



# Land tenure and agricultural expansion in Latin America: The role of Indigenous Peoples' and local communities' forest rights



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## ARTICLE INFO

### Article history:

Received 7 January 2015

Received in revised form 17 August 2015

Accepted 11 September 2015

Available online 24 October 2015

### Keywords:

Agricultural intensification

Jevons paradox

Deforestation

Land tenure

Indigenous and local communities' forest

## ABSTRACT

Agricultural expansion remains the most important proximate cause of tropical deforestation, while interactions between socio-economic, technological and institutional factors represent the fundamental drivers. Projected population increases could further raise the pressure on the remaining forests, unless agricultural intensification allows raising agricultural output without expanding agricultural areas. The purpose of this article is to understand the role of institutional factors in governing the intensification process towards the goal of preserving forests from agricultural pressures, with a focus on Indigenous Peoples' and local communities' rights to forests (as embedded in the various tenure regimes). In this paper we adopt an international dimension and analyse the process of agricultural expansion across eleven Latin American countries over the period 1990–2010 to assess whether, in a context of agricultural intensification, different land tenure regimes impact differently on the realization of land-sparing or Jevons paradox. The results, based on a number of multivariate statistical models that controls for socio-economic factors, strongly suggest that the formal recognition of Indigenous Peoples and local communities' forest rights has played an important role in promoting land sparing or attenuating Jevons paradox.

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## 1. Introduction

Tropical deforestation is an important contributor to climate change, through the release of significant amounts of carbon in the atmosphere (Baccini et al., 2012). At the global level, annual deforestation rates have declined from 0.20% over 1990–2000 to 0.13% over 2000–2010. Central and South America accounted for over 20% of global forest area in 2010. Annual deforestation rates in Central America have passed from 1.56% over 1990–2000 to 1.19% over 2000–2010 while have remained constant at 0.45% in South America. In both cases these rates remain substantially above the global average (FAO, 2011). The main proximate cause of deforestation in tropical regions is agricultural expansion (Geist and Lambin, 2002; Aide et al., 2013; Grau and Aide, 2008). The recent oil prices dynamics, which have stimulated the demand for biofuels and have led to a stronger integration between energy and agricultural commodities markets, also contribute to tropical deforestation. For example, soybean expansion has played an important role in the deforestation of the Brazilian Amazon

(Fearnside, 2001a) and the Neotropical dry forests in North-West Argentina (Gasparri et al., 2013). Sugar cane expansion in the state of Sao Paulo in Brazil, by displacing cattle, has also indirectly stimulated deforestation in the Amazon region (Andrade de Sa et al., 2013). An analysis of agricultural expansion will therefore provide useful insights into the problem of deforestation. Underlying causes of deforestation refer to deeper phenomena related to demographic, institutional, social and economic processes (Geist and Lambin, 2002; Culas, 2012; Carr et al., 2009).

As the world population is expected to reach 9 billion by 2050, the question of how to feed an increasing population without cutting down any more forests has become crucial. Some estimates suggest that food production should increase by 70–100% in order to provide for the larger population (Royal Society, 2009). On the other, hand it has been noted that solely increasing food availability will not be sufficient, as the issue of economic access to food and distribution are of paramount importance (FAO, 2012, 2013) while at the same time the issue of food sovereignty, centred on the right of people to define their own food system, has also come to the forum (Pimbert, 2009). Within this debate on food security, the role of technology in promoting agricultural intensification and achieving the required increases in food

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production without further conversion of forests to agriculture (i.e., land-sparing) has been discussed (Royal Society, 2009; Ausubel et al., 2013; Green et al., 2005). Empirically, however, the evidence that agricultural intensification actually promotes land-sparing is still mixed. There is evidence of a modest decrease in total cropland area in developing countries in correlation with yield increase in staple crops over the period 1979–1999 (Ewers et al., 2009). Similarly, yield increase may have played a significant role in the reforestation of Vietnam (Meyfroidt and Lambin, 2008). On the other hand, it has also been noted how agricultural intensification, by increasing the economic returns on agricultural land, may lead to an expansion of agricultural area thus manifesting what is known as Jevons paradox (Meyfroidt et al., 2014). In frontier agricultural areas in Brazil, agricultural intensification has been associated with agricultural expansion over the period 1960–2006 (Barreto et al., 2013). Similarly, a positive and significant correlation between soybean yield and soybean area in Brazil has been reported (Garrett et al., 2013). This ambiguity on the effects of agricultural intensification may be explained by considering explicitly its interaction with the broader institutional context, including the various aspects of governance. In tropical Latin America the strengthening of “conventional governance” (as measured through the World Bank indicators of corruption control, rule of law and accountability) in combination with agricultural intensification has been associated with agricultural expansion (Ceddia et al., 2013). This result suggests that the strengthening of “conventional governance” reflects the establishment of institutions (e.g., the enforcement of contracts, the securing of individual property rights etc.) that may promote economic growth, including agricultural expansion. On the other hand in the same region, when considering specifically environmental aspects of governance (as approximated by the extension of protected areas, the Environmental Sustainability Index and the Environmental Performance Index developed by Yale Centre for Environmental Law and Policy), high governance scores in combination with agricultural intensification have been associated with land sparing (Ceddia et al., 2014). Such results suggest that in order to reap the benefits of intensification in terms of land sparing, specific efforts must be put into strengthening those institutions that favor environmental protection. Moreover, it has been pointed out how agricultural intensification is more likely to be associated with Jevons paradox when production is mainly directed to export markets, when world prices can be considered exogenous (Hertel et al., 2014).

A significant part of the classic debate over the institutional aspects of agricultural expansion and deforestation in the tropics has been focused on the role of State and Market institutions. More specifically, state intervention either through the definition of well defined property rights (and subsequent governance through the market institution) and/or direct management of land resources (for example through land use planning etc.) has been advocated as preferable to direct ownership and/or management by local communities. For example, a number of studies indicate that the absence of well-defined individual property rights and tenure insecurity are associated with agricultural frontier expansion and deforestation in Brazil (Araujo et al., 2009; Fearnside, 2001b). Yet it is increasingly evident how the State/Market mechanism has been unable to secure the integrity of environmental resources, especially global common property resources (GCPs) as the problems of climate change, persisting biodiversity loss and deforestation clearly show (Weston and Bollier, 2013). A powerful alternative to the State/Market “duopoly” in the management of GCPs is represented by the active involvement of indigenous and rural communities in the management of commons.

Recent estimates indicate that around 8.5 billion hectares of land around the world may be presumed to be the property of rural communities under customary use and administration that are

often not officially recognized by formal law (Wily, 2011). Regarding forests, at least 513 million hectares have officially been recognized as owned or controlled by indigenous people and local communities, with the according rights recognized in policy or law (Rights and Resources Initiative, 2014). A growing body of research shows that community managed forests may be particularly effective at reducing deforestation (Barsimantov and Kendall, 2012). For example, indigenous land experienced lower deforestation rates in the Brazilian Amazon (Nolte et al., 2013), and lower fire incidence across Latin America (Nelson and Chomitz, 2011). In other cases the weak protection of community and indigenous people's rights is associated to higher deforestation rates (Naughton-Treves and Wendland, 2014; Stevens et al., 2014). The evidence, however, is still mainly based on the analysis of case studies and land cover changes at regional or national level. Macro-scale analyses spanning several countries across an entire continent are less common. The purpose of this article is to contribute to filling this gap and assess whether recognizing forests' rights of indigenous and local communities may be more effective in halting agricultural expansion in Latin America in the face of agricultural intensification, compared to more standard land tenure arrangements involving either the direct ownership by the Government or by private companies/individuals. In order to accomplish the stated objective, the interaction between agricultural intensification and institutional aspects capturing both the diversity of the land tenure regimes and aspects of environmental governance is explicitly incorporated into a multivariate statistical model.

## 2. Materials and methods

Data from the FAO, the World Bank (WB), the World Database on Protected Areas (WDPA), the Yale Center for Environmental Law and Policy (YCELP) and the Rights and Resources Initiative (RRI) for eleven tropical Latin American countries (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Guyana, Honduras, Mexico, Peru, Suriname and Venezuela) have been combined to construct a panel data to examine the major determinants of agricultural land expansion over the period 1990–2010. The exclusion of some countries (notably Ecuador, French Guiana, Paraguay) is due to the incompleteness of the relative datasets. The statistical model accounts for a number of socio-economic variable which are relevant in explaining agricultural expansion. Factors impacting on agricultural demand, like increases in per-capita GDP (e.g., Redo et al., 2012), demographic expansion (e.g., Carr et al., 2009) and agricultural exports (Richards et al., 2012), all have been shown to play an important role in the spatial expansion of agriculture. All the eleven countries included in the analysis have an export-oriented agricultural sector, particularly Argentina, Brazil and Mexico. Institutional variables, reflecting for example the quality of governance, level of corruption (Wright et al., 2007) and extent of protected areas (Joppa and Plaff, 2010) are also important elements to consider. One aspect often unaccounted for, pertains to the level of external indebtedness. Yet, external debt is also likely to promote deforestation as more indebted countries tend to overextract their natural resources to obtain the necessary foreign currency to service their debts (Shandra et al., 2008).

Moreover, the effect of land tenure regimes (including land designated for or owned by Indigenous Peoples and local communities) is also explicitly analysed.

### 2.1. Panel data analysis

Panel data techniques (Baltagi, 2005; Wooldridge, 2002) have been used to address the issue of deforestation and land use cover change (Culas, 2012, 2007) in order to overcome the shortcomings

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