

How Sustainable are Sustainable Development Programs? The Case of the Sloping Land Conversion Program in China

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Summary. — This paper undertakes a comprehensive assessment of the long-run sustainability of one of the world's largest sustainable development programs, the Sloping Land Conversion Program (SLCP) in China under different plausible post-SLCP scenarios. The analysis is based on farmer contingent behavior post-program land and labor decisions as well as choice experiment data. Our econometric results highlight the main obstacles to the program's sustainability, which include specific shortfalls in program implementation and certain institutional constraints, namely tenure insecurity and poor land renting rights. The use of a choice experiment also reveals unique evidence on rural households' preferences over tenure reform in China.
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1. INTRODUCTION

There is a well-established literature on household behavior in developing countries that describes how market and institutional imperfections drive inefficient allocation choices, which in turn contribute to both poverty and environmental degradation (De Janvry & Sadoulet, 2005; Key, Sadoulet, & De Janvry, 8; Key *et al.*, 2000). For example, failures in the off-farm labor market prevent households to access income-enhancing off-farm activities and constrain them to oversupply labor on farm. Such constrained, excess on-farm labor has been shown to be associated with high levels of forest-land conversion, which lead to both economic hardship and to negative environmental externalities (Bowlus & Sicular, 2003; Feng, Yang, Zhang, Zhang, & Li, 2004; Groom, Grosjean, Kontoleon, Swanson, & Zhang, 2006). Similarly, land right imperfections have been shown to undermine land quality investment incentives and provoke land degradation (Carter & Olinto, 2003; Deininger, Jin, Adenew, Gebre-Selassie, & Negra, 2003; Li, Rozelle, & Brandt, 1998). This “diagnosis” has motivated various policy responses that aim at killing two birds with one stone: by addressing the common roots of poverty and environmental degradation, it is anticipated that households will be lifted out of inefficiency traps and steered toward a more sustainable development path. The idea is to provide direct or indirect financial incentives (usually in the forms of subsidies or royalty payments) to local communities in order to induce changes in their land and labor allocation choices. These policies measured include land set aside and agri-environment programs, community-based conservation schemes and the so-called Integrated Conservation and Development Programs (Abbot, Thomas, Gardner, Neba, & Khen, 2001; Cernea & Schmidt-Soltau, 2006). Though such sustainable development programs come in various guises they have one common feature: the duration of the financial incentives or subsidies provided is finite as the aim is to induce a structural economic change at the local level such that this “win-win”

objective of poverty alleviation and environmental improvement becomes self-sustainable.

The immediate silver bullet attraction of such programs led to their proliferation since the mid-1990s. Given the significant funds and attention that these programs have received, there has been evident interest in investigating to what extent they have been meeting their dual objective of addressing environmental externalities and economic development. This has sprung an extensive empirical policy evaluation literature. Some of this work has focused on examining the impact of these programs on household income, on household land and labor allocation decisions as well as on the environmental externalities the programs sought to address (Duflo & Kremer, 2003). The data used in these analyses mostly come from surveys that collect information over household behavior before and during the program. Though these studies provide useful information over the implementation of these programs, they are not particularly useful for assessing their *long-term viability or sustainability*,¹ that is, how participating households will be affected *after* the specific program ends. Such an analysis can be undertaken by using household surveys that include direct contingent behavior questions over household post-program decisions (e.g., Johnson, Misra, & Ervin, 1997). Further, most evaluation studies provide an assessment of the *gross* policy impact and thus do not adequately discern

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which particular attributes of a given policy are relatively more effective in generating the desired changes in allocative behavior. They are, thus, not very informative over any auxiliary improving measures that policy makers can adopt *during* the program nor over the optimal design features of a viable and cost-effective potential follow-up program *after* the current one expires. Addressing this issue requires a detailed analysis of the impact of specific attributes of a program, which represents an empirical challenge in the absence of sufficient randomization of program attributes among households. In the absence of such data, analysts may use stated preferences choice modeling techniques which are suitable for assessing the relative importance of different program attributes (Louviere, Hensher, & Swait, 2000; Mercer & Snook, 2004, chap. 6).²

This paper attempts to address this limitation in the current policy appraisal literature by providing a comprehensive direct assessment of the sustainability of the largest sustainable development programs currently under implementation in the developing world, the Sloping Land Conversion Program (SLCP) in China—a program that simultaneously attempts to address rural poverty and externalities from deforestation. Our analysis uses both contingent behavior and choice modeling data obtained from household and village leader surveys undertaken in two provinces in China. The data allow us to assess the program's sustainability under three plausible mutually exclusive post-program scenarios: the case when the current program is renewed in its current form, when the program is terminated altogether, and when a new program is introduced. By adopting such a direct *ex ante* assessment of the SLCP, the analysis is able to identify which policy characteristics warrant more attention in the post-SLCP period as well as which households should be targeted so that the dual objective of the program can be attained in a long lasting and cost-effective manner. Further, the use of a choice modeling approach reveals unique evidence on farmers' preferences over land tenure reform currently underway in China.

The paper is organized as follows. Section 2 briefly describes the SLCP and discusses the framework adopted for directly assessing its sustainability using contingent behavior post-program land and labor allocation data as well as choice modeling data. Sections 3 and 4 present the econometric framework adopted for analyzing these two types of data and the results of the empirical analysis. Section 5 concludes.

2. A FRAMEWORK FOR A DIRECT ASSESSMENT OF THE SUSTAINABILITY OF THE SLCP

The common lineage of rural poverty and environmental degradation has been particularly well documented in the case of China. Institutional and market failures inherited from central planning policies biased toward industrialization have constrained farmers into inefficient production choices, characterized in particular by high labor-land ratios and a low level of agricultural and land savings investments (Jacoby, Li, & Rozelle, 2002). More specifically, the oversupply of on-farm labor and the inaccessibility to off-farm labor market opportunities have been pointed out as major driving factors for both rural poverty and the cultivation of marginal, low yield, and highly sloped lands (Feng *et al.*, 2004; Xu & Cao, 2002). In fact, extensive cultivation of previously forested sloping lands in the upper reaches of the Yangtze, Yellow, Chao, and Bai Rivers has induced severe environmental degradation in the corresponding river-basin in recent years, which culminated

in serious flooding and loss of life along the Yangtze River in the summer of 1998 (Uchida, Xu, & Rozelle, 2005; Wang *et al.*, 2004). In 2000, the Chinese government formally introduced the Sloping Land Conversion Program (SLCP), an ambitious 10-year program that aims at converting 32 million hectares of sloped land into forest land. The SLCP has a budgetary outlay of over US\$30 billion and will affect 60 million households making it one of the largest land-set aside programs in the world (Xu *et al.*, 2006a).

The program has the dual objective of curtailing environmental degradation as well as reducing the extent of rural poverty. To this end, it provides participating households a combination of grain, cash, and seedlings as compensation for reforestation and maintaining cultivated sloped land in the upper reaches of the major river basins (Xu, Bennett, Tao, & Xu, 2004). There are two compensation levels, which are defined at the regional level and which reflect differences in the opportunity costs of reforested land. The total value of compensation to be received in each of these two regions is ¥200 and ¥300/mu/year, respectively (Uchida *et al.*, 2005; Zuo, 2002). The duration of the compensation depends on whether the specific sloped plot of land is converted to "ecological" or to "commercial" forest, or to grassland. In the first case, land is replanted with trees that serve mainly an ecological function (namely soil retention) while farmers have no rights to the forest products that could be derived from such trees. In this case, compensation can be obtained for up to eight years. In the second case, participants are granted the rights to collect nontimber forest products, so that there is potential for the farmer to replace income lost from the reduced cultivation of crops once the trees become productive. Compensation under this case lasts for a shorter period of up to 5 years. A minimum of 80% of the reforested area in any given region must nonetheless consist of ecological forest, reflecting concerns that commercial trees may have sufficiently inferior soil retention characteristics.³

Groom *et al.* (2006) present a household production model which shows how, under certain conditions, the provision of the SLCP subsidies may enable participants to reallocate labor toward more lucrative off-farm activities, and thereby break out of an inefficient equilibrium characterized by on-farm surplus labor and excess forest land conversion. Whether the program is in fact achieving its long-term goals is nevertheless not clear. Though there are a few empirical studies that have gained some understanding over the track record of the SLCP during its implementation, there is very little appreciation over the long-term viability of the program's ecological and developmental aims after the program expires. Given the limited duration of the program, it is important to gain an appreciation of whether the huge budgetary outlay spent will in fact lead to long-lasting and self-sustaining benefits.

Some preliminary evidence from the work by Bennett *et al.* (2004), Uchida *et al.* (2005) and Uchida *et al.* (2007), Uchida, Xu, Xu, and Rozelle (2005), and Xu and Cao (2002) suggests that the SLCP impact on participating household income levels and on shifts to noncrop related income generating activities (such as off-farm labor or livestock activities) is not sufficient to make a substantial and long lasting change to pre-program production decisions. Further, various program implementation issues that have been observed such as the often involuntary nature of the program, the poor quality and frequent irregularity of the compensation payments, the inadequate training and support to local farmers in replanting and maintaining trees, and the inappropriateness of some of the plots targeted for inclusion in the program have undermined the long-term viability of the program (Xu & Cao, 2002).

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