'dual' objectives of the SLCP, environment protection and poverty alleviation, the success of the program is determined by providing the rural households with alternative income sources that reduce their reliance on gathering activities from the local environment and reducing their

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motivation to initiate cultivation in environmentally sensitive locations. This is achieved by providing options that make time spent in exploiting natural resources (above examples, gathering activities in forests and farming on sloping land) less remunerative than time spent doing other things (Ellis, 2000). The growth of non-farm income sources if accessible in remote rural areas might reduce the need for landless dwellers to carry out extractive practices in local environments for their survival. This has been called the 'substitution of employment for the environment' and has received quite a lot of attention in the policy literature (Lipton, 1991).

Obviously, the implementation of the SLCP has an influence on the livelihood strategies of farm households in rural areas, which has inspired extensive empirical policy evaluation studies on, e.g., income growth, inequality, and off-farm labor participation. Li, Feldman, Li, and Daily (2011), Liu, Lu, and Yin (2010), Uchida, Rozelle, and Xu (2009) and Yao, Guo, and Huo (2010) all find that the program has had a significant positive effect on the income of participating households, whereas Xu, Bennett, Tao, and Xu (2004) found that the effect on the income of participants is statistically insignificant. Besides, Kelly and Huo (2013), Qu, Kuyvenhoven, Shi, and Heerink (2011) and Uchida *et al*., 2009 argue that participating households are increasingly shifting their labor endowment from on-farm work to the off-farm labor market, which is also a kind of diversification reaction, while the program was not successful in shifting labor into off-farm sectors during the first few years of implementation (Xu *et al*., 2004).

As described above, much literature discusses either the change in income, or the change in the distribution of income activities. Our particular focus is on the impact of the SLCP on rural households' livelihood diversification as this captures the changes in income activities and their distribution simultaneously, which we consider a neglected aspect of the existing literature. In addition, as shown previously, livelihood diversification is an effective way of solving the problem caused by poverty and environmental degradation. Therefore, livelihood diversification can be used as an efficient indicator to evaluate the success and sustainability of the SLCP in China.

We make three contributions to the existing literature. First, the paper sheds light on the internal and external factors that motivate rural households to diversify their livelihood or income sources. Particularly, we attempt to investigate whether SLCP works as a valid external policy intervention on livelihood diversification, which is considered an effective means of solving the problem caused by poverty and environmental degradation. To the best of our knowledge, our study is the first to shift the focus from analyzing the impact of SLCP on income growth and off-farm labor participation to livelihood diversification. Second, this study attempts to examine heterogeneity regarding the policy impact among different income groups by analyzing whether the effect on livelihood diversification differs across different rural income groups. Our results show that the low-income group benefits more in terms of livelihood diversification from the policy intervention. Accordingly, poverty alleviation in rural areas can be achieved by implementation of the SLCP. Our third contribution is that we apply an updated database of household-level data covering the period 1999–2010 which saw the implementation of the SLCP and a policy adjustment in 2007. Hence, our study attempts to provide a more comprehensive analysis of the policy impact of the SLCP and may fill the gap in the literature by providing evidence from the collected rural household data after the policy adjustment.

The paper proceeds as follows: Section 2 provides some background on the SLCP in China; Section 3 outlines the conceptual framework; Section 4 presents the data and defines the livelihood diversification index used in our study; Section 5 describes the empirical strategy and empirical specification; Section 6 reports the empirical results and discussions, while Section 7 concludes.

2. BACKGROUND OF SLOPING LAND CONVERSION PROGRAM

In response to growing environmental pressure and public protection awareness, the Chinese government initiated several ecological restoration programs in the late 1990s. The SLCP, which is also known as Grain for Green (GFG), is distinct from the other programs since it is one of the first, and certainly the most ambitious, programs based on payments for environmental services in China (Bennett, 2008).

(a) *The initial state of SLCP*

The main reasons for the implementation of this payment for environmental services program was the drought of the Yellow River in 1997 and the massive floods along the Yangtze River in 1998 (Xu & Cao, 2002). The Chinese government initiated the SLCP to limit water and soil erosion by afforestation in three provinces – Sichuan, Shaanxi, and Gansu – in 1999 and formally launched the program nationwide in 2002, which was originally designed to convert 14.67 million hectares of farmland to forest or grassland (4.4 million of which is on land with slopes above 25°), and an additional "soft" goal of afforesting a roughly equal area of denuded mountains and wasteland by 2010 (SFA, 2003).

The program focuses mainly on cultivated land on steep slopes (greater than 15° in the northwest and 25° in the southwest), which is the kind of land which tends to experience serious erosion resulting from cultivation. The original plan was to convert 14.67 million hectares of farmland to forest or grassland. However, in reality, only 9.3 million hectares were finally converted.[2] The State Forestry Administration (SFA) charged by the State Council and provincial and sub-provincial forestry bureaus are primarily responsible for targeting general areas of land for enrollment in the program as well as in setting and distributing enrollment quotas to local government (Zuo, 2002). Local governments were in charge of evaluating land plots. Households whose land plots fell into the planned project area were eligible for inclusion in the program. The participant households were granted seedlings as well as technical guidance for planting, and they could receive subsidies on condition that the survival rate of the planted trees on the sloping land reached 70%, the inspection work for which is conducted by local governments. There were two subsidy levels between regions, the annual grain subsidy was 1,500 kg/ha in the Yellow River Basin and 2,250 kg/ha in the Yangtze River, reflecting inherent differences in regional average yields. However, in 2004, the grain subsidies were changed to cash payments (the conversion rate of grain to cash is 1 kg grain = 1.4 CNY (1 USD = 6.77 CNY, in 2010) (Liu & Wu, 2010). Besides, participant households are also given 300 CNY annually for managing and protecting the planted trees per hectare of converted sloping land. Obviously, the first and primary goal of the SLCP is to contribute to ecological restoration by increasing forest cover on sloped cultivated land in the upper reaches of the Yangtze and Yellow River basins to prevent soil erosion (SFA, 2003). However, the program