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Conditions influencing the adoption of effective anti-deforestation policies in South America's commodity frontiers

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ABSTRACT

Reducing large-scale deforestation in commodity frontiers remains a key challenge for climate change mitigation and the conservation of biodiversity. Public and private anti-deforestation policies have been shown to effectively reduce forest loss, but the conditions under which such policies get adopted are rarely examined. Here we propose a set of conditions that we expect to be associated with the adoption of effective anti-deforestation policies in commodity frontiers. We then examine whether these conditions have influenced policy adoption in South America's major soy-and-cattle frontiers: the Brazilian Amazon, the Cerrado, the Chaco, the Chiquitano, and Paraguay's Atlantic Forest. By collating empirical data from diverse sources, including literature review, extensive expert interviews, and analysis of primary and secondary data, we show that the Cerrado, the Chaco, and the Chiquitano differ from the Brazilian Amazon in multiple ways that might have inhibited adoptions of effective anti-deforestation instruments. These conditions include: a higher importance of the agricultural sector within the respective countries, lower carbon stocks and species richness, higher prevalence of private land tenure, and higher baseline compliance with forest reserve regulations on private lands. We also observe that the adoption of the most effective private anti-deforestation instrument, commodity moratoria, may respond to similar conditions as those influencing the adoption of public instruments. Incentivizing public and private actors to adopt effective anti-deforestation policies in the Cerrado, Chaco, and the Chiquitano will likely be more challenging than it has been in the Brazilian Amazon.

1. Introduction

Reducing emissions from tropical deforestation is a key challenge for climate change mitigation. Tropical forest loss accounts for about 10% of global greenhouse gas emissions (Baccini et al., 2012; Harris et al., 2012a, 2012b), and is largely a result of the expansion of agricultural land use. Scientists increasingly agree that greenhouse gas emissions need to decline substantially and rapidly to avoid catastrophic climate change (Brown and Zarin, 2013; den Elzen et al., 2010; Hepburn and Stern, 2008). Because tropical forests also hold rich biodiversity and provide multiple ecosystem services, forest conservation in tropical countries is incentivized with billions of dollars from multilateral, bilateral, and private donors (Agrawal et al., 2013; Silva-Chávez et al., 2015). However, the extent to which tropical countries can and want to reduce deforestation at large scales and within relatively short time frames remains the subject of much political and academic debate.

Public and private forest conservation policies are a key determinant of downward shifts in deforestation rates. Recent downturns in forest loss in Vietnam, China, and the Brazilian Amazon have been attributed at least partially to such policies (Liu et al., 2008; Meyfroidt et al., 2009; Nepstad et al., 2014). Evidence on the effectiveness of these policies has accumulated rapidly,

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owing to recent advances in impact evaluation and the increased availability of satellite data (Ferraro et al., 2012; Ferraro and Hanauer, 2014; Nolte and Agrawal, 2013). Although scholars highlight that country-level forest loss is also affected by other factors, such as exchange rates and global commodity prices (Assunção et al., 2015; Gasparri et al., 2013; Richards et al., 2012), the pivotal role of conservation policies in achieving large-scale deforestation reductions is now well established (Hargrave and Kis-Katos, 2013; Miteva et al., 2012; Soares-Filho et al., 2010).

While scholars are quantifying the effects of forest conservation policies with increasing precision, less attention is paid to the conditions under which such policies emerge. This is surprising given: 1) the effort aimed at incentivizing tropical countries to reduce forest loss and 2) the variation in how tropical countries and regions within countries have addressed forest loss over the past two decades. For instance, while Brazil reduced rates of forest loss in the Amazon by 70% over the past ten years, record rates of forest loss were observed in the neighboring Cerrado, Chaco, and Chiquitano forests (le Polain de Waroux et al., 2016). Similarly, when Vietnam and China stepped up forest protection, deforestation continued in neighboring countries such as Indonesia, Laos, and Cambodia – in part driven by increased timber exports to Vietnam and China (Meyfroidt et al., 2010). Such differences in the adoption of effective anti-deforestation policies affect the fate of millions of hectares of forests, but scholars rarely attempt to explain why these differences exist and persist.

Why do some countries adopt effective anti-deforestation policies while others do not? Case studies on the adoption of individual forest policies tend to highlight the importance of single drivers, such as the desire of governments to control resources and recalcitrant populations (Peluso, 1993); natural catastrophes attributed to deforestation (Mather, 2007); international incentives and public opinion (Boucher et al., 2013); or an improved capacity to observe deforestation (Arima et al., 2014). Comparative work exists on the adoption of protected areas (Bates and Rudel, 2000; McDonald and Boucher, 2011; Van, 2003; Vincent et al., 2014) and large-scale forest payment programs (da Conceição et al., 2015). However, studies of policy adoption rarely examine whether the adopted policies were effective at reducing deforestation. This is unfortunate, because impacts of forest conservation policies are known to vary. The size of protected area networks in particular has long been criticized as an insufficient indicator for the strength of conservation policies (Barr et al., 2011; Chape et al., 2005; Pressey et al., 2015), as protected areas are often located far from anthropogenic pressure (Andam et al., 2008; Joppa and Pfaff, 2010). Similarly, impacts of forest payment programs can range from negligible to significant (Agustsson et al., 2014; Miteva et al., 2012; Pattanayak et al., 2010). Furthermore, differences in the adoption of single policy instruments might not reflect the overall strength of anti-deforestation policy in a given area. Major reductions in deforestation, such as those in the Brazilian Amazon, China, and Vietnam for instance, were the result of a confluence of multiple policies, including protected areas, logging bans, deforestation restrictions on private lands, and commodity moratoria (Nepstad et al., 2014).

To identify conditions that influence the adoption of effective anti-deforestation policies, we propose that analysts need to: 1) examine policy adoption conjointly with policy impact; 2) encompass the full range of policies that have been shown to reduce deforestation within a given context; and 3) compare differences in the adoption of such policies across multiple jurisdictions. Here we adopt this approach in a comparative analysis of the adoption of anti-deforestation policies across South America's major soy-and-cattle frontiers: the Brazilian Amazon, the Cerrado, the Chaco, the Chiquitano, and Paraguay's Atlantic Forest. In what follows, we derive a set of conditions expected to be associated with the adoption of effective anti-deforestation policies in active deforestation frontiers. We then examine empirically whether these conditions are, in fact, associated with the adoption of such policies. For the purpose of this analysis, we use the term "policy" to refer to any intervention that aims to influence forest conversion decisions of land users, whether through legislative, executive, judicial, or market channels. We use the term "effective anti-deforestation policy" to refer to any intervention that results in observable deforestation reductions as compared to a counterfactual scenario (Ferraro, 2009).

2. Theoretical background

We derive conditions for the adoption of effective anti-deforestation policies by considering the decision environments of two actor groups: governments and commodity traders. Both of these groups have recently adopted policies that resulted in deforestation reductions in active commodity frontiers (Gibbs et al., 2015a, 2015b; Nepstad et al., 2014) and have made international commitments to further reduce deforestation over the coming decades (Meyer and Miller, 2015; UN Climate Summit, 2014).

Although the study of policy choice has been a productive field of inquiry in the political and economic sciences (Jones, 1994; Persson and Tabellini, 2000), interest in the drivers of conservation policy has long been limited (Agrawal and Ostrom, 2006; Yandle, 1999). Theoretical frameworks for explaining cross-country differences in conservation policy adoption are therefore scarce. Our study draws theoretical inspiration from two important and complementary lenses of policy choice: public choice (PC) and multiple streams (MS) (Zahariadis, 1998). PC theorists view policy choice as the outcome of individual preferences of political actors and their constituencies and the rules of the game of political processes (Keohane et al., 1998, 1997; Zahariadis, 1998). Reviews of the PC literature suggest that the adoption of environmental policies can be understood as the result of an amalgam of group interests and social welfare maximization (Hahn, 2000; Oates and Portney, 2003; Potters and Sloof, 1996). MS analysts propose that disruptive policy changes can be best explained by a temporal confluence of multiple, interacting "streams" – of problems, policies, and politics (Kingdon, 2003). Their case studies highlight the importance of often idiosyncratic contextual factors in creating "policy windows" for change (Brunner, 2008; da Conceição et al., 2015). We combine these two lenses by including both indicators of aggregate interests (environmental, agricultural, budgetary) and idiosyncratic political factors (illegality, trigger events) in an explanation of the adoption of public and private anti-deforestation policies in commodity frontiers.

2.1. Governments

Reducing deforestation in active commodity frontiers involves stark trade-offs between opposing interests (Angelsen, 2010). Conversion of forests to cropland or pasture benefits agricultural producers and associated economic sectors, but commonly results in a loss of forest products and ecosystem services valued by other groups of society (e.g., watershed protection, biodiversity conservation, and carbon storage). Policies that effectively inhibit deforestation can thus be conceptualized as "redistributive" (Lowi, 1972) in that they reallocate societal wealth from one group to another. From this viewpoint, the set of public policies governing forest conversion in a given jurisdiction can be interpreted as a reflection of the existing balance between agricultural and environmental interests within that jurisdiction. By extension, the adoption of new anti-deforestation policies indicates a shift in this balance. Such shifts can be caused by either a strengthening of