

GOING BEYOND ENFORCEMENT: THE PATH TO A SUSTAINABLE TIMBER INDUSTRY IN BRAZILIAN AMAZON, AN ECOLOGICAL-ECONOMIC MODEL

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Abstract:

We have observed from 2005 until 2010 a reduction in the deforestation rates in Amazonia. From the period after 2004 the deforestation rates reduced from 18,460 km² to 6,451 km² in 2010. Some recent results (Hargrave & Kis-Katos 2010) point that the reduction of deforestation rates is related with the presence of government agencies and institutional changes that reduced credit availability for landowners that not comply with the environmental Brazilian law. Although the space for illegal extraction is being reduced in Brazilian Amazonia, IMAZON (Pereira et al. 2010) estimates around 33% of the production was illegally extracted in 2009, these figures imply that there are around 4.3 millions of m³ of timber illegally extracted in the region (from the 13 millions of m³ extracted in 2009, in the IBGE data). Most of the illegally extracted logs are in Pará state, that is the biggest producer of natural forest timber in Brazil. Estimates (Pereira et al. 2010) from Pará state sets that 60.9% of total log production is illegal. This represented around 3.6 million of m³ of logs in 2009. The illegality is one of the main obstacles to a change in the dynamic of investment in the Amazonian timber industry. The forest industry is one important part of the Brazilian Amazonian economy. It shared in 2008, 3.6% of the the total value of the industrial transformation of the Brazilian Amazonian states (R\$ 56 billion). Outside Amazon region, the forest industry shares only 0.92% of the total industrial transformation value, leaving this industry as the third most important industrial sector in the region. The environmental impact of the timber industry is also large. Between 10,000 (Nepstad et al. 1999) to 19,923 km² (Asner et al. 2005) of forests are affected by logging every year. The new logged areas, between 1999 and 2004 had 32% of probability to be deforested within 4 years (Asner et al. 2006). Due to the importance of the timber sector for both the economic and ecological dimensions of the Brazilian Amazon, it's necessary to understand wich policies could move the timber industry to a more sustainable trajectory. Some results show that even when sufficient information about sustainable forest management is available, the poor regulatory environment and lack of enforcement allied with the market indifference on sustainable forestry, allows the illegal exploitation (Blundell & Gullison 2003).

In this work we analyse some scenarios to move the forest industry to comply with legislation and use reduced impact logging (RIL). We do not analyse only forest concessions, because most of the timber stock in Brazilian Amazon is Actually in Private properties and not in State owned lands. So, the timber extraction in private properties is harder to control and most of the illegally extracted logs are from private lands. We used a model that couples a forest growth model (Boscolo, Buongiorno, and Panayoutou, 1997) and an Economic Decision Model based on Net present value (NPV). Our model examines the profitability of the forest extraction with different extraction times and technologies combined with a set of alternative financial conditions intended to promote the adoption of reduced impact logging. Using different interest rates taxation schemes we try to understand the long term impact on the timber industry of credit and taxation policies that impose the compliance with RIL and sustainable logging practices. Our model is based in an extensive work of modeling that has been made since the end of the 90's ((Boscolo & J. Vincent 1998; Boscolo & J. R. Vincent 2000; Boscolo et al. 1997; BOSCOLO & VINCENT 2007; Boscolo & J. R. Vincent

2003a; Macpherson, Schulze, et al. 2010; Macpherson, Carter, et al. 2010). All these papers use this combination of a matrix growth model with a profit function based on net present value, to understand which kind of regulation strategy would be better to promote RIL. We combined these models with a more detailed profit function derived from (Steven W Stone 1998; S W Stone 1998; Verissimo et al. 1998).

We have runned two series of simulations, combining changes in two economic variables related to the logging technology: the tax level and the interest rates to the capital borrowed by the industry. We supposed that an economic policy to promote RIL would give lower taxes and lower interest rates to the firms that used RIL. Our simulations showed that, in all experiments that lower interest rates have much more impact than any taxation schemes. Differences in interest rates are much more important in the decision of the forest industry to adopt RIL technologies than any other policy.