Cultivating Votes in Rural Chile.

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VERY PRELIMINARY

Abstract

We extend the “swing voter” model to the context of the “binominal” electoral system used to elect members of Chile’s Chamber of Deputies. The model predicts that targetable benefits will be directed toward two member districts in which the ruling coalition is on the cusp of winning either the first or the second seat. Using data on the allocation of discretionary agricultural subsidies distributed by the Agriculture Ministry the prediction that subsidies will be channeled towards districts in which the first seat is in play finds strong support, but we cannot reject the null hypothesis that districts in which the government coalition are close to winning the second seat are not targeted for extra subsidies.

Introduction

Swing voter models predict that pivotal voters will be the recipients of bipartisan largess as candidates vie for their support. Most models of swing voters in mass elections focus on two candidate contests operating under a simple plurality rule. A different literature, focused on the US electoral college in presidential elections looks at the allocation of resources and attention to swing states, in a setting in which each state is treated as allocating its electoral votes to the winner of a plurality of votes in the state. Here we

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1This assumption only approximates the reality of the US electoral college, Maine and Nebraska choose their electors using a less disproportionate selection rule.
adapt the swing voter model to legislative elections in Chile which employ low magnitude proportional representation.

Our operationalization of the swing voter model in this context generates the prediction that states that are forecast to be close to the threshold of electing one additional deputy for the governing coalition will be targeted for discretionary transfers. We then test this model using data from the 1997 and 2001 elections for Chile’s lower house. We construct a model of voting in legislative elections that helps us to identify the districts at the greatest “risk” of giving the government coalition an additional seat in the chamber of deputies.

We find mixed support for the model. We show that discretionary agricultural subsidies are targeted disproportionately towards districts in which the government coalition is “at risk” of winning the first seat in the Chamber of Deputies. However, we are unable to reject the null hypothesis that districts at risk of sending two government deputies to the lower legislative chamber are treated no differently than “safe” districts.

In the next section we briefly review some of the relevant literature, and we discuss the institutional context of the elections we study. We then present our operationalization of the swing voter model in the context of elections to Chile’s Chamber of Deputies. The subsequent section discusses our data from the 1997 and 2001 Congressional elections, and describes our empirical methodology. We present our results in section 3, while a brief final section summarizes our conclusions.

1 Swing Voters with Low Magnitude PR

There are several strands of the literature on redistributive benefits and legislative competition that are relevant to the setting we consider. After briefly discussion some of the salient work, we turn to the case at hand: elections to the Chilean Chamber of Deputies in 1997 and 2001.
Some Related Literature

The notion that politicians might allocate benefits in response to personal or careerist motives has important roots in Buchanan and Tullock (1962) and Tullock (1983), and in Meltzer and Richard (1981), Weingast, Shepsle and Johnsen (1981), and Snyder and Kramer (1988) which have become classic models of resource allocation by electorally motivated parties competing for office. When voters have attachments to parties, and the parties can offer targetable transfers to the voters, financed by net taxes on other voters, the parties are pressured by strategic considerations to target swing voters. Models in which the government targets swing voters include Coughlin (1986), Lindbeck and Weibull (1987), and Dixit and Londregan (1995). An alternative perspective on this problem is offered by Cox and McCubbins (1986) who argue that parties will target core constituents. Dixit and Londregan (1996) reconcile these competing perspectives by showing that if parties are more efficient at targeting their core constituents for transfers than they are at making transfers to swing voters then they will focus their largess on core supporters, while if they are more nearly equally efficient at both sorts of transfers then electoral considerations will favor transfers to swing voters. Dixit and Londregan (1998) show that the swing voter findings are robust to the possibility that parties have distinct programmatic agendas that directly affect income redistribution.

The empirical findings on the swing voter model are mixed. Case (2001) estimates the impact of the political context on block grants from the central government of Albania to local jurisdictions and finds that her “inverse swing variable” which measures the absolute distance between a communities vote for the government and even division earns a negative regression coefficient. This is consistent with swing constituencies receiving larger transfers. Likewise, analysis of a local transfer schemes known as the “ecological grant
program” found that the Swedish government made disproportionately generous discretionary transfers to communities with relatively many swing voters Dahlberg and Johansson (2002), (Johansson, 2003). Diaz-Cayeros et al. (2006) find that in 2006 Mexico’s right of center PAN party successfully wooed poor voters who would normally have spurned the party at the polls with two redistributive transfer programs: “Oportunidades” and “Seguro Popular”.

On the other side of the balance, evidence of election winners favoring core constituents is found by Schady (2000), in the case of Peru, Ansolabehere and Snyder (2006) for state level elections in the US, and by Golden and Picci (2008) in the case of Italy, where they conclude that party discipline is insufficient to keep legislators attentive to their parties’ interests in focusing transfers on marginal electoral districts,

When voters are segregated into electoral districts tactical redistribution takes on another characteristic. To win a majority of seats it is no longer enough to win a majority of votes, one needs also to garner a majority of seats. Redistributive competition thus takes on some of the aspects of legislative bargaining with side payments, which has been modeled by Snyder (1991) and Groseclose and Snyder (2000). Perhaps the US Electoral College has received the most attention in this respect.\(^2\) with Brams and Davis (1974) noting that large states are more likely to be decisive in a presidential election, and that they ought to receive more attention from competing candidates. Colantoni, Levesque and Ordeshook (1975) take this analysis one step further and add the competitiveness of states to the mix, arguing that states whose voters are closer to dividing their votes should receive more attention—a claim echoed by Grofman and Feld (2005).

\(^{2}\)For more on this important application of strategic campaigning, see Owen (1975), Gelman, Katz and Bafumi (2004), and Shaw (2006).
An additional layer of strategic complexity emerges when candidates compete under alternative electoral rules. Meyerson (1993) analyses two candidate elections and finds that the choice of voting rule has an important impact on the nature of redistributive promises made by optimizing candidates, while Austen-Smith (2000) presents a model of redistribution with proportional representation.

**Legislative Elections in Chile**

The two member legislative elections that are the focus of our analysis use “open list PR”: the d’Hondt rule allocates seats among lists, while within two member lists that earn but one seat the candidate with the most votes is elected. Chileans now refer to this electoral system as the “binominal system”, it’s interesting genesis in the military government that stepped down in 1990 is beyond the scope of this paper.

In the two elections we consider, 1997 and 2001, there were effectively six political parties organized into two competing lists. The center-left Concertación de partidos por la Democracia (hereafter the Concertación) was an alliance of the Christian Democrats (PDC), the Party for Democracy (PPD), the Socialists (PS), and the Radical Social-Democrats (PRSD). These four parties negotiated the division of the party lists, with two candidates running in every district. Two center right parties, the Union of Democratic Independents (UDI), and the National Renovation Party (RN) formed the second list in the legislative elections: in 1997 they competed along with the tiny Party of the South (Sur) on the Union for Chile list (the UPC), while by 2001 the Party of the South had disappeared, and the right of center UDI and RN parties competed under the banner of “Aliance for Chile”, hereafter the Alianza. In addition there were several smaller parties, the Chilean Communist Party,  

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3For more on the genesis of the electoral system, and on the workings of legislative politics in Chile see Londregan (2000).
and the Humanist-Green Party, neither of which won no seats in either of the elections we consider, the Union of the Center Center, which won two seats in 1997, and none in 2001, and there were various independent candidates running off the two major lists. Of these two won election in 1997, and one in 2001. Thus, in 1997 the Concertación and UPC lists won all but four of the one hundred and twenty seats in the Chamber of Deputies, while in 2001 they won all but two. To a first approximation these elections involved competition between the two lists.

We choose to focus on the elections held in 1997 and 2001 because these did not coincide with presidential elections, where we might expect benefits to be targeted toward voters who are pivotal in that national election, which chooses the winner in a “dual ballot” system with a runoff election held between the most popular pair of candidates in case no candidate earns an absolute majority at the first round. Since 2001 the presidential election cycle has been modified to coincide with the legislative cycle, so no further “off year” elections are anticipated. While these elections did not coincide with balloting at either the municipal or presidential level, they did take place simultaneously with elections to the Senate, with ten of nineteen Senate districts holding elections in 1997, while the other nine districts balloted in 2001.

For both of the elections we study, and indeed for the entire twenty year period from 1909 until early 2010, the president of Chile was a member of the Concertación coalition. For the purposes of this paper, the the Concertación was the “government”, while the center right coalition (the UPC in 1997, the Alianza in 2001) constituted the “opposition”.

The targetable benefits we consider are distributed by the Institute for Agricultural Development (INDAP), created by law 15.020 on November 27, 1962. INDAP is involved in many activities, but notably it disposes of discretionary targetable funds. Farmers can ask for “colocaciones”, grants
for agricultural projects such as fence building and irrigation projects that need not be repaid, and for “bonos”, loans that come with a low interest rate and favorable terms for repayment. INDAP administrators at the national and regional level are political appointees who serve at the pleasure of the government. INDAP’s discretion in choosing which applications to grant is reminiscent of Sweden’s “ecological grant program” Dahlberg and Johansson (2002), (Johansson, 2003).

A Model of Electoral Transfers

We suppose that the government takes the locations of candidates as given when it choses its transfer policies. Let’s suppose that the citizens living in district $d$ have heterogeneous attachments to the two main party lists that are distributed along a continuum, and that given the policy positions of the parties and absent targetable transfers by the government, and absent expectations about targetable transfers that the public expects would be made by the opposition, everyone to the left of the district $d$ cutpoint $c^*_d$ will vote for one of the government’s candidates, whereas all those to the right of $c^*_d$ will vote for a candidate on the opposition list.

By making transfers in the amount of $y_d$ to the district in the form of colocaciones and bonos the government can shift the cutpoint rightwards to $c^*_d + \theta_d y_d$, where $\theta_d$ measures the sensitivity of district $d$ to agricultural transfers. This will clearly vary by district—for example in the entirely urban community of Providencia where there is no farming activity even the flexibility of the targetable INDAP transfers meets its limit, likewise, transfers to the frozen community of “Antartica” or the arid moonscape of the northern community of Putre cannot be pushed through. Moreover, transfers may be more productive of votes in some contexts than they are in others. Variations in the $\theta_d$ parameter allow for such differences.
If the public expect transfers of $w_d$ from the opposition these will push the cutpoint towards the left, to $c^*_d + \theta_d(y_d - w_d)$. To simplify out notation we define $c_d = c^*_d - \theta w_d$ as the cutpoint for district $d$ given expectations about opposition largess if there are no transfers by the government. Let $F_d(x)$ denote the cumulative density function of voters in district $d$ measured from left to right. Thus $F_d(c_d + \theta_d(y_d - w_d))$ is the fraction of individuals in district $d$ who will support the government, while the remainder vote for the opposition.

For the sake of convenience we define the function $\rho_d$ which maps district-specific transfers by the government to the ratio of government to opposition votes:

$$\rho_d(\theta_d y_d) = \frac{F_d(c_d + \theta_d y_d)}{1 - F_d(c_d + \theta_d y_d)}$$

Given the electoral system the number of seats allocated to each coalition depends on the value of $\rho_d(\theta_d y_d)$. If the government gets more than twice the opposition’s vote it wins both seats, if it falls below half the opposition’s vote count it receives no seats, and otherwise the two coalitions each earn one seat:

<table>
<thead>
<tr>
<th>Government’s Vote Share</th>
<th>Seats to the Government</th>
<th>Seats to the Opposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\rho_d(\theta_d y_d + c_d) &lt; \frac{1}{2}$</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>$\frac{1}{2} \leq \rho_d(\theta_d y_d + c_d) \leq 2$</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>$2 &lt; \rho_d(\theta_d y_d + c_d)$</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Let’s define Dirac’s $\delta$ as follows:

$$\delta(C) = \begin{cases} 
1 & \text{if condition } C \text{ is true} \\
0 & \text{otherwise}
\end{cases}$$

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4Here our model abstracts from the possibility that a third party list earns seats, a rare occurrence in our data.
Using this definition we can state the number of seats won by the government as a function of the district-specific cutpoints:

\[ S_g = \sum_{d=1}^{D} \left( \delta\left( \frac{1}{2} < \rho_d(\theta_d y_d + c_d) \right) + \delta\left( 2 < \rho_d(\theta_d y_d + c_d) \right) \right) \]

While most authors represent the choice of targetable transfers as a non-cooperative game, with the government and the opposition making simultaneous and credible promises, see for example Dixit and Londregan (1996), here we treat the public’s expectations about the opposition as fixed, and we view the government’s choice of transfers as a simple optimization problem. However, we do recognize that the government has imperfect knowledge of the district specific cutpoints. We model the government as choosing transfers subject to a budget constraint for targetable transfers. In most models of balanced budget transfers the government targets groups to receive transfers, and selects other groups to pay the cost. Because our data consist of transfers through INDAP, which are financed by general revenues, we focus on the allocation of benefits and we treat the revenue sources as exogenous. Thus, for the sake of our formal model, we treat the budget constraint as exogenous, with an amount \( B \) targeted to funding INDAP transfers and we focus on the allocation among districts. We model the government as solving the following constrained optimization problem:

\[
\max_{\{y_d\}_{d=1}^{D}} \mathbb{E}\{S_g\} \text{ subject to: } 0 \leq \sum_{d=1}^{D} y_d \leq B
\]

given that the \( \theta_d \) are positive and the \( \rho_d \) are non-decreasing functions, the lefthand inequality in the constraint will never bind. We make the additional assumption that the function \( w \) defined as:

\[ w_d(x) = \mathbb{E}\{ \delta\left( \frac{1}{2} < \rho_d(x) \right) + \delta\left( 2 < \rho_d(x) \right) \} \]

is globally concave.
Letting $\lambda$ represent the Lagrange multiplier for the constraint, the first order necessary condition for districts receiving a subsidy from INDAP is:

$$\theta_d w'_d (\theta_d y_d + c_d) = \lambda$$

while the condition for not receiving a subsidy is:

$$\theta_d w'_d (c_d) \leq \lambda$$

Notice that districts expected to have very low values for $\theta_d$ are likely to satisfy condition (2).

Inspection of equation (1) tells us that, if we ignore the small effect of changes in $\theta_d y_d + c_d$ on $\lambda$, districts with high values for $\theta_d$, and districts with high values for $w'_d (\theta_d y_d + c_d)$ will tend to receive larger targeted subsidies from an electorally motivated government.

2 Our Data and Methodology

We apply our model to targetable agricultural benefits allocated by INDAP during 1997 and 2001. As we have noted above, these are election years in which there were neither presidential nor municipal elections to distract either the public or INDAP from the parliamentary contests for the Senate and the Chamber of Deputies. In about half of the districts in each election there was a simultaneous Senate race, while in the remaining districts the sole race in the election was the competition for the Chamber of Deputies.

Our data, which come in the form of electronic files compiled by INDAP, provide information about every direct grant made by INDAP in each of the years 1997 and 2001. We also have data on targetable loans made at favorable terms in 2001. For each grant INDAP made there is a field listing
the township\textsuperscript{5} and region\textsuperscript{6} of the recipient. There are some problematic codings, in a few cases grants were attributed to a township and region that were incompatible, in a few others the township appears to have been confused with the region, as in “Santiago north”\textsuperscript{7}. As the data INDAP shared with us does not include identifying information about the individual recipients we cannot further check these locations, and so we simply omit these grants from the total.

For 1997 our INDAP data register grants totaling 35,530 million pesos (worth about 70 million dollars) distributed across 281 of the then existing 342 townships in 2001 our data cover grants made in 272 of the then existing 354 townships for a total of 26,980 million pesos (about 55 million US dollars). Likewise we have data covering 19,800 million pesos (about 40 million US dollars) in bonds allocated in 2001. In addition to our data on allocations by INDAP we have some basic agricultural data. For each township we have data on the total population, and the fraction of the population who are rural. We have data on the land area of each township, on the fraction of that land that is arable, and on the fraction of arable land that is irrigated.

We combine these agricultural data with electoral data. We have voting returns at the precinct level, though we eventually aggregate these to the level of Deputies’ districts. We have data on voting in deputies elections held in 1989, 1993, 1997, and 2001, as well as presidential election data from 1989, 1993, and 1999, plus the January 2000 runoff election. In addition we have compiled data on the 1988 plebiscite on Pinochet’s continuation in power, and on the municipal elections of 1996 and 2000. We use these

\textsuperscript{5}Chile is divided into about 350 “comunas”, literally translated as “comunes”, we will refer to them as “townships”. Because new townships are created in response to changing settlement patterns, during the years in question the number of townships was slightly smaller.

\textsuperscript{6}Chile is divided into fifteen regions, two of which were extracted from preexisting regions in 2007, during the years considered here there were but thirteen regions.

\textsuperscript{7}We doubt very much that INDAP made a grant to someone located in the township of Santiago, located at the center of metropolitan Santiago, where the most extensive cultivation is likely a basil plant growing in someone’s kitchen windowsill. It is far more likely that the grant was dispensed to a recipient in the province of Chacabuco, part of the Metropolitan region.
data to construct models of voting in the 1997 and 2001 deputies elections in order to calibrate the competitiveness of each legislative district. These models provide us with a counter factual prediction of how competitive the races would have been based on predetermined variables that we treat as weakly exogenous with respect to both INDAP allocations and voting in the two elections we study.

**Voting in Deputies Elections**

Our basic specification for voting in the 1997 Deputies elections is as follows:

\[ \rho_{1997,d} = \alpha_0 + \alpha_{1989} \rho_{1989,d} + \alpha_{1993} \rho_{1993,d} + \alpha_{Aylwin} Aylwin_{1989,d} + \xi_{1997,d} \]

where \( \rho_{y,d} \) is the ratio of votes cast during the year \( y \) election for the Concertación list and those cast in favor of candidates on the UPC list in district \( d \), and \( Aylwin_{1989,d} \) measures the vote-share district \( d \) gave to the government’s 1989 presidential candidate Patricio Aylwin.

We estimate this model and then use it to predict the Concertación ratio for the 1997 election \( \hat{\rho}_{1997,d} \) as well as the standard error for the forecast \( \hat{S}_{pred} \).

We then calculate the probability density for the relevant t distribution with \( n-k \) degrees of freedom evaluated at \( t = \frac{1 - \hat{\rho}_{1997,d}}{\hat{S}_{pred}} \), which we denote \( \phi_{1/2,1997} \). This is the probability density associated with the threshold at which the Concertación wins the first seat in the district. Likewise we calculate \( \phi_{2,1997} \), the density for the same t distribution evaluated at \( t = \frac{2 - \hat{\rho}_{1997,d}}{\hat{S}_{pred}} \), this is the threshold at which the Concertación wins the second seat. These densities tell us how responsive our forecast of the probability the Concertación wins the seat is to changes in the predicted vote share. We use this as a proxy for the government’s expectation of the relative productivity, measured in
expected seats, from increasing targetable subsidies\(^8\) for district \(d\). To the extent that our forecasts are close to the government’s own beliefs about electoral outcomes we can approximate the expression:

\[
w'_d(c_d)
\]

using \(\phi_{1,1997} - \phi_{2,1997}\). Holding \(\theta_d\) fixed\(^9\), the larger this value the greater the temptation for the government to pressure INDAP to spend money in the district. We then operationalize \(\theta_d\) either as a constant, which gives enormous credit to the creativity of INDAP’s leadership, if not their integrity, or as proportional to the fraction of the district’s population involved in agriculture. We expect that higher values of \(\theta\) will be, \textit{caeteres paribus} associated with greater spending in the district.

Our model of voting in the December 2001 Deputies elections is similar, however, we take advantage of the presidential runoff election of January 2001 between government candidate Ricardo Lagos and his challenger UDI leader Joaquin Lavin: \(\text{Lagos}_d\). We also include an indicator variable for whether there is at least one incumbent candidate running on the government’s list:

\[
\rho_{2001,d} = \gamma_0 + \gamma_{1997}\rho_{1997,d} + \alpha_{\text{Lagos}_d}\text{Lagos}_{2001,d} + \alpha_{\text{Ink}_d}\text{Ink}_{2001,d} + \tilde{\xi}_{2001,d}
\]

We use this model to generate \(\phi_{1,2001}\) and \(\phi_{2,1997}\), defined analogously with their 1997 counterparts.

A Baseline Model of INDAP Allocations

Our baseline model for INDAP grants is given by:

\(^8\)When we experiment with other measures of how close the district is to the cusp of electing another government deputy, such as \(-|\beta_{1997,d} - \frac{1}{2}|\) and \(-|\beta_{1997,d} - 2|\) we obtain very similar results to those we present in the next section using our density measures \(\phi_{1,1997}\) and \(\phi_{2,1997}\).

\(^9\)Here we treat the impact of changed spending in one district on \(\lambda\) from equation (1) as being small enough to ignore.
\[
\text{grant}_{y,d} = \beta_0 + \beta_a \text{arable}_{y,d} + \beta_w \text{watered}_{y,d} + \beta_r \text{rural}_{y,d} + \tilde{\epsilon}_{y,d}
\] (3)

where \( y \in \{1997, 2001\} \) is the year in which the grants were made. The variable \text{arable} reports the fraction of the districts land that is arable, \text{watered} is the fraction of arable land that is irrigated, and \text{rural} corresponds to the share of the population classified as rural.

We estimate similar baseline models for low interest concessionary loans made in 2001:

\[
\text{loans}_{2001,d} = \omega_0 + \omega_a \text{arable}_{2001,d} + \omega_w \text{watered}_{2001,d} + \omega_r \text{rural}_{2001,d} + \tilde{\xi}_{2001,d}
\] (4)

and for the sum of the two forms of targetable benefits:

\[
\text{total}_{2001,d} = \pi_0 + \pi_a \text{arable}_{2001,d} + \pi_w \text{watered}_{2001,d} + \pi_r \text{rural}_{2001,d} + \tilde{\upsilon}_{2001,d}
\] (5)

For each of these base line models we encounter a substantial number of cases (about a fifth of our sample) for which no grants were made. The better to encompass these cases in our analysis we use a tobit model to estimate our baseline parameters.

3 INDAP Allocation Results

For the direct grants in 1997 there are 342 townships, of which 61 received no grants. Parameter estimates for the tobit specification appear in the following table:
Table 2: Agricultural Grants in 1997

<table>
<thead>
<tr>
<th>Explanator</th>
<th>Column 1</th>
<th>Column 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable</td>
<td>$2.05 \times 10^8$</td>
<td>$7202.662$</td>
</tr>
<tr>
<td></td>
<td>$(2.70 \times 10^7)$</td>
<td>$(1896.276)$</td>
</tr>
<tr>
<td>Watered</td>
<td>$-1.44 \times 10^7$</td>
<td>$-511.925$</td>
</tr>
<tr>
<td></td>
<td>$(4.64 \times 10^7)$</td>
<td>$(3481.744)$</td>
</tr>
<tr>
<td>Rural</td>
<td>$8.25 \times 10^7$</td>
<td>$19029.73$</td>
</tr>
<tr>
<td></td>
<td>$(3.03 \times 10^7)$</td>
<td>$(2123.636)$</td>
</tr>
<tr>
<td>$\phi_1 + \phi_2$</td>
<td>$2.09 \times 10^8$</td>
<td>$.$</td>
</tr>
<tr>
<td></td>
<td>$(1.07 \times 10^8)$</td>
<td>$.$</td>
</tr>
<tr>
<td>$\phi_1$</td>
<td>$.$</td>
<td>$17408.27$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$(8290.624)$</td>
</tr>
<tr>
<td>$\phi_2$</td>
<td>$.$</td>
<td>$127.1636$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$(8024.321)$</td>
</tr>
<tr>
<td>$\sigma$</td>
<td>$1.55 \times 10^8$</td>
<td>$10897.14$</td>
</tr>
<tr>
<td></td>
<td>$(6.62 \times 10^6)$</td>
<td>$(465.4393)$</td>
</tr>
<tr>
<td>ln(Likelihood)</td>
<td>$-5738.4288$</td>
<td>$-3050.8738$</td>
</tr>
</tbody>
</table>

Standard errors appear in parentheses.

The Wald test statistics for the null hypothesis that the coefficients for $\phi_1$ and $\phi_2$ are identical takes on a value of 26.87. Relative to its asymptotic distribution under the null hypothesis, which is $\chi^2_{337}$, this value of the test statistic leads to rejection at all conventional significance levels.

While the significant t ratio for the overall “risk” of gaining another seat: $\phi_1 + \phi_2$ reported in column one of the table is marginally significant, the results in column 2 indicate that the government did indeed subsidize townships in legislative districts that were competitive for the first seat, that is to say, districts in which the government was on the margin between winning one seat or no seats at all. However, the parameter estimates indicate that
the government did not favor districts on the margin between one and two seats for the government, though our model predicts that it would have done so.

Parameter estimates based on the data for grants and loans in 2001 exhibit the same pattern of significance—with significantly more resources lavished upon districts at the margin between one seat for the government and no seats at all, but with no special treatment for districts on the threshold between one and two seats for the government’s deputies.

We have looked for potential explanations for this mixed success for our theory. When we examine the correlation between $\phi_2$ and the other agricultural variables we find that there is some correlation with irrigation, but not with either of the other variables. Our $\phi_1$ variable is correlated with none of the other explanators in the baseline model (though of course $\phi_1$ and $\phi_2$ are correlated with each other. Thus the standard errors for the coefficient of $\phi_2$ are slightly elevated relative to those for $\phi_1$ due to multicolinearity—but this is a fairly small effect.

We have examined other possible explanations. The legislative districts (drawn during the final months of the military government in 1989) tend to pack pro-government voters into larger districts. Could it be that the cost of bidding for votes in districts poised to give both seats to government candidates is more expensive than cultivating support in smaller anti-government districts? When we divide our “risk” variables $\phi_1$ and $\phi_2$ the disparity persists—resources are targeted to districts with high values of $\phi_1$ but not those with high $\phi_2$.

Perhaps the disparity is caused by the existence of other conduits for “pork” in districts that are friendlier to the government. In districts near the cusp of electing a second deputy from the government’s list we might expect to encounter more pro-government local politicians who would facilitate the targeting of local block grants, so that the Concertación would not need to
use INDAP to direct benefits to wavering swing voters. In contrast, in less friendly districts, those on the margin of denying the Concertación any seats at all, the government might find itself hard put to control what is done by opposition mayors with block grants, and so it may be forced back on the targetable INDAP subsidies. However, when we control for the presence of mayors from pro-government parties we find that the effect we identify still exists—townships in districts with high values for $\phi_1$ receive more generous treatment, \textit{caeteris paribus}, those with high values of $\phi_2$ do not.

An examination of districts identified by our legislative model as being at high risk of giving the government a second deputy include some heavily urban districts where agricultural subsidies are impractical—these include the 37th district centered on the city of Talca, the 32nd district, consisting of the regional capital of Rancagua, the 26th consisting on the heavily populated urban township of La Florida—a part of greater metropolitan Santiago, and the urban 25th district comprised of the Santiago townships of La Granja, Macul, and San Joaquín. However, urban districts are also present among those at high risk for giving both seats to the opposition including the 22nd district, the township of Santiago, located in the center of a metropolis of five million people, the 21st district consisting of Providencia and Nuñoa near the center of Metropolitan Santiago, and The 14th district comprised of Concón and Viña Del Mar, part of Chile’s third largest metropolitan area.

However, both lists of swing districts, those poised to give two seats to the government, and those at the cusp of electing two opposition deputies also include rural districts. Notably the viticultural 39th and 44th districts in the Central Valley of Chile are identified by our analysis as two of the districts at greatest risk of electing two government deputies. The list at risk for electing two deputies for the opposition also includes several rural districts, though wine producing townships are less common on the districts likely to swing to the opposition, perhaps because the grape harvest draws on the
services of large number of unskilled farm laborers with limited labor market opportunities during the rest of the year whose limited prospects may make them more receptive to the left of center government’s political platform.

Whereas a half dozen districts have sent two government legislators to the chamber of deputies over the years only one, the 23rd district in eastern metropolitan Santiago\(^{10}\) regularly sends two deputies from the opposition. Nevertheless, our model of legislative voting identifies the 40th district in the southern segment of the Central Valley as having been at even greater risk than the 23rd district of electing two opposition deputies in 1997. Deputy Guillermo Ceroni of the pro-government PPD party defended his seat during that election, and in each election that has come since. We note that IN-DAP has been very active in distributing grants and low interest loans in Mr. Ceroni’s district. Our model suggests that this is a seat that the government successfully defended through the use of politically targeted agricultural benefits.

We note that the Chilean “binominal” system provides an interesting case of a low magnitude system of proportional representation. If we were to attempt to identify the closeness to the critical cutpoint for electing another legislator in a high magnitude system we would be hard put. On one hand the larger number of legislators from a given district would leave us with fewer districts to work with, while the greater number of cutpoints, combined with the imperfect accuracy of most models of voting behavior would make it hard to predict which districts were at risk of electing another legislator. In the extreme consider legislative elections in the national districts used by Israel and the Netherlands—the plethora of cutpoints means that all parties are always at the cusp of electing another member. By contrast, the Chilean system has but two cutpoints, and this permits us to identify which districts

\(^{10}\)This district consists of the townships of Vitacura, Las Condes, and Lo Barnechea.
are “in play” are which are all but certain to elect one deputy from each of the two major lists.

**Conclusion**

In this paper we adapt the swing voter model to Chilean legislative elections. The electoral rule used in these elections creates two cut points at which the number of deputies elected from a district changes, rather than a single cutpoint as in the well known case of simple plurality rule elections. We use a model of Congressional voting to identify districts near these cutpoints. We then examine whether more competitive districts, as measured by the risk of their electing two deputies from the same list, were the recipients of targetable agricultural subsidies during the 1997 and 2001 Congressional elections in Chile. We find that while districts in which the opposition threatened to win both seats did receive disproportionately generous grants and loans, districts where the government was poised to win the second set did not.

Of course, one possible explanation for the mixed success of our theory is that it is simply wrong. However, we note that while we observe targetable subsidies from the INDAP agency charged with allocating government assistance to farmers the government may enjoy a wider set of options when targeting benefits in friendlier legislative districts, in which government candidates are competitive at all levels.

**References**


