When Titling isn't enough: An essay on private production of property rights in the Amazon frontier.

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Institutions are expected to deliver and enforce property rights, controlling uncertainty, facilitating transactions and triggering development. This paper focuses on the relation between public and private production of property rights with focus on private costs of producing property rights in developing countries. The reduction in transaction costs is dependent on the competence of existing institutions to supply and enforce property rights. In this study, the institutional structure of property rights is approached as a continuum variable. Departing from Barzel (2002) agents are expected to engage in formal contracts when legal rights are defined and enforced, and they adopt reputation mechanisms when property rights are not protected. In addition we define the critical level of protection that represents a limit from which exchanges will take place.

This paper explores the circumstances where agents engage in costly production of rights in addition to state and reputation mechanisms; it elaborates on the conditions when private investments to produce property

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rights are observed. Through a case analysis of property of natural resources allocated to the socio-environmental certified forest production in the Brazilian Amazon basin, the study provides evidences of private costs of production of rights. The results show that if sub-optimal delivery and protection of property rights by the state are observed, private agents might find incentives to make specific investments in order to produce private rights. This finding amplifies the new institutional economics view which states that in conditions of weak enforcement of property rights private agents are not expected to make specific investments.

1. Introduction:

The economic theory of property rights has shown significant progress in recent years. The definition and protection of property rights provides the foundations to the analysis of the institutional structure of production. Both public and private mechanisms provide the framework that defines, protects and enforces property rights. The theory states that the institutional structure of property rights has effects on the costs to carry transactions and makes possible the analysis of regularities observed in institutional arrangements of production. In cases where property rights are not properly defined, the theory predicts that value will be dissipated and value- adding alternative arrangements might be adopted. If the state provides enough public goods in terms of property rights delivery and enforcement services, then transactions will be made and contracts will be used to reassign ownership (Barzel, 1997.p.14)². The existence of margins that remain in public domain motivates the capture of value. In cases where the institutional structure of property rights does not emerge based on state enforcement transactions can still be observed, but at a higher cost. In such

² Barzel, Y.1997.Economic Analysis of Property Rights. Cambridge University Press.161pp.

case sub-optimal economic performance is expected, aligned to suboptimal institutional arrangements.

A case of dissipation of social value due to the lack of definition and enforcement of property rights is observed in the Brazilian Amazon frontier. Previous studies have shown that the government has consistently failed in offering property rights in the form of land titles (Alson, Libecap, and Muller. 1999)³. The enforcement of existing titles is imperfect resulting in an institutional trap, frequently leading to violent conflicts (Alston, Libecap and Muller. 1997)⁴. New and more efficient institutions did not emerge, since political groups reveal the preferences for the existence of margins in public domain. Naïve interpretation of the institutional solution suggests that simple remedy to the problem is the assignment of property rights in the form of land titles as the way to trigger development. This view, as proposed by De Soto $(2000)^5$ is incomplete and ignores the fact that existing titles can represent low or no real legal property rights, in the absence of enforcement mechanisms. We suggest that the quality of the title is a relevant variable to explain the institutional structure of production.

The structure of property rights in areas of agriculture and economic frontiers is a relevant case to be studied. The Amazon forest is particularly a sensitive issue, given its importance of natural areas of forest in face of existing global environmental problems, and also due to the fact that so far no solution has been detected to control the deforestation process that has reached 18% of the total original area⁶. High valued natural resources offer

³ Alston,L.,Libecap,G.D.,Muller,G.1999. A Model for Violent Conflict: Violence and Land Reform Policy in Brazil. Environment and Development Economics 4:135-60.

⁴ Alston, L. J., Libecap, G.D and Muller, B.1997. Violence and Development of Property Rights to Land in the Brazilian Amazon. In Drobak, J.N. and Lye J.V. C. editors. The Frontier of New Institutional Economics. Academic Press.

⁵ De Soto, H.2000.The Mystery of Capital. Basic Books. NY.275pp.

⁶ See the Final Frontier in The Economist. April 20, 2007.

incentives for appropriation of margins that are in public domain. At the same time international agencies, such as the World Bank, put pressure for an upgrade in the institutional structure of property as a way to preserve the existing natural resources, particularly in the Amazon forest. The intense rate of deforestation in the Amazon forest is the result of the capture of such margins. The observation of the real world situation shows that the weak definition and enforcement of property leads to the exhaustion of natural resources and to high transaction costs. It also suggests that a lot of effort was placed on land titling, when perverse incentives result from margins in public domain that are related to illegal logging that ignores the land value but considers, instead, the value of the forest placed on the land.

Most of the successful cases presented in the literature of natural resources preservation are related to efficient allocation of property rights based on formal and informal mechanisms. Cases of successful exploration of common pool natural resources are observed and explained based on social norms (Ostrom, 1990)⁷. Perverse cases are not common subject of analysis, but under the lenses of historians. The literature did not explore the situations related to failures in the definition of property rights. The problem of exclusion and the use of force to enforce property rights lead to the theory of the state as stated by Barzel (2001)⁸. However there are many cases of failures of the state to exercise the monopoly of use of power and to deliver an institutional structure in scale - efficient property rights.

This paper elaborates on the failures in the definition of rules to protect property rights. Particularly the paper addresses a case where social norms did not emerge and the state did not deliver nor protect the existing formal structure of property rights. In the absence of legal or social norms,

⁷ Ostrom, E.1990. Governing the Commons: The Evolution of Institutions for Collective Action. Cambridge University Press. 280pp.

⁸ Barzel, Y.2001. A Theory of the State: Economic Rights, Legal Rights, and the Scope of the State. Cambridge University Press.

contracts are difficult to enforce, and transactions are precluded. Surprisingly some transactions are still carried out and production efforts are shared, but at a high cost to the players.

The present study presents and explores two concepts related to the definition and enforcement of property rights. First, it explores the concept of a continuum index of property rights enforcement and relates to the critical limit of protection sufficient to provide incentives to carry transactions. Second, the paper addresses the issue of mechanisms of non-reputation nature of private production of property rights, in addition to imperfect state mechanisms. This represents a relevant case where low public enforcement, and no social mechanisms, including reputation are observed. The paper shows that private costly production of property rights takes place if private agents expect the institutional structure to improve in the future, with effect on the value of resources.

The study is structured as follows. In part two the theoretical structure is presented rooted in the analysis provided by Barzel (op. cit.), and expands the analysis offered by Alston, Libecap, and Muller (op. cit.). The model is rooted in the concepts of: a) index of expected property rights, b) institutional structure of property rights based on the State, social effects and c) private production of property rights. Part three presents the case of the Brazilian Jari project, which is the larger production area in the country, located in the Amazon region, identifying different levels of protection of property rights. Part four relates the quality of property rights with the strategies in the form of the observed institutional structure of production carried by the company. Part five concludes with the analysis of the observed results under the lenses of the model developed in part two.

2. Institutional Structure of Property Rights.

The literature of economics of property rights states that the architecture embedded in the contracting process depends on the institutional structure of property rights. Society is willing to spend resources in collective action in order to protect the existing structure of property rights, being the state the most important institutional machinery with this objective. If the state is absent, not supplying public goods designed to supply and guarantee property rights, other private mechanisms are expected to be adopted. In order to carry out the necessary transferences of property rights and realize transactions, economic agents define the internal organizations of firms, which differ according to the institutional structure where transactions are expected to be carried out as well as the form of the contractual relations to support cooperative production efforts, among several firms. Jensen and Meckling (1979, apud Eggertsson, 1990, p. 126)⁹, consider that production functions depend on the structure of property rights, and Eggertsson (op. cit.) proposes a model that links the external rules of the game to the internal governance mechanism, seen as the choice of internal organizational forms.

Libecap (2003)¹⁰ states that property rights must be clearly specified and enforced to be effective, and the degree of specificity depends upon the value of the asset covered. Additionally, Barzel (2001,op.cit.) elaborates on the role of the state, in terms of exercising the use of power in order to offer guarantees and enforce existing structure of property rights. Expropriation of property rights by the state is controlled by costly collective action as well as the distribution of property rights among social groups, which

⁹ Eggertsson, T.1990.Economic Behavior and Institutions. Cambridge Surveys of Economic Literature. Cambridge University Press.

¹⁰ Libecap, G.D. Contracting for Property Rights. In Property Rights: Cooperation, Conflict and Law. Ed. Anderson, T.L and McChesney, F.S.2003. Princenton University Press.

explains path dependent changes and the difficulty to change institutions towards socially efficient structures.

Libecap (op. cit.) presented elements that affect the relocation of property rights, namely; size of the aggregated gains, the number and heterogeneity of parties, information costs, distribution elements, and the physical nature of the resource. The outcome of the model is that the structure of property rights offers incentives for private parties to make specific investments in new institutional arrangements of higher value. However the new arrangement might not be feasible depending on the size of aggregated gain, number and heterogeneity of parties, information costs, distributional issues and the physical nature of the resource. We do not expect to observe investments if property rights are not defined and assured.

Barzel (2003) explores the information elements, proposing that measurement costs of transaction dimensions create conditions for appropriation of value that remains in public domain. He defines legal and economic rights, making ownership a less categorical concept (p.53) and also provides a clear- cut definition of transaction costs as being the resources used to establish and maintain economic rights.

The concepts provided by Libecap, Barzel and Eggertsson are key elements to the analysis to be developed in the context of this study, namely; economic and legal rights, internal structure of the firm as a response to the external institutional environment and persistence of sub-optimal institutional arrangements. This paper presents an argument based in the interaction between state, social norms and private strategies in defining the institutional structure of property rights and applies the rational to interpret private strategies where private agents engage in costly production of property rights in the presence of weak institutional property rights structure. The outcome indicates that even in the presence of weak property

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rights institutional structure private agents might engage in costly contracting.

The model develops as follows:

Consider an index of property rights¹¹, (PR) ranging in the interval,

0<PR<1. PR=1 represents a totally secure and enforceable situation. The opposite situation is of PR=0, representing the case of uncertain and non-enforceable institutional structure of property rights. Figure 1 represents the basic model, where A, B and C are the effects of the state (A), social norms (B) and individual strategies (C) to create and protect PR, therefore:

PR=PRa + PRb + PRc.

< insert figure 1 here>

The state supplies formal titles, the institutional structure to settle disputes and enforces the existing formally recognized property rights. Social norms add a complementary mechanism and function in small and homogeneous groups, based on reputation and social penalties for transgressors. Finally, individual agents also act to create and protect rights, adding a third element, whose characteristic is being informal and act in small and local scale in absence of formal institutions as well as social mechanisms. It is expected that PR (a) functions in situations where scale economies exist to supply and enforce PR and the social value of a particular institutional arrangement related to a given structure of PR is large enough to justify public expenses related to enforcement. It is the case of the structure of formal judiciary, courts and police, international rules and other similar mechanisms. The effective enforcement effort to guarantee legal property

¹¹ The concept of an index to represent the strength of property rights institutional structure was proposed by Araújo de Carvalho, E.R.2006.Custo de Medida, Padrões e Integração Vertical. PhD. Dissertation presented at the School of Economics and Business of the University of São Paulo.

rights is dependent on the political process, subject to capture mechanisms and institutional failures.

The parcel of property rights dependent on social norms PR (b) is related to reputation mechanisms and is effective in homogeneous groups of local or global nature that share the same beliefs and accept tacit enforcement mechanisms. Local social rules are relevant to explain institutional arrangements based on collective action mechanisms such as those in traditional societies, as explored in Ostrom (op. cit) and in Williamson (1991)¹² in dealing with ethnic homogeneity. If formal and social mechanisms are not sufficient, then private enforcement mechanisms are expected to be adopted. This parcel is represented by PR(c), where individual strategies of firms and individual agents are placed in order to protect property rights that are not affected by A and B.

Contrary to the traditional property rights models, we admit that private investments are possible when PR (a) and PR (b) are small. The role of expectations of future improvements in the institutional environment is relevant. It signals future value increase in resources and might motivate agents to engage in temporary efforts to signal the private domain. To illustrate such a situation observe figure 2, where CR represents the minimum index of PR that offers incentives for cooperative production effort. In a situation of weak institutional structure, area C adds to A and B, to reach CR, triggering economic exchange. This approach admits that part of PR still remains in public domain, yet it is possible to observe production effort. Costs to produce PR(c) are subject to scale effects, and are exemplified by private investments placed to offer signals to agents that intend to capture unprotected margins.

<place figure 2 about here>

¹² Williamson, O.E.1991. Strategizing, economizing and economic organization. Strategic Management Journal. Vol 12:75-94.

Private incentives to engage in costly production of PR(c) derive from two main sources. First the expected future flow of wealth generated from the activity, if the expected present value is larger than costs incurred in PR protection including the value captured by free riders¹³. Second is the case of expected future institutional change, where PR (a) is expected to become responsible for a large share of the total property rights institutional structure. This case relates to what Olson (1965)¹⁴ defined as a market augmenting institutional changes. In such situation even if total costs are larger than benefits under the existing PR regime, agents behave strategically offered signals to shape expectations of future institutional changes that enhance protection of property rights. Efforts, and costs, related to the areas A, B and C must be interpreted as joint costs of production and enforcement of property rights.

Some of the literature stresses the supply of property rights in the form of formal titles of property, leaving the costly public enforcement out of the analysis or giving less importance to this variable, as observed in De Soto (op. cit.). Figure 3 presents a case where institutional changes that increment the state efficiency to supply titles of formal property can be ineffective if enforcement efforts are not placed. In such cases A+B+C just change the proportions, but do not reach the minimum level of CR to trigger investments.

<place figure 3 here>

So far we have argued that private investments in production result from an adequate structure on incentives provided by the institutional property rights regime. We have also stressed that even in cases where formal and informal institutional structure of property rights (areas A and B) do not

¹³ These arguments permit to derive testable hypothesis about expenditures in PR (c), as a response for signals of future enforcement of property rights. Cases of credible state reform are susceptible for analysis.

¹⁴ Olson, M. 1965. The Logic of Collective Action. Cambridge, Harvard University Press.

reach a minimum index of protection to trigger investments private engagement in production can be observed, always at a higher cost incurred by private agents, since scale economies are expected to exist. The last relevant aspect related to observable investments placed by C is that the investment itself functions partially as a signal of private rights enforcement.

The first hypothesis based in the model can be stated as: H1: If private production of property rights amplifies the scope of A+B in order to reach the CR level, it triggers investment efforts. Therefore we can observe private investments in the absence of institutional structure of property rights protection.

A second hypothesis derived from the model relates incentives for changes in the institutional structure of production. H2: Combinations of A, B and C that potentially increases value might not be adopted, if there are large portions of property rights in public domain and interest groups that benefit from this situation. This might preclude modifications in the formal structure of property rights or the improvement in the enforcement mechanisms.

The case to be described in the next section illustrates the relation between A, B and C, presents figures to approach private costs of production of property rights and discusses the two basic hypotheses.

3. Case of the Jari Project: Economic Activity in the Amazon Region.

The case of an FSC certified sustainable forest management sheds light on the issue of transaction costs and environment in Brazil. Orsa Florestal is a forest management company of Grupo Orsa in the Jari River valley operating in Northern Brazil at the border of the States of Pará and Amapá. The Amazon forest is not an empty area, as it has been many times reported. There are 20 million habitants leaving in big cities, in small communities along the rivers and some inland areas. The Brazilian government during the 60s has considered a strategic goal to occupy the area by offering credit to implement large agro-forestry projects, promote internal migration to occupy public land and build the "Transamazonica" route, settling farmers in agro-villas along the way. This development model failed mainly due the lack of the necessary institutional framework to give support to the evolution of economic activities, but some effects are present nowadays.

The largest agro-industrial project established in the region was an integrated project to produce cellulose pulp based on eucalyptus plantations in substitution of the natural forest. The project occupies an area originally of 1,734,606 ha of which 1,100,000 were of native forest. Only 20% of the area can be legally explored but commonly squatters and illegal timber exploration enter the area.

The history of Jari is reported by Lins (2001)¹⁵. The area is located in two states in the Northern part of Brazil, Amapá and Pará, close to the border with Guiana. He describes the origin of the human occupation by Indians and the property was given by king Felipe III to Bento Maciel Parente in 1634. The first organized economic activity was carried by José Julio de Andrade, an immigrant from the state of Ceará that arrived in the Jari valley around 1920. He bought the area from a local resident with products, in a barter exchange. As reported by Lins (op. cit. p.37), "...the property title was seen as document of questionable value, just the recognition from the county "intendent" ". Mr. Andrade became the largest land owner in Brazil and later became a member of the Brazilian Senate.

¹⁵ Lins, C.2001. Jari: 70 anos de história. Fundação ORSA ed. 304pp.

Around 1948 he left the region and moved to Rio de Janeiro, having sold the land to Portuguese partners that amplified the economic activity with the production of cattle, logging, Brazilian nuts, and rubber. The area was sold to a North American named Daniel Keith Ludwig, who bought in 1967 an area of 1.632.121 ha. He made investments in infra-structure, initiated the production of eucalyptus and bought in Japan an industrial plant to produce cellulose pulp. The plant was built inside two large ships that have settled at the margin of the Jari River, close to the place where it joins the Amazon River¹⁶.

Mr. Ludwig was suffering political pressure from the Brazilian nationalistic military government. Then in 1980 he communicated to the Brazilian government that he had claims for the emission of titles of property of the area in order to continue with the project. In 1981, after the industrial plant had caught fire, he left the project, replaced by a Brazilian tycoon, Mr. Augusto Trajano de Azevedo Antunes, who had the control of one of the largest mining economic group in the country. This phase of the Jari project was very difficult, since the industry did not have enough logs to process at full scale, and also because the new owner did not have real interest in cellulose, but in the minerals present in the area. In May 1997 a new fire was reported at the plant. The debts with private and public development banks had become impossible to be handled and the project was basically dead.

In February 2000, a Brazilian pulp and paper group offered a bid for the company that was approved by the banks and government. Mr. Sergio Amoroso, from Grupo ORSA bought the debt of the Jari project and defined contractually a payment schedule based on performance and the wave of the debt after ten years of successful operation and payments. His

¹⁶ The industrial plant left Japan in February 1st, 1978 and arrived in Jarí after 87 days.

offer included to set aside 1% of total sales to be applied in social projects with the local low income population, a practice that was already adopted in other activities of the economic group.

The beliefs of the new owner, strongly biased towards socio-economic sustainability were the key to the re-negotiation of the project with the Brazilian Development Bank. Mr. Amoroso bought 1.734.606 ha, but the property titles were composed by a large number of different documents of uncertain origin and of questionable quality. The recent history of Jari is reported in Fisher and Zylbersztajn $(2007)^{17}$.

3.1. Titling and Property Rights in the Frontier

In order to implement a large development project based on agro-forestindustrial activities, Mr. Amoroso had to develop economic activities in the large territory based in formal contractual relations most of the time associated with guarantees of property. He knew that in such a large area were plenty of small occupants, squatters, long established family farmers, and large illegal timber exploration organizations, without any property title.

The lack of supply of formal land titles has been detected by Alson, Libecap, Muller (op. cit.) as a source of violent conflicts in the region. In order to understand the complex picture that we face today, it is necessary to report to the evolution of the legal institutions of property of land in Brazil.

Since the Portuguese decided to colonize the new land, the king of Portugal decided to segment the country in large areas that have been donated to entrepreneurs related to the royal family. The "capitanias hereditárias" or

¹⁷ Fisher, R.M and Zylbersztajn, D.2007. Orsa Group: the challenge of sustainable development in the Amazon. Social Enterprise Knowledge Network Case Study Collection. Harvard University.

hereditary settlements were created and the property rights could be transmitted to new generations. The independence of the country from the colonial Portuguese was reached in 1822, but the first Land Act¹⁸ was defined in 1850. Therefore there was a span of 28 years without any legal norm to regulate transactions of land. This situation generated the practice of informal occupation of land, basically by small subsistence farmers, characterized by imprecise limits and no formal titles of property.

In 1850 the state recognized the existence of several categories of property, defined as: public lands, occupied lands, occupied land lacking some legal requirement in order to generate the property title, and legal lands with formal recognition of property. A frequent concept that appears in the legal literature recognizes the cropping and usual place of living as signals of property. The Land Act was the first norm created in Brazil and the intention was to provide formal titles to land occupants of different profiles. The idea was to maintain public land as so, in addition to register all occupations opening room to create a market where property of land could be traded. The act settled the conditions to formalize the registers of property, defined the concept of public land¹⁹, defined the access to land only through acquisition, made provisions to legitimate the previous occupations and finally, created a public bureau to control the public lands in the country.

The aim of the act was to guarantee that only the State could transfer land to private domain, either by acquisition of or by formal distribution in programs of agrarian reform. As reported by Lilla and Whatley $(2005)^{20}$ the actual presence of a land occupant in the area has historically been used as a juridical argument to give support to the formal land rights. That land act

¹⁸ Free translation for "Lei de Terras".

¹⁹ Public land, unregistered or occupied.

²⁰ Lilla,F.C., Whatley,T.H.M.2005. Análise Jurídica das Terras situadas no Estado do Pará. Report to Jarí Celulose S/A.

distinguished property from occupation, and settled the conditions for the registrations of lands in private and public domain. Very relevant system, that has no judicial validity but serves as a signal of property is the "paroquial registrations". This is a system organized by the Catholic Church in remote areas of the country.

The efforts to create credible institutions were ignored by large part of the owners of large areas. They just ignored the policy of land property registration and usually defined their own rules within the limits of their domains. On the governmental side the efforts evolved to the definitions of a Federative system of land registration. Basically each state in the country had to consider the following aspects in order to supply a formal title of property: a) effective ownership and proof of local residence, b) demarcation of the limits of the property, c) absence of occupants, d) complete proof of succession of previous owners, e) absence of simultaneous precarious titles of property, and f) absence of litigants. Legal provisions have been created to define the maximum size of land, however no clear interpretation exists with respect to the number of titles that a single owner can acquire.

In this novel of legal requirements the conflicts about land ownership have increased. In the country of continental dimension, many states issued precarious titles that have been offered subject to future recognition. These titles represented a weak indication of property but in many cases have been interpreted as secure rights to support transactions. The nightmare was completed when the State of Pará defined by decree in 1996 that all land registers not formalized until December of 1996 have been declared not valid.

3.2. Land Property at the Jari Project

In face of the complex legal requirements to legitimate the land property, the outcome is that most of land in remote areas of the country and particularly in the State of Pará is subject to judicial contestation. The requirements are very strict and based on complete historical evidences of hereditary chain, size limits, and a large number of precarious registers supplied by local counties, church and even false documents, made a very obscure situation to define land property on an enforceable basis. In addition to the long time that the state office (ITERPA) takes to issue titles, it is supposed to supply land titles in cases that fit the requirements, this just adds another dimension to increase the weak institutional structure.

Legal advisors of Jari considered that 39% of the total area can be declared legitimate and have a formal title issued by the State authority. About 22% are related to areas subject to problems of legitimacy and 39% of areas with substantial problems to have the domain formally recognized. Certainly this situation contrasts with the picture presented to Mr. Amoroso when he won the bid to carry on the recuperation of the Jari project.

Table 1 presents the recent situation of property titles. From the total area reported before, About 400,000 ha have been immediately requested by the government to create two natural reserves open to common pool exploration of renewable resources. Another 229,000 ha have been considered as legitimate status, and 102,600 are titles of public land which formal property can be transferred to the company. An area of 500,000 ha remains with uncertain status of property, with no legal enforcement and therefore subject to illegal exploration of natural resources.

<insert table 1 about here>

The next section connects the model presented in section 2 to the different strategies adopted by the company given the different degrees of quality of property rights.

4. Quality of Property Titles and Private Strategies

This chapter considers two main aspects. First it associates the property rights regime with the strategy adopted by the company. Second it offers some quantification of the private transaction costs incurred by Jari to protect property rights.

4.1. Strategies:

The area where the Jari project is placed is represented in figure 4. The property right associated to the area cannot be seen as homogeneous. It can be represented by five different situations, expressed as follows:

Area A: State guaranteed property titles, each with well defined origin and fitting the legal requirements to define the property of the area.

Area B: Area with native forest with restrictions for economic activity. State guaranteed property titles fit the requirements to issue definitive title of property.

<place figure 4 here>

Area C: Area inside the limits of Jari, with population mostly characterized by internal immigrant families of settlers without titles of property.

Area D: Area with native forest that has been claimed by the Federal government for environmental reserve.

Area E: Areas under dispute with titles of uncertain value.

The different property regimes represent the macro institutional status that defines the rules to carry economic activity. Considering the model presented in section 2, we expect the profile of economic activity to be aligned to the strategies adopted by the company. Regular economic

activity is expected to be carried when transactions are guaranteed and property rights index reach the critical limit.

Therefore, in areas A the company placed the eucalyptus plantations that feed the cellulose pulp plant. The company depends on international contracts that must be carried out within reasonable guarantees that the area can be explored. The production is FSC²¹ certified, and therefore the status of property is a necessary condition to obtain the certification and carry on the transaction. Property rights are guaranteed by the state and no other mechanisms are necessary.

In areas B, legal restrictions to end uses permit only few sustainable activities to be carried, under strict governmental control. One possible activity is the sustainable timber production, based on the definition of a 30 years production plan. In order to obtain the exploration right a costly technology is adopted that basically defines the species that will be harvested at an individual level. Trees are marked and logged based on methods of minimum impact. A particular area will be visited again only after 50 years. This project is also FSC certified and a mill has been built to process the timber before it is shipped to European markets. The activity is not at the core of the interests of Jari, but it has been left as the only legal activity to be carried out and has the effect to signal the illegal loggers about the proprietary status of the area.

Being a large area, it is subject to frequent invasions of illegal loggers, generating private costs of enforcement based on frequent visits to dismiss the trials of illegal loggers. In addition, the state regulatory organization that issues the production permits on an annual basis, did not perform in the second year of operation. Since there is a limited window of time to process the timber extraction, given the regime of rain, the company had to

²¹ Forestry Stewardship Council. (www.fsc.org)

obtain a permit based on a judiciary temporary decision. All signals are that IBAMA acts politically, since they represent political groups biased against large scale plantations in the area. There are evidences that the alternative would be the increase of the illegal logging, as can be detected in areas close to but outside the Jari project.

The activity is based on legally enforceable norms; however the presence of governmental agents to monitor the activity is very loose. The agents of IBAMA are in small number and have no resources to monitor the large area. In many cases they have the support of Jari to accomplish their goal, which is to monitor them. In this particular case the legal enforcement is weak and has been replaced by private efforts to guarantee economic rights of exploration.

In areas C, the company strategy was to approach the occupants, and through the activities of the social branch of the company, offer technical assistance for production of eucalyptus in deforested areas based in long term contracts with the company; that guarantees the future acquisition and offers an annual payment as credible signal to the small farmers. At the same time, Jari acted to obtain formal titles of property to settlers and avoided that further families enter in the area, based on the legal status of property.

In this case, no collective action or social ties are reported that offer mechanisms to bind the economic activity of the settlers. They are easily subject to capture of illegal loggers that offer payments for illegally harvested timber. Absence of state as well as of social mechanisms of control leads to a fragile situation that is in the root of the explanation of part of the Amazon deforestation where illegal timber companies and small low income settlers, start a process that is later on completed by cattle and finally grain production. Jari bears the costs to keep under control the presence of squatters²².

Areas D have been considered national reserves and the natural resources are explored in the form of common pool. They are completely outside the jurisdiction of Jari project. Studies carried by Claro (2007) show evidences of exhaustion of natural resources, since no social norms exist to bound the private exploration made by residents.

In this case, the company just monitors the presence of illegal loggers and report to the authorities. This is being insufficient to prevent the exhaustion of resources in the area.

4.2. A Case of Private Enforcement Costs

Private production of property rights does not benefit from scale economies. It is carried in substitution of the state, with incentives related to the future value of the activity.

The FSC certification system has as its main task to offer incentives to allow for multiple uses of the native forest by implementing a sustainable development model in the area. Orsa makes a good partner because the Group's corporate philosophy over the last ten years has involved allocating 1% of its gross income to social initiatives²³. From 1994 to 2004, Grupo Orsa invested over US\$ 40 million in social activities through Fundação Orsa. The sustainable model under development includes 98 communities living in the forest- 14,000 inhabitants, and covers wood products, non-wood products and agri-silviculture on anthropized areas²⁴. The Orsa project was certified by FSC in 2004, and became the largest certified rainforest area in the world.

 ²² No report of violence is found, with respect to the activity of Jarí.
²³ (www.grupoorsa.com.br)

²⁴ Anthropized areas are defined as areas subject to pressure from human population.

On 2005, IBAMA entered the project and declared the land titles invalid and provided no timetable when they would be re-issued. At the same time the government provided no relief for over 50 land invasions that involved environmental degradation. The situation was no different for other PFCA (PFCA – Associação de Produtores Florestais Certificados da Amazônia- Association of Amazon Certified Forest Producers) -member companies²⁵. By the end of 2005, of the 1.2 million hectares certified in the Amazon, less than 20% received formal IBAMA's authorization (POA – Annual Operating Plan) to operate.

Throughout 2005, the most efficient sustainable management projects operating in Brazil were intermittently interrupted either by the lack of IBAMA's capacity to monitor their projects for political decisions taken by IBAMA²⁶. In some cases government representatives were personally opposed to any kind of use of the Amazon forest. This added another layer of uncertainty to the business environment, making any long term investment risky. The following are Orsa's costs²⁷ in 2005 as they attempted to salvage their sustainable timber project. These costs were not born by their illegal competitors.

Legal costs for ensuring property and operation rights:

The costs reflect the firm's attempts to define its property rights and fend off the repeated land invasions. The costs also reflect the inability of the State to enforce the rights of property owners. Four attorneys were involved, who consumed 50% of their time, costing US\$ 250,000. The services of three outside law offices were needed,

²⁵ PFCA (<u>www.pcfa.org.br</u>) represents around 80% the certified area in the Brazilian Northern region.

²⁶ IBAMA's operations in Brazil represent a good example of and institution inefficiency by design.

²⁷ The data is based on the real Orsa Florestal accounts, and all figures are approximate.

adding an additional US\$ 166,600. Travel expenses associated with the legal services added an additional US\$ 41,600.

Operating costs for property protection:

Property maintenance involves the costs to keep control of invasions by illegal timber companies. The company incurred on direct costs due to the State's inability and/or under capacity for offering property titles.

Environmental costs for ensuring operating rights:

Costs associated to travels and man hours solely devoted to ensure the right of operation at IBAMA's office located in Brasilia.

Business costs due to the impossibility of meeting business contracts and goals:

These are the indirect costs from an inability to fulfill supply contracts with customers.

Logistics costs:

These are the associated costs of Orsa's inability to produce and ship lumber. For example, ocean freight has to be engaged long in advance of the delivery date. Because of the intervention of IBAMA and land invasions, the contract with shipping services had to be broken.

Financial costs:

Financial costs of obtaining external capital to finance the working capital not generated by the business.

Costs associated to breaking contracts with third parties:

Operation difficulties led the company to break contracts with third parties, which led to the payment of fines, cost increases to operation uncertainties and costs for developing third party alternatives.

Labor Costs:

Operation suspension led to the dismissal of a significant number of employees. Under Brazilian labor legislation there are high costs related to changes in labor contracts. Also operation instability generated costs associated with unseasonable hiring.

Additional Training Costs:

Sustainable management operations require a specialized and trained workforce. The instability caused the loss of highly educated professionals, as well as operators. The replacement of those job positions led to the repeat of training programs.

Operating losses:

Operation instability and the Group's decision to keep part of the team even though there was little to no business activity.

Crisis Management:

The 2005 crisis consumed a great deal of time from senior management, executive officers and shareholders.

Communication:

The crisis management demanded significant additional communication to help clarify and inform stakeholders during a very difficult period.

Based on the approximate transaction cost figures reported by ORSA, we can estimate the total cost to the legal Brazilian industry of certified timber from sustainable projects. Assume other firms operating with FSCcertified sustainable forest management projects faced a similar situation. Then the estimated transaction costs incurred during 2005 amounted to approximately US\$ 2,830,000.00 or nearly US\$ 45.8 per cubic meter of certified lumber. FSC supervised 1.2 million hectares of certified timber land in the Amazon region, and considering a typical project of sustainable management lasting 30 years, we have 40,000 hectares of sustainable management area per year. Assuming that 60% the area is effectively operational, there are 24,000 hectares left. Sustainable exploration can achieve 20 m3 per hectare, so we have nearly 480,000 m3/year of FSCcertified logs in Amazon. Based on the costs indicated, we achieve the amount of US\$ 21 million, which could at least be partially allocated to activities oriented to social and technological issues or to investments with socio-economical return to society.

Key deforestation causes were problems associated to land property and high transaction costs, which result in low investments and returns, operation inefficiency and encouragement to illegal operations (Tomazelli, 2005). Transaction costs are estimated at US\$9-12.5 per lumber cubic meter and consumed 13% the companies' income. If an unfolded FSCcertified log generates about US\$ 200.00 then Orsa's transaction costs in 2005 amounted to over 20% of the total revenue. Under such business environment conditions there are only two options left for a timber company, shut down or go illegal. Therefore it is reasonable to conclude that institutional instability is one of the reasons of the growth of illegal operations in Amazon.

5. Discussion and Conclusions

The two hypotheses delineated in section 2 can be discussed under the lenses of the model and the case presented in section 3. First, H1 suggested that private production of property rights is necessary to replace the lack of governmental enforcement. Even in presence of positive and high transaction costs due to the lack of property rights public enforcement, it is still possible to observe production to take place. Private investments and the private occupation of the area as reported in the Jari case represent an effective form to produce property rights and reach a critical level of protection. This was observed in some areas of the Jari project, but not in area E, where property rights are unsettled. Firms choose strategically where to place investments, particularly when related to provide signals of property to potential squatters.

Hypothesis 2 points to the existence of persistent value in public domain. Changes in the institutional structure of property rights, mainly related to enforcement, would have the effect to control this variable. The persistence of value in public domain is possibly related to the interest of illegal groups, basically the loggers, who benefit from the lack of institutional strength and have shown to have influence inside the governmental environmental control agency. The visible effect of this perverse and socially sub-optimal situation is the decrease n the area of natural rainforest in the Amazon region. The illegal exploration of timber, the small holder that benefits from the one shot payment offered by the illegal organization, the beliefs of political groups, the increase in the value of cleaned land without forest and then the arrival of cattle and soybean, leads to the exhaustion of natural resources, as predicted by economic models.

Erroneous interpretation is commonly presented, that connects the increase in soybean production to the deforestation process. It is part of the problem, but does not trigger the process. The real problem is the lack of supply of public goods by the government in the form of titles and enforcement of property rights. The alternative way to guarantee property rights by private efforts, is limited and provides only a fragile structure to carry on transactions.

Incomplete specification of property rights is a persistent sub-optimal institutional arrangement. The identification of a value augmenting institutional change is a necessary, but not sufficient condition for institutional improvement. The precarious status of large number of property titles in the Amazon frontier has already been appointed as a cause of severe conflicts for land as shown by Alson, Libecap and Muller (op. cit.). However land is not the first valuable resource, but the forest is. Once natural resources are depleted, then the land value becomes relevant to explain conflict. The upshot is that the solution is not placed only on land property, but in the monitoring and enforcement efforts supplied by the state in the form of public goods.





Figura 2 – Critical level of PRi to make the transaction feasible



Figura 3 – Limit level of PRi to make transaction feasible

Figure 4. Jari Project. Areas assigned with different property regimes. States of Para and Amapa. Brazil



Table 1 – Land Ownership Otalus – Jan Troject (1,000 ha)		
State	Pará	Amapá
Natural Reserve		422.0
Property Titles (Legitimate)	229.0	218.0
Property Titles (Public Land)	102.6	
To be Legitimed	120.0	62.0
Uncertain	494.0	
Total	945.0	280.0

Table 1 – Land Ownership Status – Jari Project (1,000 ha)

Source: Primary data