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245

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EXECUTIVE SUMMARY

COMMODITY BOOM AND ENVIRONMENTAL POLICY: WHAT LIES BEHIND THE AMAZON DEFORESTATION

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In the first decade of this century there was a large expansion on the demand of a number of commodities. With the increases in prices, commodity exporters were largely benefited, resulting in a run for iron ore, oil, cattle, and agricultural land. In spite of the favourable consequences for economies based in the production of primary products, such as the Brazilian economy, some environmental concerns were raised, mostly due to the pressure on tropical rainforests, such as the Amazon.

This relation between commodity expansion and deforestation is in the forefront of the empirical literature on the deforestation of the Brazilian Amazon. Specifically, soybean crops and cattle herding have been highlighted in a number of studies as the main driving forces behind the Amazon deforestation.

Recent data on the Amazon deforestation suggest the possibility of a change in how the deforestation process relates to commodity market fluctuations. Specifically, after 2004 there was a strong and persistent reduction in the deforestation rates of the Brazilian Amazon, in spite of a hefty increase in the prices of all major commodities. Precisely when one would expect an increase in deforestation, what happened was exactly the opposite. Not surprisingly, in that same year of 2004 the Brazilian government launched a federal plan for the conservation of the Brazilian Amazon, the PPCDAM (Plano de Prevenção e Controle do Desmatamento da Amazônia Legal).

The PPCDAM was based on subsidies to sustainable agriculture, on land use planning, on the creation of conservation areas, and most importantly, on the enforcement of environmental laws with the use of new technologies of instant detection of new deforested areas. A new system called DETER allowed an almost instant detection of areas in which the forest was cleared.

In this paper I investigate the determinants of the deforestation of the Brazilian Amazon, with a particular emphasis on the role played by PPCDAM. I use a panel of 760 Amazon municipalities through a period of 15 years. The results suggest that municipal populational growth, cattle herding, total permanent and temporary crop areas, and soybean crops significantly affect deforestation. Besides that, the new environmental policy significantly reduced the deforestation of the Brazilian Amazon. The policy also made the deforestation less sensitive to fluctuations in crop areas and on the sizes of cattle herds in the Amazon.

The deforestation data were obtained with INPE (Instituto Nacional de Pesquisa Espacial). The data on deforestation areas by municipalities are available for the year 2000 and after. Since the deforestation is equal to the first difference of deforested areas (regeneration of the forest and reforestation are impossible in a tropical rainforest in the shor-run), the data set starts effectively in 2001. The rest of the data are obtained with IBGE (Instituto Brasileiro de Geografia e Estatística). These data are annual and municipal, which generates a large panel structure. Only the populational data, obtained on the 2000 and 2010 censuses, are not available with annual periodicity. In these cases, the variables that are based on populational data are considered as cross-sectional variables in a panel data model.

The estimation of a deforestation equation allows us to perform an interesting exercise of policy evaluation. In this exercise I answer the question of how effective was the PPCDAM in reducing the Brazilian Amazon deforestation. The model predicts that a much higher level of deforestation would have happened between 2005 and 2015, had the plan not been implemented. Our estimate is that the policy avoided a cummulative deforestation of 196 thousand square kilometers of forest in the 11 years from 2005 to 2015. This value is almost twice the value that was effectively deforested in this period, and approximately 4.9% of what is left of the Brazilian Amazon forest.

Since we have a panel structure, this counterfactual exercise can be refined in two directions. The first one aggregates the data on the cross-section dimension. We have two time series that together capture the effect of the policy. One of them is the observed aggregate deforestation. The other one is the counterfactual, or the predicted deforestation without the policy. The second direction aggregates the data on the time series dimension. So, for every municipality we calculate the difference between the deforestation effectively observed, and the deforestation that would have happened without the policy, predicted by the regression equation. Then, we sum the values for all the periods in which the policy was present, from 2005 to 2015. The result is the accumulated ammount of forest saved by the PPCDAM in each municipality of the Brazilian Amazon. By that means, we construct a map of areas saved by the enviromental policy during the period.

The Brazilian Amazon encompasses an area of approximately 4 milion square kilometers. It has roughly 13% of all world´s biota. Around the mid 2000´s it was being deforested at an annual rate of 0.65%. The number was reduced for something around 0.15%, a remarkable result that seemed to be possible only if coupled with a deep reduction in the Amazon economic activity. Surprisingly, this reduction in deforestation was achieved amidst a major worldwide expansion in commodity markets, including major commodities produced in the Amazon region.

The results of this paper suggest that a well-designed conservation policy can be very effective in curbing the deforestation process in tropical rainforests. In fact, the recent experience in the Brazilian Amazon should be analyzed and improved. The main structure of PPCDAM could be replicated in other tropical rainforests of the planet that are going through deforestation processes.

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