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Export tariffs combined with public investments as a forest conservation policy instrument

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ABSTRACT

The forest conservation policy instrument REDD+ (Reducing Emissions from Deforestation and Forest Degradation) is designed to compensate governments of tropical countries for their efforts to conserve forests. Food insecure countries that are specialized in agriculture and have weak political institutions, are likely to face difficulties to enforce forest conservation. This article explores in how far export tariffs on agricultural goods combined with public investments, could be used as a forest conservation policy mix in such contexts. We first show empirically that structural constraints to forest conservation policies are particularly pronounced in one third of countries where REDD+ programs are planned to be rolled out. We then develop a two sector competing land use model with a domestic food producing and an exporting agricultural sector. We show that it is possible to combine export tariffs with public investments such that deforestation decreases, while agricultural production levels and food prices remain constant.

1. Introduction

The international forest conservation program REDD+ (Reducing Emissions from Deforestation and Forest Degradation) aims at compensating governments or jurisdictions of tropical countries for their efforts to conserve tropical forests. In this context, a variety of policy approaches are discussed, ranging from direct cash or non-cash transfers, technical assistance, stricter monitoring and enforcement of conservation policies, sustainable agricultural practice programs (Fishbein and Lee, 2015) to fiscal policies, like introducing land taxes (Kalkuhl and Edenhofer, 2017).

Countries like Brazil (Cisneros et al., 2015; Nepstad et al., 2014), or Costa Rica (Andam et al., 2008) have been able to enforce forest conservation, while experiencing economic growth (FAO, 2015; World Bank, 2013). Deforestation does thus not appear to be a necessary side effect of economic development. However, in many tropical countries the implementation of forest conservation policies is challenged by the

absence of economic alternatives to deforestation-driving agricultural practices (Barbier, 2004) and weak institutions (Deacon, 1994; Barbier et al., 2005). This situation is further complicated by food insecurity (Ericksen et al., 2011). For this particular type of countries, it seems necessary to identify policies that allow to (i) reduce deforestation, while (ii) at least maintaining the pre-policy level of agricultural output, and (iii) keeping prices of food products stable.

In this article we propose to combine export tariffs on agricultural goods with agricultural productivity increasing public investments as a forest conservation policy mix for low and lower income countries[3] that are specialized in the agricultural sector, food insecure, and equipped with weak political institutions. In a stylized facts section we first explain why these factors are likely to challenge currently discussed policy approaches for REDD+ and show that in one third of the countries in which REDD+ programs are planned to be rolled out (UN-REDD, 2015; FCPF, 2015)[4] these structural constraints are particularly pronounced. Second, we develop an analytical model, which allows to

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examine the effects of the proposed policy mix on the three policy objectives named above.

The hypothesis that the proposed combination of export tariffs with public investments could allow to achieve these multiple policy objectives follows from two main insights from economic literature.

First, economic theory suggests that when environmental resources like forests are not adequately protected, opening to trade increases the market for the exploitation of the resource and thus environmental degradation (Copeland and Taylor, 2004). Empirical evidence shows that trade liberalization has indeed increased deforestation rates in the past (Barbier, 2000; Pacheco, 2006; Shandra et al., 2009). Theoretical (Bernhofen, 1997; Rodrik, 1989) and empirical (Solberg et al., 2010; Goodland and Daly, 1996) economic literature finds that export tariffs on unprocessed commodities, can stimulate the structural transformation of an economy. They can also represent a source of public revenue (Bouët and Laborde, 2010). Furthermore, Skinner (1991) and Younger et al. (1999) show that implementing export tariffs is feasible in countries with weak political institutions, which has also been demonstrated by the increase in export tariffs in least developed countries during the 2007 food price crisis (Kim, 2010). Besides, export tariffs are one of the few explicitly tolerated trade policy instruments under WTO rules.[5]

Second, public investments can contribute to increase agricultural productivity (Craig et al., 1997). In the context of this study public investments are conceived as publicly provided services that lead to productivity gains and thus intensification in the agricultural sector. The literature shows that in many countries sustainable agricultural intensification bears an untapped potential for productivity increases and that it requires public investments (Angelsen and Kaimowitz, 2001; Rudel et al., 2009; Garnett et al., 2013). Examples for such public investments include the allocation of land tenure rights (Abdulai et al., 2011; Robinson et al., 2014) and possibly electrification (Dinkelman, 2011; Teruel and Kuroda, 2005; Kirubi et al., 2009; Lipscomb et al., 2013; Assunção et al., 2015). Innovative and more recent approaches include climate-smart agriculture (Campbell et al., 2014; Lipper et al., 2014).

Public investment induced agricultural intensification can have two simultaneous effects on land demand and thus deforestation (Villoria et al., 2014). On the one hand, productivity improvements can entail an increase in natural resource demand - an effect that is commonly referred to as the Jevons-effect (1866). Byerlee et al. (2014) find that this effect particularly dominates in cases of market-driven intensification. On the other hand, agricultural intensification can also imply a more efficient (and thus land-sparing) use of the natural resources, which is commonly referred to as a Borlaug effect (2007). In our model both effects can occur and in line with Hertel (2012) we show that the dominating effect depends on the elasticity of demand for the respective agricultural product.

We use a two sector model, in order to capture both, the effect of export tariffs, as well as the two simultaneous effects of public investments on land demand, output levels, and price levels. The first sector is a domestically operating food producing sector, which satisfies an inelastic demand of the domestic population. The second sector is an international exporting agricultural sector. It produces crops like palm oil, or soybeans for the international market and is faced with an elastic international market demand. The model allows illustrating the interaction of these two types of agricultural producers.

The model shows that using the proposed policy mix, allows to limit deforestation without reducing output levels both in the exporting and domestic sector, and without increases in domestic food prices. In addition, we find that the policy package can be partly self-funding through the tariff revenues. The level of international REDD+ payments that would be necessary for the policy to achieve its goals, thus

depends on the amount of export tariff-revenues and the corresponding availability of resources for public investments in the respective country.

We start by presenting stylized facts. We then introduce the model and show that different assumptions on the elasticity of demand, corresponding to different sectors, lead to different effects of public investments. Next we analyze the effect of export tariffs and public investments simultaneously. In Section 5 we show that export tariffs and investments in agricultural productivity can be combined in a way that reduces deforestation and keeps agricultural prices as well as agricultural production stable. Subsequently, we discuss likely welfare effects of the policy. We conduct a numerical estimation of the costs of the policy for the international REDD+ donor in Section 6. Finally, we discuss our findings and put them into a policy perspective in Section 7. We end with a short conclusion.

2. Stylized facts

In this section we present stylized facts, showing that (i) an economic specialization in the agricultural sector, (ii) food insecurity, and (iii) weak political institutions, are likely to function as structural constraints to forest conservation. We further show that all three structural constraints are particularly pronounced in one third of the countries where REDD+ programs are planned to be rolled out.

2.1. Structural constraints to forest conservation policies

First, in low income countries the agricultural sector's share of GDP is relatively high. Middle and high income countries have a comparably more diversified economy (cf. fig. 5 in Appendix A[6]). Kongsamut et al. (2001) explain this empirical regularity with a model in which the fraction of income that a household spends on agricultural goods declines, once a subsistence income level is reached, which triggers the diversification of the economy. Policies concerning land use change thus have a more immediate relevance in economies that rely on a relatively unproductive and thus land-intensive agricultural sector. In economically more diversified economies the relative dependence on land as an input factor to production decreases. In Brazil for example, GDP growth ranged between 3.1% and 6% (World Bank, 2013) and no decline in agricultural output levels could be observed (Macedo et al., 2012) in spite of the stringent forest conservation enforcement policy phase between 2004 and 2008.

Second, in low and lower middle income countries the agricultural sector represents a large contribution to exports. On average agricultural raw materials constitute 11% of merchandised exports in low and 5% in lower middle income countries, ranging up to 49.1% for Benin, 48.5% for the Solomon Islands and 46% for the Central African Republic (World Bank, 2013). At the same time, the percentage prevalence of undernourishment is higher in low (24%) and lower middle (13%) income countries (FAO, 2013). For an illustration cf. fig. 6 in Appendix A. In contrast, upper middle and high income countries have both a relatively small contribution of agricultural raw materials to their exports and have a very low prevalence of undernourishment.[7] We can observe that there appear to be two parallel food markets in low income economies.

Henson et al. (2000) explain this phenomenon by a specialization in export-oriented agricultural supply chains, reliant on high-value

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[5] See GATT rule article 2, 11.1 and 11.2 (WTO, 1947).

[6] Note that Angola, Cuba, Djibouti, North Korea, Eritrea, Syria, Somalia, South Sudan and small and island states are excluded from this stylized analysis, because the respective data sets are unavailable or incomplete for these countries.

[7] FAO does not provide data for all countries for which the percentage of prevalence of food insecurity is below 5%(FAO, 2013), therefore we set the value for all of these countries equal to 0 as a default value.