

Here's the Bias! A (Re-)Reassessment of the Chilean Electoral System¹

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Abstract

Most scholars of the Chilean legislative electoral system, also known as the binomial system, have noted the many ways the system was designed specifically to benefit the outgoing military government. However, some recent work has sought to challenge this conventional wisdom. In this paper, we acknowledge some faults with earlier analyses, while systematically unpacking the crucial errors and assumptions used in contesting the accepted wisdom. Theoretically, we emphasize that in general terms, electoral system design is at least a two-pronged process involving district boundary design as well as setting district magnitude undertaken by an incoming or outgoing seat-maximizing majority. Empirically, we use previously unpublished *comuna* level electoral returns and simulations from Chile's 1988 plebiscite on continued military rule to refute challenges to the accepted wisdom and show that the system was indeed designed to 1) limit the number of parties in the Chilean party system and 2) limit electoral losses of the political right. Our analysis strongly supports the rationality of electoral engineering to benefit designers, even under sub-optimal conditions of limited time and resources.

Keywords: *Electoral system, institutional design, Chile, binomial system*

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The Chilean legislative electoral system (known as the binomial system) is among the most analyzed in Latin America (Fuentes 1993; Rabkin 1996; Scully and Valenzuela 1997; Siavelis 1997; Dow 1998; Carey and Siavelis 2005; Garrido Silva and Navia 2005; Navia 2005; Carey 2006, among many others). This is the case both because of the unique competitive dynamics it produces and the reality that the outgoing military regime had free reign to design and implement the type of election system it wanted. This led a series of scholars to note the many ways the system was designed specifically to benefit the political right and disadvantage the left (Siavelis 1997; Scully and Valenzuela 1997; Navia 2005; Fuentes 1999).

In a widely cited article in *Electoral Studies*, Zucco (2007) claims that those who have pointed to the biases inherent in the Chilean legislative electoral system are themselves biased, with the underlying suggestion that analysts' arguments have been shaded by the reality that the right is the purported beneficiary of a relative electoral advantage.² He notes what he calls "the widely stylized fact that the Chilean electoral system favors the coalition that finishes second while hurting the coalition that obtains the first place popular vote. Since the right wing coalition has finished second and the center-left coalition has finished first..." in the first four legislative elections "...of the post-Pinochet area (sic), this distortion can be called a 'pro-right' bias." To make this point Zucco advances a two-pronged argument. He presents data he claims support the view that the pro-right bias does not exist, and that the system fails to produce the benefits claimed by earlier analysts. Zucco also asserts two subsidiary arguments claiming that the right did not benefit from malapportionment of districts (308) and that if forces supporting the right were so bent on providing an advantage for it that "the binomial system was not necessarily the best *ex ante* choice available to its designers" (309).

We dispute each of these claims. First, using heretofore previously unavailable data we provide evidence for systematic gerrymandering in the drawing of districts. More importantly, we analyze the flawed logic in Zucco's selection and manipulation of data to make his point concerning the representational effects of the electoral reform. In his simulations, despite passing and somewhat perfunctory reference to the internal composition of districts, he assumes that the only undecided element in the reform process was district magnitude (and using different standard deviations of vote distribution to do so). However, the reality is more complicated, since electoral engineers had to aggregate the districts as well as set the magnitude. Finally, we provide strong additional evidence that electoral system designers set out with the intention, purpose, and conviction to benefit parties of the right.

Though Zucco significantly advances the study of Chile's binomial system and his findings are intriguing, we reassert the conventional wisdom that the system was indeed designed to benefit the right. What is more, we argue that there are several limitations to the way Zucco structures his argument, which we contend mask the mechanical effects of the system. Our point is not that the system will always benefit the right (a claim never made in the literature), but that *the binomial system has certain*

² As Zucco does, we focus throughout the paper on the electoral system for the Chamber of Deputies, not the Senate.

mechanical effects that electoral designers clearly understood, and that they designed the system knowing that its mechanical effects would benefit the right *given the political context of the time*. In addition, while Zucco claims that there is no systematic data to back up the assertion that electoral engineers gerrymandered electoral districts, we provide strong evidence to the contrary. What is more, we argue that Zucco himself bases his claim on the lack of bias of the system on problematic assumptions. Finally, we counter the Zucco's claim that if the military regime really wanted to benefit the right that it could have adopted a "better" electoral design. This ignores certain practical political limits which would have prevented the right from adopting the type of system Zucco asserts would have been optimal for them. In essence we challenge the core of Zucco's arguments by asserting (with no normative bias for or against the right) that the military sought to benefit the right, and contrary to his assertion, that they could not have picked a better system given the particular political and party context.

The paper proceeds as follows. We begin with a discussion of the origins and basic dynamics of the election system. We then discuss the conventional wisdom concerning how the system benefits the right, as well as Zucco's refutation of those claims. We go on to analyze those claims in depth, beginning with theoretical assumptions and moving on to empirical difficulties, refuting a number of Zucco's claims concerning the design, outcome, and relative desirability of various electoral reform options, as well as the methodology he employs.

This debate is not purely academic. As Chilean elites once again begin to explore electoral reform, which in 2013 seems like a greater possibility than any time in the past, it is imperative to have a grasp of both the intentions of its original design and the way it has functioned since the return of democracy in 1990. It is also important to set the historical record straight with respect to the military's efforts to establish a tutelary democracy in Chile. Rather than an innocuous instance of electoral reform aimed at enhancing stability, the binomial system imposed by the military and its allies on the right represents one of the most extreme instances of electoral and institutional engineering among third wave democracies.

1. Chile's Electoral System

Unlike most democracies where democratic actors decide the electoral rules of the game, Chile's electoral system was imposed. Following a seventeen-year military regime, military authorities led by dictator Augusto Pinochet ceded authority following a plebiscite on his continued rule. However, despite the victory of opposition forces in the plebiscite, Pinochet and his military advisors had substantial leverage to be able to impose a constitution and electoral system of their design (Pastor 2004). The constitution, though subsequently reformed quite significantly (with the most substantial reforms in 2005), provided veto power for the right and it supported it in a number of significant ways (Siavelis 2000). The legislative electoral system was widely considered to be part of this package of institutional engineering.

It is well documented in the military government reports on the country's constitutional future that Chile's PR system would be abandoned given its propensity to allow the representation of many parties, a reality that Pinochet and his supporters repeatedly underscored had led to unnecessary division and partisan conflict, and which had been partly responsible for the crisis of democracy (Pastor 2004: 50). The full

Commission for the Study of the Constitution as early as 1978 reported that “the electoral system ought to result in the effective expression of majorities through uninominal districts or polynomial districts that elect the same number of deputies” (cited in Pastor 2004).

This is the root of the controversy raised by Zucco: was the system explicitly designed to favor right wing forces? This paper is largely devoted to answering that question, and we leave it for complete analysis in the pages that follow. Yet before that analysis and argument, it is important to understand how the binomial system functions.

The binomial electoral system has a district magnitude of two (two seats per district) with open lists, as voters indicate a preference for one or another candidate on their preferred list. Though voting is candidate-centered, in determining the winner, the total votes for both candidates on any list are first pooled before distributing seats to lists. Seats are then awarded to individual candidates based on their rank on their list. The system uses the D’hondt method, which functionally provides in two member districts such that the first-place list in a district can win both seats only if it more than doubles the vote total of the second-place list. If it does not, each of the top two lists wins one seat.

Essentially, then, within the context of a pattern of two-alliance or two-party competition, the binomial system establishes strong thresholds at 33.3% and 66.7%. Because Chile has been characterized by competition between two major coalitions (the center-left *Concertación* and the right wing *Alianza*³) these thresholds have indeed prevailed--to a greater or lesser extent depending on proximity to them, as we will argue below--since the return of democracy.

2. Conventional Wisdom and Refutation

These thresholds are just one of the mechanical effects of the binomial system that certain scholars have claimed as the basis for a right wing bias in the election system. Zucco notes that for the advocates of a bias, the systematic favoring of the right begins with the very design of the electoral districts. These scholars claim that districts were drawn after the plebiscite so the government “could use its results to craft districts to favor parties in the Right,” or could over represent “conservative less populated areas” to ensure “a lower vote-per seat ratio in the areas of traditionally stronger support for the authoritarian government” (Zucco 2007).

However, Zucco correctly notes that the most important assumption of the conventional wisdom is that the military designed the binomial system to take advantage of its electoral thresholds. Armed with knowledge of the results of the 1988 plebiscite from *comunas* across the country, where Pinochet was defeated by a margin of 55% to 43% nationally, officials determined it would be quite difficult to design an election system with uninominal districts in which the right could fare well. Indeed, such a system presented the prospect that the right would be shut out of congress. However, advocates of a right wing bias note that given the 33.3% and 66.7% effective thresholds, the binomial system provided an ingenious solution to Pinochet’s problem. It resolved the conflict between his desire for a low magnitude system that would limit the number of parties and a system that would provide significant (and exaggerated) representation for

³ Since its formation in 1989 the coalition has gone by various names. Though officially called the *Coalición por el Cambio* today, it was known as the *Alianza por Chile* from 2000-2009, and is usually referred to as the *Alianza*.

the right—or limit potential losses. With the binomial system, the center-left Concertación lists would have to consistently double the vote of the center-right Alianza lists to have any hope of outdistancing the right in parliamentary elections. In this way, according to the conventional wisdom, electoral reformers gerrymandered districts to take advantage of these thresholds and effectively allow the right to garner 50% of the seats with only 35-40% of the vote.

3. Theoretical Assumptions

One of the most puzzling aspects of Zucco's analysis of the Chilean electoral system is his selective application of rationality. Zucco argues that Pinochet's government had a monopoly over the design of the new electoral system, yet designed one that did not best suit its own interests. The evidence of this is that the system has not overwhelmingly benefitted the right at the expense of the left over time. This simultaneously overlooks the practical limitations that infringe upon perfect rationality—temporal restrictions, informational incompleteness, future uncertainty, etc.—which he only partially acknowledges, while assuming that Pinochet's electoral designers were not seat-maximizers. We examine these assumptions here.

3.1 Non-seat maximizing institutional engineers

In positive political theory, agents are self-interested actors rationally pursuing their goals. Under this standard assumption, it is naïve to assume that the Pinochet government would not have stacked the deck in its favor as it exited office. Other scholarship on electoral system design supports this view. Boix (1985), Benoit (2007; 1999-2000), and Wills-Otero (2009) all explain that the adoption of new electoral systems are dictated by circumstances but predicated on the assumption that political parties are seat maximizers. Boix argues that the choice of electoral system is a strategic calculation made by the dominant party or parties, conditional upon their ideological position and strength. Specifically, “the selection (and preservation) of different electoral rules can be traced to the strategic decisions made by the current ruling parties, foreseeing the coordinating consequences of different electoral systems, to maximize their representation in parliament” (Matthews 1985: 621). This logic is echoed by Benoit (1999-2000), who assumes that a change in electoral institutions will occur when a political party—or coalition of parties—supports an alternative which will bring it more seats than the status quo electoral system and also has the power to effect through fiat that institutional alternative.

All of these conditions were present in 1988 Chile. Unforeseen circumstances (the surprising “no” vote in the 1988 plebiscite) raised the specter of a new balance of power unfavorable to the political right, which sought rules allowing it to maximize its congressional representation under this new, yet-undefined constellation of power. At the same time, the military still possessed enough power to unilaterally impose its will on the political system. It only makes sense, then, to assume that the outgoing government drew up districts and structured rules to maximize its political representation. Any other interpretation either willfully ignores this calculus or runs the risk of appearing disingenuous.

This argument, however, does not assume that the political right actually *did* or continues to benefit from the binomial system. In the over twenty years since its

establishment, both the left and right have fought to alternatively to change the district magnitude and design, or to maintain the status quo, always based on which design is politically expedient for each party. This also makes sense, since as Benoit also addresses, electoral systems should cease to change when no party or group of parties with the necessary power perceives a potential seat gain by doing so.

We also have empirical confirmation that there was a specific intention to benefit the right in the design of the system. Interviews with a key actor involved in the design of the binomial system confirmed that institutional designers were instructed by military authorities to design a system to favor parties of the right and that, “we would have been fools not to” (Anonymous 2012)⁴. Indeed, some of the most important evidence regarding electoral engineering favoring the right is the various proposals for redistricting analyzed by the regime. As explained in greater depth in section 4.3, we obtained previously unreleased copies of the simulations performed by regime officials proposing different configurations of electoral districts. The documents use the comuna by comuna results of the 1988 plebiscite as a baseline, combining them in distinct configurations to create the 60 electoral districts. Three sets of simulations are compared: The “Original Proposal,” the “Ministry of Interior Proposal”, and the “ODEPLAN Proposal.”

Any doubt that the specific intention of reformers was to benefit the right should be put to rest by these documents. The introductory paragraphs state:

This analysis of electoral system sensitivity determines the risk involved for three alternative projects of district distribution... including the risk for *government parties* (our emphasis added) that the loss of 5%, 10% and 15% and the gain of 5%, 10% and 15% would mean for the governing parties (ODEPLAN 1989).

The document goes on to specifically reference the necessary electoral thresholds the right needed to reach to maximize its representation based on the plebiscite results, noting that the documents seek to determine which districting plan “would achieve the most significant ‘margin of security,’ understood as the percent difference between 33.4% (the minimum vote necessary to obtain one deputy) and the percentage of vote that the “Yes” forces won in the plebiscite” (ODEPLAN 1989).

3.2 Unlimited resources, and complete and perfect information

At the same time that Zucco discards Pinochet government rationality in seat maximization, he also assumes that the government possessed sufficient time, personnel, computing power, and most importantly, information regarding voter behavior to design the most adequate electoral system. These expectations are untenable. The assumptions of complete and perfect information can be useful in constructing theoretical models and making ideal-world predictions, but empirical realities inevitably fall short of many of these theoretical expectations. As in all real-life situations, the Pinochet government did

⁴ Interview with anonymous representative of binomial system design team who for political reasons asked to remain unnamed, Santiago, April 17, 2012. The authors of this article are also in possession of the simulations used by the binomial system design team that substantiate all the interviewees’ claims. Translation by the authors. The translation of the word “fool” was made substantially less colorful for an academic audience. More details on the design process of the binomial system and its significance are provided in section 4.3.

not enjoy complete and perfect information nor did it enjoy high degrees of computing power or an extended period of time to reach its decision. Navia (2002), for example, notes a number of constraints limiting the government's ability to choose the electoral rules, and as a result of limited information regarding voters' preferences, the unintended consequences that resulted from this decision.

Several sets of constraints limited the institutional designers, especially those designs that entail larger district magnitudes. Analyses of the Chilean electoral system must consider both the context of the Chilean transition and the competitive dynamic of the party system. As noted, in designing the system government officials were concerned about the proliferation of political parties, as they saw the roots of Chile's democratic breakdown in the polarized competitive dynamic of the pre-authoritarian multiparty system. Consequently, Zucco's claim that the military parties could have better favored the parties of the right had they adopted a system with a larger district magnitude would simply not have been on the military's menu of options. In addition, gerrymandering was restricted in some places since electoral engineers were ordered to abide by certain restrictions in drawing districts (summarized in Section 4.3), such as respecting historical regions, keeping comunas whole, keeping comunas within an electoral district contiguous, and creating "roughly similar" district populations.

Furthermore, the design of the electoral system was a contentious affair between different factions of the government, and the binomial system had already been discussed and analyzed as a way to balance the virtues of a majoritarian system with the exigencies of maintaining advantages for the right even before the plebiscite. At the outset of the design process in the 1980s the civilian advisory known as the Council of State, headed by former conservative President Jorge Alessandri, recommended a Chamber with single member districts requiring a second round vote in the case of no majority and a Senate with two-member circumscriptions, with the exception of the two most populated ones (Valparaíso and Concepción), which would elect three, and the Metropolitan Region, which would elect six. Nonetheless, even though the left favored a PR system, there was no universal agreement (even on the right) that Chile's traditional PR system should be abandoned, and a variety of systems were proposed throughout the 1980s. However, the binomial system in its first iteration was first proposed in 1984, well before the 1988 plebiscite, contradicting the notion that its adoption was a panicked response to Pinochet's defeat. This represents an additional constraint on institutional design, since electoral engineering amounted to providing the greatest benefit for the right within the constraints imposed by the binomial system (Pastor 2004).

In other words, the information available to electoral designers was neither complete nor perfect. Zucco's (mis)use of the actual 1989-2001 electoral results (which we explain below) and the "very weak (*sic*) evidence" (Zucco 2007: 306) of a pro-right bias in these elections reveal a fundamental limitation of electoral design and even complete information: although institutions can be manipulated to benefit one group in the short-term, longer-term behavior is much more unpredictable. Given the limited information of the 1988 plebiscite, the binomial system was an appropriate electoral design to achieve the government's objectives of limiting the number of parties in the party system and maximizing the right's representation—although the latter point only applied when the right was comparatively weaker than the left, as in 1988.

Even the binomial system itself risked unpredictability. The application of different district magnitudes as proposed by Zucco (e.g. $M=7$) overlook the impossibility of predicting, 1) that parties would coalesce as they did, and 2) if the vote share for each party would be different, since many parties (PS, PRSD, PPD) would have presented candidates in districts in which they did not previously run them. The government had a certain level of information of past voter behavior at its disposal, but it possessed far less regarding future party or voter behavior. Under these circumstances, the binomial system has done a laudatory job of continuing to achieve at least some of the Pinochet government's goals.

Finally, there were important practical limitations to the computing power and actual process of running electoral simulations. Electoral engineers were instructed to ensure all simulations were kept secret until settling on a final electoral formula, and could not bring to bear the limited computing power that existed at the time, mostly located in university labs, and particularly at the University of Chile. Electoral engineers performed all simulations with small computers of limited computing power beyond the sight of the Chilean public and academics within the Ministry of Interior (Anonymous 2012).

4. Analytical Flaws

There are a number of serious analytical flaws in current analysis of the binomial system, with scholars using “party” and “coalition” interchangeably, running simulations near the electoral sweet spot, and relying on theoretical distributions of votes rather than the actual results. Scholars were forced to draw these assumptions, especially regarding vote distributions, in part because the actual data used by military planners and Chilean government officials have never been made public. Here, for the first time, we provide a record of these data. We have cited it officially as documents produced by the *Oficina de Planificación Nacional* (ODEPLAN), the former Ministry of Planning. Though the documents bear the authorship of ODEPLAN, they were never publically released, and passed to us with a request that the person providing them remain anonymous. These plebiscite results aggregated into the current district alignment can be found in the appendix, while the comuna-level results are available in the online supplementary appendix. We begin, however, by surveying some of the common analytical flaws.

4.1 Conflation of coalitions with parties

Zucco admonishes previous analysts for conflating national vote shares with seat shares, but throughout his analysis he engages in another conflation: that of coalitions with parties. Though he is correct to note that fundamentally the vote shares of coalition are what matters to win, he runs all his assumptions based on an entity that does not exist: Pinochet's party. Indeed, he runs simulations based on the number of seat shares that “Pinochet's party” would receive. However, the whole point is that Chile is a multiparty system and this affects the incentives of parties and the operation of the binomial system. The measures of proportionality he finds, for example, conveniently show that the binomial system is proportional. Yet, this assumption does not employ individual parties, but rather coalitions as the unit of analysis; analysis based on parties show less proportionality.

4.2 Use of electoral sweet spot in correlations and analysis

We also find quite problematic the assumptions Zucco makes in simulations of various electoral systems, and upon which his core arguments are based. It is a well-known and often analyzed fact that the binomial system produces powerful thresholds within the context of two-party or two-coalition competition—thresholds that exist at 33.3% and 66.6%. While a number of analysts simulate results based on a 43% vote for the right based on the notion that it received this percentage of vote in the 1988 plebiscite, this number also happens to be something of a “*sweet spot*” with respect to the sensitivity and insensitivity to vote shares under the binomial system.

By assuming a 43% vote share his simulations only come to the margins of reaching the “*sour spot*” where the binomial system is sensitive to shifts in vote. In particular, he argues that the binomial system is actually insensitive to change, providing simulations where the right’s vote share increases or decrease by 10%, bringing the right’s vote share to 33% and 53% respectively, and nearing the crucial threshold at the lower end of the spectrum and coming nowhere close to the upper end of the spectrum (with a transfer of 10%) and not even coming close with transfers of 5% (38% and 48%).

In his Table 3, for example, the author claims that $M=2$ ceases to be the optimal choice as dispersion of the vote takes place. This claim reasonably holds at the average distribution around the mean of 43% that he uses. However, if one assumes that the right might drop below 43%, but always stay about 33%, (without dropping below 33% in a significant number of individual districts due to gerrymandering) $M=2$ becomes a better choice. This will become quite clear below in our analysis of cost in votes per seats. As the right (or the second largest electoral force in the context of two coalition competition) approaches the lower threshold of 33% (but does not drop below in a significant number of districts), the cost per seat in votes becomes lower and lower.

4.3 Simulations based on theoretical vote distributions

In our view, the most significant shortcoming in previous analyses of the legislative electoral system and the contention that the binomial system was not designed to benefit the right is a failure to model based on the 1988 plebiscite returns. Electoral system analyses must always consider the empirical priors available to institutional designers—here, electoral results from the 1988 plebiscite, disaggregated by comuna—instead of outcomes. Neither Navia (2002), Siavelis (1999), Zucco (2007), nor any others we have surveyed use disaggregated electoral returns from 1988 to support their claims for or against types of electoral system design. Navia (2002) and others bias their simulations by failing to assume variance in vote shares across districts when running their simulations, instead assuming the right’s national share of 43% across districts (and the left’s 57%). Zucco, in turn, applies a beta distribution—similar to a normal distribution when the range of data is restricted to outcomes between 0 and 1—around a mean of 43% for the right across the 60 districts. This latter methodological decision is theoretically defensible and preferable to assuming a lack of variation, but nonetheless differs significantly from the actual electoral data electoral engineers used.

In either case, institutional designers in Chile did not create the legislative electoral system from these vague data, but instead used disaggregated returns from each of Chile’s then-335 *comunas* (communes, the equivalent of municipalities). Furthermore, the military regime itself aggregated these comunas into the current 60 districts, and was

therefore able to consider a number of configurations before settling on the actual setup. Empirically, then, electoral engineers were clearly not settling on a district magnitude for a normally distributed vote shares around a common mean, but—as we will show below—dealing with highly skewed distributions they themselves created.

As the histogram of the 1988 plebiscite results disaggregated by the current district alignment and separated by party tendency (Yes/Right-No/Left) shows in Figure 1 and the measures of central tendency in Table 1 attest, actual distributions by ideological group are quite distinct from the theoretical assumptions of previous studies. The left's vote share is negatively skewed (Figure 1) with a mean of 53% across the current 60 districts, but a maximum (63.8%) within 11 points of that mean and a minimum dipping nearly 20 points below it (Table 1). Conversely, the right's vote share is positively skewed (Figure 1), with a mean of 44% and a minimum within 11 points and a maximum reaching over 20 points above (Table 1). In both cases, the standard deviation from the mean is 7.6(!) percentage points.

[Figure 1 about here]

[Table 1 about here]

These numbers are evidence that the outgoing military government rationally engaged in strategic district delimitation that initially resulted in a vote distribution that was radically different between coalitions. The implication of this gerrymandering is that simulations based on a normal or beta distribution, while theoretically justified, will be biased. Chilean electoral engineers were not basing their design on simulated parameters assuming normally distributed vote shares across districts: they were simultaneously setting the district magnitude and shaping the districts to maximize gains or minimize losses.

5. Empirical Claims that the Binomial System does not favor the right

Zucco states, “the most basic piece of evidence, and the one that motivated this research in the first place, was the observation that despite what several authors have suggested the Chilean electoral system does not obviously favor the right in elections for the lower chamber” (Fleet 1985: 306). While this may prove to be true (although we do not believe so), this motivation overlooks the fundamental question of what outcomes the electoral system was designed to produce, not the actual outcomes. In this sense, Zucco's analysis refutes a straw man: it essentially argues that over time, the electoral system has not overwhelmingly favored the right.

Returning to the problematic analytical assumptions from above, Zucco uses aggregated 1989-2001 electoral data for every empirical analysis he performs. This biases the results, as the Concertación's and Alianza's vote shares change over time, rendering moot the initial effect on the party system. Zucco's figures 1, 2, and 3 examine proportionality, malapportionment, and cross-district vote variation, respectively, but all three use post-1988 waves of electoral data (1989, 1993, 1997, and 2001). As a result, these analyses do little to prove the military had a different intention in mind than maximizing the electoral representation of the right.

The contention that the binomial system was not designed to favor the right is based on three faulty claims dealing with proportionality, malapportionment, and *ex ante* choice. We examine all three.

5.1 First claim: The binomial system is no less proportional than other electoral systems

One of Zucco's most important arguments is that the binomial system is no less proportionally operational than other PR systems (Zucco 2007: 307-308). Following work by Rae (1967) and King (1990), he presents data presenting various measures of proportionality and electoral system responsiveness for other Latin American electoral systems, most of which use some form of PR with larger magnitudes. Nonetheless, the assumptions used to make the case for proportionality are problematic.

First, the data presented in the study form major assertions regarding proportionality rely mainly on measures of proportionality for Chilean coalitions and not parties. The article dismisses measures of proportionality based on parties, contending that the sample is too small. However, basing proportionality on parties instead of coalitions yields different, less proportional results.

Second, even leaving this consideration aside, Zucco mistakes the mechanical effect of the electoral system for the dynamic of party competition, essentially ignoring the political context. The dynamic of coalition formation in the post-authoritarian period has made for a manufactured proportionality that is a product of party negotiations--not the dynamics of the binomial system. The system may have produced close to proportional outcomes, but this is the case because parties negotiated seats shares based on their relative size and power. Mechanically, the binomial system will exclude parties that do not reach a negotiated agreement for inclusion on a joint list (Siavelis 2002; Navia 2005). Indeed, the system has consistently shown that small, unaligned parties are denied seats by the system. The non-aligned Communist party has achieved upwards of 7% of the national vote (in the 1997 Chamber of Deputies elections) without representation in congress. Similarly, despite receiving 5% of the vote in 2001 and 2005 it received no seats). Had it allied with the Concertación and negotiated a slate of seats for itself (as did other parties with similar level of support) it could have reached a roughly proportional level of representation. However, in consistently choosing to break ranks, the party has been shut out of legislative representation. Indeed, as a powerful testament to this argument, after being shut out of congress in every election since the democratic transition, the Communist Party reached an agreement with the Concertación in 2009 that allowed the allied presentation of its Chamber of Deputies' candidates. As a result, the party was successful in winning three seats, despite having received only 2% of the vote! Such is the power of electoral lists. In large part, then, the binomial system's proportionality is negotiated and not mechanical, nullifying more general claims about the proportional tendencies of the electoral system *per se*.

Third, while electoral system responsiveness is certainly a valid measure of the proportionality of electoral systems, the cost per seat for parties is also important. Table 2 presents a breakdown of vote cost per seat for both coalitions since the return of democracy (we do not present cost per seat for parties, which is wildly disproportional for reasons that are elaborated below). The data are instructive. In all but two elections the cost per seat for the Concertación was substantially higher than that of the Alianza.

This is instructive on three counts. To begin with, the simulated 1988 elections--the electoral projections used by electoral engineers in designing the system--had an extraordinarily high cost per seat for the Concertación.

Further, although the vast majority of the election systems of the world tend to favor large parties at a proportional rate as they increase in size and penalize them as they decrease in size (Rae 1967; Lijphart 1990; Jones 1993), this one does not—and was not designed to (unless of course parties do ally to form coalitions—which is not a mechanical effect of the binomial system, but rather grows out of coalition dynamics in Chile). Zucco addresses the arguments made by opponents of the binomial system, claiming the right did not receive electoral benefits. However, notwithstanding the fact that the right *did* receive such benefits (as we show below), the literature Zucco criticizes actually argues that this system benefits the largest *coalitions* (plural), and particularly and disproportionately, the second largest coalition based on the size and distribution of the electorate for the right in 1988. Additionally, our contention is that the rightward bias of the system is even more severe than the one Zucco tries to delegitimize.

Zucco is correct to note the previous analysts should have been clearer in saying second highest polling list favored would be favored by the binomial system (given the distribution of the 1988 electorate) rather than “the right”. However, most critics of the binomial system do say this, adding that the right just “happens” to be the second highest polling list. However, Zucco is equally unclear in his analysis, as he shifts between talking about the “right” and the “second largest coalition” as indiscriminately as the authors he criticizes. Also just because the system did not benefit the right empirically (which he asserts and we challenge here) does not mean that it was not designed to do so.

Finally, and ironically, as the winning party’s margin of victory increases, seats tend to become *more* rather than *less* expensive. Again, this makes the binomial system an outlier among the world’s electoral system. Rather than a curious feature of the system, these data present additional evidence of a self-conscious strategy of bias in favor of the second largest electoral force—in this case, the ideological right.

[Table 2 about here]

5.2 Second claim: There is no bias through malapportionment

Zucco dismisses the widely held claim that there is a bias tied to the malapportionment of district. He acknowledges that there is considerable variation in the number of electors per district, but contends that there is “no evident bias” against the Concertación or in favor of the Alianza (2007: 308). Nonetheless, he provides scant evidence to substantiate this claim, which the numbers simply do not support.

First, there is clear evidence that rural areas, which tend to be right leaning, are over-represented. All else equal, any electoral system it is rational to maximize the amount of representation per vote (or minimize the opposition’s support per vote), producing a negative expected relationship between vote share and district size. This relationship holds in Chile. Zucco uses a scatterplot of vote shares, votes cast, and seats won, disaggregated by party, and includes correlations showing a lack of statistical and substantive significance to show evidence to the contrary. Yet once again, these plots and correlations include all district-years in the 1989, 1993, 1997, and 2001 legislative

elections, totally ignoring the 1988 results! Repeating this analysis for the plebiscite results reveals a different picture.

Figure 2 (below) plots the number of votes against vote share for each ideological bloc in the plebiscite according to the 60 current districts. The dashed line denotes the national mean for that party, while the curving solid line represents the best-fit quadratic approximation of the relationship between the two variables. Clearly, the right's support is concentrated in less-populated districts, and its support falls and district size grows. Conversely, the left's support is relatively weaker in rural or less-populated areas and grows with district size. Statistical analyses also demonstrate significant correlations between district size and vote share for both the right and the left. The right has a coefficient of -0.4323 , significant to $p < 0.0006$, and the left has a positive coefficient of 0.4589 , significant to $p < 0.0002$. While we acknowledge that less-populated rural areas are more likely to naturally lean right, these data do support our expectations of the dominant party rationally drawing boundaries to best concentrate (or de-centralize) its support.

[Figure 2 about here]

Unlike the results from 1989 to 2001, the 1988 district-level returns show statistically and substantively increased seat shares for districts that voted "Sí" in the plebiscite. Table 3 shows the average number of electors in districts where the "Sí" won is 97,846, while it is 132,007 for districts where the "No" won. The table also recounts the total number of districts where each option triumphed and the number of total electors included (Joignant and Navia 2003). Indeed, it is striking that according to simple population count, Joignant and Navia find that the *Región Metropolitana* (by far Chile's most populous) should have been entitled to 45 of the 120 seats in the Chamber of Deputies. However, it received only 31. Not coincidentally, at 41%, it was the region that had the lowest for the "Sí" option, and it is the most underrepresented.

[Table 3 about here]

District gerrymandering was not just undertaken with respect to rural areas and areas that supported the "Sí" vote. A simple look at the distribution of vote shares by district supports the notion of gerrymandering related to how proximate districts were to the binomial system's well known electoral thresholds. In contrast to Zucco's Figure 3 (2007: 311), our Figure 1 shows distributions for district-level data for only 1988 instead of 1989 to 2001. Assuming no change in vote share by ideological bloc, the current district alignment applied to the 1988 plebiscite results reveal the right with no districts under the "sour spot" of 33.3% and the left with no districts over the other "sour spot" of 66.6% (see Figure 1, above). That is to say, despite a national average of 43% for the right and 57% for the left, the districting pattern chosen and consistent vote patterns would have produced exactly equal representation in the lower house for a two-party system! Clearly, this benefits the second-largest coalition, and at least in 1988, the second-largest coalition was the right.

Beyond vote shares that do not fall above or below the electoral sour spots, the non-normally distributed pattern provides additional evidence of gerrymandering. The

right clearly did not want to “waste” its support by having some districts with 55% support and others with 25%, but rather draw up districts where it would be right above the electoral sour spot of 30-40%, which could be possible by constructing districts with a small standard deviation from their 1988 national mean of 43%. Unfortunately from its perspective, its mean support in the 1989 elections was not 43% as it had been in the plebiscite, but a meager 34%. When compared to the distribution of the comuna-level vote share, as shown in Figure 3 below, it is clear that the vote is somewhat more normally distributed and many comunas fall below the sour spot. By contrast, the Concertación’s vote spread shows that the party “wasted” a lot of support from 40 to 60%. In that coalition’s ideal world, its (much stronger) support in the binomial system would probably be bimodal. In this distribution, the party would have a couple of districts with no support at all, and the rest of the votes bunched up past the 66% threshold. This is obviously not the case. Instead, support is bunched up close to 60% in a lot of places, but nothing goes past 66.7%. On other words, although the Concertación won both seats in nine districts, in only one case did it win both seats outright without needing the second party to earn less than 33.3%.

[Figure 3 about here]

Finally, there is additional evidence showing that electoral engineers continued to gerrymander significantly once they settled on the unavoidable $M=2$. Clear evidence of an attempt at gerrymandering with an effort to produce positive outcomes for the right is omnipresent in the government simulations (ODEPLAN 1989). Electoral designers were instructed that they had to follow certain fundamental guidelines in combining the country’s basic electoral units (comunas) in order to devise electoral districts. In particular designers were told to 1) respect historical regions; 2) employ the boundaries of historical comunas (i.e. they could not be broken up); 3) that all comunas in an electoral district had to be contiguous; 4) the population could not be wildly dissimilar in different districts; and that 5) the final configuration of districts should maximize the right’s electoral fortunes (Anonymous 2012). As explained above, Zucco’s analysis assumes that electoral designers were unconstrained in their choices.

Given the $M=2$ setup, designers were faced with the next phase of providing benefits for the rights which they did in devising electoral districts. Indeed, the ODEPLAN documents provide results from three different scenarios of aggregating comunas, providing additional evidence of a systematic malapportionment to favor the parties of the right. ODEPLAN planners began by calculating the right’s representation for the different district configurations based on an equal voting pattern (the “Same” column in Table 4). They then ran the same simulations for the right receiving 5%, 10%, and 15% fewer votes in each of these districts, as well as 5% and 10% more in the same districts. We summarize these simulations in Table 4, with our own simulations of the actually adopted districting plan included at the end. Note that ODEPLAN’s district aggregation actually maximizes the right’s representation in five of the six scenarios, with the actual districting plan maximizing representation in only two. Still, all configurations yield relatively similar results.

Thus, contrary to Zucco’s claim all the data and simulations presented here suggest a substantial bias in the apportionment of districts to favor the right.

[Table 4 about here]

5.3 Third claim: The binomial system was not the best choice ex ante

Zucco makes the argument that if the military really intended to benefit the right, then it would not have chosen the binomial system—and would have considered another system. However, this argument is also flawed, primarily because it assumes that electoral designers had a *tabula rasa* on which to completely build a new electoral system. Several sets of constraints acting upon institutional designers and limited the range of options on the table, and many of the options Zucco specifically discusses, especially those designs that entail larger district magnitudes.

First, this claim ignores both the context of the Chilean transition and the competitive dynamic of the party system. As noted, government officials were concerned about the proliferation of political parties, as they saw the roots of Chile's democratic breakdown in the polarized competitive dynamic of the pre-authoritarian multiparty system. Zucco's claim that the military parties could have better favored the parties of the right had they adopted a system with a larger district magnitude would simply not have been on the military's menu of options. Yet Zucco suggests that the optimal district magnitude to favor the right would have been $M=7$. With such a system, small parties could have won without forming alliances and Pinochet's goal of squelching the left and reducing the number of parties would have been contravened. Even the Communist Party could have potentially won seats without an alliance. Indeed, with $M=7$ the many parties of the Concertación could win without allying with each other or choosing a single presidential candidate, while Pinochet's goal was precisely for them to fail to ally and lose. Interestingly enough, a large magnitude system might also have permitted a splintering of the then fractious right—something Pinochet obviously sought to avoid.

Second, and on a related note, the simulations of other electoral options are fraught with difficulties. In contending that the binomial system was not the best choice *ex ante*, Zucco presents a series of simulations in Table 4 (2007: 310) based on the same national vote share from the plebiscite (43% for the right) and employing different district magnitudes. The table does show that the best choice in terms of seat share for the right was the two-magnitude system (41.86% of seat share), until the simulations reach a magnitude of 7 (which increases the right's seat share to 42.0). Despite the fact that the advantage for the right is minimal, Zucco's argument ignores an extraordinarily important contextual point and the very rationale for electoral reform. Perhaps the right could have enjoyed marginal gains with a larger magnitude (indeed, increasing the district magnitude to infinity in theory would only give the Alianza 43%). The difference between a district magnitude of 2 and of infinity is only a difference of 1.14% in seat shares. Electoral engineers were certainly astute enough to know that a less than 1% increase in representation that might come with a higher M was not worth the real risk that a more permissive PR system could entail, as described above. This also ignores Pinochet's stated goal to reduce the number of parties.

Zucco's simulations are also less than convincing on another account. He contends that "with no or low dispersion $M=2$ performs at least as well as any other M , when the standard deviation reaches 10 percentage points $M=2$ falls to fifth place among the exemplified options" (Zucco 2007: 310). While this is true, the right's seat share of

41.86% with $M=2$ could only be increased to a maximum of 42.30% in the best circumstances with a magnitude of 10. He acknowledges that “the differences are obviously small, but enough to say that from a perspective of an intuition designer, there was no clear choice” (Ibid.). Actually the choice was quite clear. Miniscule increases in seat shares were not worth the risk of a higher M .

Thus, the ideal way to balance the reduction of the number of parties with concrete benefits for the right was magnitude of 2. If authorities opted for a system with magnitudes of 3, 4, 5, or 6 they would have received fewer seat shares and risked the fracturing of the right into two parties and/or lowering the threshold of victory for parties of an unified center-left.

In short, with one exception, other magnitudes were simply not on the table. Reformers did consider a simple majority $M=1$ system which would have provided incentives for the unification of the right and the center-left. Such a system was rejected because regime electoral system architects knew that with a level of support of 40% that the right would systematically be excluded from congress if it faced a unified center-left. Indeed, Navia (2002) shows that with magnitudes of 1, the right would have been virtually shut out of congress. This simple reality is a profound testament to the underlying goals of electoral reform and who it was designed to favor.

6. Conclusion

Analysts of the Chilean legislative electoral system were correct in noting that the binomial system was designed in an attempt to benefit particular constituencies, and especially the ideological right (Siavelis 1997; Scully and Valenzuela 1997; Navia 2005; Fuentes 1999). Using heretofore private Chilean government documents and comuna level returns from the 1988 plebiscite on continued military rule, we show that this electoral system has a mechanical effects that electoral designers clearly understood and employed in an attempt to maximize the representation of the ideological right and limit party fragmentation. Taking into account the political context and data available at the time, arguments such as Zucco’s (2007) that the system was designed without a pro-right bias are simply incorrect.

We conclude that electoral system design is at least a two-pronged process involving district boundary design as well as setting district magnitude undertaken by a seat-maximizing electoral majority. We show that the Chilean legislative system was indeed designed to limit 1) the number of parties in the party system and 2) electoral losses of the political right. This analysis strongly supports the rationality of electoral engineering to benefit designers, even under sub-optimal conditions of limited time and resources. In contesting many of Zucco’s claims, we highlight the extremely flawed logic of drawing conclusions from post-plebiscite electoral data and theoretical distributions of plebiscite returns while also drawing attention to a number of theoretical and empirical defects.

It is imperative to have a grasp of both the intentions and effects of the Chilean electoral system since the return of democracy in 1990, especially in light of recent efforts in the Chilean congress to change the system. Likewise, it is essential to set the historical record straight with respect to the military’s efforts to change the party system manage its transition out of power, and engage in electoral engineering to favor its ideological party allies.

APPENDIX. 1988 Plebiscite results in Chile following **current districting boundaries**

| District | Yes | No | Null | Blank | Total |
|-----------------|------------|-----------|-------------|--------------|--------------|
| 1 | 38391 | 51746 | 1967 | 1199 | 93303 |
| 2 | 37458 | 42054 | 1221 | 977 | 81710 |
| 3 | 35959 | 53772 | 1841 | 1289 | 92861 |
| 4 | 48300 | 76280 | 2318 | 1303 | 128201 |
| 5 | 28520 | 39474 | 1019 | 1080 | 70093 |
| 6 | 20880 | 23819 | 685 | 753 | 46137 |
| 7 | 40244 | 43421 | 1158 | 1208 | 86031 |
| 8 | 45727 | 51539 | 1684 | 1564 | 100514 |
| 9 | 28279 | 39037 | 1306 | 1104 | 69726 |
| 10 | 56754 | 76274 | 2116 | 1480 | 136624 |
| 11 | 45031 | 58209 | 1307 | 1237 | 105784 |
| 12 | 52147 | 65453 | 2160 | 1238 | 120998 |
| 13 | 65795 | 100910 | 2472 | 1399 | 170576 |
| 14 | 73970 | 94720 | 2139 | 1295 | 172124 |
| 15 | 30361 | 39431 | 1069 | 854 | 71715 |
| 16 | 51989 | 69099 | 1722 | 1306 | 124116 |
| 17 | 70111 | 124918 | 2695 | 1692 | 199416 |
| 18 | 75204 | 140295 | 2932 | 1933 | 220364 |
| 19 | 57505 | 88610 | 1775 | 1218 | 149108 |
| 20 | 82733 | 142203 | 2690 | 1803 | 229429 |
| 21 | 104007 | 107293 | 1728 | 1175 | 214203 |
| 22 | 71501 | 87849 | 1442 | 1132 | 161924 |
| 23 | 113082 | 75915 | 1515 | 979 | 191491 |
| 24 | 57683 | 84166 | 1837 | 1054 | 144740 |
| 25 | 72109 | 131880 | 2940 | 1746 | 208675 |
| 26 | 54329 | 93264 | 1818 | 1093 | 150504 |
| 27 | 78305 | 128041 | 2772 | 1829 | 210947 |
| 28 | 73026 | 135889 | 2570 | 1817 | 213302 |
| 29 | 58152 | 100902 | 2356 | 1704 | 163114 |
| 30 | 68315 | 82011 | 1941 | 1474 | 153741 |
| 31 | 71224 | 76998 | 1967 | 1709 | 151898 |
| 32 | 37425 | 62014 | 1381 | 872 | 101692 |
| 33 | 45444 | 61798 | 1391 | 1185 | 109818 |
| 34 | 42524 | 49619 | 1026 | 937 | 94106 |
| 35 | 39037 | 35143 | 886 | 882 | 75948 |
| 36 | 53074 | 67054 | 1394 | 1234 | 122756 |
| 37 | 32857 | 57272 | 858 | 662 | 91649 |
| 38 | 35118 | 37874 | 1037 | 867 | 74896 |
| 39 | 47962 | 40592 | 1061 | 785 | 90400 |
| 40 | 51731 | 28556 | 977 | 803 | 82067 |

| | | | | | |
|--------------|----------------|----------------|--------------|--------------|----------------|
| 41 | 69580 | 60914 | 1678 | 1255 | 133427 |
| 42 | 66092 | 51901 | 1685 | 1447 | 121125 |
| 43 | 45910 | 80269 | 1662 | 1238 | 129079 |
| 44 | 64375 | 113282 | 2089 | 1674 | 181420 |
| 45 | 39149 | 73925 | 1385 | 1443 | 115902 |
| 46 | 39764 | 62731 | 1364 | 1238 | 105097 |
| 47 | 84643 | 63491 | 2074 | 1924 | 152132 |
| 48 | 42353 | 32869 | 1188 | 805 | 77215 |
| 49 | 42363 | 28102 | 987 | 890 | 72342 |
| 50 | 56479 | 68972 | 1496 | 1160 | 128107 |
| 51 | 37286 | 31987 | 1205 | 1064 | 71542 |
| 52 | 41609 | 25141 | 754 | 726 | 68230 |
| 53 | 36164 | 53207 | 837 | 809 | 91017 |
| 54 | 48506 | 36533 | 1332 | 805 | 87176 |
| 55 | 35133 | 46081 | 1177 | 638 | 83029 |
| 56 | 38456 | 32324 | 812 | 684 | 72276 |
| 57 | 43812 | 40736 | 1296 | 856 | 86700 |
| 58 | 40386 | 32103 | 1032 | 912 | 74433 |
| 59 | 19238 | 19245 | 436 | 406 | 39325 |
| 60 | 35549 | 48372 | 934 | 813 | 85668 |
| TOTAL | 3119110 | 3967579 | 94596 | 70658 | 7251943 |

Note: Entire comuna level results from the 1988 plebiscite are available in the supplementary online appendix.

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Figure 1. Histogram of plebiscite vote across *current* 60 districts in 1988 elections

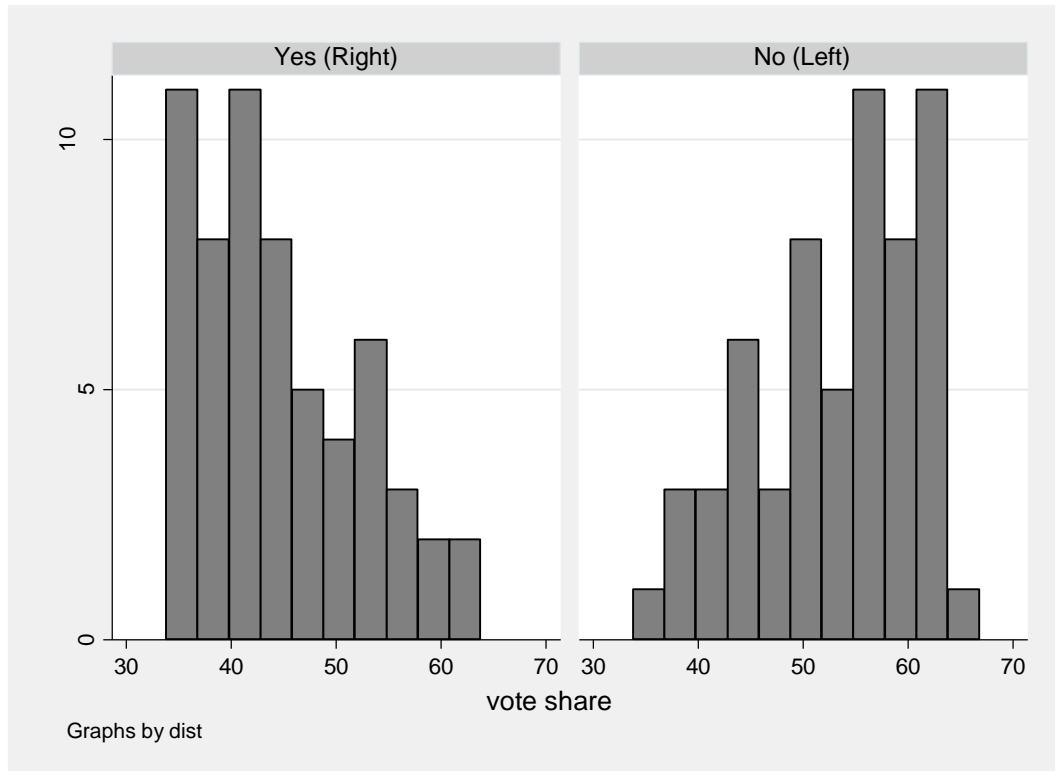
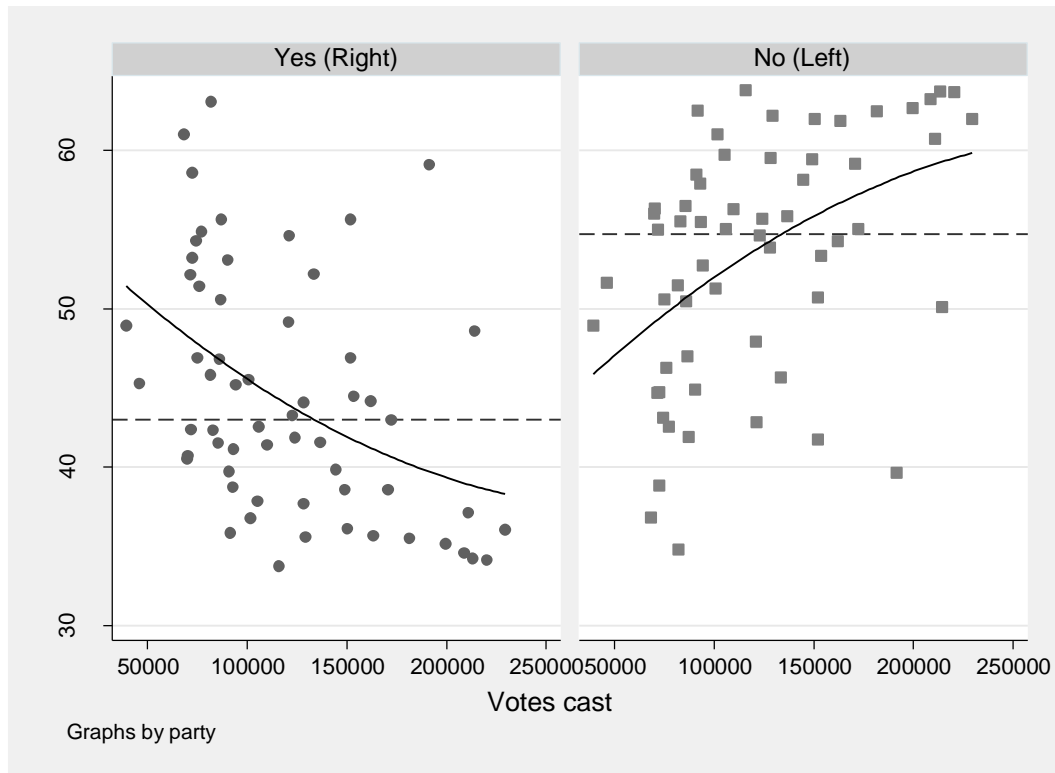


Figure 2. Vote shares and votes cast in current districts, lower house, 1988 plebiscite.



Notes: Dashed lines represent total mean vote share. Solid lines are the quadratic prediction of the fitted plots. Correlation between size of district and vote share are substantively and statistically significant values of -0.4323 for the Right ($p < 0.0006$) and 0.4589 for the Left ($p < 0.0002$).

Figure 3. Histogram of plebiscite vote in 1988 elections in 365 comunas

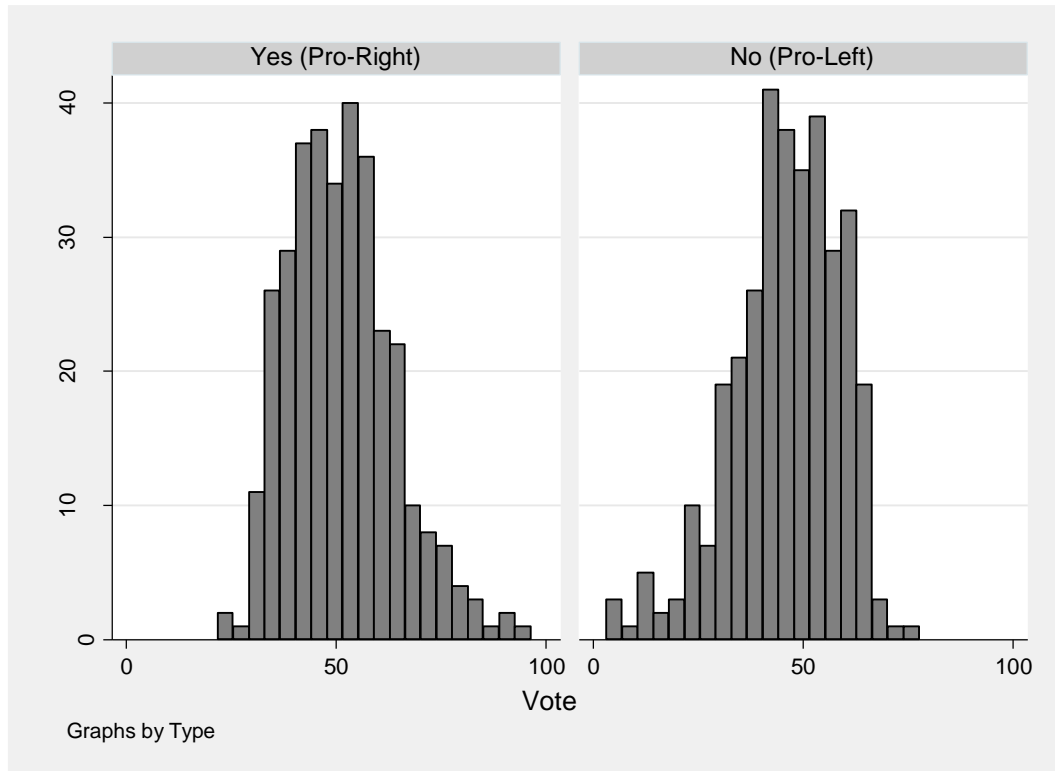


Table 1. Measures of central tendency for 1988 district-level results of congressional elections, by coalition

| | Mean | SD | Min | Max |
|-------------|-------------|-----------|------------|------------|
| Yes (Right) | 44.40 | 7.61 | 33.78 | 63.04 |
| No (Left) | 53.23 | 7.64 | 34.80 | 63.78 |

Table 2. Vote cost per seat won by each coalition, 1988-2009 (1988 figures are simulated assuming current districts, two left-right coalitions, and no change in vote)

| | Party | Votes | % Share | Seats | % Seats | Cost per Seat |
|------|--------------|--------------|----------------|--------------|----------------|----------------------|
| 1988 | Left | 3,967,579 | 54.71 | 60 | 50 | 66,126 |
| | Right | 3,119,110 | 43.01 | 60 | 50 | 51,985 |
| 1989 | Concertación | 3,499,713 | 51.49 | 69 | 58 | 50,720 |
| | Alianza | 2,332,358 | 34.18 | 48 | 40 | 48,591 |
| 1993 | Concertación | 3,733,276 | 55.4 | 70 | 58 | 53,333 |
| | Alianza | 2,471,789 | 36.68 | 50 | 42 | 49,436 |
| 1997 | Concertación | 2,927,692 | 50.51 | 69 | 58 | 42,430 |
| | Alianza | 2,101,392 | 36.26 | 47 | 39 | 44,710 |
| 2001 | Concertación | 2,942,989 | 47.9 | 62 | 52 | 47,468 |
| | Alianza | 2,720,195 | 44.27 | 57 | 48 | 47,723 |
| 2005 | Concertación | 3,417,207 | 51.76 | 65 | 54 | 52,572 |
| | Alianza | 2,556,386 | 38.72 | 54 | 45 | 47,340 |
| 2009 | Concertación | 2,934,378 | 44.35 | 57 | 48 | 51,480 |
| | Alianza | 2,874,674 | 43.45 | 58 | 48 | 49,563 |

Table 3. Results of 1988 Plebiscite and Number of Electors per District

| | Avg. Number of Registered Voters | Number of Districts | Total Registered Voters 1988 |
|------------------------------|---|--------------------------------|---|
| Districts where the “Si” won | 97,846 | 15 | 1,467,690 |
| Districts where the “No” won | 132,007 | 45 | 5,940,303 |
| Total Districts (60) | 123,467 | 60 | 7,407,993 |

Table 4. Simulations of legislative seats won by the right under three districting proposals and current alignment from 1988 plebiscite results, lower house

| | Same | -5% | -10% | -15% | +5% | +10% |
|----------------------|-------------|------------|-------------|-------------|------------|-------------|
| Original Project | 59 | 58 | 50 | 45 | 60 | 63 |
| Ministry of Interior | 58 | 56 | 48 | 44 | 60 | 60 |
| ODEPLAN | 60 | 60 | 50 | 46 | 60 | 63 |
| Current | 60 | 57 | 49 | 45 | 61 | 62 |

Note: “5%” does not refer to 5% above the existing vote *share* for the right, but rather 5% more of the existing “Sí” votes. For the left, this implies a concomitant gain of 5% of those right votes and not simply 5% more of its previous total.