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PUBLIC POLICY



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Discussion Paper No. 3800
February 2003

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ABSTRACT

Land and Power*

We study the implications of electoral corruption for resource allocation, factor market equilibrium and inequality. We focus on the control of the voting of agricultural workers by landlords and show that if the employment relationship is subject to moral hazard then the resulting rents conceded by employers give them a comparative advantage in controlling the political activities of their workers. This generates an added incentive to own land and leads to inefficiently high land concentration. We test the predictions of the model by examining in detail the effects of the introduction of the secret ballot in Chile in 1958.

JEL Classification: D72, O12 and Q15

Keywords: employment, inequality, land and productivity

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*We are grateful to Mauricio Benitez-Iturbe and Sebastián Mazzuca for their outstanding research assistance. Our greatest debt is to Jonathan Conning who persevered through at least three previous versions, pointing out all the mistakes and confusions. He enormously improved the paper. We have also benefitted from the suggestions and advice of Arnold Bauer, Michael Carter, Dilip Mookherjee, JeFrieden, Tu Jarvis, François Maniquet, Dina Mesbah, Sripad Motiram, Andrew Newman, Timothy Scully, Bill Summerhill, Werner Troesken, and seminar participants at APSA, Yale, Boston University, Universidad de Los Andes, LSE, and Stanford, particularly Timothy Besley, Alberto Diaz-Cayeros, Jim Fearon, Jeff Nugent, TN Srinivasan and Barry Weingast. Jean-Marie Baland would like to thank the MacArthur network on Inequality and Economic Performance.

Submitted 23 January 2003

1. Introduction

“It is the most cruel mockery to tell a man he may vote for A or B, when you know that he is so much under the influence of A, or the friends of A, that his voting for B would be attended with the destruction of him. It is not he who has the vote, really and substantially, but his landlord, for it is for his benefit and interest that it is exercised in the present system.” David Ricardo ([1824], 1951-1973, p. 506)

That landlords control the political activities of their workers is a pervasive characteristic of agrarian economies.¹ In Britain, before electoral reform in 1867 and the introduction of the secret ballot in 1872, this factor was critical in determining the outcome of rural elections. As observed by Lord Stanley in 1841,

“when any man attempted to estimate the probable result of a county election in England, it was ascertained by calculating the number of the great landed proprietors in the county and weighing the number of occupiers under them.”²

Throughout the nineteenth century radicals and reformers complained about the lack of a secret ballot in Britain. The reformer E.A. Leatham noted in 1870 the “prevalent form of influence which...results...from the mutual relations subsisting between landlord and tenant,” and which “operates as powerfully at an election as though it were backed up by daily acts of oppression,” (quoted in Moore, 1976,

¹As Malefakis (1970, p. 98) summarized the situation in nineteenth century rural Andalucía, “a man’s job depended on his vote.”

²Quoted in Kitson-Clark (1951, p. 112). O’Gorman (1989, p.20) estimates that by 1807 this resulted in the outcomes of 300 parliamentary seats being a foregone conclusion. He describes in detail the system of patronage linking high politicians such as Walpole with members of parliament, typically Whig ‘oligarchs,’ who controlled the local electorate, noting (p. 22) “governments won every single national election in the century before reform [in 1832]..they did so through an intricate, informal web of contacts relationships, and friendships with well disposed private patrons.” Interestingly, the period after this consolidation of control over the electorate saw large increases in land concentration in Britain and mass enclosures of common lands (on this see Plumb, 1967).

p. 410, see also Kinzer, 1982). As Cox (1987, p. 38) puts it “landlords greatly influenced the votes of their tenants, and a similar relationship held between employers and their men, between important customers and the shopkeepers to whom they gave their custom and so on.” Gash concludes (1977, p. 174-175) “wherever in ordinary social and economic relationships there existed authority on the one side and dependence on the other, political influence was always liable to be exercised.”

In Germany, despite the fact that a democratic parliament was introduced in 1848 there is a mass of evidence that rural voters were controlled by landed interests. Interestingly, Bismarck even supported an extension of voting rights in 1871 because he thought that the control exercised by landlords over rural voters would offset the rising influence of urban workers (see Gosnell 1930). Bendix’s analysis suggests that this mechanism was widespread, noting (1964, p. 97) “Liberals..feared the possibilities of electoral manipulation inherent in the extension of suffrage to the economically dependent. Conservatives, once they recognized the importance of the vote as a basis for local power, tended to favor the enfranchisement of the ‘lower orders’” (see Hamerow 1974, p. 299-300 for further evidence).

Landlords control over rural elections was greatly facilitated where balloting was open (see Goldstein, 1983, p. 15). However, even when there was a supposedly secret ballot (and not open voting), strategies were found to keep voting under control. Thus, in the German case, political parties often printed their own ballots: “given that ballots had to be obtained from the candidates themselves or from their agents, it was often physically impossible for a poor man to vote for anyone but the squire’s choice.” (Anderson, 1993, p. 1467)³ Even countries, such as France which moved early to universal male suffrage (after 1848) and free elections (after 1871) only introduced an effective secret ballot in 1913. Before this “the ballots frequently had subtle but distinct marks, such as paper thickness, colour and size, from which the election officials could deduce a voter’s decision. This information

³For further evidence on the German case see Blackbourn (1988) and the section on Germany in Gibson and Blinkhorn (1991).

was then passed on to notables who could easily punish such wayward voters since they frequently were his tenants or employees,” (Kreuzer 1996, p. 108).

Similar tactics were used and remain up to the present day in democratic third world countries.⁴ Perhaps nowhere is the evidence about landlord control of elections so conclusive as in Latin America. Following independence most Latin American countries adopted liberal constitutions committing themselves to regular elections, yet, with few exceptions, for example Costa Rica after 1948, Latin American societies did not become consolidated democracy with free regular elections contested by all adults until the 1980’s.⁵ In Chile an effective secret ballot was introduced only in 1958, and before that there was well documented control of the votes of rural dependent workers (*inquilinos*) by landowners. This electoral corruption again worked because the parties issued their own ballot papers which were different colors.⁶ This issue was very frankly discussed in the congressional debate leading up to the introduction of the secret ballot in language strikingly similar to that used by Lord Stanley quoted above. For example, Socialist senator Martones argued in favor of introducing the secret ballot because,

“if that law [the old electoral law without a secret ballot] did not exist, instead of there being 9 Socialist senators there would be 18, and you [the Conservatives] would be reduced to 2 or 3...[laughter]..you laugh, but the truth is that there would be not 2 Conservative senators from O’Higgins and Colchagua, which corresponds exactly to the number of

⁴For evidence from India see Kohli (1990), who notes that in the state of Bihar big landlords (p227-228) “hold near-absolute economic, social and political power in their respective areas. In Belchhi it was Mahavir Mahato, in Gopalpur it was Birendra Singh; the landlords of Dharampura and Chhaundadano were led by mahanths who were the biggest landlords of their respective areas. In each case the big landlord concerned is basically the “raja” of his area...to the social, economic and military power of the raja, “democracy” had added political power.” This evidence is also supported by that from Gujarat in Breman (1974).

⁵See Engerman, Mariscal and Sokoloff (1998). For Brazil see Pang (1973), Graham (1990) and Martins (1996). In Colombia, the Australian secret ballot was introduced only in 1988, before which the parties themselves distributed the ballot papers making it obvious who a person was voting for (Hartlyn and Valenzuela, 1998).

⁶On this see Loveman (2001, pp. 222-3).

inquilinos in the fundos which belong to the Conservative hacendados in that region. Conservatives would have only one or perhaps none.”⁷

While a large literature in the social sciences has considered the implications of different types of political regime for different economic and social outcomes, it has typically focused on simple dichotomies between ‘democracy’ and ‘dictatorship.’ This is true of both the empirical (e.g., Przeworski et al., 2000) and the theoretical (Acemoglu and Robinson, 2001) literature. Though attempts have been made to distinguish between different shades of democracy,⁸ to our knowledge no scholars have considered the idea that electoral corruption, despite the significance of its incidence, may have important and systematic effects on social and economic outcomes.

In this paper, we study the implications of such corruption for economic efficiency, factor market equilibrium and inequality. We argue that employment and political control are deeply connected, particularly in agrarian economies. Many employment relationships concede rents to workers. For example, when worker effort is crucial for production, but only imperfectly observed, landlords may have to concede rents to induce effort. We show how these rents allow landlords to influence other activities of workers, particularly their political behavior. We show that even if political behavior (such as voting) is contractible, the fact that landlords already concede rents to workers for some other reason gives them a comparative advantage in the control of their political activities. We thus demonstrate that employment does not simply generate income, it also gives *power* to control the behavior of others.

We then study the implications of this phenomenon for the functioning of the land market. The desire to attain power over others and the benefits it brings may significantly influence the way the land market functions because of the

⁷A “fundo” is a large farm and a “hacendado” a large landowner. Quoted in *El Mercurio*, Saturday May 19, 1958, p. 20.

⁸For example recent theoretical work (Cox, 1997, Persson and Tabellini, 2000) has investigated the impact of different electoral institutions on political and economic outcomes. Persson and Tabellini (2003) have also examined the cross-country relationship between such institutional differences and various government policy outcomes.

complementarity between labor and land in production. We focus on the control by landlords of their workers' voting behavior when there is no secret ballot.⁹ This control can be used by landlords to generate political benefits, since they can then exchange the votes they control for political favors and rents from political parties. We develop a simple probabilistic voting model where two political parties, 'left' and 'right,' compete in an election by buying votes from rural agents.¹⁰ We focus on equilibria where the right-wing party values votes more than the left-wing party and ends up purchasing all the votes controlled by the landlords. This induces landlords to hire workers and consequently buy more land, even if this is economically inefficient.

The model has several important empirical predictions with respect to the impact of political reform on land prices and concentration and voting patterns. If political reform occurs which stops electoral corruption and the selling of votes then the incentive to employ people to control their voting vanishes, and employment and land concentration should fall. Moreover, since the demand for land falls, so should its equilibrium price. Finally, we should observe large changes in voting behavior since workers whose votes were previously sold can now vote freely.

We examine these implications by considering the electoral reforms which took place in 1958 in Chile. Many scholars have claimed that, before the reforms, there

⁹Though we model political control in terms of voting, the analysis extends to other types of political activities (such as types of protests, riots, demonstrations and other forms of collective action). Such a model would have similar results to the one we present.

¹⁰Why does electoral corruption seem to be more significant in rural as opposed to urban areas? Our model suggests three factors which indicate that urban votes may be more expensive to buy and hence political corruption relatively less attractive in urban settings. First, as suggested by Marglin (1973) it may be the case that rents are lower in factories and urban environments. This means that, to induce effort, employers need to pay only a small wage premium. In this case it is more likely that the wage rate will have to be increased to control voting behavior, thus raising the equilibrium price for votes. Second, it may be harder to monitor voting and political activities in anonymous urban environments. This again leads to an increased wage premium and makes votes more expensive to buy. Third, workers in the cities may enjoy superior alternative employment opportunities, which reduce the scope for political control by their employers.

was widespread electoral corruption and control of voting behavior in the countryside which were ended by the successful introduction of the secret ballot in 1958. We therefore collected data on land concentration, land prices, the employment of *inquilinos* and voting outcomes before and after the reform to see if the implications of our model were consistent with what happened.

We show in section 5 that the empirical predictions of our model are highly consistent with the data. We first demonstrate that before 1958 there exists a close association between land concentration, the employment of *inquilinos* and right-wing support, particularly in those provinces of Chile where control of voting was endemic. These were the traditional ‘oligarchic’ provinces of Aconcagua, Colchagua and O’Higgins. Moreover we also show that, following the 1958 electoral reform, land concentration, the number of *inquilinos* and support for right-wing parties fell dramatically in exactly the same provinces. Finally we show that land prices also fell after 1958 in a way consistent with our theory since this fall was larger in the oligarchic provinces. We also present a variety of other pieces of evidence which support our interpretation.

Our work is related to a large literature on the efficiency of rural resource allocation and property rights. Seminal papers on how imperfect capital markets generate inefficient structures of ownership are Banerjee and Newman (1993), Legros and Newman (1996), Mookherjee (1997) and Banerjee, Gertler and Ghatak (2002). Our model suggests another avenue to explain the persistence of land concentration in agrarian economies. Although our model emphasizes the political attractiveness of certain types of labor contracts, there are clearly economic reasons why these contracts could be offered, see for example, Sadoulet (1992).

To our knowledge, nobody has developed a model of vote buying as an electoral strategy or studied its implications for resource allocation. Scholars in political economy such as Snyder (1991) and Grossman and Helpman (1996) have looked at interest groups buying politicians with ‘campaign contributions’ but this work focuses on very different issues than those we study. An important distinction is that these scholars, and most others in the political economy literature focus on the efficiency of government policy. We focus on the way in which the presence of

political corruption affects the way the economy is itself organized. Most closely related to our research, Summerhill (1995) developed a simple model of the idea that political rents accrue to landowners and tried to estimate the impact of electoral reform on the economy using data from nineteenth century Brazil.

The paper proceeds as follows. In the next section we develop the fundamentals of our model of the political economy of voter control and land ownership. In section 3 we show how moral hazard gives landowners a comparative advantage in the control of political activities. In section 4 we embed this into the full political model and show how this power increases the desire to hold land and can lead to inefficient land concentration in equilibrium. We derive important comparative static implications of political reform. In section 5 we study the Chilean case and section 6 concludes. The appendix contains the raw provincial data from Chile which we have used to construct much of the evidence presented in section 6 and a map which is useful in locating particularly important provinces.

2. The Fundamentals of the Model

There are two sectors, rural and urban with the rural sector consisting of $1 - \mu$ agents. A proportion μ of the population lives in the urban areas, and, to keep the discussion simple, we assume that there is no economic activity in the cities. There are also two political parties, ‘Left’ (denoted L) and ‘Right’ (denoted R) competing for votes to win an election.

All rural agents have the option to be self-employed and earn an income of \underline{w} . A proportion n of rural agents have access to the capital market and can therefore purchase land and hire workers. We let m denote the proportion of rural agents who become agricultural workers, and $1 - m - n$ who remain self-employed. We capture the supply of land with the function ω with $\omega(0) = 0$, and $\omega' > 0$. Letting π be the price of a plot of land, $\omega(\pi)$ is the total amount of land supplied at price π .

There is a single numeraire consumption good which is produced from land and labor. The technology is fixed coefficients in the sense that one plot and

one worker must be matched together to produce agricultural output (having two peasants on a plot does not increase output and one peasant cannot farm two plots simultaneously). On each plot of land, a worker produces an output equal to $\tilde{\theta}$, where $\tilde{\theta}$ is a plot-specific stochastic shock to output which is distributed independently across plots and can take two values, θ^h and θ^l . The probability that θ^h occurs depends on the effort exerted by a worker.¹¹ Effort, ε , takes two values, $\varepsilon \in \{0, e\}$. If $\varepsilon = e$, θ^h occurs with probability γ^h , while if $\varepsilon = 0$, θ^h occurs with probability $\gamma^l < \gamma^h$. We capture the possibility of diminishing returns to farm size in a very simple manner by introducing supervision costs.¹² These are captured by the function c , where $c(z)$ are the total supervision costs incurred on a farm of size z . We assume that $c(1) = 0$ and $c' > 0$ and $c'' > 0$. While these specific assumptions about the nature of the technology are not necessary for our results, they ease the presentation considerably.

While output is perfectly observable by the landlord, the level of effort exerted by the worker is not. This induces a moral hazard problem. We assume that effort can never be observed so that the only possible wage contract depends on the realization of $\tilde{\theta}$.

All agents in the rural sector have utility functions which are linear in consumption, x , effort, ε , and voting decision σ^j for $j = L, R$ which depends on the ideological orientation of the agent. Thus, $U(x, \varepsilon, \sigma^j) = x - \varepsilon + \sigma^j$ is the utility of an agent of type j if they vote for the party they prefer, otherwise it is $U(x, \varepsilon, \sigma^j) = x - \varepsilon$.¹³

The political parties have utility functions,

$$U_j = \varphi_j W^j - M_j, \quad j = R, L$$

where φ_j stands for the probability that party j wins the election, and W^j , the

¹¹We use a variant of a model which has become standard in the development literature, see for example section 3 of Bardhan et al. (1998) and Banerjee, Gertler and Ghatak (2002)

¹²Many researchers have attempted to explain the robust empirical finding that farm size and productivity are inversely related (for example Berry and Cline, 1979, Binswanger, Deininger and Feder, 1995, and Basu, 1990).

¹³Alternatively, one may think of σ_j as the marginal impact of one's vote on the probability that his own preferred party wins the election, times the utility he derives from this.

gain in utility for party j if it wins the election. M_j represents the amount of rents (income) transferred by party j to other agents in the economy so that neither party is liquidity constrained. The price that a party offers for the vote of an agent will in general depend on the occupation of the agent: let p_ℓ^j be the price paid by party j to a landlord, p_w^j be the price paid by party j for the vote of a worker, and p_s^j be the price paid for the vote of a self-employed agent.¹⁴

In the urban sector the ideological make-up of the electorate is stochastic. In particular,¹⁵ we assume that there is a random proportion $\tilde{\alpha}$ of right-wing voters and, correspondingly, a proportion $(1 - \tilde{\alpha})$ of left-wing voters in the cities, where $\tilde{\alpha}$ is uniformly distributed over $[0, 1]$. In the rural sector, we simplify by assuming that ideology is deterministic with all landlords being right-wing and all workers and the self-employed being left-wing. We assume that $\mu > \frac{1}{2}$, which implies that to win an election, any political party must attract some support from the urban sector. With μ urban voters and $1 - \mu$ rural voters in the population, the probability that the right party wins a majority at the election, given that it received a proportion v of the votes in the countryside, can be written as:

$$\begin{aligned} \varphi_R &= \Pr\left(v(1 - \mu) + \tilde{\alpha}\mu > \frac{1}{2}\right) = \\ \int_{\frac{1}{2\mu} - \frac{(1-\mu)v}{\mu}}^1 g(\alpha) d\alpha &= 1 - \frac{1}{2\mu} + \frac{(1 - \mu)v}{\mu}. \end{aligned}$$

The probability that the left party wins, is thus equal to:

$$\varphi_L = \frac{1}{2\mu} - \frac{(1 - \mu)v}{\mu}.$$

From these expressions, one can immediately see that the impact of one rural vote in party j 's favor on party j 's chances of winning the election is equal to $\frac{1-\mu}{\mu}$.

¹⁴Though we focus our analysis on situations where political parties directly purchase votes (a very common political phenomenon, historically in Europe and in contemporary Latin America, Asia and Africa), the model is consistent with other interpretations. For example, instead of buying votes, parties may offer policies which favor landlords, or give landlords elected positions.

¹⁵A more general formulation, allowing randomness in voters' behaviour, which allows preferences to depend on political platforms can be found in Persson and Tabellini (2000).

From this we can deduce that the maximal price that party j would be prepared to pay for a vote is $\left(\frac{1-\mu}{\mu}\right) W^j$.

We now describe the timing of the game.

- The political ‘market for votes’ opens, with parties non-cooperatively announcing a price at which they will purchase votes from each type of rural agent.
- The land market opens with each landlord deciding how much land to buy.
- Landowners then hire workers by proposing a contract which depends on the state of nature and, possibly, the worker’s voting behavior.
- Agents then sell votes to the political parties.
- Workers choose their effort level and nature chooses the political types of urban agents.
- Voting and production take place.
- Landlords and the political parties then observe voting behavior and the state of nature. Rents are distributed by the political parties, wages are paid and consumption takes place.

We solve for the subgame perfect equilibrium of this game.

3. Employment and Power

We start by describing the optimal labor-voting contract. As is standard, we endow the landlord with all the bargaining power with respect to workers and he can therefore make take-it-or-leave-it contract offers to his worker(s) specifying his expected voting behavior and effort level. As there are two dimensions to the worker’s behavior, there are four possible wages, corresponding to whether output is high or low, and whether the worker is observed voting for the specified

party or not. However, to ensure maximal incentives, a landlord will optimally propose only two wages: a high wage, w^h , if output is high and the worker is not observed voting for the wrong party, and a low wage, w^l , otherwise. The state dependent wage rates proposed, w^h and w^l , must be sufficiently different that the worker has the incentive to simultaneously exert the desired level of effort and vote appropriately.

We focus here on the situation under which a worker is required by his landlord to vote for the right-wing party. (The conditions under which a worker is required to vote for the left-wing party are less stringent, and are therefore omitted here.) Given his voting behavior, the worker will exert the optimal amount of effort if the following incentive compatibility condition is satisfied:

$$\gamma^h w^h + (1 - \gamma^h) w^l - e \geq \gamma^l w^h + (1 - \gamma^l) w^l \quad (1)$$

(1) has a standard interpretation. The left side is the expected utility of exerting effort given the probability of the high wage, γ^h , induced by exerting effort. The right side is the expected utility when $\varepsilon = 0$.

A worker must also be induced to vote the way the landlord wants him to. In particular, the worker should not find it optimal to shirk on votes and effort simultaneously, which implies,

$$\gamma^h w^h + (1 - \gamma^h) w^l - e \geq w^l + \max\{p_s^R, \sigma^L + p_s^L\} \quad (2)$$

where the right side of the inequality takes into account that the worker now votes for the political party he chooses. Even though a self-employed person has an ideological preference for voting for the left-wing party, he may prefer to sell his vote to the right-wing party if it offers him a price for his vote which is sufficiently greater than the price offered by the left-wing party. In this case he gets a utility benefit of $\max\{p_s^R, \sigma^L + p_s^L\}$, but is penalized with the low wage w^l . Notice that it can never be optimal for a worker to exert effort and deviate from the voting behavior stipulated in the contract - since voting is observed, if the worker is going to vote as he wishes it is surely optimal to shirk as well since the worker will receive the low wage.

We assume that a worker's liability is limited, so that $w^l \geq 0$. In an optimal contract the landlord offers $w^l = 0$. Consider a situation in which the optimal wage is chosen so that condition (1) is satisfied with equality, that is

$$w^h = \frac{e}{\gamma^h - \gamma^l} \quad (3)$$

Note that, $\frac{e}{\gamma^h - \gamma^l} - \underline{w}$ is the rent which must be conceded to the worker to induce effort and results from the unobservability of effort. We now assume that it is always profitable for the landlord to pay this efficiency wage contract, $(w^h, 0)$. We therefore assume that the expected increase in profit from workers exerting effort must be greater than the expected increase in the wage bill, this implies that the following inequality holds $(\gamma^h - \gamma^l)(\theta^h - \theta^l) \geq \frac{\gamma^h e}{\gamma^h - \gamma^l} - \underline{w}$.

Finally, we also require that the wages offered in the contract satisfy a participation constraint, that is:

$$\gamma^h w^h + (1 - \gamma^h) w^l - e \geq \underline{w} + \max\{p_s^R, \sigma^L + p_s^L\}. \quad (4)$$

The left side of (4) is the expected utility from exerting effort and voting against ones preference. For a contract to be acceptable, this must be at least as great as the expected utility from not having a contract which is the outside wage \underline{w} plus the expected utility from voting as one wishes $\max\{p_s^R, \sigma^L + p_s^L\}$. Note that, in this case, if the participation constraint (4) is satisfied, then (2) is also satisfied.

We assume that even at the maximum prices political parties are prepared to offer, the agent prefers working for the landlord than being self-employed and voting freely. We therefore assume:

Assumption 1: $\frac{\gamma^l e}{\gamma^h - \gamma^l} - \underline{w} \geq \max\left\{\left(\frac{1-\mu}{\mu}\right) W^L + \sigma^L, \left(\frac{1-\mu}{\mu}\right) W^R\right\}$.

Hence the following proposition.

Proposition 3.1. *If Assumption 1 holds then the participation constraint is satisfied, and it is costless for the landlord to control the political behavior of his workers.*

Intuitively, the simple fact that the labor market is plagued by moral hazard problems implies that the landlord must concede rents to his workers. This occurs even though he is in a position to make take-it or leave-it offers to the latter. However, the threat to the worker of losing those rents reduces the amount the landlord must give them to compensate for voting against their will.¹⁶

More specifically, under Assumption 1, and given the specification of the contract, a landlord pays w^h if θ^h is observed and the worker is not found cheating with respect to voting. Otherwise, the landlord pays 0. By construction such behavior induces workers to exert effort and vote as specified by the landlord in the relevant range of prices that can be offered by the parties for the votes. In the following, we let denote $\bar{\theta}$ the expected productivity of a plot of land if a worker provides effort level e , and use \bar{w} to denote the expected wage paid to a worker who does not shirk: $\bar{\theta} = \gamma^h \theta^h + (1 - \gamma^h) \theta^l$, and $\bar{w} = \gamma^h w^h$.

To keep the discussion simple, in the following we assume that Assumption 1 is always satisfied. Note that, even if Assumption 1 is not satisfied, the main results of the paper go through. Indeed, as long as the effort premium is positive, the increase in wage rate necessary to elicit the appropriate voting behavior is lower than the utility of being able to vote freely and sell one's vote, and landlords still enjoy a comparative advantage in controlling their workers' votes. When Assumption 1 does not hold and the wage is increased above w^h to induce the worker to vote as specified as well as to exert effort, the model has additional empirical implications.

4. Electoral Corruption and Resource Allocation

The political parties engage in Bertrand competition. There are several different cases that one can consider, depending on the relative valuations of the political parties for votes. To keep the discussion focused we assume that the right-wing

¹⁶The surplus thus given to the workers also yields a comparative advantage to the employer in other spheres, such as the credit market. This argument has been used in part of the literature on interlinked contracts.

party values winning more than the left-wing party. This will have the implication that the right-wing party will be prepared to pay more for votes than the left-wing party. Hence:

Assumption 2: $\frac{1-\mu}{\mu}W^R > \frac{1-\mu}{\mu}W^L$.

We first consider the situation in which the right-wing party will always wish to outbid the left-wing party for votes. This implies that $\frac{1-\mu}{\mu}W^R \geq \frac{1-\mu}{\mu}W^L + \sigma^L$ and the following prices are offered by the parties in equilibrium,

$$\text{Party } R \text{ offers } \begin{cases} p_\ell^R = \left(\frac{1-\mu}{\mu}\right)W^L - \sigma^R \\ p_w^R = \left(\frac{1-\mu}{\mu}\right)W^L \\ p_s^R = \left(\frac{1-\mu}{\mu}\right)W^L + \sigma^L \end{cases}$$

and,

$$\text{Party } L \text{ offers } p_\ell^L = p_w^L = p_s^L = \left(\frac{1-\mu}{\mu}\right)W^L$$

In this case, for any price that the left-wing party proposes for votes, the right-wing party is always willing to outbid that offer for the three categories of rural agents. As a result, in equilibrium, the left-wing party announces the maximal price it is ready to pay for one vote, $\frac{1-\mu}{\mu}W^L$. Given this price, landlords will be willing to sell their own votes to the right-wing party provided they can achieve the same utility level that they could by selling their votes to the left-wing party. This implies that the right-wing party must offer them a price at least equal to $p_\ell^R = \left(\frac{1-\mu}{\mu}\right)W^L - \sigma^R$. Landlords will also sell the votes of their workers if they are given the same price that is offered by the left-wing party, which is then the price the right-wing party announces. Lastly, for the self-employed agents, the right-wing party must compensate them for not voting for their own preferred party, which implies that he has to pay a price $p_s^R = \left(\frac{1-\mu}{\mu}\right)W^L + \sigma^L$ to those agents.

Given these prices, all rural agents sell their votes to the right-wing party, with right-wing landlords stipulating that their left-wing workers vote right-wing in their employment voting contracts.

In the case where $\frac{1-\mu}{\mu}W^L + \sigma^L \geq \frac{1-\mu}{\mu}W^R > \frac{1-\mu}{\mu}W^L$, then

$$\text{Party } R \text{ offers } \begin{cases} p_\ell^R = \left(\frac{1-\mu}{\mu}\right)W^L - \sigma^R, \\ p_w^R = \left(\frac{1-\mu}{\mu}\right)W^L, \\ p_s^R = \left(\frac{1-\mu}{\mu}\right)W^R, \end{cases}$$

and,

$$\text{Party } L \text{ offers } \begin{cases} p_\ell^L = \left(\frac{1-\mu}{\mu}\right)W^L, \\ p_w^L = \left(\frac{1-\mu}{\mu}\right)W^L, \\ p_s^L = \left(\frac{1-\mu}{\mu}\right)W^R - \sigma^L. \end{cases}$$

In this case, it is no longer optimal for the right-wing party to outbid the left-wing party for the votes of the self-employed agents. Now, rather than buying the votes of all rural agents, the right-wing party buys the votes of the landlords and their workers, but the self-employed sell their votes to the left-wing party. Here, moving from being self-employed to becoming a worker leads to a switch in voting behavior.

Under either scenario we have the following result.

Proposition 4.1. *Under Assumption 2 it is cheaper for the right-wing party to buy votes from a landlord than to buy votes directly from the self-employed.*

This result follows immediately from the fact that in equilibrium $p_w^R < p_s^R$. This proposition has the implication that it will never be profitable for a rural agent to become a political entrepreneur, buying votes from individuals and then selling them to parties.

If a landlord creates a farm of size z , the value of the last parcel he acquires, including the political rents, is equal to

$$\bar{\theta} - \bar{w} + p_w^R - c'(z). \quad (5)$$

This expression is the expected output, minus the expected wage bill, plus the income from selling the vote of the worker employed on this plot, minus the

marginal supervision cost. If the price of land is π , a landlord would wish to hire $z(\pi)$ units of land and labor such that:

$$\bar{\theta} - \bar{w} + p_w^R - c'(z(\pi)) = \pi. \quad (6)$$

The total demand for land, denoted L^D is thus equal to $n \cdot z(\pi)$. Since the supply, L^S is equal to $\omega(\pi)$, market clearing implies that $n \cdot z(\pi) = \omega(\pi)$.

Equation (6) implies the following result.

Proposition 4.2. *In equilibrium the price of land incorporates political rents.*

The main argument developed in the paper is that, thanks to the rents they concede to their workers, it is less costly for landowners to control the political behavior of workers than it is for the political parties. As a result, parties are ready to transfers rents to landowners in exchange for the votes they control. Acquiring land is thus desirable not only for productive purposes, but also for the political rents attached to the political control of the workforce employed on it. Equilibrium prices on the land market reflect this mechanism.

At the margin, landlords are making economic losses, yet they are still prepared to hire workers and buy land because of the political benefits. Hence, farms are inefficiently large. This inefficiency comes from the interaction of two market failures in the model - moral hazard and imperfect capital markets. Because capital markets are imperfect, only some agents can become landowners. If all agents had access to capital markets then there would be no land concentration and all land would be farmed by smallholders with no workers getting rents. To see this note that the price a self-employed agent is willing to pay for a plot of land, denoted π_s , is equal to $\bar{\theta} - \underline{w} - e$. The price that a landlord would be willing to pay, π_ℓ is as above, $\bar{\theta} - \bar{w} + p_w^R - c'(z)$. We now show that $\pi_s > \pi_\ell$. Observe first that the participation constraint (3) implies, $\bar{w} - e \geq \underline{w} + p_s^R$. Moreover, by Proposition 4.1, in equilibrium $p_s^R \geq p_w^R$. Therefore,

$$\bar{\theta} + \bar{w} - e \geq \bar{\theta} + \underline{w} + p_w^R,$$

which can be re-written as,

$$\pi_s \equiv \bar{\theta} - \underline{w} - e \geq \bar{\theta} - \bar{w} + p_w^R \equiv \pi_\ell + c'(z).$$

Then, since $c'(z) > 0$ for $z > 1$ it follows that $\pi_s > \pi_\ell$. The fact that, with perfect capital markets, smallholders are always willing to outbid landowners for land follows from two things, the landlords incur supervision costs, and the participation constraint implies that the economic rents that landlords transfer to workers exceed the political rents they receive from parties. Therefore, even though it is still true that the ability of landlords to sell votes increases their demand for land, land is still more valuable to smallholders.

The interaction of the market failures is crucial. Without moral hazard there are no rents and even with imperfect capital markets electoral corruption would not create any incentives to concentrate land. At the same time, with moral hazard but no capital market imperfections there is no inefficiency either.

It follows from Proposition 4.2 that a political reform which removes electoral corruption, such as the introduction of an effective secret ballot, removes the ability of landlords to sell the votes of their workers and has interesting comparative static effects. We summarize these in the following proposition.

Proposition 4.3. *The introduction of a secret ballot leads to a fall in the price of land, reduces land concentration and the vote share of the right-wing party.*

To see these results, note that political reforms remove the price of votes from the left side of (6). Writing (6) as, $\bar{\theta} - \bar{w} + p_w^R = c'(z) + \omega^{-1}(n \cdot z)$, since the right side is increasing in z if the left side falls then the equilibrium farm size must fall too. Then from the market clearing condition $n \cdot z = \omega(\pi)$, it follows that a fall in z leads to a fall in π .

We are now in a position to discuss some of the assumptions made in the paper. First, note that when Assumption 1 does not hold, the optimal labor-vote contract involves a wage higher than w^h . Although w^h gives a worker sufficient rents that they do not wish to shirk, it does not give them enough to also control

their voting behavior. To achieve this the landlord must raise the wage further. Thus in this situation, political reforms which stop vote buying will lead the wage rate to fall to w^h .

It is also important to note that our technological assumption of fixed coefficients merely simplifies the development of the argument. The results hold with more general technologies as long as there is complementarity between land and labor. In this case, as landowners hire other agents in order to sell their votes, they simultaneously drive up the marginal product of any land they hold, and this force leads to land concentration. Interesting comparative static results flow from the extent of supervision costs (or equivalently, diminishing returns to farm size). For example, the greater the extent of diminishing returns (the higher is c') the less likely is land concentration and vote buying. Therefore, one would expect to see more land concentration and political corruption when farms grow crops such as sugarcane where it is thought that diseconomies of scale are largely absent. On the other hand, in crops such as coffee, where small farms are thought to be much more efficient, concentration and political corruption are less likely to prevail. Notice that in the case where $c(z) = 0$ so that there are no economic profits, still landlords want to concentrate land to capture political rents. As it is cheaper to control votes through the employment relationship than to become a political entrepreneur, the political rent necessary to induce a landlord to hire a worker is lower, so that, in equilibrium, parties will buy votes only from the landlords, at a low price.

Lastly, the absence of an ideological bias doesn't change the main prediction of the model as stated in Propositions 4.2 and 4.3. However, in equilibrium the price paid by the right-wing party for the vote of any rural agent is identical and therefore it is no longer true that it is strictly cheaper to buy votes through landlords.

5. A Study of Land and Power: Chile

5.1. Political Reforms and Democracy in Chile

Like most Latin American countries, upon gaining independence from Spain, Chile adopted republican institutions. These became institutionalized in the 19th century and elections determined presidential succession without military or other intervention. Nevertheless, like all other nascent democracies in the nineteenth century, the franchise was restricted by wealth and literacy restrictions. Moreover, voting was not secret. Gradually however, political reform took place as the political system attempted to adjust to socio-economic changes unleashed by the evolution of the state and the economy, for example the rise of the mining and agricultural export economies.

A significant watershed in this process were the electoral reforms of 1874. The standard interpretation of these by scholars is an attempt by traditional elites to control the growing autonomous power of the state and urban groups. The leading expert on the history of Chilean democracy, J. Samuel Valenzuela (1996), argues that the 1874 suffrage extension in Chile was opposed by more progressive Chileans who “resisted attempts to expand suffrage...they fully realized that in a predominantly rural society with traditional landlord-peasant ties, the Conservatives would overwhelm their opponents at the polls.” Bauer (1995, p. 30) presents a similar analysis of these events “... the aristocratic fronde, dominated by the great landowners...(in 1874) helped push through a Law of Electoral Reform that permitted universal literate male suffrage...Chilean landowners supported the reform not because of an enlightened faith in the civic qualities of the lower classes but as a measured way of counteracting the executive’s disconcerting autonomy in a democratic political system they supported in principle, used when possible, and tenaciously endeavored to restrict and control.” Table 1 below shows Valenzuela’s data of the electorate in the province of Rancagua in 1872 and 1878 (taken from Bauer, 1995, p. 31, referring to J. Samuel Valenzuela, 1985, p. 119). Rancagua is particularly interesting because it is a municipality in O’Higgins, one of the Central Valley provinces surrounding Santiago which were the heart of the traditional landed elites (see Appendix Map 1, the other important provinces here are Aconcagua and Colchagua). Table 1 shows that the main effect of the 1874 law was to enormously increase the number of enfranchised *inquilinos* who were

employed on the large agricultural estates.

INSERT TABLE 1 HERE

The controlled democracy which had formed in the nineteenth century collapsed in 1924 and the following period saw five military coups before democracy was fully restored in 1932. The intervening period was dominated by Colonel Carlos Ibáñez. After 1932 democratic stability was based on an explicit compromise between the growing power of urban groups and the power of the traditional landed elites. As Arturo Valenzuela (1978, p. 26) puts it “underlying this state of affairs was a tacit agreement between rural and urban elites. Rural elites were willing to endure the hardship of price controls on agricultural goods imposed by an industrially orientated middle class which relied...on support from parties of the left with similar interests. In tern, centrist and leftist parties did not alter the basic political and social structure of the landed elite.”¹⁷

Part of the political pact which developed after the 1930’s involved the banning of agricultural unions, a policy which allowed severe labor repression to be carried on in the countryside. For example, in Bauer (1995, p. 32) landowners are described as “pressuring the state to keep political ‘agitators’ and union organizers out of the countryside”. Dismissal of unionized or protesting workers was frequent, and often backed by the police. Landowners not only systematically dismissed workers participating in ‘subversive’ activities, they also “used violence against the workers, and destruction of crops and homes; blacklisting to prevent future employment was routine....Despite their own retaliatory measures, landowners frantically insisted on rigorous governmental action to repress the legal unionization of campesinos.” (Loveman, 1976, p. 164). “According to a former minister of interior in the 1940s, Arturo Olavarria: ‘...a group of carabinieri would arrive at a fundo accompanied by a convoy of trucks. When the *inquilinos*

¹⁷There is an interesting analogy between the structure of these institutions which helped to sustain Chilean democracy before 1973 and Weingast’s (1998) analysis of how the Missouri compromise kept the Union together from 1821 to the start of the Civil War in 1860. The Chilean pact is discussed in more detail in Scully (1992, p. 108-109) who notes “relative social and political stability in the 1930’s and 1940’s was predicted on the exclusion of the peasantry,” and Collier and Collier (1991, p. 565-73).

were assembled in the area, the carabinero officer would order those who wished to continue the strike to stand on his left. The officer would then order that the strikers gather their families, cats, dogs, chickens and belongings and get in the trucks to be evicted. ... This tactic I converted into a system....as the good ones went on the right and the bad ones on the left, as I hoped will occur one day in the valley of Josafat.” (as quoted in Loveman, 1976, p. 163).

5.2. Mechanisms of Control of Rural Votes

In line with our model, the control of rural votes by landlords was made possible by the relatively good working conditions of the *inquilinos* compared to the possible alternatives: “landowners over and over expressed the need to root their workers to the estate through the offer of land and perquisites....any tenant family seeking an independent rural existence faced bleak possibilities” (Bauer, 1995, p. 27). Moreover, “rural people sought positions as *inquilinos* on the estate rather than casting their lot with the desperate and insecure wage earners beyond the gates. They were free....but they had no defence in the face of expulsion; indeed, the threat of being cast out into the subproletariat of migratory workers was the most powerful weapon at the landowner’s disposal. Most *inquilinos* families undoubtedly judged their welfare on the estate superior to life outside or in the nitrate fields of the northern desert.” (Bauer, 1995, p. 28). The patron-client relationship was very developed (see in particular Bauer, 1995). Thus, “anyone seen visiting the home of a resident laborer would be immediately approached and questioned by the owner, who reserved the right to expel him from the property” (Swift, 1971, p. 37).

5.3. Land Concentration, Agrarian Relations and Political Control before 1958

Landlords systematically controlled rural voting until the late 1950’s. Petras and Zeitlin (1968, p. 510) document that, “until 1958, elections were carried out with each political party having a separate ballot. (...) Thus the *patrones*

often simply gave the ballots for the party of their choice to the *inquilinos*, and provided them and nearby peasants with transportation to and from the polling places.”¹⁸ Similarly, Bauer (1995, p. 29) argues “The landowners’ political power in the countryside derived from control of land and people;..as Chile’s formal democracy emerged, landowners had to compete in an electoral game with an ever more autonomous state. This meant that in order to use the state to coerce their workers, they had first to extract from their workers the votes necessary to compete in a restricted but nevertheless formally democratic system.” There is absolute consensus amongst historians, political scientists and sociologists about how this system functioned (for more evidence see Kaufman, 1972, Bauer, 1975, Loveman, 1976, Zeitlin and Ratcliff, 1988 and Scully, 1992, ch. 4).

Particularly important in the detailed study of the presidential election of 1920 by Millar (1981) who describes in detail how this system functioned. “There was an absolute control of peasants by their patrones, and elections in rural communes depended on the political preferences of the landowners. They relied on an electoral clientele formed by the *inquilinos*, *peones* and small landholders (*pequenos propietarios*); this last group had...a strong relationship with the *latifundistas* due to credit, crop trade, lease of money and materials, and personal relations” (Millar, 1981, p. 172). Large landlords usually registered all their employees, by teaching them how to sign their names (as literacy was a condition for vote registration). The day of the election, the employer would go vote with all their employees. “This type of control is pervasive (...). The situation was publicly accepted, and it was even used as an argument in electoral legal complaints, particularly in order to show that any result against the preferences of the *latifundistas* was fraudulent, or to justify an unanimous electoral result in a rural locality” (Millar, 1981, p. 173).

By the 1950’s the political landscape in Chile was dominated by several main parties. The traditional nineteenth century parties, the Conservatives, Liberals and Radicals were all still effective. The Conservatives and Liberals were furthest

¹⁸Loveman (2001, p. 222-3) provides a detailed discussion of how party provision of ballots before 1958 facilitated electoral corruption.

to the right and united in most things except in their attitudes to the Church (the Conservatives were closely associated with the Catholic Church while the Liberals tended to be anti-clerical). The Radicals were more towards the center politically and were strongly anti-clerical. Also in the center, though very small in the 1950's were the Christian Democrats. To the left were the Socialists and then the Communists (the latter were officially banned between 1948 and 1958 though they competed under different names). The landed oligarchy provided the traditional constituency of the two right-wing parties, the Conservative and the Liberal (see, e.g., Gil, 1966). As Sinding (1972, p. 776) notes "The literature..identifies large landowners and industrialists as Conservatives and Liberals; the urban middle classes and the owners of medium-sized farms as Radicals, and more recently as Christian Democrats; miners and urban labor-union members as Communists; and the residents of the extreme northern and southern provinces, some intellectuals, and some of the urban poor as Socialists." The existing party system was shocked however by the return of the former dictator Carlos Ibáñez as a populist presidential candidate in 1952. Ibáñez formed a very heterogenous coalition of mostly leftist groups and capitalized on the general disillusionment with the traditional parties.

In what follows we focus on the 1957 parliamentary (all of the congress and half of the senate) elections, as it allows a more direct comparison to the parliamentary elections that occurred after 1958 (the 1961 and 1965 elections), though the patterns highlighted here extend to the other electoral results as well.¹⁹ The

¹⁹We do not take the 1953 congressional and senatorial elections because they were very exceptional. After the election to the presidency of Carlos Ibañez in 1952, the 1953 elections saw a transient collapse in the right-wing vote in the face of the Ibañista bandwagon. Scully (1992, p. 126) notes "The disruption of familiar patterns of party competition was also reflected in the extreme fragmentation by the party system in the congressional elections of 1953. In that year, 25 party organizations presented candidates, and 19 achieved representation. Party proliferation weakened Chile's traditional parties. Whereas in the congressional elections of 1949 the Conservative, Liberal, and Radical parties combined received more than 60% of the vote, in 1953 they received barely on third." This was just a temporary phenomena however. Scully goes on to add (1992, p. 126) "Though Ibañez had put the leadership of traditional parties on the defensive in 1953, the situation was reversed between 1953 and 1957." Focusing on 1953 therefore has a tendency to underestimate the fall in conservative support after 1958. In any

landed oligarchy in Chile dominated the Central Valley provinces, and in particular, as noted above, the provinces of Aconcagua, Colchagua and O'Higgins. (It also dominated the rural parts of the Santiago province, but its impact on the electoral results of the province is overwhelmed by the large proportion of urban voters). Unsurprisingly therefore it is in these three provinces that the proportion of votes in favor of the two right-wing parties was the strongest. The share of right-wing votes in 1957 in Colchagua was 70.2 percent, in Aconcagua, 58.5% and in O'Higgins, 47.4%, much higher than the national average (33%) or the scores obtained in the other rural provinces.

Across all Chilean provinces, the relationship between right-wing votes and the patron-*inquilino* system is striking.²⁰ For example, the correlation between right-wing votes and the proportion of *inquilinos* in the agricultural labor force, indicating the importance of patron-client relationships in agrarian relations, is as high as 0.60. (The correlation coefficients between the proportion of right-wing votes and the ratio of *inquilinos* to the number of voters in the province, or the proportion of *inquilinos* in the active population of the province are 0.51 and 0.60 respectively). Clearly, provinces in which the *inquilino* system was more developed also tend to exhibit stronger support for the right-wing parties.

The relationship between right-wing votes in the 1957 elections and land concentration is less clear however. Taking the share of agricultural area operated by large farms (over 200has) in 1955 as an indicator of land concentration, its correlation with the proportion of right wing votes is equal to 0.25. This rather low figure is however due to the fact that in the arid, semi-arid and infertile provinces to the north and to the south of the Central Valley (including the Frontier), land concentration tends also to be very high, though it seems there to result from

case our results still hold when we also use the 1953 data.

²⁰The various correlations reported in the text are very robust. We thus have also investigated the following alternatives without altering the main relationships: take the 1953 elections, and compute the average between 1953 and 57, which is then compared to the average of 61 and 65, or 65 only; compare the electoral results of 57 and 61 only; compare 57 to the average of 61 65 and 69 electoral results; describe land distribution by computing the share in total agricultural area operated by farms larger than 1000 has and its changes over time.

the technological constraints of these provinces and the type of activities undertaken (ranching instead of farming). Thus, out of the 8 provinces with a share of agricultural area operated by large farms larger than 80%, one finds 2 provinces from the Canals region in the extreme south (Aysen and Magallanes), 2 remote provinces to the North of the central Valley (Tarapaca and Atacama) and the urban province of Valparaiso (see again Appendix Map 1).

To better control for this potential bias introduced by the radically different ecology of the northern and southern provinces, we also examined the corresponding correlations within the 15 rural provinces of the Central Valley and the Frontier region, which are much more homogenous in their physical characteristics. There, the correlation between the proportion of right-wing votes and land concentration is equal to 0.64. (It is equal to 0.58 if one takes the share of agricultural area operated by farms larger than 1000 has in 1955.) The relationships between agrarian relations, right-wing votes and land concentration is striking, as the correlation between right-wing votes and the proportion of *inquilinos* in the agricultural labor force is 0.64, while the correlation between the latter and land concentration is 0.80. Moreover, the resilience of this system is illustrated by the correlation between right-wing votes in 1957, and the share of agricultural land operated by farms over 200 has in 1930, which is equal to 0.27. (All the correlation coefficients are reported in Table 10, in Appendix 2.)

Table 2 below provides an illustration of the above discussion, where we indicate the proportion of right-wing votes, land concentration and the importance of the *inquilino* system in agrarian relations for the three oligarchic provinces of Colchagua, Aconcagua and O'Higgins, the corresponding averages for the other Central Valley rural provinces, the other rural provinces, and the country as a whole.

INSERT TABLE 2 HERE

Direct buying of votes by parties, a system known as the 'cohecho', was a major instrument used by political parties to rally urban voters at the beginning of the century, but it was never systematically used in the countryside, as landlords maintained their control over rural voters. As Heise emphasizes, "In the parlia-

mentary period, the docility of the electorate remained exclusively in the rural areas; it was not necessary to ‘cohechar’ (buy votes) there. The urban voter on the contrary, sells his votes. The buying of votes in the cities became a system in which all political parties were engaged (...) There were even candidates that offered to pay more for votes than any other candidate in printed ads” (Heise, 1982, p. 228-9). Quoting a prominent newspaper of that period (*El Mercurio*), Heise points out “The working class was convinced that a congressional or presidential candidate was entitled to pay for votes.” Many voters thought that “when votes are not bought, politicians had stolen the money that the government had sent for the elections” (Heise, 1982, p. 230).

That landowners were not directly paid per vote is not totally surprising, as they were benefitting from their political influence in a variety of ways, among which were electoral positions for themselves and their relatives. Thus Heise calculates that until the end of the parliamentary period (1925), more than 90% of political leaders are large landowners.

By the 1950’s however, direct vote buying by the parties had almost disappeared (see e.g. Scully, 1992, or Sinding, 1972), and, as we shall see, the 1958 electoral reform puts an end to this practice.

According to the few pieces of information provided by historical studies, we were only able to get some information on the price of a vote for the elections of 1909, 1915 and 1918. Prices vary a lot from one source to another (they are directly comparable since there was no inflation during this period), depending on the type of election (presidential or parliamentary), and the degree of competition between political parties. Thus, according to Heise (1982) prices vary between 25 and 35 pesos in 1909, 10 to 40 pesos in 1915, and 100 to 200 pesos (and even between 400 and 500 pesos, “equivalent to a one-year salary for a lower class person”) for the 1918 elections. The political history by Rivas Vicuña (1964, p. 579), himself an active politician in this period, reports a price of 2000 pesos for the 1915 election.

Even though there is thus large uncertainty about these amounts, as well as whether they are a good indicator of the potential political rents a landlord

could secure by controlling votes, it is interesting to attempt to estimate the corresponding amount in the 1950's of the price of a vote in 1915. We shall do this by using two prices: a lower estimate of 40 pesos per vote, and a high price of 200 pesos per vote, so as to obtain a reasonable range of estimates. We focus on year 1952, which precedes the high inflationary period under Ibañez regime, and 1957 as this is the year for which we have reasonable estimates of farm prices (see below).

To do this, we have to take into account the change in the number of registered voters and inflation. The number of registered voters in 1915 was 383000 (Cruz-Coke, 1984, p. 36-7). (This number is the one set after the electoral reform of 1915. In 1912, out of the 591,000 registered voters, only 51% actually voted. They then decided to organize a system of permanent voter registration, to be renewed every nine years). The number of registered voters in 1952 was 1,100,027, and 1,284,159 in 1957.²¹ Thus, we shall assume that one vote in 1952 is equal to 0.54 (=591000/1100027) of a 1915 vote. Similarly, a 1957 vote is equal to 0.46 units of a 1915 vote. Inflation is endemic in Chile over this period, particularly in the 1950's (see our further discussion below when we analyze the trends in the price of land). The Consumer Price Index (CPI) went from 1 in 1915 to 24.4 in 1952 and 181.3 in 1957 (Mitchell, 1998, Table H2, p. 712-3). Wheat prices followed a similar trend, as 1 peso of wheat in 1915 was priced at 18.7 in 1952 and 117.6 in 1957. (The general index of agricultural producer prices similarly went from 1 in 1915 to 28.4 in 1952 and 189.0 in 1957, see Mamalakis, 1983, Volume 4, Table 4-5, p. 222-3)

By using the CPI, simple computation yields the following result. Taking into account inflation and the change in the number of registered voters, a price of 40 pesos for one vote in 1915 is equivalent to 340 pesos in 1952 (or 2162 pesos in 1957). Similarly, a price of 200 pesos in 1915 corresponds to 1700 pesos in 1952 (or 10810 in 1957). If one compares the first of these to the average annual real earning of an agricultural worker (2864 pesos in 1952, Mamalakis, 1983, Volume 2, Table 14.2), the price of a vote is equivalent to 12% of average earnings of an

²¹These figures come from the Dirección del Registro Electoral 1953 and 1957.

agricultural worker, which corresponds to 44 work-days. (It is also worth 7.8% of the average real earnings of a worker for all industries, which corresponds to 28 work-days). In 1957, the minimum daily wage of an agricultural worker in Talca was set at 35 pesos, so that the price of a vote in 1915 corresponds in 1957 to 62 work-days at the minimum wage. (source: Mamalakis, 1983, Volume 2, Table 14.3). If instead we use the higher price of 200 pesos, the sale of a vote was equivalent to 60 % of the average earnings of an agricultural worker, or 310 work-days at the minimum wage.

One can also extend this exercise by computed the discounted value of all political rents accruing to the right to vote of one person. To do this, we first take into account the frequency of elections: every 24 years, there are 13 elections (6 parliamentary, 4 presidential and 3 congressional, as only half of the Congress is re-elected at each parliamentary election). As a result, there is on average 0.54 elections per year. At an interest rate of r , the current value of the political rents associated with a right to vote, R_t , is:

$$R_t = \frac{0.54 * Pv_t}{r}$$

where Pv_t is the value of a vote at time t . In Table 3 below, we computed the value of the political rents corresponding to the prices of 40 and 200 pesos per vote, by using discount rates of 0.03 and 0.05. As Table 3 shows, the rents associated with the control of one vote lies approximately between 2 and 10 years of earnings for an agricultural worker.

INSERT TABLE 3 HERE

We can illustrate the implications of this calculation by considering a large farm in the province of O'Higgins in 1955. A typical farm between 500 and 1000 hectares employed 44 workers, out of which 17 were *inquilinos*. As most *inquilinos* (and workers) live with their families on the estate, we also assume that the control by a landlord of the voting behavior of one *inquilino* (worker) also implies the control of his spouse's vote, so that a landlord on such a farm effectively controls 34 *inquilinos'* votes. Though the evidence presented above as well as much of the historical discussion we cited emphasizes that it was the

votes of *inquilinos* that were controlled, it is also interesting here to investigate the implications of the votes of all employees being controlled. In this case the landowner would control the votes of 88 workers. Given the average value of such a farm (72 million pesos in 1957), it implies that, for a discount rate of 0.03, the political rents associated with the control of the *inquilinos*' votes lies between 1.8% and 9.0% of the value of the farm. If such power extends to all workers on the estate, the political rents represent between 4.8% and 24% of the value of a farm. The corresponding figures for a farm in a large size class (between 1000 and 5000 has) are 2.6 % and 13.0% for the votes of the *inquilinos*, and 8.8 % to 44% for the votes of all the workers on the farm. The discussion is summarized in Table 4 below.

INSERT TABLE 4 HERE

This exercise is of course at best indicative of the value of a vote in 1957 since we have to assume some correspondence between the nature of electoral corruption in the 1950's and the system of vote buying which took place at the beginning of the century. Moreover, inflationary pressures may have distorted relative prices. However, the figures obtained look perfectly sensible, even though one may argue that they probably constitute a very conservative estimate of the political rents enjoyed by large landlords. First, the number of dependents on a large farm is probably underestimated, even if we take into account all workers and their spouses since we omitted for instance the landlord's tenants or his main trading partners. Secondly, the sale of votes is to some extent a metaphor which certainly does not capture all the political rents, including the social prestige, the electoral positions and the influence over policies (such as those with respect to the ability of trade unions to organize), that landlords enjoyed.

5.4. The Political Impact of the 1958 Ballot Reform.

There were several important electoral reforms undertaken in Chile in the late 1950's and early 1960's. The most important was Law 12.889 promulgated on May 31st 1958. This law amended the basic electoral law of 1925 (see Castro, 1941,

p. 35 for a discussion of this law and Cruz Coke, 1984, p. 27-29) and its most important aspect was the introduction of the *cédula única* (the unified ballot). Under the 1925 law, while ballots had been printed by the government, they had printed separate ones from each party list. Thus to vote for the Socialist party, a voter had to request the Socialist ballot which made it easy to determine his voting behavior. Scully (1992, p. 134) notes that the introduction of the unified ballot “prevented party agents from learning the preferences of the electors in the voting booths.” Another important law of 1958 banned electoral pacts between parties for deputies and councilmen (a 1962 electoral law extended this prohibition to senatorial elections).

As Table 5 below shows, the introduction of the secret ballot had an immediate impact on the balance of political power in Chile. Loveman (1976, p. 219) notes, “The introduction of a public ballot meant that landowners could no longer effectively control the votes of rural labor. The electoral hegemony of the Right in the countryside thus gave way to forces that advocated social change in the rural areas....In 1958 the performance of the FRAP (Socialists and Communists) in rural districts left little doubt that landowners’ control over rural votes had considerably declined.” In the Central Valley Provinces, “the result was a steady decline of rightist voting strength in these areas (from 54 percent in 1949, to 31 percent in 1961, to 17 percent in 1965) and a steady increase in the number of Marxist voters....(they) nearly provided the Marxist presidential candidate, Salvador Allende, with a national victory in the presidential elections of 1958. Running again in 1964 against the Christian Democratic candidate, Allende polled an absolute majority (52 percent) of the male voters within these provinces.” (Kaufman, 1972, p. 28-9).

INSERT TABLE 5 HERE

If the lack of secret balloting had played an important role in guaranteeing democratic stability in Chile since the 1930’s, why was the secret ballot introduced in 1958? Though this issue appears not to have been researched by political scientists, the most plausible reason for this is a deliberate attempt to disrupt the existing political equilibrium. As we noted above, the election of Ibáñez in 1952

was based on a heterogenous coalition and an ‘anti-politics’ platform.²² Ibáñez intended to forge a new political movement and though he failed in this, it seems likely that the introduction of the secret ballot with its easily anticipated effects on voting in the countryside, was a calculated gamble. It may also have been part of a deal which he made with some of his key supporters, the Agrarian Labor party (Agrario Laboristas) and the Popular Socialist party (Partido Socialista Popular) both of which would have had an interest in mobilizing rural voters.²³

Interestingly however, despite these changes, the Conservative Jorge Alessandri won the presidential election in 1958,²⁴ principally on a platform emphasizing conservative monetary policies which were a response to the populism of the Ibáñez regime. Under Ibáñez per-capita GDP had fallen by 2% and inflation had averaged 45%, peaking at an annual rate of 76% in 1955 (see French-Davis, 1973, p. 242 and Table 35). However, the right began to disintegrate during the 1960’s with the rise of the centrist Christian Democrats (whose candidate Eduardo Frei won the presidency in 1964) and in 1966 the Conservatives and Liberals merged to form the National Party.

As the urban-rural pact fell apart after 1958 so did its institutions. Agricultural unions were legalized in 1967 and started to mobilize in the early 1960’s so that “over two hundred rural unions were organized before the passage of legislation in 1967 allowing the formal establishment of rural unions” (Valenzuela, 1978, p. 29).

We now turn to the change in voting behavior at the provincial level. To do this, we compare the electoral results in 1957, to the average of the electoral

²²Ibáñez’s strategy is reminiscent of many other anti-political figures in Latin America. Two clear comparisons being Gustavo Rojas Pinilla, Colombian dictator in the 1950’s, who was narrowly beaten in the 1970 presidential election race and the current Venezuelan president Hugo Chavez who previously attempted to orchestrate a coup against a democratically elected government.

²³A gamble with grave consequences since in some sense the dramatic shift in the Chilean political equilibrium after 1958 induced a process which converged to the coup in 1973 and sixteen years of military rule.

²⁴Though he polled only 33,416 votes (out of 1,235,552 cast) more than Salvador Allende, the candidate for the Socialist and Communist alliance.

results in 1961 and 1965.²⁵ Across all provinces, the fall in the right-wing votes occurs in provinces with higher initial right-wing votes ($\rho = -0.67$), provinces with a larger proportion of *inquilinos* per worker ($\rho = -0.67$) or a larger proportion of *inquilinos* in the active population ($\rho = -0.48$), and larger land concentration ($\rho = -0.33$, for the area operated by farms larger than 200 has). If one focuses on the 14 rural provinces located in the Central Valley and the Frontier, the pattern is even more pronounced as the correlation between the fall in right-wing votes and land concentration is very high ($\rho = -0.58$) as with the proportion of *inquilinos* in the agricultural labor force ($\rho = -0.78$) and the initial proportion of right-wing votes ($\rho = -0.71$). As indicated above, the fall in right-wing votes parallels a rise in the share of votes going to Christian-Democrats and left-wing parties. (For instance, the correlation between the change in left-wing and Christian-Democrats votes and the proportion of *inquilinos* in the agricultural labor force is 0.62).

As these correlations suggest, the fall in right-wing votes is dramatic in the Central Valley provinces. Even the absolute number of right-wing votes fell in that area, in spite of the increase in registered voters. Therefore, while the right wing parties lost 11.5% of votes in 1961-65 compared to 1957 in Chile, the fall is -36.2% in Colchagua (from an absolute majority of 70.2% of the votes in 1957 to barely 22.5 % in 1965, and 23.1% in 1969!), -29.4% in Aconcagua and -25.6% in O'Higgins. Simultaneously, the rise in Christian-Democrats and left-wing vote is equally dramatic in those provinces, as it increased by 41.7% in Colchagua (from 6.6% to 48.3% of the votes), by 46.7% in Aconcagua and by 39.8% in O'Higgins, more than in the other Central Valley provinces (+31.2%) or the other rural provinces (+25.1).

INSERT TABLE 6 HERE

²⁵As we noted previously all of the results we describe here are robust to alternative dating strategies and comparisons. For example, we can focus just on single elections or we can also include the 1969 election. The correlations we report are basically the same.

5.5. The Economic Impact of the 1958 Ballot Reform: Land Concentration and Labor Contracts

Between 1955 and 1965, the pattern of land distribution changed significantly. Thus, while the general fall in land concentration over Chile was almost negligible (the area operated by farms larger than 200 has fell by 1.9% over the period), the change is far from homogeneous. As a matter of fact, the share of large farms actually increased in 9 provinces, and the increase was larger than +10% in 5 of them (Antofagasta, Aysen, Atacama, Osorno and Chiloe). Thus, in Osorno, the area under large farms increased from 68.0 to 80.3% of the total agricultural area, and from 56.6% to 70.4% in Chiloe. (If one takes the area operated by farms larger than 1000 has, the average fall in Chile is -1.6%, and it actually increased in 8 provinces).

Over all provinces, the change in land concentration is strongly associated with the fall in right-wing votes ($\rho = 0.41$) and with the proportion of *inquilinos* in the agricultural labor force in 1955 ($\rho = -0.60$) or in the total labor force in 1955 ($\rho = -0.44$), but less with the levels of land concentration in 1955 ($\rho = -0.26$). Interestingly, the fall in land concentration occurred mostly in former right-wing provinces ($\rho = -0.47$). If one focuses on the 15 Central Valley and Frontier rural provinces, land concentration on average fell by an amount of -5.7%, and land concentration rose in the border provinces of Osorno, Cautin and Llanquihue. Once again, falling land concentration is associated with a fall in right-wing votes ($\rho = 0.36$), initial land concentration ($\rho = -0.30$), the initial amount of right-wing votes ($\rho = -0.37$) and the proportion of *inquilinos* in the agricultural labor force ($\rho = -0.21$).

In the landed oligarchic provinces, the fall in land concentration and in right-wing votes was accompanied by a corresponding fall in the proportion of *inquilinos* in the agricultural labor force (1965 versus 1955). The correlation between those changes across all provinces is notably high, as the change in the proportion of *inquilinos* and the change in right-wing votes display a correlation coefficient of 0.43, and with the fall in land concentration of 0.44 over all provinces, and of

0.47 and 0.55 respectively in the Central Valley and Frontier provinces. Clearly, the 1958 ballot reform dealt a fatal blow to the strength of the landed oligarchy. Thus, as Table 7 below indicates, in the province of O'Higgins, right-wing votes fell from 47.4 to 21.8% of the votes, the area controlled by large farms fell from 73.6% to 53.1%, and the proportion of *inquilinos* in the agricultural labor force fell from 20.2 to 11.0.

INSERT TABLE 7 HERE

5.6. The Economic Impact of the 1958 Ballot Reform: Land Prices

Our model also predicts that the electoral reforms of 1958 should lead to a fall in the price of land.²⁶ To examine this issue, we collected data from the most important national Chilean newspaper, *El Mercurio*, from August 1956 to December 1960. This newspaper has a large advertisement section each week which provides nation-wide announcements of farms offered for sale. While the content of the advertisements vary widely, we restricted our sample to those advertisements which explicitly provide the size of the farm,²⁷ its price, its province of location and the number of employees' houses that are attached to the farm (*casas de inquilinos y majordomos*). We moreover restricted the collection of such information to farms which were of at least 50 hectares. We have therefore left out all the other sales advertised. By so doing, we obtained information on 264 farms proposed for sale over this period.

This procedure is subject to sample selection biases: the characteristics of the farms announced in *El Mercurio* might not correspond to the usual farms for sale in the countryside, and our collection strategy (farms advertised with enough information and larger than 50 has) might make the selection bias even more

²⁶We found two published studies of the behavior of land prices in Chile over this period (CIDA, 1966, p. 343, and Hurtado et al.,1979) both of which find, as we do, significant falls in land prices after 1958. We do not emphasize the data in these studies because their samples

and methodologies are unclear.

²⁷Sizes came in two different measures, the hectare and the chilean cuadra. We assumed here that one cuadra was equal 1.44 hectare.

pronounced. However, we chose this procedure because we felt that it was important to control for the quality of the land when investigating the determinants of land prices, and a simple way of doing so was to report the number of employees buildings attached to the farm, so as to obtain an indicator of the intensity of cultivation in that farm, and hence, indirectly, of the quality of its land.

Another worry arose as inflation was high during this period, and we only had at our disposal the annual consumer price indices (or the index of agricultural prices which follows a very similar pattern). We therefore had to compute within each year (from 1 of July of year t to the 1 of July of year $t+1$) the average weekly inflation rate. We thus reconstructed a weekly consumer price index, which was then used to deflate the nominal price of land ($1/7/56=100$).

Since the electoral reform law was promulgated on May 31, 1958, we first looked at the average price of one hectare of land before and after 31/5/58 according to the province of location. Table 8 summarizes this information. While it appears that land prices in real terms may have fallen after 1958, the fall is much more pronounced in exactly those provinces that we have already singled out: Aconcagua, Colchagua and O'Higgins. Also noticeable is the hierarchy in land prices, with land being the most expensive in the Central Valley urban area (Santiago and Valparaiso), followed by Aconcagua, Colchagua and O'Higgins, then by the Other Central Valley provinces, and finally by the other provinces (the Frontier, the North, the Lakes, and the Canals) where prices fell by about 7%.

INSERT TABLE 8 HERE

In interpreting the results given in Table 8, however, we do not properly control for the size of the farm, nor for the quality of land. As a result, we turned to regression estimates, in order to investigate the existence of a structural break on the 31st of May, 1958. The basic model we estimated is the following:

$$P_i = \beta_0 + \beta_1 X_i + \beta_2 R_i + D_i (\beta_0 + \beta_1 X_i + \beta_2 R_i) + \varepsilon_i$$

where P_i stands for the price of land per hectare and X_i , for the log of farm size and the number of employees' building (per hectare) on the farm, to reflect the intensity of cultivation as well as the investments made on the farm. R_i is

a regional dummy, which takes the value 1 if the farm belongs to the specified area, and D_i is another dummy which takes the value 1 if the sale is advertised after May 31, 1958, and zero otherwise. The results of the estimation are given in Table 9 below, where model 1 corresponds exactly to the specification described above. Model 2 and 3 are alternative specifications of the same basic model, where we propose an alternative grouping of provinces (model 2) or we ignore the *inquilino* houses/hectare variable (model 3). The main problem with this estimation strategy however is that there is a lot of multicollinearity between the post-1958 dummies, which undermines the significance of the estimated coefficients. This is why we also provided two alternative models, where we assume that the structural break takes place only through the intercept term (models 4 and 5). Model 6 is identical to model 1, except that size now enters linearly in the equation (instead of log).

INSERT TABLE 9 HERE

All the estimates are consistent with one another, and the coefficients obtained are extremely robust across various alternative estimations (even by changing the grouping of provinces, or differed break points, or quadratic models for size and *inquilino* houses/hectare,...). We chose the logarithm of farm size in this table as it tended to reduce the influence of a few very large farms. We also chose to ignore a quadratic effect of the *inquilino* houses per hectare, as it often turned out to be insignificant without adding to the precision of the estimates.

The results obtained are striking. There is a structural break in farm prices before and after the electoral reform: price fell by about one third after May 31, 1958. The break seems to occur mostly through the intercept, and the regional intercepts, and not through farm size (which would have implied that larger farms are less expensive per unit of land after 1958, an implausible effect since parcelling out for sale is an available option), or through the intensity of cultivation (as measured by the number of employees' houses on the estate). More interestingly is that the fall is more pronounced in precisely the three Central Valley provinces of Aconcagua, Colchagua and O'Higgins, and probably also in Santiago and Valparaiso (see model 2). By contrast, the corresponding coefficient is insignificant

for the other Central Valley provinces, or the other provinces (which in models 1 and 3 is measured through the intercept 'dummy after 1958').

It is also interesting to note that, as already pointed out in Table 8, prices before 1958 are consistently highest in the urban Central Valley, slightly lower in the three provinces of Aconcagua, Colchagua and O'Higgins, followed by the other Central Valley provinces, and then lowest in the other provinces. Even more interesting is the fact that the difference in prices in the three provinces and the other Central Valley provinces disappears after 1958. It must also be underlined that all the coefficients (except the break in logsize in model 2) have the expected sign. The 1958 dummy, interacted with all the variables, has systematically a negative effect. The imprecision of these estimates may therefore be attributed, at least in part, to the high level of multicollinearity between the interacted variables. Lastly, the overall precision of the estimates is very high, as attested by the adjusted R^2 values attached to the different models.

We also ran alternative estimates (the results of which are not reported here) by introducing in the regression model a time trend (and a break in the time trend). The estimates obtained under this alternative are consistent with the ones obtained above, as the magnitude and the signs of all the relevant coefficients are left unchanged. The significance of the estimates are however slightly lower (typically, the critical probability associated with the post 1958 break in the stronghold dummy hovered around 12%, though it fell to 2% for the estimate with a time trend of model 3), which can be attributed to the high multicollinearity between the structural break variables (given our relatively small data set).

5.7. Alternative Hypotheses

It seems hard to imagine that there is a plausible alternative story which can explain the correlations we have shown before 1958 and what happened afterwards in Chile. However, there may be other possible interpretations of part of this evidence. Clearly, it is possible that land concentration and real land prices might have fallen for several reasons apart from the fact that the secret ballot

removed the political rents which had previously accrued to land ownership (and were capitalized in its value).

There is one other obvious main alternative hypothesis that accepts the fact that before 1958 electoral corruption stopped rural voters expressing their political preferences, but it emphasizes different mechanisms linking electoral reform to the data. This idea is that after electoral reform, a left-wing president and government was much more likely. Such a government would aim at redistributing income and assets, particularly land. Such redistribution, once anticipated, would clearly tend to reduce the attractiveness of holding land, thus leading to a fall in concentration and land prices. This hypothesis seems all the more convincing because we know *ex post* that agrarian reform became such an important political issue in the late 1960's and early 1970's in Chile.

We would argue however that this mechanism, though possibly present to some extent, is not really generally plausible, nor in fact consistent with all of our evidence. Since this hypothesis accepts the importance of voter control before 1958, it is consistent with the empirical evidence we have shown connecting the right-wing vote to land concentration and the presence of a dependent labor force. Moreover, this hypothesis does seem able to predict falling land prices and falling land concentration after 1958.

There are two main problems with it. The first concerns the implausibility that the land reforms of the late 1960's and early 1970's could have been anticipated in the late 1950's. The second concerns its inconsistency with our data. Firstly, the Alessandri government between 1958 and 1964 was Conservative and did not adopt a redistributive agenda at all. Therefore the politics of this government cannot account for the fall in real land prices. Moreover, while agrarian reform had been occasionally discussed in Chile since the early 1920's, it was not treated as a policy that might seriously be implemented until the end of the 1960's. Some marginal land purchases and redistributions took place between 1962 and 1964 under the 1962 Law 15020, but they were explicitly targeted towards unused or abandoned estates. Very little land was redistributed during this period. (Actually, 70% of the land thus affected came from abandoned state farms, and

40% from a single large state farm in Talca.) As a result, the value of cultivated farm land could not have been affected by these minor reforms (for a detailed account of these, see Loveman, 1976). As Kaufman underlines, “the Alessandri administration did initiate some legislation dealing with peripheral issues in the land-tenure problem...But it pointedly avoided any approach to the question of expropriating and redistributing large, private estates” (Kaufman, 1967, p. 9).

Land reform based on the size of properties only became a real issue in 1964-66 with the success of the Cuban revolution and the counterrevolutionary drive of United States foreign policy, particularly Kennedy’s Alliance for Progress (see the discussion in Loveman, 1976, p. 220). The law was however voted only in July 1967, and its implementation started only in 1969. Consistent with this Swift (1971, p. 68) argues that “landowners did not really begin to fear expropriation until after July 1967, when it became possible to expropriate land for the motive of size alone.” Moreover, after a study of agricultural investment behavior in the early 1960’s, Swift concludes (p. 68): “The examination of investment behavior, therefore, does not clearly support an interpretation of lower investment through fear of expropriation”. The evidence therefore suggests that the anticipation of land reform cannot have been the factor depressing land concentration and prices in the late 1950’s. Instead, the most plausible explanation is the one proposed by our theory; with the introduction of the secret ballot the price of land fell since the return to landownership fell.

The second problem with this alternative hypothesis is that while the evidence we discussed above shows that land prices were generally falling after 1958, as one would expect if agrarian reform were anticipated, it is not in fact generally true that land concentration was falling. Actually, as we showed, land concentration increased in 9 provinces. It was only in the Central Valley provinces where the traditional oligarchy and patrón-inquilino relations were concentrated that land distribution became more egalitarian. This observation is important because the land reform legislation that began to threaten the expropriation of large farms after 1967 in no way discriminated against the oligarchic Central Valley provinces. A large farm in Tarapacá or Talca, was just as likely to be redistributed as one in

O'Higgins. While our theory does not explain why land concentration increased in provinces like Tarapacá, it is perfectly consistent with the fact that concentration went up (for example because of changes in technology). It seems implausible however that in provinces where land concentration was already extremely high, people anticipating land reform would purchase more land and form larger farms.

One can think of other hypotheses consistent with parts of our story. First, there might be a secular falling trend in land prices. The results obtained with a time trend tend to show a decline in land prices (note however that the period of time covered is very short). Yet, that the fall tends to be more pronounced in exactly those provinces dominated by the landed oligarchy, directly supports our hypothesis. Second, the fall in land prices after 1958 might be due to the fact that land is often held as a hedge against inflation and, under the Alessandri government, the post 1958 period enjoyed much more monetary stability than the years before. As a result, landholders may have decided to sell the land they accumulated during the inflationary period, so that a general fall in land prices should occur after 1958. Once again, we cannot entirely disprove this other hypothesis, even though the fact that fewer land transactions occurred after 1958 argues against it. Alternatively, over the long-run demographic factors could explain why land concentration may have fallen in some areas rather than others. Nevertheless, these ideas can only explain part of the overall picture while our theory provides a unified account of a whole set of political and economic phenomena.

6. Conclusions

In this paper we showed that the presence of rents in the employment relationship gives employers a comparative advantage in controlling the political activities of their employees. Though this argument is general, we focused on the best documented case of this, the political control of voting behavior by landowners in the absence of a secret ballot. By threatening to withdraw rents, landlords can exercise power over the voting behavior of workers and they can exchange these votes for favors and rents from political parties. We showed that this tends to

push up the price of land and leads to inefficient land concentration.

We tested our theory by investigating in depth the political economy of Chile in the late 1950's. Many scholars in both history and political science have emphasized the important ramifications of electoral reform in Chile in 1958. We presented evidence showing that the relationship between land distribution, the presence of dependent laborers, and support for right-wing political parties in Chile before 1958 is strikingly consistent with our theory. Moreover, we showed the predicted political and economic effects of electoral reform which our theory generates exactly match the Chilean data. This evidence suggests to us that electoral corruption, and the economic and political incentives that it created, is an important part of the story for why inequality has been so high historically in Latin America and possibly also an important part of the story about why long-run economic performance in Latin American has been so disappointing (on which see Engerman and Sokoloff, 1997, and Posada-Carbó, 2000, who argue for the central importance of electoral corruption in Latin American political history).

Though our analysis focused on vote buying, as we suggested in section 2, this can be thought of as a metaphor for a wide variety of political favors or policies that transfer rents to the landlords. Moreover, the political control that rents allow employers to exercise applies much more generally, even in situations where there is an effective secret ballot. Any type of observable political activity, collective actions, demonstrations, trade unionism, political activism, can all be controlled by the threat of losing ones employment and the rent that it provides.

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Table 1: Registered voters by occupational groups (Rancagua, 1872, 1878)

Occupation	1872	1878
Proprietors and capitalists	142	11
Professionals, merchants and other middle strata	167	625
Public and private employees	111	151
Agriculturalists (incl. <i>inquilinos</i>)	780	5223
Artisans and other specialized workers	266	1573
Miners	14	115
Workers and other low strata	0	24
Total	1480	7722

Table 2: Land concentration, right-wing votes and agrarian relations before 1958

Province	Proportion of right-wing votes in 1957 (%)	Share of total agr. area operated by farms over 200 has in 1955 (%)	Share of total agr. area operated by farms over 200 has in 1930 (%)	Share of total agr. area operated by farms over 1000 has in 1955 (%)	Prop. of inquilinos in the agric. labour force in 1955 (%)	Prop. of inquilinos in active population in 1955 (%)
Colchagua	70.2	79.7	83.6	56.4	20.4	10.0
Aconcagua	58.5	94.9	94.6	91.1	19.3	5.6
O'Higgins	47.4	73.6	91.8	49.3	20.2	7.4
Other Central Valley rural provinces	32.2	66.0	77.6	40.8	15.2	8.2
Other rural provinces	27.0	70.5	84.3	50.2	8.0	4.0
Chile	33.0	71.4	84.0	50.4	12.4	3.8

Notes: The other Central Valley rural provinces include Curico, Maule, Linares, Nuble and Talca. The Central Valley provinces that are thus excluded are the two predominantly urban provinces of Santiago and Valparaiso. The other rural provinces include the Great North provinces of Tarapaca, Antofagasta, Atacama and Coquimbo, the Frontier provinces of Bio-Bio, Arauco, Malleco and Cautin (thereby excluding the urban Concepcion province), the Lakes provinces of Valdivia, Osorno and Llanquihue, and the Canals provinces of Chiloe, Aysen and Magallanes.

Table 3: Price of a vote and political rents in 1952 and 1957

	1952		1957	
	Discounted value of a voting right, R (1952 \$)	# months of work of an agric. worker at the average real wage	Discounted value of a voting right, R (1957 \$)	# months of work of an agric. worker at the minimum real wage
$P_v=40, r=0.03$	6139	26.0	39038	36.7
$P_v=40, r=0.05$	3684	15.6	23423	22.0
$P_v=200, r=0.03$	30695	120.0	195190	183.5
$P_v=200, r=0.05$	18420	78.1	117115	110.0

Table 4: Political rents from vote selling for a large farm in O'Higgins (1957)

Size class (has)	Average arable land operated (has)	Average value of the farm in 1957 (10 ⁶ \$)	Number of agr. work.	Number of inquil.	Political rents from inquilinos in 1957 pesos (10 ³ \$, r=0.03, Pv=40)	Political rents from all agric. workers in 1957 pesos (10 ³ \$, r=0.03, Pv=40)
500-1000	710	72.0	44.0	17.0	1327.3	3435.3
1000-5000	1927	98.8	111.0	32.3	2521.9	8666.4

Size class (has)	Political rents from inquilinos in % of the value of the farm			Political rents from all workers in % of the value of the farm		
	(r=0.03, Pv=40)	(r=0.03, Pv=200)	(r=0.05, Pv=200)	(r=0.03, Pv=40)	(r=0.03, Pv=200)	(r=0.05, Pv=200)
500-1000	1.8	9.0	5.4	4.8	24.1	14.4
1000-5000	2.6	13.1	7.8	8.8	44.3	26.4

Notes: Data on farms size and employment comes from the III Censo Nacional Agropecuario, Servicio Nacional de Estadística y Censos, Vol. 2, 1955, Chile. The value of the farm is the average price of a farm in this size class in Chile in 1957, from the El Mercurio farm sales informations (see below).

Table 5: The percentage of votes received by major Chilean parties 1949-69

	1949	1953	1957	1961	1965	1969
Conservativeand Liberals	42.0	25.3	33.0	30.4	12.5	20.0
Radicals	27.7	15.6	22.1	21.4	13.3	13.9
Christian-Democrats	3.9	2.9	9.4	15.4	42.3	29.8
Socialists and Communists	9.4	14.2	10.7	22.1	22.7	28.1

Note: Source for this Table is Valenzuela (1978, p35) and the Variacion Porcentual de los Partidos Politicos: 1957-71, 1971, Direccion del Registro Electoral.

Table 6: Voting patterns in the Central Valley provinces before and after 1958

Province	Share of total agr. area operated by farms over 200 has in 1955	Proportion of inquilinos in the agr. labour force in 1955 (%)	Proportion of right-wing votes (%)			Change in right-wing votes 1957 vs 1961-5		Proportion of votes for the christian- democrats and the left (%)			Change in votes for the christian- democrats and the left 1957 vs 1961-5
			1957	1961	1965	#	%	1957	1961	1965	
Colchagua	79.7	20.4	70.2	45.8	22.1	-7174	-36.25	6.6	33.2	63.4	+41.7
Aconcagua	94.9	19.3	58.5	38.6	19.0	-7106	-29.4	6.9	37.2	70.0	+46.7
O'Higgins	73.6	20.2	47.4	29.6	14.0	-5384	-25.6	14.5	40.7	67.8	+39.8
Other Central Valley rural provinces	66.0	15.2	32.2	31.7	16.9	-2570	-16.0	11.0	16.1	68.3	+31.2
Other rural provinces	70.5	8.0	27.0	26.5	14.1	+2260	-8.5	22.8	37.9	57.7	+25.1
Chile	71.4	12.4	33.0	30.4	12.5	+4243	-11.5	20.1	37.5	65.0	+31.1

Table 7: Land distribution and agrarian relations in the Central Valley before and after 1958

Province	Proportion of right-wing votes (1957)	Change in the proportion of right-wing votes	Share of total agricultural area operated by farms over 200 has			Proportion of inquilinos in the agricultural labour force			Change in the share of total agr. area op. by farms over 1000 has 1965-55
			1965	1955	1965-1955 change	1965 (%)	1955 (%)	1965-1955 change	
Colchagua	70.2	-36.25	71.7	79.7	-8.0	12.0	20.4	-8.4	-8.7
Aconcagua	58.5	-29.4	88.9	94.9	-6.0	11.0	19.3	-8.3	-6.0
O'Higgins	47.4	-25.6	53.1	73.6	-20.5	11.0	20.2	-9.2	-23.7
Other Central Valley rural prov.	32.2	-16.0	60.8	66.0	-5.2	9.9	15.2	-5.3	-4.1
Other rural provinces	27.0	-8.5	73.6	70.5	+3.1	5.6	8.0	-2.4	-4.2
Chile	33.0	-11.5	69.5	71.4	-1.9	8.4	12.4	-4.0	-1.1

Table 8: Land prices in the Central Valley before and after May 31, 1958

	Before 31/5/58			After 31/5/58			Change in average land prices %
	Average land price (000 pesos per ha)	Number of observ.	Median farm size (has)	Average land price (000 pesos per ha)	Number of observ.	Median farm size (has)	
Urban central (Santiago and Valparaiso)	275 (202)	40	128	236 (172)	21	100	-14%
Aconcagua, O'Higgins and Colchagua	211 (201)	22	179	135 (154)	21	214	-36%
Other Central Valley Provinces	151 (156)	41	280	107 (111)	43	240	-29%
Other Provinces	66 (48)	53	500	61 (66)	37	594	-7%
Chile	162 (175)	156	243	127 (138)	107	210	-22%

Note: Standard Deviations are shown between brackets. The grouping of provinces is identical to the one in the above tables, except that (few) observations from the province of Concepcion have been included in the 'Other Provinces'.

Table 9: Regression results on land prices in the Central Valley before and after May 31, 1958

Dependent variable = Real Price of land (1956pesos/hectare)	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6 (linear in size)
Log(size) (has)	-18.9*** (7.3)	-20.1*** (7.1)	-53.5*** (8.4)	-20.2*** (5.9)	-18.2*** (5.94)	-0.87** (0.38)
Log(size) (has) after 31/5/58	-1.6 (11.2)	-2.5 (10.7)	2.1 (14.3)			0.51 (0.61)
Inquilino Houses (#per hectare)	356.7*** (47.1)	366.3*** (46.6)		378.9*** (26.2)	345.6*** (27.2)	325.9*** (47.8)
Inquilino Houses after 31/5/58	-1005.0 (3438.5)	-1305.4 (3416.3)				1930.6 (3352.7)
Urban Central Valley dummy	87.3*** (22.9)		158.0*** (28.3)		70.3*** (19.2)	76.6*** (20.9)
Urban CV dummy after 31/5/58	-56.1 (39.7)		-48.3 (50.5)			-41.7 (33.6)
Aconcagua, Colchagua and O'Higgins dummy	74.8*** (26.4)		145.5*** (32.9)		44.2** (20.2)	70.3*** (26.7)
Aconc, Colch.and O'Higgins dummy after 31/5/58	-74.4* (40.2)		-87.6* (51.2)			-74.9** (38.1)
Other Central Valley dummy	28.9 (21.5)		63.7** (27.1)		25.4 (16.6)	-3.87 (27.8)
Other CV dummy after 31/5/58	-21.2 (34.1)		-36.8 (43.4)			3.28 (40.6)
Urban C V and Aconc, Colch.and O'Higgins dummy		68.5*** (17.4)				
Urban C V and Aconc, Colch.and O'Higgins dummy after 31/5/58		-60.1*** (26.6)				
Constant	146.3*** (47.2)	164.6*** (44.7)	391.3*** (54.1)	187.2*** (38.6)	152.4*** (39.6)	51.6*** (13.0)
Dummy after 31/5/58	-6.3 (72.3)	-8.8 (64.4)	-22.3 (92.1)	-47.1*** (13.0)	-47.4*** (13.0)	-24.9 (19.1)
# observ.	264	264	264	264	264	264
Adj. R ²	0.60	0.60	0.35	0.58	0.60	0.59

Notes: * denotes significance at 10%, ** at 5% and *** at 1%. Standard errors are indicated between brackets.

Table 10: Correlations between conservative votes, land concentration and the proportion of inquilinos in the agricultural labour force

Correlation over all provinces						
	Conserv. votes in 1955	Large farms in 1955	Inquilinos in 1955	Change in conserv. votes	Change in large farms	Change in inquilinos
Proportion of conservative votes in 1955	1					
Proportion of agric. area owned by large farms in 1955	.25	1				
Proportion of inquilinos in the agr. labour force in 1955	.60	.25	1			
Change in the prop. of conservative votes 1957-1961/65	-.67	-.33	-.67	1		
Change in the prop. of agr. area owned by large farms 1965-1955	-.47	-.26	-.60	.41	1	
Change in the prop. of inquilinos in the agr. labour force 1965-1955	-.53	-.08	-.83	.43	.44	1
Correlation over rural Central Valley provinces						
Proportion of conservative votes in 1955	1					
Proportion of agric. area owned by large farms in 1955	.64	1				
Proportion of inquilinos in the agr. labour force in 1955	.64	.80	1			
Change in the prop. of conservative votes 1957-1961/65	-.71	-.58	-.78	1		
Change in the prop. of agric. area owned by large farms 1965-1955	-.37	-.30	-.21	.36	1	
Change in the prop. of inquilinos in the agr. labour force 1965-1955	-.59	-.72	-.83	.47	.55	1

Appendix: Raw data used

province	worker	inqui	worker	inqui	active pop	right	radical	christ dem
	1955	1955	1965	1965	1952	1953	1953	1953
antofagasta	2510	30	2862	14	72264	13.5	18	10.6
tarapaca	5361	51	8767	138	38846	15.3	20.4	14.9
cautin	93093	5314	81338	3618	117453	15.8	15.5	2.6
magallanes	6175	48	7004	715	24305	1.9	26	0
aysen	8102	127	7982	96	9849	14.3	25.8	0
atacama	5407	570	6694	140	28040	0	34.8	19.4
osorno	23067	4001	25381	3314	44410	33.5	15.8	0.2
arauco	9810	1413	13097	1167	23691	27	10.5	0
concepcion	24555	2388	33088	1610	143890	22.9	9.3	0
valparaiso	19084	2679	27144	2872	187006	24.8	12	1.3
nuble	59344	6779	66370	5716	85587	30.8	13.2	0
valdivia	40723	6158	47928	3105	80513	23.7	10.5	6.8
santiago2-4	49969	12021	84347	11597	689412	15.5	9.8	2.4
llanquihue	34469	2554	34839	2729	47829	33.4	19.3	0
malleco	24444	2452	32641	1933	51466	28.2	15.7	0
biobio	29592	4153	45231	3619	45976	18.3	22.9	2.4
talca	28392	5310	44874	4751	61498	37.7	8.5	2.4
coquimbo	32969	3783	42550	2988	86112	35.4	24.2	4
linares	28760	4293	45588	4222	50584	23.6	12.9	1.3
curico	15123	2869	23397	3349	31501	36.2	15.4	0.3
chiloe	40376	359	43683	342	35285	29.5	27.3	6.8
maule	13781	1618	21014	1399	23729	35.9	3.5	1.7
ohiggins	29397	5940	58284	6400	80768	35.8	8	7
aconcagua	13662	2637	26121	2865	47229	38.6	14.6	0
colchagua	23699	4838	43556	5241	48550	61.1	5.5	0
chile	664240	82367	878780	73938	2155293	25.2	13.3	2.9

socialists	#voting	right	radical	christ dem	left	#voting	right	radical
1953	1953	1957	1957	1957	1957	1957	1961	1961
30.4	18810	13.3	36	16	15.3	18305	18.2	27.3
30.9	12796	16.6	32.7	13.4	23.7	14817	22.9	27.4
5.1	40927	19.8	22.4	15.1	5.6	46345	28.6	18.3
40.2	9783	20.4	9.3	0	44.1	9961	3.5	45
11.6	2312	25.1	29.3	20.2	0	2901	33	25.3
21.9	10332	26	29.5	23	19	13068	21.1	33.9
11.9	15706	27	32.1	7.3	14.1	17719	29.4	27.5
17.4	8469	28.2	45.8	0	25.8	9306	0	21.2
24.3	52063	28.6	23.3	7.6	24.7	60236	21.6	25.2
11.1	75099	30	20.1	5.3	10.3	83389	27.6	17.4
12.4	33673	31.4	36.9	4.9	6.7	38770	26.7	31.4
6.2	26537	32.4	22.6	6.7	7.4	30404	23.9	26.2
10.5	194873	31.7	17	16	12.2	144071	36.6	11.6
5.9	15631	34.7	23.4	11.6	0	17838	41.2	26.1
13.3	20711	35.3	20	0	7.1	24889	49.6	19
12.5	16850	38.8	32.3	0	13.5	18725	27	28.3
6.6	25632	39.3	20.5	8.5	7.8	29175	36	13.6
19.7	28174	41.4	32	6	8.3	33079	31.9	28.1
10.4	24582	43.1	11.7	9.8	3.2	27661	36.2	24.5
23.5	12420	43.2	20.5	0	12.1	14805	33.3	22
20.1	11080	43.7	27.2	3.6	11.8	12646	40.1	32.4
3.7	14023	47	12.6	0	2.1	14980	31.3	15.9
7.2	32038	47.4	10.5	8.9	5.6	34969	29.6	14.1
10.5	20166	58.2	18.3	5	1.9	23440	38.6	19.7
8.5	20669	70.2	13.7	1.8	4.8	22948	45.8	17.6
14.1	779174	33	22.1	9.4	10.7	878229	30.4	21.4

christ dem	left	right	radical	christ dem	left	right	radical	christ dem
1961	1961	1965	1965	1965	1965	1969	1969	1969
13.3	37.4	6.4	16.7	33.7	36.7	8.1	22	26.6
14.9	31.1	14	15.4	31.3	37.4	17.9	10.9	27
8.4	12.7	19.4	14.5	37.2	0	32.4	10.3	35.5
2.8	44.5	0	44.9	0	53	3.8	10.7	33.5
8	27.8	14.6	17.1	37.4	28.4	19.7	8	32.5
21	22.5	0	20.4	40.1	36.1	6.9	22	26.2
19	20	6.2	29.4	40.8	10.3	17.1	28	24.3
11.6	45.7	0	29.8	22.4	47.1	0	23.9	24.6
14.2	27	6	15.3	38.9	32.1	11	13.9	29.7
15.8	20.3	13	9.4	51.4	19.8	18.3	12.1	32.3
25.3	6.4	11.7	24.6	44.5	11.7	19.8	27.4	28.1
15.5	22.4	10.3	18.1	37	26.8	21.7	10.9	27.2
16.1	25	11.6	11	46.3	22.9	23.1	7.2	32.4
10.6	17.6	33.8	10.1	36.5	17.7	26	11.5	28.8
14.9	8.8	31.2	19.9	30.7	11.7	24.2	27.2	30.9
16.4	24.2	14.6	23.8	34.8	18	22.2	15.7	26.9
10.4	11.1	20.4	14.1	37.4	11.4	20.2	18.3	29.7
10	28.2	11.7	18.6	31.5	34.8	13.3	20	25.4
17.9	18.7	16.1	16.8	39.8	16.6	18.6	20.1	32.5
20.4	22.4	12.7	16.8	42.8	23.6	16.1	19	31.2
5.6	16.8	35.2	26.9	20.4	15.5	31.2	23.8	25.9
28.8	0	23.8	20.6	32.6	0	24.5	21.5	24.5
12.9	27.8	14	5.9	39.6	28.2	22.2	9.2	26.9
15.7	21.5	19	9.8	43.6	26.4	23.3	13.1	28.4
18.6	14.6	22.1	12.2	43.4	20	23.1	20.1	27.3
15.4	22.1	12.5	13.3	42.3	22.7	20	13.9	29.8

left	sharea55	sharea65	sharea30	sharea55	sharea65	sharea30
1969	farm>200	farm>200	farm>200	f>1000	f>1000	f>1000
37.2	22.9	51.6	48.8	0	31.2	0
35.8	90.9	93.6	79.2	77.8	86.6	65.5
9	39.3	40.6	72.1	14.4	12.7	47.5
47.4	98.8	99.8	99.8	97.8	98.7	99.7
34.9	86.7	98.9	98.9	41.8	83.8	91.5
41.2	87.9	99.3	98.6	72.2	99	96.7
24	68	80.3	85.2	37.5	43.1	58.5
46.6	65.2	57.9	83.9	42.9	33.3	61
48.8	50.1	34.7	78	23.5	14.6	32.8
30.8	83.7	77.8	89.6	60.4	51.7	78.9
20.3	61.7	55.6	73.1	38.4	34.7	50.2
34.1	72.3	65.7	86.7	47.7	42.2	67.1
27.5	87	77.7	95.6	73.3	58.2	86.4
29	58.7	59.7	77.5	40	23.4	49.3
14.5	70.7	55.9	85.6	48.8	31.2	62.2
29.5	72.8	62.2	83.3	48.3	38.3	63
16.6	76.4	71.5	89.3	55.4	52.4	66
37.5	96.3	95	98.3	92	89.6	95.1
25.9	66.7	63.7	81.8	39.3	38.5	59.4
28.7	73.2	67.3	81	52.6	39.1	62.2
13.8	56.6	70.4	81.8	41.4	48.3	63.1
0	52	45.8	62.6	18.2	18.7	33
32.3	73.6	53.1	91.8	49.3	25.6	82.5
28.8	94.9	88.9	94.6	91.1	78.9	92.9
24.1	79.7	71.7	83.6	56.4	47.7	67.7
28.1	71.4	69.6	84	50.4	48.9	65.3

Sources and methodology

- Columns 2-5: 'workers' and 'inquilinos' are the total number of agricultural workers and the total number of inquilinos working in the agricultural sector in 1955 and 1964-5 respectively. Source: III Censo Nacional Agrícola Ganadero, 1955, Vol. 1-6, Servicio Nacional de Estadística y Censos, República de Chile; IV Censo Nacional Agro-pecuario 1964-65, Vol. 1-26, Dirección de Estadística y Censos, República de Chile.
- Column 6: 'active pop' is the total number of persons aged above ... in 1952.
- Columns 7-29: 'right' is the proportion of votes in favor of the 'Conservador', 'Conservador Tradicionalista' and 'Liberal' parties in the total number of valid votes, in the parliamentary elections of 1953, 1957, 1961, 1965 and 1969 respectively; 'radical' refers to the proportion of votes in favor of the 'Radical' and 'Radical Doctrinario' parties in the total number of valid votes, in the parliamentary elections of 1953, 1957, 1961, 1965 and 1969 respectively; 'christ dem' is the proportion of valid votes in favor of the 'Falangia Nacional' in 1953 and 1957 and the 'Democrata Cristiano' party for the years 1961, 1965 and 1969; 'left' is the proportion of valid votes in favor of the 'Comunista', 'Socialista' and 'Socialista Popular' parties in 1953, 1957, 1961, 1965 and 1969 respectively. The regrouping of the political parties was made according to the methodology followed by Valenzuela (1978). '#voters' is the number of valid votes in the 1953 and 1957 elections. We chose parliamentary elections only because of their comparability across years and the stability of the major parties over the years. Presidential and Municipal elections in those years followed very closely the pattern followed by the parliamentary elections. The data relative to Santiago exclude the urban part of the Santiago province (Primer Distrito). Sources: Dirección del Registro Electoral, Elección ordinaria de senadores y diputados al Congreso Nacional (periodo consitucional 1953-7), Chile; Dirección del Registro Electoral, Variación Porcentual de los Partidos Políticos, 1957-1971, Chile.
- Columns 30-35: 'sharea55-farm>200', 'sharea65-farm>200', 'sharea55-f>1000' and 'sharea65-f>1000' represent the share of arable area operated by farms larger than 200 or 1000 hectares in 1955 and 1964-5 respectively. 'sharea30-farm>200' and 'sharea30-f>1000' represent the share in total agricultural area operated by farms larger than 200 or 1000 hectares respectively in 1929-30, so that it may not be directly comparable to the 1955 or 1965 figures. Another source of imprecision regarding the 1930 data. The data relative to 1930 may not be entirely precise because of the changes in administrative units in Chile. In 1927, President Ibanes decreed a new administrative division for Chile, which was divided into 16 provinces and two 'territories'. Subsequent legislation reinstated the seven provinces suppressed in 1927, and declared the two territories as provinces. To homogenize the information, the data from the 1929-30 census in terms of the final number of provinces were calculated by adding up the data from the from the departamentos that were later reinstated as provinces. The province of Valparaíso was formed by the departments of Quillota and Valparaíso, which were part of the province of Aconcagua. The province of O'Higgins was formed by the departments of Roncagua, Cochaposi and Compolican, which were part of the province of Colchagua. Curico was formed with

the departments of Curico and Mataquito, from the province of Talca. The province of Linares was formed with the departments of Loncomilla and Linares, from the province of Maule. The province of Arauco was formed with the departments of Arauco and Canete, from the province of Concepcion. The province of Malleco was formed with the departments of Angol, Traiguén and Victoria, from the provinces of Bio-Bio and Cautín. The province of Osorno was formed with the department of Osorno, in the province of Valdivia. Finally, the province of Llanquihue was formed with the department of Llanquihue, in the province of Chiloé. Sources: I Censo Nacional Agrícola Ganadero, 1930, Vol. 1-6, Servicio Nacional de Estadística y Censos, República de Chile; III Censo Nacional Agrícola Ganadero, 1955, Vol. 1-6, Servicio Nacional de Estadística y Censos, República de Chile; IV Censo Nacional Agro-pecuario 1964-65, Vol. 1-26, Dirección de Estadística y Censos, República de Chile.

