THE IMPACT OF LAND INEQUALITY ON PUBLIC EDUCATION IN BRAZIL

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Submitted to Central European University Department of International Relations

In partial fulfilment of the requirements for the degree of Master of Arts in Global Economic Relations

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Word Count: 14,155

Budapest, Hungary 2019

Abstract

For a country to achieve long term economic growth, there is no standard formula. It is widely known that education is one of the main pillars along the developmental path of a country. Based on previous studies, this research shows the impact of land inequality on education and the consequences for further economic growth. The Brazilian government has long neglected education and done everything to avoid redistributing land from a powerful rural elite. As the agricultural sector needs less high skill labor than the industrial sector, the rural elite, through their political and economic power, influence policies benefiting their own group instead of the general population. Though Brazil has gone through a process of industrialization, land inequality still impacts educational achievements in Brazilian municipalities. This research demonstrates that land inequality still negatively impacts public education achievements in Brazil even after the industrialization and decrease of agricultural importance in the economy. Although, higher levels of educational expenditure in the last two decades by the Brazilian government have decreased the impact, it is still present nowadays.

Acknowledgments

First of all, I would like to thank my family for all the support they have given me though the whole Master's period. I am grateful to my supervisor, Andrew Cartwright, who has provided me the support and guidance on this thesis.

I would also like to thank Mario Gomes, for his tireless assistance and João Raphael Martins da Silva, for the topic discussions.

Last but not least, Andressa Schirmer, without whom I wouldn't have started this Master's degree and certainly, without her support, I wouldn't be able to finish it.

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Introduction and Research Question

Brazil is one of the biggest countries in the world and even though population density in the countryside is not a problem, it has also one of the highest land distribution inequalities in the world. In 2006, 0.91 percent of all land holdings in rural Brazil had more than one thousand hectares concentrating a total of 45 percent of all rural area in the country (Oxfam 2016, 6). The land inequality is a long-standing issue in the history of Brazil. Powerful land owners always opposed to land reform laws as this meant losing their economic and political power (Bethell 2009, 134). However, large landowners also have conflicting ideas as for the government to provide free education to the whole population, as this would entail higher labor wages, in a sector with high need of labor force (Oded Galor, Omer Moav, and Dietrich Vollrath 2009; Wegenast 2010, 104-106; Bethell 2009, 52)

Brazil also does not have a reputation for education investment and achievements in this field. The lack of attention to land inequality and education has a long history in this country. However, it started to change with the re-democratization of the country in the mid-1980s. Although Brazil has industrialized significantly and the agricultural sector has become more mechanized, the agricultural sector remains an important part of the economy and plays a role in political decisions. Agribusiness sector represents 23 percent of the Brazilian economy, a decrease in share of the economy when in 1993, it represented 26 percent, but still it integrates almost one-fourth of the whole economy (Arias et al. 2017, 10). The mechanization and increase on export crops cultivated in large scale also means less low skilled labor for the plantations (Arias et al. 2017, 15).

Rural poverty in Brazil is still a reality nowadays. Most people living in this

condition have low levels of formal education but several years of experience in farming. Land concentration inequality in Brazil varies considerably depending on the region but it affects most of the country. In rural areas, land access can have a strong impact on income increase for poor families. This increase in income can lead parents to let their children frequent school instead of working, if they have access to any education where they live.

The points above demonstrate a historical reality for Brazil, which is seeing some changes in the re-democratization period. Therefore, the question that entailed in this research is: Does land inequality impact public education in Brazil?

In this research, we propose to examine that although the agriculture sector has lost some of its importance in the Brazilian economy, there is a negative and significant relation between land inequality and education quality achievement. Although it has improved, especially in municipalities that have the highest level of inequality, it is still not enough to curb the negative effect.

This research brings forward the discussion of how land inequality can impact the long term economic development of a country by considering two different angles than previous research (Wegenast, 2010; Haddad, Freguglia, and Gomes 2017; Valadares, Silveira, and Pirani 2017; Oded Galor, Omer Moav, and Dietrich Vollrath 2009). The first is the focus on small scale sample distributions of one main country, which are Brazilian municipalities, as the independent variable. The second is to take a period after industrialization and understand if land inequality, which is linked to the agricultural sector, is still a problem for economic development, by using an index of education quality developed by a Brazilian institute, as the dependent variable.

Commonly, education is seen as one of the main factors for people and countries to take a step towards growth and development (Haddad, Freguglia, and

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Gomes 2017, 1679). As a country starts to develop its economy, higher levels of human capital are needed to increase productivity. The solution is higher investment in education, either by the government or by the household, meaning the families. When governments neglect public education, it is up to the families to either find a solution on the public sphere or search for alternative methods of financing education. The alternative methods are either financing from their own pocket, reaching to financial institution for credit loans (Deininger and Squire 1998, 260) or even searching for religious institutions that can provide educational services (Beltrán Tapia and Martinez-Galarraga 2018, 83).

Brazil is among the 10 biggest economies in the world. Nonetheless, it has high levels of inequality in income and wealth distribution and low levels of educational investment and achievement. Brazil passed through a process of industrialization and urbanization with great economic growth during the military regime from 1964 to 1985. Even with high levels of GDP growth and education being a public service, the country could never sustain a long term economic development and productivity (Vieira Filho and Fishlow 2017, 121-123) and reach high levels of educational achievement (Haddad, Freguglia, and Gomes 2017, 1680-1681).

Brazil's stagnant educational achievement is demonstrated by its fairly unchanged performance in the Program for International Student Assessment (PISA), wherein its 2015 score was only 10 points higher than that of 2006. Although Brazil spends more money than some countries in Latin America, its performance is inferior. When comparing Brazil with Russia and China, countries from the BRICS group, in performance in science, reading and mathematics exams the discrepancy is even higher. The share of top achievers for Brazilian students in at least one of the subjects is 2.2 percent, while its peers from Russia and China were 13 and 27.7 percent. Yet

Brazilian students were overrepresented in the low achievement group at 44.1 percent in all subjects, whereas Russian and Chinese students' share was 7.7 and 10.9 percent, respectively (OECD 2016).

From an internal perspective of educational achievements in Brazil, the results are also not so favorable. For this reason, in 2006 a legislative project was introduced for discussion in the Brazilian Parliament to punish public education managers that did not deliver a high-quality education system in public schools (Câmara dos Deputados 2010). The justifications to create this law were based on the national achievements of the educational indexes and also the long-standing low achievements in the PISA. The law never went through voting due to high resistance of public management, as well as a strong disagreement on stipulated targets due to the large variables involved in measuring education (Souza and Cabral Neto 2018).

Although the majority of Brazil's population lives in urban areas, concentrating a lot of poverty, the rural areas are still the poorest in the country. Families working in the agrarian sector in Brazil have lower incomes than in other sectors and the main determinants are occupation, education and region where they work (Kageyama and Hoffmann 2000, 2). Normally, peasants in Brazil have more years of experience in their occupation, working on the land, than formal education. Kageyama shows that people in rural areas, working on non-farming activities earn more and have more years of education than those working on farming activities (Kageyama and Hoffmann 2000, 3).

In a country where land ownership inequality is high and public education services have lower standards, the likelihood of social mobility for low skill people living in the rural areas is extremely low. The agricultural sector employed 11 percent of the more than 86 million employees in Brazil. This same group of people earned 54

percent of the total salary of an employee in the service sector, had half the schooling years and they were older. Also, it is worth to note that 74 percent of workers from the agricultural sector had family farms and 89.5 percent of extreme poverty in Brazil is represented by agricultural family holdings (Vieira Filho and Fishlow 2017, 184,187).

Land inequality can be one of the reasons for agrarian sector workers not being able to economically progress, as land sometimes may be the only way to earn an income. Brazil is a country of continental proportions and its Gini index for land distribution varies significantly. In 2006, taking into account municipalities of Brazil, the coefficient ranged from a minimum of 1.6 points to a maximum of 98.1 points (Vieira Filho and Fishlow 2017). Although Brazil has significantly different arrangements of land concentration throughout the country, the average Gini index for Brazil was 0.854 points in 2006.¹

Landowners normally concentrate political and economic strength, influencing where government – be it local, state or national – expenditures will be allocated. As elite groups have different economic preferences than other groups in societies, they might not have incentives to defend investments on public education because they have the means to provide a private education for their offspring (Oded Galor, Omer Moav, and Dietrich Vollrath 2009, 149-152). On the political side, landowners can leverage their relationship with the peasants to influence their votes in elections (Jean-Marie Baland and James A. Robinson 2008).

Brazil became a democratic country in 1985, where the population freely elects its leaders. When policies or governments decisions are not supported by the majority of the population, they have the right to complain to the government about their

¹ The Gini index for land distributions measures from 0, meaning totally equal, to 100, meaning totally unequal.

discontent. Populations with higher levels of formal instruction, education, are more prone to mobilize and complain about governments (Wegenast 2009, 82). In rural areas peasants are normally not in a position to make formal complaints, either due to low power to confront the political representation or lack of knowledge on how to mobilize. Local governments hold strong political and economic power, suppressing any dissatisfaction from the poorer citizens.

As Hirschman theorizes, citizens can either express their unhappiness with a company or public service either by their voice, expressing discontent with it, or by ceasing to use/buy the product from the company or organization, over the exit option, searching for another product or service (Hirschman 2004).

In rural areas where the number of public schools are limited or private schools are unaffordable for families, it is hard to use the exit option. On the other hand, use their voice to show dissatisfaction with a public service might be as difficult as the exit option. The inability to employ one of these two options can imprison peasants and their families in a vicious circle, not having access to a better education and higher paying jobs. Hence, in places where public schools are in bad condition and do not attend to a certain part of the community, families possessing an income enough to support their offspring to have a better education will do so. This means searching for a private education institution that provides a service with greater quality than the public one.

When parents try to exert their voice to public school management, the response comes from the state, therefore, to keep the child at school or change to another one will depend on the availability of another public school. However, for private schools the quality is measured through market regulations. If parents do not agree with certain school methods and disciplines, they can either complain to the

management or transfer their child to another school (Hirschman 2004). The willingness of local government to improve the public education in local schools might only come if the local community puts pressure on local leaders to enhance education (Kreutz 2000, 161). Nevertheless, everything might stay the same where governments do not have the interest or motivation to change.

As asserted by de Carvalho Filho and Monasterio, one of the reasons why southern regions in Brazil have better education ratings may be a result of pressure from immigrants on the local government (de Carvalho Filho and Monasterio 2012, 801). European immigrants started to arrive in South Brazil in the first quarter of the nineteenth-century, due to a government incentive to colonize the area. These immigrants, mainly Germans and Italians, had superior educational levels than Brazilians, between three to seven times higher education enrollment rates in their respective homelands than the population in the region where they arrived. The authors conclude that higher initial human capital levels, more equalitarian land distribution and the subsidies provided by the government upon the immigrants estile and other regions in southern states.

The thesis will be organized following the structure presented hereafter. A brief introduction will situate the topic and the problems involved around discussion linking directly to the research question; followed by a detailed presentation of the methodology and data collected and its limitation. Additionally, the research will be constructed in three chapters; the first will situated land inequality, land reform and public education and their linkage; the second chapter will touch on Brazilian history regarding topics researched to provide context for the contemporary issues discussed; the third chapter will present the empirical results of the regressions and an

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explanation on the results. The conclusion will finalize the research and present the main ideas and findings.

Methodology and Data

The research is going to look at the relation between land inequality and education achievement using an Ordinary Least Square (OLS) regression model. It will be constructed on quantitative data from several databases supported by the Brazilian government such as the *Instituto Brasileiro de Geografia e Estatística* (IBGE) or Brazilian Institute of Geography and Statistics and the *Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira* (INEP) or National Institute for Education Research and Studies. The use of qualitative data is also present, through secondary sources such as journal articles, books and reports related to the topics researched in this thesis.

Land ownership inequality will be used as the independent variable. Land is utilized for productive matters when used for cultivation, herding and so forth. Another important aspect of possessing land is its use as a collateral for access to credit. Landowners obtain political and economic power derived from the land. Where land is more concentrated in the hands of a few, the power is more concentrated too. The measurement of this variable will be made through the Gini coefficient calculation from IBGE to encompass inequality among landowners (Deininger and Squire 1998; Valadares, Silveira, and Pirani 2017). The Gini coefficient of land for municipalities in Brazil is calculated every ten years when the Agricultural Census happens (IBGE 2007).

This research will use the data from the years 1995-96 and 2006, which are the last two censuses available from IBGE with data on Gini coefficient of land for municipalities. This date was also selected because 1996 marks two important

changes related to land reforms, hence it is an important step toward changing land inequality and educational policies. The Cardoso administration (1995-2002) was the first government that put in practice land reform policies at a federal level, being the administration that has distributed the most land in the history of Brazil. The same government in 1996 proposed and approved a new base law for education, fixing an amount that the federal government was obliged to use for education.

For the OLS regression, the Gini coefficient was divided into three parts. These three parts are separated into low, medium and high land inequality. The first third ranges from 0 to 0.33, representing municipalities with low inequality; the second starts from > than 0.33 to 0.66, representing the medium land inequality; followed by municipalities with > than 0.66 to 1, representing the high land inequality. This arrangement groups municipalities by coefficient range, rather than by geographic location. Policies on education and land reform in the period analyzed are centralized decisions, leaving no need to aggregate the municipalities by state.

The dependent variable for education will be an index developed by INEP which is called *Indicador de Desenvolvimento da Educação Básica* (IDEB) or Development Indicator of Basic Education (INEP 2018). For this variable, the index data to be used is from 2007, which represents the first year of measurement, and data from the last available year, 2017. Normally, authors use the amount of capital spent on education because through this measure it is possible to have an idea whether or not a country has high or low investment on public education service.

The expenditure can be a good indicator to sense the level of investment a country makes in their education, but this variable would not include an overall assessment of educational quality. Hence the use of the IDEB, which tracks not only the grades measured by a national exam – which was introduced in 2007 and is

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redone every two years – but also the passing rates of students in a school per grade (INEP 2015). This index goes beyond the expenditure variable as it can show the quality of public education. In this case, IDEB only measures the quality of primary education which goes from first to ninth grade. Not using data from basic education, before the first grade, and secondary education, after the ninth grade, could give biased view of education quality by land concentration. However, there is no single education quality measure for all three parts of basic education in Brazil. Therefore, the primary education achievements will be used because throughout Brazilian education policy history it was an extremely neglected part of the educational system (Kang 2018, 769).

In table 1 it is possible to see that this is when most Brazilians stop studying, the rural areas having half the studying years of urban areas. From 1996, during Cardoso's administration, a higher incentive and investment was given to primary education. Another reason to research primary education is the well-structured index results (IDEB) for such a timeframe in comparison with the other education levels.

Geographical Region	Studied Years		
	Urban	Rural	
Brazil	7.0	3.4	
North	6.4	3.3	
Northeast	5.8	2.6	
Southeast	7.5	4.1	
South	7.3	4.6	
Center-west	7.0	4.1	

Table 1. Studied years for Urban and Rural population

Source: Data from Sampaio et al. 2006, 16.

As I have explained, I will use the Gini Coefficient from 1995-96 to 2006 and the IDEB from 2007 to 2017. The period used amounts to 10 years because of the lack of data for both main variables. There is a measure of Gini Coefficient before 1995-96, but not by municipalities, only by states. The IDEB started on 2007, therefore it has no data from previous periods. However, these variables are pertinent for this research, as the Gini by municipality reaches one of the smallest region configurations in Brazil, having below it only cities, and the IDEB is a quality index that reaches all public schools in Brazil. Thus, the preference of having a shorter, but more specific and detailed period of time in the analysis.

Another important aspect of the research is to avoid reverse causality. This means that we want to see the impact of land inequality on education and not vice-versa. Therefore, the effects of the Gini coefficient of land for municipality *i* in period *t*-*1* on the education index IDEB in municipality *i* in period *t* will be taken into consideration. This is done in a way that education measure, IDEB, in *t* cannot affect the land inequality in the past, *t*-*1*. This lag between the two variables give a control over a possible reverse causality (Oded Galor, Omer Moav, and Dietrich Vollrath 2009, 167,168).

The geographical data selected for the regression refers to Brazilian municipalities. It brings micro level data showing the specificity of certain regions (Giovanini and Marin 2011, 39) instead of looking at states or regions, which can be of a big dimensional space, taking into consideration the size of Brazil. The negative side of looking at such micro level data in a country is the difficulty of finding other variables that can be used for controls since it is not easy to collect the data in a vast number of observations. The second problem is the spread of data and inconsistencies. As some measurements are done by states and not the federal

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government, each state can use a different way of measuring or even not have the data for a certain variable. However, the implication of not using municipalities in the results would be bigger than the presented negative points.

The impact of land inequality in education, nowadays, is a completely endogenous issue, normally not having any exogenous factors that directly affect the relation between them. In this case, some control variables have to be used for these endogenous problems that can have an impact on the correlation. The first one accounts for the municipal growth domestic product (GDP) per capita. Depending on the municipal resources, their expenditure in education can vary considerably. Another factor illuminated by the GDP is the amount each sector, agriculture, manufacturing and services, contribute to the GDP. In municipalities where the primary sector, agriculture, has a higher impact in the total product, the influence of agriculture on politics can be stronger (IBGE 2019).

For the educational part, some controls will also be used which are relevant for the case. The first one is the enrollment rate in public and private schools. The distinction between public and private can provide a more detailed understanding of whether families are searching for private schools and if this may have to do with income, quality or inequality on land (INEP 2019).

The research will also contain qualitative data from additional sources to support the theoretical side. The existing literature will be used for support on questions of inequality by mainly talking about wealth and education as a chief indicator for human development and countries' economic growth.

Research has already been done on the correlation between land inequality and educational public provision. The researchers take into account several countries around the world (Deininger and Squire 1998; Erickson and Vollrath 2004) and also

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the United States (Oded Galor, Omer Moav, and Dietrich Vollrath 2009). However, no research has been done analyzing Brazilian municipalities. Valadares, Silveira, and Pirani have analyzed land inequality and Municipal Human Development Index (MHDI) as certain aspects of education and health (Valadares, Silveira, and Pirani 2017). This research is also look at a different range of time frame and a more recent one, to understand how the impact of education investments extends long after the industrialization process. Hence, the choice to research Brazilian municipalities between 1996 and 2017.

One last variable which could have been included, but is problematic due to data inconsistency, is the enrollment of children in rural or urban schools inside the municipality. Prior to 2017, IBGE used the typology urban/rural defined by a Brazilian law from 1938 where the municipalities were the administrative body responsible for defining urban/rural areas. Because of the great urbanization process that transformed Brazil, IBGE changed the way this typology was used by the institute and introduced a new calculation based on population size and demographic density measures to define urban/rural areas. However, this new typology is only used from 2017 onwards, a time period not comprised by this research.

1. Literature Review: Land Inequality, Land Reform, Education

In this chapter, a literature review will be done on how land inequality through economic and political means can affect long term development of countries. It will also look at land reform policies and consequences on education. Lastly, it will embrace how education can be used for income increase even when land scarcity might be a problem.

1.1 Land Inequality

Some authors propose that wealth and income inequalities in various countries were inherited from a colonial past that has been perpetuating itself (Sokoloff and Engerman 2000; Acemoglu, Johnson, and Robinson 2001). Although this is a debatable argument, from a Brazilian perspective of land inequality, the colonial past had a great impact on setting the current distribution (Navarro 2009). Sokoloff & Engerman and Acemoglu Johnson, and Robinson present a positive and strong correlation between institutions created at the time when countries were colonies or had just become independent and the social, economic and political outcomes of countries today. In cases where countries had high inequality levels when institutions were created, these systems tended to perpetuate the disparities (Sokoloff and Engerman 2000; Acemoglu, Johnson, and Robinson 2001).

This might not be the case only for countries with a colonial past. Spain and former Prussia are two examples of countries with higher land concentration in certain regions due to distinct reasons. While Spaniards were fighting to *Reconquest* the country, land concentration started to be defined from the ninth to the fifteenth century. The further south the Christian Kingdoms fought the Muslim forces, the harder it was.

To convince military, religious armies and nobility to fight against the occupying forces the reward was bigger and in form of land (Beltrán Tapia and Martinez-Galarraga 2018, 89-91). The historical context of Spain, as concluded by Beltrán Tapia and Martinez-Galarraga, taking in consideration difference in landholding sizes in nineteenth century lead to a negative impacting the literacy results of boys.

On the other hand, Prussia had serfdom as a main land relationship prior to the nineteenth century. Changes in land access laws such a legal emancipation of small parcels of land from noble landowners in the 1850s and mass education policies, as compulsory education and exemption of education fees for those that could not afford. The policies resulted in an increase of enrollment even in regions with high land concentration ownership (Cinnirella and Hornung 2016, 138-139).

Furthermore, Alesina and Rodrick look at the relation between wealth inequality to economic growth. When providing empirical evidence of regressions on land inequality through Gini coefficients and economic growth, they found significant negative correlations concluding that a society, in a democratic regime or not, with higher inequalities will have lower economic growth as a greater part of the society will request distributive policies. They conclude that the more unequal a society is, the more need for redistributive policies which slow the economic growth due to the interventions needed to have a more equal society (Alberto Alesina and Dani Rodrik 1994).

Moving forward, Oded Galor, Omer Moav, and Dietrich Vollrath theorized and provided empirical data results showing that the agricultural sector uses land and labor factors, and thus, do not need or want a high investment in human capital. Instead, countries focusing on the manufacturing sector do need development in human capital, requiring higher investment in education (Oded Galor, Omer Moav, and

Dietrich Vollrath 2009). In a transitional economy from agrarian to industrial, countries with a more unequal land distribution would invest less in public education due to the disincentive for powerful landowners to invest in education. By contrast, countries with a more equal land distribution would favor a higher provision of public services since the agrarian sector did not hold so much power.

The agricultural sector further down the line has landowners as their main actor. An individual landowner may have economic power but little political power. Therefore, they associate to gather more strength and have a say based on their interests. The collective action of landowners is used to support their sector and can be exemplified by how they organize themselves to protect their lands from invasions that might result in expropriation due to agrarian reform policies, as it happened in Brazil (Albertus, Brambor, and Ceneviva 2018, 2-3). Another form of collective action, with respect to political power, can be seen through the *Frente Parlamentar da Agropecuária* (FPA) or Parliamentary Farming Front also known as the *Bancada Ruralista*, a group formed by farmers to defend their agenda on the National Parliament.

The strength of the agricultural sector in Brazil, presented above, connects with the theory of Oded Galor, Omer Moav, and Dietrich Vollrath concerning the transition from an agrarian society to an industrial one (Oded Galor, Omer Moav, and Dietrich Vollrath 2009, 144-145). Kay affirms that among other reasons, many countries in Latin America did not conduct land reform as deeply and consistently as countries from East Asia, such as Korea and Taiwan, because they had already industrialized themselves (Kay 2002, 1076-1078). Therefore, land reform was not as high of a priority for the Latin American countries as it was for these East Asian countries. Among other reasons, Latin American countries might not have had long term economic growth because of high inequalities in land concentration (Deininger and

Squire 1998; Alberto Alesina and Dani Rodrik 1994). The theory of Oded Galor, Omer Moav, and Dietrich Vollrath. applies to transitioning economies, but does this land inequality still have an impact on education after countries reach industrialization?

In order to better understand the relationship between inequality and economic growth, Deininger and Squire revised several articles to improve the data and have a better statistical measure for the correlation of these variables (Deininger and Squire 1998, 1). The authors conclude that initial inequality, more of assets than income, has an impact on future economic growth. Additionally, they find that inequality is strongly related to imperfections in financial markets regarding credit and insurance, and those imperfections are more significant for human capital, mainly education, than physical capital.

Extending the previous research, Erikson and Vollrath further improved the land inequality data to compare with financial development and education (Erickson and Vollrath 2004). The inequality data is not only considered by Gini coefficient, which accounts only for landholders and number of holdings, but from the entire agricultural population divided by all holdings in a country. They use this measure to have a broader view of inequality across the rural population. The strong evidence linking inequality and financial markets from Deininger and Squire did not repeat for Erickson and Vollrath. However, when looking at the new data of land inequality across agricultural population, findings are consistent. Nevertheless, when the authors include the entire rural population, this can account for landless peasants who desire land but also people not related and not seeking to acquire land. The inclusion of agricultural population as a whole can create a false sense of higher inequality since the holding maintain the same but the amount of people can be much higher. Thus, they do not improve the data, but add an extra controversial element to the evidence

they provided.

1.2 Land Reform

Access to land is still a highly discussed and studied topic especially among developing countries. Not just access to land but the best practices, conditions and who should be granted land or have the right to access it are subjects of debate (Janvry et al. 2001, 2). Historically, land changed ownership through the use of power by dominant classes or dominated social classes that fought for rights and assets believed to belong to them. These wars, revolutions and conflicts regarding land control go as far as the French Revolution in Europe, passing through Mexico, Russia, China and many other countries around the world with very different outcomes (Binswanger, Bourguignon, and Brink 2009, 6). These conflicts ended up becoming land reforms, which, in the words of Dekker, "is the deliberate act to change the existing land tenure in a rural area making it a non-evolutionary way to change land tenure" (Dekker 2003, 77).

Land reform is a term defining a legal change with the intention to redistribute land and rearrange land tenure through a new institutional framework. The reforms have the intention to improve the agricultural production in terms of quantity and quality and wealth of the people living in rural areas (Ciparisse and FAO of the UN 2003, 59-69). However, land reforms still generate controversy about their implementation. There is no standard formula to follow (Dekker 2003) and there is no consensus among economists and specialists in this area regarding land redistribution in countries with high land inequality and increased numbers of landlessness (Binswanger, Bourguignon, and Brink 2009).

Although land reform was considered a lost cause in Latin America, in 1996, Brazil introduced a new program financed by the International Reconstruction Bank of

Development or World Bank focused on Market-Assisted Land Reforms (MALR) (Janvry et al. 2001). As Deininger explains, this is a "*negotiated* land reform that relies on voluntary land transfers based on negotiation between buyers and sellers, where government's role is restricted to establishing the necessary framework and making available a land purchase grant to eligible beneficiaries" (Deininger 1999, 651). This new approach towards land reform partially leaves behind the past experiences with expropriation to enact a more neoliberal redistribution reform (Sauer 2009, 128-130).

The World Bank was highly critical of past land reform policies implemented by states. These critiques centered around the low efficiency and productivity of farmers after receiving land due to lack credit and technical expertise. Instead of stopping, conflicts in rural areas were increasing, leaving parcels of land unused. As a conclusion, these were policies costing exorbitant amounts of money without providing the expected result (Deininger 1999). On the other side, Sauer criticized the World Bank for looking only at the economical side of land reforms and not the whole aspect of the land distribution history in Brazil (Sauer 2009, 138). The author also questions the success of the program implemented by the World Bank, as it did not reach the targets stipulated, and how innovative market land reforms really are, compared to their traditional state-led counterpart. At last, the author indicates that only focusing on the economical side and not changing the political, social and cultural aspect, even if it means through conflict, the unjust property structure will remain a part of the society.

Although the MALR policies have negative and positive sides, having a closer look at the beneficiaries of these policies and their outcomes might help to understand some problems. When looking at one particular MALR in Brazil called National Program of Land Credit or simply Land Credit, all peasants waiting for selection are

low income and one third of them live in extreme poverty (Fitz 2018, 260-261). As for the human capital features of the population analyzed, household heads have in average 3.9 years of formal education while experience in farming reached more than 20 years. Looking at the result of the research and livelihood aspects of the beneficiaries that were selected by the Land Credit program brings out some interesting features. Although beneficiaries possessed more land, agricultural and animal assets than before joining the program, they had the same income level increase as non-beneficiaries. Also, the likelihood of earning an income from nonfarm labor or having paid employment decreases but the chances of being an agricultural producer increase. At last, the author shows that the Land Credit program increases by 50-59 percent the chances of beneficiaries to receive technical assistance, which is vital in the beginning of production for these peasants, but does not increase the amount of people with private credit loans (Fitz 2018, 264-265).

1.3 Education Issues Related to Land Inequality

Credit loans are often seen as an option to invest in private education as an as a form to finance schooling. Although it is not vital for education, it can be used to enhance physical capital which might generate profits for further human capital investments, or be used directly to finance education (Deininger and Squire 1998, 266).

Previously, some arguments were provided on how land inequality has a negative impact on education expenditure. Nevertheless, this does not mean that only redistributing land for peasants will increase the performance and quality of education. In illustrative case is that of Malawi, which joined the World Bank program of MALR in 2005 to improve land access and increase incomes. The program had a positive result related to increased incomes, productivity and access to land but it was not combined

with an improvement of social services such as health and education in the short term (Mendola and Simtowe 2015, 65-66). Perhaps one of the flaws from the article was to look a really short term, from 2006 to 2009, whereas education reforms normally take longer to present results.

A similar study was conducted in southern Italy, where after World War II some regions had a land reform administered by the state (Percoco 2018). The research looks from 1951 until 2001, a much longer timeframe than Mendola and Simtowe. The author shows an increase in the education variable, percent of population with high school degrees, by one percent in the beginning from 1951 to 1961 up to five percent in the long run, over the whole timeframe. Percoco mentions that breaking the monopolistic power of large estates make it possible for people to increase investments in education, livelihood and entrepreneurship due to higher incomes. A second point made is the provision of credit with low rates given through the policy of land reforms (Percoco 2018, 190-191). However, no specific explanation is given as to why these two points are the mechanisms to further develop levels of education in a lower land concentration. Though Malawi and Italy are hardly analogous to one another, it is possible to surmise that even if Italy had no specific education policy (at least, none was mentioned by Percoco), in the long term a reduction on land concentration might have a positive effect on education.

On the flipside, Datzberger analyzes Uganda's educational policies starting from 1997 which comprises of universal basic education through strong government investments (Datzberger 2018). Like Sauer, Datzberger also sees that investment without social, political and economic changes to the structures of society, there will not be a significant and real achievement of policies. Although the levels of enrollment in Uganda more than doubled from 1996 to 2015, reaching more than 90 percent of

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children enrolled in schools, retention levels were weak, education quality was really low and after finishing the secondary school, teenagers did not have the opportunity to work because of the lack of jobs. In this context, the author argues that although investments in education were made, the "surrounding political, economic and social structures have to be transformed in a way to enable the poor to make their own decisions about their futures and lives" (Datzberger 2018, 127). In a more explicit way to explain the problem, the first cause of children dropping out of school in Uganda is the lack of financial resources.

In the case of Brazil, it is not only the landownership inequality that has preserved colonial structures in most of the country, but also the disregard for public education, especially at the primary level. As argued by Wegenast, the Brazilian government, dating back to before independence from Portuguese Monarchy, was always careless about education and after the country became a Republic, the education priority was always higher education, which served to educate the sons of elites to become liberal professionals (Wegenast 2010, 112-114). As the author exposes, after the re-democratization in 1985, education policies were enhanced and investments increased ameliorating the certain indicators as the decrease of illiterate, yet Brazil still lags behind on education achievement.

Moving forward on the education aspect, when a process of industrialization begins in a country, more education is needed. Brazil is considered a developing country with great industrial capacity and as a result of that, people from rural areas migrate to find jobs outside of the agricultural sector. However, when development reaches further and further in a country, it becomes less necessary to migrate because it becomes easier to find jobs outside of agriculture in the countryside. This is called pluriactivity, which is when a rural family has one or more members dedicated to non-

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agricultural activities (Schneider 2009b, 3-6).

In Brazil, the pluriactivity started to be studied and seen as a practical effect around the late 1980s and early -90s, as the decentralization of industrialization brought non-agricultural jobs closers to peasants (Schneider 2009a, 74-75). Kageyama and Hoffmann looked for the relation between family income per capita and its influence on pluriactivity, region, education and etc. The authors related the search for jobs outside the agricultural activities as a form of avoiding the risks of farming, such as weather conditions – in agriculture, income is seasonally determined. When researching families involved with pluriactivity, it was possible to see that such families earned more than those involved solely in agricultural activities. They also highlight that two other main factors statistically contributed significantly to the increase of income: region where the families lived and most of all, how many people in the family had 8 or more years of formal education, which means to have the primary education completed (Kageyama and Hoffmann 2000, 25).

Reardon et al. arrive at a similar conclusion to Kageyama and Hoffmann that both factors which can influence non-farm incomes are infrastructure, which can be related to more developed regions in a country, and education as the second important variable (Reardon et al. 2008, 278-280). However, the authors also present some negative aspects of education on non-farm incomes such as the increase of income inequality in rural areas where education is not well distributed. Another problem with the failure to provide education is that "inequality in access to scarce land translates into inequality in non-farm employment opportunities because agricultural cash incomes, use of land as collateral for credit, and the confounding of land wealth and political pull are all determinants of farm non-business starts" (Reardon et al. 2008, 282). They continue by saying that opportunities in non-farm activities grow as human

capital increases in such a way that creates room for more jobs outside farming. Brazil is the exact case where human capital was not developed to a point of reaching certain requirements to create non-farm job opportunities. However, with the increase in education investments and a steady growth for more than two decades, non-farm activities could be today a replacement for farming. In this case, land concentration inequality might not play a big role on education, as industrialization has surpassed the agricultural role in the economy.

2. Historical Context of Land Inequality and Public Education in Brazil

This chapter will provide a look at why Brazil has a composition of high land possession inequality and how public education has been developing by taking a more historical and analytical focus. Although this thesis proposes an impact of land inequality on public education from 1996 until 2017, the historical context of inequality and development has to be analyzed and understood. Both variables are highly impacted by the historical context of Brazil and to not explain how it had developed would be a major flaw when presenting the topic.

2.1 Land Inequality and Land Reforms

If education only entered the sights of the federal government in 1930, which will be explained later, the issues with land inequality and land reform had to wait a longer period. Land inequality in Brazil tracks back to the beginning of the state's creation. During the 1950s the Land reform movement in Latin America reached several countries including Brazil.

The first government of Getúlio Vargas (1930-1945) nothing did in terms of land reform. This was likely because he had full support from the rural elite and he himself was owner of a large land field for cattle in South Brazil. The transition between the end of Vargas' government in 1945 and the beginning of the military dictatorship in 1964, saw some movements in favor of a land reform and others, always supported by the rural elite, against it (Bethell 2009). The closest the federal government came to land reform was when the Joao Goulart administration (1961-1964), viewing the social aspects of society as the most important part, supported the agrarian reform in Brazil. However, Goulart's efforts to change the social and agrarian reality of Brazil did not last for long, as in 1964 he suffered a military coup (Bethell 2009, 144).

During the military regime, Brazil passed through an economic 'miracle' of high economic growth. Yet, the countryside did not see all this growth, which was concentrated in big metropoles. Social conflicts were already erupting around the 1950's in which the land was the main cause. Due to these conflicts and the political instability Brazil was experiencing, Castelo Branco the current military president at that time enacted a law called the Land Statute. The statute was used as a framework for land reforms, where all land could be expropriated without judicial disputes, only in cases of negotiation on the value of the property (Navarro 2009, 271).

However, De Salis goes further on the discussion based on the creation of the Land Statute, adding that the first military government saw the rural landownership structure as the main problem of agricultural production levels in Brazil (De Salis 2014, 498). The counter reformists strongly fought on the legislative house against the Land Statute arguing that the law was against the right of private property and the problem of Brazil was not landownership structure but lack of incentives for production from the government. Although Castelo Branco believed that a break on the landownership structure was inevitable for deeper process of industrialization, another part of the military was against the implementation of an agrarian reform and the strong opposition from landowners in the Congress made the government to give up on any further actions on the agrarian reform (De Salis 2014, 513-514).

Following the conciliatory agreement with landowners, the law was never really put into practice by the government, unless an escalation of rural conflicts in a specific region was identified. In the words of Navarro, "the country's political history has demonstrated a vigorous and as yet invincible alliance among large landowners, politicians, and conservative sectors capable of preventing the enforcement of law in due course should a significant process of land reform becomes reality" (Navarro

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2009, 271).

The military government did not do anything to actually redistribute land. They preferred to colonize new land than confront the rural elite and make a serious land reform. As we can see on table 2, from 1970 the number of establishments and area keeps increasing until 1985, the last year of the military government. Certainly, the new area legally colonized, as an initiative of the government, was not only by peasants who did not have land but also by large farm owners who wanted to expand their possessions. As Navarro informs, "approximately 30 million hectares were transferred to private hand through the mechanism of 'fiscal Incentives'" (Navarro 2009, 273). From 1985 onwards, the area size decreases along with number of rural proprieties until 1995, and from then on, the number of establishments increases even though the area diminishes.

Data			Census	years		
Dulu	1970	1975	1980	1985	1995-1996	2006
Rural Proprieties	4,924,019	4,993,252	5,159,851	5,801,809	4,859,865	5,175,636
Total Area (ha)	294,145,466	323,896,082	364,854,421	374,924,929	353,611,246	333,680,037
Courses Data from IDCE 2007						

Table 2: Number on establishments and agricultural area of Brazil

Source: Data from IBGE 2007.

The year 1995 marks a turning point in land reform policies. With a democratic government in place, Cardoso's administration passed new laws on land redistribution (Navarro 2009, 276). The new laws served to implement a Market Assisted Land Reform (MALR) with the assistance of the World Bank. The importance of the MALR for the government is indicated by the appointment of a new Minister of Land Reform and the corresponding budget growth from \$0.4 billion in 1994 to \$1.3 billion in 1995, reaching \$2.6 billion in 1997 (Deininger 1999, 663). Although it was a great step compared to previous decades, not much of the country's land inequality has changed.

The rural elite still had political and economic power to curb the laws implemented in the new democratic constitution and to influence public policy spending (Acemoglu and Robinson 2008).

The same way that Cardoso's administration was a landmark, it was also a surprise for adopting land reform policies. He was elected with a neoliberal agenda of market-led economic development, although he was part of the *Partido Social Democrata Brasileiro* (PSDB) or Social Democratic Brazilian Party. However, what the government was not expecting was an escalation of the rural conflicts mainly incited by the *Movimento dos Sem Terra* (MST) or Landless Movement, which culminated in the massacre of Eldorado dos Carajas, where the police killed several members of MST, causing national and international repercussions. These conflicts in the rural areas lead the government to adopt the land reform laws (Robles 2018, 16-17).

The MALR started in 1996 under Cardoso's administration and the first part of the National Agrarian Reforms Plan II finished at the beginning of Lula's first administration in 2008 (Sparovek and Fernando Maule 2009, 298). During Lula's first term, the government redistributed a total area equal to Belgium, Denmark, Portugal and Switzerland combined (Navarro 2009, 278). Although the amount of land distributed by Lula was relatively large, Robles conclude that much was new settlements and not a redistribution, therefore not having the same social impact (Robles 2018, 29). Nevertheless, taking into consideration the whole administration and not only one term, Cardoso's land reform distributed more land, in total area, than Lula's administration (Robles 2018, 20).

2.2 Public Education in Brazil

Federal educational policy in Brazil was only possible from 1930s on, as before this period, educational policies were handled by each state. During the Old Republic

period (1989-1930) Brazil was dominated by two oligarchies, one from Sao Paulo with the *Partido Republicano Paulista* (PRP) and the *Partido Republicano Mineiro* (PRM). Both parties represented states with high interest in agricultural products, to be more specific, coffee and cattle respectively (Bethell 2009, 7).

One key point from before the 1930s was the issuance of special decrees by the southern states of Brazil with regard to primary and secondary education. As mentioned earlier, these states were mainly populated by European migrants with a higher level of education than the Brazilian population at that time. These three southern states had official settlements in most of their territory, where the government gave parcels of land up to a certain size defined previously by law, giving land to those immigrants and resulting in a more equally divided land possession(de Carvalho Filho and Monasterio 2012, 796).

When the Vargas Era (1930-1945) started, education had a new role in the government. Getulio Vargas wanted to industrialize Brazil to bring progress and development² therefore, education for the population would be necessary. During his government, education became a federal concern, centralizing all the decisions related to education, but leaving the administration and management under control of municipalities and states. Primary education, amounting to four years at the time, became free and compulsory for primary education.

The Ministry of Education focused on developing a curriculum, taking inspiration from the European education system, with its emphasis on social sciences and humanistic education. Although the government extolled education in comparison to previous government, the main goal was economic development. Thus, people had

² One of the main policies was the import-substitution process, where a country through industrialization provides goods to the population which were previously imported. This leads to a high consumption of national goods, boosting the national economy.

needed a technical education in order to leave school and enter professions without going to university. As this market need was not met, "industrialists created their own technical schools, which were considered of good quality and adjusted to their needs, and remained outside the control of the education authorities; commercial education grew in the private sector, as a second-best alternative to children coming from lower social strata; and agricultural education never developed" (Schwartzman 2004, 13-14).

The statement above from Schwartzman clearly shows how the rural elite value education. While the government could not provide technical education and skills for the population to join the job market, industrialists and traders started to invest their own time and money to train and educate workers. It is worth noting that this benevolence from both groups was self-serving. However, they wanted the government to provide better education, whereas the agriculturalists, meaning the rural elite, did not wanted to invest in education for their labor force (Schwartzman 2004; Oded Galor, Omer Moav, and Dietrich Vollrath 2009, 148). In fact, taking an international perspective, in countries with high levels of education and income, field workers are often immigrants from developing countries with lower levels of education (FAO 2018).

Neither the rural elite want to invest in the rural population education, nor did Vargas intend to do so. The president at that time increased several social and welfare benefits for urban workers, leaving rural workers out of the benefits. As Bethel exposes, "Vargas had no interest in agrarian reform and no intention of extending existing and future labor and social welfare legislation to the 70 percent of Brazil's population in the primary sector (not of improving the level of their education)" (Bethell 2009, 52).

Not only on practical terms but on juridical ones, the education had been neglected. The first legal framework, called Law of Direction and Bases for Education (LDB), had already been written and presented to Congress in 1948, it was just approved by the government in 1961. This law guaranteed compulsory financing from the federal sphere, providing 12 percent of the total budget to education, and from state and municipality spheres 20 percent of their budget was destined to education funding. Another important aspect of this law was that it made the primary level, at that time from first to fourth grade, compulsory (Bernardo Stuhlberger Wjuniski 2013, 152).

The military government, which took power in 1964, modified the law to create the second LDB in 1971. Under the new law, the grades had a new arrangement, as per table 3. However, three important changes came with the new law. First, the *Ensino Fundamental*, primary and lower secondary became compulsory, but there was no obligation from the federal government to invest in education, while the states and municipalities kept their quota of 20 percent (Kang 2018, 770-772).

Grade	Pre-1971	Post-1971
1	Ensino Fundamental	Ensino Fundamental
2	(Primary)	(Primary and Lower Secondary)
3		
4		
5	Ensino Médio	
6	(Lower and Upper	
7	Secondary)	
8		
9		Ensino Médio
10		(Upper Secondary)
11		
12-17	Ensino Superior	Ensino Superior
	(Tertiary)	(Tertiary)

 Table 3: Change on educational structure from 1971

Source: Data from Thomas Kang 2018, 772.

The third change specified that public upper secondary education should be gradually replaced by loans given to students. Therefore, tertiary education would continue to be financed by the government, however secondary education would be made 'private' (Bernardo Stuhlberger Wjuniski 2013, 153).

When specifically talking about Brazil, the focus has long been on tertiary education, which is mainly available to elites (Bernardo Stuhlberger Wjuniski 2013; Kang 2018; Wegenast 2009). Kang shows the expenditure on education per pupil for primary and secondary as a proportion of GDP. For primary education, there is a significant decrease of funding from 1941 where it drops from 17 percent of expenditure to below 12 percent. The amount only increases to higher rates after 1985 where it almost reaches 15 percent of expenditure. For secondary education, on the other hand, the funding steadily increases until 1950 reaching 140 percent of expenditure as a proportion of GDP per capita. But from that point on it only decreases until 1985 reaching 20 percent of expenditure from which point it has a constant value until 2003 (Kang 2018, 776).

Table 3 shows clearly the overinvestment in tertiary education compared to other levels of education in the 1990s. As presented by Kang, the amount spent on the primary and lower secondary education, as explained before changed structure in 1971, is really similar to the one of upper secondary education. Although the first ones having more than twice the length as the latter one. The tertiary education expenditure totally differs from the other level of education. While a pupil for primary and lower secondary cost an average of R\$ 517 and 637 respectively, a student in the tertiary costs almost 23 times more. Although there more points to take in consideration as the total number of pupils in each level and the returns each level of education give, the gap still high.

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Brazilian Structure	Terminology	Grade	Length	Average No. of years to complete	Estimated cost in R\$ per student/year	Legal Responsibility
Ensino Fundamental	Primary Education	1-4	4	5,4	517	Shared between Municipality and State
	Lower Secondary Education	5-8	4	4.9	637	State
Ensino medio	Upper Secondary Education	9-11	3	3.7	661	State
Superior	Tertiary Education	12-17	4-6	4.5	13,654	Federal

Table 4: Details on educational information of Brazil in the 1990s

Source: Data from Blom, Holm-Nielsen, Dorte 2001, 4.

After 1985 the military government left power under great popular protests and huge economic problems. Economic stability came only under the Cardoso administration (1995) and together with it, a new education law (third LDB) was approved. In it, the federal budget contribution to education was made mandatory once again, at a level of 18 percent, and states and municipalities had to contribute 25 percent of their budget. However, the main importance of this law was the creation of the *Fundo de Manutenção e Desenvolvimento do Ensino Fundamental* (FUNDEF) or Fund for Primary Education Development which made it obligatory for states and municipalities to invest in primary education for 10 years and mandated that resources from the federal government should be used to better pay primary school teachers (Bethell 2009, 523-524).

Already in Lula's administration, the FUNDEF was extended to the *Fundo de Desenvolvimento da Educação Básica* (FUNDEB) or Fund for Basic Education Development in 2007, which should guarantee but not oblige, access for all children and teenagers to education, from day care centers through secondary school (de Lima Araujo 2012, 526-527). Although the government tried to improve the quality for all the basic education, the programs faced a lot of challenges, such as the shortage of funds

compared to the increase of enrollments, inadequate infrastructure for classes and unsatisfactory conditions and salaries for teachers (de Lima Araujo 2012).

The comparison of education and economy can also be made with other regions where developing countries had a different focus than in Latin America. If we go back a bit in time and look at East Asia. Economically speaking, they were behind Latin America but focusing on education and with a different economic approach, we see that today the region is ahead in several aspects. Until the 1960s Latin America was considered more developed, in economic terms, than Asia. After this period, with changes in South and East Asia, countries in the region started to grow and develop further than Latin American countries. As Wegenast shows, not only did agriculture in Asia develop in small parcels instead of large landholdings, but the number of students in secondary education was much higher than in Latin America. In Latin America, in the 1960s, some 12 percent of the total population over age 15 had completed secondary school versus 15 percent in Asia. In the year 2000, that percentage in Latin America had risen to around 25 percent, while Asia had reached about 35 percent. In certain countries, like South Korea, Hong Kong and Sri Lanka, around 60 percent of the population passed through secondary education (Wegenast 2009, 86-87). The author also mentions that compared to Latin America, where the proportion of plantation crops exported dropped from 50 percent in 1960 to 12 percent in 2000, these goods always had a small significance in the export basket of Asian countries, where they represented five percent in the 1960 and dropped to one percent in 2000.

3. Empirical Effects of Land Inequality on Public Education

This chapter will present the main arguments about the negative impact of land inequality on education and long term economic development, together with analyses of some descriptive statistics from the data collected. Furthermore, it will include a brief theory for the quantitative analyses finishing up with a commentary on the regressions performed will be provided.

3.1 Argument and Descriptive Statistics

From the previous historical analysis, we see that Brazil, besides neglecting education policies and investment as well as land inequality through late use of land reform policies, took the opposite track from several countries that are today considered developed. As asserted by Oded Galor, Omer Moav, and Dietrich Vollrath some countries that passed through land reform policies before investing heavily in education are South Korea, Taiwan, Russia before the revolution, Japan during the Meiji restoration and the United States, which did not have a land reform but enjoyed higher levels of education in more land-equal states (Oded Galor, Omer Moav, and Dietrich Vollrath 2009, 161-165). The reforms served to take political and economic control out of the large landowner's hands, while solid education policies provided skills for people for work in industries and services rather than staying in the plantations, where little skill is needed.

In the case of Brazil, the land reform policies were developed more than 60 years after the initiation of centralized education policies and during certain periods, as the one during the military government, education was again decentralized. However, when education policies did come, they focused specifically on urban workers, as the large landowners wanted to secure their plantations with cheap labor.

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Table 5 below presents the Gini coefficients per state and for the whole country from a time period of 20 years. This period comprises the return of democracy in Brazil and also the period with active land reform policies. There is a slight decrease in inequality, indicated by the general average in the first row.

States	1985	1995	2006
Brazil	0.857	0.856	0.854
Rondônia	0.655	0.765	0.717
Acre	0.619	0.717	0.716
Amazonas	0.819	0.808	0.837
Roraima	0.751	0.813	0.664
Pará	0.827	0.814	0.822
Amapá	0.864	0.835	0.852
Tocantins	0.714	0.726	0.792
Maranhão	0.923	0.903	0.864
Piauí	0.896	0.873	0.855
Ceará	0.815	0.845	0.861
Rio Grande do Norte	0.853	0.852	0.824
Paraíba	0.842	0.834	0.822
Pernambuco	0.829	0.821	0.825
Alagoas	0.858	0.863	0.871
Sergipe	0.858	0.846	0.821
Bahia	0.84	0.834	0.840
Minas Gerais	0.77	0.772	0.795
Espírito Santo	0.671	0.689	0.734
Rio de Janeiro	0.815	0.79	0.798
São Paulo	0.77	0.758	0.804
Paraná	0.749	0.741	0.770
Santa Catarina	0.682	0.671	0.682
Rio Grande do Sul	0.763	0.762	0.773
Mato Grosso do Sul	0.86	0.822	0.856
Mato Grosso	0.909	0.87	0.865
Goiás	0.766	0.74	0.776
Distrito Federal	0.776	0.801	0.818

Table 5: Gini coefficient k	by '	year	and state	ķ
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Source: Data from IBGE 2007.

As previously mentioned, the southern states of Rio Grande do Sul, Santa Catarina and Parana are among the states with lower Gini coefficients of land together with the state of Espírito Santo. These states had a large influx of European immigration from the nineteenth century onwards. Another interesting detail are data from the states of Mato Grosso do Sul e Mato Grosso located in the border with

Paraguay and Bolivia. During the military regime, these two states received a high influx of families through the colonization of land initiated by the government. It is related to land reform policy, however it was not a redistribution of lands. In general, the land inequality numbers have not changed much. Although land reform policies were put in place in recent years, it has not contributed to a significant redistribution of lands.

Table 6 below presents the municipalities' highest scores for IDEB from 2007. The results for the IDEB from 2017 and the Gini coefficients were included for the purpose of comparison. The highest grade from all the municipalities was 7.7 out of 10. This shows that no municipality has reached an outstanding grade. This could be due to the bad quality of the system but also because this was the first year of the index – which is comprised of exams from different areas, such as mathematics, Portuguese and science – therefore, the schools and students did not know what to expect from the exams.

Municipality	IDEB 2007	IDEB 2017	Gini 1996	Gini 2006
Adolfo	7.7	6.5	0.800	0.813
Santa Fé do Sul	7.6	7	0.731	0.713
Cosmorama	7.5	7.4	0.571	0.595
Parai	7.3	7.3	0.439	0.492
Centenario	7.3	7.1	0.390	0.414
Taquarivai	7.2	6.7	0.825	0.879
Santa Rita				
Doeste	7.2	6.1	0.672	0.694
Cajuru	7	6.4	0.751	0.752
Turmalina	7	6.4	0.701	0.662
Barra do				
Chapéu	6.9	6.2	0.670	0.667

Source: IBGE 2006; INEP 2018.

Almost all municipalities had a worse IDEB score ten years later, besides Parai, which maintained the same score. The same pattern can be seen when comparing the Gini

Coefficient from 1995-96 to 2006. Only three municipalities had a decrease in land inequality, while all the others had an increase in land inequality measured by the Gini.

Table 7 below presents the municipalities with highest score on the IDEB from 2017. Contrary to the table, all municipalities had a better grade on the IDEB 2017 than from ten years before. What is remarkable is that the worst grade out of these ten municipalities was 8.2, while the best from ten years before was 7.7. Only one city reached a grade above nine, however the improvement on the grade is clear. The Gini coefficients in general grew, meaning that inequality increased in all but two municipalities.

Municipality	IDEB 2007	IDEB 2017	Gini 1995-96	Gini 2006
Sobral	4.9	9.1	0.885	0.874
Serranopolis do Iguaçu	5.8	8.7	0.515	0.577
Deputado Irapuan Pinheiro	3.6	8.6	0.718	0.752
Coruripe	4.1	8.5	0.887	0.908
Milha	3.2	8.4	0.656	0.739
Japura	2.8	8.3	0.164	0.727
Monsenhor Tabosa		8.3	0.795	0.807
Ararenda	3.4	8.3	0.858	0.837
Sertaneja	5.4	8.2	0.680	0.707
Catunda	4.4	8.2	0.889	0.816

Table 7: Highest IDEB 2017 scores

Source: IBGE 2006; INEP 2018.

After looking at the highest IDEB scores, below on table 8, we have the highest Gini coefficients, meaning most unequal municipalities. All municipalities that had a high Gini also had a poor achievement on IDEB in 2007. However, all municipalities had a decrease in Gini and an increase in IDEB, when comparing the initial amounts to the final ones.

Municipality	Gini 1995-96	Gini2006	IDEB 2007	IDEB 2017
Telemaco Borba	0.994	0.982	4.4	6.3
Almeirim	0.985	0.772	2.7	3.6
Apicum Açu	0.983	0.817	3.1	4.6
Peri Mirim	0.981	0.470	3.5	-
Bacurituba	0.981	0.539	3.6	4.7
Central do Maranhão	0.981	0.960	3.1	4.5
Americana	0.980	0.925	5	6.9
Santa Quiteria do				
Maranhão	0.977	0.966	3.6	-
Afonso Cunha	0.975	0.704	3.4	-
Santa Terezinha	0.972	0.832	3.3	5
Source: IDCE 2006, INED	2019			

Table 8: Highest Gini Coefficients in 1995-96

Source: IBGE 2006; INEP 2018.

In this last table 9, we can see again the municipalities with highest Gini coefficients, but this time for 2006. Among the ten highest, two municipalities are the same as in table 8, Telemaco Borba and Central do Maranhão. We can see a reduction on the Gini, generally speaking, but the coefficients are still high. For the IDEB, all municipalities performed poorly in 2007 but also all had an increase on the index level ten years later.

Municipality	Gini 1995-96	Gini2006	IDEB 2007	IDEB 2017
Telemaco Borba	0.994	0.982	4.4	6.3
Coelho Neto	0.971	0.977	3.1	4
Sapeaçu	0.759	0.970	3.1	4.7
Lagoa de Itaenga	0.861	0.967	3.4	4.5
Conceição da Barra	0.923	0.963	4.1	5.5
Ribeirão Preto	0.858	0.961	4.3	6
Central do Maranhão	0.981	0.960	3.1	4.5
Pradópolis	0.911	0.955	5	6.2
Matões do Norte	0.963	0.951	2.7	5.5
Barão de Melgaço	0.927	0.949	4.1	5.5

Source: IBGE 2006; INEP 2018.

Analyzing the IDEB for municipalities in all the tables, apart from the first one, all had an increase on IDEB, raising the level significantly. The same cannot be said about the Gini coefficients, which did not follow any pattern. If we divide the Gini in three equal thirds, low, medium and high coefficient, we can say that most of the municipalities are situated in the high coefficient third, which is also no surprise, considering the Gini coefficient for the whole country. Another conclusion is that, recent education investment and policies, as seen from previous chapter, are working faster and have a clearer return than land reform policies.

The slow development in land reform policies to redistribute land is due to taking the exact same approach as the military regime: colonization of new lands instead of redistributing latifundia from large landowners. This is important in that it demonstrates the previously mentioned political power of rural elites, which under Lula and Dilma, his successor, started to be called Agribusiness. During the Cardoso administration, 20 million hectares of land were settled by 540,704 landless peasant families (Robles 2018, 18). However, a majority of these families were settled in new areas, meaning they colonized these lands. As Robles mentioned, the major intention of Cardoso was to reduce poverty and not fight land inequality (Robles 2018, 21). The author also criticized Luis Inácio "Lula" da Silva and Dilma Rousseff, who settled a higher amount of landless families than Cardoso but in a smaller area, for copying the same colonization strategy and incentivizing the Agribusiness. One number that supports this observation is the increase of soybean crops planted from 1985 to 2013. During Cardoso's administration, the number of hectares increased from 11 million to 18 million. From the beginning of Lula's administration until the mid-first term of Dilma, it increased from 18 million to 30 million hectares. From 1985 to 2013, it increased from 10 million to 30 million (Robles 2018, 26). In the table below, there are more statistics that express the difference between Agribusiness and family farms.

	Agribusiness	Family Farms					
Number of farms	807,587	4.37 million					
% Total Agricultural area	75.7	24.3					
Agricultural Labor	-	74					
% of gross annual value	62% (USD44.5 billion)	38% (USD27 billion)					
Subsidy budget (2013-14)	USD62 billion	USD17.8 billion					
Source: Data adapted from Crooub at al 2016, 0,10							

Table 10. Main information on Agribusiness and Family Farms

Source: Data adapted from Graeub et al 2016, 9-10.

For the purposes of this research, what stands out from the information above is the subsidy budget given by the federal government to both groups. The Agribusiness budget is three-fold higher than family farms. Agribusiness operations are heavily based on mechanization of production, using heavy machinery to plant, spread fertilizers and pesticides and to harvest. This also means a lower amount of labor, which could be the reason for the increased expenditure in education by the government in later administrations. However, this does not automatically imply that support for education expenditure will come from Agribusiness groups.

The increase in soybean, an export crop using vast land fields to be cultivated, clearly exemplifies the growth in economic power of rural elites, which also becomes political power (Casanova, Xia, and Ferreira 2016; Wegenast 2009). The political power can be channeled through the Frente Parlamentar da Agropecuaria, mentioned previously in the first chapter, a lobby group formed by deputies and senators, to defend the Agribusiness interests. As presented in their own website, 32 out of 81 senators and 225 out of 513 deputies are members of this group (Frente Parlamentar da Agropecuária 2019). This means almost 50 percent of both Legislative Houses are represented by an Agribusiness interest group.

Education policies normally take a long term perspective because of the duration of a child's education. In the case of Brazil, starting from primary education nowadays there are nine grades, in secondary, three grades, and if the child goes to

university, at least four more years. All of these summed up reach a minimum of 16 years. The increase of public spending on public education started during the Cardoso administration, with FUNDEF implemented in 1998. In 2007, during the Lula administration, the name changed to FUNDEB and it should last until 2020. These two funds amount to 22 years of increased funding for basic education. Although two decades might seem like a long period, for education policies this might not be sufficient, especially if we take into consideration the long years the sector did not have such importance in Brazilian policies.

From figure 1 below, we can see the evolution of IDEB scores for public and private schools (keeping in mind that private schools are not obliged to participate in the exams used as the base for IDEB). For public schools, there is an increment of one unit in the score, passing from 4.4 to 5.5 in a period of ten years (INEP 2018). Although the public scores are above the target, it is still a slow and small increase in the scores.



Figure 1. IDEB scores for Private and Public schools from 2007 to 2017

The private scores show a higher achievement, from 6 to 7.1 in the same period of ten years. Although the private schools had a higher score, their improvement growth had the same level, 1.1 units in ten years, as the public schools. The same growth for private and public schools might show that increasing public expenditure is leading public education to a better future. Nevertheless, stopping the finance of such funds might lead to a precariousness of public education.

3.2 Theory and Regressions

The main objective of this research is to understand the impact of land inequality on education in Brazil, expanding the literature by using more recent data. This is done to see if countries that already passed through an industrialization process are still affected by land inequality. To better understand and explain, the research will be done through an Ordinary Least Square cross-sectional regression with multiple variables, represented by the formula below:

$$Y_i = \alpha + \beta_1 X_i + \beta_2 Z_i + u_i$$

Where Y_i is the dependable variable, IDEB, X_i is the independent variable and Z_i is the control variable. As a dependent variable is not only influenced by a single independent variable, more than one control variable is used on the regressions. As explained previously, the Gini coefficient always reflects the data from 11 years prior to the IDEB. All the other variables in the analysis are from the same period as the dependent variable.

For each dependent variable, IDEB 2007 and 2017, there are three regressions, one for each level of Gini coefficient. The levels were explained previously in the methodology. Also included in the regressions was the Log for

number of public schools in a municipality, the Log GDP per capita, as well as the agricultural sector per capita value (agropca), industry per capita value (indpca) and the service per capita value (serpca) for each municipality. The last two variables are the total education expenditure per capita (totaleduexppca) in the municipality and the proportion of public enrollment, taking into consideration the public and private enrollments (pprenrollment) in the municipality.

Table 11 shows the regression taking into consideration the IDEB of 2007. For municipalities with low Gini coefficient, we only have 17 observations. The ones with a medium coefficient have a much more expressive amount, with 1,608, and high Gini coefficient has the highest amount with 3,133 municipalities. The regression for municipalities with low Gini has a negative impact on the IDEB but it is not significant, nor are any of the other variables. However, when we regressed municipalities with medium Gini coefficient (1d), there was a negative and significant correlation. We can say that with 95 percent Confidence Interval an increase on one unit of Gini Coefficient from 1995-96 decreases by 0.47 unit the IDEB score of a Municipality with medium Gini coefficient for land, holding all the other variables constant. There are two other statistically significant variables. The first is Log GDP per capita, where we can say that with 99 percent Confidence Interval an increase in one percent Log GDP per capita increases by 0.60 unit the IDEB score for a municipality, with all the other variables constant. The second and most surprising negative relation is that with 99 percent Confidence Interval the increase in one percent Log of public schools decreases by 0.19 unit the IDEB score in a municipality, keeping all the other variables constant.

In the regression using municipalities with high Gini coefficient of land (1f), all variables are statistically significant but with extremely low numbers. The only three

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variables that are statistically significant and have significant values are the same as regression 1d. It is possible to say with 99 percent Confidence Interval, an increase of one unit in the Gini decreases by 2.15 units the IDEB scores for a municipality, keeping the other variables constant. The impact of municipalities with a high Gini are much greater than the medium ones, which shows that the higher the level of inequality, the worse it impacts educational achievement.

	(1a)	(1b)	(1c)	(1d)	(1e)	(1f)
gini	-2.81 (1.33)	-0.83 (1.77)	-1.91 (0.27)**	-0.47 (0.23)*	-4.30 (0.19)**	-2.15 (0.19)**
logpubschool		-0.39 (0.30)		-0.19 (0.02)**		-0.17 (0.01)**
agropca		0.07 (0.07)		-0.00 (0.00)		-0.00 (0.00)**
serpca		0.00 (0.00)		0.00 (0.00)		0.00 (0.00)**
indpca		-0.00 (0.00)		-0.00 (0.00)		-0.00 (0.00)*
totaleduexpp ca		0.15		-0.00		-0.00
		(0.25)		(0.00)		(0.00)*
logpibpca		0.11 (0.50)		0.60 (0.04)**		0.60 (0.02)**
pprenrollmen t		0.10		0.00		0.00
•		(0.39)		(0.00)		(0.00)*
_cons	4.23 (0.25)**	3.14 (4.88)	5.57 (0.15)**	-0.34 (0.43)	7.22 (0.15)**	0.75 (0.28)**
R^2	0.20	0.87	0.03	0.31	0.12	0.39
Ν	17	17	1,711	1,608	3,326	3,133
		* <i>p</i> <.05	** <i>p</i> <.01			

 Table 11: OLS regression, dependent variable: IDEB 2007

Table 12 shows regressions using as a dependent variable the IDEB from 2017 and the Gini coefficient of 2006. In this regression, there is a lower number of observations. For low Gini municipalities, there are only 15 observations. For medium and high Gini municipalities, there are 1,120 and 2,653 respectively.

Unlike before, the regression for municipalities with low Gini coefficient have a

positive relationship with IDEB scores for 2017. However, it is still not as significant as all the other variables. When we look at medium Gini coefficients (2d), Log GDP per capita is not significant anymore but agricultural sector per capita becomes significant. Therefore, we can say that with 99 percent Confidence Interval an increase in one unit of agriculture sector per capita decreases by 0.21 unit IDEB score for a municipality, holding all the other variables constant. When agriculture increases its share on the municipality GDP per capita, it has a negative impact on IDEB scores.

Moving forward to the high Gini coefficient regression, there is one surprising result. The increase in Log GDP per capita decreases the IDEB score. All the other variables maintain the same relationship. It is important to note that municipalities with high Gini coefficient had a lower impact on IDEB score from 2007 to 2017, which was not the case for municipalities with medium Gini coefficient. Comparing regression 1d to 2d, the increase in one unit of Gini coefficient causes a decrease of 0.28 more from 2007 to 2017 in municipalities with medium Gini holding all the other variables constant and both years with 95 percent Confidence Interval. However, there is a higher impact of Log public schools and we start to have a negative impact for the agriculture sector's share of GDP per capita on IDEB scores.

One main variable which is regularly used to measure education, is government expenditure (Oded Galor, Omer Moav, and Dietrich Vollrath 2009; Erickson and Vollrath 2004; Deininger and Squire 1998). Haddad, Freguglia, and Gomes already looked into the effects of public expenditure, specifically the FUNDEF, on scores of Prova Brasil, one of the variables used to calculate IDEB, and found no significant results (Haddad, Freguglia, and Gomes 2017, 1693-1694). Although, the authors did not use any land inequality variable, their research was already an indicator that public expenditure would not be statistically significant. As we can see on both regressions,

total expenditure on education per capita on a municipality has no statistical significance and the values are not significant.

	(2a)	(2b)	(2c)	(2d)	(2e)	(2f)
aini	-0 77	2 42	-1 22	-0.75	-1 92	-0.94
gin	(2.64)	(3.98)	(0.32)**	-0.75	(0.29)**	-0.3 - (0.28)**
lognubschool	(2.01)	-0.04	(0.02)	-0.32	(0.20)	_0.27
logpubscribbi		-0.04		-0.32 (0.03)**		-0.27 (0.02)**
ograpaa		(0.00)		0.00)		(0:02)
agropca		1.43		-0.21 (0.00)*		-0.40 (0.08)**
		(0.72)		(0.09)		(0.08)
serpca		0.00		0.00		0.00
		(0.00)		(0.00)		(0.00)
indpca		0.00		0.00		-0.00
		(0.00)		(0.00)		(0.00)
totaleduexpp		0.03		0.00		0.00
са						
		(0.05)		(0.00)		(0.00)
logpibpca		-1.40		-0.02		-0.05
		(0.58)		(0.03)		(0.02)*
pprenrollmen		-0.01		-0.00		0.00
t						
		(0.03)		(0.00)		(0.00)
cons	5.72	14.56	6.77	7.05	7.15	7.13
	(0.41)**	(3.55)**	(0.18)**	(0.30)**	(0.22)**	(0.25)**
R^2	0.01	0.74	0.01	0.19	0.02	0.20
Ν	15	15	1,137	1,120	2,710	2,653
		* <i>p</i> <.05	** <i>p</i> <.01		,	

The statistics presented in this chapter show a clear tendency of unaltered land inequality, even looking for a period prior to the one this research comprises. However, it is also possible to conclude that even though education policies, starting around two decades ago, have flaws they also have a positive impact.

The continuation of educational policies like the ones implemented might change the impact of land inequality, along with the mechanization of agriculture, showing promise for addressing this challenge in the long run. Nonetheless, for the moment land inequality still has an impact on education in Brazil and solely investing in education might not be an adequate solution.

Conclusion

As this thesis has shown, the present situation in Brazil still indicates that land inequality and education are not just the result of government negligence but an outcome influenced by the interests of rural elites. As mentioned in the introduction, education is one of the main pillars for long term economic growth and for individual income growth. Studies connect the increase of rural population income with higher levels of education through non-farming jobs. However, these possibilities were only available to those with access to higher education. As land inequality, despite Brazil's increased industrialization, still impacts education achievements, the possibility for higher income jobs in the rural areas can be limited.

Although Janvry and Sadoulet believe land reform had been over in Latin America, Brazilian administrations in the 1990s and 2000s put in practice partial land reforms, but instead of redistributing, new lands were colonized (Janvry and Sadoulet 1989). The rural elites maintain their economic power and in fact increased their political power, creating lobby groups reaching almost 50 percent of both Legislative Houses in 2019.

This research showed that it is important to understand that developing countries with high land inequality might have long term economic growth difficulties if they do not face this issue early on their developmental path. It was shown that countries such as South Korea, Taiwan, Japan and even the United States had low levels of land inequality before they started the industrialization process (Oded Galor, Omer Moav, and Dietrich Vollrath 2009). Meanwhile, Brazil always had strong rural elites, who could use their political and economic power to curb investment in sectors such as education. In chapter three, the research aligns with other studies (Wegenast

2010), to show that land inequality still has an impact on education quality, even though Brazil has been investing more than ever in basic education.

The increase in the IDEB results through education expenditure might show that land inequality does not play the biggest role in terms of education financing nowadays in Brazil. This can be linked to the fact that large scale agriculture, for plantation exports such as soybean, corn and cotton is increasingly being mechanized, thus reducing the need for low skilled labor. However, it is important to mention that as Agribusiness increases, family farms might lose their land, and a path out of farming is through education. Therefore, investment in education by the government is imperative in order to keep having better educational achievements.

One of the main limitations of this research is the period length. As consequence of the lack of data, it is not possible to start back from the redemocratization period or even from the military regime. However, if such data could be found, it would significantly enrich the discussion of the impact of land inequality on education.

Two improvements that I see for future research on the same topic are as follows. The first would be to include a more extensive investigation into the deputies and senators related to the agricultural lobby. In order to understand the exact way in which political power influences the policies concerning their own group of influence. This should include not only policies that affect education and land reform and redistribution but also policies that can undermine the benefit of the general population in order to further the interests of the agricultural lobby. Such research would lead to a better understanding of the mechanism of how this lobby group has been affecting specific policies such as land reform and education.

The second improvement would be to relate the research to private education institutions and how they have developed in Brazil, in this case not just primary private institutions but also secondary and tertiary. As mentioned in chapter two, the investment in tertiary education was much higher and lasted longer than that in primary and secondary education. Therefore, looking at all levels of education could find a possible correlation of higher social strata searching for primary and secondary education, and lower social strata searching for easier access into tertiary education. As tertiary education had an elite focus, public universities had a high standard for admission exams, which did not reflect the levels achieved in public primary and secondary education.

The approach used in this research follows previous research showing that Brazil's education, as in other countries, is impacted by land inequality. This starting point is crucial because from here it is possible to extend the research to incorporate other variables that would further explain the process.

These points of improvement were taken into consideration when conducting this research. However, such points could not be thoroughly incorporated in this research as they extend beyond the scope of this thesis. This leaves space for further research which can expand on the findings presented in this thesis.

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Appendix



Figure A.1: Lowess of IDEB x Gini from 2007





	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ν	mean	sd	min	max
gini	5,054	0.705	0.128	0	0.994
escolaspublicas	5,032	22.88	37.01	1	1,074
pibpcap	5,054	9,091	10,069	1,551	206,190
idebfund	5,054	4.079	0.955	0.100	7.700
agropca	5,054	5.256	68.58	0.000506	3,943
indpca	5,054	1.461e+06	7.458e+07	117.3	5.216e+09
serpca	5,054	4.143e+06	2.087e+08	1,088	1.463e+10
totalgastoeducacaopcap	4,765	5.940	53.32	0.000278	2,465
proporcaomatricula	5,032	5.630	27.15	0.0927	964

Table A.1: Description of Statistics for regression IDEB from 2007

Table A.2: Description of Statistics for regression IDEB from 2017

(1)	(2)	(3)	(4)	(5)
N	mean	sd	min	max
3,862	0.706	0.122	0	0.982
3,862	18.76	43.91	1	1,613
3,862	5.791	1.004	1.800	9.100
3,862	0.245	0.290	5.61e-06	3.137
3,862	6,976	7,163	606.0	136,741
3,862	3,889	9,746	99.28	229,678
3,862	14.44	185.2	0.0463	9,240
3,788	7.107	74.05	0.000980	3,541
	N 3,862 3,862 3,862 3,862 3,862 3,862 3,862 3,862 3,862 3,862	N mean 3,862 0.706 3,862 18.76 3,862 5.791 3,862 0.245 3,862 6,976 3,862 3,889 3,862 14.44 3,788 7.107	(1) (2) (3) N mean sd 3,862 0.706 0.122 3,862 18.76 43.91 3,862 5.791 1.004 3,862 0.245 0.290 3,862 6,976 7,163 3,862 3,889 9,746 3,862 14.44 185.2 3,788 7.107 74.05	(1) (2) (3) (4) N mean sd min 3,862 0.706 0.122 0 3,862 18.76 43.91 1 3,862 5.791 1.004 1.800 3,862 0.245 0.290 5.61e-06 3,862 6,976 7,163 606.0 3,862 3,889 9,746 99.28 3,862 14.44 185.2 0.0463 3,788 7.107 74.05 0.000980