Substitutability and complementarity of forest conservation policies

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Abstract:

Forest conservation policies are the most widely used strategies to preserve biodiversity and promote carbon sequestration around the world. Instrument policies as Protected Areas and Payment for Environmental Services (PES) have been implemented all around the world. The evaluation of the impact of these instruments in achieving forest conservation has been studied in many countries separately (Vogt el al. 2006, Gimenez 2012, Gaveau 2011, Oliveira et al. 2007, Vuohelainen et al. 2012, Nolte et al. 2013, Mas 2005, Hanura 2010, Andam et al. 2008, Pfaff et al. 2009, Sanchez-Azofeifa et al. 2007, Alix-Garcia et al. 2012, Arriagada et al. 2012, Robalino and Pfaff 2013).

However, protected areas and PES are also implemented together and empirical analysis to assess the impact of the mix of these instruments is scarce. This document tries to contribute to fill the gap of evaluating policy-mix impacts on forest conservation. In other disciplines methods to evaluate the combination of two treatments use random assignment of the combination and each treatment separately. However, forest conservation policies are not implemented randomly and, therefore, their combination is not randomly located either. That makes this a complex empirical exercise. Important variables that affect deforestation are systematically different between groups. These differences make comparisons between policies and policy mixes biased estimates of the impacts they generate.

One alternative to address this problem is to fix, for instance, the characteristics of land within a policy mix (e.g. payments and protected areas), and search for observations similar to those with only payments, with only protected areas and without any policy. To do that, we apply matching method. Specifically, we use Propensity Score Matching approach (Rosenbaum & Rubin, 1983). That allowed us identifying similar untreated observations and compare with treated observations to remove the bias generated by the effects of other explanatory variables.

We find that for the period 1997-2005, parks and 'protection PES' are perfect policy substitutes with respect to conserving forest cover. The additional effect of using both instead of one is zero in both cases. When we analyze payments and buffer zones we find that the cross-effects differ. The estimated effect of payments when those are implemented outside any protection is around 2.5%. However, the effect of implementing payments inside a buffer zone around national parks decreases to 1.4%. This implies that proximity to national parks reduces the effects of payments by 1.1%. Additionally, buffer areas without payments reduce deforestation by around 1.2%. However, we find that, buffer zones do not generate any additional effect on avoided detestation once the land has been protected by

payments. This implies that payments reduce the marginal effect of buffers to zero. Therefore, we also find high substitutability between payments and buffer zones.