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Indigenous land rights and deforestation: Evidence from the Brazilian Amazon [☆]

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ABSTRACT

Concerns over the expropriation of and encroachment on indigenous communities' lands have led to greater formalization of these communities' rights in a number of developing countries. We study whether formalization of indigenous communities' land rights affects the rate of deforestation in both the short and medium terms. Beginning in 1995, the Government of Brazil formalized the rights of several hundred indigenous communities whose lands cover more than 40 million hectares in the Amazon region and provided support for these rights' enforcement. We study the program's impacts using a long time-series of satellite-based forest cover data. Using both plausibly exogenous variation in the timing of formalization and matched samples of treated and comparison communities, we find no effect of these protections on satellite-based greenness measures. This is true even for communities that received support for surveillance and enforcement of these rights. Notably, we observe low counterfactual rates of deforestation on communities' lands between 1982 and 2010, suggesting that indigenous land rights programs should not uniformly be justified on the basis of their forest protection, at least in the medium term.

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Introduction

Concerns over the expropriation of and encroachment on indigenous communities' lands have led to greater formalization of these communities' rights in many developing countries. When enforced, the improvement in these rights can help indigenous communities prevent incursions into their territories. Of particular importance are rights for indigenous communities¹ inhabiting tropical forests, where ambiguity over and weak enforcement of land rights often lead to unsustainable resource extraction and conversion of forest to agricultural use. In Brazil, these concerns led the Government to enshrine its commitment to formalizing indigenous peoples' territorial rights in its 1988 Constitution. Since then,

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¹ For the remainder of this paper, we refer to indigenous communities each time we use the term 'communities.'

indigenous lands have been formalized on more than one-fifth of the Brazilian Amazon, often in locations near the expanding deforestation frontier.

The policy-relevant question is whether improving these communities' rights can protect their lands from increasing deforestation. However, prior studies of the relationship between indigenous communities' land rights and deforestation have not examined *changes* in land rights, limiting the conclusions policymakers can draw when considering whether strengthening land rights for these communities will result in lower forest loss.

Why might improvements in land rights for indigenous communities affect the pace and extent of deforestation? [Bohn and Deacon \(2000\)](#) provide a theoretical framework through which weak land rights affect the rate of forest harvesting (as well as use of other natural resources). In their model, less secure rights over lands with standing forests lead unambiguously to faster forest harvesting, as future risks diminish the discounted future value of the forests. Thus, communities may slow their own harvesting in response to extended prospects of retaining their land. Perhaps even more directly, if encroachment on these communities' lands is motivated by resource extraction, more secure rights reduce the likelihood of expropriation and thus deforestation by encroachers. [Araujo et al. \(2009\)](#) suggest that tenure insecurity may itself motivate encroachment and deforestation by squatters as a strategy to eventually gain formal title to land. Both mechanisms depend on the expropriation risk level: for sufficiently low risks, land rights themselves do not affect forest harvesting rates.²

Consistent with both of these mechanisms, evidence from the broader literature largely finds land rights improvements to be associated with slower deforestation and better agricultural results. [Robinson et al. \(2014\)](#) conduct a meta-analysis of 118 sites covered by 36 papers in this literature (largely in non-indigenous contexts) that plausibly control for potential confounds, and find generally positive effects. Most salient for our case, [Araujo et al. \(2009\)](#) find substantial deforestation reductions in Brazil associated with improved tenure security (again, among non-indigenous communities). Similarly, [Nelson et al. \(2001\)](#) find slower deforestation in lands with greater protections in a remote province of Panama. More broadly, [Lawry et al. \(2017\)](#) provide a meta-analysis of land rights improvements on agricultural (rather than forested) lands and show gains in productivity, consistent with a more general theory of investment responses on better-secured lands. In the Brazilian Amazon itself, [Alston et al. \(1996\)](#) document similar agricultural responses to private titling.

These promising results from improvements in the security of rights over non-indigenous lands coalesce with findings from the literature studying indigenous communities. As noted above, this literature has to date assessed indigenous control as a *static* set of rights ([Nepstad et al., 2006](#); [Nelson and Chomitz, 2011](#); [Nolte et al., 2013](#); [Pfaff et al., 2014](#); [Vergara-Aseno and Potvin, 2014](#)). Using both global and within-country comparisons and controlling for features that differentiate other kinds of lands from indigenous ones, these studies find that indigenous lands generally exhibit slower deforestation rates than those with other governance forms, be they privately owned, publicly owned but eligible for sustainable use, or publicly owned protected areas. A notable exception is [Buntaine et al. \(2015\)](#), which finds no impacts on deforestation of formalization of land rights in one region of Ecuador but whose external validity is limited.³

Formalizing the land rights of indigenous communities may therefore serve as a viable policy to conserve tropical forests. However, to date, no study has reliably assessed this claim on a large scale. Moreover, if baseline risks of deforestation among these communities are not high, improvements in land rights may lead to only small or even no reductions in deforestation.

These literatures highlight the dual empirical challenges in assessing impacts of changes in indigenous land rights: one needs (1) carefully documented time variation in the extent of rights, and (2) sufficient spatial variation for statistical analysis robust to spatial clustering and potential spillovers ([Robalino et al., 2015a, 2015b](#) document important interactions and spillovers in forest conservation). Micro-studies of one region document the timing of rights improvements but lack statistical power once spatial effects are adequately addressed. Global studies provide sufficient spatial variation but do not document changes in rights across an array of national legal systems.

We overcome these limitations by studying the Brazil Indigenous Lands Project (PPTAL), which formalized the land rights of 106 indigenous communities covering more than 38 million hectares of largely forested area between 1995 and 2008. Brazil's 1988 Constitution guaranteed "original rights to the lands [indigenous peoples] traditionally occupy" and assigned responsibility to the state to demarcate these lands and ensure respect for these communities' property rights.⁴ All indigenous communities thus had *de jure* rights to their lands, but the land formalization process (including demarcation and registration) formally secured these land rights. This paper measures the averted losses in forest cover due to the legal formalization of these *de jure* rights.

² Other mechanisms through which land rights interventions often affect welfare (laid out by [Besley, 1995](#)) are less plausible in this context: communal ownership of land did not allow pledging this land as collateral for credit, and the non-transferability of these rights did not affect investments related to expectations of future sale or leasing.

³ [Buntaine et al. \(2015\)](#) also do not account for spatial autocorrelation in error terms or observables, possibly because such autocorrelation potentially saps the statistical power available in small-scale studies.

⁴ According to Brazil's 1988 Constitution, Chapter 8, Article 231: "Indians shall have their social organization, customs, languages, creeds, and traditions recognized, as well as their original rights to the lands they traditionally occupy, it being incumbent upon the Union to demarcate them, protect and ensure respect for all of their property." Thus, the state is responsible to physically demarcate the limits of the indigenous land. Chapter 2, Article 20 (XX) of the Constitution declares Indigenous lands as the Union's property. This has meant in practice that above-ground property belongs to the indigenous community, while water resources and minerals belong to the state and can be extracted or dammed after consultation with the indigenous community. Retrieved from: <http://pdba.georgetown.edu/Constitutions/Brazil/english96.html#mozToclid506170>.

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