IBS

INSTITUTE OF BEHAVIORAL SCIENCE ■

RESEARCH PROGRAM ON
ENVIRONMENT and BEHAVIOR ■

University of Colorado at Boulder
Boulder CO 80309-0484

WORKING PAPER EB2003-0001■

Solving the Puzzle of Missing Land Rentals in Latin America: Conflicts and Crops in Brazil

Lee J. Alston
Bernardo Mueller

August, 2003

Solving the Puzzle of Missing Land Rentals in Latin America: Conflicts and Crops in Brazil*

Lee J. Alston
University of Colorado
Research Associate NBER
lee.alston@colorado.edu

Bernardo Mueller
University of Brasilia
bmueller@unb.br

August 2003

* Paper prepared for the 2003 annual meeting of the International Society for the New Institutional Economics in Budapest Hungary. For helpful discussions on the issues in the paper we thank Ken Chomitz and Robert Schneider. We thank the World Bank for financing the field work that helped develop the hypotheses that we test.

1. Introduction

Compared to the rest of the world, farmers in Latin America rely relatively little on tenant contracts.[1] Alone, this fact may not present a puzzle but coupled with the large number of landless peasants and large amounts of unused land the question is: why don't landowners with unused or under-utilized land negotiate land rental contracts with the landless.[2] Some scholars have attributed the lack of rentals to a fear by landlords that renters will become de facto owners because of existing legislation making it extremely costly to evict tenants, if they are in default with their rental payments [de Janvry, Macours and Sadoulet (2002); Deininger (2003) and Macours (2002).] A similar fear of rentals may arise from land reform projects [de Janvry, Macours and Sadoulet (2002)]. For example, in Brazil, land should be put to productive use or it may be subject to compensated expropriation [Alston, Libecap and Mueller (1999)]. Renting land could be deemed unproductive use by land reform agencies and as a result owners would be fearful of renting.[3] Alternatively, if farmers are fearful that land may be invaded and expropriated if left idle, they might opt to rent to demonstrate use and possession, particularly if the landlord has reason to trust the renter. An additional explanation for the lack of rentals rests on the labor and capital intensity of different crops. Some land may not be worth the opportunity cost of capital and the return to applying labor via a rental contract may be close to zero. As such landowners may opt to leave land vacant as a potential store of value or in some cases collateral for credit to be used elsewhere. In the case of Brazil we believe that the transition from hectares in highly labor intensive coffee to hectares in capital intensive soybeans has created both some highly productive farms but also some land that is now marginal, especially as the soybean frontier has moved north and west into Mato Grosso do Sul and Mato Grosso.

We propose to test these hypotheses by using *municipio* (county) level data from the Brazilian censuses for the state of Parana along with data on land conflicts from the Pastoral Land Commission (CPT). We will also test the hypotheses with data across

---

[1] de Janvry, Macours and Sadoulet (2003) present tables showing the importance of land rentals across the world and for certain countries in Latin America.

[2] Estimates of the number of landless or those "demanding land vary from 5 million (MST) to 7 million (study at the University of Campinas. .

[3] According to INCRA land in unproductive use totals 166 million hectares.

states in Brazil. In Section 2 we will give a brief overview of the theoretical literature on tenancy contracts. In Section 3 we will chronicle the coffee boom in Parana along with government efforts to reduce the hectares in coffee and their efforts to deal with labor displacement. In Section 4 we will present our empirical tests and interpretation of the results, followed by concluding remarks in Section 5.

2. Theoretical Hypotheses about Tenancy

The theoretical literature on tenancy is voluminous and presenting an overview is treacherous for fear of not citing someone. We assume that the standard explanations for the efficiency of tenancy – both share and fixed-rent – are now public knowledge. By standard explanations we mean risk and transaction costs.[4] In short, depending on the endowments of landlords and workers as well as their preferences towards risk there exist conditions such that the optimal operator status can be either, owner-operator (with only household or with hired wage workers); sharecropper; share tenant; or fixed-rent tenant.[5] In the U.S. in the 19th and early 20th centuries there was a life-cycle to contract choice which agricultural economists referred to as the agricultural ladder. The "ladder" referred to the movement with age from the statuses of wage worker to tenant to owner [Alston and Ferrie (2003); Alston and Kauffman (1997) and (1998)].

Most transaction cost explanations for contract choice rest on the costs of information, negotiation, supervision and enforcement. The plethora of explanations based on transaction costs (or market failures) arose because many economists initially took to heart the Marshallian inefficiency argument and then had difficulty explaining why various forms of tenancy and sharecropping have been so ubiquitous over time and space. Now economists are turning the issue on its head: why are there some regions of the world that rely too little on tenancy and sharecropping, given the existence of

[4] By transaction costs we mean the information, monitoring and enforcement costs associated with contracting. They include issues of moral hazard and adverse selection. Many authors refer to these costs as "market failures." It has never been clear to us how "markets" fail. They only do so relative to an abstract theoretical construct of zero transaction costs. Once you introduce transaction costs as being similar to other costs of production we can drop the notion of "market failure." The distinction is primarily semantic but we will stick to the Coasian pedigree in referring to the costs as transaction costs. We also follow in the footsteps of the scholars analyzing tenancy in the early part of the 20th century. For a review of the some of the earlier work of agricultural economists see Alston and Higgs (1982).

[5] de Janvry, Macours and Sadoulet (2002) provide a very helpful table of the "contextual conditions under which each land tenure status is observed."

transaction costs? Consistent figures are difficult to find but both North America and Europe stand out in the high percentage of land and farm establishments rented. For example, de Janvry, Macours and Sadoulet (2002; pp. 24-25) present data showing that in the U.S. 45% of agricultural land was leased in 1988 and Europe the figures for 1995 range from a low of 12% for Ireland to above 60% for Belgium, France and Germany. For Brazil 11% of farm establishments were rented in 1996. The percentage of agricultural land rented would be considerably lower.

Most explanations for the lack of rentals rest on the insecurity of property rights, though de Janvry, Macours and Sadoulet (2002) suggest that there may be serious under-reporting of rentals in census data because many variants of rental do not fit the standard fixed-rent or share contract.[6] Insecure property rights may reduce the prevalence of rentals because of difficulties in conflict resolution. If it is difficult to evict tenants who do not meet the rental terms, landlords may respond by using wage labor or by only renting to those they trust such as relatives and friends.[7] In some countries tenants receive the right to purchase the land that they rent and not surprisingly landlords may be reluctant to rent.[8] Some governments prohibit land rentals on land redistributed through land reform projects, either de facto (because there are frequently delays in assigning formal titles) or de jure because of a fear of absentee beneficiaries.[9]

In addition to the fear by landlords of expropriation (de facto or de jure) there may be factors on the demand side limiting rentals. It may be that many "would be" renters lack either the physical capital or human capital necessary to profitably rent land. We are less persuaded by the physical capital constraints because presumably rental markets for physical capital should arise, though we recognize that there are transaction costs associated with abuse in renting capital that may preclude the emergence of active

---

[6] For example, de Janvry, Macours and Sadoulet (2002) compared census data from the Dominican Republic with their own micro survey data and found land rentals to be considerably higher in their survey. Land rentals in their survey in San Francisco de Macoris represented 39% of farmland compared to the census figure of 9% for the province; and in their survey of Constanza land rentals represented 52% compared to the provincial census figure of 23%. See Table 7 in their paper.

[7] Macours (2002) found that in the Dominican Republic landlords were more likely to rent to those in their same social network.

[8] This was the case in the Pampas in Argentina under Peron (Gallo, 2003); and in the Dominican Republic following legislation passed in 1972 (de Janvrey, Macours and Sadoulet, 2002).

[9] Brazil is probably not atypical in the long delays associated with assigning formal titles. In Mexico, until recently, the government forbade the renting of *ejidos*.

rental markets. On the human capital side many potential renters may lack the skills necessary to successfully rent. This may be particularly important where the region is shifting to new crops, e.g. niche crops like flowers or even a switch from tree crops like coffee to annual crops like soybeans.

To the above explanations we want to add the impact of land differentiation. With expanding frontiers and markets, the highest valued use of land may change and with it the optimal type of contracts. For example, as the U.S. frontier moved from east to west the higher fertility land in the west marginalized agricultural production in the east with the result that many areas today in the east have more forest cover than they did 150 years ago. Expanding markets can have the same effect as an expanding frontier. If consumers can purchase food grown far away for less than what they would pay for locally grown food then the local land becomes marginalized. "Marginalized" may mean shifting to pasture, or niche type crops, for either local markets, e.g. "fresh fruit and vegetables," or extended markets, e.g. tropical flowers. "Marginalized" may also mean out of production, though not necessarily legally abandoned. Land may not be worth cultivating but it may be worth holding onto the formal title. In both types of marginalization the former types of contracts for bringing together land, labor and capital may no longer make economic sense. "Marginalization" frequently results in labor displacement because of decline in labor intensive agricultural production. In some instances there may be a demand for land but the demand may be for subsistence in which case we will not see a contract emerging either for sale or rent because there is no surplus with which to pay the rent or purchase the land.

Many rural regions around the globe are facing marginalization and its attendant labor displacement. To the extent that labor is not instantaneously absorbed by other sectors locally and does not migrate costlessly, we will witness land invasions by the landless and calls for land reform. Our land differentiation story may partially explain why land rentals are falling while land conflicts are rising in many parts of Latin America. This description certainly fits Brazil today. For example some former soybean farmers in Parana convert their land to pasture and take their capital to the expanding soybean frontier in Mato Grosso. How much of an impact land differentiation has on

rental markets and land conflict are empirical questions which we will explore in Section 4.

3. The History of the Paraná Coffee Frontier

By 1930 the state of Paraná was still beyond the agricultural frontier. The most important economic activity in Brazil was still coffee exports; most of it produced in the neighboring state of São Paulo (see figures 1 and 2).[10] In the next four decades Paraná experienced a remarkable frontier process, supplanting São Paulo as the major coffee producing state. The frontier expansion was fueled by private and public colonization projects that promoted small farms, with a high use of tenant contracts by the 1960s – see Graph 3. However, as quickly as the coffee sector boomed, it subsequently burst. By 1970 several factors conspired to reduce the attractiveness of coffee, leading to sharp reductions in planted area and massive conversion to pasture and other crops, particularly soybeans. In addition, much land became marginalized as witnessed by increases in the area of unproductive and fallow land.[11] As part of this process labor demand fell along with the use of rental contracts. In this section we describe the rise and fall of the Paraná coffee frontier focusing on the elements that determine the choice of rental and sharecropper contracts.

The coffee frontier moved gradually from near Rio de Janeiro and down the Paraiba Valley in the mid 19th century, to western São Paulo over the last decades of the 19th century and early decades of the 20th century. Throughout this period the price of coffee in the international market was the main determinant of the expansion of the coffee frontier. Because Brazil was the world's dominant player, controlling over 70% of world production, it was in a position to directly influence coffee prices. The coffee elite was the dominant political group and used their power to maintain a high price for coffee, which otherwise had a tendency to fluctuate due to supply (overproduction) and demand (recessions in consuming countries) shocks. The government initiated controls starting in

[10] During the 1930's, according to the classic analysis of Furtado (1959), industry would supplant coffee as the dynamic sector of the economy. Nevertheless, coffee remained a key crop in Brazil for several decades after this.

[11] Whereas those *municipios* that truly had a vocation for coffee reduced the fallow and unproductive area from 1960 to 1970 by 102,596 hectares, the more western *municipios* of northern Paraná, which had gone into coffee during the boom despite less suited land, increased the fallow and unproductive area by 126.974 hectares (IBGE, 1960 and 1970).

1906 by temporarily removing stocks of coffee form the market in times of excess production.[12] The success of these government schemes to boost the price of coffee provided incentives for ever-increasing production. Eventually, however, the fundamentals of supply and demand prevailed. The high prices of the early 1920s (see graph 5) led to such coffee stockpiles that when coupled with the drop in world demand due to the Great Depression, could not possibly be sold over the 1930s. The government attempted to stabilize coffee prices by buying and destroying coffee and by prohibiting new plantations. Curiously, the prohibition did not apply to all states; states could plant up to a total limit of 50 million coffee trees. Paraná, compared to São Paulo and Rio de Janeiro, was considerably below the limit and the coffee frontier was just entering into the micro-regions of Wensecslau Braz and Jacarezinho (see figure2) [Cancian, 1981].

With coffee plantations prohibited in São Paulo but not in Paraná migration flowed towards the frontier, stimulated by several private colonization projects. The projects sold small and medium plots in the north of Paraná. The state of Paraná encouraged the projects in part because of fiscal revenue; they received more revenue in the 1930s from taxes on land transfers than they did from agricultural activity [Cancian, 1981]. Consequently the state of Paraná fought vigorously all attempts by the federal government to impose production restrictions. Although coffee prices were low, the new fertile land[13] of the region offered sufficiently attractive profit possibilities for small farms based on family labor producing not only coffee but diversified subsistence crops [Muller, 1956]. Part of the success of these colonization projects arose from the companies' policies of selling land in installments, thus giving access to land to a large number of settlers.[14]

The North of Paraná Land Company (see D in figure 3) was the first and most influential colonization project. Its origin was the Brazilian Plantations Syndicate Ltd.,

---

[12] See Mueller (1983) for the political economy of agricultural price interventions throughout de XXth century.

[13] In 1947 the productivity in the north of Paraná was 586 kilo of coffee per hectare while that of São Paulo was 338 kg/hec [França, 1960:245].

[14] A typical land purchase contract involved the following outlaws: 10% of the value of the plot would be paid when the plot was chosen and 20% sixty days later when the contract was signed; the first installment of 10% would be paid one year later and the remaining three installments of 20% were due in the next three years. Interest was 8% over the outstanding debt [Carvalho, 1991:3]. According to Carvalho (1991: 3) the price of land from 1938 to 1962 was affordable to coffee laborers.

which was created in 1924 by British capitalists with the aim of providing Britain with an alternative source of cotton to Sudan, who was the major supplier to Britain and was undergoing political turmoil. Some cotton was produced in São Paulo but eventually the company purchased land in northern Paraná, not to plant but to colonize and sell. In 1925 the Brazilian Plantations Syndicate Ltd. changed its name to Paraná Plantations Company, increased its capital from £200 thousand to £750 thousand, and created its local subsidiary the North of Paraná Land Company (*Companhia de Terras Norte do Paraná*, 1975). Because of poor transportation and because the land that they sought was in dispute between squatters and people who claimed to have received land concessions from the state government, .the price of land to the North of Paraná Land Company was low. Aware of the importance of being able to offer absolute tenure security, the company bought all claims from squatters and concessionaires to any land in the area and then bought the land once more from the state government. By 1927 the company had purchased 12,643 square kilometers and in 1929 founded, in the middle of the forest, the city of Londrina, today the second largest city in Paraná. The colonization project was carefully planned. The company extended the Ourinhios-Cambará railway to the region, built a railroad along the divide between the Ivaí and Paranapanema river basins, and created urban nuclei along the railroad. Secondary roads stemmed from the railroad and smaller vicinal roads stemmed from these, with smaller urban agglomerations set so that no property would be more than 15 kilometers from a village or city (França, 1960:226). The company designed plots as long strips beginning at a road and ending with access to a river of stream. The average size was 39 hectares, though those closer to towns or villages were smaller than those further away. In most cases the settler built his house near the water, and planted subsistence crops in the lower level land and coffee planted in the higher reaches near the road that was less prone to frosts (França, 1960:227).[15]

From 1930 to 1939 the North of Paraná Land Company sold 4,651 plots and from 1940 to 1950 sold 16,046 more. In total, from 1930 to 1979, the North of Paraná Land

[15] The colonization projects in the Amazon in the 1970's along the Transamazon Highway followed a pattern remarkably similar to the one implemented by the North of Paraná Land Company. Ironically a large proportion of the migrants to the Amazon colonization projects was composed of settlers fleeing from the coffee bust in Paraná.

Company and its successor sold 35,165 plots, with 81% purchased by actual farmers and only 19% to people holding other professions [Carvalho, 1991:4].[16]

The success of this first colonization project soon led to other similar initiatives. In 1935 another private company created the Ibiporã Colony (E in figure 3) on a land concession purchased from the state government neighboring the North Paraná Land Company's colony. Next to this colony the state government made its own project on 5,783 hectares (J in figure 3). Both companies sold plots in small sizes, at most 24 hectares (França, 1960: 229). During the 1940s the state government created four other colonization projects (H, F, I and G in figure 3).[17] When the government created these colonies the land was occupied by a considerable number of squatters and regrettably the government did not sort out the property rights prior to selling the land. Most of the problems involving land conflicts in Paraná, up to the present day, occurred in these regions.

As a consequence of these colonization projects, together with the accompanying spontaneous settlement, the total number of establishments in the north of Paraná which stood at only 471 in 1920, increased to 2,593 in 1935, and to 5,274 in 1942, with the area of planted coffee increasing 484% in this period. Cancian (1981:75) compares the settlement pattern in 1942 in a region of old spontaneous settlement (Old North of Jacarezinho, 2 in Figure 2) to a region of planned private and public settlement (New North of Londrina, 4 in Figure 2). In the old north 69% of the landowners were Brazilian and the rest foreigners, often immigrants who had worked in coffee plantations in São Paulo, while in the new north the Brazilians accounted for 43% of the settlers. While the new region was initially settled with small farms (average 59 hectares in 1942) the old region was initially settled with large farms and with the coffee boom started to subdivide (average 144 hectares in 1942). Land prices were slightly higher in the new more fertile

[16] In 1939 the federal government nationalized the railroad and in 1944 the company sold out to Brazilian investors because of an obligation imposed by the British government for all British capital to be repatriated due to the war effort. The company's name was changed to North of Paraná Improvements Company; however they maintained the same style of colonization as their predecessor (Companhia Melhoramentos Norte do Paraná, 1975).

[17] Figure 3 does not show all the private and public colonization projects. As this became a very profitable business several large landowners fractioned their land and sold plots to settlers. One example is the Ivaí Valley Colonization Company Ltd. created by the Lunardelli Agricultural Company in 1949 with plots divided from its own land and that of third parties [Cancian, 1981:81].

region, Cr$390 per hectare versus Cr$359 per hectare in the older region. The farms in the old region tend to process their coffee within the property with their own equipment. In the new region few farms possessed any equipment and processing was done by traveling machine owners who often also purchased the production. The average number of workers per farm in the old region was 28 and 13 in the new.

In the mid-1940s the price of coffee trended sharply upward, a trend that continued until 1955 (see Graph 5). This increase resulted from a series of coincidental factors: a very strong frost in 1942 which greatly reduced the production of coffee in Paraná and São Paulo in that and the following years; the end of the war which greatly increased demand; and both internal efforts by the National Coffee Department as well as the effort by the Interamerican Coffee Agreement.[18] The increase in prices sparked the coffee boom in Paraná. From 1949 to 1953 farmers planted approximately 135 million coffee trees per year. One of the effects of the increase in coffee prices was to shift the coffee frontier further west. While the Old North (1 and 2 in Figure 2) had produced most of the coffee in Paraná in the 1940s, it was overtaken by the New North (4, 5 and 6 in Figure 2) during the 1950s, which in turn was overtaken by the Very New North (7 and 8 in Figure 2) during the first half of the 1960s, after which production started to fall as will be described below. The coffee boom lead to extreme specialization throughout the north of Paraná and especially in the new regions. Cancian (1981) analyzes the process by which the diversified farms of the 1930-1945 period gave way to heavy concentration in coffee during the 1950s and early 1960s. In the New North of Londrina, for example, in 1960 two *municípios* planted only coffee, 21 planted predominantly coffee and in only one *município* coffee was not the major crop. High coffee prices lead not only to the planting of too much coffee, but of the planting of coffee in regions where the soil was not suitable – too sandy and subject to erosion – and subject to frost.

The result of the high coffee prices was a drastic increase in the production of coffee. Cancian (1981: 122) cites a study by the state secretary of Agriculture stating that "(i)n 1960 Paraná produced almost one third of the world's production, half of the

[18] The government still pursued active policies to maintain coffee prices; however the motivation was different than that before 1930 when the coffee elite was politically powerful. Now the dynamic sector of the economy was the consolidating industrial sector and the industrialists support coffee exports as a means to generate hard currency to promote industrialization.

Brazilian production, twice that of Africa and three times that of Colombia." As it turned out however, this apparently favorable situation was not going to last. In the following years the North of Paraná would witness a drastic change in its agricultural organization. The area in permanent crops (mostly coffee) fell 21% in the state and 36% in the north (IPARDES, 1978: 72), giving way to pasture and other crops, particularly soybeans. This movement led to a consolidation of plots and dramatic changes in labor relations. In the 1950s and 1960s renters operated a large percentage of the farms. A survey by the Brazilian Coffee Institute in Paraná in 1961, cited by Carvalho (1991: Annex 1, pg. 21) shows that renters and sharecroppers operated 59% of all farms (27% fixed rent and 32% sharecroppers). Census data (IBGE, 1960 and 1970) shows 51% of the farms in the north of Paraná operated by rental contracts in 1960 and 49% in 1970. A study the government of Paraná (IPARDES, 1978: 48) states that "after 1970 … the reduction of the area dedicated to coffee, and its substitution by soybeans, implied not only a drastic reduction in the number of small establishments, but also the eviction from the agricultural properties of tenants and sharecroppers, that produced their subsistence by planting corn, beans and rice between the coffee strips." As a result of these changes mass exodus occurred in several *municípios* in the North of Paraná. Carvalho (1991: 9) found 32 *municípios* that lost up to 20% of their population from 1960 to 1970, 15 that lost from 20% to 40 %, and four that lost from 40% to 60%. Most of that exodus took the form of rural to urban locations within Paraná, with the west of the state becoming an attraction pole. For those who remained in the north the main occupation became temporary workers in agriculture.[19] IPARDES (1978) interviewed 1,104 wage workers living in urban areas in 22 *municípios* in the north and west of Paraná in 1977 and found that 37% had been tenants and 4% land owners in their last occupation.

These drastic and sudden changes in the organization of agriculture in Paraná generated a specialized literature attempting to explain the coffee boom and bust and the subsequent soybean boom.[20] In what follows we will present the extant explanations

[19] In Portuguese temporary agricultural workers became known as *boia-frias*, or cold-food, given that they tended to take their lunch with them from home. The IPARDES (1978) study is a result of the state government's concern over the sudden predominance of this form of labor relation and the social problems it implied.

[20] For a review of this literature see Saint (1980). Other references are Cancian (1980), Carvalho (1991), IPARDES (1978), Nichols (1971) and Ribeiro and Stolf (1975).

along with the neglected role of land conflicts. We inform our discussion in light of the literature on the impediments to the use of rental contracts in Latin America. Each of the factors analyzed below either directly reduced rental contracts or did so indirectly by leading to a shift from coffee to other activities where these contracts are typically less prevalent. In the subsequent section we will test some of the suggested hypotheses with data at the *município* level for Paraná and state level for Brazil.

Frosts

The coffee frontier stopped at the north of Paraná because the climate was not suitable below the 24th parallel (see figure 2). Even in the north of Paraná the incidence of frosts was a constant hindrance to coffee growers. The frosts burned the leaves of the coffee tree and could drastically reduce production. Data from the Brazilian Coffee Institute cited in Carvalho (1991:6) shows the impact of the frost on the production of coffee in Paraná during this period (loss in parenthesis): 1953 (58%), 1955 (65%), 1957 (not available), 1959 (not available), 1962 (49%), 1963 (22%), 1966 (24%), 1969 (87%), 1972 (58%) and 1975 (100%). The historic frost of 1975 destroyed all coffee production in the state. In each of these events several farmers would chose to eradicate part of their coffee trees. Carvalho (1991: 164) interviewed 19 current coffee producers in the north of Paraná who had been growing coffee there from the 1950s to the 1970s. Of those 14 had eradicated their coffee following the 1975 frost.

In general one would expect frosts to have different incentive effects on the use of fixed rental versus share contracts. The use of sharecropping spreads the risk between landlords and tenants and to the extent that landlords are relatively less risk averse, we should observe share contracts to rise.[21] Also the frost provided incentives for more coffee to be planted by increasing the price of coffee. Given that rental contracts were more frequent in coffee production, the frosts could lead to more use of renting overall. On the other hand the frosts could impose severe losses on the affected farmers, prompting the switch to pasture, other crops or fallowing. This was particularly strong in

[21] Higgs (1973) found evidence of this for the U.S. South. The ratio of farms that used sharecropping versus fixed rent contracts in Paraná increased from 1.67 to 1.79 from 1960 to 1970 in Paraná when coffee prevailed (the 1950s census does not make the distinction). It then fell to 1.45 in 1980 when coffee had been mostly substituted by other activities that are less subject to risk.

those areas that were not climatically suited but planted coffee in response to the high prices. Where coffee was substituted by other activities rental contracts declined sharply.

Coffee Eradication Programs

The coffee eradication programs in the 1960s were simply a new round in the continual attempt by the Brazilian government to control coffee prices. As in the past, the success of the attempts to shore up coffee prices in the period from 1940-1955 (see Graph 5) led to an expansion of hectares in coffee, leading in turn to overproduction and consequently to declining prices, thus requiring renewed intervention. Since the beginning of the century several different strategies had been used, such as stocking of excess coffee to sell in subsequent years, taxing of coffee exports, purchasing of coffee to burn, and prohibiting planting. This time the strategy involved paying farmers to eradicate coffee trees and substitute them with other crops. This not only served the purpose of reducing excess coffee production and thus assuring higher foreign exchange earnings, but also of increasing food production which was then a serious concern in Brazil.

In 1961 the government created the Executive Group for the Rationalization of Coffee (*GERCA*) that instituted the Program for Rationalization of Brazilian Coffee from 1962 to 1969. The program, which covered all coffee planting states in Brazil, included the payment in cash for each coffee tree uprooted and financing of the alternative crops in all coffee planting states of Brazil. This was done through the large network of *Banco do Brasil* as well as state banks and some private banks. The program changed over time to try to reduce fraud and differentiate between different regions. From 1962 to 1967 the program induced the uprooting of 249,957 coffee trees in the state of Paraná, with the Very New North (7 and 8 in Figure 2) accounting for 47%, the New North (3, 4 and 5 in Figure 2) with 39% and the Old North (1 and 2 in Figure 2) with 14% [Cancian, 1981, Carvalho, 1991]. This released 307,062 hectares that where subsequently used for pasture (40.4%), cotton (16.0%), beans (13.2%), mamona (2.9%), mandioc (1.8%), rice (1.9%) and other crops (10.9%). Carvalho (1991:76) cites a GERCA report from 1963 promoting soy beans as a potential substitute. Six hundred farmers were provided with soy seeds that were planted on 3,000 hectares.

The total area of coffee eradicated in the north of Paraná from 1962-1967 was approximately 20% of the area in coffee in 1960.[22] This is a fairly large number for a program of this nature, indicating that it played an important role in the reduction of tenancy in Paraná.

Labor Legislation

In 1963 the government established the Rural Worker Statute extending the set of legal labor benefits already held by urban workers to those in agriculture.[23] The Statute set regional minimum wages, established the 13th salary, holidays, payment for overtime, 48-hour workweek and limited the employers' acceptable justifications for firing. It is argued that the imposition of these encumbrances lead landowners to dispense hordes of rural workers, both tenants and wage workers and to switch towards using temporary workers [Saint, 1980; Ribeiro and Stolf, 1975; Nichols, 1971, IPARDES 1978, Carvalho, 1991]. With temporary workers the farmers could evade the labor regulation as a permanent link was never established. It also became common for middlemen to intermediate the hiring of daily or task workers with a farmer, so that the legal obligations would be upon the middleman who had greater ease of evading the law.

One question that arises is whether the law actually had any impact? Given the difficulty in monitoring and enforcing this type of regulation in the rural area of a developing country one might think that *de facto* the law would be practically innocuous. Saint (1980) argues that although most of the rural employers did not adhere to the regulation in the Rural Worker Statute, the laws were increasingly enforced. The reasons why are: i) the rise of a contingent of rural labor lawyers who specialized in this type of case, many associated with rural worker unions,; ii) the decline in the power of the rural elites; iii) the understanding by the government of the importance of reducing inequality in rural areas in Brazil and defusing social tensions; and iv) the goal of creating a larger consumer market in rural areas [Saint, 1980:522]. Carvalho (1991) examined a set of labor cases that were initiated in the courts of the *municípios* of Jaguapitã, in north Paraná

[22] In 1960 the area in permanent crops (most of which was coffee) was 1.593795 hectares and the Program released 307.362 hectares.

[23] To the present day Brazil possesses very progressive labor laws conceding a wide set of benefits and privileges to rural and urban workers. Labor justice in Brazil almost always decides in favor of the employee, which at least reduces uncertainty. However these benefits make for more rigid labor markets and increases unemployment.

during the 1950s and 1960s.[24] She found a large increase in the number of cases in the courts after 1963 when the Statute was put in effect. She also found that there was a qualitative difference in the post-1963 cases with the rural workers actively seeking rights that they not have before, such as the payment of a 13th salary. In the sample of cases described in Carvalho (1991:91-95) the rural workers were able to win the case or settle in a large proportion of the cases. This indicates that even if there was massive evasion of the new labor legislation, it was far from innocuous and probably contributed to the shift from a tenancy-based agriculture to one based on day laborers.

Increase in Land Prices

During the 1970s land prices increased sharply in Brazil. This increase was prompted mostly by the introduction of subsidized credit for agriculture. The military government recognized the poor performance of agriculture as a severe impediment to economic growth and development and used rural credit at negative interest rates (given inflation) as one of the solutions. Brandão (1988) tested econometrically the increase in land prices from 1966 to 1984 and found rural credit to be the major determinant, more so than input and output prices, the business cycle or the use of land as a hedge against macroeconomic instability. Essentially what happened was that land markets capitalized the "rents" from cheap credit into land values. This effect lasted until the early 1990s when subsidized credit was no longer available.

There are three reasons why the availability of subsidized credit and the consequent increase in land prices lead to a reduction in the use of tenancy contracts. First, there were impediments to accessing the credit if the land was rented out. As a result many landowners opted for wage labor as to be eligible for the loans. Often the purpose of owning the land became that of accessing the subsidized credit, which was used elsewhere and the land was left unused or underused. Secondly, credit was often tied to specific crops that typically used fewer tenant contracts, such as soy beans. Also the credit was often related to the purchase of machinery and other inputs that had the effect of reducing the use of tenancy. Finally, the increase in land prices meant that it often became too expensive for the landowner to allow tenants to live on the land and use part

[24] The University of Maringá possesses a classified archive of a large number of labor related court cases in the north of Paraná during the 1950s and 1960s.

of it for their own subsistence need. Higher land prices gave an incentive for landowners to expel the tenants and use wage workers that did not live on the farm and thus occupy valuable space. This is the reason found by a study by the state government on the causes of the predominance of temporary labor in Paraná in the 1970s (IPARDES, 1978: 146):

> This study intends to show that temporary labor arose as a result of the growing capitalization of Paraná's agriculture, which has lead to a great increase in the value of land. Thus, this basic input for production, that was previously conceded to the worker as compensation for his labor, became exceedingly valuable for it to be left out of production for the market, making uneconomic other contractual relations such as sharecroppers, tenants and others.

Soy beans and Mechanization

In the previous section we argued that over time the highest valued use of land may change and with it the optimal type of contracts. The agriculture of Paraná in the 1960s and 1970s is a good example of this land differentiation story. Graph 7 shows the evolution of the area in coffee and in soy beans from 1960 to 1996. In 1960 soy beans were practically unknown in Paraná with only 3,547 tons produced whereas coffee was at its prime. Ten years later coffee and soybeans covered approximately the same area, although that census year was a particularly bad one for coffee given the large frosts in 1969. Thereafter coffee area reduced systematically as soy bean area increased. The land and climate in Paraná is particularly well suited for soy beans, and as information was disseminated there were strong economic inducements for switching from coffee and other crops.[25] As this happened there occurred a reduction in rental contracts because the soybeans required considerably less labor and more capital with capital standardizing the production process leading to more wage workers relative to sharecroppers and renters.[26]

4. Empirical Analysis of the Determinants of Rental Contract Use

In section 2 we briefly reviewed the literature on the determinants of rental contract use. In particular we noted that the literature that focuses on Latin America has stressed the issue of insecure property rights as an impediment to tenancy relations. To

[25] We have had access to a letter from William Nichols, who in the early 1970s was pursing research on Brazilian Agriculture, assuring the US Department of Agriculture that although Brazil had some areas that were extremely well suited for soy beans, there was no immediate threat to US producers given the poor infrastructure of the country.

[26] Alston (1981) found that sharecropping and rentals and wage contracting increased when cotton became mechanized in the U.S. South.

this we added our hypothesis that land use differentiation over time may induce changes in contractual choice. We argued that one of the effects of changing land use may be the marginalization of some land, where rental contracts would no longer be worthwhile. The analytical narrative of the dramatic frontier process in Paraná confirmed the role of land differentiation as a determinant of the demise of rental contracts. In addition it suggested some related determinants, such as the increase in land prices, governmental intervention on crop choice, labor legislation and, climatic conditions. In this section we will test several of these hypotheses with data for Paraná at the *município* level and data for Brazil at state level. We will test the following determinants of the choice to use rental contracts: i) tenure security; ii) land use differentiation; iii) land marginalization; iv) land prices; and v) mechanization. Unfortunately the effect of labor legislation can not be tested for lack of data.

In this version of the paper the state level regression is done in terms of growth rates of all the variables from 1985 to 1996, which are the two last agricultural census dates. The use of growth rates captures how changes in the explanatory variables over time lead to changes in tenancy rates. The use 1985 and 1996 data is only provisional, our intention being to eventually use all censuses since 1950, which capture periods of important changes in Brazilian agriculture. One advantage of the focusing on the 1985-1996 period is that systematic data on land conflicts is only available since 1985. The regression with *município* level data is not in growth rates but in levels for 1996. Once again this is only provisional, in subsequent revisions we will use growth rates from the censuses 1950-1996.

For the state level regression the dependant variable is the growth from 1985 to 1996 in the percentage of all farms in a state under sharecropping or fixed rent.[27] In order to capture the effect of tenure security we used the growth in average number of conflicts in the state in the years 1987-1991 to the average in 1992-1995, Δ *Conflicts*. The land differentiation variables measure the percentage growth in the area of each crop from 1985 to 1996, Δ *Rice,* Δ *Soy,* Δ *Coffee,* Δ *Corn* and Δ *Cane*. The same was done with the growth in the area in pasture and the growth in useless area, Δ *Pasture* and Δ *Useless*. The 1996 census no longer provides land values, so we used the growth in the level of

[27] The census classifies all farms as being either owner-operated, sharecrop, fixed rent or squatter.

investment per farms in each state from 1985 to 1996 as a proxy, Δ *Investment*.[28] We also added a variable to capture the effect of changes in land ownership concentration, Δ *Concentration*, which measures the change in the percentage of area in a state held in farms larger than 500 hectares. Finally we included dummies to control for regional effects with the Northeast as the baseline.

We present the results of the state level regressions in Table 1.[29] Two specifications are presented, with and without the increase in investment. In almost all states the number of farms using rental contracts fell from 1985 to 1996, so variables with positive coefficients can be interpreted as those which most retarded that reduction in tenancy and variables with negative coefficients as those effect which helped to promote that fall. The growth in rural conflicts had the effect of reducing the use of rental contracts in a state. A one half-standard deviation increase in the growth of rural conflicts in a given state would increase the fall in rental contract use by 8.6%. The mean fall in farms using rental contracts was 46.9%, so the one half standard deviation increase in conflict growth increases that fall to 55.5%.

The crop variables together with the pasture variable measure the effect of changes in land use over the period on the use of rental contracts. We included only the major crops as we had few degrees of freedom. Naturally each region is affected by a different set of crops, nevertheless the results are consistent with our land differentiation story. On average increases in the area in rice, coffee and corn led to increases (or slower falls) in the use of rental contracts, while increases in the area in soybeans and sugar cane (the latter not significant) lead to greater reductions in their use. These results fit our argument that capital intensive crops, i.e. more mechanized, rely less on tenant contracts because supervision costs are lower and hence less of a need to use a 'high powered" incentive. Additional evidence of our mechanization story is the reduction in importance and reliability of the coefficient on soybeans once we add investment. For the first column, a one half-standard deviation increase in the growth of soy area from 1985 to 1996, leads to a 1.5% reduction in the use of rental contracts. For coffee a one half-standard deviation increase leads to a 6.5% in growth of farms using tenancy. The

[28] Per farm investment was set in constant 1996 Reais using the IGP-DI index from Fundação Getúlio Vargas.
[29] The state of Amapá is was dropped due to several outliers and missing data.

numbers for rice and corn are 5.8% and 5.3%. The same land differentiation effect is valid for pasture. A one-half standard deviation change in the increase in area in pasture induces a 16.1% drop in rental contracts, which indicates the change from crops to pasture has a particularly strong effect in reducing tenancy.

Our results also lend support to our hypothesis about the role land marginalization. The variable that measures the change in area declared useless by the landholder had a negative and significant coefficient. The effect of a one-half standard deviation increase in useless area growth in a state results in an 8.9% reduction in the growth of rental contracts.[30]

In the second specification we proxied land prices with investment. The coefficient is large an reliable, lending support to our story that the custom of hiring tenants and providing land to them for "garden" plots gives way on higher valued land to wage workers with mechanized equipment. A one-half standard deviation change in Δ *Investment* leads to a 6.3% drop in the growth of the number of farms under tenancy arrangements from 1985 to 1996.

We present our results using data across *municípios* from Paraná in Table 2. The data in this regression are in levels. The crop variables measure the percentage of the area in the *municípios* planted with each crop. In this specification we added two new crops relevant for the case of Paraná: mate and manioc. We also used data on tractors per farm to proxy for the role of mechanization as well as an index for land values. Finally, we included a dummy variable for the Southwest Paraná micro-region, the only one that was statistically different from the others. The dependant variable is the percentage of all farms in the *municípios* under sharecropping or fixed rent in 1996.

As in the state level regression, conflicts, which measures tenure security, is negative. An additional conflict in a *município* is predicted by the model to reduce the use of rental contracts by 0.3%. The average proportion of rental contracts was 12.3%, so an additional conflict would reduce that number to 12.0%. The effect of a one-half standard deviation is -0.2%. This effect is statistically small but still impacts thousands of farmers.

[30] We expect the impact to be greater in areas with more land conflict. We will test this hypothesis in a future draft.

All crop variables affect the use of rental contracts. Changes in the proportion of area planted in rice, mate, manioc and beans reduce tenancy while soybeans, coffee and sugar cane increases it. It is noteworthy that the signs on soybeans, sugar cane and rice are the opposite from the state level regression. For soybeans we speculate that the sign will change when we move to levels. For all but soybeans the quantitative impacts are small: a one-half standard deviation in the percentage of area each crop affects tenancy rates by –0.6% for rice, 4.8% for soy beans, 0.6% for coffee, -0.9% for mate, 0.6% for manioc, -0.6% for beans and 0.8% for sugar cane.

As at the state level, our *município* results indicate that pasture matters for reducing pasture. The impact of a ½ standard deviation change in pasture on is -2.2%. The coefficient on "useless" hectares is also negative, thought its impact is not huge: a one-half standard deviation change in the proportion of useless farm area leads to a 0.8% reduction in rental contracts.

Our two proxies for land values had a negative and significant effect on the use of rental contracts. An additional tractor per farm is predicted to reduce the share of tenancy-using farms by 3%. In the same manner an R$1,000,000 (1996 value) increase in investment in a *município* is associated with a 0.3% reduction in tenancy rates.

Overall, our results for the determinants of state level growth rates in tenancy and variation in *município* rates of tenancy fit our narrative story of the multiple causes for the decline in tenancy and its variation across space. We found that conflicts, land use differentiation, land marginalization and land values all played a role in reducing tenancy.

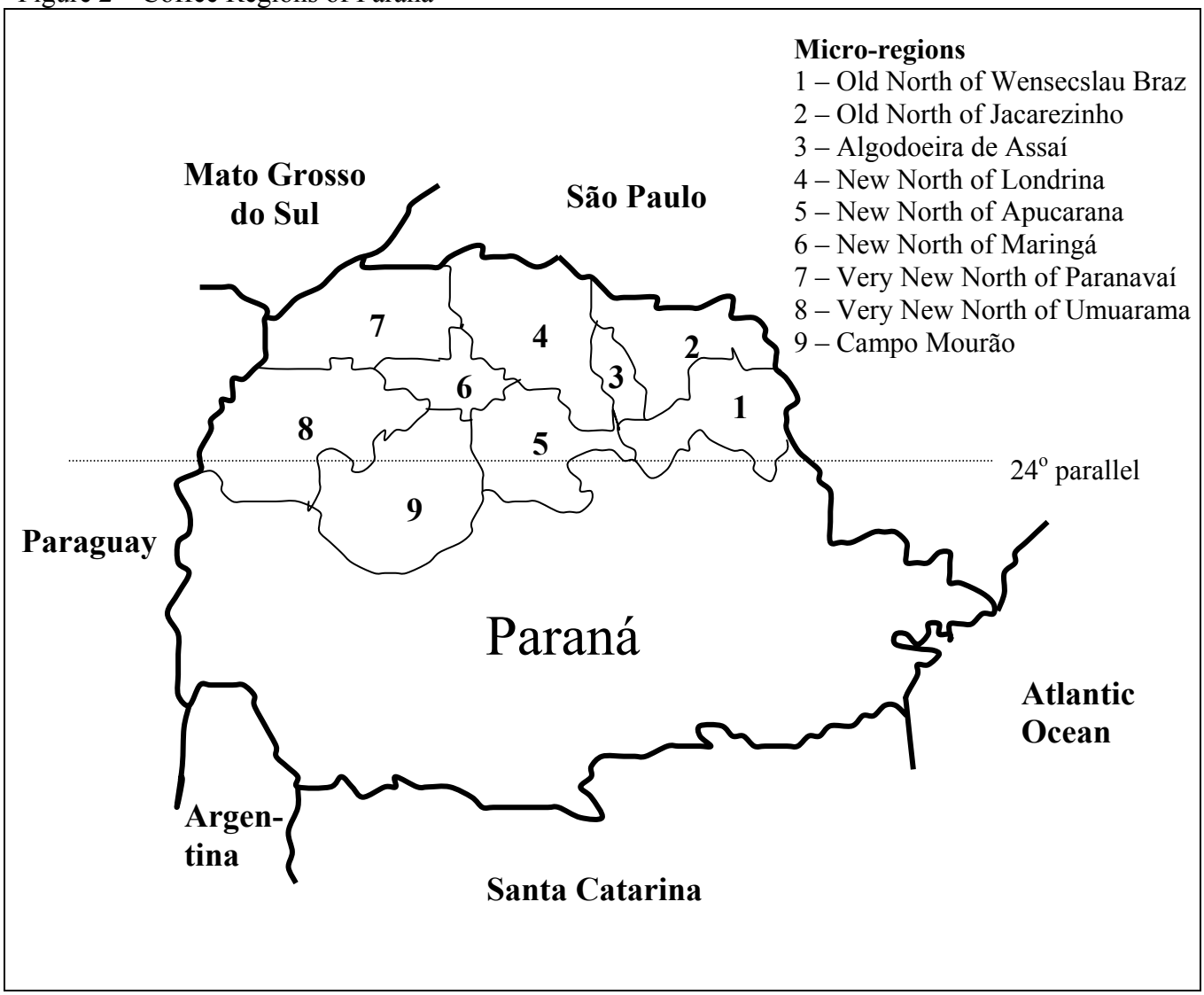
5. Conclusion

Relative to the rest of the world, Latin America relies relatively little on rental contracts. In this paper we analyze the use of rental contracts in Brazil. We provide an analytical narrative of the decline of renting in Paraná along with econometric tests. In the narrative we point out that historically, at least for coffee, Brazil relied heavily on rental and sharecrop contracts. The standard explanations for rental contract rest on risk and transaction costs. These factors still play a role but mechanization, along with changes in crop mix have worked towards reducing risk and transaction costs. As a result, tenancy fell. We also found support for the impact of land marginalization. As globalization proceeds and the frontier advances in Brazil, there will land left behind. The land may be

suitable for subsistence but it is not worth risk and costs of renting. Some of this land is classified as "useless" but for some farms we suspect that they are simply turned to pasture. In future revisions we will explore the marginalization story in more depth. We also found that conflicts, and the associated fear of expropriations reduce tenancy. Across states, the impact of land conflicts on lowering rentals is high. Ironically, the current land reform policy may create more landless farmers by raising the costs to landowners of renting their farms.

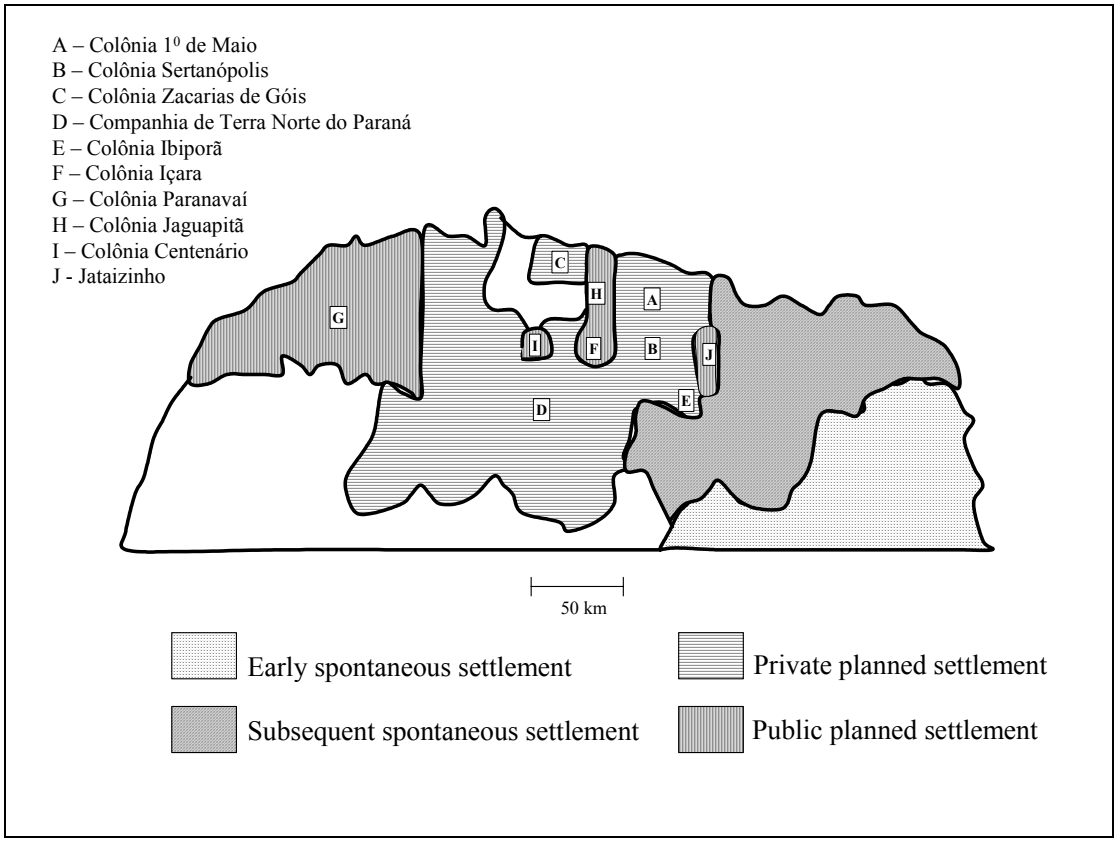
Figure 1 – Map of Brazil and Paraná.

Figure 2 – Coffee Regions of Paraná



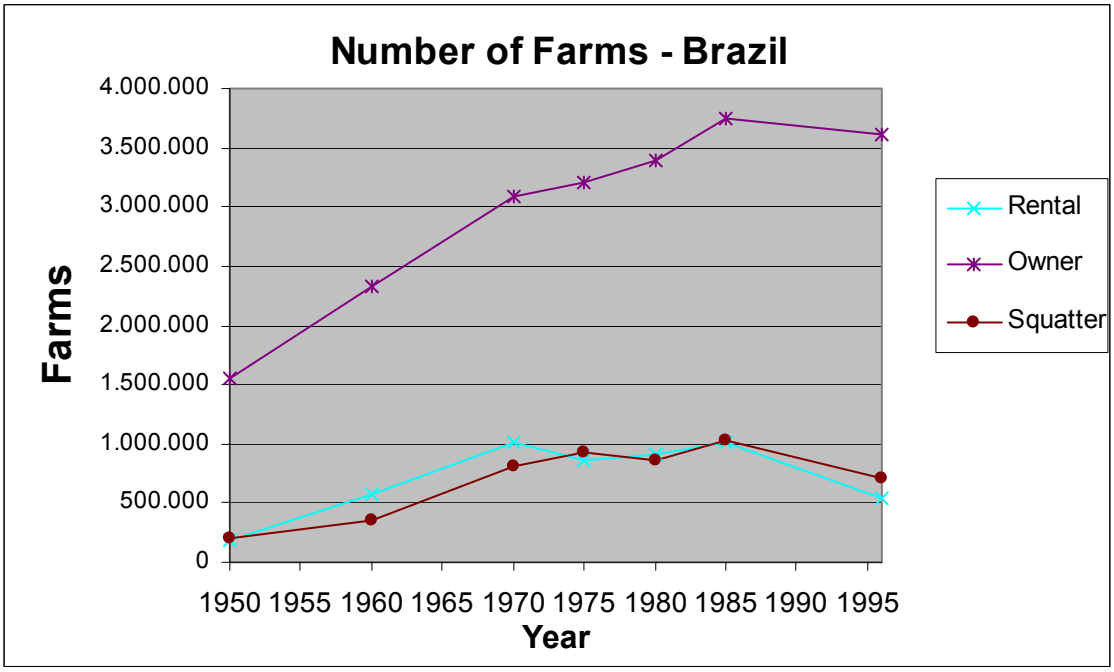
Source: Adapted from Cancian (1981: 51).

Figure 3 – Settlement Pattern of the North of Paraná



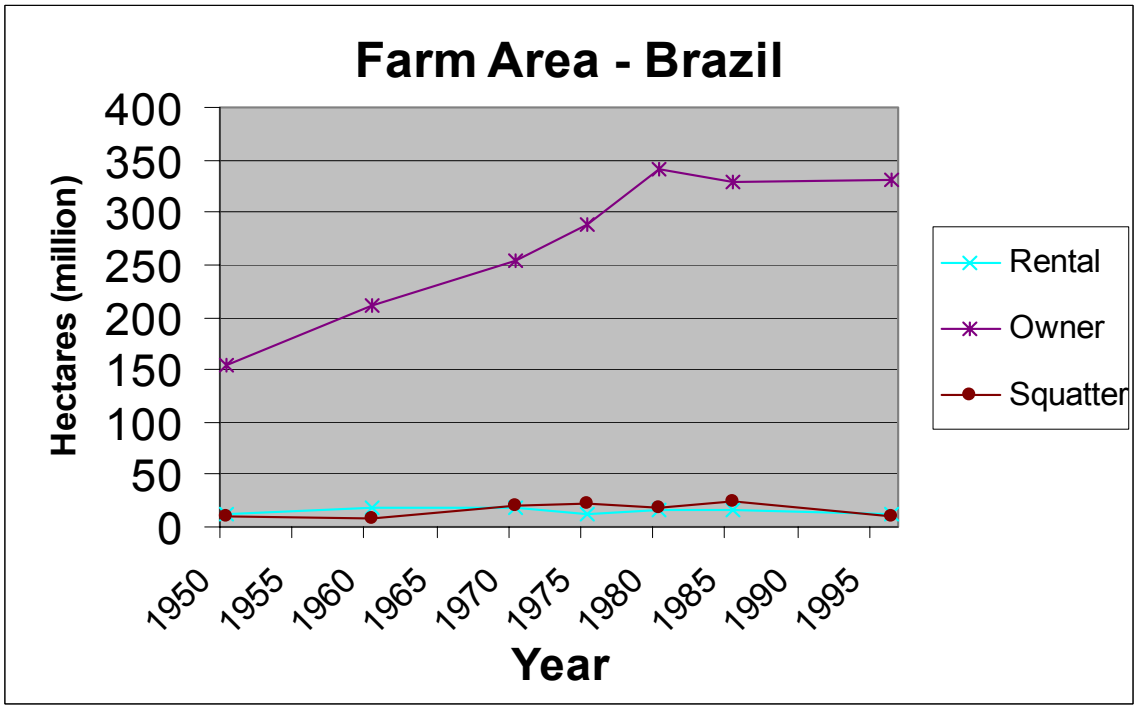
Source: França (1960: 224).

Graph 1 – Number of Farms in Brazil under each type of land use.



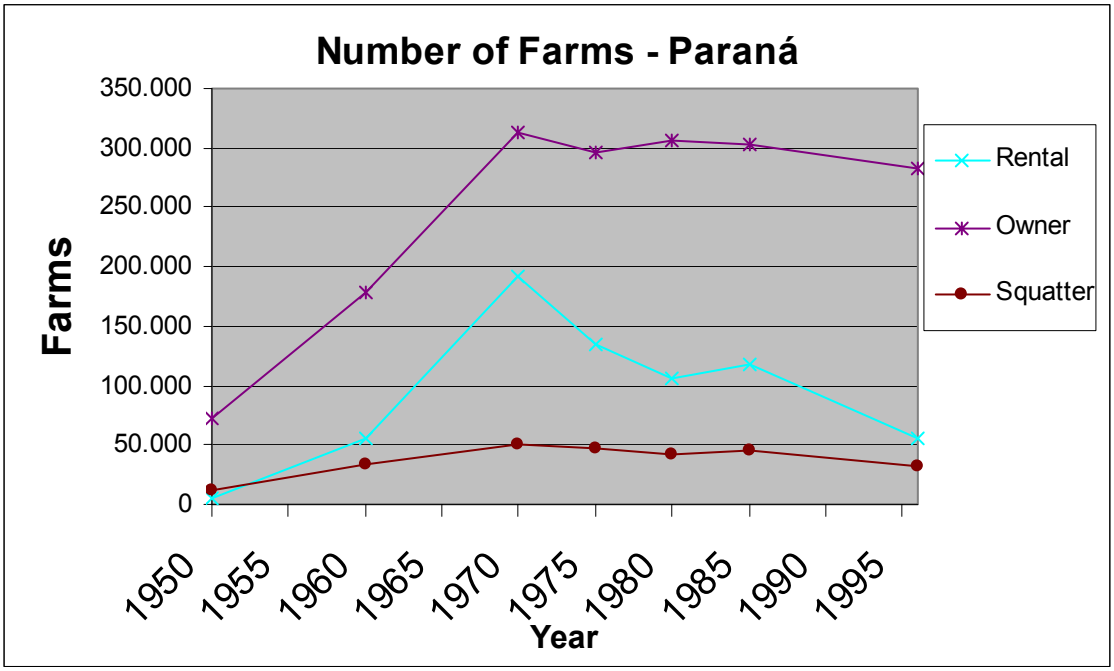
Source: IBGE, Censo Agropecuário, several years.

Graph 2 – Total area of farms in Brazil under each type of land use.



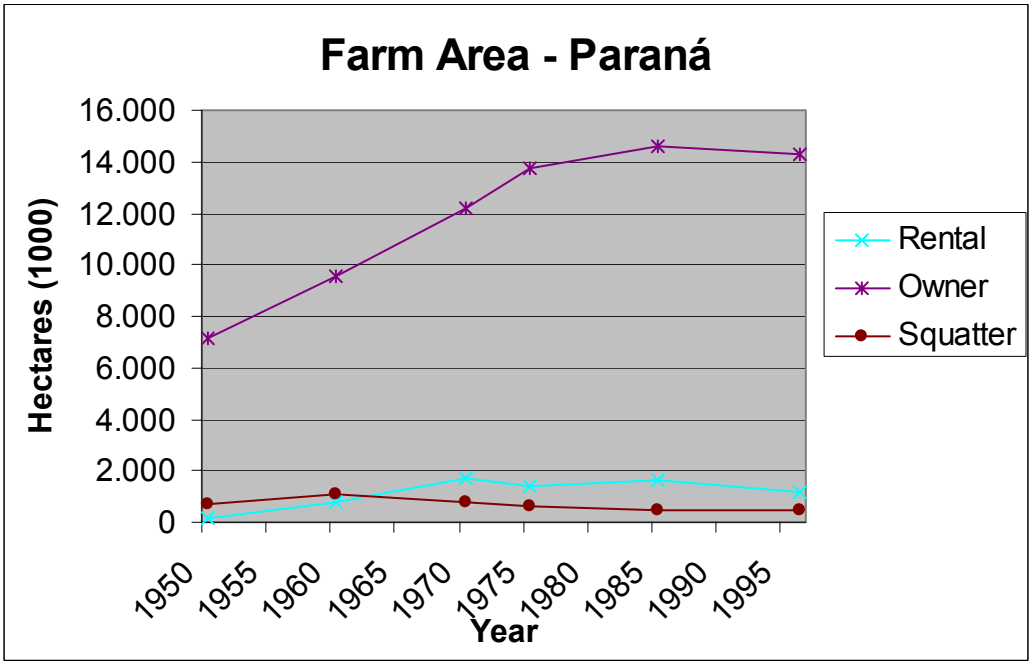
Source: IBGE, Censo Agropecuário, several years.

Graph 3 – Number of Farms in Paraná under each type of land use.



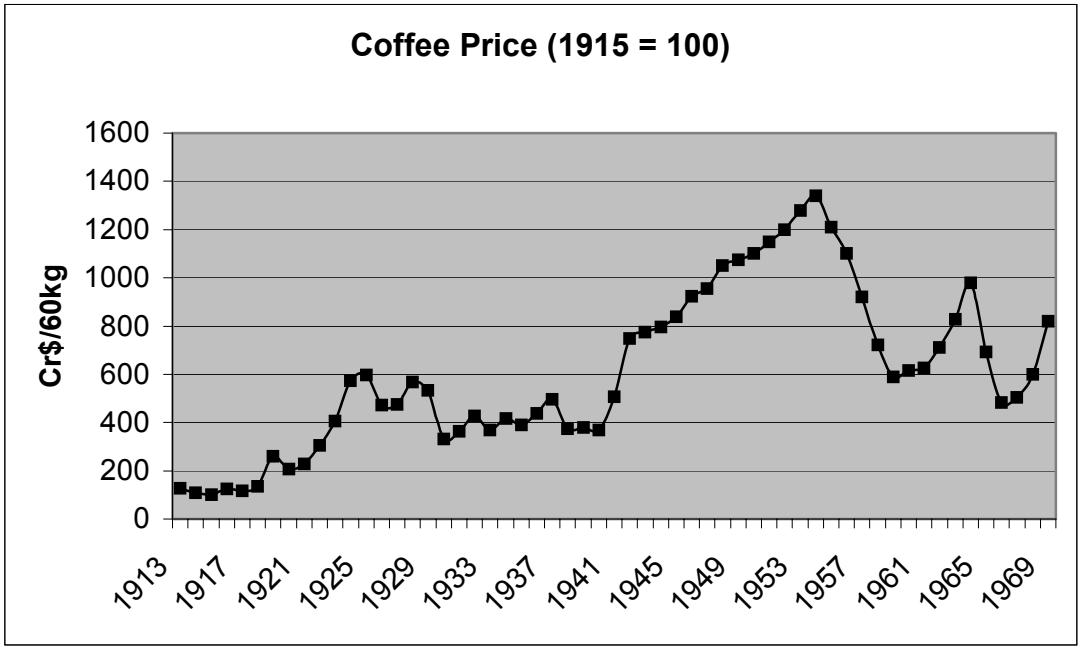
Source: IBGE, Censo Agropecuário, several years.

Graph 4 – Total area of farms in Paraná under each type of land use.



Source: IBGE, Censo Agropecuário, several years.

Graph 5 - Real Coffee Prices, 1913- 1969



Graph 6 – Land Prices in Brazil 1966-1984

Source: Brandão (1988).

Graph 7 – Soy and Coffee Area in Paraná

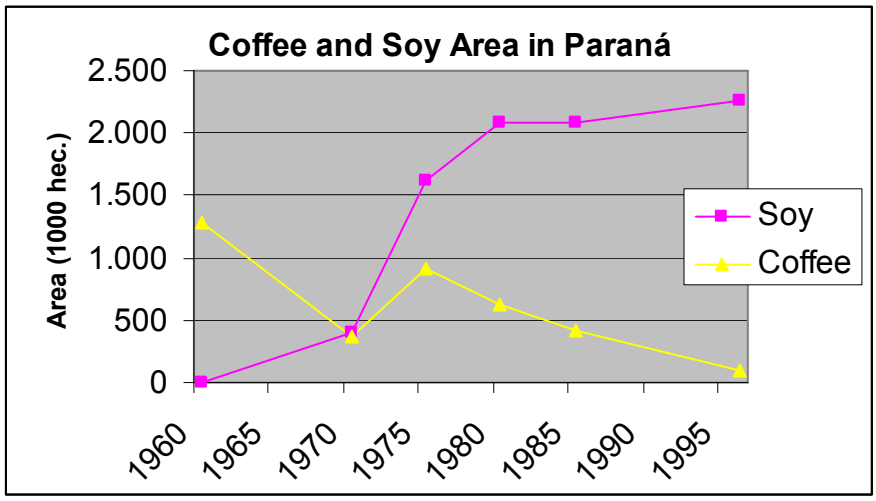


Table 1 – State level data: Growth rates of area under sharecropping and fixed rent

Variable	**Coefficient**	
Constant	-0.20**	-0.38***
	(-2.89)	(-3.05)
Δ Conflicts	-0.34**	-0.31***
	(-2.92)	(-3.07)
Δ Pasture	-0.78**	-0.64**
	(-2.76)	(-2.29)
Δ Useless	-0.20*	-0.21**
	(-1.81)	(-2.20)
Δ Concentration	2.32***	2.00***
	(3.74)	(3.48)
Δ Rice	0.27*	0.23
	(1.89)	(1.62)
Δ Soy	-0.004*	0.002
	(-1.90)	(0.48)
Δ Coffee	0.24**	0.18**
	(2.74)	(2.51)
Δ Corn	0.12**	0.17**
	(2.14)	(2.30)
Δ Cane	-0.07	-0.11*
	(-1.35)	(-1.94)
Δ Investment		-0.69*
		(-1.94)
Center-West	-0.01	-0.17
	(-0.07)	(-1.17)
Southeast	0.62	0.54*
	(1.72)	(1.91)
South	0.39	0.33*
	(1.75)	(1.90)
North	-0.48***	-0.60***
	(-3.90)	(-4.18)
N	26	26
R^2	0.65	0.71

Ordinary Least Squares. *** 1%, ** 5%, * 10%
t-stat in parenthesis
Corrected for heteroskedasticity

Table 2 – Paraná Data: Percentage of agricultural area in sharecropping and fixed rent.

Variable	**Coefficient**	
Constant	0.28***	0.23***
	(11.57)	(9.45)
Conflicts	-0.003*	-0.003*
	(-1.74)	(-1.88)
Pasture	-0.20***	-0.17***
	(-7.87)	(-6.64)
Useless	-0.60***	-0.61***
	(-4.35)	(-3.53)
Rice	-0.002***	-0.002***
	(-6.15)	(-5.81)
Soy	0.0004*	0.0005*
	(1.68)	(2.00)
Coffee	0.0003***	0.0003***
	(2.67)	(-2.39)
Mate	-0.0007***	-0.0006***
	(-6.71)	(-5.59)
Manioc	-0.001***	-0.001***
	(-3.38)	(-3.03)
Beans	-0.001***	-0.001***
	(-3.02)	(-2.43)
Cane	0.001***	-0.001***
	(3.43)	(-2.19)
Investment		-0.003**
		(-2.32)
Tractor	-0.03***	
	(-4.93)	
Southwest	-0.02*	-
	(-1.89)	
N	362	362
R^2	0.51	0.48

Ordinary Least Squares. *** 1%, ** 5%, * 10%
t-stat in parenthesis
Corrected for heteroskedasticity

References

Alston, Lee J. (1981) "Tenure Choice in Southern Agriculture, 1930-1960," Explorations in Economic History, 18 (July): 211-232.

Alston, Lee J., Samar K. Datta and Jeffrey B. Nugent (1984) "Tenancy Choice in a Competitive Framework with Transactions Costs," Journal of Political Economy, 92 (December): 1121-1133.

Alston, Lee J. and Joseph P. Ferrie (1999) Paternalism and the American Welfare State: Economics, Politics, and Institutions in the U.S. South, 1865-1965. New York: Cambridge University Press 1999).

Alston, Lee J. and Joseph P. Ferrie (2003) "Time on the Ladder: Career Mobility in Agriculture, 1890-1938." Working Paper University of Colorado (August).

Alston Lee J. and Robert Higgs (1982) "Contractual Mix in Southern Agriculture Since the Civil War: Facts, Hypotheses and Tests," Journal of Economic History, XLII (June): 327-353.

Alston, Lee J. and Kyle Kauffman (1998) "Up, Down and Off the Agricultural Ladder: New Evidence and Implications of Agricultural Mobility for Blacks in the Postbellum South," Agricultural History 72,: 263-279.

Alston, Lee J. and Kyle Kauffman (1997) "Agricultural Chutes and Ladders: New Estimates of Sharecroppers and Welfare Implication for the Southern Agricultural Labor Market, 1900-1960," Journal of Economic History (June): 464-475.

Alston Lee J., Gary D. Libecap and Bernardo Mueller (2000) "Land Reform Policies, The Sources of Violent Conflict and Implications for Deforestation in the Brazilian Amazon," Journal of Environmental Economics and Management, 39:162-188.

Alston, Lee J., Gary D. Libecap and Bernardo Mueller (1999) Titles, Conflict, and Land Use: The Development of Property Rights and Land Reform on the Brazilian Amazon Frontier. Ann Arbor: University of Michigan Press, 1999.

Alston, Lee J., Gary D. Libecap and Bernardo Mueller(1999) "A Model of Rural Conflict: Violence and Land Reform Policy in Brazil," Environment and Development Economics 4: 135-160.

Alston, Lee J., Gary Libecap and Robert Schneider (1996) "The Determinants and Impact of Property Rights: Census Data and Survey Results for Land Titles on the Brazilian Frontier" Journal of Law, Economics and Organization: 25-61.

Alston, Lee J., Gary Libecap and Robert Schneider (1995) "Property Rights and the Preconditions for Markets: The Case of the Amazon Frontier" Journal of Institutional and Theoretical Economics, Vol., 151, No.1, (March: 89-107.

Brandão, Antônio. (1988). "Mercado da Terra e Estrutura Fundiária," Os Principais Problemas da Agricultura Brasileira: Análise e Sugestões, Rio de Janeiro, IPEA, 139-179.

Cancian, Nadir A. (1981). Cafeicultura Paranaense – 1900/1970, Curitiba, Grafipar.

Companhia Melhoramentos Norte do Paraná. (1975). Colonização e Desenvolvimento do Norte do Paraná**,** Curitiba, Edanee.

Carvalho, Marcia S. (1991). A Pequena Produção de Café no Paraná, São Paulo, Uuniversity of São Paulo, Ph.D Thesis, Dept. of Geography.

Deininger, Klaus (2003). "Land Policy for Pro-Poor Development." Oxford University Press.

de Janvry, Alain, Karen Macours and Elisabeth Sadoulet (2002) Access to Land Via Rental Markets in Latin America: The Puzzle of Atrophy."

França, Ary. (1960). A Marcha do Café e as Frentes Pioneiras. Rio de Janeiro, Conselho Nacional de Geografia.

Furtado, Celso. (1959). Formação Econômica do Brasil. São Paulo, Companhia Editora Nacional.

IBGE. (1985). Censo Econômicos de 1985 – Censo Agropecuário. Rio de Janeiro. Vários números.

IBGE. (1996). Censo Econômicos de 1996 – Censo Agropecuário. Rio de Janeiro. Vários números.

IPARDES. (1978). O Trabalhador Volante no Estado do Paraná – Vol I, Curitiba.

Macours, Karen. (2002). "Insecurity of Property Rights and Matching in the Tenancy Market." Working Paper.

Mueller, Charles. (1983). Das Oligarquias Agrárias ao Predomínio Urbano-Industrial: Um Estudo do Processo de Formação de Políticas Agrícolas no Brasil, Rio de Janeiro, IPEA.

Muller, Nice L. (1956). "Contribuição ao Estudo do Norte do Paraná," Boletim Paulista Geográfico, São Paulo, (22):73.

Nichols, William H. (1971). "A Frontiera Agrícola na História Recente do Brasil: O Estado do Paraná, 1920-65," Revista Paranaense de Desenvolvimento. Curitiba, set-out., 26:19-53.

Paiva, Ruy M., Salomão Schattan and Claus F.T. Freitas. (1976). Setor Agrícola do Brasil: Comportamento Econômico, Problemas e Possibilidades, São Paulo, Editora Forense.

Ribeiro, M.C.M and M.I. Stolf. (1975). "A Moradia do Trabalhador na Fazenda de Café Paulista," in E. Carone (ed.) O Café: Anais do II Congresso de História de São Paulo. São Paulo: 135-156.

Saint, William S. (1980). "Mão-de-Obra Volante na Agricultura Brasileira: Uma Revisão da Bibliografia, " Pesquisa e Planejamento Econômico, IPEA, Vol. 10, Agosto, No. 2:503-526.