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Strategic Registration of Voters: the Chilean Case

Giacomo De Luca

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Abstract

In this paper we have investigated how the employment relationship, if it implies transfer of rents, may allow employers to control the voting behavior of their workers and lead to a strategic registration of voters. This is feasible when individual voting behavior is observable, as in open ballot elections. More easily controlled voters are more likely registered providing an even larger impact of vote controlling on election results. Making individual vote truly secret (for instance with the adoption of a secret ballot) significantly reduces this control. Moreover, we show that as long as electoral districts are heterogeneous enough, i.e. contain also free voters, any attempt to control votes on the basis of district aggregate results is bound to fail. 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: D72, D82, J41, K39

1. Introduction

In this paper we investigate the connection between employment and political control. Many employment relationships concede rents to workers, for instance, when worker's effort is imperfectly observable by the employer. It has been shown that these rents may allow employers, depending on the political institutions in place, to control their voting behavior (Baland and Robinson, 2007).

This occurs particularly in the absence of a secret ballot. When voting is not secret, it becomes feasible to coerce votes. Several cases have been reported in the literature in which employers control and supply the votes of their employees in exchange for money, favors or policies. In agrarian economies landlords influenced or even directly controlled the voting behavior of their workers sometimes crucially determining election outcomes where vote secrecy was not guaranteed¹.

In absence of an effective secret ballot, the ballots have frequently subtle but distinct marks across parties, such as paper thickness, color and size, from which the voter's decision is easily detected. Once this information reaches the local lords (in agrarian societies notably the landlords) punishment can be inflicted to the deviating voters.

Similar tactics were used and remain up to the present day in democratic third world countries. Baland and Robinson (2007) report few examples particularly focusing on Latin America². In their paper they set up a model to describe the mechanism, which allowed

¹ See for instance Kitson-Clark (1951) for Britain, O'Gorman (1989) for Andalucia, and Blackburn (1988), Gibson and Blinkhorn (1991), Bendix (1964), and Hamerow (1974) for Germany.

² For instance, in Colombia, an effective secret ballot (*tarjetón*) was legislated only in 1988 and introduced two years later in the 1990 election.

Chilean landlords to control the political behavior of their long-term tenants (*inquilinos*) and to derive an extra political rent from that control. In particular, they show using election results and population data from Chile that before the introduction of a secret ballot, occurred in 1958, landlords were able to control their workers and through this to influence election results to the advantage of the Conservative and Liberal parties. After 1958 the secrecy of the vote reduced this control and allowed the Christian Democrats first and the left parties few years later (in 1970 with Salvador Allende) to reach the government.

This paper originates as an extension or a qualification of their results. We argue that the effects showed in Baland and Robinson (2007) result largely from the existence of a bias in electoral registration. The power that landlords had on their lands led in fact to a distortion in registration incentives. On the one hand landlords were able to control *inquilinos*' votes. On the other hand they effectively deterred many potential voters among other farmers from registering under the threat of individual punishment. In particular, we show that if registration is costly, all *inquilinos* controlled by the landlord are relatively more likely to register because they fear to lose their job otherwise, whereas among other farmers only individuals who derive a sufficiently high utility from voting register.

We develop a simple model of labor contracting assuming moral hazard and limited liability. Landlords find it optimal to concede rents to workers to induce optimal effort in agricultural production. These rents place *inquilinos* in a privileged status (as compared to the outside option) and allow landlords to induce them to register in the electoral lists at their own cost and to vote for the landlord's preferred party. The price for the *inquilinos* to pay in case on non-compliance is the loss of the privileged status.

The theoretical model generates predictions about electoral registration, which can be tested by investigating the impact of the introduction of the secret ballot in 1958. This makes individual voting behavior and consequently any individual targeted punishment impossible, reducing landlords' control. Therefore, among *inquilinos* only enough motivated individuals will register and vote. In other words, the registration rate among *inquilinos* should reduce after 1958. On the other hand, other farmers have no longer to fear any punishment from the landlord when voting for their preferred party. Indeed, an increase in registration rate among other farmers should emerge. Both effects operate in the same direction and jointly reduce the bias in registration existing before 1958.

We show in section 5 that the empirical predictions of our model are consistent with the data. The incidence of secret balloting has been studied by the literature on political economy and institutions (e.g. Cox 1997; Persson and Tabellini, 2000, 2003; Acemoglu and Robinson 2006). However, the existing theoretical papers focus on different issues (mainly the efficiency of government policies) than those we study. Several studies have also investigated the impact of the cost of voting (including cost of registration) on turnout (e.g. Wolfinger and Rosenstone, 1980; Powell, 1986; Riker and Ordeshook, 1968), but to our knowledge no study relates this with the effects of an open ballot.

The case study literature on the secret ballot focuses mainly on coercion and corruption and has pointed out that this can lead to systematic biases in election results. In the Chilean case, scholars such as Loveman (1976), Scully (1992) or Bauer (1995), have reported the significance of *inquilinos* for the political power of the right parties (Conservative and Liberals) before 1958. They also suggest a link between the introduction of the secret ballot and the 1970 election result, which brought the socialist candidate Allende to the presidency. Recently, Baland and Robinson (2007) provided both the microfoundation for the reason why landlords control voting behavior and the first systematic tests for the effects of 1958 reform on electoral results in Chile. Our contribution here is to show both theoretically and empirically that the effect of an open ballot on electoral results may derive not only from the direct control of employers on their workers but also largely from a biased registration of

voters. Focusing on the Chilean case, not only *inquilinos*' votes were controlled by landlords. *Inquilinos* were also more likely to be registered as voters, increasing the share of total votes influenced by the landlords.

This paper relates also with the literature on moral hazard in team, which investigates optimal contracting in settings characterized by moral hazard issues, in which the principal can only observe agents' aggregate output (Holmstrom, 1982; Eswaral and Kotwal, 1985; Mathewson and Winter, 1985 and Lal, 1990; Demski and Sappington, 1991). Our contribution here is to set up a simple model which links standard moral hazard in agricultural production with moral hazard in team in voting behavior.

Indeed, once individual voting behavior is no longer observable, the landlord can still use the aggregate electoral output to build a collective punishment scheme after which everybody in the farm is punished if "too many wrong" votes emerge in the electoral district. We provide the conditions under which this represents the optimal strategy for the landlord.

The remainder of the paper is organized as follows. We present our theoretical model in Section 2. The existence of a bias in registration under open ballot elections is proven in Section 3. Section 4 discusses the effect of the introduction of a secret ballot and considers the issue of collective punishment. The predictions of the model are tested in Section 5 on Chilean data. Section 6 concludes.

2. The Model

We set up a simple model to describe the incentives at work. A unique electoral district is constituted by n farmers and one landlord, who have to register at a cost c in order to actually vote.

Only two parties exist in the political system: left (L) and right (R). The landlord prefers the right wing party whereas farmers prefer the left wing party with probability q , where q is uniformly distributed between 0 and 1, formally $q \sim U[0;1]$.

Both farmers and the landlord derive a positive utility σ from voting for their own preferred party. Moreover, the landlord derives a positive utility for each L voter either forced to vote for R or prevented to vote. Think of it as the marginal probability of R winning the elections and providing policies favorable to the landlord. Define Π the total profit derived by the landlord from these policies. Assume an electoral system in which the probability for party R

to form the government is determined by the share of votes gained, $\frac{v_R}{v_R + v_L}$, where v_R and v_L

are the number of votes cast for the R and L party, respectively. Deterring one L oriented

voter from voting provides an utility of $g = \frac{v_R \Pi}{n^2}$. Forcing a L voter to vote for R provides

instead a utility of $\frac{\Pi}{n}$ (notice that $g < \frac{\Pi}{n}$).

There exist two types of voters: a share h of highly motivated voters with a utility of voting equal to σ^h and $(1-h)$ scarcely motivated voters who derives a utility σ^l from voting, where $\sigma^h > \sigma^l > c$. It follows that in free unbiased democratic elections everybody in the district register and vote for her own preferred party. The political orientation and the level of motivation of the single farmers can not be deduced before observing the vote.

All farmers can gain an income \underline{w} from their activity on the land. A given amount of farmers denoted by i (with $i < n$) are hired by the landlord as long-term tenants. We make some assumption on the nature of this contract. Effort in production is not observable by the landlord and agricultural output is characterized by uncertainty. Furthermore, we assume limited liability of the long-term tenants entering the contract. These features lead to a classical moral hazard issue. The landlord has to offer a higher wage w_I to their tenants to

give them the incentive to provide the optimal effort in production³. We assume this rent to be larger than the highest utility of voting. Formally:

$$w_1 - \underline{w} > \sigma^h \quad (\text{A.1})$$

In a politically relatively inactive rural context that represents a reasonable assumption: poor farmers, living in a context in which no real political campaigning occurs, care possibly less about politics than about the economic situation of their household.

3. Registration in Open Ballot Regime

If the electoral system is characterized by an open ballot regime, voting behavior is observable at the individual level. That happens for instance when each party is allowed to print and distribute its own ballot showing different features (e.g. color, thickness, size). At the polls anybody can observe the ballot paper chosen and cast by any single voter, making vote secrecy virtually impossible.

We capture this feature in our model making individual voting behavior observable and consequently contractible. Moreover, we assume that the landlord has the power to inflict a punishment T , with unit cost, to the L voters in the district after observing their voting behavior. Of course, the maximum punishment implemented is $T=g$ and we assume that $\sigma^h > c+g$ and $\sigma^l < c+g$.

What would the optimal contract offered by the landlords under this scenario look like? As voting behavior is contractible the contract specifies that the long-term tenants will have to register in the electoral lists and vote for the landlord's preferred party, i.e. the R party.

Such a contract has to fulfill some conditions to be optimal. The conditions (incentive compatibility and participation constraint) to provide the right incentives to the farmers supporting the L party are as it follows:

$$w_1 - c \geq \sigma - c - T \quad \text{IC}_L$$

$$w_1 - c \geq \underline{w} + \max(\sigma - c - T; 0) \quad \text{PC}_L$$

Given (A.1) all L oriented farmers offer their labor to the landlord as the participation constraint is fulfilled even for the highly motivated L farmers.

Contract conditions for the farmers supporting the R party are instead:

$$w_1 + \sigma - c \geq \sigma - c \quad \text{IC}_R$$

$$w_1 + \sigma - c \geq \underline{w} + \max(\sigma - c; 0) \quad \text{PC}_R$$

All R oriented farmers in the district are willing to accept the contract. In fact they derive a higher utility as long-term tenants than working outside the farm. Since R farmers do not need any control or incentive to vote according to the landlord's will, we will focus in the remaining of the paper on L oriented long-term tenants only.

³ For simplicity we choose not to explicitly model the part of the contract dealing with moral hazard in production as it is well known and it does not add insights to our results.

Indeed, if the rent is high enough all farmers are willing to enter the contract with the landlord. Since the landlord can not select on the basis of political preferences, this implies in expected terms that qi long-term tenants will be L oriented and $(1-q)i$ will be R oriented.

Proposition 1: *given the rent conceded for optimizing agricultural production and observable individual voting behavior, landlords control freely the voting behavior of their long-term tenants.*

Proof: Recall that A.1 states that $\sigma^h < w_1 - w$, which implies that the IC_L and PC_L are always fulfilled. Consequently, it is costless for the landlord to force his L oriented farmers to incur the cost of registration and to vote for R. Observable individual voting behavior provides the landlord with the credible threat to fire and replace whoever deviates.

Corollary 1: *given A.1 a bias in registration occurs.*

Landlords register all long-term tenants as it does not cost anything to them and they get a return $\frac{\Pi}{n}$ for all votes shifted from L to R. In expected terms they get a utility of $\frac{qi\Pi}{n}$ from registering their L long-term tenants. Outside the farm, however, voting for L costs $c+T$, which is larger than the utility of voting for low motivated agents. All long-term tenants are registered whereas among other farmers L voters only high motivated farmers are. The bias follows.

4. Registration under Secret Ballot

Let us now consider the impact of the introduction of an effective secret ballot in the electoral district which makes it impossible to observe individual voting behavior. Aggregate results are still observable at the district level. It is straightforward that vote controlling can not be easily implemented as in the previous setting. However, the landlord can still set up a collective punishment scheme in which all her tenants are punished if “too many” L votes emerge in the district. In the same spirit the landlord could still find it profitable to announce a similar collective punishment to the farmers outside her farm. Notice, however, that the maximum profitable punishment that the landlord can announce outside the farm is now lower, as punishment in case “too many” L emerge has to be inflicted to everybody in the district (L and R oriented farmers, high and low motivated ones), whereas the aggregate expected gain for the landlords remains the same as before (i.e. $gq(1-h)(n-i)$). We first rule out the profitability of this strategy by assuming that

$$\sigma^l > c + \frac{q(1-h)v_R\Pi}{n(n+1)} \quad (\text{A.2})$$

meaning that the maximum credible punishment is not enough to deter for voting the less motivated agents. Any tougher punishment announced would be too costly for the landlord to implement and it is therefore not credible. Ruling out collective punishment on other farmers implies that outside the landlord’s farm everybody now registers and votes freely for her preferred party. We will show later on that relaxing this assumption will not qualitatively change our results.

Given all other farmers registered and voting freely in the district, can the landlord still implement a collective punishment scheme to control the vote of her tenants?

If we define the relative size of the two groups, tenants and other farmers, as $s = \frac{n-i}{i}$ contract conditions change accordingly:

$$\left(p(q < q^*) - \frac{x}{si} \right) w_2 \geq w_1 \quad \text{IC1}_L$$

$$\left(p(q < q^*) - \frac{x}{si} \right) w_2 - c \geq \left(p(q < q^*) - \frac{x+1}{si} \right) w_2 + \sigma - c \quad \text{IC2}_L$$

$$\left(p(q < q^*) - \frac{x}{si} \right) w_2 - c \geq \underline{w} + \max\{\sigma - c; 0\} \quad \text{PC}_L$$

where x represents the number of tenants voting for the L party.

IC1_L states that the landlord still has to give the minimum expected wage w_1 to push the tenants to provide the optimal effort in agricultural production. The term in brackets on the LHS represents the probability for the collective punishment scheme not to be implemented which depends on the threshold announced by the landlord (q^*) and on the number of tenants shirking on voting.

Given assumption (A.1) IC1_L is always binding before PC_L. This means that making sure that the transferred expected wage provides the right incentive in production implies that no screening can occur.

IC2_L states that in the optimal contract the tenant's utility of registering and voting for R has to be larger than the utility of voting for L, given the change in probability of getting punished implied by her action.

The landlord chooses q^* to maximize his utility.

Proposition 2: *the optimal punishment scheme chosen by the landlord is firing and replacing all tenants if more than $s i$ L votes show up in the electoral district ($q^* = 1$).*

Given the uniform distribution assumption⁴ on q , choosing $q^* < 1$ does not reduce the incentive of shirking on vote in IC2_L, but it increases the required wage to be provided for tenants to accept the contract (PC_L) and provide optimal effort (IC1_L). Consequently, the landlord will set $q^* = 1$. All her tenants are fired, if more than $s i$ L votes are found.

Replacing the optimal punishment scheme it simplifies the former conditions as follows:

$$\left(1 - \frac{x}{si} \right) w_2 \geq w_1 \quad \text{IC1}_L$$

$$\left(1 - \frac{x}{si} \right) w_2 - c \geq \left(1 - \frac{x+1}{si} \right) w_2 + \sigma - c \quad \text{IC2}_L$$

$$\left(1 - \frac{x}{si} \right) w_2 - c \geq \underline{w} + \max\{\sigma - c; 0\} \quad \text{PC}_L$$

⁴ A normal distribution assumption on q changes the situation. The best q^* equals $E(q)$ and the model develops differently. The results hold qualitatively though. However, no tractable analytical solutions were reached.

Given these conditions we can explore the optimal strategy for the landlord in several scenarios.

Proposition 3: for $s < \frac{w_1}{i\sigma^h}$ tenants' votes are perfectly controlled at no extra cost for the landlord.

Proof: If very few motivated farmers are left outside the landlord's farm in the electoral district, the probability for a tenant shirking on voting to be decisive for the implementation of the punishment scheme is relatively high. Consequently the announced collective punishment effectively deters vote shirking also for the most motivated L oriented tenants (in IC2_L). Since nobody shirks on voting, $x=0$. Given (A.1) PC_L and IC1_L are valid for the wage rate implemented in the open ballot scenario, w_1 . This implies that the landlord can control her tenants at no extra cost as stated in Proposition 3.

Corollary 2: in perfectly homogeneous electoral districts, i.e. where there is perfect matching between landlord's farm and electoral district, the introduction of a secret ballot does not reduce the control power of the landlord.

The last result directly follows Proposition 3, as in perfectly homogeneous electoral district $s=0$.

As soon as vote controlling is costly for the landlord he optimizes choosing the most profitable option between costly control and no control, the latter strategy being setting the wage to w_1 , the level implemented in the open ballot scenario which optimally solved the moral hazard in production⁵.

Proposition 4: for $s > \frac{w_1 + q/n}{i\sigma^h}$ vote controlling is no longer profitable for the landlord, who will stop any vote control device. Registration bias disappears and registration rate increases.

Proof: Consider IC2_L. If enough other farmers register and vote the probability of being decisive for the implementation of the punishment scheme becomes so low that is not possible to deter the highly motivated L oriented tenants from vote shirking even when the entire extra rent derived from vote controlling is transferred to the tenants by the landlord. The landlord sets the wage rate to the optimal level w_1 , and refrains from any vote controlling activities. Consequently, everybody in the district registers and votes for her preferred party.

Let us now relax (A.2). That implies that the landlord's announced collective punishment of all farmers outside his farm in case "too many" L emerges from election is now credible.

⁵ We explore the option of partially controlling the pool of tenants in a companion paper on collective control. However, for the objective of this paper, focusing mainly on the registration process, we assume that partial control is not feasible. This assumption does not qualitatively change the results. A sufficient condition for

partial control not to be feasible is $s > \frac{w_1 + q(1-h)/n}{i\sigma^l}$

Recall that by assumption highly motivated farmers can not be deterred from registering and voting for their preferred party. The best result that the landlord can achieve is to announce a collective punishment which deters low motivated L voters from registering. In the economy of the model this would slightly reduce the number of other farmers registered in the district, making it a little easier for the landlord to control her tenants' votes. In fact, in this case

tenants' vote control is no longer optimal for the landlord if $s > \frac{w_1 + q/n}{i(1 - q + hq)\sigma^h}$. Notice that if s is below this threshold value, the bias in registration holds. Indeed, all tenants would register and vote for R whereas among other farmers low motivated L farmers would not register.

The previsions of the model are reasonably clear: when voting behavior is individually observable a landlord who concedes a large rent to her tenants to provide the optimal incentive in production can dispose of their vote. Since landlords have positive gains from letting them vote for R, they will register all their farmers to capture this political extra rent. Provided that landlords can inflict a punishment to L voters, a bias in registration towards tenants occurs. After an effective secret ballot is introduced, such bias disappears only in heterogeneous electoral district, in which enforcing a collective punishment scheme is not optimal for the landlords. The remainder of this paper tests these previsions using the 1958 Chilean electoral reform as a natural experiment.

5. A Study of Strategic Registration: 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 significant military or other intervention. During the first period the electoral process was controlled by the municipal authorities who usually strongly favored the central government. The 1834 electoral legislation required literacy and a minimum rent to register in the electoral lists.

The rent requirement was lifted in 1874, extending the suffrage to the entire literate male population. The same year the electoral process including registration supervision was transferred from the municipal authorities to a committee of taxpayers chosen among the 40 major taxpayers at the district level, the *Junta de Mayores Contribuyentes* (Boron, 1971).

After a period were again municipal authorities controlled elections (1891-1912) spread corruption and fraudulent behavior, proven by registered voters being more than population eligible for voting (Nazer and Rosemblit, 2000), brought to a new reform in 1912-1914 which re-imposed the committee formed by the largest taxpayers (*Asamblea de Mayores Contribuyentes*) as the elections supervision body, ensuring elections control to local oligarchies (Salazar and Pinto, 1999). A unique electoral list was formed to be renewed every 9 years. This drastically reduced by more than two third the number of registered voters as shown in Table 1 (Nazer and Rosemblit, 2000).

A new political constitution was introduced in 1925. Concerning electoral legislation, a permanent electoral registration office was created, which would be suspended only six months before each election. Before 1925 offices were open only 10 days from 10:00 to 14:00 during the year before the elections. Most eligible voters were not even aware of the opening times unless they had strong personal political engagement. Elections supervision was given to a new body formed by ex high institutional personalities (*Tribunal Calificador de Elecciones*) and Armed Force members were excluded from registration lists. Thus, theoretically the largest taxpayers were substituted by public officers and notables in elections supervision. However, the same law insisted that they should preferably be proprietors,

professionals and rich in general, ensuring to landlords a firm hold on elections (Gamucio and Vanquez, 1988; Valenzuela, 1998).

Table 1: Chilean national registration rate in the XX century

Election	Population	Registered Voters	Registration Rate (%)
1900	2,959,000	281,351	9.54
1903	3,065,000	340,106	11.1
1906	3,175,000	409,635	12.9
1909	3,295,000	493,474	14.9
1912	3,421,000	593,234	17.3
1915	3,553,000	184,307	5.2
1918	3,690,000	341,872	9.3
1921	3,839,000	380,000	9.9
1925	3,929,000	302,142	7.7
1932	4,495,000	429,772	9.6
1937	4,842,000	475,354	9.8
1941	5,149,000	575,625	11.2
1945	5,541,000	641,495	11.6
1949	5,962,000	591,994	9.9
1953	6,462,969	1,106,709	17.1
1957	7,062,403	1,284,154	18.2
1961	7,765,900	1,858,980	23.9
1965	8,509,717	2,920,615	34.3
1969	9,198,978	3,244,892	35.3

Source: Correa et al. 2001 and Nazer and Rosemblit, 2000.

Perhaps not surprisingly, congressional representation was heavily weighted in favor of rural districts where the peasantry historically formed a pliable and controllable mass base for conservative and reactionary groups (Hellinger, 1978). Landlords systematically controlled rural voting until the late 1950s (Millar, 1981). In 1958 control of voting was endemic in the traditional oligarchic provinces of the North and Urban Central Valley provinces characterized by long term patron-client relationships (*inquilinaje* system).

There is a consensus amongst historians, political scientists and sociologists about how this system functioned (see Kaufman, 1972; Bauer, 1975; Loveman, 1976; Petras and Zeitlin, 1968; and Scully, 1992). 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 employers would go vote with all their employees.

Valenzuela (1998), even if not entirely supporting the hypothesis of total control, confirms that the landlords would typically organize a party where the preferred candidates were presented to their peasants. On the election day landlords would then organize the transport to the cities or villages, where polls were located.

This pervasive control was a result of different peculiar features of the Chilean countryside. The first determinant was the lack of secrecy of vote. Prior to the reforms of 1958, parties issued their own ballot papers. Thus to vote for the Socialist party, a voter had to request the Socialist ballot which made it relatively easy to determine his voting behavior.

Secondly, in line with our model, the control of rural votes by landlords was also made possible by the relatively good working conditions of the long term tenants (*inquilinos*)

compared to the possible alternatives. In fact, most *inquilinos* judged their welfare on the estate superior to life outside or in the nitrate mines (Bauer, 1995; Kay, 1982; Friedman, 1979).

The threat to be evicted provided probably a strong enough incentive for *inquilinos* to vote for their landlord's preferred candidate. In fact, "the relation between patron and worker [inquilino] was defined by a total authority on the one side and total dependence and obedience on the other" (Kaufman, 1972, p.22).

This incentive was even reinforced from the political isolation of the countryside and from the almost unchallenged power that landlords enjoyed on their lands where they dominated the local government and the police force (Swift, 1971; Bauer, 1975; Petras and Zemelman, 1973). They would throw out of their land tenants and peasants voting for the left, or simply for the non-designated candidate as well as anybody trying to influence their peasants' political opinion (Loveman, 1976).

Moreover, the 30s and 40s economic crisis led to a "tacit pact" in which landlords guaranteed low price agricultural products for the expanding cities and in change obtained from center and left parties low or no political spread of the new ideologies on their lands. Accordingly, left parties were then mainly urban organizations and Christian Democrats became interested in the countryside only after 1958 (Loveman, 1976).

Until 50s the urban-rural border was generally accepted as a border for political competition. "With the rural workers considered beyond the pale of legitimate competition, none of the parties, including those of the left, were in a position to acquire a large, organized mass base of support" (Kaufman, 1972, p. 18). "The landowners' [...] willingness to acquiesce in the limited welfare demands of salaried and blue-collar strata [...] virtually assured the preservation of their rural prerogatives during the years between 1920 and 1950. Thus, by an agreement which was sometimes tacit and sometimes explicit, centrist and leftist groups abandoned efforts to shake the rural authority structure" (Kaufman 1972, pp. 25-26).

Well into the 1950s the countryside was outside the bounds of legitimate party competition (Loveman, 1976).

Quoting directly Loveman: "In these conditions [economic crisis] the bourgeoisie decided again and again to oppose increases in agricultural prices. The bourgeoisie was disposed to find ways to compensate the landowners. The nature of these measures depended upon political exigencies but there was one means which was almost always constant: repression of the rural union movement" (Loveman, 1976, p. 203).

However, this pervasive control was bound to change eventually. There were several important electoral reforms undertaken in Chile Between 1949 and early 1960s.

In 1949, Law N° 9.292 extended the franchise to women, who voted first for municipality elections, then for congressional contests in 1951, and finally for presidential race in 1952. This determined a first sharp increase in size of the electorate (see Table 1). However, this increase in registration does not seem to have significantly changed the control of votes on the countryside (Baland and Robinson, 2007).

The most important reform was Law 12.889 promulgated on May 31st 1958 (see Cruz Coke, 1984, pp. 27-29 for a discussion of this law) and its most important aspect was the introduction of the *cedula unica* (the unified ballot). After 1958, the voter received a single, numbered, official ballot, which contained all party slates for any single type of election in his district (Nazer and Roseblit, 2000).

This had an immediate impact on the balance of political power in Chile, reducing the control of votes on the countryside and electoral fraud in general (Loveman, 1976; Faúndez, 1988; Petras and Zemelman, 1973; Borón, 1971; Kaufman, 1972). Baland and Robinson (2007) show that this reform coincides with a shift in political support from the landlords' traditional party to other center and left parties, particularly in rural regions.

If the lack of secret balloting had played an important role in guaranteeing democratic stability in Chile since the 1930s, why was the secret ballot introduced? A plausible reason for this is a deliberate attempt to disrupt the existing political equilibrium by Ibáñez, elected President few years before supported by a heterogeneous coalition and with an anti-politics platform. Ibáñez intended to form a new political movement and the introduction of the secret ballot, with its expected shock on voting in the countryside, might have been a calculated gamble. Another reason might derive from the victory of the right parties in 1957 and the consequent increase in personal power and popularity of Jorge Alessandri. That might have pushed Ibáñez to reject the coalition with the right wing of his constituency and to rely more on the leftist parties' support (Correa et al., 2001b). The 1958 reform was heavily supported by leftist parties (FRAP along with the Radical and Falange Nacional) which saw in the elimination of bribery and vote control the opportunity to increase popular participation and consequently their power (Parrish et al., 1970).

Finally, a potential explanation is provided by the words of a Colombian Senator facing an analogous law project more recently: "To go against public opinion is to commit [political] suicide" (Shugart et al., 2006, p.20). In other words, actors do not support reform for its own sake but fear the political consequences of blocking it (Shugart et al. 2006).

Whatever the rationale beyond the reform, its effects were dramatic: landlords could no longer observe individually the voting behavior of their peasants and saw their political power reduced in the countryside. Moreover, that immediately increased electoral participation. The proportion of population registered increased from 18% in 1957 to almost 24% in 1961 (Faúndez, 1988; see also Table 1).

The largest increase in registration occurred however after the adoption of the 1962 electoral reform. The new Law on one hand increased the social benefits attached to registration (e.g. access to services in banks, credit institutions and government entities, and documents to leave the country) and fixed tougher sanction for non registration (up to sixty days in prison, or a fine of half *scudo* a day, and loss of civil rights for ten times the length of imprisonment), and on the other hand "[...] simplified significantly the registration process making it easier for all citizens, whatever their work schedule and working conditions, to comply with the legal requirements" (Borón, 1971, p. 406; Gil, 1969).

Thus, registration lists were made permanent and would be declared null only if more than fifteen names had been dropped for death, change of residence, or similar reasons. Opening hours of registration offices (which represented 4% of work time in the 50s) were significantly extended making it finally possible for the working class to comply with their electoral duty (Burnett, 1970; Gil, 1969).

The joint effects of these two reforms would be dramatic both on the size of the electorate and on electoral results. The first elections following the reform led the Christian Democrats to the Presidency although Faúndez (1988) claims that the result was heavily influenced by U.S. financing which covered apparently more than half of the total budget of the Christian Democratic candidate Eduardo Frei. However, in the 1965 Parliamentary election and even more in the 1970 Presidential election the change in the electorate became evident with the victory of the socialist candidate Salvador Allende.

Baland and Robinson (2007) focus their study on the change in electoral results. We will instead concentrate on the radical change in registration. We argue in fact that it was not only the freed *inquilinos'* votes which mattered for the change, but the increasing electorate that found it profitable to register and vote, once no punishment from the landlords was feasible anymore.

5.1 The Data

We searched for data on the voting behavior in Chile before and after the 1958 electoral reform. We focused on parliamentary elections occurred in 1957, in 1961 and in 1965. We collected data on the number of voters at the municipality level which represents the smallest electoral unit for these three elections. To collect information in the *inquilinos* and other farmers by municipality we used the agricultural census which was run in 1935, in 1955 and in 1965. We used the last two data period to derive the number of *inquilinos* and other farmers in 1957 and 1961 by interpolation. Secondary historical sources were checked to confirm the general diminishing trend in the *inquilinos* population throughout the country starting from 1935 (Kay, 1982; Bauer, 1975). The 1935 information was used to run some robustness checks on our results. Since electoral registration was theoretically open to literate citizens only, we collected data on literate population and total population by municipality. We referred to the national census which occurred in 1952, in 1960 and in 1970. We used exponential interpolation to derive literate and total population for the years in which the elections under study occurred (aggregate figures from national statistics seem not to contradict this choice – see, for instance, Mamalakis, 1980 and Correa et al., 2001). Given inconsistency in the denomination of municipalities across the three data sources (National Census, Agricultural Census and Electoral Administration), we dropped 56 ambiguous observations. We end up with 239 observations with complete information for the three periods.

Finally, since our story mainly focuses on the rural context, we will mainly concentrate on the rural sub-sample in which the two mostly urban provinces of Chile (Santiago and Valparaiso) are dropped.

5.2 The Empirical Models

The model set up in the theoretical part of this paper shows that given the existence of a set of conditions, i.e. privileged status for tenants engaging in a contract with the landlord (*inquilinos*), observable individual voting behavior and feasible punishment of “wrong” voters by the landlord, a bias in registration would emerge, in which tenants are more likely to be registered than other farmers. To test this prediction we want to compare the registration rate across groups. With the available we can not test that directly, as we do not have the data on the registration *by* worker category. Instead, we can compare the specific registration rate found among *inquilinos* richer municipalities as compared with municipality with relatively less *inquilinos*. In other words, we can test if a municipality with relatively more *inquilinos* was systematically showing a higher registration rate.

The second prediction of the model was that unless the electoral district is too homogeneous, i.e. it is constituted by almost exclusively *inquilinos*, after an effective secret ballot is introduced the bias disappears. We will test this by comparing registration rates before and after the 1958 reform. What we expect is that after 1958 the gap in registration rates should reduce significantly. In fact, we might expect that the bias does not fully disappear in 1961, as this was the first election following the reform. People typically need some time to adjust to the new situation. It is therefore reasonable to expect that not every landlord stopped registering *inquilinos* anticipating the difficulties in controlling their vote, and in the same spirit it is possible that many farmers were not confident enough in the secrecy of the vote to register in 1961. The following election in 1965 might indeed have been a better test for our prediction. However, the 1962 reform makes it impossible to isolate the effects of the secret ballot only. Theoretically both reforms reinforce each other in reducing even further the previously existing bias.

Let us now state our structural model in formal terms:

$$V_{it} = r_t^I l_{it}^I I_{it} + r_t^A l_{it}^A A_{it} + r_t^O l_{it}^O O_{it} \quad (1)$$

where r_t^K are time and group-specific registration rates with $K=I, A, O$ (*inquilinos*, farmers, others in the district, respectively); K_{it} is the number of K agents at time t in municipality i , and l_{it}^K represents the group-specific literacy rate at time t in municipality i . What this model says is that the number of registered voters in municipality i at time t equals the sum over K of the number of K agents in municipality i at time t times their specific literacy rate (which gives the pool of local K agents who have the right to register and vote) times their specific registration rate (which equals the actual registered K agents in the municipality). We tried several specifications of the model to check for robustness. In the first specification which we consider the best among the ones proposed we need the following assumption:

$$l_{it}^I \leq l_{it}^A \quad (A.3)$$

Take the extreme case in which:

$$l_{it} = l_{it}^I = l_{it}^A = l_{it}^O$$

Notice first that:

$$L_{it} = P_{it} \cdot l_{it}^I = P_{it} \cdot l_{it}^A = P_{it} \cdot l_{it}^O$$

If we divide both sides of equation (20) by L_{it} we obtain our Model I:

$$\frac{V_{it}}{L_{it}} = r_t^I \frac{I_{it}}{P_{it}} + r_t^A \frac{A_{it}}{P_{it}} + \varepsilon_{it}$$

Adding the interaction terms capturing the effects of the 1958 reform and the 1962 registration reform, we obtain the basic model I which we will estimate.

$$\frac{V_{it}}{L_{it}} = \beta_1 \frac{I_{it}}{P_{it}} + \beta_2 \frac{A_{it}}{P_{it}} + \beta_3 \frac{I_{it}}{P_{it}} * t_{61} + \beta_4 \frac{I_{it}}{P_{it}} * t_{65} + \beta_5 \frac{A_{it}}{P_{it}} * t_{61} + \beta_6 \frac{A_{it}}{P_{it}} * t_{65} + \beta_7 + \varepsilon_{it} \quad (2)$$

The hypothesis is that $\beta_1 > \beta_2$ (bias in registration before 1958), and that $\beta_3 < \beta_5$ and $\beta_4 < \beta_6$ (reduction of the bias after the introduction of the secret ballot).

Notice that we developed the model starting from the extreme assumption $l_{it} = l_{it}^I = l_{it}^A = l_{it}^O$. If $l_{it}^I < l_{it}^A$ the estimated β_1 would be downwardly biased. In other words, that would reduce the bias in registration that emerges from the estimation.

It is appropriate to test our identification assumption. In particular, given the results we expect, we want to make sure that the results are not driven by a larger literacy rate among *inquilinos* in the period before the introduction of the secret ballot, in which case we would observe an apparent bias in registration. Moreover, since we expect the bias to disappear after the 1958 reform, we should make sure that this does not result from a rapid increase in literacy among other farmers as compared to *inquilinos*. Formally, our assumption holds if $\beta_1 \leq \beta_2$, $\beta_5 \leq \beta_3$ and $\beta_6 \leq \beta_4$ in the following equation.

$$\frac{L_{it}}{P_{it}} = \beta_1 \frac{I_{it}}{P_{it}} + \beta_2 \frac{A_{it}}{P_{it}} + \beta_3 \frac{I_{it}}{P_{it}} * t_{61} + \beta_4 \frac{I_{it}}{P_{it}} * t_{65} + \beta_5 \frac{A_{it}}{P_{it}} * t_{61} + \beta_6 \frac{A_{it}}{P_{it}} * t_{65} + \beta_7 + \varepsilon_{it} \quad (3)$$

We test equation (3) using a municipality fixed effect specification to control for local municipality specific unobserved effects. The results are reported in Table 2 for the entire sample and for the rural sample only.

Table 2: Test on literacy rate across groups and time.

Dep. Var.=L/P	Municipality FE Entire sample (n=717)		Municipality FE Rural Sample(n=570)	
	β	<i>t</i> -statistics	β	<i>t</i> -statistics
I/P	-0.42	-2.38	-0.4	-2.13
A/P	0.048	1.58	0.01	0.33
I/P*61	0.07	1.07	0.16	1.52
A/P*61	0.001	0.10	0.01	0.75
I/P*65	0.16	2.36	0.37	3.50
A/P*65	0.006	0.40	0.025	1.43
t_{61}	0.06	21.82	0.056	15.68
t_{65}	0.12	46.22	0.12	33.13
<i>constant</i>	0.64	117.33	0.63	96.33

Notes: I=inquilinos, A=other farmers, L=literate population, P=total population

As expected $\beta_1 \leq \beta_2$, indicating that *inquilinos* richer municipalities could not have higher registration rate deriving from higher local literacy rate. Indeed, if anything, we should observe a lower registration rate among *inquilinos* rich electoral districts, in case no different incentive was present. Overtime literacy rate increased among all rural agents in Chile, but more rapidly in municipalities with relatively more *inquilinos*. Accordingly, we should expect the registration rate to increase more sharply in those *inquilinos* richer municipalities, if registration depended genuinely on literacy only.

A somehow stronger assumption is needed to specify our two alternative models: model II and model III:

$$\frac{V_{it}}{P_{it}} = r_t^I l_{it}^I \frac{I_{it}}{P_{it}} + r_t^A l_{it}^A \frac{A_{it}}{P_{it}} + \varepsilon_{it} \quad (4)$$

$$\frac{V_{it}}{L_{it}} = r_t^I l_{it}^I \frac{I_{it}}{L_{it}} + r_t^A l_{it}^A \frac{A_{it}}{L_{it}} + \varepsilon_{it} \quad (5)$$

In this setting we can not isolate the registration rate from the group specific literacy rate. In fact, what we estimate is the product of the specific literacy rate times the registration rate. Interpreting the relative magnitude of the estimated coefficients in terms of relative magnitude of the registration rates among *inquilinos* and other farmers implies that we implicitly assume a *homogeneous literacy rate across K at time t and across time*. The results of the test on the literacy rate run above indicate that *inquilinos* rich municipalities show a significantly lower

literacy rate. This means that model II and model III will probably lead to an underestimation of the bias in registration predicted for the 1957 elections. Moreover, literacy rate is not constant over time and it increases more among *inquilinos* rich municipalities. This will tend to decrease the reduction of the bias detected in the estimation for 1961 and 1965 elections. This derives from the fact that after 1958 the registration rate is predicted to decrease among *inquilinos* whereas the literacy rate among *inquilinos* increases (see Table 1). The two effects might even cancel each other.

As for model we add the interaction terms to detect the change in registration rate over time obtaining the estimated equations:

$$\frac{V_{it}}{P_{it}} = \beta_1 \frac{I_{it}}{P_{it}} + \beta_2 \frac{A_{it}}{P_{it}} + \beta_3 \frac{I_{it}}{P_{it}} * t_{61} + \beta_4 \frac{I_{it}}{P_{it}} * t_{65} + \beta_5 \frac{A_{it}}{P_{it}} * t_{61} + \beta_6 \frac{A_{it}}{P_{it}} * t_{65} + \beta_7 + \varepsilon_{it} \quad (6)$$

$$\frac{V_{it}}{L_{it}} = \beta_1 \frac{I_{it}}{L_{it}} + \beta_2 \frac{A_{it}}{L_{it}} + \beta_3 \frac{I_{it}}{L_{it}} * t_{61} + \beta_4 \frac{I_{it}}{L_{it}} * t_{65} + \beta_5 \frac{A_{it}}{L_{it}} * t_{61} + \beta_6 \frac{A_{it}}{L_{it}} * t_{65} + \beta_7 + \varepsilon_{it} \quad (7)$$

The hypothesis is that $\beta_1 > \beta_2$ (bias in registration before 1958), and that $\beta_3 < \beta_5$ and $\beta_4 < \beta_6$ (reduction of the bias after the introduction of the secret ballot).

5.3 The Basic Results

We tend to favor a municipality fixed-effect framework for our estimation as it controls for municipality specific unobservable effects. To test our choice we run first a Breusch-Pagan test (Green, 2000), which test for the existence of residual structure in the municipality specific component of the error, after we control for provincial specific effects (provincial dummies) in a POLS estimation of model I. The test strongly rejects the null that the variance of the municipality specific component of the error is zero. That indicates that an error component model performs better than POLS. Running a generalized Hausman test indicates a municipality fixed-effect model as the most appropriate.

We can now proceed to estimate our models, starting from model I. We report in Table 3 the results of the estimation run on the full sample and allowing different effects for urban and rural context in Table 4.

Table 3: Model I using the full sample (n=717)

Dep. var. = $\frac{V_{it}}{L_{it}}$	Municipality FE Without provincial dummies		Municipality FE With provincial dummies	
	β	<i>t</i> -statistics	β	<i>t</i> -statistics
I/P	2.13	4.03	1.13	2.22
A/P	-0.022	-0.24	0.23	2.20
I/P*61	0.04	0.25	0.14	0.63
A/P*61	-0.08	-1.91	-0.094	-1.93
I/P*65	0.559	2.80	0.23	1.00
A/P*65	-0.19	-4.35	-0.18	-3.66
<i>t</i> ₆₁	0.065	8.16	0.11	2.11
<i>t</i> ₆₅	0.145	18.29	0.13	3.28
<i>constant</i>	0.175	10.74	0.15	4.32

Table 4: Model I splitting the sample in urban (n=147) and rural (n=570)

Dep. var. = $\frac{V_{it}}{L_{it}}$	Municipality FE Without provincial dummies		Municipality FE With provincial dummies	
	β	<i>t</i> -statistics	β	<i>t</i> -statistics
Rural I/P	1.99	3.92	1.08	2.01
Rural A/P	0.37	3.79	0.43	3.53
Rural I/P*61	-0.52	-1.86	-0.43	-1.09
Rural A/P*61	-0.16	-3.83	-0.19	-3.13
Rural I/P*65	-1.00	-3.48	-0.55	-1.40
Rural A/P*65	-0.36	-7.89	-0.33	-5.12
Urban I/P	0.46	0.29	1.91	1.19
Urban A/P	0.13	0.38	0.20	0.56
Urban I/P*61	0.43	0.57	0.12	0.15
Urban A/P*61	-0.04	-0.24	0.15	0.83
Urban I/P*65	0.34	0.40	-0.47	-0.50
Urban A/P*65	0.28	1.73	0.23	1.27
<i>t</i> ₆₁	0.08	9.55	0.07	1.42
<i>t</i> ₆₅	0.17	21.69	0.16	3.99
<i>constant</i>	0.12	6.98	0.13	3.40

Notes: I=*inquilinos*, A=other farmers, L=literate population, P=total population

A look at the results in Table 4 reveals as expected that the phenomenon we are trying to investigate was mainly concentrate on the countryside. All coefficients concerning the urban context are not statistically different from zero. We therefore focus on the rural sub-sample in the remainder of this work. In Table 5 Model I is estimated on the rural sub-sample only.

Table 4: Model I using the rural sub-sample (n=570)

Dep. var. = $\frac{V_{it}}{L_{it}}$	Municipality FE Without provincial dummies		Municipality FE With provincial dummies	
	β	<i>t</i> -statistics	β	<i>t</i> -statistics
I/P	1.94	3.76	1.08	2.00
A/P	0.36	3.63	0.43	3.50
I/P*61	-0.68	-2.34	-0.43	-1.08
A/P*61	-0.20	-4.29	-0.19	-3.11
I/P*65	-0.96	-3.21	-0.55	-1.38
A/P*65	-0.35	-7.02	-0.33	-5.07
<i>t</i> ₆₁	0.09	8.94	0.08	1.92
<i>t</i> ₆₅	0.17	17.15	0.12	2.37
<i>constant</i>	0.12	6.82	0.14	4.60

Notes: I=*inquilinos*, A=other farmers, L=literate population, P=total population

As expected $\beta_1 > \beta_2$. This result varies in magnitude between the different specification and samples used but it is very robust. Indeed, before the 1958 reform *inquilinos* relatively rich municipalities also show systematically a larger registration rate. This seems to confirm that landlords managed to control their tenants' votes and were able to deter effectively low motivated agents in the countryside from registering.

Clearly, municipalities with a relevant presence of *inquilinos* had relatively more voters, which is exactly what our model predicts.

Let us now focus on the effects of the introduction of the secret ballot occurred in 1958. This is captured by the group-specific terms interacted with the time dummies. As the phenomenon described by our theoretical model applies almost exclusively on the rural setting, we shall rely more on the results of the estimation on the rural sub-sample. Several reasons motivate this choice. First, recall that we assumed in our model a relative freedom for the landlord to selectively punish L voters. This can be a reasonable assumption in the rural setting in which the landlord represented often the only authority in situ and could frequently dispose of the public force for her purposes. However, this is certainly less the case close to the urban centers. Secondly, according to our model the bias gets wider in electoral districts in which a large share of other farmers are politically low motivated. This is a standard characteristic of relatively isolated rural regions, in which political activism is costly and easily contrasted by local interests. Usually the closer one gets to large urban settlements the larger the interest and the participation of the population to politics. We focus therefore in the remainder of the paper on results derived from the rural sub-sample.

Looking at Table 4 we observe that indeed after the introduction of the secret ballot the bias in registration reduces. In both specifications with and without provincial dummies $\beta_3 < \beta_5$ and $\beta_4 < \beta_6$, as we expected. Interestingly, when provincial dummies are entered in the regression the two coefficients capturing the reduction in the registration rate in *inquilinos* rich municipalities lose significance. The reason is probably the relatively high correlation between the share of *inquilinos* on the population and the provincial dummies. A way of testing for this is to regress the share on *inquilinos* on the set of provincial dummies interacted with year dummies. Such an exercise results in highly significant coefficients and a $R^2=0.51$, which confirms our worries. That leads to a problem of multicollinearity which typically increases the variance of the estimated coefficients which we observed. Since we are estimating our model in a municipality fixed-effect framework, we are already controlling for unobservable local specific heterogeneity. Moreover, depending on the model only 3 out of 75 provincial dummies are significantly different from zero. Consequently, we argue that the specification without provincial dummies can be trusted. Notice that as anticipated the bias reduces significantly in 1961, but it does not disappear completely. We argue that this followed the significant reduction in control power for landlords who could no longer individually observe voting behavior and were not able to set up a profitable and credible collective punishment scheme, given the large number of other farmers registered in the electoral district (even assuming all *inquilinos* were registered in 1961, only 22 out of 190 rural municipalities displayed a share of *inquilinos* over total registered voters larger than 0.25 and the median value was 0.087).

In 1965 the bias reduces further and basically disappears. Unfortunately, we are not able to tell what part of this last result is determined by the sharp increase in other farmers' registration after the 1962 reform, and what part of it follow instead from the complete realization of the secret ballot reform after one period of adjustment. It is most likely a joint effect: recall that according to our model increasing the number of other farmers registered in the district reduces dramatically the profitability of any collective punishment scheme making it eventually not optimal for the landlord.

As a robustness check we report in Table 5 the results of the estimation of model II and in Table 6 the results obtained from model III.

Table 5: Model II using the rural sub-sample (n=570)

Dep. var. = $\frac{V_{it}}{P_{it}}$	Municipality FE Without provincial dummies		Municipality FE With provincial dummies	
	β	<i>t</i> -statistics	β	<i>t</i> -statistics
I/P	1.39	3.73	0.74	1.92
A/P	0.286	4.00	0.31	3.61
I/P*61	-0.42	-2.03	-0.26	-0.97
A/P*61	-0.16	-4.85	-0.15	-3.45
I/P*65	-0.57	-2.67	-0.43	-1.60
A/P*65	-0.296	-8.26	-0.28	-6.18
<i>t</i> ₆₁	0.08	11.04	0.07	2.68
<i>t</i> ₆₅	0.16	22.90	0.15	5.84
<i>constant</i>	0.06	4.67	0.07	2.43

Notes: I=*inquilinos*, A=other farmers, L=literate population, P=total population

Table 6: Model III using the rural sub-sample (n=570)

Dep. var. = $\frac{V_{it}}{L_{it}}$	Municipality FE Without provincial dummies		Municipality FE With provincial dummies	
	β	<i>t</i> -statistics	β	<i>t</i> -statistics
I/L	1.07	3.71	0.697	2.38
A/L	0.27	4.82	0.29	4.57
I/L*61	-0.24	-1.36	-0.11	-0.52
A/L*61	-0.11	-3.92	-0.08	-2.53
I/L*65	-0.30	-1.42	-0.25	-1.01
A/L*65	-0.21	-7.80	-0.18	-5.69
<i>t</i> ₆₁	0.086	9.38	0.07	2.11
<i>t</i> ₆₅	0.17	18.45	0.15	4.44
<i>constant</i>	0.11	6.51	0.12	2.94

Notes: I=*inquilinos*, A=other farmers, L=literate population, P=total population

The existence of the bias in registration is confirmed in both model II and model III, significant also in the specifications where provincial dummies are added. The reduction of the bias in 1961 and 1965 is instead less stable and it is non significant in model III. We already anticipated what the reasons might be. The high correlation existing between the number of *inquilinos* and the provincial dummies leads to a problem of multicollinearity, which in turn increases the variance of the estimated coefficients and reduces their significance. We should consequently be cautious in interpreting the models with provincial dummies. On the other hand, even if the sign of the coefficients capturing the reduction of the bias is negative as expected in the two models, model III in particular does not show any

statistically significant reduction of the registration rate for *inquilinos*. Recall however, that what we are in fact capturing with these coefficients is a joint effect of the change in registration rate *and* literacy rate. As we showed in Table 2 literacy rate in *inquilinos* rich municipalities increased over time. Given the coefficient found it is likely that in average the reduction in registration rate might have been larger than the increase in literacy rate, but that that has not systematically been the case, resulting in poorly significant coefficients.

A last exercise addresses the potential endogeneity of the *inquilinos* variables. The only good instrument for these variables we were able to find is the number of *inquilinos* per municipality in 1935. We can safely assume that the number of registered voters in 1957-1965 can not influence the number of *inquilinos* in 1935. Unfortunately, having one data period in the past (1935) to instrument for three periods (1957, 1961 and 1965) reduces the scope and the power of such a test.

We can investigate the effect of having more *inquilinos* in 1935 on the registration rate in 1957, 1961 and 1965. Substituting the share of *inquilinos* over the population in 1935 for the same variable in 1957, 1961 and 1965 in our fixed-effect specifications presents a drawback. Given the structure of the fixed-effect framework, the registration rate among *inquilinos* (β_1) drops from the equation estimated and therefore does not allow us to test for the existence of a bias in registration in 1957. We can therefore only test whether registration rate among *inquilinos* decreased more than among other farmers in the following elections, i.e. whether $\beta_3 < \beta_5$ and $\beta_4 < \beta_6$. We provide finally a POLS estimate in which the share of *inquilinos* over the population in 1935 substitutes the same variable in 1957, 1961 and 1965. That allows a test on the existence of a bias in registration. Results of the two strategies are reported in Table 7 for model I and Table 8 for model II. We can not run this test on model III as we do not have literacy in 1935 by municipality.

Table 7: Model I with *inquilinos* in 1935 using the rural sub-sample (n=486)

Dep. var. = $\frac{V_{it}}{L_{it}}$	Municipality FE Without provincial dummies		Municipality FE With provincial dummies		POLS (R ² =0.42) With provincial dummies	
	β	t-stat	β	t-stat	β	t-stat
I/P	-	-	-	-	0.64	2.35
A/P	0.59	5.28	0.64	4.86	0.005	0.07
I/P*61	-0.48	-2.44	-0.39	-1.65	-0.27	-1.13
A/P*61	-0.25	-4.67	-0.25	-3.46	-0.17	-3.33
I/P*65	-0.86	-4.27	-0.97	-4.09	-0.94	-1.82
A/P*65	-0.42	-7.36	-0.35	-4.68	-0.11	-1.05
t_{61}	0.09	8.06	0.11	2.01	0.10	9.74
t_{65}	0.18	15.62	0.19	2.44	0.13	18.39
constant	0.13	7.45	0.12	2.47	0.12	130.88

Notes: I=*inquilinos*, A=other farmers, L=literate population, P=total population

Table 8: Model I with *inquilinos* in 1935 using the rural sub-sample (n=486)

Dep. var. = $\frac{V_{it}}{P_{it}}$	Municipality FE Without provincial dummies		Municipality FE With provincial dummies		POLS (R ² =0.54) With provincial dummies	
	β	t-stat	β	t-stat	β	t-stat
I/P	-	-	-	-	0.25	1.32
A/P	0.47	5.91	0.45	4.86	-0.12	-2.34
I/P*61	-0.31	-2.23	-0.21	-1.23	-0.09	-0.55
A/P*61	-0.20	-5.22	-0.19	3.81	-0.13	-3.79
I/P*65	-0.57	-3.99	-0.61	-3.61	-0.55	-1.46
A/P*65	-0.35	-8.66	-0.29	-5.40	-0.09	-1.16
t_{61}	0.08	9.99	0.10	2.65	0.09	11.11
t_{65}	0.17	20.97	0.19	3.41	0.12	20.30
constant	0.06	5.09	0.05	1.51	0.10	163.71

Notes: I=*inquilinos*, A=other farmers, L=literate population, P=total population

As expected the fixed-effect estimations confirm a larger reduction in registration rate among *inquilinos* as compared to other farmers. As considered before, we tend to trust model I more than model II as it relies on less restrictive assumptions. Moreover, we believe that the non significance of the coefficient capturing the reduction in registration rate for *inquilinos* in 1961 is the consequence of the likely existence of multicollinearity between our *inquilinos* population and provincial dummies discussed earlier in this section. Municipality fixed-effect estimations predict a reduction in the rate of registration among *inquilinos* between 1.5 and 2 times larger than among other farmers both in 1961 and in 1965.

We know from the tests run previously that POLS performs quite poorly as a large share of the variance is explained by municipality specific unobserved heterogeneity. The results emerged from the POLS are generally not satisfactory. However, our test was mainly on the existence of a bias in registration in 1957, and the estimation confirms that municipality richer *inquilinos* in 1935 displayed a relatively higher registration rate in 1957.

The results of this section are consistent with the predictions of the model. The different empirical models we tested converged regarding the existence of a bias in registration before 1958, in which *inquilinos* were more likely registered than other farmers. The introduction of a secret ballot reduced significantly the power of the landlords to control their workers' votes and to punish individually the voters who did not comply with their wish. That led probably to the sharp increase in registration among other farmers that we observed, reduced the registration rate among *inquilinos* and consequently the bias in registration.

Baland and Robinson (2007) showed that it was in *inquilinos* relatively rich municipalities that the largest change in political orientation occurred (from right parties to center-left parties) after 1958. They interpreted this as evidence that *inquilinos* were finally free to vote for their own preferred party after the introduction of the secret ballot. According to our result we suggest that it was not only the control of *inquilinos* which drove the electoral results before 1958, but also the unchallenged power of landlord on their territories which effectively deterred a large section of population from registering. In the same line, the change in election results after 1958 was perhaps less determined by the free vote of *inquilinos*, which were declining in number starting from 1935 (Bauer, 1975), than by the large mass of new voters registering in 1961 and even more in 1965, after the 1962 reform.

6. Conclusions

In this paper we have investigated how the employment relationship, if it implies transfer of rents, may allow employers to control the voting behavior of their workers and lead to a strategic registration of voters. This is feasible when individual voting behavior is observable, as in open ballot elections. More easily controlled voters would also be more likely registered providing an even larger impact of vote controlling on election results. Making individual vote truly secret (for instance with the adoption of a secret ballot) significantly reduces this control. Moreover, we show that as long as electoral districts are heterogeneous enough, i.e. contain also free voters, any attempt to control votes on the basis of district aggregate results is bound to fail.

We test the predictions of the model by examining in detail the effects of the introduction of the secret ballot in Chile in 1958. We show that, consistent with our theory, the political reforms led to large changes in registration. Before the reforms, localities with more pervasive patron-client relationships tend to exhibit a higher registration rate. After the reform however, the difference in registration rate across localities completely disappeared. This evidence suggests that electoral corruption, and the economic and political incentives that it creates, is an important part of the story for why inequality has been so high historically in Latin America. Though our study concentrates on electoral registration, it showed how political favors or policies to landlords were sustained through vote controlling.

A direct support to the introduction of secret balloting in democratic political systems is directly implied by our results. However, our model warns on the danger of collective punishment schemes, which might void completely the effects of a secret ballot. In order to guarantee vote secrecy there should be some uncertainty on the aggregate elections' results at the smallest electoral level. Accordingly, we argue that sometimes secret ballot alone will not be enough to achieve truly democratic elections. In the case of Chile, most likely the reduction in registration costs occurred implied by the 1962 reform might have strengthened the effects of the secret ballot. In some other context a redesigning of electoral district boundaries might even be required.

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