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Key Issues for Property Rights in Brazil:

Implications for the Forest Code

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May 2016

Literature Review

Acknowledgement

This work is generously supported by the Omidyar Network.

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Key Issues for Property Rights in Brazil: Implications for the Forest Code

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1. Introduction

In 2012 Brazil revised its Forest Code legislation that regulates private land use and management. It mandated that landowners set aside and leave unused areas of native vegetation that are equal to 20% of the total property area (80% in the Amazon). The Forest Code was initially established in 1934 to promote fuel conservation and was revised in 1965 to promote the economic development of forest-based industry. But, since the mid-1990's, the Forest Code has become an environmental law (S.R. Hirakuri, 2003).

Until recently, government failed to enforce the Forest Code effectively, as neither the political consensus nor the administrative capabilities seemed to be in place. The recent revision of the legislation, however, indicates that both of these circumstances are changing and that a more realistic effort at implementing the Forest Code will be made this time.

If this proves to be the case, this might be Brazil's grand policy experiment in the area of property rights. It is a grand experiment because the size of the country makes the area and population involved reach continental proportions. Other Brazilian policies that involved intervening directly with individuals' property rights, such as the land reform program or the occupation of the Amazon, pale in comparison. In terms of magnitude and reach, they did not apply to all or even most properties in the country. As those policy experiences showed, interventions that require altering property rights tend not to be as straightforward as they can seem initially; they often elicit unexpected behavior and yield unintended consequences.

These difficulties are compounded by the fact that the Forest Code legislation is one of the most draconian land laws in the world: it requires landowners to set aside significant fractions of their properties. This requirement leads to non-trivial impacts in foregone production possibilities and reduced rental streams that must be fully absorbed by the owners without compensation. On the other hand, it is precisely because of the law's

massive magnitude, depth, and coverage that the Forest Code has the potential for a profound positive environmental impact (Joana Chivari and Christina Leme Lopes, 2015; Britaldo Soares-Filho et al., 2014).

The purpose of this paper is to assess how the nature of property rights in Brazil will affect the implementation of the Forest Code and the realization of the potential positive environmental impacts. This paper analyzes the historical evolution of property rights in Brazil, and it examines how the institutional structure of administering property rights affects the incentives and behavior for property owners.

In the past two decades a consensus has formed in the academic literature about the fundamental role that institutions and property rights play in determining economic decisions and outcomes. (Daron Acemoglu et al., 2001; Daron Acemoglu and James A. Robinson, 2012; Douglass Cecil North et al., 2009). Secure and well-defined property rights are widely recognized as crucial inputs for investment, development of markets, better use of resources, and economic growth. Although this recognition is widespread, the predominant notion of property rights is often over-simplified. Property rights are often seen as a one-dimensional concept that can be either “secure” or “insecure”. Although such terminology can be useful for cross-country comparisons, when it comes to understanding how individuals’ and groups’ land use choices and behaviors are affected, a more rigorous understanding of property rights is necessary.

Property rights are not a relation between an individual and the land, but rather a relation among different individuals related to the use of the land. This means that a property right specifies a list of the permissions and restrictions that apply to both the owner and to other members of society (Y. Barzel, 1997). Furthermore, property rights are not a single blanket right that covers every aspect of the property; rather, they are composed of many different dimensions and can refer to different attributes. For example, a property right to a piece of land might give the holder the right to sell, lease, subdivide, and fence the property. It may give the neighbor the right to cross, to pursue hunted animals, and to be free from noxious odors emanating from the property. It might also allow society to retain the rights to subsoil minerals on the property and to tax and regulate the property.

The Forest Code is essentially a re-specification of property rights. It limits landowners’ right to clear all of their land, and it confers to society the right to the

environmental benefits of protecting native vegetation on each piece of land. To further complicate matters, it is almost never possible or economically rational to enforce fully the formal property rights specified by the Forest Code laws and regulations. This means that the *de facto* property rights that provide the incentives for land use choices are generally disjointed from the *de jure* property rights on paper. This wedge between *de jure* and *de facto* may not be very consequential when there is widespread understanding that what will apply are the *de facto* rules. However, when there is uncertainty about whether the *de facto* rights will prevail or whether the *de jure* rights might be invoked by other claimants or by the government, then incentives can arise for unproductive, opportunistic, and defensive behavior. This disparity can dissipate much of the land's rental streams through suboptimal land use and investment as well as through conflict, violence, and environmental degradation. This paper argues that one of the major challenges for the Forest Code has been and will continue to be the insecurity of property rights that emerges from the uncertainty between *de jure* and *de facto* rights.

Because property rights involve multiple dimensions and are difficult to enforce, it follows that both academic analysis and actual policymaking are often trickier than one might initially presume. For many years experts had presumed that the only way to avoid the tragedy of the commons, where resources are overused due to lack of clear ownership, was to resort to strong, clear property rights, either in the form of private property or state ownership (Garrett Hardin, 1968). The presumption was that in the absence of either of these solutions, prisoner dilemmas and problems of collective action would inevitably lead to the tragedy of the commons. And yet, as noted by Elinor Ostrom in her research on common property management of natural resources, small groups and communities across the world and throughout history have managed to establish governance mechanisms to use resources such as land, water, forests, and pastures in sustainable ways (Elinor Ostrom, 1990). Although this insight might seem obvious once it has been stated – and rewarded with a Nobel Prize in 2009 – it is still often ignored in the literature and in policymaking.

Another example of the elusive nature of property rights is the influential argument made by Hernando de Soto in “The Mystery of Capital” (Hernando Soto, 2003). He argues that if the poor were granted title to the houses and land they possessed, they would access credit and enter the formal economy. This would allow the poor to leverage property into

wealth and would allow poor countries to access the same kind of gains from capitalism that have been experienced by developed countries. This thesis became highly popular among politicians and policymakers in different countries and led to several programs to better define and secure property rights to unlock this potential. It is noteworthy that in de Soto's prototypical case of urban slums in Lima, Peru, the policy to strengthen property rights was found to have led to greater residential investment, but this did not take place as expected. The poor did not obtain credit by using the newly titled property as collateral. Banks continued to withhold credit to the poor because they realized the political difficulty of foreclosing on the loans despite formal titles (which is another example of an uncertainty between *de jure* and *de facto* rights). Instead, the improved investment was found to have been driven by the greater employment possibilities that arose once secure title obviated the need for some family members to remain home constantly to defend the possession of their property (Erica Field, 2005).

Although the basic intuition that clear and secure property rights are crucial for good economic performance is correct, the way in which property rights affect incentives and behavior is complex and subtle. Therefore, policy based on property rights has to consider carefully the specificities of the contexts and the nuances of how property rights work. This paper does exactly this for the case of property rights to land in Brazil.

The next section provides four concepts or insights from the economic theory of property rights that make it easier to understand the subtleties involved in specific cases. These analytical tools will then be used in the subsequent sections, which turn to the Brazilian case. Section 3 provides a brief analysis of the historical evolution of property rights to land in Brazil that shows how and why the current configuration of rights and institutions was reached. Section 4 takes stock of the research on the impact of property rights to land in Brazil. It establishes what outcomes in terms of economic performance have been realized and how property rights impacted these outcomes significantly. Because many of these experiences have much in common with what is being pursued by the Forest Code, the cases that are analyzed hold many lessons and insights for this grand policy experiment. In particular, Section 5 details the process of land reform, which has been continuously pursued in Brazil through many different programs since at least the mid-20th century. Many of the shortcomings of these land reform programs were related to property

rights issue that can potentially impinge on the Forest Code program. Section 6 concludes on a positive note by pointing out some ways in which the Forest Code might be better positioned to succeed than any of the previous programs.

2. Four Concepts for Understanding Property Rights

Given the multidimensional and dynamic nature of property rights, it is useful to have analytical tools to understand how they arise and how they impact the choices and behavior of economic agents. This section presents four concepts from the property rights literature that provide insights that will be used in subsequent sections to analyze property rights in Brazil: “bundle of sticks,” property rights evolution, path dependence, and design principles.

2.1 Property as a Bundle of Rights

Legal scholars often use the metaphor of a “bundle of sticks” to think about property rights. Each of the sticks in the bundle represents a specific attribute of the object, or, in this case, of the property.¹ These attributes refer to the many different uses and actions that can be taken with the property. Because property is a relation among different agents with respect to an “object,” each of these attributes represents a permission or a restriction on the owner or on the rest of society. Thus, the bundle of rights is a form of listing these permissions and restrictions for each of the potential uses of the object. A bundle of rights for a piece of land, for example, might allow the holder to plant, subdivide, fence, or leave their property fallow. It might also grant society the right to tax, take by eminent domain, or require the presence of a legal reserve in native vegetation.

Figure 1 shows an example of a bundle of rights related to a piece of land. The bundle specifies which rights the “owner” holds, which the state holds, and which are held by third parties. The usefulness of stating property rights in this way is that it makes explicit the incentives and constraints faced by the property holder given those specific property rights. The basic notion that “good” property rights are important for good economic performance becomes much more detailed and powerful when it is stated in terms of a bundle of rights. The metaphor also makes it clear that the bundle can be assembled in many different ways by separating, combining, trading, and contracting the

¹ For a series of papers debating appropriateness of the bundle of rights metaphor see **Klein, Daniel and John Robinson**. 2011. "Symposium: Property: A Bundle of Rights?" *Econ Journal Watch*, 8(3)..

sticks in the bundle. Each combination of rights in the form of a bundle provides different incentives and constraints and thus leads to different outcomes and performance. A policy recommendation for a program such as the Forest Code involves finding a bundle of rights that simultaneously achieves the desired environmental protection, the productive use of the land, and incentives for compliance.

Figure 1 – Property as a Bundle of Rights

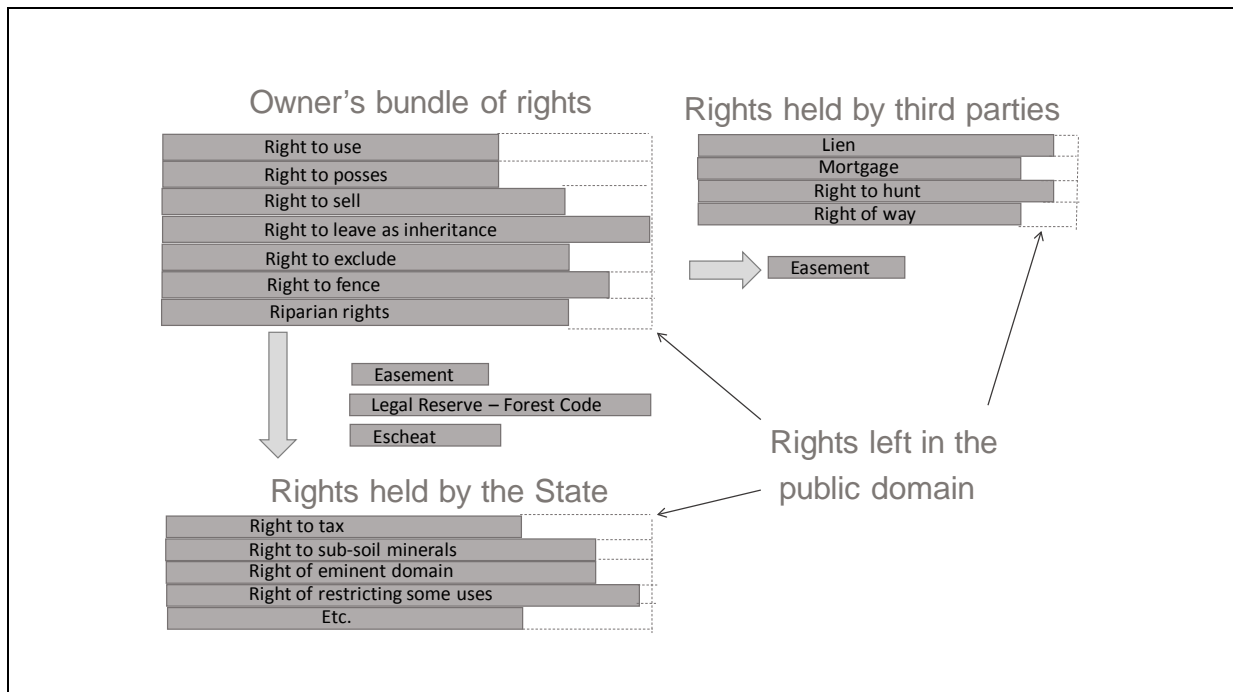


Figure 1 also shows that each of the sticks in the bundle is shorter than they could be. This reflects the fact that rights are never fully enforced. Some of the rights are left in the public domain where others can capture these rights. Even if the property rights are in a protected state, the extent of the enforcement is always incomplete, as monitoring and policing is costly. Because of this, individuals also expend resources to enforce their property rights in addition to what is done by the state. For example, instead of relying completely on the state, most people still lock their doors and even install security systems. But even here enforcement is never complete. Because enforcement is costly, individuals will only choose to expend resources to secure their rights up to the point where the benefits from doing so are worth the cost. Someone could, for example, hire security guards to stand by their car when it is parked on the street. But the added protection would

probably not compensate the expected reduction in probability of the car being stolen, so it is rational to leave part of the right to the car in the public domain.

Because of the transaction costs of specifying and enforcing property rights, the bundle of rights that effectively constrains and incentivizes the players will often differ considerably from the formal property rights in the laws and regulations. That is, the *de facto* property rights can diverge significantly from the *de jure* property rights. This does not mean that the *de jure* rights are irrelevant or innocuous for they represent the expectation of how society, or those making the laws, envisioned the property rights working. This means that even if the *de jure* property rights are not currently fully constraining, they could come to life in the future. It is often easier to start enforcing laws that have already been passed than it is to legislate completely new laws.

The key issue is the expectations of the players related to what bundle of rights they hold now and how those might change in the future. To illustrate this, consider a situation where there is no uncertainty about the enforcement of the rights now or in the future, so that *de jure* and *de facto* rights are the same. Suppose additionally that the bundle of rights is constructed so as to induce “good” outcomes for both the owner and society. If some transaction costs are introduced so that there is a wedge between *de jure* and *de facto* rights, there might be some rent dissipation and inefficiencies relative to the prior situation. Some of the rights are now partially in the public domain where they can be captured by others, and the holder might incur unproductive expenditures to protect those rights. But, as long as there is reasonable certainty about what the rights are, a second-best situation will prevail where the *de facto* rights effectively determine incentives and constraints. In the Brazilian Forest Code, for example, there has long been a great divergence between *de jure* and *de facto* rights. The law required the maintenance of a forest reserve on each property, but because of lack of enforcement, it was tacitly understood that one could fail to abide by this stipulation and stand little chance of triggering a sanction. However, if something changes that casts doubt on whether it is the *de jure* or the *de facto* that will prevail, the uncertainty will upset the previous second-best incentives and might lead to greater distortions and rent dissipation.

With the revision of the Forest Code and the revised commitment of the government to implement the program, there is now uncertainty as to where landowners’ property rights

stand. The conditions for pushing forward with the program are stronger now than they have ever been, with considerable political will from society, social movements, and the international community to move ahead. In addition, technological advances have made the logistical task of surveying, registering, and monitoring properties and compliance easier and more efficient. And yet, even with these favorable forces, the implementation of the program remains a formidable task.

Different individuals will have different assessments of whether this time the program will effectively take off. This uncertainty makes it unclear whether the *de facto* or the *de jure* rights are the ones which should be acted upon, thus leading to unsecure property rights which impact individual's behavior and economic performance. Sending a signal that the new *de facto* rights are the same as the *de jure* rights will be crucial for the program's success. But this is difficult to do because a credible signal requires implementing the program according to plan, which depends greatly on the agents' perception that the property rights have truly converged. The best way to achieve this credibility is to go ahead with the program and build trust that the rules have changed effectively.

2.2 *The Evolution of Property Rights*

The discussion about property as a bundle of rights makes it clear that property rights are a dynamic concept; that is, they change over time. Therefore, it is important to understand what determines that process of change. How do property rights first emerge and how do they evolve?

A frontier can be thought of as a place or a situation where there is no scarcity of a given good and thus where property rights are either non-existent or irrelevant. Because the good is abundant relative to demand, there is no competition for it. In this situation, the lack of property rights is innocuous because it will not lead to conflict or rent dissipation. However, if at some point a shock takes place that increases the demand for the resource, competition to appropriate it, conflict, and violence over it, and other forms of rent dissipation will arise. This increase in demand can be triggered by shocks, such as a demographic change, technological change, new preference, climatic variations, or other types of shocks. The shocks bring in new potential appropriators, replacing abundance with scarcity. Before the shock there was no need for formal property rights and competing

claims could be mediated through norms; after the shock, there are many heterogeneous competitors and norms are no longer sufficient.

An influential thesis by Harold Demsetz suggests that at this point a “demand” for property rights arises (Harold Demsetz, 1967). He argues that the losses and inefficiencies inherent in an insecure property rights situation induce unproductive competition and rent dissipation. This prompts the holders of the assets to seek to devise new property rights that internalize externalities and eliminate the inefficiencies. His classic example is the Quebec Indians, who prior to contact with Europeans, appropriated beavers through an open access or first-come-first-serve rule. Given the size of the population of beavers relative to the demand from the Indians, this was an “efficient” rule that assured the productive and sustainable use of the resource. But once the Europeans arrived in a demographic shock that opened the large-scale fur trade to the Indians, the property right rule of open access was no longer “efficient.” The increased competition for fur pushed the population of beavers towards its carrying capacity. According to Demsetz’s account, the associated losses pushed the Indians to change the property rights to beavers to a system of private property. Different groups of beavers were assigned to specific individuals who could exclude others. By making each individual the residual claimant for his/her own set of animals, there were incentives to internalize the externalities – a beaver not killed today would still be yours tomorrow – and “efficiency” was once again achieved.²

Demsetz’s theory of property rights evolution thus argued that rights evolved optimally whenever the relative prices changed and the current rule no longer worked properly. This provided incentives for “efficient” resource use. Although very influential, this view was criticized for accounting only for the demand for property rights and simply assuming that a supply would automatically emerge.³ In most situations the supply of property rights is filtered through the existing political system and there is no guarantee that the newly chosen property right rules will be the best for society. If the efficient rule under the new conditions is not in the interest of those who hold power, it will probably not be put

² For a more detailed analysis of the evolution of property rights see **Alston, Lee J.; Edwynna Harris and Bernardo Mueller**. 2012. "The Development of Property Rights on Frontiers: Endowments, Norms, and Politics." *The Journal of Economic History*, 72(03), 741-70. For a Darwinian theory of property rights evolution see **Alston, Lee and Bernardo Mueller**. 2015. "Towards a More Evolutionary Theory of Property Rights." *Iowa Law Review*, 100, 2255-74.

³ For a critique of Demsetz’s theory see **Eggertsson, Thrainn**. 1990. *Economic Behavior and Institutions*. Cambridge: Cambridge University Press.

in place, even if this implies social losses. Political transaction costs impede resolving the inefficiencies through contracts so that property rights that promote inefficient behavior and rent dissipation may persist. The prevalence of situations with these characteristics throughout history and across countries indicates that such outcomes are not unlikely.

The upshot from this discussion is that, when circumstances change, there are forces in play to cause property rights to change. Whenever the current bundle of rights is not inducing the best use of assets and resources, there is space to try to improve incentives by adapting the property rights. But even if the design of a superior new bundle of rights is obvious to all, it will not necessarily be achieved. Inefficient configurations can persist for long periods of time. Negotiation among stakeholders can help to move the rights towards more efficient designs, but political costs can make it difficult to make the credible commitments that this kind of intertemporal transaction typically requires.

The success of the Forest Code depends on this kind of transaction. There are clear gains to changing the current environment of uncertain property rights given the presence of externalities in terms of deforestation, carbon and biodiversity, as well as the lack of security for production and investment. Yet the negotiation for this change takes place in a status quo in which each side's willingness for exchange depends on their current endowment and the value today and hereafter of what they give up and what they receive. That is, the necessary political exchanges require consensually secure property rights. As suggested above, the best way of achieving this is to pursue the program in through consistent action that builds trust in the new set of property rights.

2.3 Property Rights and Path Dependence

Because property rights are difficult to change, even in the presence of clear gains to trade, they are highly path dependent. Path dependence means that property rights tend to persist with the same design over long periods of time. It also means that the forms taken by property rights are highly contingent to initial conditions when they first emerged. Both of these characteristics are illustrated by the comparison by Engerman and Sokoloff of the different colonization trajectories of countries that emerged from the discovery of the New World in the 15th century (Kenneth Sokoloff and Stanley Engerman, 2000). They argue that where European colonizers encountered labor that could be coerced or imported (slavery) for the production of precious metals or large-scale plantations, institutions were

established to enable that form of economic organization. These were extractive and coercive institutions that lead to high inequality of land and of wealth, with power concentrated in a small elite. This configuration of institutions naturally led to policies (i.e. educational, immigration, access to land, franchise, access to credit, judicial, etc.) that perpetuated the concentration and exclusion over time, thus reinforcing the path dependence.

On the other hand, colonies where there was no possibility of using coerced labor, such as the U.S. and Canada, led to more inclusive institutions that gave rise to a more equitable society. Here, too, path dependence meant that inclusive institutions produced inclusive policies that perpetuated the nature of open access societies. Because inclusive institutions are more conducive to economic growth and development over the long term, the colonies that began producing greater wealth and activity eventually became poorer than those that were initially more impoverished. This phenomenon is known as the “reversal of fortune” (D. Acemoglu et al., 2005). Section 3 compares the historical trajectories of Brazil and the U.S. to show how initial endowments and path dependence in each colony contributed to outcomes centuries later.

The point is that although property rights evolve and change, history nevertheless matters. What can be achieved in designing property rights is highly contingent on how the current set of property rights and distribution of power were reached. Since the Forest Code was revived in the mid-1990’s, it has been a highly controversial and disputed issue. In many ways it is quite surprising that the Forest Code legislation has been so prominent in the country’s policymaking agenda. Many people assumed that because landowners are well-organized and well-represented in Congress, they could dominate the political debate regarding this issue. But if they were the single dominant interest, the Code would have been abandoned long ago. The fact that it has been kept in the policymaking agenda indicates that there are also strong interests in favor of an effective implementation of the Forest Code. This includes environmental interest groups and voters. The fact that the most disputed votes in the 2012 revision of the Code in Congress focused on the parametric details rather than the actual decision to pursue the policy indicates that both sides were relatively well matched (Lee Alston and Bernardo Mueller, 2007). The balance of power between the different interests is a crucial determinant on what form the Forest Code will

take as it gets implemented. Path dependence in a country with one of the highest levels of land ownership concentration has made the evolution of Forest Code legislation slow and uncertain. But changes in Brazilian society's beliefs and preferences show that endowments are not fate.⁴

2.4 Design Principles of Robust Property Rights Institutions

The previous three points have argued that property rights are complex, multidimensional, possibly different from the *de jure* rules and are evolving but hard to change. What practical lessons are there in property rights literature for the design and implementation of the Forest Code?

One of the most acclaimed approaches to understanding and designing property rights has been that of Elinor Ostrom. Ostrom documented that small groups and communities throughout the world often defy the conventional wisdom that resources held in common property are inevitably fated to fall into the tragedy of the commons (Elinor Ostrom, 1990).⁵ Ostrom's "Law" proposes that "a resource arrangement that works in practice can work in theory" (Lee Fennell, 2011). This insight started a large literature that collected numerous cases related to all sorts of assets and resources. These showed that small groups are frequently able to self-organize and create governance structures, which can lead to sustainable uses of the resources.

From this large catalogue of successful and failed common property resource use cases, Ostrom distilled eight design principles of property rights institutions (Elinor Ostrom, 2009, 1990). Design principles are not specific rules, but rather they are generalities that are common to many instances of successful resource management. Although the Forest Code deals directly with private property and not common property resources, the environmental role of the legal reserves means that there is an important common property dimension, so these principles can still be helpful.

⁴ This is a reference to **Nugent, Jeffrey B. and James A. Robinson.** 2010. "Are Factor Endowments Fate?" *Revista de Historia Económica (Second Series)*, 28(01), 45-82. They state that "while geography, factor endowments and technology are clearly important, their implications for the institutional structure and thus development are conditional on the form that political competition takes in society. Endowments are not fate."

⁵

Table 1 shows eight questions that translate Ostrom's original principles into a form that is directly relevant for policymakers considering a specific policy.

Table 1. Questions for Creating Robust Property Rights Institutions Based on Design Principles

| | |
|---|---|
| 1 | How can we better define the boundaries of this resource and of the individuals who are authorized to use it so as to ensure clarity in who is authorized to harvest and where harvesting is authorized? |
| 2 | How can we improve the relationship between the benefits received and the contributions to the necessary costs of sustaining this system? |
| 3 | How can we enhance the participation of those involved in making key decisions about this system? |
| 4 | Who is monitoring this system and do they face appropriate incentives given the challenge of monitoring? |
| 5 | What are the sanctions we are authorizing? Can they be adjusted so that someone who makes an error or a small rule infraction is warned sufficiently so as to ensure longer-term compliance without having to impose unrealistic sanctions? |
| 6 | What local and regional mechanisms exist to resolve conflicts arising over the use of a resource? |
| 7 | Are there functional and creative efforts by local appropriators to create effective stewardship mechanisms for local resources that should be recognized? |
| 8 | How do we create a multiple-layer, polycentric system that can be dynamic, adaptive, and effective over time? |

Source: (Elinor Ostrom, 2009)

These principles can be applied to the Forest Code. The first design principle requires the boundaries of the resource to be defined clearly. For the Forest Code this refers not only to the boundaries of the property itself, but also to the size and location of the legal reserves and other required protected areas, such as river banks and steep slopes. The lack of registries, cadasters, and maps in Brazil has long been an obstacle to defining boundaries in land-related policy, including earlier versions of the Forest Code. Yet, new technologies have greatly improved capabilities in this area. This principle ratifies the importance of efforts to establish clear boundaries.

The second principle requires a proportionality equivalence between the benefits from the Forest Code and the costs imposed by the system. According to Ostrom, this principle:

“(R)elates to the likelihood that participants will feel that the rules they are using are equitable. If some people pay low costs but they get high benefits over time, this inequity is

a matter of frustration for the participants and may lead to more and more participants refusing to abide by the rules because they are unfair. Thus, this design principle is directly related to the types of attitudes that are necessary to sustain a system over the long run. If some users get all the benefits and pay few of the costs, few of the others are willing to follow rules over time.” (Elinor Ostrom, 2009)

In the case of the Forest Code, this issue is highly controversial. The legislation imposes all of the costs for maintaining a legal reserve on the landowners. These are very significant, composed of the opportunity cost of land use, and, in many instances, the cost of restoring the vegetation. The landowners feel that the *de facto* legislation never effectively required a legal reserve and that mandating this now amounts to a regulatory taking. On the other hand, environmentalists note that the *de jure* legislation has been in place for decades and argue that landowners have already benefited all this time from evading these rules. They argue that it is fair to now require compliance. What the second principle suggests is that this divergence in perspective can be very damaging to the program’s success and warrants efforts to achieve some measure of consensus. In part, the efforts being made to reduce the costs of compliance, such as allowing trading of forest reserve obligations from higher to lower opportunity cost land, serves the purpose of reducing the divergent incidence of costs and benefits.

The relevance of the other design principles to the Forest Code will not be discussed here. In addition to introducing the design principles concept, the point is that these and other recommendations from the property rights literature regarding institutions, power, and context can help to inform more effective policies.

3. Historical Evolution of Property Rights in Brazil

The four basic insights about property rights described in the previous section have the following implications for the Forest Code in Brazil. The process of implementation of the Forest Code is inherently a redefinition of the bundle of property rights to land, in which there is currently a mismatch between *de facto* and *de jure* rights. This mismatch is consequential because the redefinition of rights has introduced uncertainty about which rights, *de facto* or *de jure*, will prevail. The redefinition of rights is a political process by necessity. There will be winners and losers. One of the key determinants of the outcome of this political process is the current rights situation. The status quo reflects the current endowments of each party at the negotiations and also the reversionary point if no change is

made. Thus, it is important to understand what the current rights are, i.e., what powers and constraints the rights imply for the landowners, for the state, and for the rest of society.

Because property rights evolve over time in a highly path dependent manner, to understand property rights in Brazil today and what they imply for the Forest Code, it is crucial to understand their historical evolution. This section describes the evolution of property rights to land in Brazil by comparing it to the parallel trajectory followed by the US. The comparison is enlightening because both countries started off as colonies abundant in land and scarce in labor, yet their paths diverged dramatically due to several contextual factors.

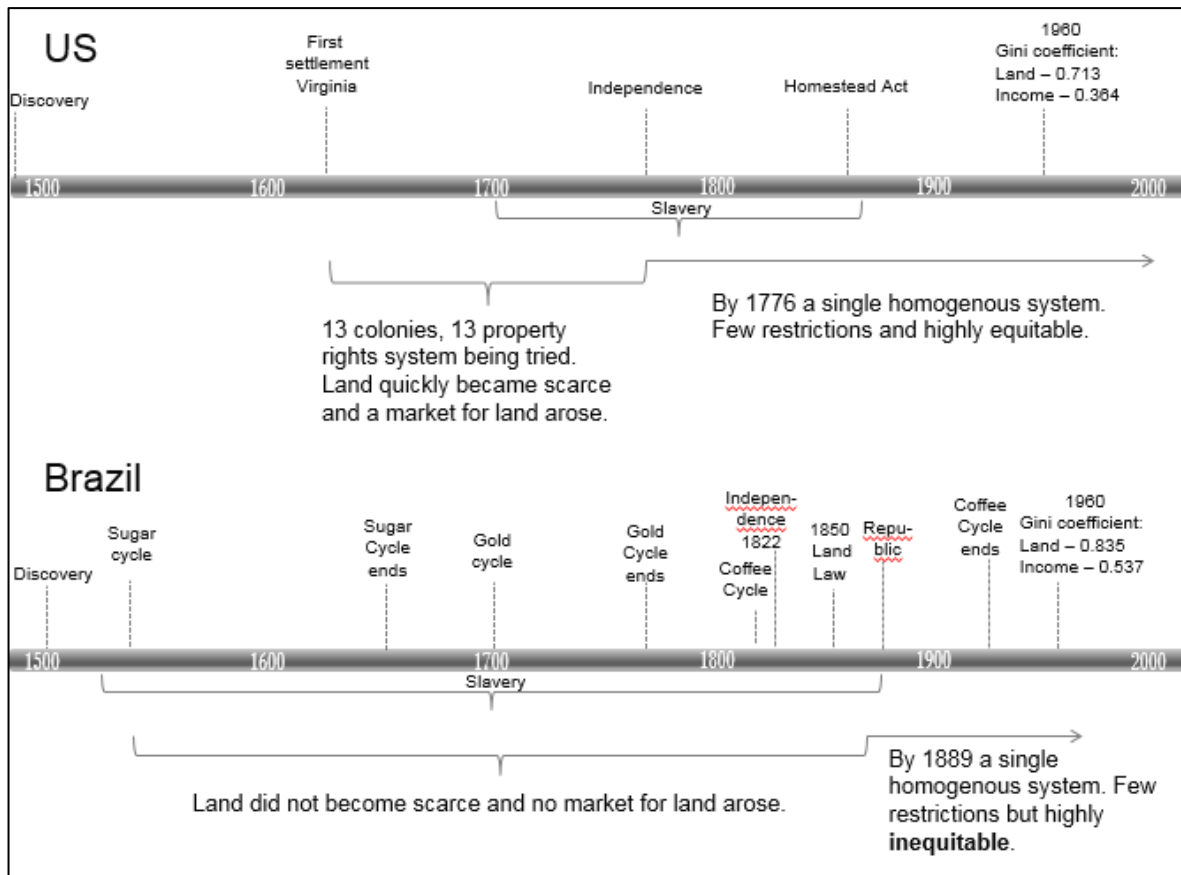
This comparison focuses on two main characteristics of property rights that emerged in each country: (i) the extent to which property rights facilitated or constrained the productive use of land and a functioning land market; (ii) the rise of a concentrated or equalitarian pattern of landownership. The next two subsections explain why it is that while the US quickly developed property rights that placed few restrictions on land use and transactions, Brazil also arrived at similarly unrestrictive property rights to land, but only after a much longer period of time. While the US process led to a relatively equalitarian and inclusive pattern of landownership, wealth distribution, and open access to voice and political participation, in Brazil the result was extreme concentration of land, wealth, and power that persists today.

3.1 The Evolution of Property Rights to Land in the US

Although the US was discovered eight years before Brazil, actual settlement and productive use of the land, as opposed to extraction and trade, was initiated almost a century earlier in Brazil with the production of sugar. Figure 2 compares the timeline of events related to land use in both colonies/countries. This gap is related to the fact that endowments of land, climate, and labor availability allowed for the immediate establishment of lucrative sugar mills in Brazil but not in America, where there were no sedentary populations to coerce or exportable tropical product. Slavery would only become economically viable in large scale in America towards the end of the 17th century with the diffusion of tobacco and cotton, whereas slavery was almost immediately adopted in Brazil. Thus whereas institutions for land use and property rights evolved simultaneously with coercive labor practices in Brazil, in the U.S. large scale slavery arrived subsequent to the

development of land-related institutions. This differential timing is consequential, given the fact that in path dependent processes the initial conditions have large impacts on which trajectories are followed (Daron Acemoglu et al., 2008, Stanley Engerman and Kenneth Sokoloff, 2002).

Figure 2 – Evolution of Property Rights to Land in Brazil and the US



The emergence of unrestrictive property rights to land and a relatively equal pattern of ownership in the U.S. developed during the period that began in 1621, when the first settlements were made in Virginia. It continued until independence in 1776. By that time the characteristics of property rights that prevail today in the U.S. were already basically in place throughout all of the colonies. But what happened in between these dates was an intense process of experimentation with a wide variety of institutions. This created an evolutionary dynamic that “selected” for the designs that were best suited to the context of abundant land and scarce labor. An evolutionary process is one where there is variation,

selection, and replication. Each of these three elements were present in America during this period.

The way in which the English Crown colonized America introduced the variations in types of property rights. The biggest hope for the Crown was to find valuable metals as they did in Spanish colonies, but neither metals nor any crop that could be profitably exported presented an opportunity. The abundance of land meant that it could not be sold as an alternative means of deriving income from the colony; the land simply had no value. Faced with these poor prospects, the Crown adopted the strategy of essentially giving away the land as an incentive for groups to colonize the territory and initiate some form of economic activity. The hope was that in time – many decades later – the colonies would grow and produce income flows and wealth that the Crown could tax. Compared to the immediately thriving colonies of Spain and Portugal, these meager and distant prospects were indeed a disappointment for the British Crown.

Because the prospects for settlers were equally meager, the land grants that were made by the Crown not only needed to be free, but also the Crown could not impose too many restrictions on the rules and institutions that settlers could put in place. In all, thirteen colonies were granted in America, most to companies, two to individuals and one settled directly by the Crown. It is not the intent here to describe the details of the property rights institutions in each colony. The important point is that the rights varied greatly. Without restrictions as to what the colonists could put in place, each colony expressed their own interests and beliefs through the rules they chose. Virginia started out with communal labor requirements. Georgia limited size of holdings and prohibited slavery. Massachusetts transplanted Dutch patroon institutions. Lord Baltimore in Maryland and William Penn in Pennsylvania devised their own idiosyncratic visions and put themselves at the top.⁶

Although the colonists were free to choose the institutions they wanted, not every arrangement was equally successful in mediating the harsh conditions of colonial America in the 16th century. Given the abundance of land, labor was the scarce resource on which survival and prosperity depended. Contrary to most other nations at this time, Britain had a

⁶ For details and references, see Mueller, Bernardo. 1994. "The Economic History, Political Economy, and Frontier Settlement of Land in Brazil," *Economics*. Champaign-Urbana: University of Illinois, 206. See also Harris, Marshall. 1953. *Origins of the Land Tenure System in the United States*. Ames: Iowa State College Press.

sufficiently large population to start sending residents to the colonies. The Enclosure movement in Britain had raised agricultural productivity, allowing for faster demographic growth and the dislocation of part of the population from rural to urban settings. Furthermore, means of financing the dislocation and adaptation of the colonists were enabled by institutions such as headrights and grants of entire townships to well-knit religious groups.⁷ These institutions thus help overcome many of the obstacles to immigration.

After the influx of immigrants to the colonies, economic activity began to emerge in some areas fomenting localized specialization and gains to trade. This improved the quality of life and attracted further immigration to those same areas. This process had positive feedbacks with greater immigration leading to a greater extent of the markets, leading to more specialization and greater gains to trade, fomenting more immigration. Eventually trade would expand from being localized to linking different localities within the colonies and even overseas. As the size of the population increased, the demand for land increased in each locality. As this process grew and the more central land in each center of activity was already taken, land started to acquire value. The competition for land naturally led to a price gradient. Land closer to the markets grew more valuable and decreased with distance. Once land had become a commodity, markets arose and facilitated exchanges that helped allocate land to its highest uses.

In this process of land becoming a merchandise, the key ingredient was the availability of (scarce) labor to be combined with (abundant) land. Although England's demographic situation provided potential fluxes of immigrants willing to risk their lives in the colonies, the supply of labor was still much below the demand of the thirteen colonies. What ensued in this period (1621-1776) was therefore an intense competition between the colonies to attract immigrants to their domains. This competition was the "natural selection" of the evolutionary process of property rights emergence. Those colonies that managed to attract the most immigrants would prosper and grow more than the others. This competition turned out to be a great constraint on the institutions that the colonies could

⁷ Headrights were contracts through which one party (e.g. a landowner in the colonies) paid the trip and installation of a family to the New World and the family worked for that party for seven years in exchange. Headrights allowed for the immigration of a large contingent of poor settlers who could not have afforded to make the trip otherwise.

impose on their denizens. If any of the colonies had instituted restrictive and burdensome rules and property right requirements, immigrants could simply chose to “vote with their feet” and relocate to another colony with more amiable institutions. In Pennsylvania, for example, where land was sold for £100 for 10 acres and a quitrent (tax) of 2 shillings in 1713, Gates (1968: 41) notes that “the price was high compared with the cost of land in Virginia, and many immigrants soon moved from Pennsylvania to Virginia.”

The result of this competition was to push all colonies towards less cumbersome and more equalitarian rules and property rights institutions. By the time of the American independence in 1776, the thirteen diverse experiments in property rights to land had already converged to a single homogenous set of institutions that placed very few restrictions on land use and exchange. This convergence is the “replication” part of the evolutionary process. The competition for immigrants helped to place land in the hands of a large fraction of society, creating a thriving middle-class that had access to the political process and contributed towards maintenance of the open access nature of the country’s institutions. The basic property rights for land that had emerged by 1776 were maintained by all states after independence. This formed a crucial part of the institutional infrastructure that established the conditions for the rise of the United States as the wealthiest nation in the world during the 19th and 20th centuries.

3.2 The Evolution of Property Rights to Land in the Brazil

The preceding account of the emergence of property rights to land in the U.S. might seem to have something missing as it does not mention the large plantations that eventually dominated agriculture in the U.S. South. While it is true that the slave-based, mono-culture, plantation system there had many resemblances to the Brazilian system, there were some crucial differences. The most important is that in the U.S. the plantations arose in a context where, for the previous century, the rules had been patterned on family farms. These farms did not disappear when the plantations entered the scene. They simply relocated to areas that were not used by plantations and remained in the division of labor of the economy, producing foodstuff for domestic consumption rather than exports. In Brazil, there never were any small family farms, as the system was born and remained based predominantly on large plantations. This distinction was fundamental as it determined the initial institutions

that would persist in character over time in each country (Bernardo Mueller, 1994, Kenneth Sokoloff and Stanley Engerman, 2000).

Contrary to the varied trial and error with property rights institutions that took place in the U.S., there was almost no experimentation in Brazil. Figure 2 shows that although Brazil developed agricultural production almost a century before America, it would take almost four centuries for land to become a scarce good transacted in market. Thus Brazil lagged behind the U.S. by almost one century.

The Brazilian timeline in Figure 2 shows the series of economic boom and bust cycles that the colony experienced prior to the rise of land markets by 1900. The sugar cycle from 1550 to 1650 generated great wealth, but it did little to induce other forms of economic activity or to increase the free population. This failed to make land scarce and stimulate a market. By 1600 there were only 120 relatively autonomous sugar mills in Brazil, and at the height of the sugar cycle, the number of mills was still small relative to the availability of land. (Prices collapsed after 1650 as the Dutch and then the English started producing sugar in their colonies.)

The main institution for allocating land during most of the colonial period was the *sesmaria*, which was a grant of land from the Crown. The Portuguese had used these since the 14th century as a means to increase agricultural production in the rural regions depopulated by the plague.⁸ *Sesmarias* are often interpreted as an elitist gift among friends to which the common citizen would not have access. But the true motivation was not to limit access to land in a context of excessive competition, but the contrary. *Sesmarias* were a response to the lack of demand for land. They were an incentive for those who had the capability (owned slaves and had the technology) to venture out in the colony to generate wealth, which the Crown could then tax. As such, this colonial strategy was not that different from the one followed in the U.S. But contrary to what happened in America, in Brazil these initial grants of land did not generate the conditions under which an intense competition for land would raise prices, attract immigration, and evolve new rules for the allocation and regulation of land. Throughout the entire colonial period even though *sesmarias* were the *de jure* form of access to land, in *de facto* terms the abundance of land

⁸ *Capitanias hereditárias* are often cited as an important form of allocating land in colonial Brazil. Shortly after discovery Brazil was subdivided into 14 sections that were granted to Portuguese noblemen. This was, however, a short-lived experiment, soon abandoned and had little lasting impact.

meant that simply taking possession of land was what prevailed. In the absence of scarcity this open access did not induce conflicts or other forms of rent dissipation. In fact, in 1822, two weeks before independence, the Emperor even abolished the *sesmarias* and did not replace them with any other rule for allocating land; this is a clear sign that land was not a scarce, disputed resource.

The gold cycle of 1700 to 1770 also generated great wealth and led to a ten-fold increase in the population. But even this intense activity did little to generate a multiplier effect in terms of other economic activities. Although land containing precious metals was scarce and generated detailed rules governing its use and allocation, this was always a localized and fleeting effect. The rules had little enduring impact once the resource was exhausted. As with the sugar cycle, this episode did not lead to the emergence of a class of merchants nor to a significant class of small farm owners.⁹

It was only with the production of coffee, starting slowly in the first half of the 19th century, that the emergence of land as a market-based commodity began. After independence, the 1824 Constitution failed to mention land or to establish new rules to substitute for the abolished *sesmarias*. In the institutional vacuum that ensued, there was massive claiming of possessions across the country. But, since this was a period of economic stagnation and low commodity prices, there was little actual land use so that conflicting claims to land did not lead to physical or legal conflicts. Even though coffee was still a new crop and international prices would be low until the late 1840's, the availability of idle land and slaves induced a gradual expansion of the coffee frontier. The frontier started near Rio de Janeiro and moved down towards São Paulo. This expansion increased competition for land and led to the emergence of a price gradient. Because there were no formal property rights institutions to mediate this increased competition, conflict ensued. The nature of this conflict was not of large landowners against peasants or squatters, but rather between large landowners who had the ability to engage in coffee production.

⁹ For a rigorous empirical analysis of how the institutions that were established during the sugar and gold cycles had persisting effects on current Brazilian institutions, see **Naritomi, Joana; Rodrigo R. Soares and Juliano J. Assunção**. 2012. "Institutional Development and Colonial Heritage within Brazil." *The Journal of Economic History*, 72(02), 29.

These conflicts, fought through gunmen and lawyers, implied rent dissipation, so by the 1840's, as predicted by the Demsetz model reviewed above, there arose a demand for new, more efficient property rights. The Land Law of 1850 was the response to this demand. Because the ruling elite in Parliament wrote it, the new rules naturally catered to the interest of the land and slave owning elite. The law recognized all *sesmarias* and all possession that had been taken until then (which were in the hands of the landed elite) and established that from then on access to land could only be achieved through purchase. This was motivated by the attempt to force new immigrants to work on the already existing plantations rather than venturing out to the frontier in the search of free land. At this time the British Crown was pressuring Brazil to end slavery, and in 1850 all importation of slaves ceased. The new law reflected the landowning elite's concern for assuring a supply of labor for a coffee boom that would last until 1930. The law was meant to restrict the access to land by poor immigrants and other claimants, but not by the coffee elite, which continued the practice of simply claiming possession of land as the coffee frontier expanded greatly during the second half of the 19th century.

The result of this process was that by the time of the fall of the empire and the proclamation of Brazil as a republic in 1889, land had become a valuable commodity. It was regulated by unrestrictive property rights, which were essentially identical to those that exist today. They allowed the owner to produce, exclude, divide, sell, etc. Contrary to the U.S., however, the ownership of the land was highly concentrated in the hands of a small fraction of the population. Despite the change in the form of government, the concentration of power followed the concentration of land, and wealth meant that the new system perpetuated the extractive nature of the previous regimes. With the abolition of slavery in 1888, an intense process of immigration of poor peasants from Europe led to important demographic changes in the country. But under the new system, neither the new immigrant population nor the freed slaves had access to land ownership nor to a voice in government. The path dependent nature of the country's development meant that the property rights institutions that 20th century Brazil inherited were deeply rooted and would prove resistant to change. Governments and society recognized the perverse consequences of this highly skewed distribution of land ownership at least since 1946 when land reform was written into the Constitution. Yet, despite attempts by all governments since to change the pattern

of landownership, including attempts by a military dictatorship and a highly inclusive democracy, Brazil's land and wealth concentration remain today one of the highest in the world. This is further evidence of the tenacity of path dependence to lock-in past decisions. The next section explores the impact on the economy, society, and the environment of the set of property rights to land that emerged from this historical process.

4. Impacts of Property Rights on Social and Economic Performance in Brazil

A cursory look at the use of land in Brazil reveals signs of rampant rent dissipation in the form of conflict, violence, missing markets, suboptimal use, unsustainability, deforestation, and missed opportunities. To what extent are these inefficiencies related to the country's form of property rights to land? In the next subsection we show an inventory of the kinds of distortions that property rights have induced across the world according to the literature. The subsequent subsection will then examine which pathologies related to land use in Brazil have been linked to property rights.

4.1 Property Rights and Performance: General Evidence

There is a very large academic literature that tests empirically the impact of property rights on behavior, resource use, and performance. This literature is not restricted to land, but applies to any resource or asset over which the notion of property is relevant, such as wildlife, minerals, human capital, ideas, innovations, spectrum, and airspace. The interest here is on evidence of the many ways in which property rights to land can impact the economy and society, not limited to Brazil.

Table 2 provides a list of pathologies that have been associated with property rights that are ill defined or insecure. For each pathology, a citation is provided of one or more studies that found empirical evidence of the link to property rights. The purpose is not to provide a complete survey of all pathologies nor of all studies, but rather to show a representative sample of evidence that property rights matter. It will not be specified what was the exact impact; different studies often find different effects. Instead, the purpose is to show the variety of channels through which property rights have been consequential. Inclusion in the table does not mean that the evidence found is widely accepted or that the studies don't have any flaws. Empirical tests that seek to attribute causality are always difficult to perform because data is almost always incomplete and there are many confounding factors. In the area of property rights these difficulties are particularly severe.

The table simply gives a notion of the wide array of impacts that property rights can have and indicates some sources for the interested reader. The studied effects range from the more obvious consequences, such as impacts on investment and productivity, to less expected ones, such as gender inequality and teenage pregnancy.

Table 2 – Evidence of the Impact of Property Rights

| Pathologies ascribed to insecure property rights | Evidence |
|---|---|
| Reduced investment | Besley (1995) – Ghana Field (2005) – Lima, Peru slums Carter and Olinto (2003) – Paraguay |
| Overinvestment or premature investment | Anderson and Hill (1990) – U.S. West 19 th century |
| Deforestation | Mendelsohn (1994) – cross-country Jamarillo and Kelly (2000) – Latin America |
| Distorted tenancy markets | Conning and Robinson (2007) – India Deininger, Ali, Alemu (2008) – Ethiopia |
| Expenditure in defense | Feder and Feeny (1991) – Thailand |
| Reduced productivity | Goldstein and Udry (2008) – Ghana |
| Conflicts and violence | Gordillo, de Janvry, Sadoulet (1998) – Mexico Sanchez et al. (2010) – Colombia Alston, Harris, Mueller (2012) – Australia, U.S., Brazil |
| Inferior technology | Bandiera, (2007) – Nicaragua |
| Reduced asset values | Allen (2002) – Rhino horn |
| Impediments to sale/rent to higher valued uses | Deininger and Jin (2003) – Vietnam |
| Reduction of hours worked | Field (2003) – Peru |
| Gender inequality and fertility effects | Field (2003) – Peru Deininger, Ali, Alemu (2008) – Ethiopia |
| Bribes and corruption | Lobo and Balakrishnan (2002) – Bangalore |
| Lower tax collection | Burns (2007) |
| Impediments to school completion | Galiani and Schargrotsky (2010) – Argentina |
| Teen-age pregnancy | Galiani and Schargrotsky (2004) - Argentina |

4.2 Property Rights and Performance in Brazil

The description of the historical evolution of property rights to land in Brazil in section 3.2 explained an extremely high concentration of landownership was reached by the 20th century. The implication of this was that both in *de jure* and in *de facto* terms the rules for the allocation and use of land were fairly closely related, as both the laws and the physical reality privileged the landed elite. This state of affairs enabled a steady expansion of the agricultural frontier and production after World War II, though at low levels of technology and productivity (Lee Alston and Bernardo Mueller, 2016, Bernardo Mueller and Charles Mueller, 2014).

However, in Brazilian society the belief emerged gradually that such extreme concentration of land and wealth was not desirable from an economic or a social justice perspective. Over the second half of the 20th century, there were several punctuated and intermittent attempts to institute policies to counter this state of affairs. Many of these attempts were written into laws and even into constitutions. Most were of limited or no effect as they often implied redistribution from the powerful elites to poorly represented groups in society, so they were ineffective. Yet starting in 1985, with re-democratization after two decades of military rule, the sentiment towards correcting the excessive concentration of land and wealth emerged as a central belief in Brazilian society. Not only did the new perspective induce more legislation imbued with this purpose, but it also led to greater success enforcing the legislation, at least partially.¹⁰ The 1988 Constitution was dominated by this sentiment and helped codify the belief in social inclusion. In many ways the original document went too far in this other direction, contributing to the hyperinflation that followed. But, over time many of the excesses of that document were revised, and it has been an important instrument in the unprecedented fall in inequality in Brazil from 1995 to the present (Alston et al. 2016).

This social change is important because it is the fundamental cause of what this paper has identified as the central problem of property right to land in Brazil: the divergence between *de jure* and *de facto* rights. In a first stage, as *de jure* rights started to incorporate rules that were contrary to the interest of landowners, the rules were simply

¹⁰ For a detailed analysis of this period of Brazilian history and the emergence of a belief in social inclusion, see Alston, Lee; Marcus Melo; Bernardo Mueller and Carlos Pereira. 2016. *Brazil in Transition: Beliefs, Leadership and Institutional Change*. Princeton: Princeton University Press.

ignored and the *de facto* reality prevailed. But as the belief in social inclusion became stronger, there was increasing pressure for the *de jure* rules to come into being and start to be implemented and enforced. Because the *de facto* rules have a strong constituency, a tension was created that led to increased uncertainty about how the allocation and use of land would be governed. This uncertainty resulted in rent dissipation and inefficiencies such as those described in Table 2. This subsection describes which impacts have been most pervasive in Brazil.

The clearest instance of this dynamic tension between *de jure* and *de facto* property rights to land can be seen in the notion of “the social function of property.” This term appeared for the first time in the Land Statute of 1964 and remains in effect today as the overarching set of principles that any land-related rule must follow. As expressed in Article 2 (and later reiterated in the 1988 Constitution) the notion of the social function of land is as follows:

Article 2 The opportunity of access to ownership of land is secured to all, conditioned on its social function, as per this Law.

§ 1° The property of land fulfills its social function when it simultaneously:

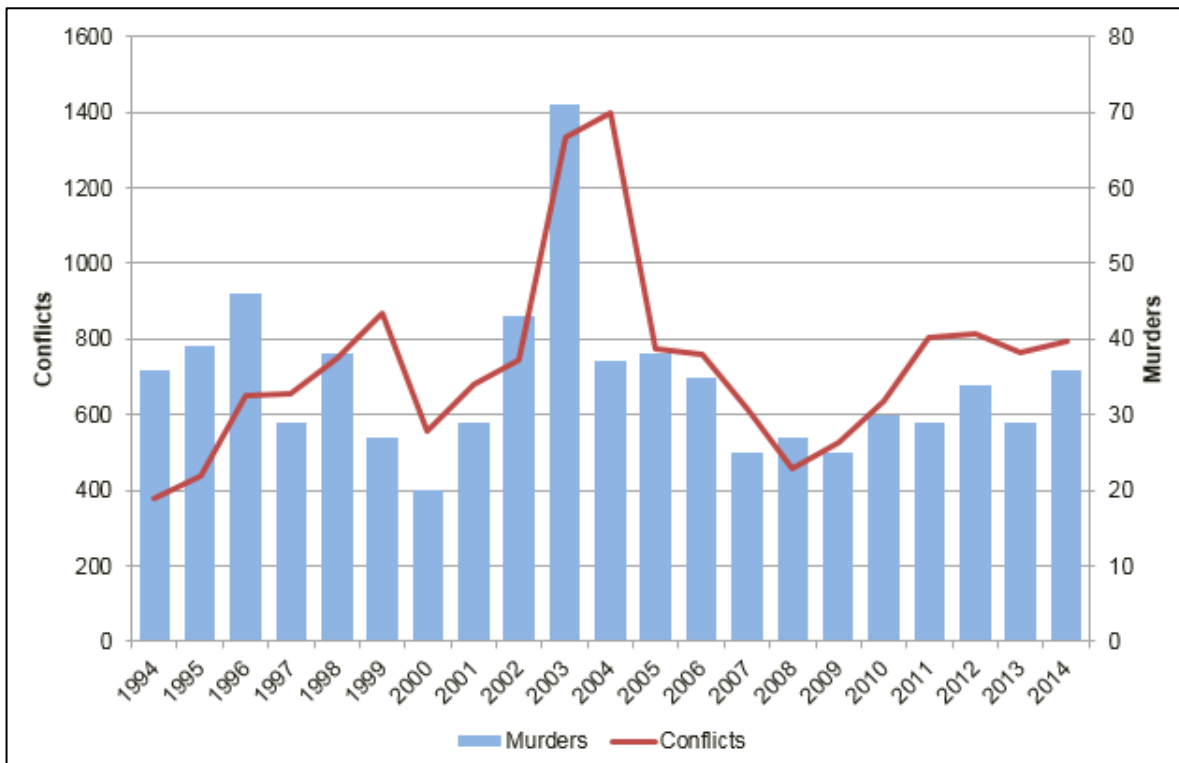
- a) promotes the welfare of the owners and the workers who toil in it, as well as their families;
- b) maintains satisfactory levels of productivity;
- c) assures the conservation of natural resources;
- d) observes the laws governing fair working relationships between those who own the land those who cultivate it.

This paper has identified five major pathologies related to land use and allocation in Brazil. These are linked the growing discrepancy between *de jure* and *de facto* property rights, which has become more severe as the demand for social inclusion clashes with the prevailing distribution of wealth and power. Most of these pathologies can be described in terms how land fulfills its social function as stated in the Land Statute and the Constitution. This does not mean that the legislation itself that is having this effect. Rather, the Constitution codifies the dominant belief in social inclusion and equality that has pervaded Brazilian society in the past decades. This belief created the wedge. By awakening old *de jure* rules and enabling new potentially effective property rights, the social function of land was simply one of the means through which the belief has been expressed.

4.3 Conflicts and Violence

Perhaps the most direct and obvious consequences of uncertain property rights are land conflicts and violence. Every instance of frontier evolution in Brazil has been accompanied by conflict and violence, from the coffee frontier in the 19th century described in Section 3.2 to the Amazon frontier starting in the 1960s. As relative prices change, the previous property rights are no longer suitable for handling the increased competition and conflict ensues. Although conflicts have always been present, starting in the early 1990's, the number of land related conflicts increased significantly in number and in prominence (see Figure 3). Conflicts and violence are an obvious form of rent dissipation, which indicate dysfunctional property rights, so why did this state of affairs become so prevalent?

Figure 3 – Land conflicts and violence in Brazil



Source: Comissão Pastoral da Terra. <http://www.cptnacional.org.br/>

This specific pathology is associated with the "social function of property" requirement that land must "maintain satisfactory levels of productivity." This requirement has been the justification, since the Land Statute of 1964, for the advancement of land reform through the expropriation of unproductive farms and their transfer to landless peasants who are expected to make them productive. Although the expropriation is

compensated, in most cases the compensation is punitive in the sense that it is imposed, not negotiated. As a result, it can fall below the original holder's valuation of the land. This style of land reform contrasts with milder forms of reform, such as the distribution of public land or land reform through taxation. On the other hand, it is less punitive than land reform through uncompensated expropriation.

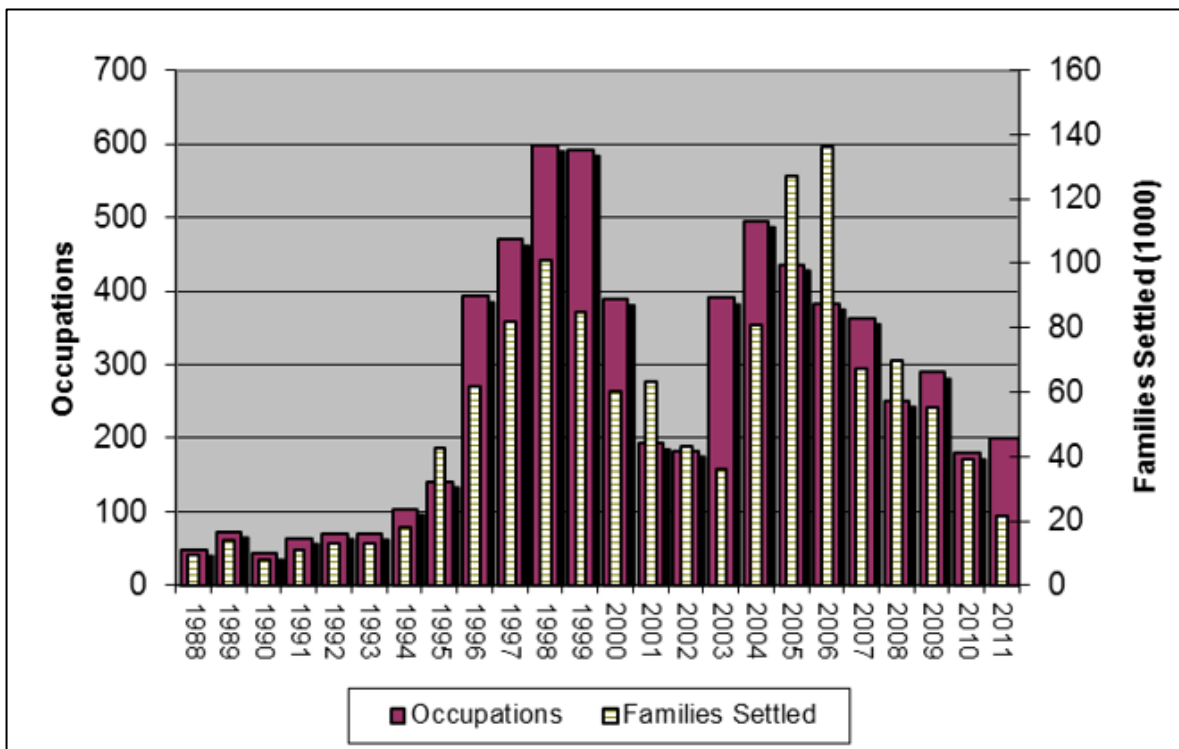
Both the military government (1964-1984) and the new democratic regime established extensive land reform programs. The first because of the perception that the vast idle latifundia were a significant obstacle to creating a great, industrialized power. The democratic regime established land reform to advance social justice. Land reform was one of the major banners of the New Republic and a symbol of the social inclusion it prioritized.

Yet, neither of these regimes managed to implement the programs they created with much fanfare. Land reform under any circumstances is a difficult policy to implement. It is even harder in a large and undeveloped country such as Brazil was at that time. In a country where wealth and power are so unevenly distributed, redistribution proved almost impossible. During this period, up to the early 1990's, land reform was conspicuously present in the political debate and the policymaking scene, but it had few practical results. The discrepancy between *de jure* and *de facto* property rights was present, given this constant presence of land reform in daily life, but it was not too consequential because the *de facto* reality clearly trumped the *de jure* aspirations. There were land conflicts at this time, but nothing like what is shown in Figure 3. However, as the belief in social inclusion deepened in Brazilian society, the intent to make the *de jure* property rights prevail became increasingly stronger. The inclusion of the social function of property in the land reform section of the 1988 Constitution was by far the most controversial item of an intensely debated constitutional process (Bernardo Mueller, 1998).

These developments created the opportunity for well-organized peasants to increase their pressure for land reform. Led by the Landless Peasant Movement (*MST – Movimento Sem Terra*) the number of invasions of unproductive farms grew dramatically in the 1990's. The *MST* realized that if they waited for the government to follow through with its announced land reform programs, nothing would be accomplished. So they devised the strategy of invading land that fit the requirements for expropriation (unproductive and/or

weak title) as a means to force the government to expedite their efforts. Figure 4 shows the number of occupations from 1988 to 2011 and the number of families settled by the government. The fact that settlements track occupations so closely shows that land reform in this period was fully driven by *MST* pressure; that is, land reform happened where they invaded. The intent was not to gain the land by sheer force. Instead the invasions were explicitly geared at exploiting the *de jure* rules that required “satisfactory levels of productivity.” The violence and conflict that often ensued as the landowners or the police tried to remove the occupants attracted the attention of the urban electorate through the media, which avidly covered these events. Urban voters in Brazil sympathized with land reform due to their belief in social inclusion as well as their mistaken perception that land reform is merely redistributive and thus has no cost to them.¹¹

Figure 4. Farm occupations and land reform settlements



¹¹ For a game theoretic treatment of the institutionally determined nature of rural conflicts in Brazil see Alston, Lee J.; Gary D. Libecap and Bernardo Mueller. 2000. "Land Reform Policies, the Sources of Violent Conflict, and Implications for Deforestation in the Brazilian Amazon." *Journal of Environmental Economics and Management*, 39(2), 162-88, _____. 1999. "A Model of Rural Conflict: Violence and Land Reform Policy in Brazil." *Environment and Development Economics*, 4(02), 135-60. For an analysis of the voter sympathy as the key driver of land reform see, Alston, Lee J; Gary D Libecap and Bernardo Mueller. 2010. "Interest Groups, Information Manipulation in the Media, and Public Policy: The Case of the Landless Peasants Movement in Brazil," National Bureau of Economic Research.

Source: (Lee J Alston, Gary D Libecap and Bernardo Mueller, 2010)

The result of this state of affairs was that the government was compelled by the commotion raised by conflicts and violence to put more effort and resources into land reform. This had the effect of strengthening the *de jure* rights but was not enough to make the *de facto* rights match the official rules. Thus, as the government increased its efforts, the uncertainty over property rights grew, which led to greater incentives for more invasions and violence. This style of invasion-led land reform has resulted in a massive redistribution of land and resources to over one million underprivileged families. It did not manage, however, to create a thriving substrate of productive family farms, as was the intention. The settlement projects that emerged from land reform at great expense in resources, environmental damage, violence, and human suffering have rarely become independent and productive, and they often experience high levels of sales of plots and abandonment.

Today Brazilian agriculture is still predominantly based on large, mechanized farms and agribusinesses (Bernardo Mueller and Charles Mueller, 2012). By now this process has run most of its course and land reform has receded to the background, with few land invasions. The *MST* and other groups have turned to new tactics to expedite the release of credit and subsidies the government owes them. Thus property rights to land in Brazil today may entail less uncertainty with regard to conflicts and violence as in the past. But, that is only after huge rent dissipation has already taken place.¹²¹³

4.4 Missing Tenancy Markets

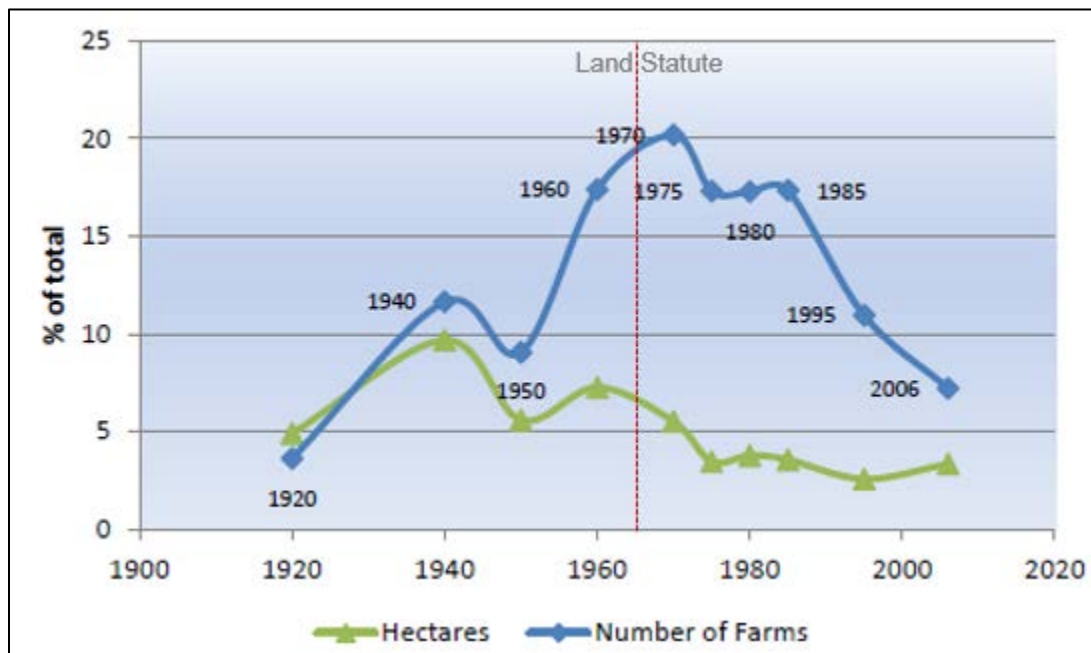
Tenancy contracts, through which an owner rents out the use of the land to another agent in exchange for a fixed sum or a proportion of the production, have been prevalent throughout time. They can improve the use of resources by helping to allocate land to its highest valued uses and to address differential preferences for risk. In addition, tenancy can

¹² The lessons from these experiences for the Forest Code will be drawn out in Section 5.

¹³ For further evidence and analysis of rural conflicts in Brazil see **Barros, Carlos Pestana; Ari Francisco Araujo Junior and João Ricardo Faria**. 2012. "Brazilian Land Tenure and Conflicts: The Landless Peasants Movement." *Cato Journal*, 33(1), 47-75, **Fetzer, Thiemo and Samuel Marden**. 2105. "Take What You Can: Property Rights, Contestability and Conflict," *Working paper*. University of Warwick, **Hidalgo, F. Daniel; Suresh Naidu; Simeon Nichter and Neal Richardson**. 2010. "Economic Determinants of Land Invasions." *Review of Economics and Statistics*, 92(3), 505-23, **Ondetti, Gabriel**. 2008. *Land, Protest, and Politics: The Landless Movement and the Struggle for Agrarian Reform in Brazil*. University Park, PA: Pennsylvania State University Press, **Vertova, Pietro**. 2006. "Property Rights on Unused Asset and Investment Incentives: Evidence from Brazil." *Tilburg University, Center for Economic Research, Discussion Paper*, 48.

be a major instrument through which poor peasants with little experience can climb the agricultural ladder and achieve landownership. In a country such as Brazil, where there is an abundance of underused land together with large contingents of landless peasants, tenancy contracts would seem to be an ideal means to solve two problems at the same time. However, relative to most other countries Brazil displays a remarkably low use of tenancy. Figure 5 shows the proportion of farms and area under tenancy contracts according to the agricultural census data. In 1995, less than 5% of the agricultural land in Brazil was under tenancy contracts. In the U.S., the comparable number was around 45% and in Belgium, France, and Germany, it was over 60% (Alain de Janvry et al., 2002). What is impeding economic agents in Brazil of engaging in tenancy contracts that could yield such obvious gains?

Figure 5 – Percent of farms and area in tenancy contracts



Source: (Lee J Alston and Bernardo Mueller, 2010)

Once again we can turn to the Land Statute to search for the codified expression of the forces that have blocked greater use of tenancy and sharecropping. Two of the conditions for the social function to be met are that arrangements (i) “promote the welfare of the owners and the workers who toil in it, as well as their families;” and (ii) that they “observe the laws governing fair working relationships between those who own the land those who cultivate it.” These requirements reflect a deep suspicion, not wholly unfounded

historically, that tenancy relations involve exploitation of peasants by powerful landowners. In a context where land reform and expropriations are a central part of the political debate, the sentiment expressed by this legislation had the effect of inducing many landowners to avoid tenancy relations, even when they were profitable from a purely economic point of view. Jonathan H. Conning and James A. Robinson (2007) present a model where the economic organization of agriculture and the political equilibrium determining the distribution of property are jointly determined. Their main result captures well what has happened in Brazil: “Despite possible economic benefits of tenancy, each landlord acting individually may choose to defensively limit the extent of tenancy in order to limit the possible consequence of future property challenges to their property.” (pg. 421). Lee J Alston and Bernardo Mueller (2010) use agricultural census data for all municipalities in Brazil through 1996. They show that a one-standard deviation increase in conflicts in the previous 10 years decreases the incidence of fixed rent contracts from 4% to less than 3% and the incidence of sharecropping from 2.5% to 1.3%. In areas that have more conflicts, land reform and the threat of expropriation is more salient, and thus the risk to the owner of entering tenancy contracts is greater.¹⁴

4.5 Deforestation

Deforestation is the pathology due to insecure property rights that is most directly relevant for the Forest Code. Because forests are often remote and difficult to access, monitoring and enforcement of property rights is also difficult, leading to great insecurity and uncertainty. There is a very large literature associating deforestation to dysfunctional property rights. Because of the Amazon, a large part of that literature is on Brazil. Some of these studies are: D. Acemoglu, S. Johnson and J. Robinson (2005); Lee J Alston et al. (1999); Lee J. Alston, Gary D. Libecap and Bernardo Mueller (2000); Lee James Alston et al. (1999); Claudio Araujo et al. (2009); Ari Francisco de Araujo Junior et al. (2008); Juliano Assunção et al. (2013); Juliano Assunção et al. (2015); Claudia Azevedos-Ramos (2008); Carlos Pestana Barros, Ari Francisco Araujo Junior and João Ricardo Faria (2012); Hans P. Binswanger (1991); Esteve Corbera et al. (2011); Denis J. Mahar (1989); Sergio

¹⁴ Other papers analyzing the dearth of tenancy in Brazil are **Assunção, Juliano and Joana Chiavari**. 2014. "Land Rental Markets in Brazil: A Missed Opportunity," C. P. Initiative, *CPI Report*. **Buainain, Antonio M.; Fernando Lima; José Maria Silveira and Patricia J. Almeida**. 2008. "Land Rental Markets and Land Access in Brazil," *BASIS Brief*. Madison: Land Tenure Center.

Margulis (2003); Pablo Pacheco (2009); Alexander Pfaff (1997); Jose Antonio Puppim de Oliveira (2008); André Albuquerque Sant'Anna and Carlos Eduardo Frickmann Young (2010); Andre A. Sant'anna and Carlos E.F. Young (2014). There are certainly many more.

Although it is difficult to separate which deforestation is caused by insecure property rights from other causes of deforestation, such as its profitability, the evidence makes clear that property rights are a major issue. The Land Statute's and Constitution's requirement of maintaining satisfactory levels of productivity may be one channel through which property rights induce deforestation. Cleared forest often serves as evidence of productive use, and thus it makes the land less susceptible to expropriation for the purposes of land reform. It is true that the same legislation requires the land to "assure the conservation of natural resources," but this contradiction in the legislation just increases uncertainty. With the land reform agency promoting productive use and the environmental agency promoting conservation, it is often unclear for the landowner how to proceed. The result has often been deforestation. In addition, forest clearing makes invasions easier to detect and the property easier to protect. It is often noted that the forest is more valuable to society left standing than it is felled, but given the difficulty of assigning the property rights so that they can be negotiated, the result has often been to cut. Many schemes have sought to establish better incentives for more efficient use of the resources, such as the REDD+, but the central challenge there is precisely the issue of defining and ascertaining property rights.

The literature cited above has identified many other channels through which property rights influence deforestation but these will not be detailed here. The main point is that poorly defined and insecure property rights have been a central determinant of deforestation in the Amazon and elsewhere, and through very similar mechanisms they will be crucial for Forest Code policy.

4.6 Distortion of Investment Decisions and Crop Choices

When property rights are insecure, many choices related to the use of the land may be distorted beyond what they would be under purely economic considerations. It is difficult to gauge the overall extent of rent dissipation due to these distortions, but several papers provide evidence for specific cases. Lee J. Alston et al. (1996) find evidence of reduced land-specific investment as a response to weak titles in the Pará and Paraná

frontiers. Pietro Vertova (2006) uses county-level data for Brazil to find evidence of sub-optimally large or premature investment in production activities as a means to strengthen insecure property rights. William Bowser and Carl H. Nelson (2012) find that land titles to low-income Afro-Brazilian communities (*quilombos*) lead to greater levels of income and welfare through their effect on production and investment, yet approximately 5% of these communities had formal land titles.

Crop choice has also been shown to skew away from purely economic and agricultural considerations. Lee J Alston and Bernardo Mueller (2010) find that in counties where there are more conflicts, and thus less secure property rights, the choice of which crops are planted is affected. Each crop has different implications for the risk of invasion and of expropriation. Natural pasture and unused land signal under-use of the land and hence increase the probability of the property being targeted for land reform. Many of the most valuable crops are temporary crops, such as soya (as opposed to permanent crops, such as coffee). Although a productive farm would not normally be subject to invasion or expropriation, a climate of insecurity in the region can nevertheless reduce investment. This study found that greater levels of conflicts had impacts at both the high and low intensity-of-use margins. A one-standard deviation increase in conflicts reduced the areas in natural pasture by 17%, in unused land by 3.7%, and the area of temporary crops by 3.1%, with compensating increases in planted pasture of 11.3% and permanent crops of 7.3%. Because the exercise controls for other determinants of crop choice, the results suggest that insecure property rights are distorting crop choice decisions.

4.8 Inequality in Production

Section 3.2 described the historical origins of land ownership inequality, wealth, and political power in Brazil. It was also shown how these characteristics of society and the economy tend to be path dependent and hard to change. It is consequently not surprising that even today Brazilian agriculture remains highly concentrated. Nevertheless, given the massive effort in land redistribution and in the official promotion of family farms in the past quarter century, one would expect there to be at least a moderately well-established and thriving stratum of small farms participating in the agricultural sector. But the data in Table 3 shows the shocking reality that less than 1% of the farms in Brazil generate more than half of the gross income, while the 66% less productive farms produce only 3.27% of

the income. This is such a highly skewed production profile that it suggests that the successful orientation of current Brazilian agricultural policy towards family farms may be a chimera.

Table 3 – Gross Income per Farm by Farms Size (2006)

| Brackets (min. wages) | Number of farms | % | Gross Income % | Gross Income per farm |
|----------------------------------|------------------------|-------------|---------------------------|----------------------------------|
| 0 to 2 | 2,904,769 | 66.01% | 3.27% | 0.52 |
| 2 to 10 | 995,750 | 22.63% | 10.28% | 4.66 |
| 10 to 200 | 472,702 | 10.74% | 35.46% | 34.49 |
| > 200 | 27,306 | 0.62% | 51.19% | 861.91 |
| Total | 4,400,527 | 100% | 100% | 10.45 |

Source: Navarro and Campos (2013: 15)

Inequality is not a consequence of poorly defined property rights to land, but it is related in many ways. The belief in social inclusion, which has been argued to be the fundamental cause of the disjuncture between *de jure* and *de facto* property rights, is a direct aversion to inequality. The greater the level of inequality, the greater the reaction will be in terms of programs and policymaking to address this issue. This often leads to attempts to make the latent *de jure* rules and legislation come too life, which then increases the uncertainty of property rights leading to many of the pathologies noted above.

4.9 Other Impacts

The consequences of insecure property rights to land discussed in this section are by no means a complete list of all the ways in which rents are dissipated and inefficiencies created due to the lack of better rules, norms, and institutions. Other examples are lobbying and rent-seeking expenses (Michael Albertus et al., 2015; Lee J Alston, Gary D Libecap and Bernardo Mueller, 2010; Ari Francisco de Araujo Junior, Claudio Shikida and Patrícia Silva Alvarenga, 2008; Gabriel Ondetti, 2008), and human suffering (Wendy Wolford, 2010). Many other examples are sure to exist, and this is still an active area of research.

5. Lessons for the Forest Code

What lessons can be learnt from the pathologies described above for the implementation of the Forest Code program? Some useful insights can be gained by a comparison of land reform and the Forest Code. Both are large-scale policies that involve

interfering directly with landowners' bundle of rights. While land reform removes from the owner the stick in the bundle relative to the right to leave the land unproductive, the Forest Code removes the right to cut down all of the vegetation. Although these requirements are in opposition, they are nonetheless both constraints on the owner's liberty to choose what to do with the land and are subject to many of the same forces. In the previous section it was suggested that although land reform in Brazil did manage to redistribute vast areas of land, the program nonetheless failed to reach its objective of generating a large class of productive family farms. Let us see why this happened and consider the implications for the Forest Code.

The previous section described how the key determinant of the success of land reform and redistribution was the belief in social inclusion that pervades Brazilian society and the support of the electorate who saw it as a way to compensate for past wrongs. A 2006 survey, for example, which asked respondents which reform the government should pursue first, had land reform at the top of the list when the question was open-ended. When a list of reforms was pre-specified, land reform was in the top 3 choices of over 45% of respondents (Fundação Perseu Abramo, 2006). Such preoccupation with land reform is remarkable in a country that is 80% urban and at a time when Brazilian agriculture was already one of the world's most productive.

Given that there was so much political support for the program, that so many resources were actually spent on the program, and that so much was actually done in terms of transferring land to landless peasants, why did the program fail in its main objectives? Lee J Alston, Gary D Libecap and Bernardo Mueller (2010) argue that the high level of popular support and scrutiny of the land reform program might have actually been a hindrance rather than a facilitator. An ongoing political debate became established on whether the government was doing enough in terms of land reform. This debate was constantly in the media and had important electoral consequences. Typically it revolved around the government's claims to have settled a certain large number of families each year, and the denouncement by the opposition and by the *MST* that the government was not doing enough. Inevitably this debate ended up concentrating on a single metric: the number of families settled in land reform projects. The problem is that, once a metric becomes the single measure of progress, all sides have incentives to focus solely on that metric. This

means that they may end up disregarding other margins that are not observed but are crucial for the program's success, such as whether the peasants were settling the land they were given and making it productive or whether they were living off subsidies or selling the land. Under pressure to meet next year's ambitious targets, the government had incentives to use cheaper frontier land (much of it in the Amazon) where the probability for settlers to thrive was much lower. The upshot was that the land reform program got deeply implemented along the one salient margin but was fatally under-implemented along several of the other crucial margins.

It is not clear whether the Forest Code is subject to the same sort of perverse incentives, but many of the same elements are present. Like land reform, the Forest Code is highly controversial and part of a public debate. There certainly is a large constituency that supports the program, though it is not clear if the issue is as deeply rooted in the electorate's consciousness as land reform has been. If this support turns out to be a lasting electoral issue, there will be incentives for the government to try to extol its accomplishments in terms of the number of farms brought into compliance or the area of forest reserve protected. Similarly, critics will point out shortcomings in those same margins. Yet the ultimate objectives of the program are things that are much harder to measure and to prove; that is, markers such as carbon sequestration, protection of biodiversity, preservation of the soil and water, may be the more relevant goals. The example of land reform warns that there is a risk that the political dynamics of the Forest Code could distort which objectives are ultimately pursued.

Lessons for the Forest Code can also be gleaned from another property rights-related area, the success at reducing deforestation in Brazil since 2004. In the early 2000's almost no one predicted that deforestation in the Amazon would start to subside at significant rates. The continual expansion of deforestation had always seemed impervious to all attempts to reverse the trends. Yet, suddenly the yearly statistics began showing encouraging numbers. How was this achieved? Might similar strategies be helpful for the Forest Code, which is clearly a related policy? The jury is still out on exactly what were the forces that led to the happy outcomes in deforestation (and whether they are sustainable), and no attempt will be made here to settle this issue. Yet one interpretation will be

highlighted, as it seems to point to some characteristics of the policies that might be similarly effective in the case of the Forest Code.

A typical reaction when confronted with the task of making a policy work is to suggest that the policymaker should simply put more political will, effort, and resources into enforcing the rules. This is a very top-down approach, and, as seen in the case of land reform, it doesn't always manage to address the difficulties that can emerge. *The Economist* (2013) provides an interpretation of the fall in deforestation in the Amazon that tells a very different story. Their interpretation focuses on the confluence of factors acting on deforestation, many of them at the local level. Although the federal environmental agency played an important role, many other players presented in this story also did. Most significantly, mayors and governors faced mounting electoral pressure from national and international conservation NGOs, and from a strong environmental sentiment among the electorate. This movement included efforts by independent public attorneys, a free and active press, and companies constrained by corporate social responsibility not to purchase from farmers who deforest. It would probably be a useful strategy for the Forest Code program to elicit a similar local and dispersed set of forces rather than rely solely on centralized implementation.

6. Conclusions

This paper has cast the major problem faced by Forest Code legislation as the uncertainty regarding property rights to land. In particular the problem lies in the stick in the bundle of rights that pertains to the right to cut the area known as the legal reserve of the property. *De jure* legislation places that stick in the hands of society, which has the right to the benefits that emanate from the standing vegetation in that area (carbon sequestration, biodiversity, etc.) Yet *de facto* property rights have been such that landowners have truly held that stick of the bundle, and many of them chose to cut down the corresponding area. The renewed effort to implement the Forest Code strengthens the *de jure* rights, but not enough to make *de facto* rights the same as those in the legislation. The uncertainty that ensues can have perverse incentives, which could lead to adverse reactions such as conflict, violence, deforestation, investment and crop choice distortions. This suggests that a key

objective of the new program should be signaling credibly which rules will prevail to reduce that uncertainty.

If property rights were perfectly defined and transaction costs were negligible, then it really would not matter for efficient land use whether the landowner or society had the right to the legal reserve. This is because it would always be possible and worthwhile to negotiate to reach the optimal allocation. This is an application of the most influential insight in the property rights literature, known as the Coase Theorem (Ronald H. Coase, 1960). The theorem states that clear property rights and no transaction costs lead to an efficient allocation of resources independent of who owns the property rights, as once the surplus has been maximized costless negotiations can find a division of the surplus that makes everybody better off. If we accept that the efficient thing to do is to have a standing legal reserve in each property, then under the condition of the Coase Theorem either society has the right to the legal reserve and it is kept standing by the owner, or the owner has the right to the reserve and society compensates him/her for not cutting it down. In this case, whoever has the property right has an impact on who bears the cost, but it does not affect whether the legal reserve will be kept standing or not.

The point of the Coase Theorem is not that this desirable outcome will automatically be realized. On the contrary, the expectation is that property rights are generally ill defined and insecure and transaction costs typically make negotiations prohibitive. Under such real world circumstances, the use of the resource that emerges will consequently not be the same efficient outcome of the idealized conditions. Who owns the actual property right to the resource turns out to be truly consequential, not only for the determination of who incurs the costs, but also for whether the legal reserve is kept standing. Brazilian legislation has decided that the property right to the legal reserve belongs to society. Thus, society has a right to expect landowners to leave a predetermined portion of their land in natural vegetation. This has been a disputed and controversial decision, but if we accept that this is what will prevail, then how should the Forest Code program be pursued so as to ensure the best use of the resource? The Coase Theorem suggests two important margins through which the implementation of the program could work to ensure its success: clear property rights and low transaction costs.

Clear property rights cannot simply be decreed; they have to be achieved through consistency of implementation of the rules. As the government consistently demonstrates that it will follow and uphold the legislation, not overstepping its bounds and not failing to punish those who deviate, in an impersonal way and without exceptions, the credibility of the program will emerge. This will make *de jure* and *de facto* rules converge. Reducing transaction costs would make it easier for all parties to reach negotiated alternatives that still meet the legislation. Through the implementation of the program, several means of facilitating these transactions are being pursued. For example, owners of highly productive land have been allowed to purchase a compensating legal reserve on less productive land. Such schemes not only make economic sense, but they should also help to increase compliance. Although the programs have to be carefully managed, they can make the difference between the success and failure of Brazil's grand policy experiment with property rights.

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