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BREAKING LAND INEQUALITY IN PERU:
ARE LAND MARKETS ENOUGH?

A Thesis in
Agricultural, Environmental and Regional Economics

by
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ABSTRACT

The relatively well-documented adverse effect of land inequality on economic development has brought forth a new liberal approach on land reform in Latin America—the region with one of the most skewed land distributions in the entire world. Peru has not been the exception to this trend, where policies aimed at activating rural land markets have been constantly pursued since the 1990s with the hope of breaking the unequal and dualistic land distribution that characterizes the country.

In light of these market-oriented land reforms, this thesis seeks to empirically examine the factors that influence the functioning of land markets in Peru, their distributional impacts, and the scope for policy to improve outcomes. Using panel data district-level information from the Peruvian Agricultural Census that spans recent liberal reforms, this thesis estimates fixed-effects regression models to compare the change in land inequality across districts and test for inter-district differences in land market activity. The aggregate nature of our approximation allows us to explore effects on different features of land inequality, such as processes of land concentration, fragmentation, and overall inequality (using the Gini index). In addition, our approach also enables us to examine the determinant factors that influence land market activity, aspect that is especially relevant for evidence-based policy recommendations.

The results show that despite government efforts for activating rural land markets since the 1990s, both sales and rental markets are still thin and have not yet generated the volume of land transfers that would be required to achieve major changes in the land structure of the country. However, we found that sales market activity is positively influenced by the levels of titling density and credit access in the district, and that these effects are even stronger when titles and credit are provided together. This last result indicates a positive synergy between private
property rights and strengthening credit markets, which points toward greater effectiveness of credit markets in enhancing the functioning of land markets in environments where the density of titling is higher. These findings give rise to an important policy space of government action for improving the functioning of land markets through massive land titling programs and policies designed for increase credit availability.

On the other hand, whether for their limited activity or due to their performance when they have been more active, our estimates suggest that land markets have not been able to break the dualistic agrarian structure that characterizes the country. Although land markets have allowed land transfers from land-rich farmers to medium-sized farmers, this redistributive role is not observed in the lower end of the land distribution, where land markets seem to have failed in preventing the deepening of the fragmentation of rural property. While the first result could be seen as an important step to enhance agricultural efficiency and achieve a more balanced land structure among those medium-and-large-sized farms, the second result warns on the limitations of land markets to reach and improve the conditions of the poor and small farmers.

Finally, even assuming that the land policy can correct all the relevant markets failures and substantially reduce land-markets transaction costs, the evidence presented in this thesis suggests that land markets alone would not be enough to achieve a structural change toward a more balanced land structure. While under the appropriate conditions land markets can contribute with this goal, the still critical importance of other traditional sources of land access (e.g., inheritance) considerably reduces the ability of this market-led mechanism to induce major changes on land distribution. It is therefore important to consider alternative land policies that, in addition of providing the necessary conditions for land markets to perform a redistributive role, address the deepening of the fragmentation that arise due to inheritance transfers.
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1. Introduction

Land inequality\(^1\) in developing countries has been a topic of particular concern for both policy-makers and scholars in the last decades. This is because of its well-documented harmful effects on economic efficiency, whether by undermining the subsequent economic growth of countries (Deininger & Olinto, 1999; Fort, 2007a), or by increasing the income inequality within them (Carter, 2000; Oyvat, 2014). Such inequality has also been found to mitigate the poverty-reducing effects of existing growth, as it limits the capacity of smallholders to access land and, therefore, their opportunities for making profitable indivisible investments (Deininger & Squire, 1998). Moreover, due to the often-observed inverse relationship between farm size and productivity, it has been demonstrated that inegalitarian distributions of land adversely affect agricultural productivity (Carter, 1984; Feder, 1985; Lipton, 2009).

Given this strong evidence, it is not surprising to observe a renewed contemporary interest of governments of the developing world in seeking egalitarian land access as a strategy for avoiding the detrimental consequences of land inequality (Deininger, 2003a). This has become especially imperative in the case of Latin America, as it is the region that exhibits the highest rates of land inequality in the entire world (Deininger & Olinto, 1999; Griffin, Rahman, & Ickowitz, 2002), and wherein such unequal configurations could represent a major impediment to economic development.

\(^1\) Land inequality is related to the unequal distribution of land structure, where this latter concept is defined as the distribution of agricultural land between producers and firms that use this input for their economic activities, such as small or large farmers, livestock producers, or agro industrial enterprises. It is an analogous concept to income inequality, but in this case applied to the land issue.
The land market has probably been the most common and widespread mechanism fostered by Latin American governments to influence land structure during the last decades, given the economic liberalization paradigm reigning in most of these countries since the eighties (Deininger, Zegarra, & Lavadenz, 2003). A variety of policy instruments have been used to enhance the functioning of land markets, including measures that seek to eliminate the distortions that affect land prices, the deregulation of land transactions, and the provision of property rights by means of land titling programs.

The justification used by scholars and policy-makers to promote these measures has been based on the gains-from-trade argument, which claims that the unfettered operation of land markets will yield both efficiency and equity gains. Conceptually, the first outcome will be attained because the market would allow land transfers from less to more productive farmers, thereby putting land to its highest and best use (Atwood, 1990). The equity outcome would be achieved due to the often-observed competitive advantage of smallholders, who would be willing to pay a higher price for the land given their larger expected per unit returns (Besley, 1995).

However, some economists point out that these conceptual arguments overlook the fact that efficiency and equity outcomes from liberalization of land markets in turn depend on complementary conditions, such as the pre-existing endowments, the presence of public goods, imperfections in other markets (specially credit and insurance), and access to information and technology (Deininger et al., 2003). Consequently, they claim that there is no guarantee that land market activity will yield a better and more efficient distribution of land. In any case, the extent to which land markets can help bring about a more egalitarian land structure, or the type of government intervention needed to ensure that this goal is achieved optimally, is very much an empirical question that needs to be subject to an adequate empirical scrutiny.
In this thesis, we analyze the case of Peru, a country which, in addition to having some of the most unequal land access, has recently undertaken far-reaching reforms to liberalize the rural economy and to enhance the functioning of land\(^2\) and other factor markets. These aspects, coupled with the fact that land inequality has increased considerably over the last twenty years (from a land Gini index\(^3\) of about 0.86 in 1994 to 0.93 in 2012\(^4\)), lead to the question of whether land market liberalization has contributed to this trend toward inequality, or whether on the contrary, it has slowed this trajectory.

With the aim of analyzing these issues, this study seeks to, first, understand the factors that influence the functioning of land markets, and, second, assess the impact of land market activity on land inequality in the Peruvian context. For this purpose, the study uses district-level information from Peru that spans recent liberal reforms, and a fixed-effect regression panel data model to compare the change in land inequality across districts and test for inter-district differences in land market activity. Our approximation allows us to explore effects on different features of land inequality, such as processes of land concentration, land fragmentation, and overall land inequality (using the Gini index).

\(^{2}\) The deregulation of land transactions and the implementation of a large-scale titling program are two of the main policy measures that illustrate this land market-led approach.

\(^{3}\) The Land Gini coefficient is a measure of the extent to which the actual land distribution in a country or region differs from a hypothetical uniform distribution. It goes from 0, for absolute equality, with each individual or agricultural unit receiving an identical share of land, to 1, which indicates that one person or agricultural unit concentrates all land (Deininger & Squire, 1997).

\(^{4}\) Based on information from the Peruvian National Agricultural Census 1994 and 2012. These statistics were calculated considering the total farmland of the country and all legal forms of management, including indigenous communities.
This study is the first to explore the distributional effects of land market activity in the Peruvian case. The aggregate nature of our approximation allows us to look at the big picture to examine and test these relationships in a sufficiently large time period (i.e., about 20 years) and in a nationally representative dataset. This kind of analysis is relevant for several reasons. First, it allows us to test such a relationships in a context with a highly unequal land structure, where the consequences of inequality could be important in terms of reducing the economic efficiency of the agricultural sector and increasing the inequalities within rural areas. Second, it is a case where the evolution of land inequality has increased in a considerable manner. This fact, coupled with the heterogeneity of land inequality among districts, constitutes a unique scenario in which we can explore the role of land market activity on this matter. Finally, it represents relevant information for Peruvian policy-makers by allowing them to assess the consequences of the ongoing land policies implemented in the agricultural sector.

The structure of the thesis is as follows. Section 2 describes the evolution of the Peruvian land policy over the last 50 years—including the recent market-oriented land reforms—and provides some information on the changes of land structure during this period. Section 3 discusses the theoretical factors that influence the functioning of land markets, as well as the resulting equity outcomes from its operation, while Section 4 presents the empirical evidence on this topic for the Latin American context. Section 5 describes the research questions and hypotheses of this thesis, the methodological approach and the data. Section 6 discusses the results of (i) the determinants of land market activity, and (ii) the effect of land market activity on different indicators of land inequality. Finally, Section 7 concludes with a number of implications for land policy.
2. Background: Land Policy and Land Structure in Peru

Access to land has been and still is a controversial issue in Peru. Different approaches and policies have been practiced on this front, from a radical agrarian reform in the seventies, to liberalization and deregulation measures that began to be implemented in the eighties and gained strength since the nineties. Currently, land issues have returned to the political agenda as there is emerging evidence of an increasingly unequal and dualistic agrarian structure, placing the country as one with the most skewed land distribution in all Latin America.

These disparities in land access are especially relevant in a country like Peru, where the agricultural sector is the main source of income for more than two million of households and where the poverty levels are still quite high. The agrarian sector in Peru accounts for no more than 9 percent of the national GDP, but employs around one fourth of the country’s working population (National Institute of Statistics and Informatics-INEI). Moreover, according to official figures about 50 percent of those living in rural areas can be considered poor under international consumption standards (National Household Survey-ENAHO, 2012).

This section describes the evolution of the Peruvian land policy over the last 50 years, giving special attention to the market-oriented land reforms that were implemented in 1990. Then it turns to the available information regarding the evolution of land structure during this period, and finally—based on some descriptive statistics—it discusses the different modes of land acquisition that are present in the Peruvian context.

2.1. The Evolution of Peruvian Land Policy Prior to 1990

The agrarian reform executed by the left-leaning Peruvian military government, from 1969 until 1976, radically altered the juridical, economic and political conditions affecting land
property and management in Peru. Overall, this reform dismantled the economic power of the traditional land-based elite, which had arisen at the beginning of the century (Zegarra, Espinoza, & Callenes, 2009). For these features, it is considered as one of the most drastic and extensive agrarian reforms implemented in Latin America.

The Agrarian Reform Law (DL 17716) expanded to massive dimensions a rather timid process that had started during the early 1960s. It involved the expropriation of about 16 thousand farms and more than 9 million hectares of land (approximately 30% of the farms and pastures land and 50% of the irrigated land of the country). Most of this land was allocated to around 370 thousand beneficiaries (Eguren, 2006).

The Peruvian agrarian reform established an ownership and land management model in which the expropriated land units (haciendas) kept their initial size. Conversely, the reform established a system of cooperative production farms, mostly inspired by the idea of collective property. The most used associative models in the coast region were the Cooperativas Agrarias de Producción (CAPs—Agrarian Production Cooperatives) and the service-oriented Cooperativas Agrarias de Usuarios (CAUs—Users’ Agrarian Cooperatives). In the sierra region (the Andes), the government established the Sociedades Agrícolas de Interés Social (SAIS—Agrarian Societies of Social Interest) (Zegarra et al., 2009; Zegarra, 1999a). In all of these models, the expropriated land was awarded to the societies, not to their individual members. In fact, few portions of land were given under individual arrangements.

It is important to mention some of the principles that were defined in this process and radically reformed years later. The Agrarian Reform Law enforced regulations that in practice made it almost impossible to trade land in the reformed area. For instance, a ceiling was imposed on the size of property, indirect farm management was banned and many restrictions were
applied to the land market (Remy & de los Ríos, 2012). Furthermore, individual land management was not allowed because it was considered at odds with the agrarian reform goals (land is for whom works it) (Zegarra et al., 2009).

The agrarian reform process culminated before 1980, the year in which a new civil and democratic regime headed by President Belaunde assumed leadership of the country. One of the first policy measures taken by the new government was to allow the liberalization of the agricultural sector in general, and of the land property regulations in particular. Since the new Constitution, enacted in 1979, backed the legality of the Agrarian Reform, the strategy of the new administration was not to drastically alter the principles upon which the reform was based, but to loosen some regulations in order to allow an eventual division of the land in individual plots (Zegarra et al., 2009).

The issuance of Law-Decree 02 "Promotion and Agricultural Development Law" allowed for the cooperative members to freely decide the business model that best suits their needs. This apparently minor change in the law actually gave rise to a massive transformation of the agrarian structure, as it resulted in the liquidation of most enterprise organizations and the transfer of property rights over the land of these to its individual members. As a result, a massive atomization of the reformed land occurred, with which the Peruvian countryside radically changed from being a set of a few associative companies that had kept the size of the old large estates, to a collection of hundreds of thousands of small producers (Remy & de los Ríos, 2012; Zegarra et al., 2009).
2.2. The Market-Oriented Reforms

With the advent of Fujimori’s government in 1990, and in a context characterized by a deep economic crisis, company bankruptcies, hyperinflation and internal war; the country took a radical turn, going from a developmental state towards one led by the policy prescriptions marshaled by free market economics (aimed at increasing market orientation, openness, and competition). These efforts were especially dramatic in the agricultural sector, where land market liberalization initiatives were launched after three decades of heavy government intervention in support of land redistribution and rural credit provision (Remy & de los Ríos, 2012).

The market-oriented reforms were undertaken at the beginning of the 1990s, and emphasized strengthening individual property rights to land, extending titling efforts, activating land and private credit markets, and removing state-imposed restrictions on land transactions and all forms of direct land redistribution efforts that did not involve market mechanisms. The main goal of these reforms was to eliminate or at least substantially reduce the constraints on the functioning of land market transactions, with the hope that this mechanism would enhance the efficiency of the agricultural sector and it would reduce the disparities in land access (Trivelli & Abler, 1997).

With a new Constitution and the so-called “Land Law” (Law 26505) enacted in 1993 and 1995, respectively, the legal framework for land property rights was mostly stripped off of any restrictions to the nature, size and purpose of land transactions (Zegarra, 1999a). Hence, the ceiling size of land property was removed, free land trade was allowed, and direct and indirect farm management, either from private individuals or other legal forms, was recognized. (Eguren, 2006). As a result, all state-imposed restrictions on land transactions that remained since the Land Reform were completely eliminated.
Under this new legal framework for land transactions, a shift in the land and agricultural strategy is put in place to fit this new reality from a clearly more free-market oriented government. This new strategy combined titling programs and legal reforms securing private property rights with a major reduction in state sponsored credit and technical assistance services.

Implicit in this constructive engagement with land markets was the need for Peruvian contemporary land policy to provide the basic legal tools needed for a free land market to operate without direct government intervention. For this reason, the government launched a large-scale titling program intended to guarantee land security and to provide an adequate institutional framework for ruling land market operations (Fort, 2007b). Conceptually, the idea behind this program was that the provision of titles would reduce the transaction costs underlying land markets operations, and thus would improve the functioning of land markets. Additionally, that by increasing land tenure security and by allowing farmers to use land title as collateral, the land registration program would increase both farmers’ willingness to invest and their availability of resources to finance investments. Indeed, given the major reduction in state sponsored credit during this time period, the government strategy presumably assumed that private credit institutions would emerge once private property rights are secured.

The Special Project for Titling and Registration of Rural Land (PETT) was created in 1992 but started operations in 1996, in order to provide officially registered land titles at a massive scale. Most of the activities of the PETT Program were implemented between 1996 and 2009, which focused mainly in the coastal region and some specific areas in the Andes. After 13 years of intervention, the PETT Program managed to title and register more than one and a half million of parcels according with their estimates.
On the other hand, as mentioned before, the Peruvian government adopted a ‘hands-off’ credit market policy since 1990's, which began with the liquidation of the public Agrarian Bank in 1992. Apart from channeling minimal amounts of subsidized credit to priority areas, the main policy implemented was to provide the legal foundation for rural credit unions (CRAC) and to strengthen the already existing municipal banks (CMAC). At the same time, measures were also taken by the Peruvian government to rationalize the rural financial sector by strengthening incentives for the private sector to assume a leadership role. Nonetheless, recent information makes it clear that the formal rural financial market in Peru still has a very limited coverage.

Now is an auspicious time to evaluate and, as necessary, rethink the direction of market-oriented land policies. Although there are other policies undertaken by the government that affect land structure⁵, it is clear that the firm commitment of the country since the nineties has been with the land markets. In this mechanism the government has relied for improving the dynamics of land transfers and move towards a more efficient distribution of resources. It is therefore crucial to assess whether land markets have been able to improve land access for the poorest, or if instead they have generated exclusionary trajectories that have only benefited farmers that were already better-off.

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⁵ An important complementary land policy applied by the government since the nineties has been the investment on expensive irrigation projects to expand the agricultural frontier to the desert that occupies most of the coastal region. They are known as Special Projects, which are in charge of developing major and lesser irrigation infrastructure that provides enough available water to commercially irrigate a certain lot of idle land. The new irrigated land is then divided into lots and sold to private agents through a public auction process against commitments of investment. These large and expensive state projects became a major source of land for the new agribusiness companies and have promoted large-scale private investments in the affected areas according to some sources (see evidence by Burneo, 2011).
2.3. Changes in Land Structure in Rural Peru

Land distribution in Peru has changed considerably during the last 50 years. In part, this dynamic can be explained by the different policy paradigms that have ruled the rural sector and the different land-related policies that have been implemented. The information from the Agricultural Censuses applied in 1961, 1971, 1994 and 2012 allows us to give an overview of how the various legal frameworks and policy regulations ruling land transactions have responded to their structure and have influenced its dynamics. Table 1 presents summary statistics on the country’s aggregate distribution of agricultural land for each of these periods.

Table 1: Agricultural Land Distribution According to the Agricultural Census (thousands of farms and thousands of hectares of land)

<table>
<thead>
<tr>
<th>Farm size (Ha)</th>
<th>1961 Census</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Farms</td>
<td>%</td>
<td>Ha</td>
<td>%</td>
<td>Farms</td>
<td>%</td>
<td>Ha</td>
<td>%</td>
<td>Farms</td>
<td>%</td>
<td>Ha</td>
</tr>
<tr>
<td>Less than 1</td>
<td>291</td>
<td>34.1</td>
<td>128</td>
<td>0.7</td>
<td>483</td>
<td>34.8</td>
<td>185</td>
<td>0.8</td>
<td>424</td>
<td>24.3</td>
<td>191</td>
</tr>
<tr>
<td>Between 1 and 5</td>
<td>417</td>
<td>49.0</td>
<td>927</td>
<td>5.0</td>
<td>600</td>
<td>43.2</td>
<td>1,375</td>
<td>5.8</td>
<td>805</td>
<td>46.1</td>
<td>1,882</td>
</tr>
<tr>
<td>Between 5 and 20</td>
<td>107</td>
<td>12.6</td>
<td>879</td>
<td>4.7</td>
<td>232</td>
<td>16.7</td>
<td>2,036</td>
<td>8.6</td>
<td>382</td>
<td>21.9</td>
<td>3,410</td>
</tr>
<tr>
<td>Between 20 and 100</td>
<td>25</td>
<td>2.9</td>
<td>980</td>
<td>5.3</td>
<td>60</td>
<td>4.3</td>
<td>2,183</td>
<td>9.3</td>
<td>110</td>
<td>6.3</td>
<td>4,132</td>
</tr>
<tr>
<td>Between 100 and 500</td>
<td>8</td>
<td>0.9</td>
<td>1,625</td>
<td>8.7</td>
<td>11</td>
<td>0.8</td>
<td>2,151</td>
<td>9.1</td>
<td>19</td>
<td>1.1</td>
<td>3,679</td>
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<tr>
<td>Between 500 and 1,000</td>
<td>2</td>
<td>0.2</td>
<td>1,065</td>
<td>5.7</td>
<td>2</td>
<td>0.1</td>
<td>1,087</td>
<td>4.6</td>
<td>3</td>
<td>0.1</td>
<td>1,755</td>
</tr>
<tr>
<td>Between 1,000 and 2,500</td>
<td>1</td>
<td>0.1</td>
<td>1,659</td>
<td>8.9</td>
<td>1</td>
<td>0.1</td>
<td>1,737</td>
<td>7.4</td>
<td>2</td>
<td>0.1</td>
<td>2,959</td>
</tr>
<tr>
<td>More than 2,500</td>
<td>1</td>
<td>0.1</td>
<td>11,342</td>
<td>61.0</td>
<td>1</td>
<td>0.1</td>
<td>12,791</td>
<td>54.3</td>
<td>2</td>
<td>0.1</td>
<td>17,375</td>
</tr>
<tr>
<td>Total</td>
<td>852</td>
<td>100.0</td>
<td>18,605</td>
<td>100.0</td>
<td>1,390</td>
<td>100.0</td>
<td>23,545</td>
<td>100.0</td>
<td>1,746</td>
<td>100.0</td>
<td>35,382</td>
</tr>
</tbody>
</table>

Elaboration: For 1961 and 1972 (Eguren, 2007); for 1994 y 2012 (own elaboration)

This information shows a considerable skewed land distribution in 1961, before the agrarian reform was implemented in the country. Evidence of this is the fact that farms with more than a thousand hectares operated 70% of total farmland (representing 0.3% of the country’s agricultural units), while farms with less than five hectares—that represented 83% of the farms—covered less than the 6% of this surface. This extreme inequality was moderately
reduced after the first stage of land reform, which did not fundamentally alter the size of many of the farms. Hence, it is observed that in 1972 the farms with a size over a thousand hectares came to represent 0.16% of national farms and to concentrate 78% of the surface, while the farms of less than five hectares represented 78% of units and covered 6.6% of the agricultural land.

By 1994, two fundamental aspects are reflected in the agrarian structure after the process of fragmentation of the eighties. First, it is noted that the problem of small farms was still in force—a quarter of the farms had less than one hectare in size and more than 70% had less than five hectares. In that time, the surface covered by those properties was less than 6% of the total surface, a similar situation to that presented in the previous years of land reform, although in this case the percentage of farms of less than five hectares was reduced from 83% in 1961 to 70% in 1994. On the other hand, it is observed that land concentration in larger farms is substantially reduced. These units later cover only 58% of the surface, a figure that sharply contrasts with 70% of 1961.

Finally, recent data (2012) show that land concentration and fragmentation have increased significantly compared to 1994. The level of land fragmentation has returned to the pre-land reform period, with 80% of farms with less than 5 hectares accounting for less than 6% of the surface (see Appendix A). On the other hand, the number of large-farms has increased substantially. These represent less than 0.2% of agricultural units but account for almost 65% of the surface area. It is noteworthy, however, that with this information it is difficult accurately interpret the process of land accumulation since the data include all legal forms of land management, including indigenous communities. In this regard, a disaggregated analysis that distinguishes the situation when one includes or not indigenous communities may be appropriate,
as it allows us to examine to what extent land concentration is generated by communities or by private individuals and private companies.

On the other hand, since we have full information on the past two agricultural censuses, it is possible to make a more accurate analysis of the changes in the distribution of land between these two points of the time. Furthermore, this period coincides with the implementation of market-oriented land reforms that have allowed market forces to influence private land access and land accumulation patterns of different strata of farmers. Since the focus of this thesis is related with the functioning of land markets and its effects on land inequality, this examination results relevant for our purpose and it could bring some insights regarding the role of land markets on land dynamics. In the table below we present some synthetic statistics of land structure, including three types of indicators: Overall Inequality indices, concentration indices and fragmentation indices. For all the indicators the table includes the mean value for the years 1994 and 2012.

Table 2 shows that the overall land inequality, measured by the Gini index, has increased from 1994 to 2012. This result is observed for all types of land considered (see the footnotes of Table 2 for an explanation on each type of land), but especially for agricultural and adjusted land. While the farmland Gini increased in 5%, the same indicator increased in 16% for the other types of land considered.

Similarly, both the fragmentation and concentration indicators increase their values, representing an intensification in both processes. For instance, in 1994 about one third of farmers had a farm size of less than one hectare of agricultural land, while by 2012 they represented approximately one half of the farmers. In the other extreme of the distribution, in 1994 the large-scale farms (with a farm size above 500 has) concentrated 1% of the agricultural surface, while
they hoarded 8% of this land by 2012. These land dynamic processes could exacerbate the configuration of a dualistic agrarian and economic structure, since it seems that the expansion of the large farms is at the expense of the displacement of the small farm units.

Table 2: Changes in Agricultural Land Distribution between 1994 and 2012

<table>
<thead>
<tr>
<th>Overall Inequality Indices</th>
<th>Mean 1994</th>
<th>Mean 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini Index (Farmland a)</td>
<td>0.78</td>
<td>0.82</td>
</tr>
<tr>
<td>Gini Index (Agricultural Land b)</td>
<td>0.63</td>
<td>0.74</td>
</tr>
<tr>
<td>Gini Index (Adjusted Land c)</td>
<td>0.68</td>
<td>0.78</td>
</tr>
<tr>
<td>Concentration Indices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of farmland held by the 5% of farms with more land</td>
<td>59%</td>
<td>64%</td>
</tr>
<tr>
<td>% of agricultural land held by the 5% of farms with more land</td>
<td>36%</td>
<td>51%</td>
</tr>
<tr>
<td>% of adjusted land held by the 5% of farms with more land</td>
<td>42%</td>
<td>58%</td>
</tr>
<tr>
<td>% of the farmland held by farms with more than 500 ha</td>
<td>19%</td>
<td>22%</td>
</tr>
<tr>
<td>% of the agricultural land held by farms with more than 500 ha</td>
<td>1%</td>
<td>8%</td>
</tr>
<tr>
<td>% of the adjusted land held by farms with more than 500 ha</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>Fragmentation Indices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of farms with less than one hectare of farmland</td>
<td>24%</td>
<td>38%</td>
</tr>
<tr>
<td>% of farms with less than one hectare of agricultural land</td>
<td>35%</td>
<td>49%</td>
</tr>
<tr>
<td>% of farms with less than one hectare of adjusted land</td>
<td>66%</td>
<td>74%</td>
</tr>
<tr>
<td>% of farms with less than three hectares of farmland</td>
<td>56%</td>
<td>68%</td>
</tr>
<tr>
<td>% of farms with less than three hectares of agricultural land</td>
<td>70%</td>
<td>79%</td>
</tr>
<tr>
<td>% of farms with less than three hectares of adjusted land</td>
<td>90%</td>
<td>92%</td>
</tr>
<tr>
<td>Average size of the agricultural unit (farmland)</td>
<td>9.12</td>
<td>6.93</td>
</tr>
<tr>
<td>Average size of the agricultural unit (agricultural land)</td>
<td>3.13</td>
<td>2.87</td>
</tr>
<tr>
<td>Average size of the agricultural unit (adjusted land)</td>
<td>1.45</td>
<td>1.50</td>
</tr>
</tbody>
</table>


Note: For all the indicators the information corresponds to private individual land, which means that we have excluded indigenous land (which has a communal status) for this analysis.

a Includes agricultural land, pastures, forest and other uses

b Includes cultivated land, land under fallow, and land not cultivated due to some problem (e.g., lack of credit, lack of water, personal shock)

c Based on the conversion coefficients from (Hubert, Huerta, & Igreda, 1994): For irrigated agricultural land: Costal Region=1, Andean Region=1/1.9, Amazon Region=1/1.16; for not irrigated agricultural land: Costal Region=1/2.1, Andean Region=1/4, Amazon Region=1/3.4. Improved pastures=1/4, natural pastures=1/97.2, forest=1/200
Another way to look at the land inequality in Peru is by the Lorenz Curve. This is a graphical representation of the overall inequality, this time applied to the land issue. Figure 1 shows that the 2012 curve is further from the equality line than the 1994 curve, which precisely indicates that land inequality has deepened during this period—a result that is consistent with the Gini statistics presented above.

**Figure 1: Land Lorenz Curve for Agricultural and Adjusted Land (1994 and 2012)**

![Lorenz Curve for Agricultural and Adjusted Land](image)

**Source:** Peruvian Agricultural Census 1994 and 2012. Own elaboration.

### 2.4. The Different Modes of Land Acquisition in Peru

In Peru, there are many ways in which farmers can acquire land, both in the short and long term. These different mechanisms for access to land could have different implications in terms of the land accumulation patterns they foster and the incentives for efficient use of land that they promote. Table 3 presents the different sources of provenance of the land that are reported in the Agricultural Census. It includes the number of plots and the amount of land that was acquired by land markets (sales and rental), inheritance processes, administrative adjudication and other sources. Furthermore, the table also includes the indigenous land, which is
ruled and administered by a communal system. For all the variables we present the information referred to as adjusted land\(^6\) for the years 1994 and 2012.

### Table 3: Source of Provenance of the Land in 1994 and 2012

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N° %</td>
<td>N° %</td>
<td>N° %</td>
<td>N° %</td>
</tr>
<tr>
<td><strong>Non-Communal land</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales Market</td>
<td>908,354</td>
<td>22.0%</td>
<td>750,020</td>
<td>27.8%</td>
</tr>
<tr>
<td>Rental Market</td>
<td>126,492</td>
<td>3.1%</td>
<td>71,067</td>
<td>2.6%</td>
</tr>
<tr>
<td>Inheritance</td>
<td>1,369,586</td>
<td>33.1%</td>
<td>499,712</td>
<td>18.5%</td>
</tr>
<tr>
<td>Administrative Adjudication</td>
<td>258,113</td>
<td>6.2%</td>
<td>521,876</td>
<td>19.3%</td>
</tr>
<tr>
<td>Other</td>
<td>283,132</td>
<td>6.8%</td>
<td>273,317</td>
<td>10.1%</td>
</tr>
<tr>
<td><strong>Sub-total (Non-Communal)</strong></td>
<td>2,945,677</td>
<td>71%</td>
<td>2,115,992</td>
<td>78%</td>
</tr>
<tr>
<td><strong>Communal land</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual indigenous land</td>
<td>1,178,814</td>
<td>28.5%</td>
<td>416,341</td>
<td>15.4%</td>
</tr>
<tr>
<td>Indigenous communal land</td>
<td>13,263</td>
<td>0.3%</td>
<td>170,373</td>
<td>6.3%</td>
</tr>
<tr>
<td><strong>Sub-total (Communal)</strong></td>
<td>1,192,077</td>
<td>29%</td>
<td>586,714</td>
<td>22%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4,137,754</td>
<td>100.0%</td>
<td>2,702,707</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**Sources:** Agricultural Census 1994 and 2012. Own elaboration

As we can see, land market activity has increased during the period 1994-2012. In the case of the land sales market, the plots that were acquired by purchase grew in 41%, from 908 thousand plots in 1994 to 1.2 million plots in 2012. This increment is even more pronounced in terms of adjusted land, since land acquired by purchase went from 750 thousand hectares in 1994 to more than 1.2 million in 2012—a growth of about 62%. With respect to the rental market, its activity has also considerably grown but still remain limited, since this mechanism was used by a small amount of parcels in 2012 (5% of the plots and 6% of the adjusted land). It is important to note, however, that when we look at the relative importance of land market as a source for land

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\(^6\) The idea of using adjusted land is to convert all type of land to comparable units. In this case the calculation was based on two features: whether the land is irrigated or not, and in which natural region is the plot located (land quality or its potential productivity is closely related with the location of the plot). This adjustment is based on the conversion coefficients by Hubert et al. (1994) (see footnote \(^c\) in Table 2)
acquisition in each period, their relative importance only increases slightly. This fact could be explained by the impressive growth of both the aggregate number of plots and the agricultural surface during the last two decades. While the number of plots in the country increased in more than one million during this period, the adjusted land expanded in 1.2 million of hectares.

Another important source for land access in the country is inheritance. Through this mechanism 43% of the plots and 21% of the adjusted land were acquired by 2012. Compared with the situation in 1994, this mechanism has substantially increased in importance. More than 800 thousand plots and 300 thousand hectares of adjusted land were acquired by inheritance between these years. It is important to note that these processes of intra-household transfers might have important implications on the dynamics of land distribution. This is because inheritance land transfers have been usually linked with fragmentation processes, since the lack of off-farm income opportunities might force farmers to parcel out their plots among their heirs.

Another source of provenance of individual land is the administrative adjudication—which represented in 2012 about 4.3% of the plots and 9.1% of the adjusted land. It should be noted that the award criterion has changed substantially during the last decades. At the time of the Agrarian Reform—which had a redistributive character—many of the adjudications were made to landless workers or peasants, especially in areas of expanding agricultural frontier. Subsequently, since the early eighties, the state has given greater importance to the adjudication of idle land to investors who are willing to cover the enabling costs of such lands. These adjudications are made in large areas and require a stable regulatory framework over time.

Finally, there is the communal land, managed by indigenous communities, which covers 24% of the country’s adjusted land for 2012 (that mainly includes natural pastures and idle land). These traditional systems of land tenure and land administration are ruled by the communal
order, which assigns to its members certain amount of land for individual use and, also, communal land for shared use of all community members. The first form of land management accounted for the 8.1% of the land and represented 754 thousand of plots in 2012, while the communal land was administered by almost 12 thousand communities and covered 16% of the land.
3. Theoretical Aspects on the Functioning of Land Markets and its Distributional Impacts

The economic literature has widely discussed the determinants and impacts of land market activity from a theoretical perspective. The main inquiry that has been analyzed is related with the way in which rental and sales markets for agricultural land in the developing world affect efficiency and equity outcomes. In this section, we summarize the conceptual framework on functioning of land markets, focusing particularly on its potential distributional impacts.

The operation of land markets requires that there be individuals willing to both offer and demand land at a single price. In other words, market transactions require agent heterogeneity. Furthermore, land markets also require that agents incur in transaction costs underlying any of such operations, which respond to the institutional framework that mediate land transfers and the pre-existing endowments that prevail in a given country or region.

The distributional impacts of land markets will depend then on how these aspects affect land transfers across different classes of producers. Carter and Mesbah (1993) identified two types of land transfers that are likely to be triggered by land market liberalization: (i) Inter-class transfers, which occurs between different size strata or classes of producers; and (ii) Intra-class transfers, which take place among heterogeneous individuals within the same strata or class. While the first type of transfers is likely to induce changes in the agrarian structure, the latter would not have a major impact on the aggregate distribution of land.

A more equitable land structure would be achieved if land markets allow inter-class transfers from land-rich to land-poor households, while efficiency gains would be attained when agents with high (potential) marginal productivity of land are induced to acquire land from
agents with low marginal productivity—either from inter-class or intra-class transfers (Besley, 1995; Feder & Feeny, 1991).

Drawing on the microeconomic theory of rural markets, in this section we will examine the factors that influence inter-class land transfers and, thus, that are crucial to shaping the distributional impacts of land markets activity. To this end, we focus on the relative economic competitiveness of different strata of farmers and the transaction costs underlying the operation of land markets. Additionally, we will then compare and review the main differences between sales and rental markets in terms of their likelihood to work as a device to produce major changes in land distribution.

3.1. The Role of Agents Heterogeneity in Land Markets

In order to develop some basic concepts about the role of agents’ heterogeneity on the distributional effects of the operation of land markets, we begin with a relatively simple approach of land valuation, which focused solely on the production value of land. Following Carter & Mesbah (1993) and Carter & Zegarra (2000) we use the notion of the so-called reservation price measure of land value to explain the way in which market-mediated land transactions can affect the patterns of land access and accumulation among farms of different size unit.

The reservation price of land can be expressed as follows (Carter & Zegarra, 2000):

\[ \rho_i = \sum_{t=1}^{\infty} \frac{[\Delta_{it}(A_i)]}{(1 - r)^t} \]  

(1)

\( \rho_i \) is a measure of the marginal willingness of farm \( i \) to pay for land, which is defined as the net present value of the stream of expected production income from an additional unit of
land. $\Delta_{it}(A_i)$ is the increment in income that a farm earns in year $t$ with an additional unit of land expressed as a function of its operated area $A_i$; and $r$ is the rate of interest used to discount the stream of future income.

For a farm that wants to acquire a unit of land, the reservation price of land $\rho_i$ represents the maximum amount the farm could pay for the unit of land without losing money. For a seller, $\rho_i$ is the minimum price they will accept without losing money. If we assume that the interest rate is the same for all farms and land markets operate in a context with perfect capital markets and homogeneous land tenure security, then the only source of variation in the reservation prices among farms will come from the term $\Delta_{it}$, which express the differences in the additional current income generated by farms from an incremental unit of land (Carter & Zegarra, 2000).

Hence, the degree to which the reservation price varies between farms, and between classes of farms, is an indicator of differential economic competitiveness in the land markets and a predictor of the ability of an individual or class to be able to accumulate land in the market (Carter & Mesbah, 1993). Thus, it is important to understand the factors that influence this competitiveness heterogeneity, since systematic class-related differences in this feature is what would ultimately explain the distributional implications of the operation of land markets.

Under perfect markets, and ignoring transaction costs, the reservation price among farms would vary due to differences in intrinsic individual characteristics (i.e., farmer’s ability, preferences) but it would be constant across classes of farmers regardless of initial farm size or wealth endowment. In this scenario, land markets transactions would not change in a systematic
manner the distribution of land\footnote{Nonetheless, Binswanger (1987) argued that even in this perfect market scenario, land markets will not autonomously shift land to the landless and near-landless individuals, whose low level of income would not allow them to purchase land at the market price without curtailing their subsistence consumption. This problem is what Binswanger called the fundamental financing problem of the poor.}, but it would increase the aggregate efficiency of the agricultural sector by putting land to its highest and best use (Atwood, 1990).

However, it has long been recognized that labor markets are likely to be intrinsically thin and imperfect in the farm sector (Feder, 1985; Sen, 1966). This is expected due to the presence of moral hazard and agency problems related with hired labor and by the observation that labor sales are usually constrained in this context (Barrett, 1996; Heltberg, 1998). The explanation for this rests on two primary claims: first, as hired hands have a propensity to shirk, they need continuous supervision, making wage labor more expensive than family labor—whose incentives to provide effort are higher and who can be employed without incurring hiring or searching costs (Eswaran & Kotwal, 1986; Frisvold, 1994). Hence, labor costs which different farmers face vary systematically with the size of their holdings. Second, small farms often have reservoirs of underutilized labor due to the limited and irregular off-farm employment opportunities. Such constraints imply that households resource allocation will differ across households according with their endowment of land and labor, resulting in a more intensively labor use of land by farms that rely on family labor (Barrett, 1996; Carter & Zegarra, 2000).

Consequently, under labor imperfections there will be an inverse relationship between operational farm size and land productivity (Feder, 1985; Sen, 1966)—a well-known stylized fact widely discussed in the economic literature and confirmed by a large body of empirical studies (see, for example, the empirical work by Benjamin, 1995; Bhalla & Row, 1988; Carter,
Accordingly, small holdings would exhibit a competitive advantage with respect to large farms, making land especially valuable for smallholders and increasing their willingness to pay for it. These induced systematic differences in the reservation price of land in favor of small farms would imply that, in an economy without transaction costs, a well-functioning land market should shift land to small but efficient farms, thereby enhancing not only equity but also economic efficiency (Deininger et al., 2003).

There are, however, potential countervailing forces that may prevent the land market for operated in the way predicted by the simple, imperfect-labor-market model. In this regard, failures in key complementary markets (i.e., credit, insurance) and the presence of risk are some of the most important aspects that may overwhelm the competitiveness advantage of small farmers and, thus, reduce the ability of land markets to allow for the transfer of land to resource-poor agents (Carter & Zegarra, 2000).

A great deal of theoretical and empirical work has suggested that rural credit markets trend to be highly imperfect, since credit transactions are subject to information and moral hazard problems due to the risk and asymmetrical information inherent in agriculture (Carter, 1988; Feder, 1985). This feature affects both the supply and demand for credit and may give rise to what Boucher, Barham and Carter (2005) called an intrinsic farm-size bias in rural financial markets. On the supply side, since financial institutions routinely require collateral in the form of land as a condition for offering loan, they will trend to ration the amount of credit to small and

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8 Although large farms could gain competitiveness advantages by the presence of economies of scale due to the lumpiness of managements skills and machines, the supervision and labor cost advantages of family labor have been documented to be large enough to offset this potential feature of large farms (Binswanger et al., 1995)
near-landless farms⁹, either rationing them out completely or offering them credit at less favorable terms (Binswanger & Ronsenzweig, 1986; Carter, 1988). On the demand side, as Barrows and Roth (1990) note, small farmers generally appear unwilling to accept bank loans—even in cases where they have enough collateral to qualify for it—due to their lack of access to sufficient insurance to outweigh the risk of collateral loss associated with a bad outcome in the loan contract.

Since agricultural activity requires up-front working capital for the acquisition of inputs in addition to land and labor and because of the importance of land-related investments in enhancing land productivity, these credit market failures that constraint smallholders’ access to capital will put them at a competitiveness disadvantage with respect to large, wealthy farms. In fact, as Binswanger, Deininger and Feder (1995) note, in the presence of credit and labor imperfections the relationship between farm size and productivity is not necessarily inverse. For instance, Feder (1985) demonstrated that the combination of credit and labor market imperfections in environments where access to credit is important can lead a U-shaped relationship, a similar result to the one found by Carter and Mesbah (1993) in the case of a competitive market setting. Consequently, these countervailing financial market failures, rather than an inherent productivity advantage of large farms, could induce differences in the reservation price of land across categories of farm size and deepen the unequal distribution of land in post-liberalization land market environments.

⁹ This credit rationing against small producers can be explained because formal lenders may not be willing to accept collateral under a certain minimum value due to the transaction costs associated with management of the loan and with foreclosure and resale in the event of a default (Boucher et al., 2005).
While informative about the main factors that shape the reservation price for land across different size strata of farmers, the net present value approach to land valuation used so far overlooks both risk and intertemporal considerations which influence households’ willingness to pay for land. As Carter, Barham, Mesbah and Stanley (1995) point out, in the presence of serious credit- and insurance-market imperfections, these aspects are likely to further distort the shape of the reservation price function and, thus, to influence the trajectories of land accumulation of different-sized farms.

Incorporating risk, and allowing differences across agents in the interest rate used in equation (1) to discount the stream of future income for land, gives rise to some considerations. First, land-poor farmers constrained in their access to long-run capital, or who must pursue costly self-insurance and autarkic savings strategies, will discount the future income from land at a higher rate than would land-rich farmers well integrated into formal financial markets (Carter et al., 1995). Consequently, in environments of unmediated risk and with failures in capital markets, land valuation would be lower for small farms than it would be for large farms.

Second, the presence of risk is likely to differentially affect portfolio choice according to a household’s initial wealth level. Resource-poor households, who are closer to a subsistence minimum—and therefore in danger of losing future labor power if consumption falls to slow—will pursue a more conservative portfolio strategy than do wealthier agents (see model developed by Zimmerman & Carter, 2003). As a result, the combination of risk and insurance constraints

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10 In equation (1) it can be observed a negative relationship between the reservation price for land and the discount. That is, the higher the rate of discount, the lower the reservation price.
might also affect the competitiveness gap of small versus large farms and, hence, influence the reservation prices in favor to the latter.

A third aspect related with the presence of risk and directly associated with land transactions is the role of distress sales. These are transfers that occur stochastically because of differential ability of farmers to cope with economic or climatic downturns (Carter & Mesbah, 1993). In the presence of serious credit-and insurance-market imperfections, these sales would affect only small and near-landless farmers—who would be willing to undertake these sales with the purpose of satisfying basic needs such as food and medicine—, since well-endowed farmers are better able to insure themselves through access to credit, temporary depletion of accumulated nonland assets, or diversification of income sources (Baland, Gaspart, Platteau, & Place, 2007). Consequently, failures in capital markets and the incidence of idiosyncratic and covariate shocks may create profound economic pressures for peasant displacement and land concentration.

A final consideration that goes beyond the land valuation approach—which is based on its productive value—but that could directly influence the reservation price of land is its value as a speculative asset. In an inflationary environment, or when agricultural land is located near expanding urban sites or other recent or expanding non-farm industries (e.g., mining, tourism), the expected price of agricultural land would increase, since land would be considered a store of value (Binswanger et al., 1995). This could also be the case in the absence of well-functioning capital markets, as land ownership can be used to accumulate savings, particularly as a hedge against inflation (Baland et al., 2007). These processes could foster the unproductive purchases of land by wealthy investors and land-rich farmers in anticipation of major capital gains, who would be willing to accumulate land at the expense of small or medium farmers.
In this section we have summarized the microeconomic theory regarding the structural factors and circumstances which shape the underlying competitiveness of different strata of producers. It suggests that the impact of land market liberalization on land distribution is a priori ambiguous, depending on the severity of the problems mentioned above. In context where capital markets are not important or where they work well, the cheap labor-based competitive advantage of smallholders would allow land markets to shift land from land-rich to land-poor farmers, thus fostering a more egalitarian land distribution. However, severe credit-and-insurance market imperfections might completely offset the supervision cost advantages of family-operated farms and make them less competitive in the land markets. In this latter scenario the impact of land market liberalization could be to further polarize the agrarian structure.

3.2. Transaction Costs in Land Market Operation

For any land-market competitiveness configuration, whether and how quickly land transfers occur depends on how the land market itself functions. Transaction costs are a key consideration on this matter, since these affect the ability of different classes of farmers to participate in the land market. These costs are related to the institutional and information context in which economic agents operate and include all costs that they must incur if they want to make a land transaction. The main transaction costs are those associated with titling and land registration, the costs of obtaining accurate and useful information about the commercial potential and attributes of the land to be acquired, as well as all costs associated with the negotiation of price and contract terms (Zegarra, 1998).

Some of these costs are fixed but some of them vary according with the size of the farm to be traded in the market or with the number of parties involved in the transaction. Search and
bargaining costs, registration fees and titling costs are examples of standard fixed costs. Such costs are expected to increase the effective price per hectare in smaller purchases and, therefore, they could make small land transactions prohibitively expensive. Because these aspects may drive a wedge between a household’s reservation sale price and its reservation purchase price, a farmer would have no incentive to make any transaction when the net market price fell between these two artificial prices (Carter & Zegarra, 2000). Hence, higher fixed transaction costs may discourage smallholders’ participation in land markets, making land market especially thin and inactive for this segment of producers.

In addition to these fixed transaction costs, land market operation involves the cost of negotiating contracts, which depends on the number of parties involved. This type of cost would vary according to whether the land acquisition operation involves an inter-or intra-class land transfer, since the latter usually entails higher costs. For instance, transaction costs may make it prohibitive for smallholders to buy small pieces of land from a much larger unit because of negotiation, subdivision, and legal costs. Conversely, wealthier individuals who wish to buy large pieces of land may find it extremely costly to consolidate a single holding out of multiple small holdings. Such transactions costs can be sufficiently high to actually segment the land market, meaning that the market for a small piece of land is really a different market than the market for a large piece of land (Carter, Barham, & Mesbah, 1996). Such land market segmentation would obviously pose a barrier to inter-class land transfers, thereby limiting the scope of land markets to induce major changes in land distribution.

Finally, it is worth mentioning the role of titling on land market operation, since it is considered as one of the main instruments of contemporary land policy. As indicated above, it can be considered as a fixed cost. This would be the case when the lack of title increases the
problems of asymmetric information and the costs of exchange (the cost of discovering a valid
owner, the cost of engaging in the purchase itself, and the cost of enforcing one’s claim), thus
reducing the transferability of property and the liquidity of land markets (Besley, 1995).
However, the lack of title can also affect the competitiveness regime of different strata of farmers
(especially when titles are unequally distributed), thereby influencing the distributional outcomes
of land market operation. The argument here is two-fold (Feder & Onchan, 1987): (i) the absence
of land title can induce tenure insecurity, which could reduce investment incentives and, thus,
land productivity; and (ii) by not having proof of ownership, land cannot be used as a
mortgageable commodity for accessing to credit, hence, restricting farmers’ access to the
working capital needed for achieving maximum efficiency (Binswanger et al., 1995). These
theoretical arguments suggest that land titles—or the lack of them—play an important role in
land market activity and its distributional effects.

3.3. Land Sales and Rental Markets

So far, the theoretical discussion has not distinguished between rental and sales
transactions, which are the two type of land market operations. Although the general elements of
the conceptual framework that was discussed above affect to some extent both types of markets,
they have some distinctive features that differentiate their performance. In this section we will
briefly explain the main differences between rental and sales markets according to the theory.

Under market imperfections, the theory points out that sales and rental markets could
differ in several dimensions. For instance, credit market imperfections tend to affect rental
markets less than they do sales markets, since in the former case renters require only modest
initial capital outlays, especially if rents are paid after harvest (e.g., sharecropping) or on a
seasonal basis. Contractual arrangements can be flexible and made to suit the need that
smallholders may have to use their limited working capital for production (Deininger, 2003b). In this sense, rental and sales markets may be seen as complementary, as land rentals may be one rung in an “agricultural ladder” out of landless wage labor up to land ownership. While renting land, farmers may be able to save enough to buy land of their own, while gaining experience that will enable them to farm successfully when they do become owners (Masterson, 2007).

However, land ownership is required for using land as collateral in credit markets, and thus land purchases may provide to smallholders the basis to circumvent capital market failures. This feature of land ownership would increase incentives of credit-constrained farmers to forgo current consumption and accumulate land by means of purchase, since land would carry what might be termed a strategic value beyond increased future income (Carter & Zegarra, 2000). This additional incentive could increase smallholders’ demand for land in the sales market, motivation that would not be present in the case of land rental acquisitions.

Another important distinction between sales and rental markets is that the latter is not affected either by distress sales nor by speculative acquisitions of land (Deininger, 2003a). Clearly in these two processes—which could have severe negative implications against smallholders’ accumulation patterns—land ownership is an underlying element; therefore they only occur among land sales transactions. In addition, while the theory recognizes that rental and sales markets are both affected by segmentation, land sales markets may provide the basis for additional credit access that can over time be used to break the barrier that segmentation imposes (Boucher et al., 2005).

To sum up, the theory indicates that land rental and sales markets could differ widely in accordance with the context in which they operate. The presence of market imperfections would affect the performance of both land markets, which in turn distort their equity and efficiency.
outcomes. Whether land sales or land rental are more effective in achieving a more balanced land
distribution is an empirical question that will be further explored in the next section.
4. Evidence of the Determinants and Impacts of Land Market Activity in Latin America

The largely theoretical discussion in the prior section has identified a number of countervailing forces which work both for and against the ability of the land market to function as a device for fostering a more egalitarian land distribution. Given the distinctive character of land structure in Latin America, where the distribution of land ownership is known to be one of the most inequitable in the world, it is important to understand whether land market can be an effective means to break the dualistic agrarian structure that characterizes this region. Taking this into consideration, this section turns to the available empirical evidence on Latin America, looking both at the evidence on the degree to which land markets function at all, and at the evidence on the distributional impacts of land market activity in this context.

However, it is important first to note that the evidence regarding the existence and impacts of land markets on Latin America is basically confined to case studies in a number of countries, since there is no cross-country examination on this topic and we have not found any study that has analyzed this issue from an aggregate or national perspective. Nevertheless, these case studies provide important insights regarding the distributional implications of land market activity under different institutional frameworks (i.e., land regulatory environment) and circumstances (e.g., agricultural export booms, land market friendly policies, and land registration measures).

4.1. Evidence on Land Market Activity

The available evidence indicates that land sales markets in the region are more active than it was thought, even higher than the level observed for more-developed countries. According to Jaramillo (1998), the average turnover was 5 percent in 15 districts of Colombia by
1991, 1.4 to 2 percent in the coastal region of Ecuador between 1989 and 1991, 2 to 3.5 percent in Venezuela during the period 1974-1986, and 1 percent in Honduras by 1995. Other studies based on surveys reported that land sales market activity was also important in countries like Chile, Paraguay, Guatemala and Mexico during the early nineties (Carter et al., 1995; Carter & Zegarra, 2000). This evidence makes it clear that both formal and informal land transactions have occurred in Latin America, and that the presence or absence of land reforms (either state-mandated or market-friendly) may be an explanatory factor in the level of activity of land markets throughout the region. However, whether these levels of market activity would be enough to produce major changes in the agrarian structure is a question that needs to be answered and we will try tackle later on.

The situation of land rental market, however, is rather different. Many authors note that rental activity is actually quite limited in many countries of the region (see the comprehensive review by Echeverría et al. (2002) for a detailed assessment). As Deininger (2003a) argues, this may be due to informational imperfections and the resulting high transaction costs, as well as the effect of past restrictions on rental markets, which have weakened the perception of the security of property rights among landowners. Whatever the reason, this inactivity, coupled with the fact that rental markets are expected to provide large productivity benefits but more restrained equity benefits than those obtained through land-ownership (Deininger, 2003b), suggests that land rental markets have not played an important role in shaping the agrarian structure of the Latin American countries during the last decades.

4.2. Evidence on the Distributional Impacts of Land Markets Activity in Latin America

A distinctive feature of Latin American countries is the highly skewed and dualistic distribution of land (both ownership and operational). Many authors argue that is precisely this
feature which may pose an important barrier to allowing land markets to effectively increase overall equity in land access. This aspect is supported by evidence on the segmentation of land markets often found in Latin-American studies, meaning that sales involve either transfers from large producers to other large producers, or from small producers to small producers, but rarely across different farm size groups (Carter & Zegarra, 2000; Jaramillo, 1998). This segmentation has been found in studies from Paraguay (Carter & Galeano, 1995; Carter & Olinto, 1998), Chile and Guatemala (Carter et al., 1995), Nicaragua (Deininger & Chamorro, 2004), Dominican Republic (Macours, Janvry, & Sadoulet, 2010), Colombia (Deininger, Castagnini, & González, 2004) and Peru (Zegarra, 1999b). According with Deininger (2003a) this segmentation is in part due to the cost of subdivision and high transaction costs, and in part due to lack of long-term financing for the smallholders associated with the continent's dualistic land ownership structure.

Another important factor that would reduce the equalizing effect of land markets activity is the credit market imperfections present in most of the countries of the region. This aspect has been widely discussed and tested in a number of studies. To illustrate, Deininger et al. (2003) have shown that, in Nicaragua, land inequality has deepened significantly over a short span of time, mostly through land sales and purchases. Using survey data collected in 1998, which coincide with the implementation of major macroeconomic and sectoral reforms, the authors find that even though the data point toward an inverse farm-size productivity relationship and large differences in land productivity between large and small producers, land markets have not led to an equalization of returns among the groups considered due to the credit market imperfections have impeded demand in land sales markets by the small farmers.

The same phenomenon has been documented by Carter et al. (1996) for Chile and Paraguay in the context of rapid agro-export boom. They show that the economic characteristics
of agro-export crops interact with the intrinsic imperfections of rural credit markets to create farm-size biases, which ultimately diminished the land access of the mass of small farmers and the rural resource poor. In Chile, for example, large initial investments with long gestation periods and large amounts of working capital needed for the standardized production and packaging of export crops create a bias against smallholders to the extent that they are disadvantaged in capital markets. Moreover, export firms, which often supply credit to producers, are not greatly interested in working with small farmers, who are thought to be greater risks and cause higher transaction costs. As a result, the Chilean agricultural export boom has been dominated by larger farm units whose successful adoption of boom products and the associated technologies enabled them to expand their farm holdings and displace small farm units. As Barham, Carter, & Sigelko (1995) note, these aspects gave rise to “increasingly dualistic agrarian and economic structures, rising income disparities, and intense social conflicts”.

In Paraguay, using survey information from 300 rural households in 1991, the same study by Carter et al. (1996) provides evidence that the growth boom induced a pattern of structural change that systematically worsened the access of disadvantaged groups to land. These results were similar to the ones found in a study by Carter & Olinto (1998) that use the same sample of farmers but with panel data information for 1991 and 1994. Their estimations show that land purchase probability increases sharply with land endowment mainly because financing constraints impeded smallholders to compete for land in such competitive environment. Finally, more recent evidence from Henderson, Corral, Simning, & Winters (2015) and Masterson (2007) in other regions of Paraguay confirms that both rental and sales markets situation has not improved since the early nineties, inasmuch as the demand side remains restricted by a lack of
access to credit. They conclude that with serious credit market imperfections, the impact of land markets could be to further polarize agrarian structure.

Many scholars have argued that this farm-size bias in rural financial markets can be overcome by land titling interventions, since secure property rights would enhance credit access and farmers’ competitiveness\textsuperscript{11}, as well as it would reduce the transaction costs of land markets transactions. Furthermore, as tenure insecurity is often posited to relate inversely with producer wealth, land titling interventions may disproportionately benefit small- and medium-sized agricultural producers (Henderson et al., 2015). The evidence in Latin America, however, does not support those theoretical arguments in most cases. For instance, in the Paraguayan example Carter and Olinto (1998, 2003) conclude that land titling appears to be an insufficient instrument to bolster the land market competitiveness of the small farmers, since their evidence points out that the credit supply effects of tenure security was nonexistent for the smallest farms and only become large for farms in excess of 15 hectares. Similar conclusions have been drawn in a similar study conducted in Honduras (Boucher et al., 2005). However, Deininger and Chamorro (2004) provide opposing evidence for Nicaragua by showing that the effect of land titling and registration on land values has benefited those who were less well off, which would imply that, by giving the poor more secure property rights to assets which they already own, titling could help improve land distribution and economic opportunities. Nevertheless, they recognized that, up until that time, the award of title had failed to reverse a decline in land market activity observed in the country.

\textsuperscript{11} As mentioned before, land titling could increase both farmers’ willingness to invest (“the security effect”) and the availability of resources to finance investments (“the collateral effect”). Hence, both affects are likely to increase the productivity of farmers and, thus, their competitiveness regime.
In sharp contrast to the evidence presented so far, some studies have documented cases where land markets have performed a redistributive role. In contexts where market imperfections are not severe enough, market-mediated transfers from large to small farmers have been documented in Colombia (Deininger et al., 2004), Mexico (Olinto, Deininger, & Davis, 2000) and Guatemala (Carter et al., 1996). For instance, in the latter study—which was performed in the context of Guatemalan boom in winter-vegetable exports—the authors provide evidence that the export boom has induced a transfer of land from modestly larger to smaller farms, since the nature of the contractual linkages in the studied regions have helped small farmers overcome working-capital constraints. Similarly, Olinto et al. (2000) observed an upward shift in land demand by the poor and landless, together with a downward shift in land demand by those well-endowed with this factor of production. However, they recognized that the imperfections in the credit markets have lessened the equity effects of land market reforms in Mexico. Finally, Deininger et al. (2004) also found that land markets made a significant contribution to greater equalization of the structure of land holdings, however, they claim that markets alone are unlikely to be able to deal with the deep-rooted problems of unequal land access in Colombia, since the quantities involved in the land markets are limited.

4.3. Evidence on the Distributional Impacts of Land Markets Activity in Peru

Considering this evidence as a prelude, now we turn to the evidence for Peru. The work from Zegarra (1999b) is presumably the most important assessment on the functioning and impacts of land market activity in the country, although the study was carried out short time after market-oriented land policy reforms were applied (i.e., land deregulation and PETT titling program). The author used survey information from a sample of farmers located in three valleys from the coastal and highland regions in 1998. He found that in two areas the land market had
not played a significant role in farmers’ land accumulation strategies, since other mechanisms as inheritance or family transfers seem to continue to fulfill this function more systematically. Key features behind these results are: (i) severe problems of asymmetric information and lack of experience discouraged farmers’ participation in land markets transactions; (ii) the informality and the presence of short-terms contracts diminished the activity of rental markets; (iii) high levels of land fragmentation limited the possibilities of accumulation due to increasing transaction costs. In the other area the author found a more dynamic land market despite the observed low levels of land formalization. However, the author claims that land market activity was substantially reduced due to imperfections in credit markets. He argues that differences in access to working capital reduced the expected income from land and therefore their market value. Additionally, the lack of financial instruments to facilitate the operation of land markets limit the demand for land even in the short term.

A more recent study in the Peruvian context is Zegarra, Escobal and Aldana (2008), who use impact evaluation techniques over a panel sample of 1,800 farmers from different regions to analyze the impact of titling on land market activity in 1998. Based on difference-in-difference estimators for treated and matched comparison groups, their results indicate a null overall impact of having title on credit access and land market activity. Yet, the authors do find a significant impact for the supply of rentals in areas with a high density of titling, which suggests that high titling density is indeed an important condition for land market activation. These results are very much in-line with the ones found in a previous study by Larson, Smith, Abler and Trivelli (2001) over a sample of farmers in a coastal valley in 1999. This latter study did not find any significant effect of titling on land market activity, result that is explained in part due to the low levels of credit access in the area (16% of farmers with access).
While the evidence on the operation of the land market in Latin America is to some extent mixed, it is clear that the unconditional operation of the land market does not assure a more balanced land structure. The presence of multiple market imperfections and high transaction costs, coupled with the prevailing levels of land inequality in the continent, make it very difficult for land markets to function as a device to transform land structure and perform a redistributive role. Even in the cases when land markets perform this latter role, it is clear that additional policy instruments are required to achieve structural changes in aggregate land distribution of a given country.
5. Empirical Strategy

5.1. Research Questions, Hypotheses and Methodological Approach

In light of the market-oriented land reforms that were implemented in Peru two decades ago, this thesis seeks to answer the following research questions:

*Research Question 1:* What are the main factors that have influenced land market activity in the post-liberalization Peruvian context? Are titling density and credit access important determinants of the functioning of land markets?

*Research Question 2:* Has land market activity reduced land inequality? In case it has, will land market be enough for breaking the skewed and dualistic land distribution of the country?

These research questions are aimed to explore the degree to which market-oriented land reforms affected the functioning of land markets and whether these markets have had some redistributive role on the country's land configuration. From these research questions we state two associated research hypotheses.

*Hypothesis 1:* While land market activity would be positively affected by increases in titling density and credit access, the effect would be larger when the advances in these two fronts occur altogether (positive synergy between title and credit).

*Hypothesis 2:* The redistributive effect of land markets would be triggered when most credit market failures have been removed and land titling coverage is above some threshold level. If not, it is expected that land markets will not allow inter-class transfers from land-rich to land-poor households, thereby limiting the ability of land markets to deal with the deep-rooted problems of unequal land access. Furthermore, given the current critical role of other forms of land access in the Peruvian context, it is expected that the effect of land market will be small.
In order to answering these research questions and testing our hypotheses, this thesis uses district-level information from Peru that spans recent liberal reforms, and a fixed-effect regression panel data model to compare the change in land inequality across districts and test for inter-district differences in land market activity. Our approximation allows us to explore such effects on different features of land inequality, such as the processes of land concentration, fragmentation, and overall land inequality (using the Gini index). In addition, by using this approach we also examine the determinants of land market activity.

Our approach differs from that adopted by most of the empirical studies that have analyzed these issues. As we have seen in section 4, such literature is often based on case studies that allow a detail analysis of the underlying microeconomic factors that influence land market participation of different classes of producers. This approach is useful for identifying different patterns of land accumulation of a sample of farmer and in a specific setting, but it does not provide enough information for assess the major implications of land markets activity at the aggregate national level. The aggregate nature of our approach, which uses district-level information of the entire country, does allow us to analyze the extent to which land markets can be an effective means to break the dualistic agrarian structure that characterizes the country.

In the next section we will detail our empirical approximation and then, in section 5.3, we will explain the sources of information as well as the variables included in the analysis.

5.2. Empirical Framework

With the purpose of address the research questions and hypotheses outlined before, we will use a fixed-effects regression model approach based on district-level information from Peru. In order to test the hypothesis 1 we examine the determinants of district land market activity,
giving special attention to the role of titling density and credit access, as these factors have been at the center of the Peruvian land policy during the last two decades. The model can be expressed as follows:

\[ LM_{it} = \alpha_i + \delta t_t + \gamma TD_{it} + \varphi CA_{it} + \beta X_{it} + \epsilon_{it} \]

Here \( LM_{it} \) is the land market activity variable for district \( i \) in time \( t \) (where \( t = 1994, 2012 \)), \( \alpha_i \) is the district fixed-effect, \( t_t \) is a dummy variable that account for the period, \( TD_{it} \) is the titling density, \( CA_{it} \) is the credit access, \( X_{it} \) is a vector of control variables that vary over time across districts, and \( \epsilon_{it} \) is the error term.

The advantage of using the “within groups” transformation is that it solves the omitted variables bias that arises when we exclude some unobservable fixed district characteristics. Furthermore, the term \( \alpha_i \) is allowed to be arbitrarily correlated with the covariates, which we suppose is likely to happen. Another advantage of this approach is that by using the district-cluster standard errors method, the resulting standard errors will be completely robust to any kind of heteroscedasticity and/or serial correlation (Wooldridge, 2010). Because we are working with two periods, the fixed-effect model is equivalent to first-differencing (Greene, 2003), and this feature is exactly what allows us to assess how the changes in different attributes of the districts (including credit access and titling density) affect land market activity.

With respect to the identification strategy, we do not have any reason to suspect that there exists a reverse causality relationship between the explanatory variables and the land market activity indicator. Specifically, given the exogenous nature of the titling interventions and under the assumption that the changes in credit access are not influenced by the changes in land market activity, our model would provide unbiased and consistent estimates of these relationships.
On the other hand, since the literature suggests that the success of market-oriented land reforms hinges on a positive synergy between strengthened private property rights and credit markets (Deininger & Chamorro, 2004), we decided to include an additional term in equation (1) that accounts for the interaction between district titling density and credit access. This modified model can be expressed as follows:

\[
LM_{it} = \alpha_i + \delta t_t + \gamma TD_{it} + \vartheta CA_{it} + \pi (TD_{it} \times CA_{it}) + \beta X_{it} + \epsilon_{it}
\]

In this model the coefficient $\pi$ captures the joint effect of titling density and credit access, while the remaining variables are the same than in equation (1). This specific term will allow us to test the first hypothesis mentioned in the last subsection.

Once the main determinants of land market functioning are identified, we turn to analyze the effect of land market activity on land inequality—which allows us to test our second hypothesis. For this purpose, we use a similar approach to the one detailed above. In this case the model to be estimated is the following:

\[
Li_{it} = \alpha_i + \delta t_t + \gamma LM_{it} + \beta Z_{it} + \epsilon_{it}
\]

In equation (3) $Li_{it}$ is the land inequality indicator for district $i$ in time $t$, $\alpha_i$ is the district fixed-effect, $t_t$ is the time dummy variable, $LM_{it}$ is the land activity indicator, $Z_{it}$ is a vector of covariates that vary over time across districts, and $\epsilon_{it}$ is the error term. The parameter of interest in this case is $\gamma$, which will indicate the effect of market activity on land inequality.

As we are working with three different measures of land inequality—overall inequality, land concentration and fragmentation—we will run three different regressions to analyze the channels by which land markets affect land inequality. On the other hand, the set of covariates $Z_{it}$ includes all the potential drivers of land structure beside land markets, which are related with
inheritance processes, the presence of communal land, as well as other demographic and economic processes that may affect land access across different classes of producers (e.g., population pressure, off-farm opportunities, and the expansion of the agricultural frontier).

It is important to mention that in estimating model (3) some endogeneity problems might arise due to reverse causation with the land market activity variables and other mechanism of access to land (e.g., inheritance) that are included in the regression. This might be the case because it is possible that highly unequal initial distributions of land could foster processes such as inheritance due to limited opportunities for accessing land, or that initial high levels of land fragmentation may increase transaction costs in land markets and thus influence its activity. However, by using panel data information we can considerably reduce this problem by estimating a first-difference model (which is numerically equivalent to the fixed-effects model when working with two periods) that only considers the changes in both dependent and independent variables. In this way the potential reverse causality problem is significantly reduced since the dynamic of land market and inheritance processes are less likely to be influenced by the changes in land inequality. Indeed, we performed endogeneity tests for the land market activity variable and we confirmed that the problem of reverse causation is absent in our estimation\textsuperscript{12, 13}.

\textsuperscript{12} We estimate equation (3) by using an instrumental variables (2SLS) fixed-effects model, which included land sales market activity as instrumented variable and titling density as instrument (given the exogenous nature of the titling interventions and its explanatory power on land market activity). Then we performed three exogeneity tests, namely, Durbin-Wu-Hausman test, Davidson-MacKinnon test and Hausman test. In all the cases the tests fail to reject the null hypothesis of no endogeneity (that the specified endogenous regressor can actually be treated as exogenous), thus confirming that at least with respect to the sales market activity variable this potential reverse causation relationship is not a problem.

\textsuperscript{13} Another approach to deal with the potential problem of reverse causation is to use twice-lagged values of regressors as instruments in the first difference model (see explanation by Wooldridge (2010)—section
5.3. Data and Descriptive Statistics

The primary source of information used in this study is the Peruvian Nacional Agricultural Census 1994 and 2012, which provides detailed information of the universe of farms in the country\textsuperscript{14}. The survey mainly covers stock variables, which are related with the characteristics of the farms (size, number of plots, access to technologies, assets holdings, cattle), plots (type of land held, cultivated crops, ownership status, provenance of the land), farmers (access to credit, organization’s membership, agricultural practices, labor demand, off-farm activities), and household members (age, gender, education).

All the information is available at farm-level, but it can be aggregated at district level with the purpose of analyzing aggregate processes such as land inequality or land market activity in each district. Furthermore, this aggregation allows us to assemble a balanced panel data of 1,642 districts for 1994 and 2012, task that cannot be done at the farm level since there is not compatible farm ID for both periods.

The list of variables included is depicted in Table 4, where we also present the district weighted mean values for 1994 and 2012\textsuperscript{15}. As can be seen, the variables used in the study are divided into four categories. The first category includes the land market activity indicators, which measure the importance of both sales and rental land markets in terms of the proportion of

\textsuperscript{14} We supplemented this information with data from the Peruvian National Census of Population and Housing for the years 1993 and 2007, with which we created some additional control variables at district level (related to socioeconomic characteristics of the districts, such as migration, rural employment rate, or the percentage of rural population).

\textsuperscript{15} The weighted average is based in the number of farms in each district, with which we get representative statistics of the country.
land that was acquired by these mechanisms in the district. By taking the difference between such values in 2012 and 1994 what we get is an indicator of land market activity, since it represents the change in the proportion of land that was purchased or rented between these periods. These variations are the ones that are going to be considered in our estimations, since, as we explained, the fixed-effects estimator is numerically equivalent to the first-difference estimator.

It is important to mention that in these and other cases we consider the adjusted land instead of agricultural land or farmland for the construction of the indicators. As explained in section 2.3, using adjusted land is convenient because it does not consider land as homogenous, but incorporates some features of land that are highly correlated with its potential productivity (or quality). Specifically, the adjustment procedure is based on two features: whether the land has irrigation system or not, and in which Natural Region the land is located (land quality is closely related with the location of the plot)\(^{16}\).

The second set of indicators are referred as the land market determinants, which are the explanatory variables that are going to be used in the estimation of equation (1) and (2). In this group we include the titling variable, which is measured by the density of adjusted land that has secure title in the district, and the credit access indicator. These variables are of particular interest, as they are affected for the contemporary land policy intended to enhance land market activity. Within this group we include as well some indicators of the individual characteristics of the farmers (age, gender, and education), which are features that we assume are highly correlated with the risk aversion of individuals, their preferences, and their capacity for income generation.

\(^{16}\) See footnote n° 6 for further information on the procedure and conversion coefficient used.
According with our conceptual framework, these are aspects that could influence land valuation among farmers and thus, land transfers. Finally, we include an additional indicator to account for the access to technology (irrigation), which also affects the competitiveness of farmers.

Table 4: Variables Used in the Analysis

<table>
<thead>
<tr>
<th>Variable</th>
<th>Weighted District Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land Market Activity Indicators</strong></td>
<td></td>
</tr>
<tr>
<td>% of adjusted land acquired by the selling market (sales market activity)</td>
<td>28.1% 34.0%</td>
</tr>
<tr>
<td>% of adjusted land acquired by the rental market (rental market activity)</td>
<td>2.7% 5.1%</td>
</tr>
<tr>
<td><strong>Land Market Activity Determinants and Proxies</strong></td>
<td></td>
</tr>
<tr>
<td>% of adj. land with secure title to land (titling density)</td>
<td>26.4% 29.6%</td>
</tr>
<tr>
<td>% of farmers who received credit (credit access)</td>
<td>6.2% 8.4%</td>
</tr>
<tr>
<td>% of farmers 65 years old or more</td>
<td>14.5% 18.7%</td>
</tr>
<tr>
<td>% of farmers 25 years old or less</td>
<td>6.1% 4.9%</td>
</tr>
<tr>
<td>% of farmers who are women</td>
<td>20.2% 30.3%</td>
</tr>
<tr>
<td>% of farmers who have basic education or more</td>
<td>41.8% 54.6%</td>
</tr>
<tr>
<td>% of farms with modern irrigation</td>
<td>1.2% 4.2%</td>
</tr>
<tr>
<td><strong>Land Inequality Indicators</strong></td>
<td></td>
</tr>
<tr>
<td>Overall inequality indicator</td>
<td>0.55 0.62</td>
</tr>
<tr>
<td>Land Gini Index (adjusted by irrigation)</td>
<td></td>
</tr>
<tr>
<td>Accumulation indicator</td>
<td></td>
</tr>
<tr>
<td>% of adjusted land held by the 5% of farms with more land in the district</td>
<td>30.6% 39.4%</td>
</tr>
<tr>
<td>Fragmentation indicator</td>
<td></td>
</tr>
<tr>
<td>% of farms with less than one hectares of adjusted land</td>
<td>66.0% 74.3%</td>
</tr>
<tr>
<td><strong>Other Land Inequality Drivers Besides Land Market</strong></td>
<td></td>
</tr>
<tr>
<td>% of adjusted land acquired by inheritance</td>
<td>25.2% 32.8%</td>
</tr>
<tr>
<td>% of adjusted land acquired by administrative adjudication</td>
<td>12.4% 7.6%</td>
</tr>
<tr>
<td>% of adjusted land held by community members</td>
<td>23.1% 12.1%</td>
</tr>
<tr>
<td>Aggregate adjusted land in the district (thousands of has)</td>
<td>2.98 3.98</td>
</tr>
<tr>
<td>District adjusted land pressure (Population / adjusted land)</td>
<td>4.36 4.61</td>
</tr>
<tr>
<td>Employment rate in the rural area +</td>
<td>34.8% 36.5%</td>
</tr>
<tr>
<td>Immigration rate +</td>
<td>10.7% 6.9%</td>
</tr>
<tr>
<td>Emigration rate +</td>
<td>12.3% 11.5%</td>
</tr>
<tr>
<td>% of rural households in the district +</td>
<td>65.6% 61.3%</td>
</tr>
<tr>
<td><strong>Number of districts</strong></td>
<td>1,642 1,642</td>
</tr>
</tbody>
</table>

Note: The sources of information for all the variables is the Peruvian Agricultural Census 1994 and 2012, except in the four cases marked with the sign (+), where the source is the Peruvian Population Census 1993 and 2007. We reported the weighted district means based on the number of farms in each district.
The third group of variables are the land inequality indicators, which are the dependent variables in the estimation of equation (3). As we mentioned before, we used three different specifications of the model, using in each case each of the three inequality indicators as dependent variable. The overall inequality index is measured by the Gini index of the adjusted land in each district, which calculation was based in a decomposition procedure. The concentration indicator consists in the portion of adjusted land in the district that is held by the 5% of farms with more land. It is a relative measure of the concentration of land in the hand of a reduced group of farmers. Finally, the fragmentation index captures the relative presence of farms with extremely small size in the district. In this case, we use an indicator of the proportion of farms with less than one hectare of adjusted land.

Last but not least, the fourth set of included variables are related to the drivers of contemporary land dynamics. With the aim of capture these processes in the estimation of equation (3), we include, besides the land market activity indicators, an index of the importance of inheritance in the district—measured by the percentage of adjusted land that was acquired by this mechanism; other about the importance of traditional communal systems—measured by the percentage of adjusted land that was acquired by virtue of membership in the community; and an index that captures the importance of administrative processes as a mechanism to access to land—measured by the percentage of adjusted land that was acquired by administrative adjudication\textsuperscript{17}. Furthermore, in order to assess the effect of the expansion of the agricultural

\textsuperscript{17} As we have explained in section 2.4, administrative adjudication of land could obey to quite different policy initiatives that date from different time periods, namely land acquired by agrarian reform or by denunciations of idle land. While the former source was of a redistributive nature and favored smallholders and peasants, the latter is well-known to have an important bias in favor of wealthy economic agents, favoring the expansion of large-scale farms. For these reasons, and the fact that the adjudication variable does not distinguish between these two processes, it results difficult to interpret the specific policy measure that is driving the effect of such variable.
frontier in this matter, we include the aggregate adjusted land in the district. Finally, we also considered some indicators related with the opportunities of accessing land in the district, such as population pressure over land and the employment opportunities outside agriculture.

After describing the construction of the variables used in our analysis, it is worth giving some comments and additional information regarding the descriptive statistics of the data. First, an initial look at Table 4 demonstrates that the activity of land markets has increased for both sales and rental markets, but these changes are relatively small. This information provides a first indication of the limited role played by land markets to achieve major changes in land structure during the last two decades. On the other hand, the data confirms the low activity of rental markets in the Peruvian case, a similar situation to that encountered by the empirical literature in many Latin American countries.

A closer look at the data suggests, however, that sales markets have been quite active across districts, in some of them increasing considerably its activity, and in others reducing it (see Figure 2). This heterogeneity is what exactly allows us to assess both the determinants of land sales market activity, as well as its impacts on land inequality.

On the other hand, it is worth noting that the titling density and credit access variables have increased between both periods, but the levels, however, remain limited. On average, less than 10% of farmers in the district had access to credit in 2012, while in the case of the titling density indicator this percentage was equal to 30%. This observation would indicate that in case land markets are actually affected by these factors, there is an important policy space for government action in terms of titling advances and credit access.
With respect to the land inequality indicators, Table 4 shows that in all cases the district inequality has deepened on average between both periods. Since these averages hide important variations among districts, in Appendix B we present scatter plots for the three land inequality indicators that show the change in their levels between 1994 and 2012. These figures confirm that land inequality has sharply increased overall, but also in the two extremes of the land distribution. We observe higher levels of both fragmentation (lower end) and land concentration (upper end) across districts. However, as demonstrated in the figures, this trend is quite heterogeneous among districts, in some of them the increase is considerable, in some others is less pronounced, and even in other cases the inequality has been reduced. To get a graphical representation of this process, in Appendix C we mapped the district land Gini coefficients for both 1994 and 2012.
Finally, it is necessary to highlight the important role of the other mechanisms for land acquisition besides land market. As can be observed in Table 4, inheritance, administrative adjudication and community allocation, all continue to play a critical role in access to land. According to the data, on average almost one third of the land was acquired by the first mechanism, 8% by the second and 12% for the third. This information suggests that land inequality and land access presumably need to be explained by several factors beyond land market activity.
6. Results

In this section we present the results of the estimations. In first place, we cover the analysis of the determinants of land market activity, paying attention to the role of land titling and credit access in this matter. Then we turn to explore the principal drivers of land structure dynamics, focusing attention on the effect of land market activity on different indicators of land inequality.

6.1. Determinants of Land Market Activity

To empirically test the factors that influence the functioning of land markets in Peru, we estimate a fixed-effect regression model using as explanatory variable a proxy for land sales market activity at district level. We focused on the sales market because it is by far the more important land market in the Peruvian context and thus the one that could have major implications on the dynamic of land distribution. By comparison, the role of land-rental markets seems to be rather modest in the country.

In Table 5, the first column presents the results of the model that only includes—besides a time indicator, a constant, and district fixed effects dummies—titling density and credit access as explanatory variables. Both variables are highly significant and positive, meaning that the amount of land purchased in the market would increase when the density of land with secured title in the district is higher or when the proportion of farmers who have access to credit is larger. These results suggest that land reform policies that provides secured land titles or enhance financial market access would encourage land market transactions. But this also suggests that the small advances of the Peruvian land policy in these fronts—as demonstrated by the descriptive statistics presents in the last section—are in part responsible of the low levels of land sales activity during the last two decades.
In the second and third column of Table 5 we present the results of the estimation of equations (1) and (2), respectively. While the former includes all additional control variables, the latter incorporates an additional interaction term between titling density and credit access. The idea here is to empirically test the suggested positive synergy between titling and credit markets.

### Table 5: Determinants of Land Sales Market Activity at District Level

<table>
<thead>
<tr>
<th>Dependent variable: % of adjusted land acquired by market sales</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (1994=0, 2012=1)</td>
<td>0.026***</td>
<td>0.068***</td>
<td>0.068***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.015)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>% of adj. land with title</td>
<td>0.199***</td>
<td>0.185***</td>
<td>0.136***</td>
</tr>
<tr>
<td></td>
<td>(0.032)</td>
<td>(0.027)</td>
<td>(0.032)</td>
</tr>
<tr>
<td>% of farmers who received credit</td>
<td>0.247***</td>
<td>0.205***</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>(0.058)</td>
<td>(0.055)</td>
<td>(0.085)</td>
</tr>
<tr>
<td>Title*Credit</td>
<td></td>
<td></td>
<td>0.594***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.223)</td>
</tr>
<tr>
<td>% of adj. land held by community members</td>
<td>-0.199***</td>
<td>-0.196***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.020)</td>
<td></td>
</tr>
<tr>
<td>% of farmers 65 years old or more</td>
<td>0.067</td>
<td>0.027</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.076)</td>
<td>(0.070)</td>
<td></td>
</tr>
<tr>
<td>% of farmers 25 years old or less</td>
<td>-0.085</td>
<td>-0.084</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.155)</td>
<td>(0.157)</td>
<td></td>
</tr>
<tr>
<td>% of farmers who are women</td>
<td>-0.342***</td>
<td>-0.323***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.072)</td>
<td>(0.071)</td>
<td></td>
</tr>
<tr>
<td>% of farmers with basic education or more</td>
<td>-0.169**</td>
<td>-0.174**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.070)</td>
<td>(0.070)</td>
<td></td>
</tr>
<tr>
<td>Aggregate adj. land in the district (thousands of has)</td>
<td>0.002</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.002)</td>
<td></td>
</tr>
<tr>
<td>% of farms with modern irrigation</td>
<td>-0.137**</td>
<td>-0.124**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.061)</td>
<td>(0.061)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.234***</td>
<td>0.412***</td>
<td>0.430***</td>
</tr>
<tr>
<td></td>
<td>(0.010)</td>
<td>(0.036)</td>
<td>(0.035)</td>
</tr>
<tr>
<td>Observations</td>
<td>3,284</td>
<td>3,284</td>
<td>3,284</td>
</tr>
<tr>
<td>District Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.143</td>
<td>0.287</td>
<td>0.295</td>
</tr>
<tr>
<td>Number of clusters</td>
<td>1,642</td>
<td>1,642</td>
<td>1,642</td>
</tr>
</tbody>
</table>

**Note:** Std. Err. adjusted for district clusters in parentheses.
Significance: *** p<0.01, ** p<0.05, * p<0.1.
The results show that the titling density coefficient is positive and significant in all the specifications, confirming the idea that land sales market becomes more active in environments where the density of titling is high enough to reduce transaction costs (Fort, 2007b). The way this effect is induced is based on the argument that the provision of property rights titles would increase the supply of land in the sales market and, thus, it would lead to a reduction in the high transaction costs that prevail in the presence of thin markets.

On the other hand, the credit market parameter appears as significant and positive in column two, suggesting that credit access would positively impact on land market activity, as people would be able to access to the resources needed to carry out land transactions. In the third model, however, the credit access coefficient alone becomes small and insignificant, but the interaction term coefficient is not only highly significant but also comparatively large. This last result points toward greater effectiveness of credit markets in enhancing the functioning of land sales markets in contexts where the density of titling is higher. This result is consistent with the idea that credit access alone would not be enough to incentive land transactions if the potential sellers do not have a document as proof of ownership. In other words, even if farmers have the resources to acquire land, the lack of titling in a given environment would discourage them from doing so given the high transaction (and information) costs involved. Hence, the suggested positive synergy between private property rights and strengthening credit markets is met in the Peruvian case, as suggested in the hypothesis 1.

It is also important to comment on the positive and significant sign of the time indicator, which captures the effect of all the unobservable-or-omitted time-varying explanatory variables. It is likely that this positive effect is related with the deregulation of land transactions and the impressive agro-export growth in the country after 1994. Both processes appear to have
contributed with the activation of land markets, which is expected and very much in line with the empirical literature on Latin America.

Among the other determinants of the functioning of land sales markets, the presence of community land in the district stands as a highly significant factor that reduces sales market activity. This is expected since in such contexts, where communal land tenure systems prevail, land is principally allocated by the community order and not based on market-led mechanisms.

Besides these result, it is important to understand the role of others factors in explaining the functioning of the land market. We included some demographic variables (age, gender and education) and an indicator of access to technology (irrigation), since they could be correlated with the risk aversion of individuals, their preferences, and their capacity for income generation. As discussed before, all these factors could influence land valuation, and therefore, the willingness of individuals to acquire or offer land in the market. The results show that gender, education, and access to technology exhibit a significant influence on land market activity.

An interesting result is the strong and significant negative effect of the gender variable on land market activity. This means that an increase in the proportion of female farmers in the district reduce land market transfers, aspect that could be explained by several reasons. These include some kind of exclusion of female-head farms in the land market, a higher risk aversion from female producers, or differences in preferences between male and female farmers. However, with the available information we are not able to test these potential explanations, so it remains as a future area of research.
6.2. Determinants of Land Inequality

Now we turn to analyze the drivers of land inequality. For this purpose, we estimate equation (3) using three different land inequality indicators as dependent variable: (i) overall inequality, measured by the land Gini coefficient; (ii) land fragmentation, measured by the percentage of farms with less than one hectare; and (iii) land accumulation, measured by the percentage of adjusted land held by the five percent of farms with more land. The reason for estimating three different models is that the overall inequality variable does not indicate the channel through which the effect comes about. In a country like Peru, with an unequal and dualistic land structure, the changes in land inequality could be driven by increments in the land fragmentation among those farmers in the bottom of the distribution, or conversely, by processes of land accumulation of those farmers located in the top of the distribution. Hence, by using this approach we can understand better which of these processes are influencing the overall inequality.

In the estimation of the three models we included district fixed-effects dummies and demographic control variables (not reported in Table 6). As explanatory variables we included indicators of land markets activity in the district (sales and rental) and other variables that account for the additional sources of land access (the percentage of operated land acquired by inheritance, administrative adjudication, and community allocation). Additionally, we add a credit access variable\(^\text{18}\) as well as other explanatory variables that include the aggregate adjusted

\(^\text{18}\) The reason for including the credit access variable in this model—while this variable was already included in the previous regression—is because it can affect land inequality not only by its effect on land markets, but also by reducing or increasing inheritance transfers. These are associated with income opportunities (inside or outside the agricultural sector) that in turn are related with credit access.
land in the district (to assess the effect of the expansion of the agricultural frontier), land
pressure, employment opportunities and migration patterns.

Table 6: Determinants of Land Inequality at District Level

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Overall Inequality (1)</th>
<th>Land Fragmentation (2)</th>
<th>Land Concentration (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (1994=0, 2012=1)</td>
<td>0.064***</td>
<td>0.089***</td>
<td>0.068***</td>
</tr>
<tr>
<td>% of adj. land acquired in the selling market</td>
<td>0.010</td>
<td>0.013</td>
<td>0.015</td>
</tr>
<tr>
<td>% of adj. land acquired in the rental market</td>
<td>0.034</td>
<td>0.034</td>
<td>0.051</td>
</tr>
<tr>
<td>% of adj. land acquired by inheritance</td>
<td>0.080**</td>
<td>0.069**</td>
<td>0.083</td>
</tr>
<tr>
<td>% of adj. land acquired by admin. adjudication</td>
<td>-0.026</td>
<td>-0.125***</td>
<td>-0.035</td>
</tr>
<tr>
<td>% of adj. land held by community members</td>
<td>-0.014</td>
<td>0.022</td>
<td>-0.041</td>
</tr>
<tr>
<td>% of farmers who received credit</td>
<td>-0.181***</td>
<td>0.156***</td>
<td>-0.188***</td>
</tr>
<tr>
<td>Aggregate adj. land in the district (thousands of has)</td>
<td>0.012***</td>
<td>0.008***</td>
<td>0.021***</td>
</tr>
<tr>
<td>District Adj. land pressure (Population / Adj land)</td>
<td>-0.002***</td>
<td>0.002</td>
<td>-0.002***</td>
</tr>
<tr>
<td>Employment rate in the rural area</td>
<td>0.008</td>
<td>-0.128***</td>
<td>-0.012</td>
</tr>
<tr>
<td>Immigration rate</td>
<td>0.030</td>
<td>0.103*</td>
<td>0.077</td>
</tr>
<tr>
<td>Emigration rate</td>
<td>0.030</td>
<td>0.053</td>
<td>(0.100)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.519***</td>
<td>0.638***</td>
<td>0.268***</td>
</tr>
</tbody>
</table>

| Observations                                             | 3,262                  | 3,262                  | 3,262                  |
| District Fixed Effects                                    | Yes                    | Yes                    | Yes                    |
| Demographic control variables b                          | Yes                    | Yes                    | Yes                    |
| Adjusted R-squared                                       | 0.317                  | 0.293                  | 0.283                  |
| Number of Clusters                                       | 1638                   | 1638                   | 1638                   |

**Note:** Std. Err. adjusted for district clusters in parentheses. Significance: *** p<0.01, ** p<0.05, * p<0.1.

- Overall inequality: Gini index (adjusted land); Land Fragmentation: % of farms with less than 1 ha (adj. land); Land Concentration: % of adjusted land held by the 5% of farms with more land in the district.
- Demographic control variables: age, gender, education, and % rural households in the district.
Table 6 presents the results of the three models. The results show that sales markets have a negative and somewhat significant effect (at the 90% confidence level) on overall land inequality (model 1), which means that an increase in land sales market activity would reduce the districts Gini coefficient associated with land inequality. Nevertheless, this effect is small, which is consistent with the fact that land market activity has increased only slightly during the last twenty years.

Then we turn to the results of models 2 and 3 to find out what processes are driving this result. The estimates show that the coefficient for sales markets is not significant and close to zero in the model that explains land fragmentation. However, in model 3 it becomes not only significant but also comparatively large. Taken together, these results suggest that land sales market activity had a redistributive role on the upper end of the land distribution, presumably by allowing transfers of land from land-rich farmers to medium-sized farmers—giving rise to a more balanced distribution of land among that segment of producers. On the bottom end of the distribution, however, land sales market seem to have failed in preventing the deepening of the fragmentation of rural property—which would be desirable given the documented adverse effects of land fragmentation on agricultural productivity and rural poverty (Finan, Sadoulet, & de Janvry, 2005). This last result is consistent with the theoretical and empirical literature on Latin America, which claims that in environments with severe imperfections in capital markets and high transaction costs (given the low levels of titling density and the segmentation that arises due to the dualistic land structure), small farmers would be strongly constrained for acquiring land in the market. Under these circumstances, the land market would not be able to enhance land access to those disadvantaged groups, confirming in this way the second hypothesis of this thesis.
With respect to land rental market, we found that its activity had no impact on any of the indicators of land inequality that were evaluated, which is not surprising given the low activity of this market within the country. This finding is also consistent with the Latin American literature on this subject, which documented the presence of thin rental markets throughout the continent. This limited activity, coupled with the fact that rental markets are expected to provide large productivity benefits but more restrained equity benefits than those obtained through land sales markets, are arguments that would explain the results for the Peruvian case.

Now we turn to look at the impacts of the additional sources of land access on land inequality. In the case of inheritance, we find a positive and significant coefficient in models (1) and (2)\textsuperscript{19}, which suggests that these inter-households land transfers contribute to overall land inequality by their effect on reproducing the fragmentation of rural properties. This result seems reasonable, given that the inheritance mechanism has been usually associated with fragmentation processes, as lack of opportunities outside agriculture may force farmers to parcel out their plots among their heirs. Likewise, this result is consistent with the significant and negative coefficient of the rural employment rate in model (2), which indicates that in environments where the opportunities for income generation increase, the pressures on land fragmentation are diminished.

With respect to the other sources of land access, like community land and administrative adjudication, these have not played an important role in land structure dynamic. The only

\textsuperscript{19} In contrast, this coefficient is not significant in the land accumulation regression. This is expected, since inheritance processes trend to influence only the lower end of the land distribution—which is mostly composed by family farms.
significant impact is observed for the adjudication mechanism in the land fragmentation model, effect that is difficult to interpret given its ambiguous character (see footnote n° 17).

The significant and large negative effect of the credit access indicator on all the land inequality measures deserves a special mention. As can be observed in Table 6, this seems to considerably reduce land inequality, affecting both ends of the land distribution. Many factors could be involved, but whatever the reason it is clear that any policy effort to improve the distribution of land should strongly consider strengthening rural credit markets.

Finally, it is worth mentioning some of the results found when looking at the effect of the remaining control variables. For instance, the district aggregate adjusted land coefficient (which reflect the expansion of the agricultural frontier) is significant in the three models. Its positive sign in the overall inequality regression seems to respond to its effect on land concentration. This could reflect the fact that government-led efforts to increase agricultural land by means of irrigation projects have usually favored the formation of large-scale farms, fostering in this way both land concentration and overall inequality. In contrast, estimates from model 2 show that the expansion of the agricultural frontier reduced fragmentation, an impact that can be explained due to its diminishing effect on land pressure, which in turn would provide greater possibilities for access to land for smallholders. However, this last effect seems to be small, and not enough to impact the overall inequality (as does the first effect just described).
Concluding Remarks and Policy Implications

A renewed contemporary interest in egalitarian land access as a part of both growth and poverty reduction strategies has brought forth a new liberal perspective on land reform in Latin America (Boucher et al., 2005). Peru has not been the exception to this trend, where policies aimed at activating rural land markets have been constantly pursued since the 1990s with the hope of breaking the skewed and dualistic land distribution of the country. Now is an auspicious time to evaluate the functioning and performance of land markets and, as necessary, rethink the direction of these market-oriented land policies.

With this goal, this thesis has sought to empirically examine the factors that influence the functioning of land markets in Peru, their distributional impacts, and the scope for policy to improve outcomes. While the literature has provided important insights on these issues, often based on case studies elsewhere, for that such findings can be generalized requires larger scale and representative datasets. The aggregate nature of our approach, however, does allow us to fill this gap, since our analysis is based on district-level information of the entire country that spans recent liberal reforms. In this way, we can assess whether land markets can function as a device to transform the agrarian structure of a whole country and achieve a more balanced land distribution.

Using panel data district-level information for the Peruvian Agricultural Censuses 1994 and 2012, this thesis estimates fixed-effects regression models to compare the change in land inequality across districts and test for inter-district differences in land market activity. Our approximation allows us to explore such effects on different features of land inequality, such as the processes of land concentration, land fragmentation, and overall land inequality (using the Gini index). In addition, our approach also enable us to examine the determinants that influence
land market activity, an aspect that is especially relevant for evidence-based policy recommendations.

Based on the descriptive evidence and our empirical analysis we reach the following results. First, despite government efforts for activating rural land markets since the 1990s, both sales and rental markets are still thin and have not yet generated the volume of land transfers that would be required to achieve major changes in the land structure of the country. This inactivity is particularly severe in the case of rental markets, especially when compared with the dynamic of other sources for land access such as inheritance—which is a traditional mechanism that still play and important role on this matter.

Second, we found that district sales market activity is strongly influenced by the levels of titling density and credit access, meaning that the amount of land purchased or sold in the market would increase when the density of land with secured title in the district is higher or when the proportion of farmers who have access to credit is larger. Furthermore, we also found a positive synergy between private property rights and strengthening credit markets, since the interaction term between these two factors is not only positive and significant but also comparatively large in explaining land sales market activity. This result points toward greater effectiveness of credit markets in enhancing the functioning of sales markets in environments where the density of titling is higher.

Third, the two results just discussed and the observation that the district-levels of land titling and credit access remain quite low in the country, taken together, suggest that the small advances of the Peruvian land policy on these two fronts (titling and credit) are in part responsible for the low levels of land sales activity during the last two decades. It also confirms that the deregulation of land transactions alone is not enough to activate the functioning of land
markets. Finally, these considerations give rise to an important policy space of government action for improving the functioning of land markets through massive land titling programs and strengthening credit markets.

Fourth, whether for their limited activity or due to their performance when they have been more active, our results suggest that land markets have not been able to break the dualistic agrarian structure that characterizes the country. Presumably due to land market segmentation, our estimations show that even though land markets have allowed land transfers from land-rich farmers to medium-sized farmers, this redistributive role is not observed in the lower end of the land distribution, where land markets seem to have failed in preventing the deepening of the fragmentation of rural property. While the first result could be seen as an important step to enhance agricultural efficiency and achieve a somewhat more balanced land structure among those medium-and-large-sized farms, the second result warns about the limitations of land markets to reach and improve the conditions of the poor and small farmers.

Finally, even assuming that the land policy can correct all the relevant markets failures and substantially reduce land-markets transaction costs (for example through the provision of massive titling, information, credit access, and other complementary measures), the evidence presented in this thesis suggests that land markets alone would not be enough to achieve a structural change toward a more balanced land structure. While under the appropriate conditions land markets can contribute with this goal, the still critical importance of other traditional sources of land access (such as inheritance or community allocation) considerably reduces the ability of this market-led mechanism to induce major changes on land distribution. It is thus necessary to think in a more broad land strategy—that incorporates these considerations—to achieve a real agrarian transformation that enhances both equity and efficiency outcomes.
7.1. Policy Discussion

The highly unequal distribution of rural land and the limited access to this resource by most of the farmers represents a critical concern for policy makers in Peru. In particular, the extreme fragmentation of rural property has been considered one of the major impediments to economic development in the rural sector, where around 1.7 million of farmers (80%) operate land-holding of less than three hectares of agricultural land. These high levels of fragmentation can significantly reduce the efficient use of land by smallholders and near-landless individuals, who are restricted in their access to credit and in their opportunities for making profitable indivisible investments. In fact, the alarming levels of poverty in rural areas (50% according to the INEI) have often been associated with the problem of land fragmentation.

In light of these concerns, it is worth asking to what extent the contemporary Peruvian land policy has made progress to address this problem, and whether this strategy can be sufficient to improve the living conditions of the rural population. Otherwise, it would be important to seek complementary measures to improve the current land policy or alternative strategies to deal with these issues.

The evidence presented in this thesis suggests that the deregulation of land transactions and the firm commitment of the country with land markets have not been enough to achieve a more balanced land distribution and reduce the levels of land fragmentation. Many aspects can be associated with these outcomes, but the most important factors can be divided into two categories: i) failures in the land policy to improve land market activity and to ensure the desired equity and efficiency outcomes; and ii) the importance of additional sources of land access and the factors involved in their dynamic.
With regard to the first aspect, the liberal perspective of land policy has favored measures to extent the scope of land titling and activate private credit markets. However, the advances in these two fronts appear to be limited, since by 2012 only 35% of the adjusted land had formal title and 8% of the farmers had access to credit. This observation suggests that the policies designed to address these issues have been unsuccessful so far, and thus, alternative measures are required to enhance the effectiveness of these strategies, whether by improving the ongoing policies or by complementing them with new policy measures.

The limited advances in the scope of land titling may obey to several aspects related with the policy design and implementation, its sustainability, and the role of external factors that affect the titling advancement throughout time. For instance, the titling process should dedicate more effort at keeping and updated record of the advances of their work (Fort, 2008), since the high mobility of farmers and land may considerably reduce the achievements made by this policy. Furthermore, these titling efforts should deal with the land and farmers that belong to traditional communities (Peasants or Native), whether by providing collective titles or by fostering the individualization of their communal property. Finally, the titling policy should also consider the effects of land transfers through inheritance, since this mechanism for land access could considerably reduce the scope of titling by the fragmentation of titled plots.

With respect to the credit policy, the evidence demonstrates that neither the government nor the private sector have been able to increase credit access in the rural areas, where only a

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20 According to information from the Agricultural Censuses 1994 and 2012 both the number of farmers and the agricultural land grew significantly between these two periods. In 2012 almost half million of new farms and more than 1.5 million of additional hectares of agricultural land were registered.

21 An interesting debate on this subject should be promoted, which should include a discussions on the arguments for and against collective property vis-à-vis individual titles, as well as the conditions that are required to increase the chances of success of each of these schemes.
small portion of farmers had access to this type of capital in 2012. The government strategy for fostering private credit by means of titling appears to have failed, since the descriptive statistics presented in this thesis and empirical studies for the Peruvian case—see, for example, Fort (2007b) and Zegarra et al. (2008)—suggest that titling alone seems to have been an insufficient instrument to bolster credit supply. The importance of credit access for improving the functioning of land markets and reducing land inequality highlighted in our findings calls for alternative strategies that directly address this issue. For instance, it would be important to evaluate the experiences of land banks or land financing institutions such as mortgage banks (see, for example, the work by Deininger and Binswanger (1999) for the arguments for and against these policy instruments), as well as other alternatives for achieving the goal of substantially increase credit access in the rural sector.

It is expected that with these actions and improvements in the titling and credit policy the activity of land market will increase, as well as its capacity to reach the desired efficiency and equity outcomes. However, apart from correcting the relevant market failures (e.g., credit) and substantially reduce the transaction costs (e.g., titling), any land policy should consider the detrimental possibility of speculative acquisitions of land and distress sales, which could have considerable adverse effects on agricultural productivity and rural poverty.

Finally, it is also important to recognize that the land market alone is unlikely to be able to transform the agrarian structure of the country and achieve a more equitable land distribution. As highlighted in this thesis, other sources of land access, such as inheritance processes, still play a critical role in the dynamic of land transfers. Since these type of transfers can deepening the fragmentation of rural property (as suggested by the results of this thesis), it is critical to understand the factors that influence these developments and to identify the required actions to
reduce these harmful dynamics. As suggested by some scholars (see, for example, Fort [2008]), an alternative option to deal with the fragmentation that arises due to inheritance processes is to promote associative schemes among small producers, so they can take advantages of the larger scale (e.g., by reducing risk, increasing credit access). In addition, complementary policies to increase off-farm economic opportunities in the rural sector can also contribute to reduce the pressure over land, diminishing these land dynamics and preventing efficiency losses that may arise due to the fragmentation.

7.2. Suggestions for Future Research

In the discussion on the possibilities and capacity of land markets to transform the agrarian structure, several elements that interact in their outcomes deserve further analysis. For instance, it would be important to analyze whether land market liberalization has increased the likelihood of smallholders to carry out distress sales, since this type of land transactions can rise rural poverty and harm vulnerable farmers. If this is the case, it would be necessary to consider insurance contract alternatives that could help them to confront the usual negative shocks in agriculture. This type of schemes can reduce farmer’s vulnerability, but also they might contribute to increase their willingness and ability to undertake investments and increase their productivity.

Furthermore, a topic that has not been analyzed in the Latin-American literature is the importance of speculative acquisitions of land. Future research on this subject is required, since this type of land acquisitions can substantially reduce the aggregate efficiency of the agricultural sector and restrict the access to this scarce resource for the small and medium-size farmers.
Finally, it is critical a detailed analysis of the factors that bolster inheritance processes and increase the fragmentation of rural property. Many aspects can be related with this outcome, including demographic processes, economic opportunities outside agriculture, aging processes of rural producers, or the lack of retirement funds in the rural sector. Understanding and identifying the key elements that affect inheritance dynamics and, thus, the processes of land fragmentation, can be helpful for the design of new policy instruments to prevent and reduce the reproduction of these harmful dynamics.
APPENDIX A

Evolution of Farms with Less than One Hectare of Land over the Last 60 Years

APPENDIX B

Changes in District Land Inequality between 1994 and 2012


Change in District Land Fragmentation between 1994 and 2012

Change in District Land Concentration between 1994 and 2012

APPENDIX C

Maps of the Land Gini Index at District Level (1994 and 2012)

1994


2012

Source: Peruvian Agricultural Census 2012.
References


