

Chapter 6

TRANSFER MECHANISMS INDUCING A SUSTAINABLE FOREST EXPLOITATION

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Abstract In this paper our concern is with deforestation as a global environmental issue. Foreign transfers from developed countries to forestry countries have been proposed for this goal. The problem is formulated as a Stackelberg differential game played over an infinite horizon, with the donor community as the leader and the aid recipient country as the follower. We consider different transfer mechanisms through which the donor community subsidizes the forestry country. We compare the results both from the environmental and economic points of view.

1. Introduction

The problem of deforestation in developing countries has received a great attention in the international community due to its important global environmental effect both on biodiversity conservation and on climate change.

The main causes of tropical deforestation seem to be the conversion of forested land to agricultural use and, to a lower level, the forestry activities (see, for example, Southgate (1990), Southgate et al. (1991), Amelung and Diehl (1992), Kaimowitz and Angelsen (1999)). Various models of allocation between forest uses and agricultural uses in devel-

oping countries have been developed (see, for example, Barbier et al. (1991), Barbier and Burgess (1997)).

Scientists and politicians point out that the problem of deforestation in developing countries requires coordination at an international level. The international externality dimension of the deforestation in developing countries makes of the forest conservation a global environmental issue. Different mechanisms have been proposed in the literature to coordinate the efforts of the developed and developing countries to tackle deforestation (see, for example, Perrings et al. (1995), Pearce and Moran (1994), Panayotou (1994)). In this paper we are interested in the mechanism called financial transfers, which considers aid donation and transfers as a solution for some global environmental issues such as deforestation in developing countries.

The use of financial transfers flowing from developed to (forestry) developing countries to improve forest conservation has received recently some attention in the economic literature. Optimal control theory and differential games are the methodological tools used to show that financial transfers from developed to developing countries may improve both the forest conservation and the welfare of the domestic and/or of the foreign country.

The literature has proposed initially lump-sum aid donations (see, for example, Barbier and Rauscher (1994)). Authors as Stähler (1996) and Mohr (1996) criticized this type of donations as being a passive instrument to prevent deforestation and proposed to make the amount of transfers conditional to the recipient country's effort to improve forest conservation. Later on Van Soest and Lensink (2000) and Fredj et al. (2004) propose a compensation function which makes the amount of transfers also dependent on the deforestation rate. In Martín-Herrán et al. (2004) the authors compare the effect of a compensation function from the developed countries to the developing ones which depends only on the forest stock with one compensation function dependent both on the forest stock and the deforestation rate.

The present paper is also concerned with the design of different aid programs by developed countries to help developing ones keeping their forest. The comparison is made both from the environmental and economic points of view. By environmental point of view we mean the size of the forest both in the short and long runs, which can be viewed as a measure of the conservation of the forest area. By economic point of view we focus on both the aid recipient's and the donor's welfare. As in most of the papers cited in the previous paragraph (except Barbier and Rauscher (1994) and Stähler (1996)) we use differential games as the methodological framework. The game is played à la Stackelberg, where