Scaling up Responsible Land Governance

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LAND MARKET DYNAMICS ON AN EXPANDING FRONTIER: INVESTMENT IN BRAZIL

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Abstract

In the last years the Brazilian agricultural frontier is expanding towards the cerrado region, more specifically the region called MATOPIBA, comprised by savannah areas of four different states located on the north and northeastern parts of the country. This research paper aims to show a recent pattern of second wave investments in the frontier aimed at inferior quality land. For this we organize the paper in 4 sections: 1) literature review of land price dynamics in the Brazilian agricultural frontier, 2) analysis of the land prices trends in the frontier and consolidated areas, 3) presentation and analysis of the field research data on land transactions over the last five years, 4) concluding remarks and policy proposals for securing land property rights and improving land governance over the MATOPIBA region.

Key Words: Frontier, Land Markets, Brazil.

INTRODUCTION

Brazil has a unique set of characteristics for land governance research: a vast territory with large amounts of arable lands, one of the biggest tropical rainforests in the world, an internal frontier that is still expanding, and a confusing land administration institutional framework that has seen some recent improvements. Meanwhile, land markets in these frontier areas are increasingly dynamic and, most often than not, leading to speculative land deals, insecure land rights, and environmental damage.

The weakness of the Brazilian land governance makes land management in the country chaotic and inefficient, as evidenced Reydon (2011), Reydon et al (2014), among others. There are several factors that led to this weakness, among them legal uncertainty is a problem resulting from poor land management which directly affects the dynamics of the land market and, ultimately, the country's process of economic development.

Even with the problems caused by weak Land Governance, Brazil continues to have an important role as an agribusiness powerhouse, being one of the major exporters of agricultural commodities.

The objective of this research is to analyze the specificity of the land markets in the expanding cerrado[1] frontier region called MATOPIBA[2]. During field researches in different areas of MATOPIBA we noted that a second wave of investments in land was happening focused on less fertile lands leading to more areas brought into cultivation. Our main hypothesis is that the expansion of the frontier in the last decade has a pattern that comprises of first the best lands being put to production causing an increase in land prices and, later, creates the demand for inferior quality lands that are then also put to production. This movement is happening throughout the MATOPIBA as the demand for agricultural land is increasing and with it is possible to see the speculative component of the land market.

The study of land market dynamics in the recent frontier is important because these are the areas with a recent strong demand for land and, at the same time, these areas are the ones that governance over land is lacking.

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[1] *Cerrado* is the Brazilian equivalent to a savannah ecosystem.
[2] MATOPIBA is an acronym for the *cerrado* regions in the states of Maranhão, Tocantins, Piauí and Bahia.

With this in mind a series of interviews were done in eight selected areas of the MATOPIBA during the year of 2015. The interviews were carried out exclusively with agents that had bought or sold a plot of land in the last 5 years (land deals from 2010 and 2015), and the same questionnaire was used in all interviews. The questionnaire included the following questions: total price paid, price per hectare, overall quality of land, percentage of land under cultivation at the moment of the land deal, type of cultivation, location, and legal status of the land (titled or not).

To ensure that our results are correct we also used the data collected by AgraFNP (an annual report called Agrianual) to analyze the land prices pattern in the same regions where the field research happened and to compare it with the land prices in consolidated agricultural areas in the southern Brazilian states. By doing this, it was possible to show how current speculative rushes affect the new frontier areas on MATOPIBA's cerrado and the dynamics of new second-best lands being put into the market as a sign of the transition between frontier and consolidated regions.

We structured the paper in four sections. The first section comprises a brief literature review on land price dynamics in the Brazilian agricultural frontier in order to bring forth a theoretical background to the phenomenon we are analyzing. In the second section, we use the data on land prices from AgraFNP to make comparisons about the dynamics of land price in the frontier areas and consolidated ones, and to compare the prices of the best lands with second-best ones in the same regions. The third section comprises the presentation of the data collected in the field research on land prices followed by statistical analyzes to describe if there is a consistent pattern of second-best land increasing in price in the frontier regions. In the fourth section, we sum up the results to show the specificity of the land price formation and dynamics on the frontier area comparing to other areas, concluding with some policy proposals aimed at securing land property rights and ensuring the efficient functioning of land markets to enable the development of the Brazilian recent frontier areas.

1. LITERATURE REVIEW

Land markets and farmland price valuation

According to economic theory, "in a competitive market, the price of land will equal the discounted sum of expected net returns obtained by allocating the land to its most profitable use" (Plantinga et al. 2002). If the land has more than one prospective use, the return to these uses can be incorporated in a simple additive form. For example, one can add the expected net returns to use in agriculture and the returns expected in other market, be it speculative (asset market) or future developments at the fringe of urban centers (urban land market).

To price these value stocks it is necessary to decompose each of the expected net return flows into the main components that drive the underlying price fundamentals. The hedonic pricing method was developed to achieve this goal. There are two forms of hedonic pricing. The first composes the price from the willingness to pay for a characteristic of a good, land in the case, which is derived from an underlying utility function. The second, and more used, the price is composed by the willingness to pay for a characteristic that is derived from the supply and demand of this characteristic in the market.

Considering a developing economy, land markets are usually incomplete depending on the region. In this case, the pricing of land according to the return to different uses will be valued locally, that is, taking into consideration only local characteristics and markets. This is compatible with the hedonic pricing method that derives the price according to the supply and demand of the characteristics of the land because segmented markets arise naturally from this theory.

It is also possible to include psychological and institutional considerations into the pricing of agricultural land. In a study of US farmland over a long period, Chavas and Thomas (1999) reject the hypothesis of risk neutrality and a pure capital asset pricing model. The authors conclude that in dealing with farmland it is also important to incorporate risk aversion on part of the agents and transactions costs. This can be done through the addition of proxies that capture these effects into the discounted flow of net returns.

These considerations are especially important for the case of this paper because we are interested in uncovering the pricing dynamics of "second-best" lands. Thus, local geographic, economics and institutional characteristics like weather, soil, population density, infrastructure availability (roads and electricity mainly) conditional on the nearby existence of "first-best" lands would capture the notion of willingness to pay, within a market valuation, of the characteristics of a specific farmland area also within an environment of decreasing risk and transaction costs.

Brazilian land markets

Brazil has the world's fifth largest national land area and this land resource represents a critical asset for the country's urban, agricultural and economic development, also providing essential environmental services. Nevertheless, it has an historical lack of governance over its lands, failing to provide secure land rights and to control the extensive frauds resulting in large processes of land grabs.

One of the main characteristics of the Brazilian land market is its concentration (land monopoly), with one of the highest rates of unproductive *latifúndios* in the world (Deininger and Byerlee, 2012; Paulino, 2014) simultaneously with a large number of people demanding land (Reydon, 2011a). Data from the 2006 Agricultural Census conducted by the Brazilian Institute of Geography and Statistics (IBGE) show that land concentration, estimated by the Gini index at 0.872 was higher than in 1975 (0.855) and 1995 (0.856). It also shows that, in 2006, 50 percent of the smallest farms occupied 2.3 percent of the total farm area, whereas 5 percent of the largest farms occupied more than 69.3 percent.

According to Reydon et al (2015), the possibility of real estate speculation, one of the most profitable and lowest risk activities in the Brazilian economy and may occur in three different ways: the first is the autonomous appreciation of the portfolio, where land brings high profits or at least maintain investment values (Sauer and Leite, 2012); the second is the change in land use from forest to pasture where the price of land, which is determined by the expected gains in agricultural production, rises immediately after deforestation – the profit is even higher when in unclaimed land (land grab), which happens mainly in the Amazon region (Reydon 2011b, Fasiaben et al, 2009); the third type of profit occurs through transforming rural property into urban on the outskirts of

towns, usually changing rural areas into illegal housing developments with high profit for the real state agentes operating the process (Reydon, 2011a).

The lack of land governance can also be found systematically in the results of the four stages of the Land Governance Assessment Framework (LGAF) applied to Brazil in the last years, showing that:

- There is a lack of control over public lands;
- Private land property registry is not reliable;
- The registry coverage is incomplete and not up to date;
- There is a lack of spatial information (georeferencing) on the registry of private land properties;
- There is a lack of a reliable and integrated registry of public and private land;
- Low level of land property taxation;
- Supply, land use planning and regularization of urban land are not in line with the demand;
- Neglectful governance over large scale land and forest acquisitions

The Brazilian agricultural frontier and the Matopiba region

The local focus of this study is located on the recent Brazilian agricultural frontier named MATOPIBA, an acronym that results from the initials of four Brazilian states (Maranhão, Tocantins, Piauí and Bahia) and comprises the *cerrado* region of those states. It represents the geographical and economic reality of those regions inside these states that are characterized by the expanding agricultural frontier, large-scale and high technology agriculture mainly in the *cerrado* biome (Miranda et al, 2014:2).

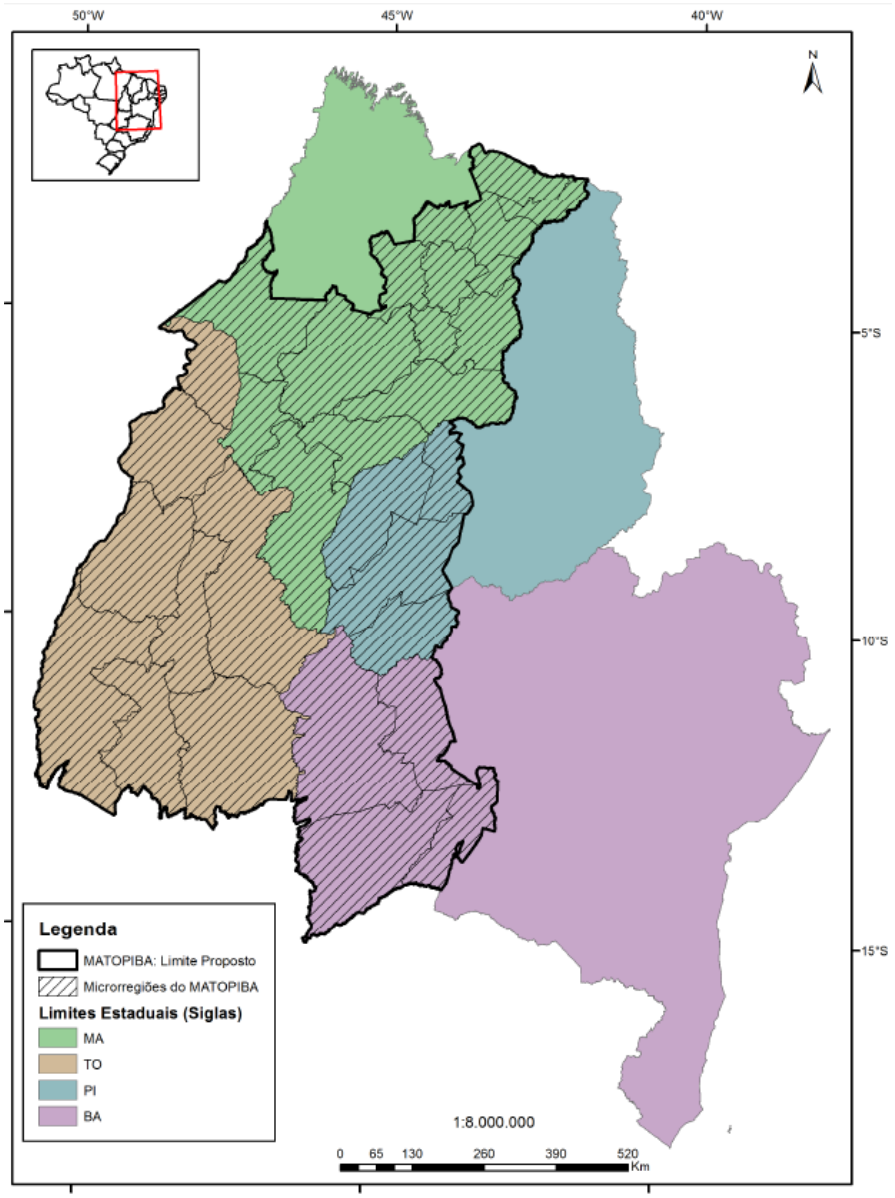
The specificity of this region is its differences compared to the agricultural expansion through the south of the Brazilian Amazon in the 1970s and 1980s, which was marked by the low productivity of the land use, deforestation and conversion of the forest to pasture for extensive cattle ranching. In the MATOPIBA region, there is low deforestation – instead, what usually happens is the change in land use from native and traditional pasture regions of the *cerrado* biome to intensive agriculture using modern methods that include irrigation.

Taking the soya production as an example, between 1990 and 2010 the area cultivated in the region rose from 1 to 2.5 million hectares, with a yield of 3.36 million tons taking only the state of Bahia for the year of 2011 (USDA, 2012).

According to Miranda et al (2010:10),

> The definition proposed for the MATOPIBA region encompasses the limits of 31 geographical microregions as defined by the IBGE (Brazilian Institute of Geography and Statistics), which cartographic frontiers are very stable over time (figure 1) when compared to the municipalities' frontiers. They sum up 337 municipalities and represent a total of 73 million hectares. There are 324,326 agricultural establishments summing up 33,929,100 hectares, 46 protected areas (8,334,679 hectares), 35 protected indigenous people's lands (4,157,189 hectares) and 781 agrarian reform settlements and *quilombola* areas (3,033,085 hectares). This sums up a total for 13,967,920 hectares in areas legally destinated, excluding overlaps. (Translated freely by the authors)

Figure 1. Proposed territorial limits of the Matopiba and IBGE's geographical microregions



Source: Miranda et al, 2014a.

The largest part of MATOPIBA is inside the state of Maranhão, with 30 million hectares (almost 37.9% of the total area of the region) and almost 139 municipalities. In the state of Bahia, 13.2 million hectares (16.7%) are inside the region and 30 municipalities, followed by the state of Piauí with 8.2 million hectares (10.4%) and 33 municipalities (Table 1).

Table 1. Microregions, municipalities and area of the Matopiba by state

MATOPIBA in numbers				
	Microregions	Municipalities	Area (hectares)	%
Maranhão	15	135	29,982,345.86	37.9%
Tocantins	8	139	27,772,052.07	35.1%
Piauí	4	33	8,204,588.15	10.4%
Bahia	4	30	13,214,498.49	16.7%
Total	31	337	79,173,484.57	100%

Source: IBGE.

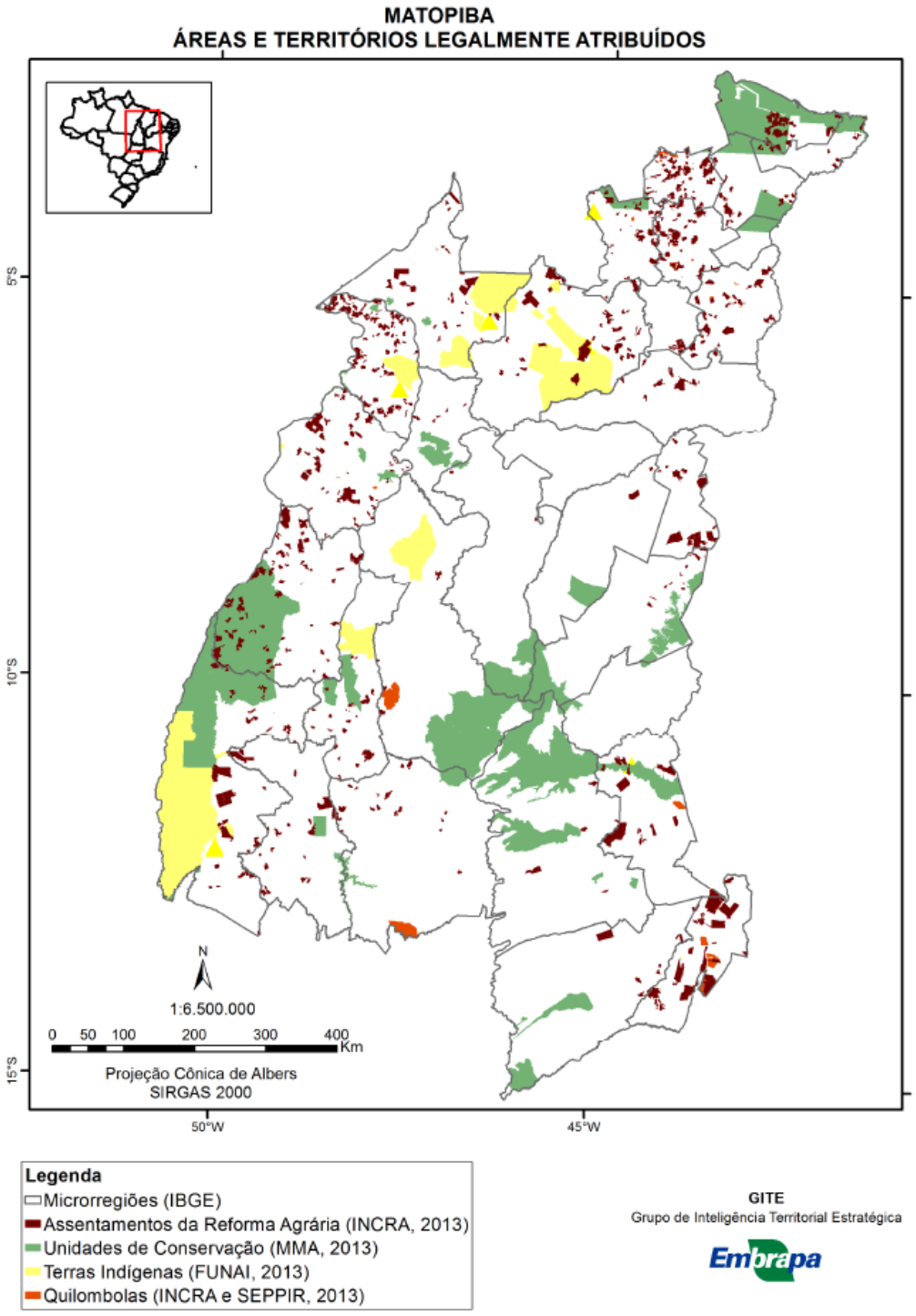
In Figure 2 and Table 2 there are the distribution of Protected Areas, Indigenous People's land, Quilombolas and Land Reform Settlements inside MATOPIBA. As the data shows, from a total area of 73.18 million hectares there are over 46 Protected Areas (8.3 million hectares), 35 Indigenous People's Lands (4.1 million hectares), 36 Quilombola lands (250 thousand hectares) and 745 Land Reform Settlements (2.9 million hectares).

Table 2. Protected areas, Indigenous people's land, Quilombolas and Land Reform Settlements in MATOPIBA

Identification	Num.	Hectares	%
Protected areas (Unidades de Conservação)	46	8,334,679.10	11.4%
Indigenous people's land (Terras Indígenas)	35	4,157,189.16	5.7%
Land reform settlements (Assentamentos)	745	2,782,754.82	3.8%
Quilombolas	36	250,330.30	0.3%
Total destined areas		15,524,953.38	21.2%
Total destined area (excluded the overlaps)		13,967,919.97	19.1%
MATOPIBA's total area		73,173,484.58	100.0%

Source: Miranda et al, 2014b.

Figure 2. Protected Areas, Indigenous people's land, Quilombolas and Land Reform Settlements



2. FNP FARMLAND PRICES ANALYSIS

In this section we will discuss the secondary data based on reports of the Informa Economics FNP consultancy in agribusiness, more specifically, the farmland prices from 2010 to 2015 on the Agrianual yearly report.

There is a wide variation in average farmland prices between different Brazilian states, the highest ones are located on the South where the agricultural tradition is older and the infrastructure is more favorable. The lowest average farmland prices are on the northern region of the country. Nevertheless, there are spots such as the cerrado region of the MATOPIBA where prices are high above the region or states' average (for example the western of Bahia state).

Table 3 pictures the average, minimum and maximum land prices per hectare for selected states of fully developed agriculture (Rio Grande do Sul, São Paulo and Mato Grosso) and the MATOPIBA states (Maranhão, Tocantins, Piauí and Bahia). São Paulo has the highest average price per hectare (BRL 24,524), while Piauí the lowest (BRL 1,950). For comparison we added the average price for Mato Grosso (BRL 6,993) which is the most important soya producer, specializing in large-scale agriculture in the *cerrados*.

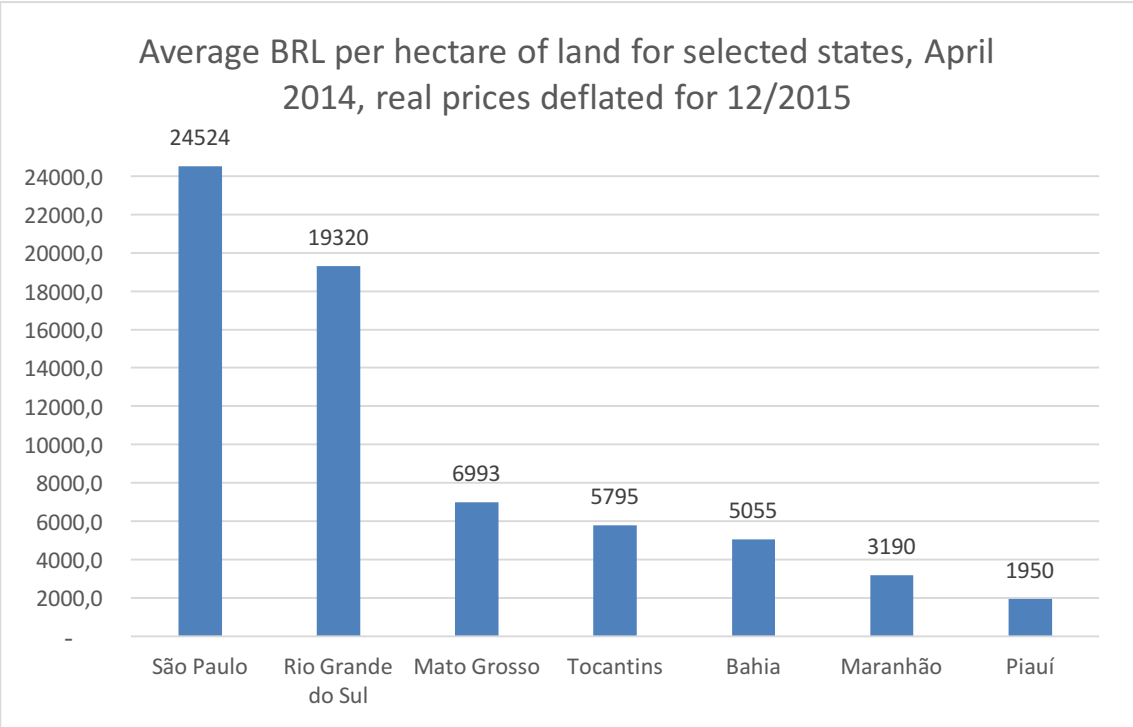
Table 3. Average, minimum and maximum land prices per hectare for selected states, April 2014, real prices deflated for 12/2015

Land prices per hectare (average, min, max) for selected states, April 2014, real prices deflated for 12/2015

State of Brazilian Federation	Average	Max	Min
São Paulo	24,524	46,960	4,025
Mato Grosso	6,993	26,834	537
Rio Grande do Sul	19,320	45,842	4,696
Maranhão	3,190	16,212	514
Tocantins	5,795	15,653	760
Piauí	1,950	11,181	168
Bahia	5,055	19,567	184

Source: FNP, 2015.

Graph 1. Average BRL per hectare of land for selected states, April 2014, real prices deflated for 12/2015



Source: FNP, 2015.

We selected specific regions inside each states's part of the MATOPIBA and used in the Agrianual reports for comparing with the same regions where the field research took place (as will be discussed in the next section).

In the Table 4, we took the average for each land use category (*cerrado*, *caatinga*, pasture or best agricultural land) and compared the ratio of increase in prices between 2010 and 2015.

Table 4. Land prices in BRL per hectare - Real prices (using IGP-DI index)

Land Prices in BRL per hectare - Real Prices (using IGP-DI index)								
Type of Land		Year						Ratio
		2010	2011	2012	2013	2014	2015	2015 / 2010
Balsas - MA	Cerrado	1,849	2,119	2,027	2,385	2,731	2,703	1.46
	Pasture	1,514	1,802	2,298	3,102	4,170	5,067	**3.35**
	Best agricultural land	5,676	7,557	9,254	13,078	13,792	12,917	2.28
Gurupi - TO	Cerrado	1,770	1,683	1,720	1,734	1,934	2,189	1.24
	Pasture	2,347	3,316	3,415	3,555	4,815	4,667	**1.99**
	Best agricultural land	7,599	8,656	10,540	13,078	13,499	12,167	1.60
Palmas - TO	Cerrado	721	881	1,047	1,222	1,702	2,083	**2.89**
	Pasture	3,417	3,484	3,536	3,485	3,653	4,200	1.23
	Best agricultural land	6,558	6,734	7,253	8,667	10,443	10,667	1.63
Picos - PI	Caatinga	142	157	143	148	178	198	**1.39**
	Pasture	757	867	782	761	757	710	0.94
	Best agricultural land	1,112	1,407	1,313	1,211	1,128	1,000	0.90
Uruçuí - PI	Caatinga	170	267	281	331	455	500	**2.94**
	Cerrado	1,516	1,710	1,617	1,765	2,411	2,388	1.57
	Pasture	615	792	843	1,045	1,347	1,289	2.10
	Best agricultural land	3,163	3,700	4,369	5,448	6,065	5,367	1.70
Oeste Baiano - BA	Cerrado	1,633	2,207	2,677	3,388	3,661	3,214	**1.97**
	Pasture	3,170	3,592	4,398	5,716	6,047	4,967	1.57
	Best agricultural land	11,451	12,195	14,635	15,943	17,097	16,000	1.40

Source: FNP (2016, 2015, 2014, 2013, 2012, 2011).

As expected, the older and more traditional regions for large-scale agricultural production have higher baseline prices for each category of land use: the western part of the state of Bahia (Oeste Baiano-BA) sets the highest average prices in the MATOPIBA region for best agricultural land (BRL 16,000) and *cerrados* (BRL 3,214), standing close (BRL 4,967) to the highest price of pastures within the selected regions (Balsas-MA pastsures, BRL 5,067).

The most important evidence for our argument is that, in each region, the ratio of second-best lands price increase (be it pastures, *cerrados* or *caatinga*) is always higher than the ratio of increase of the best agricultural land prices – the highest ratio of increase is marked in bold on the last column to the right.

3. **FIELD RESEARCH AND RURAL LAND PRICES IN THE MATOPIBA REGION**

The field research presented in this session was conducted throughout the months of January and February of 2015, where the research team went to eight different municipalities, 2 in each state of the MATOPIBA. The municipalities visited were

Balsas and Carolina (state of Maranhão), Pedro Afonso and Chapada da Natividade (state of Tocantins), Currais and Palmeira do Piauí (state of Piauí), Barreiras and São Desidério (state of Bahia). All of those municipalities locate in a region with specificities related to its land markets as will be discussed later in this session. Primary data was collected through a series of interviews with agents of the land market (buyers or sellers of land, be it individual agents or employees working in real estate companies focused on rural land). These interviews follow the same methodology of hedonic prices as in Reydon et al (2014)[3], the same questionnaire was used and only observations based on rural land transactions that happened from 2010-2015 were included.

Results

A total of 145 valid observations were collected, distributed between 5 homogeneous land markets[4] (Table 5). Barreiras/São Desidério region was the first place of the MATOPIBA where the production of soya and cotton in large scale happened and has better infrastructure for this reason – the average land price in Brazilian Reais[5] (BRL) for the region is the highest, at BRL 12,828 per hectare and the average area of the observations was 2,469 hectares. Balsas/Carolina, Chapada da Natividade and Pedro Afonso regions had lower average prices per hectare, ranging from BRL 2,726 to 3,644, and average areas ranging from 931 to 1,052 hectares – a remarkable difference

[3] The primary information for the study of land price dynamics in specific markets was be obtained through fieldwork conducted using random sampling of properties traded in a Homogeneous Zone. The cadaster of trades by municipality, used to define the random sample, consists of a list of completed deals for the respective areas, obtained from the public notary. During interviews, the researchers use printed application forms that are filled out and they get electronic codes. Another program receives the database which is analyzed and the final processing is performed. These stages are as follows: more advanced critical routines with registers being checked for duplication, extreme values, as well as several other logical processes like: price deflation, composition of data and interaction with the external database. The outcome at this stage is a database which will be used for the statistical analysis. Trained interviewers performed the fieldwork and applied the questionnaires. The first stage of the research was carried out at the notary's office, identifying all the deals noted on the area statements of the predefined properties in the Homogeneous Zone. The purchasers, once identified, were interviewed using a 100-item questionnaire that generated more than 250 variables. The variables cover the following types of property characteristics: physical (soil, climate, topography), productive (system of production, location, access), infrastructure of the property (fences, buildings) and expectations (regional situation, local investments). This information was input to the database to be used in the statistical analysis that defined equations for the land price determination. The equations were not included in this study due to its brief size and because they are not part of the main argument pursued here.

[4] In some cases (Maranhão, Piauí and Bahia) the two municipalities where the field research took place were considered part of the same land market because of proximity and specific characteristics like same kind of topography, access to infrastructure and climatic conditions. In the case of Tocantins, the two different regions (Pedro Afonso and Chapada da Natividade) where different enough to consider them two separated land markets.

[5] The prices are deflated for 12/2015 using the IGP-DI index available at Ipeadata.

comparing to Barreiras/São Desidério region. Currais/Palmeira do Piauí region has the most recent occupation for large-scale agriculture, especially because of its lack of transport infrastructure and adverse climate conditions (mostly dryness and lack of enough rain or irrigation capabilities) – the average price was BRL 616 per hectare, and the average area of the observations was 815 hectares.

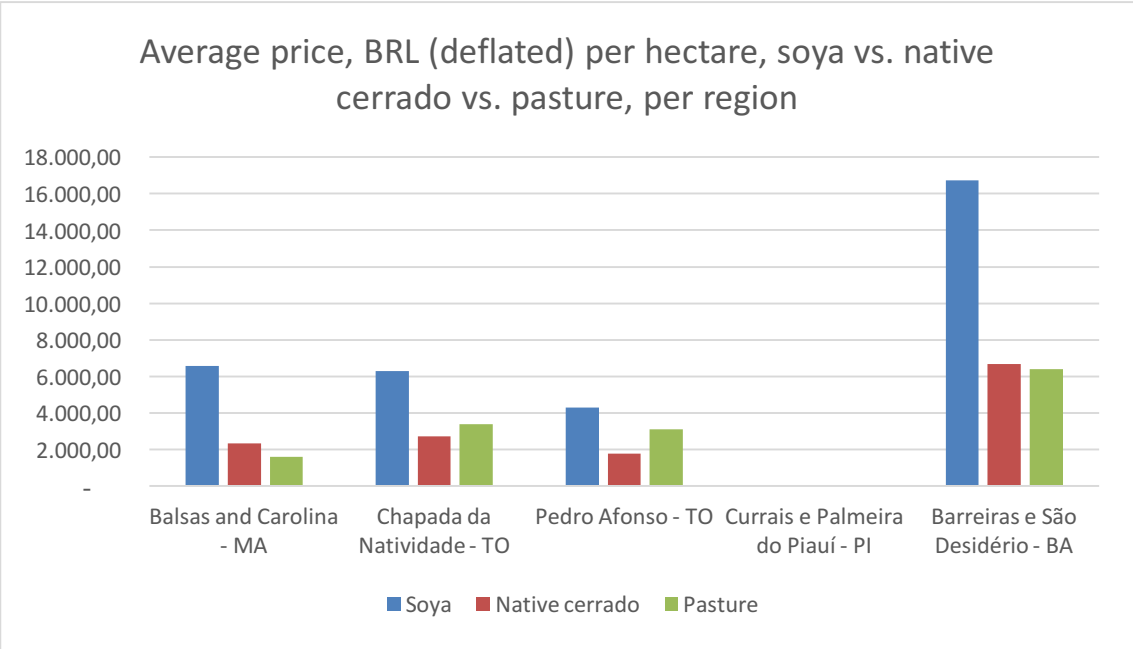
Table 3. Observations, mean value and mean area for the results

Region	State	Observations	Mean value (deflated BRL/ha)*	Mean area (ha)
Balsas/Carolina	MA	39	3,644	931
Chapada da Natividade	TO	35	3,891	1,052
Pedro Afonso	TO	32	2,726	982
Currais/Palmeira do Piauí	PI	13	616	815
Barreiras/São Desidério	BA	26	12,828	2,469
Total		145		

* deflated for 12/2015, via IGP-DI from Ipeadata.

Looking further on the data, it is possible to analyze the land-use for soya, native cerrado and pasture and compare its prices between 4 regions – we excluded the comparison for Currais and Palmeira do Piauí region for lack of reliable information on land-use type. What is show on Graph 2 is that the average price per hectare for land being used for soya crops always have higher prices in all regions. In Barreiras and São Desidério, for example, its average price is BRL 16,729 per hectare which is more than double the price for native cerrado and pasture (BRL 6,679 and 6,400 respectively). For Balsas and Carolina region, the average soya land price was BRL 6,568; Chapada da Natividade BRL 6,301; Pedro Afonso BRL 4,282.

Graph 2. BRL (deflated) per hectare, soya vs. native cerrado vs. pasture, per region



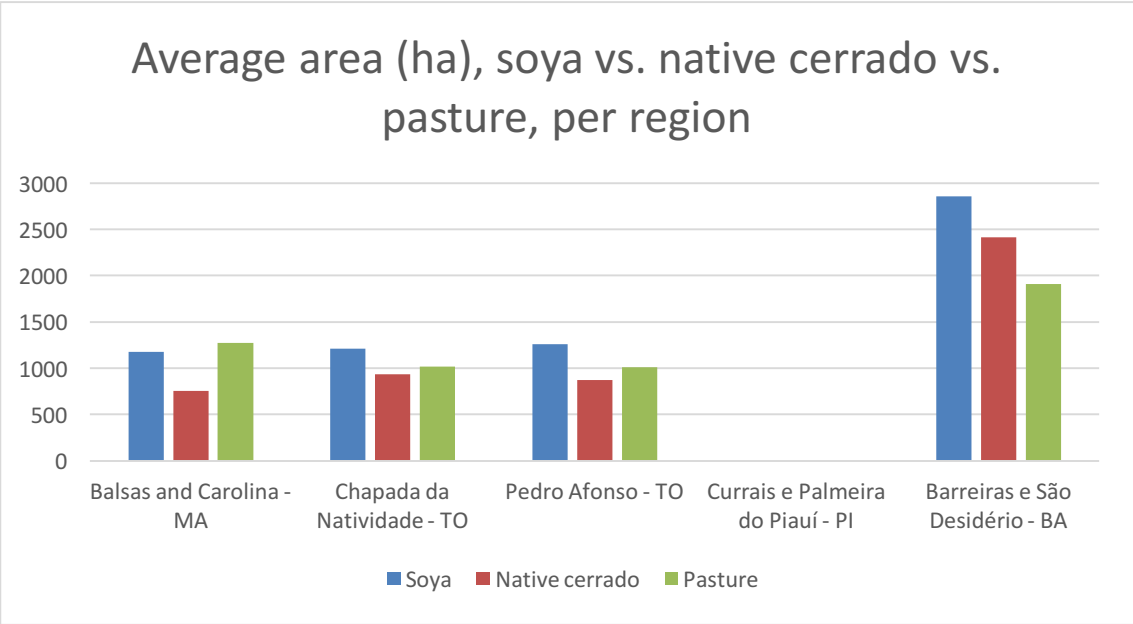
A comparison between average land prices based on the type of use in each region shows that the ratio between soya and cerrado lands range between 2.3 to 2.8 times the price per hectare (Table 2).

Table 4. Average land price ratio per type of use

Average land price ratio per type of use		
	Soya/Cerrado	Soya/Pasture
Balsas and Carolina - MA	2.8	4.1
Chapada da Natividade - TO	2.3	1.9
Pedro Afonso - TO	2.4	1.4
Currais e Palmeira do Piauí - PI		
Barreiras e São Desidério - BA	2.5	2.6

As for the average area (in hectares) sorted by region and by land use type (soya, native cerrado and pasture) the highest three were those from Barreiras and São Desidério region (2,854 hectares for soya, 2,413 for native cerrado and 1,909 for pasture). On the other three considered regions, the average area for soya ranged from 1,177 hectares to 1,261 hectares (Graph 3).

Graph 3. Average area (ha), soya vs. native cerrado vs. pasture, per region



The analysis of the collected data on this brief study are in line with the argument that the older and the more consolidated a region is in relation to large scale crop production, the higher are the pressure on prices of every type of land (be it the best lands used for soya production, be it for secondary lands still to be put to productive agricultural use). Also it was possible to show that the land under soya production are always more expensive than native cerrado lands still to be put to use – and more important: the price of native cerrado lands, even not being the best kind of land for soya production given that they were not chosen as a suitable location for production in the first place, is linked to the price of soya land rising with the consolidation of a large-scale agricultural production in the region. Either way, the average prices from the field research are far from those collected via Agrianual reports (section 2). We believe the main reason for this is the small overall sample of observations in our field research.

4. **DISCUSSION AND POLICY PROPOSALS**

Brazil still has innumerous problems related in one way or another to rural land, such as deforestation in the Amazon, extreme concentration of rural properties, lack of protection for indigenous peoples' land and pervasive speculation with land. The MATOPIBA consists in an interesting region for academic studies for it is the focus where the agricultural frontier is expanding and mistakes that happened in other areas earlier can therefore be avoided.

In section 2 we saw that the first class agricultural lands in the MATOPIBA region are those producing soya and their price per hectare is stable at the top prices per region. Although the areas still covered with native *cerrado* have a low price compared to those best areas used for large-scale soya production, their price increases relatively faster comparing to those latter soya lands.

Section 3 discussed alternative data from a recent but not so large field research pointing in the same direction: even considering the MATOPIBA as a frontier area, there are some regions inside it in which soya production is older (as in the western region of Bahia), thus having higher base prices for best and second-best land. Even though, the average price for native *cerrado* lands rose up faster than the expensive and traditional areas with large-scale soya production.

Evidence points to the potential of developing a theoretical model in the spirit of Chavas and Thomas (1999) and Platinga et al (2002) that could explain the first-best, second-best dynamics argued in this paper. This model could then be tested using FNP data or data from any other representative survey. If confirmed, the model has then the potential to better explain and predict frontier dynamics in Brazil and other places with internal expanding frontiers such as Africa.

Through the analysis of the Brazilian land market using data from FNP and from the interviews and data from the field survey for the MATOPIBA region we noticed a pattern of large-scale agriculture intensification focused on this internal frontier. Given that, one could propose some policies as:

- Improvement of rural land taxation (ITR) for it could be proper used as a tool for punishing inefficient behaviors such as keeping land unproductive and, therefor, using it for pure speculative reasons.
- As the land market in the region is increasingly dynamic, securing property rights for land is essential for a well functioning market. For this to happen it is essential that the Brazilian government focus on creating a unified land cadaster for furthering the governance over land.

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