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Political behavior in times of institutional novelty

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POLITICAL BEHAVIOR IN TIMES OF INSTITUTIONAL NOVELTY

by

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DEDICATION

I would like to dedicate this work to my uncle, Rodrigo, and my parents, Mario and Cecilia; to my brothers and sisters, Loreto, Catalina, Mario Ignacio, and Rafael; my brothers-in-law, and my niece María Gracia. I will always appreciate your support, love, and advice during these years. You were a light of hope during difficult times and the shoulder I could lean on every time.

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ABSTRACT

This dissertation consists of three papers exploring how critical historical moments can produce different electoral patterns in Latin American countries. Through the comprehension of times in which new institutions emerge (or are reformed), the articles investigate how factors can move voters beyond what the discipline has acknowledged as the typical patterns of voting behavior. Specifically, the papers look at elements such as biased information exposure during the expansion of the voting franchise, changes in technological and procedural rules of elections, and long-term exposure to autocratic government repression on the eve of the re-birth of democratic institutions.

The first paper studies the 1958 Chilean presidential election to assess the impact of pro-partisan informational channels on aggregate voting patterns by using information retrieved from national election archives and an original dataset for radio stations across the territory. The analysis exploits as-if random variation in signal reception using a linear regression model to estimate the effect of exposure to pro-partisan radio signal strength on electoral results. Results show that exposure to partisan radio substantially increases electoral support for the ideologically closest candidates, providing persuasive evidence regarding the relevance of informational control.

The second article explores the effect of the different periods of Pinochet's repression machinery on the 1988 plebiscite results by using a two-part methodological strategy, achieved through collecting ecological data of repression cases, pre-existing security infrastructure, aggregate electoral outcomes, and survey responses. The first strategy employs a two-stage least square model to observe the possible influence of repression's geographical variation on electoral outcomes. The second approach looks at a multilevel logistic regression with survey observations to assess the possible influence of different levels of repression on individual self-reported vote choice. Results show a null relationship between the variables of interest, but it is not possible to reject the idea that repression doomed Pinochet's regime because its effect could be mediated by television and campaign ads.

Lastly, the third paper investigates how the introduction of new voting technologies can decrease the rate of residual votes by limiting the capacity of political and bureaucratic agents to intervene during the vote-counting moment. Based on district-level data for elections in Peru and Paraguay, the analysis of this research uses a comparative framework taking advantage of the conditions under which the implementation of electronic voting happened by using a group-time difference-in-difference model. The quantitative exploration is complemented by in-depth interviews conducted in both countries. Results show that the implementation of electronic voting is associated with a decrease in the rate of residual votes that can be attributed to the user—error reduction and the limitation of political activists' capacities to influence the rate of null votes.

The findings of the different articles can serve as an important addition to the broader literature on comparative politics and political behavior in Latin America. Moreover, they highlight the relevance of observing how unique conditions and novel institutional settings might be essential to revisit crucial historical moments and comprehensively understand factors that shape political dynamics.

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LIST OF ABBREVIATIONS

AM	Amplitude Modulation
CERC	Centro de Estudios de la Realidad Contemporánea
CNI	Central Nacional de Informaciones
dBuV	Decibels Voltage Level
DiD	Difference-In-Difference
DINA	Dirección de Inteligencia Nacional
EBM	Electoral Body Management
FBIS	Foreign Broadcasting Information System
IDEA	International Institute for Democracy and Electoral Assistance
ITM	Irregular Terrain Model
JNE	Jurado Nacional de Elecciones
OAS	Organization of American States
ONPE	Oficina Nacional de Procesos Electorales
PTA	Parallel Trend Assumption
PTP	Point-to-Point
TSJE	Tribunal Supremo de Justicia Electoral
TSLS	Two-Stage Least Squared
UP	Unidad Popular
US	United States

CHAPTER ONE. INTRODUCTION

This dissertation brings together three unique cases under the umbrella of political behavior literature in Latin America. The different analysis looks at the role of biased information, repression, and new technologies to contribute to decades of accumulated evidence in political science that have emphasized regular sets of conditions that influence electoral outcomes. For instance, societal conditions – such as employment rate, and economic growth – have dominated ecological research and academic efforts (MacKuen et al. 1992, Nadeau and Lewis-Beck 2001). Complementarily, individual factors – such as age, income, and partisanship – have provided the discipline with a substantial understanding of the complex dynamics going through the people's mind at the time of choosing which party or candidate to support at the voting booth (Niemi et al. 2011, Bartels 2000). However, these regularities have fallen short in the attempt to explain how, under certain conditions, unique historical moments in which an institutional novelty emerge can change what political science has cemented as the founding blocks of the political outcomes and voter's decision-making process.

Despite the limitations of looking at cases in which generalization is not always possible, the relevance of those exemplar events provides the discipline with a deeper comprehension of the nature of human political behavior. Simultaneously, the exploration of these moments allows researchers to observe the influence of long-disputed factors in a close-to-ideal framework. In this sense, and further away from the effect that institutions directly have on the incentive structure of political agents, the emergence or transformation of new rules in the political game might also provoke crucial moments. Across them, voters

are faced with unprecedented levels of freedom to cast a ballot without the traditional strength of factors such as institutional-psychological effects, party representatives, previous individual experience, or partisan attachments.

Placing attention at cases in Chile, Peru, and Paraguay, the motivation behind this work aims to explore unique events and times in which new institutions emerge (or are reformed). Through them, this dissertation investigates how factors such as biased information exposure on the context of the expansion of voting franchise, changes in technological and procedural rules of elections, or long-term exposure to autocratic government repression in the eve of the re-birth of democratic institutions can move voters beyond what the discipline has acknowledge as the typical patterns of voting behavior.

The first article explores how the capacity of politicians to gain power might be explained by the control they have over informational channels. Placing attention over radio, one of the earlier mass media outlets, this research exploits as-if-random signal exposure to estimate its influence over aggregate vote choice in Chile´s 1958 presidential contest. Radio was, from early stages, a preferred information channel employed by politicians and parties to persuade voters and expand their messages, but political science has underexplored the relevance of information sent through radio waves because of data limitations and complicated cross-effects. In this regard, the case explored in this paper presents a unique opportunity to observe the possible impact of pro-partisan radio waves on electoral results without being worried about the influence of television. New voters, new institutions, and a competitive campaign might help explain the relevance of information on electoral results. By constructing a radio signal measurement, using

ecological data, this research aims to unravel the impact of national broadcasting on a competitive three-percentage points race. Results show persuasive evidence that control of informational channels is essential to understanding electoral results. More specifically, the availability of pro-partisan radio waves is associated with a candidate's vote share. Findings have implications for theoretical development and historical interpretations, but more importantly, they expand our understanding on the impact of information on elections and provide new insights to see politicians' strategic decisions from a novel perspective.

The second article explores the role that different periods of repression may have played in the defeat of Pinochet in the 1988 plebiscite. Indeed, the use of repression by dictatorships is commonplace among non-democratic governments. Its social and political effects differ significantly depending on the context and temporality. In this regard, Pinochet's dictatorship is a perfect example of crude repression and a non-violent exit from the regime, transforming his case into a point of interest for political science. With reformed institutions and special political conditions, the case of Chile presents a novel opportunity to expand our theoretical and empirical knowledge on the subject. Analyses are carried out using a two-part methodological approach, with an ecological model that takes advantage of a two-stage instrumental variable least square estimation to overcome endogeneity problems and a multilevel logistic approach with individual observations to assess the possible influence of different levels of repression on individual self-reported vote choice. In contrast with recent evidence, results show a null relationship between the variables of interest, establishing that factors such as demographic-territorial characteristics and the effect of television would have been the major factors explaining

the dictator's defeat at the polls. Nevertheless, it is not possible to reject the idea that repression doomed Pinochet's regime because its effect could be mediated by television and campaign ads. These outcomes are vital for understanding what happened in 1988 and the trace left by the military dictatorship on Chile during its period of democratic consolidation.

The third article looks beyond the common assumption which argues that residual votes are usually seen as a manifestation of discontent with the political system (protest) or as the consequence of mistakes made by inattentive citizens (error). By looking at the cases of Paraguay and Peru, this research argues that technological interventions reduce residual votes by decreasing complexities and reducing the discretion and power of electoral officials and partisan agents. Combining in-depth qualitative evidence from interviews and using a group-time difference-in-difference statistical model, results show that the implementation of new voting technologies is associated with a decrease in the rate of residual votes that can be attributed to the user—error reduction and the elimination of administrative rules and procedures to call a vote invalid. The final implication of this type of intervention resulted in thousands of citizens being effectively part of the democratic decision-making process.

The contribution of this dissertation can be summarized in three crucial elements. First, it explores vital moments in a democratic country's history to expand our appreciation of the factors that might open a path for political change. From a theoretical standpoint, this contribution permits one to theorize the conditions under which certain factors – like

information, human rights, and technology innovations – can show their full capacity to persuade voters' choices.

Secondly, the different articles expand the discussion about possible political repertories that might be understood as illustrations of weak parties and corruption. By looking at the potential influence of bureaucratic agents and party activists during the voting-counting process in Peru and Paraguay, the establishment of the secret ballot in the 1958 presidential election in Chile, and the emergence of democratic institutions for the 1988 plebiscite, the following dissertation present an opportunity to reflect on the importance of robust and fair norms and rules for democratic development.

Thirdly, it allows for the exploration of historical databases, which required extensive archival research, and that contribute to the recovery of elections that have not been looked at carefully by contemporary political science. Furthermore, this effort should stimulate the academic endeavor of retrieving past events and look at them through the eyes and development of current techniques in political methodology.

CHAPTER TWO. CAN RADIO SAVE MY CAMPAIGN? THE IMPACT OF NATIONAL BROADCASTING IN CHILE´S 1958 PRESIDENTIAL ELECTION.

Abstract.

The capacity of politicians to gain power might be explained by the control they have over informational channels. One of the earlier mass media outlets was the radio. From early stages, it was employed by politicians and parties to persuade voters and expand their messages, but political science has underexplored the relevance of information sent through radio waves because of data limitations and complicated cross-effects. In this regard, Chile's 1958 presidential campaign presents a unique opportunity to observe the possible impact of pro-partisan radio waves on electoral results without being worried about the influence of television. New voters, new institutions, and a competitive campaign might help explain the relevance of information on electoral results. By constructing a radio signal measurement using ecological data, this research exploits as-if-random radio wave exposure to unravel the impact of national broadcasting on a competitive three-percentage points race. Results show persuasive evidence that control of informational channels is essential to understanding electoral results. More specifically, the availability of pro-partisan radio waves is associated with a candidate's vote share. Findings have implications for theoretical development and historical interpretations, but more importantly, they expand our understanding on the impact of information on elections and provide new insights to see politicians' strategic decisions from a novel perspective.

2.1. Introduction.

The power of politicians can usually be understood by their ability to control information (Wolfsfeld 2011). Indeed, the relationship between mass media and politics is essential for democratic competition. The information available to citizens can both change elections and alter the destiny of governments. If those involved with politics can control media outlets that deliver information, they are more likely to influence voters' beliefs and manipulate voters to act against their interests (Strömberg 2015). As Boas and Hidalgo (2011) argue, active control of media from politicians can decrease the quality of democracy. Consequently, political science has explored the impact of information on politics in several ways. Studies looking at campaigns (Boas 2015), electoral outcomes (Lawson and McCann 2005), government approval ratings (Bleck and Michelitch 2017), and public policies (Tewksbury et al. 2000) are all examples of the impact that information has on different aspects of democratic societies.

Nevertheless, the extent of mass media's impact on politics is debated for theoretical and methodological reasons. From the idea of "minimal" effects to the influence of biased coverage, the literature has developed different approaches to observe how information matters and overcome cross-effect complications. A common view acknowledges that media is relevant if some conditions are present. Elements such as voters' characteristics, partisan strength, and institutional innovations are essential factors in understanding how information might substantially impact political outcomes (Lawson and McCann 2005).

In the context of developing democracies, evidence from Mexico (Greene 2011), Brazil (Boas and Hidalgo 2011), Peru (Boas 2005), and Argentina (Widener and Elorante 2020) all show how biased information and control of media outlets can effectively change voting patterns and citizens' decisions. The 1958 election in Chile is a novel opportunity to advance our understanding of the topic, testing the impact of biased information availability after introducing a set of institutional innovations that secure free and fair elections and a media environment with unique characteristics.

Two main outlets dominated the media in Chile during the 1950s. Citizens mostly received political news through newspapers or radio because of the inexistence of television stations. Moreover, radio was the most trusted and widely received source of information across the country (Carter and Sepulveda 1964). Moreover, news records acknowledge the efforts made by candidates to reach their audience through local and national radio broadcasts (Morel et al. 1979). Indeed, campaigns took a strategic turn during radio expansion to reach newly enfranchised voters (Gil 1969).

As radio was the first mass communication outlet in the country (Lasagni et al. 1987), influenced by a critical ideological bias and ownership concentration (Riquelme 1984), this research argues that the availability of information through radio signals might be a decisive factor to understand voting patterns. The likely impact of information on the 1958 Chilean presidential election is a feature of two main conditions. First, as this research shows, radio corporations and privately owned stations were highly related to political parties and politicians, with approximately 40% of them under control of the Conservative, Christian Democratic, Socialist or Radical parties. Second, the unique institutional settings

in which the highly competitive 1958 presidential race was celebrated, with an increase of almost 36% of the electoral registry, the introduction of the secret ballot, and a novel competitive race with new parties and actors.

This article studies the political effects of exposure to biased media through radio. Results show that pro-partisan radio signal quality is associated with an increase in vote share for the supported candidate and a decrease in the vote obtained by opponents. More importantly, it demonstrates that controlling information channels is essential for understanding electoral results. Using an Ordinary Least Square Model with original data collected through archival records from all radio stations operating in 1958, the analysis compares the effects of different pro-partisan radio stations' signal strength to measure the impact of the availability of informational channels at the aggregate level.

Accordingly, this research aims to expand our understanding of how base conditions help understand the influence of information and explain the electoral results of 1958 and decisions made by political conglomerates in the following decades in two main ways. First, looking at how the control of information channels through radio stations could have affected elections before introducing television. Second, by exploiting the unique political environment in which the election was celebrated, with a broad expansion of the electoral registry, new rules to guarantee a secret ballot, and new parties in competition.

This paper is structured as follows. The second section discusses theoretical arguments and evidence regarding the importance of information, mass media, and political campaigns on electoral outcomes. The third section presents the expansion and politics of radio in Chile, the importance of political and news shows, and the political relations

between politicians and radio stations. The fourth section describes the environment of the 1958 presidential election and the newly introduced institutional rules that create the theoretical conditions to expect a substantial media impact over vote choice. The fifth section discusses this research's datasets, methods, and empirical strategies. Next, the sixth section shows results and discusses their extension compared to related research. Lastly, a brief discussion of the results, their theoretical relevance, the effect of information throughout the following decades of Chilean politics, and the possible causes of electoral outcomes are presented.

2.2. Information, mass media, and electoral outcomes.

Political science has widely debated the impact of information on the outcome of elections. One of the most traditional ways politicians aim to inform citizens is through campaigns. They serve as an opportunity for candidacies to demonstrate their policy positions, attributes, and ideas to persuade voters to support them. Nevertheless, the literature has generally been pessimistic about the capacity of politicians and campaigns to change the destiny of an electoral race. Moreover, factors such as cross-messages from different candidates and different channels of information (Brady and Johnston 2006), or partisanship, ideology, and related preexisting values (Converse 1962) are theorized to reduce the capacity of campaigns to produce political change. Therefore, the capacity that information could have to persuade voters might be limited or even inexistent (Alvarez 1998).

What seems clear is that from the novel work of Lazarsfeld and colleagues (1948) to recent evidence in the U.S. traditional research, evidence from developed democracies

seems far away from thinking that information is the primary driver of electoral results. Moreover, literature reduces the effect of information as a factor able to activate political predispositions (Henderson 2005), mobilizing core groups of constituents (Holbrook and McClurg 2005), and even demobilizing inattentive citizens (Llaudet 2018). Despite this, exposure to different news outlets might help to explain how these different effects operate. As Dilliplane (2013) shows, media exposure can activate citizens or increase the odds of conversion subject to citizens' exposure to partisan news outlets.

Nevertheless, the traditional notion of "minimal effects" has been widely overcome when exploring developing democracies. As Lawson and McCann (2005) observe when studying the 2000's Mexican presidential race, "media effects vary with the political and informational context" (p. 28). Furthermore, the authors acknowledge that media effects might be substantial or massive when weak partisan attachments or new parties and candidates are present. Along the same line, Boas (2015) studies the 1988 Chilean plebiscite showing how unique institutional and historical settings can create the conditions to produce significant media effects that can change electoral outcomes. An additional component is introduced by Baker and colleagues (2006), demonstrating that the combination between social context and the existence of young or weak parties creates the conditions for voters to be more likely to be influenced by information obtained from interpersonal discussions.

If societal conditions and institutional settings are essential, controlling information channels might be crucial when understanding the relationship between mass media and political dynamics. Indeed, pro-partisan information might be an important factor in

understanding the relationship between mass media and elections. Control over media outlets finds extensive evidence of its impact on elections and the rise and fall of politicians.

Several examples show the relevance of controlling media outlets to achieve political goals in the Latin American context. In Brazil, Boas and Hidalgo (2011) show how control of media outlets not only boosts a candidate's electoral support but also is an important spoil of office, with incumbent politicians being increasingly likely to grasp control over local media, which, in turn, increases their chances of being reelected. In Argentina, Widener and Elorante (2020) show how pro-Peron media outlets were a pivotal determinant in explaining his triumphs in the 1946 and 1948 presidential contests; by controlling information and appealing to his charismatic attributes, the Argentinian President was able to effectively use radio waves as a mechanism to expand his political message. In Mexico, Greene (2011) presents evidence supporting the idea that exposure to specific media outlets magnifies the effect of information exposure in voters with weak partisan attachment. Lastly, observing the case of neopopulist presidents, Boas (2005) shows how biased media exposure increases citizens' likelihood of supporting Fujimori's reelection.

Moreover, recent evidence coming from European experiences shows how exposure to bias or controlled informational channels produces substantial political effects. For example, Adena and colleagues (2015) demonstrate how exposure to pro-Nazi information boosted the party to become a powerful political actor in Germany. At the same time, Della Vigna and colleagues (2014) present evidence arguing that the reception of Serbian nationalistic information altered Croatian political attitudes. Lastly, Peisakhin

and Rozenas (2018) show how pro-Russian airwaves substantially affected Ukrainian voters. Thus, cases in which the combination of politicians' control of mass media communications and particular political and institutional factors present ideal settings to observe the impact of information on electoral results.

Therefore, an exception to this "minimal effect" might occur under exceptional historical and institutional circumstances. For instance, when parties control media outlets or when citizens are closer to a political "blank slate" (individuals with low or nonexistent experience in democratic elections and less partisanship), conditions will be ideal for observing media exposure effects. Thus, an exploration of historical moments in which media outlets could theoretically have a substantial impact on electoral outcomes would help to improve our understanding of how communication channels can influence the development of democracies and the emergence of somewhat-stable voting patterns.

In this regard, the case of the 1958 election in Chile provides an ideal opportunity to assess the impact of radio without being worried about the possible impact of television[1] or a vast competitive radio marketplace (more on this discussion in Section 3). Moreover, evidence from mass communications research shows the massive extent to which radio reached citizens during the 1950s[2].

Far more importantly, and in connection with the ongoing discussion of the timing and context in which elections are celebrated, Chile's 1958 presidential contest presents all

[1] By the end of the 1950s television in Chile was only on an experimental phase. The first channels started in the early 1960s, while the first presidential debate televised occurred only for the 1989 election (Subercaseaux 2011).

[2] Despite conventional wisdom among scholars of the time, radio was the most common channel to obtain information about current events and politics (Davies 1999).

the base conditions under which mass media could substantially impact electoral outcomes. As is going to be presented in Section 2.4.1., a mixture of institutional reforms, an expansion of available voters, and a shallow level of partisan and ideological engagement of the voting population create a close-to-ideal scenario to explore how, under certain conditions, partisan control on a mass-media outlet can influence voting patterns. The following two sections of this article look at the relevance of radio as the main massive information channel in the country and explores the unique conditions that make the 1958 presidential race an ideal opportunity to expand our knowledge on the subject.

2.3. The relevance of radio as a mass communication outlet in Chile.

From the end of the 1920s, Chile's media environment drastically changed. The arrival of radio stations across the country emerged as a new way to reach the masses. The public relevance of radio emerged not solely as a source of entertainment but also as the way Chileans connected with the world and as a powerful educational tool sponsored by the State through the private radio stations (Sagredo and Gazmuri 2007, Osorio 2016). Between 1922 and 1960, 191 radio concessions were given to private and public agents. However, many were not exploited until later years to create new radio stations (Lasagni et al. 1987). By 1958, 121 concessions existed, but only 88 radio broadcasting signals were under operation. With the existing radio signals, almost every corner of the country had access to at least one radio station, but the quality of the signal and the availability of receivers prevented universal exposure.

Indeed, between 1939 and 1957, the average growth of the total amount of radio receivers owned by Chileans increased by 43%. Between 1958 and 1960, the number

rapidly increased, reaching an average increment of 13%. As Figure 2-1 shows, by the year of the election, 700,000 radio receivers were owned by Chileans, i.e., 959 receivers per 10,000 inhabitants (Banks 1973). However, a vast majority of them were in regional and departmental capitals, reducing the capacity of national broadcasts to reach rural communities and towns (UNESCO 1963).

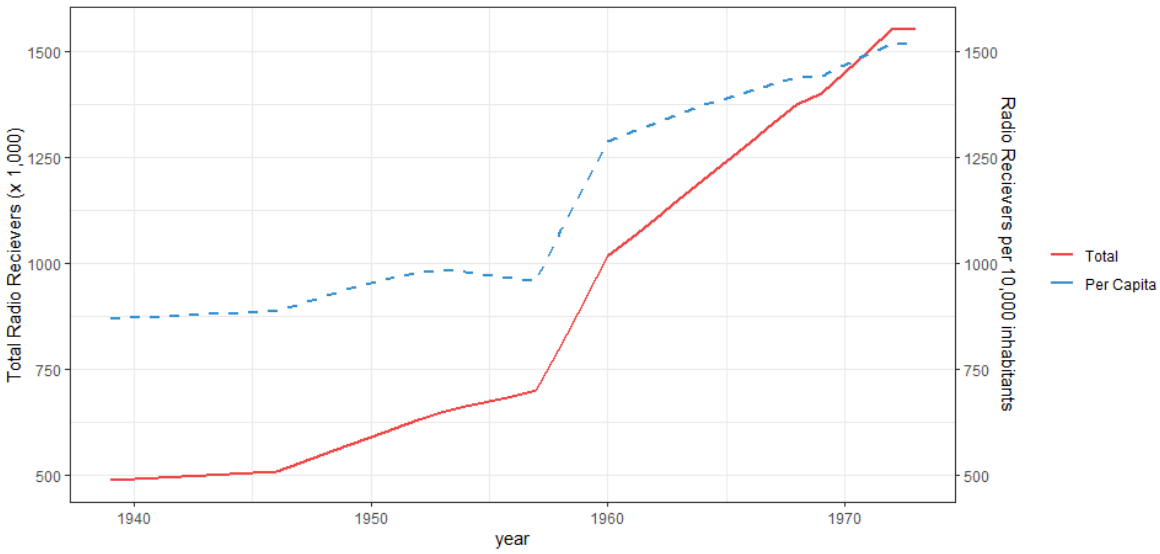


Figure 2-1: Radio receivers in Chile, 1939-1973[3].

Another crucial aspect is the strength and number of radio broadcasting stations across the country. Using data from the Broadcasting Stations of the World (FBIS 1953, 1955, 1957, 1959) is possible to know the number of functioning radio stations and the total signal power to transmit across the country. In 1953, 81 radio stations worked in Chile with a combined transmission power of 234,700 watts (FBIS 1953). In 1958, 88 radio stations functioned with a combined power of 368,450 watts (FBIS 1957). In four years,

[3] Source: Banks 1973.

there was an increase of only 9% in the total amount of working radio broadcasting stations but an overall growth of 57% in total transmission power.

From a political perspective, radio was the primary channel to communicate with the masses – especially for the lower classes. Nevertheless, the private nature of radio companies and the concentration of media owners heavily favored non-leftists coalitions and parties (Wolpin 1969).

As expected, the different governments, politicians, and parties employed this channel to increase the reach of their electoral messages, and political propaganda became a standard norm after the mid-1950s (Gil 1969). From the beginning of radio broadcasts, presidents employ it to deliver their annual account to the citizens and, at the same time to boost the legitimacy and support in favor of their administration (Morel et al. 1979).

This phenomenon was due to the expansion of radio across the country and the several public concessions that governments gave to private owners and educational institutions (Morel et al. 1979). However, it was not until the 1958 race that radio took a new level of relevance. In the weeks preceding that year's contest, Radio Minería – one of the most powerful radio broadcasters in the country – launched an invitation to all presidential candidates to participate in the first "presidential forum." In August[4], and for more than two hours, candidates[5] Allende, Frei, and Bossay discussed public policy, the current issues of the country, and their social programs (Subercaseaux 2011). This

[4] Diario El Mercurio, August 18th 1958.

[5] Not surprisingly, the favorite to win the contest – the right-wing candidate Jorge Alessandri – refused to participate in the debate. His distrust of journalists, and the absolute security that the other candidates would try to erode its privileged position in the race, avert him to be part of – what he thought – was nothing more than a circus (Gamonal 1987).

anecdotal moment illustrates radio's transformation as a vehicle for mass-political communication across the country's main areas. Likewise, from that moment on, the radio stopped being the limited source to repeat campaign ads and jingles and transformed itself into the center of public discussion. Compared to other channels to deliver campaign messages[6], citizens employed radio as the most common vehicle to obtain information.

2.3.1. The politics of radio waves in Chile.

Two crucial factors mediate radio's growth and possible impact on Chilean electoral results. First, the concession model, which placed in the hands of the President the exclusive attribution to provide permission to install radio broadcasting stations (see Appendix 2A for examples). Second, the relationship between politics and radio station ownership.

Since the beginning of radio broadcasting, the State has had its eye on this mass media communication outlet. In 1925, the first legislation was passed, creating a system of radio wave concessions. The power to grant a radio wave remained in the hands of the President of the Republic, as established in the First Radio Communications Regulations (Supreme Decree No. 2,018 of 1925). The regulation allowed maintaining control over what could be broadcast through radios nationwide, prohibiting, for example, the transmission of the results of horse races in 1936 (Benavides and Segovia 2017).

[6] For instance, photographic evidence shows how public spaces (buildings, streets, and public squares) were used to present advertisement from campaigns. In every one of those pictures, it is noted how equilibrated was the number of posters and canvasses those campaigns deployed (see Appendix 2A for examples).

In 1926, the Law of Internal Security of the State (No. 12927) was published, which enshrined the censorship of radio and press content in cases where there was a possibility of disturbing the country's order. Thus, the government of the day would have the power to restrict freedom of expression, generating a complex relationship between the coalition in power and the radio media in the country. The stages of institutional breakdowns, such as the period between 1931 and 1932, brought a vital effort to limit freedom of expression in radio and communication media. For example, the communication company La Nación-Crónica was closed in 1932 (Diario Oficial 1932b). Moreover, the approval of the Law for the Defense of Democracy (1948) gave the State the capacity to intervene directly on radio content. In practice, the mechanisms under which the State administration had the power to intervene were implemented through the obligation to broadcast national networks, which Congress questioned on more than one occasion (Congreso de Chile 1958).

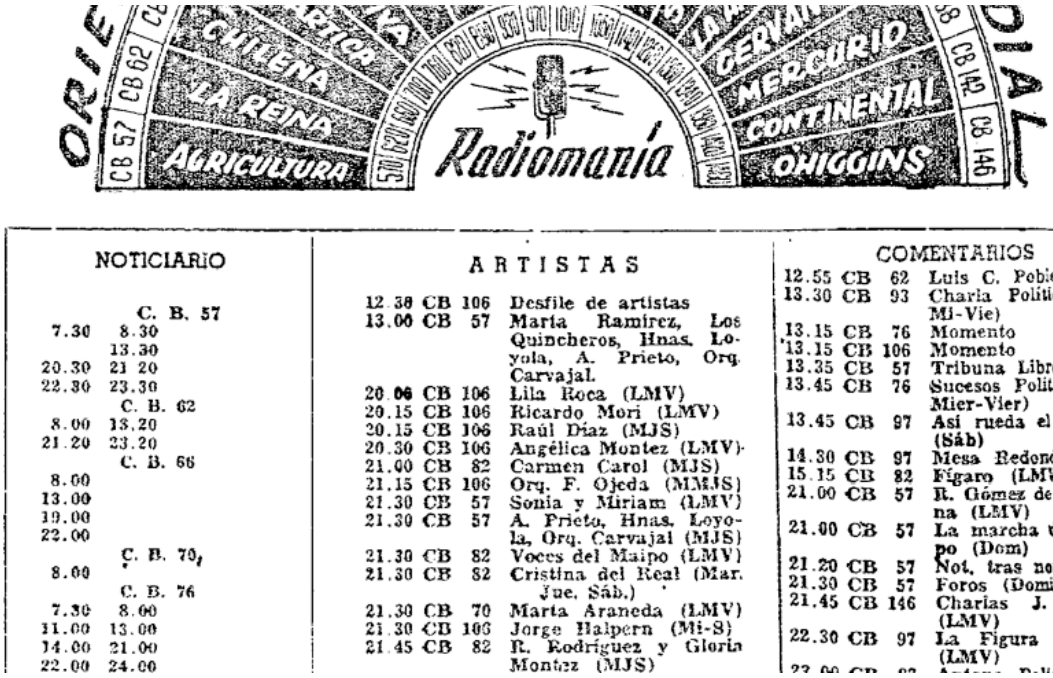
Politicians' fears about radio's expansion and possible influence reached such a point that at the Senate session of December 16, 1953, Radical Party Senator Exequiel González Madariaga spoke at length about the case against the owner of "La Aurora" (“El Mercurio”) radio station, Mauricio Arnoff. Mr. Arnoff was accused of seriously insulting the Chilean Congress by treating them as "ignorant" and "useless" in the radio station he owned. The case demonstrates the intense politicization and relevance of the media in Chilean politics during the 1950s. Another manifestation of the importance of radio was the intervention of Senator Salvador Allende in Congress during the ordinary session of April 23, 1957. On that occasion, he accused Congress of not wanting to prevent the censorship that his allied media (Mundo Libre newspaper and radio Nuevo Mundo) were

receiving from the government of Carlos Ibáñez del Campo. Part of the members of Congress's discussion was even dedicated to protecting radio signals from foreign interference due to a possible ideological influence of Argentine Peronism (Congreso de Chile 1957).

2.3.2. Radio programming.

Since the beginning of broadcast emissions in Chile in the 1920s, radio was mainly a media outlet to entertain people. During its first decades, stations played music and provided Chileans with theatrical shows and sports transmissions that connected families and served as the country's leading source of entertainment. News and information were reduced to replicating what major newspapers published that day (Gutierrez and Munizaga 1983). From the 1940s to the 1950s, the informational offer through radio waves changed drastically. Radio Cooperativa Vitalicia started broadcasting "Reporte Esso," a daily news program that provides information to Chileans, forcing other stations to start their daily news shows. Moreover, the first political satires were part of in-air programming with shows such as "Familia Chilena" and "Topaze en el Aire" (Lasagni et al. 1987).

During the 1950s, political programs and daily news were part of most radio stations. For example, radio Minería created the political program "Correo de Minería" while Radio Prat broadcasted news every fifteen minutes (Lasagni et al. 1987). Unfortunately, information on the content of news and political radio shows is unavailable for the period of this study. However, the magazine "Radiomanía" shows how political programs became common among major radio broadcasting stations. Figure 2-2 shows an example of the information available in the monthly magazine for the city of Santiago.



NOTICIARIO

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C. B. 62
8.00 13.20
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8.00
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22.00
C. B. 70
8.00
C. B. 76
7.30 8.00
11.00 13.00
14.00 21.00
22.00 24.00

ARTISTAS

12.38 CB 106 Desfile de artistas
13.00 CB 57 Marta Ramírez, Los Quincheros, Hnas. Loyola, A. Prieto, Orq. Carvajal.
20.06 CB 106 Lila Roca (LMV)
20.15 CB 106 Ricardo Mori (LMV)
20.15 CB 106 Raúl Díaz (MJS)
20.30 CB 106 Angélica Montez (LMV)
21.00 CB 82 Carmen Carol (MJS)
21.15 CB 106 Orq. F. Ojeda (MMJS)
21.30 CB 57 Sonia y Miriam (LMV)
21.30 CB 57 A. Prieto, Hnas. Loyola, Orq. Carvajal (MJS)
21.30 CB 82 Voces del Maipo (LMV)
21.30 CB 82 Cristina del Real (Mar. Jue. Sáb.)
21.30 CB 70 Marta Araneda (LMV)
21.30 CB 106 Jorge Halpern (Mi-S)
21.45 CB 82 R. Rodríguez y Gloria Montez (MJS)

COMENTARIOS

12.55 CB 62 Luis C. Poblete
13.30 CB 93 Charla Política (Lu Mi-Vie)
13.15 CB 76 Momento
13.15 CB 106 Momento
13.35 CB 57 Tribuna Libre
13.45 CB 76 Sucesos Políticos (L Mier-Vier)
13.45 CB 97 Así rueda el mundo (Sáb)
14.30 CB 97 Mesa Redonda (S)
15.15 CB 82 Fígaro (LMV)
21.00 CB 57 R. Gómez de la Serna (LMV)
21.00 CB 57 La marcha del tiempo (Dom)
21.20 CB 57 Not. tras not.
21.30 CB 57 Foros (Domingos)
21.45 CB 146 Charlas J. Ibarn (LMV)
22.30 CB 97 La Figura del di (LMV)

Figure 2-2: Programming of radio stations in the city of Santiago[7].

Several programs are highlighted in the magazine. For instance, Radio Agricultura transmitted the daily political show "Tribuna Libre" and "Foros" every Sunday. Radio Minería presented the "Momento" political program every day and "Sucesos Políticos" on Mondays, Wednesdays, and Fridays. Cooperativa Vitalicia presented a daily political show ("Mesa Redonda") and a special weekly program every Saturday. Lastly, radio Nuevo Mundo presented "Charla Política" every Monday, Wednesday, and Friday. Moreover, every station had news programming that aired several times a day, usually with three broadcasts during the mornings, afternoons, and nights.

Two essential elements come from the description of political shows on major Chilean radio stations. First, radio listeners had an extensive spectrum of possibilities to

[7] Source: Lasagni et al. 1987.

get information and opinion from specialized political shows. Secondly, mostly all the major radio stations broadcasted their political programming simultaneously, i.e., between 1 and 3 pm on weekdays, while weekend shows were broadcasted around 2 pm. The implications of both factors support the notion that if radio receivers could capture more than one radio station, Chileans would have to choose what show to listen to.

2.3.3. Political ties and radio corporations.

The connection between mass media outlets and Chilean politics is essential for understanding the country's political dynamics in the 1950s. The fight for hegemony over information channels that were overwhelmingly in control of the oligarchic Conservative and Liberal factions through the ownership of corporations shaped a vital part of the public debate in the subsequent decades (Riquelme 1984). When observing the political relations of radio broadcasting companies during the period preceding the 1958 presidential election, clear links between the radio media and national politics can be found. More importantly, the ownership and control over different radio stations make it possible to approximate their editorial position and theorize about the influence of biased radio waves on electoral results. Table 2-1 summarizes the political ties between radio stations in Chile and political parties.

Bias	Radio Ownership	No. Radio Stations	Combined Power (Wtz.)
Pro-Christian Democrat	Cia. Chilena de Comunicaciones	13	107250
	Soc. Chilena de Radiodifusoras	18	
	Individual private ownership	3	
Pro-Conservative	Soc. Chilena de Agricultura	9	53750
	Individual private ownership	4	
Pro-Radical	Individual private ownership	2	13000
Pro-Socialist	Soc. Emisoras Nuevo Mundo	2	15000

Table 2-1: Political ties with radio stations, Chile 1958.

The Christian Democratic country had the highest political connections with radio broadcasting corporations and privately-owned stations. For instance, Compañía Chilena de Comunicaciones (Cia. Chilena de Comunicaciones) belonged from 1950 to 1971 to the Social Christian Conservative Senator Carlos Vial Espantoso[8], who controlled the radio station Cooperativa Vitalicia and its regional affiliates. The Sociedad Chilena de Radiodifusoras (Soc. Radiodifusoras), recognized as the most critical radio conglomerate in the country (Weil et al., 1969) and which had radios such as Minería and its regional affiliates, was directed by Hernán Videla Lira[9], a Liberal Party militant, and sympathizer of President Eduardo Frei Montalva. Private stations also show a meaningful political

[8] Carlos Vial Espantoso was Minister of Finance during 1950 in the government of President Gabriel Gonzalez Videla. Senator elected for the period 1957-1965, he was a member of the Parliamentary Committee of the Social Christian Conservative Party, from which the Christian Democratic Party would emerge (Library of the National Congress, 2021a). During his sessions in Congress in 1965 he made express reference to his position in charge of a radio broadcasting company (Biblioteca del Congreso Nacional 2021a).

[9] Hernán Videla Lira was Senator for Atacama and Coquimbo between 1941 and 1965. A militant of the Liberal Party, he would be appointed Chilean ambassador to Argentina by President Eduardo Frei Montalva in 1965. He resigned from the Liberal Party in 1965 due to its opposition to the Christian Democrat government. He was president of the National Mining Society between 1937 and 1965 (Biblioteca del Congreso Nacional 2021b).

connection, with radio La Americana owned by Miguel Ramis Mascaro, a historical member of the Christian Democratic party, and radio Rancagua owned by Jorge Romero Ramirez, a close friend and ally of the Christian Democratic politician Ricardo Tudela Barraza[10].

The Conservative Party presents a lower number of ties with radio stations but a close connection with the powerful Sociedad Nacional de Agricultura (S.N. Agricultura), owner of the Agricultura radio stations and its regional affiliates across the country. The board of the agriculture society was strongly linked to the Conservative Party and the most right-wing faction of the Liberal Party (Apiolaza and Salgado 2016). Its President between 1953 and 1958 was Recaredo Ossa, a member of the Conservative Party and brother of Manuel Ossa[11], Senator for O'Higgins and Colchagua between 1937 and 1945. More importantly, the party had close ties with several privately-owned stations. For instance, in Santiago, radio La Aurora (also known as radio "El Mercurio") was owned by Mauricio Arnoff, a well-known Conservative businessman. In addition, Carlos Kaehler Schroeder, co-owner of radio Baquedano in Valdivia, was mayor for the Conservative Party in the same city between 1953 and 1954. Lastly, Alberto Guerra Cruzat – a close ally of President Arturo Alessandri Palma – owned radio Condell in the city of Curicó.

The Christian Democratic and Conservative parties had strong links with powerful media conglomerates in the country, while the Radical and Socialist parties present

[10] Ricardo Tudela Barraza was an active collaborator of Eduardo Frei Montalva during his 1958 and 1964 presidential campaigns. Governor of the province of O´Higgins between 1964 and 1968 was elected congressman in 1969 and reelected in 1973 (Biblioteca del Congreso Nacional 2022).
[11] Historical militant of the Conservative Party. He was Senator for the O'Higgins area between 1937 and 1945 (Biblioteca del Congreso Nacional 2021c).

networks with only a couple of radio stations. The Socialist party had control over the Sociedad de Emisoras Nuevo Mundo through Augusto Olivares, a close ally of President Salvador Allende (Bustos 1996).

Lastly, the Radical party present links only through privately-owned radio stations. First, in the city of Coquimbo, Cesar Nieme Apey, owner of the radio station Guardiamarina Riquelme, was mayor for the Radical Party between 1950 and 1955. In the city of Concepción, the owner of radio El Sur, Mario Saez Lagos, was elected Mayor of Concepción in 1950, running as a Radical candidate.

As Table 2-2 shows, private corporations with close ties to political parties were prominent actors in the radio market. In 1953 their stations represented 28% of the available signals, while in 1957, that percentage grew, reaching control over 41% of the internal radio market thanks to the rapid expansion of Soc. Broadcasting. More importantly, during the election year, radio stations owned by Cia. Chilena, S.N. Agricultura and Soc. Broadcasting represented 55% of the total transmission power installed in Chile.

	Cia. Chilena		S.N. Agricultura		Soc. Broadcasting	
Year	*Number*	*% Market*	*Number*	*% Market*	*Number*	*% Market*
1953	12	14.8%	5	6.2%	6	7.4%
1955	13	14.9%	5	5.7%	7	8.0%
1957	13	14.8%	5	5.7%	18	20.5%

Table 2-2: Chilean broadcasting mayor companies[12].

The importance of radio in elections only grew over time. The enactment of the General Services Law in November 1958 and the arrival of F.M. radios in early 1960 expanded the country's radio spectrum, and so did the political competition for control of the airwaves. In short, radio was a powerful tool used by politicians to spread their message and persuade voters. As Chile's most reliable media outlet, radio became a power struggle between politicians and parties (Carter and Sepulveda 1964). The fight for controlling airwaves was a vital feature of the 1960 and 1970s political dynamics, being part of the campaigns´ toolkit and a fearful terrain for political battle (Sepulveda 2020).

Because of the nature of radio broadcasting signals in Chile, this research theorizes that a higher signal availability of pro-partisan broadcasting stations increases the vote share obtained by a candidate supported by the associated party. Furthermore, it should be expected to find that biased signal strength decreases the vote share of opponents.

[12] Source: FBIS 1953, 1955, and 1957.

2.4. The 1958 Chilean presidential election.

2.4.1. Institutional characteristics.

From an institutional perspective, the 1958 election was celebrated in a context of electoral novelty. During the preceding years, the Chilean Congress changed the game's rules (Torres 1989), constructing a set of unique conditions that might increase the relative influence of mass media and campaign efforts. Among the most important is the construction of the first state-controlled electoral registry, the introduction of the secret ballot, and a significant increase in the number of eligible voters (Torres 1989, Nazer and Rosemblit 2000).

Until 1957 the Chilean electoral registry depended on the arbitrary inscription of political parties (Urzua 1992). Because of this, the democratic system was under the scrutiny and dependence of party leaders and officials. As a result, several electoral vices gave rise to a network of corruption and unfair competition in which political agents could manipulate the registry to prevent specific individuals from casting a ballot or even running for public office (Etchepare 2006). During the Carlos Ibáñez del Campo presidency, the government proposed a bill to create the first state-run national registry. This institutional reform[13] prevented electoral vices and allowed for greater competition between political forces, which for the first time, could deposit all their efforts into conducting a campaign that aimed to reach all possible constituents.

[13] Approved by the 12.891 law in 1958.

A second crucial reform was the introduction of the secret ballot. Even though this vital ballot system was legally introduced in the 1925 Chilean constitution, the lack of a single national voting credential for elections created the conditions and incentives for parties to commit vote-buying and construct a system of corruption (Figueiredo 1972). Until then, each party was responsible for creating their ballot, and when citizens reached the voting booth, they were required to choose from the options given to them by party officials (Cruz-Coke 1984). With this mechanism, parties could bribe citizens to select their ballots, violating the norms and principles of a democratic election. The new national ballot system eradicated this practice, allowing citizens to choose between electoral options freely and securely for the first time in the country's history[14]. Therefore, it is possible to argue that real electoral competition emerged during the 1958 election due to both institutional innovations.

A third crucial transformation carried out during the last moments of the 1958 presidential contest was the expansion of the voting franchise. Since the 1940s, Chile's political system systematically incorporated new population sectors into the democratic process. For instance, women voted for the first time in a presidential contest during the 1952 presidential election, and according to data compiled by Nazer and Rosemblit (2000), the electoral registry expanded by approximately 36% between 1952 and 1958 electoral races (392,873 new voters). Moreover, Santiago's population's ideological and party

[14] Historical evidence acknowledges the difficulties and corruption of voting in Chile during the first half of the twentieth century (Millar 1982). This phenomenon was especially complex in rural regions, in which the lord-peasant relationship dramatically increased the corruption of elections (Jara 2017).

attachment was surprisingly low. Pooling data showed that only 1 out of 3 citizens identified themselves with a party or an ideological position (Navia and Osorio 2015). Certainly, the presidential contest is a unique opportunity to observe how non-partisan and inexperienced voters[15] might be persuaded by campaign and media effects during an electoral race.

Furthermore, the end of the "Law for the defense of democracy" allowed – for the first time in a decade – the communist party to run for office and significantly decreased the capacity of non-partisan candidates to participate as candidates (Etchepare 2006). The effects and dynamics of these new laws changed the rules of politics and created new incentives for political agents to form coalitions and expand their everyday grassroots advocates to seek new voters (Gamboa 2011). For instance, for the first time, a left-wing coalition participated in a presidential election with a genuine chance to obtain office, the Popular Front – whose leader was the former Minister of Public Health Salvador Allende – shows the extent to which socialism could achieve power by democratic means. Additionally, the Christian Democratic party made its debut in a presidential contest, obtaining the third position under the campaign of Eduardo Frei (Jaksic and Gazmuri 2018).

[15] According to evidence drawn from the US, once an individual decided to support a party the likelihood, he/she will create loyalty for that same party increases, and consequently continue voting for that political group over time (Dina 2014). In the same line, related evidence argues the relevance of party attachment to determine presidential vote choice (Bartels 200).

2.4.2. Candidates, campaigns, and results.

On September 3, 1958, presidential candidates Jorge Alessandri, Eduardo Frei, Salvador Allende, Luis Bossay, and Antonio Zamorano were on the eve of one of the most contested elections in Chilean history. An open race election with no incumbent candidate or party trying to maintain the executive office.

Jorge Alessandri Rodriguez, serving Senator for the city of Santiago, represented the right-wing factions. An independent candidate who ran with the support of the United Conservative Party and a faction of the Liberal Party. Former businessman and son of former Chilean president Arturo Alessandri Palma was well known for his apathetic relationship with fellow politicians and his humble way of life (Carrasco 1987).

Eduardo Frei Montalva represented the center. One of the founders of the newly created Christian Democratic Party and a serving Senator for the city of Santiago. A professional politician that crumbles the roots of the Liberal party by asking them to support his candidacy to stop socialism[16]. Indeed, historical accounts show how a third of the Liberal Party decided to back his candidacy, with many historical figures – like Senator and President of the Chilean Broadcasting Society Hernan Videla Lira – rooting for him (Arancibia 2005).

[16] Pro right-wing newspapers such as El Mercurio did not think that Alessandri's candidacy was a good idea. In their editorial from August of 1958 several warnings were raised questioning if the right supporters should follow Alessandri or support Frei's candidacy. The environment drastically changed during the last weeks of the campaign. Realizing that Alessandri was the only candidate who could defeat Allende, the written press took the side of favoring Alessandri´s campaign to prevent Allende´s rise to power (Soto and Garay 2018).

Luis Bossay Leiva represented the center-left wing. Member of the Radical Party and former Secretary of Economy and Commerce during Gonzalez Videla's administration was a serving Senator for the city of Valparaiso. His candidacy was an attempt to show the strength of the radical supporters after losing electoral support during the 1957 congressional election (Etchepare 2006).

The left-wing parties, formed under the Popular Action Front, were represented by Salvador Allende Gossens. Member of the Socialist Party and presidential candidate during the previous election, Allende was the most prominent figure of the Chilean left and a serving Senator for the city of Antofagasta. Under his leadership, the Socialist Party joined forces with the Communist Party, the Popular Socialist Party, the Socialist Democratic Party, and the Labour Party to construct the broadest and strongest left-wing coalition (Fernández 2015).

Lastly, a self-denominated Marxist entered the race. Antonio Zamorano, a former priest, popularly known as "Cura de Catapilco." Even though the left never took his candidacy seriously, the former priest has been used to explain the defeat of Allende for decades among Chilean historians (Cruz-Coke 1984, Urzua 1992, Arancibia 2005; Etchepare 2006). Many rumors during the decade and even some newspapers argue that Alessandri supported his candidacy to undermine Allende's chances of reaching the presidency (Fernández, 2015), but none of those accusations has been proved (Navia and Soto, 2017).

The campaign period was not exempt from polemics and problematic events for candidates. For instance, on Monday, August 19, the right-wing candidate Jorge Alessandri

suffered from a public attack while delivering a speech in the central square of the city of Osorno (El Mercurio 1958). Moreover, historical accounts acknowledge the increasing conflict between campaign activists, to the extent that struggles between campaign brigade members of Alessandri and Allende took place in public spaces and streets across the major cities (Arancibia 2005).

The previous point must be noted in the face of how the campaign was run, and specifically, how each candidate of the leading candidates employed different strategies to appeal to and reach voters across the country. For example, Frei's campaign aimed to mobilize the youth and women by creating an appealing propaganda mechanism based on a particular policy vagueness (Arancibia 2005). Allende aimed to construct a well-defined policy platform, primarily based on social security, that avoided confrontation with any other candidate that was not the rightist Alessandri (Fernández 2015). During his campaign, one of the most iconic moments happened days before the election; the so-called "victory train" brought Allende to ten different cities across the center-south of Chile, making public speeches and rallying his supporters (El Gráfico 1958).

Nevertheless, Frei and Allende's campaigns tried to create tight connections with their supporters, mainly by the deployment of rallies, manifestations, and extensive use of radio as a source to increase the reach of their message and ideas while at the same time command a fearful attack over Alessandri's figure (Gil 1969). Examples of how the radio was deployed during the campaign show Frei and Allende's relevance over the media channel. For instance, during the campaign period, Allende's campaign bought a daily 15-minute space on the radio Simon Bolivar (Concepción) to inform citizens about campaign

activists and notable remarks from the candidate (El Grafico 1958). Moreover, Frei's campaign publicly addressed the country through a final radio message five days before the election (Politica y Espiritu 1958).

On the other side, Jorge Alessandri exhibits a more traditional perspective during the campaign. True to his style, the independent candidate kept a distance from the electorate, making public appearances only during rallies and avoiding a direct relationship with journalists and media outlets (Gamonal 1987). However, Alessandri's traditional perspective was not the strategy deployed by his campaign headquarters. Instead, the right-wing candidate's campaign deployed new marketing techniques using special iconographies to reach voters and persuasive rhetoric techniques to expand its message and reach new audiences (Fernández 2015).

After a tense and increasingly polarized campaign in which commentators and elites understood that the winner of the contest was only going to be selected between Alessandri and Allende (Urzua 1992, Etchepare 2006), the right-wing candidate obtained a narrow first place by a margin of less than 3% (33,416 valid votes) over the socialist Salvador Allende (see Table 2-3 for detailed results).

In this scenario, the race for the Chilean presidency was novel not only because of the competitiveness[17] of the contest but also as the result of the many factors that, combined,

[17] For historians (Cruz-Coke 1984, Urzua 1992, Etchepare 2006), the race for the presidency started immediately after the congressional race of 1957. The landmark triumphs of Frei and Alessandri in their districts, the power that the left-coalition obtained in the same elections, and the decline in electoral support suffered by the Radical party transformed the presidential campaign into the center of public opinion more than a year before the time to go to the voting booths.

raised the 1958 election to a special place for the country's political history and a close-to-ideal setting to observe the impact of mass media on electoral outcomes.

Candidate	Party	Votes	Percentage
Jorge Alessandri	Liberal Party / Conservative Party	389909	31.6%
Salvador Allende	Socialist Party / Communist Party	356493	28.9%
Eduardo Frei	Christian Democratic Party	255769	20.7%
Luis Bossay	Radical Party	192077	15.5%
Antonio Zamorano	Independent	41304	3.3%

Table 2-3: Results presidential election 1958.

Despite the importance of this election, scholars have analyzed it in a narrow fashion. Traditional historical views and some recent efforts have pointed to the role that Antonio Zamorano played in the defeat of Allende (Urzua 1992, Navia and Soto 2017) and the debated gender gap that shifted the balance against leftist candidates (Zeitlin and Petras 1970, Fernández Navarro 2002, Lewis 2004, Lopez and Gamboa 2015). Moreover, this body of research has highlighted the failed attempt of Allende to mobilize workers, peasants, and women – especially in the countryside (Stone 1971, Hellinger 1978). In this sense, researchers' eyes have emphasized how Allende lost the race and not much attention to how Alessandri managed to obtain first place despite the concentrated efforts made by his opponents to attack and undermine his presidential attempt (San Francisco 2016).

2.5. Methods.

2.5.1. Data.

This research employs an empirical strategy based on three ideas to address the impact of national radio broadcasting on electoral results in the 1958 presidential election. First, the research takes advantage of *comuna*-level data to assess the impact of biased radio signals on electoral support for each candidate. Second, this approach employs an "encouragement" research design (Duflo, Glennester, and Kremer, 2007; Pisakhin and Rozenas, 2018), in which the availability of the treatment might influence aggregate-level behavior. This design argues that the availability of a quality radio signal encourages citizens to listen to those broadcasting stations that deliver better sound quality to their receptor devices. This strategy can measure the impact of the availability of each radio station signal but not the consumption of a specific broadcasting station. Third, radio's signal strength measurement is combined with *comuna*-level data for the 1958 election results and characteristics retrieved from the 1960 national census. Thus, this strategy employs an ecological model that accounts for the strength of radio signal reception across the country to serve as a proxy measurement to estimate the impact of radio broadcasting on voting patterns. Overall, 298 municipalities were part of the administrative division of Chile, according to the 1960 census.

a. Reception of Chilean radio waves.

This article uses the Irregular Terrain Model (IRT) to measure the reception quality of electromagnetic propagation. This model is an updated version of Longley-Rice's

original model (Longley and Rice 1968), including a factor to assess the travel of radio waves through complex geographical environments using a point-to-point method that incorporates topographical information retrieved from Ministerio de Bienes Nacionales (2019). The radio signal strength is a function of a simplified[18] version of Longley-Rice's irregular terrain propagation model that computes a single value representing the strength of reception at a given point based on a reference attenuation measurement (path loss indicator). The power of the radio transmitter, the antenna height, the wavelength, and specific terrain factors are used to measure the strength of reception in decibels (see Appendix 2B for details and specifications). In addition, models employ a standardized version of the signal strength measurement for interpretation purposes.

Information on Chilean radio stations' locations and technical parameters were obtained from the Broadcasting Stations of the World (FBIS 1957) and official documents from the Chilean government between 1932 and 1958. All radio stations located within the country's territory are included in the analysis.

When calculating radio signal strength at a specific location, the standard practice presents two alternatives. First, take the most potent transmitter signal of all the possibilities available in that location (Adena et al. 2015). Second, averaging across the four highest-quality available signals to avoid that minor obstacle might impede reception from any radio receiver (Pisakhin and Rozenas, 2018). The main results use the first option in this research because of the reduced radio marketplace.

[18] Usual radio transmitters from the time use an analogic antenna that disperses waves in all directions from their location.

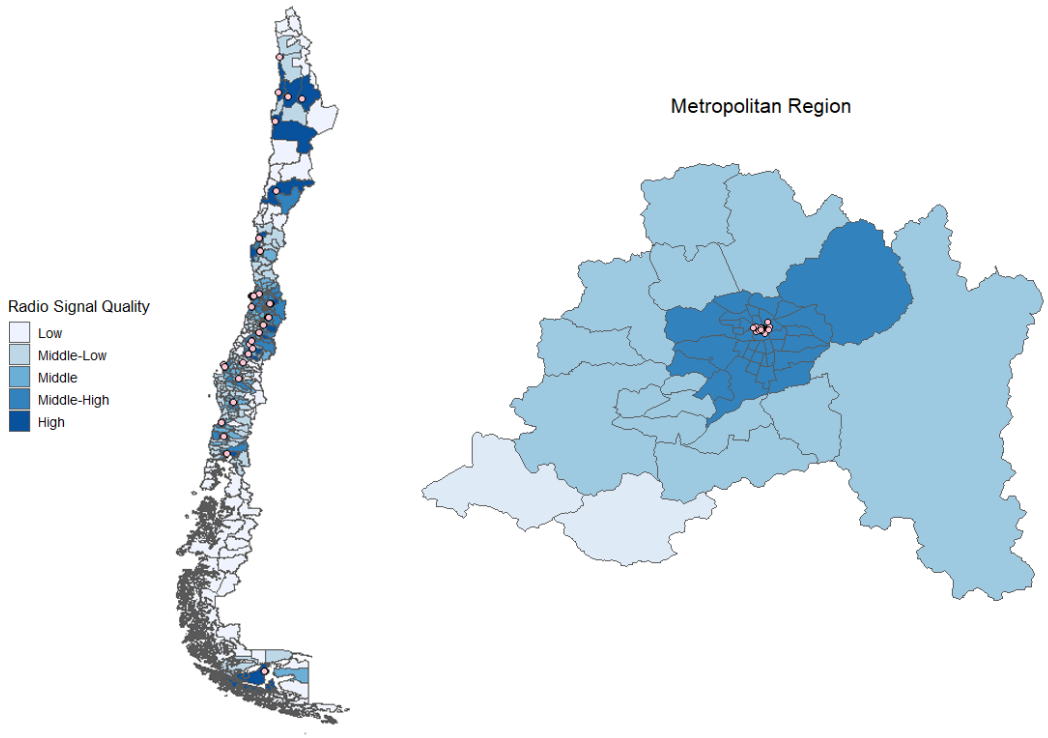

Figure 2-3: Radio Signal Strength Coverage and Location of Radio Stations in Chile[19]

Figure 2-3 shows a signal quality map (using five breaks for raw dBuV strength) for the entire country and the metropolitan region. 30 out of the 88 functioning radio stations were in the city of Santiago, with was also home to the most powerful transmitters. Because of the capacity of AM radio waves to travel across the air, every *comuna* in the country had theoretical access to receive a radio station. However, the strength of the received signals varies significantly across the territory.

b. Comuna-level data.

Using *comuna* level information retrieved from Valenzuela (2003) and signal quality for different radio stations, the ecological analysis of this research relies on

[19] Most of the stations and broadcasting locations were in urban areas. Moreover, the official location of transmitters was usually placed in downtown areas of the cities

information for 281 *comunas* across the country. Table 2-4 presents descriptive statistics for all variables. These include vote share for all 1958 candidates plus the 1925 presidential race contenders. The 1925 candidates' vote share will serve as a placebo test to address the possible endogeneity issue between radio transmitter's locations and political criteria for their installation. Additionally, raw signal strength indicators for each pro-partisan group and non-partisan radio station are included. The analysis uses signal quality for specific radio stations with a political connection with parties based on the classification provided in Section 2.3.3. while the strongest signal of those not classified is employed as a non-partisan signal variable that is employed as a placebo variable. Finally, demographic controls include electricity access, average educational level, and population size in thousands of individuals.

Descriptive statistics show three sets of crucial results. First, there was a substantial difference in the quality of radio signal reception across different pro-partisan radio station groups. For those related to the Christian Democratic Party, the raw mean signal quality measurement reaches 90.61 dBuV (minimum of 46.1 dBuV and maximum of 170.2 dBuV). Compared with pro-Conservative Party radio stations, pro-Christian Democrats' radio signals' strength is 10% better than those related to Alessandri's campaign.

Moreover, compared with those broadcasting signals related to the Radical and Socialist parties, the raw quality of Frei's related airwaves is 50% and 39% higher, respectively. Second, descriptive data show a low level of households with electric power across the different *comunas*. The national average reaches 41.6% of houses with access to the electric grid, with a wide dispersion (minimum of 0.2% and maximum of 99.1%) which

is coherent with historical accounts arguing that radio signals were not universally available.

Lastly, there is a substantial difference in voting patterns when looking at each candidate's electoral support. For instance, Antonio Zamorano only obtained an average of 3.1% of the popular vote at the *comuna* level, but he did not get a single vote in some places, while he gained 31.4% of the valid vote in other cities. The preceding effect is also accurate for the major candidates, with Alessandri's vote share ranging from 2.5% to 75.1% across municipalities (mean = 33.6% at the *comuna* level) and Allende ranging from 4% to 76.3% when looking at the minimum and maximum vote share obtained (average = 28.1%).

Variable	N	Mean	St. Dev.	Min	Max
Alessandri Vote (%)	281	33.61	13.65	2.47	75.07
Allende Vote (%)	281	28.12	12.79	4.05	76.26
Zamorano Vote (%)	281	3.06	4.70	0.00	31.40
Bossay Vote (%)	281	17.46	9.95	1.83	55.04
Frei Vote (%)	281	17.74	7.71	1.89	51.23
Figueroa ’25 Vote (%)	252	76.89	14.71	34.57	100.0
Salas ’25 Vote (%)	252	23.11	14.71	0.00	65.43
Pro-Conservative Signals	281	82.69	22.63	34.39	169.47
Pro-Christ. Dem. Signals	281	90.61	23.08	46.06	170.17
Pro-Radical Signals	281	60.38	18.80	22.15	139.45
Pro-Socialist Signals	281	65.16	23.82	28.36	160.69
Nonpartisan Signals	281	83.51	24.63	36.14	176.63
Electric Availability (%)	281	41.56	25.68	0.20	99.10
Education Level (Avg.)	281	3.29	1.09	1.20	7.00
Population (Log)	281	9.57	0.98	7.00	13.38

Table 2-4: Ecological level descriptive statistics

2.5.2. Analysis.

To properly explore the impact of radio signals on vote choice, this research employs an ordinary least square model. The estimation looks at ecological data using *comuna* level observations. The dependent variable is the share of votes obtained by each candidate. The key parameter of interest is the signal quality measurement of pro-partisan radio broadcasts at the *comuna* level. For interpretation purposes, the signal quality indicator is included in all models as its standardized version (a version of the main analysis using raw signal strength measurement is available in Appendix 2C).

Moreover, the relationship between signal strength and vote share might not be linear. Theoretically, once an individual has a sufficiently good radio signal quality reception, increasing the signal strength might not produce any political difference. Because of this notion, models include a quadratic term to assess the potential nonlinear relationship between the variables of interest.

The analysis explores the relationship between specific pro-partisan radio signals and each candidate's vote share. This analysis tests whether a particular radio station might increase the vote share obtained by their supported candidate and decrease or negatively affect opponents' electoral support. A placebo test to explore the possible endogeneity that locations of radio stations might present is incorporated into the initial results. This test allows addressing the possibility that radio owners decide to install a station based on

political criteria. This analysis employs results from the 1925[20] presidential election in Chile.

All reported models include demographic controls collected from the 1960 national census. They include household electricity access, education level, the logarithmic version of population size, and fixed effects for the geographical zone (north, center, center-south, south). Additionally, since all radio signals are theoretically receivable, every model includes all possible radio signal strength variables (Pro-Conservative, Pro-Socialist, Pro-Christian Democratic, and Pro-Radical) to avoid possible omitted variable bias and include a placebo test variable with the inclusion of the Non-partisan signal strength variable. Furthermore, baseline, complete results, and reduced models are included in Appendix 2C.

2.6. Results

This section presents an examination of the effect of the reception of pro-partisan radio station signals on comuna level outcomes. The analysis looks at how pro-partisan radio signals impact the electoral results of their supported candidacies. Overall, the results reported in Table 2-5 show a consistent and coherent effect in 3 out of the five models. A graphical version of the key parameters of interest is shown in Figure 2-4. In every panel, the red line represents estimated values, while the grey area represents confidence interval bands at the 95% level. Lastly, the dotted black line represents the average share of votes

[20] The 1925 contest is the oldest dated election with a majoritarian rule and universal vote in Chile's history and happened in a time in which radio broadcasting was only at an experimental phase. Candidates facing the contest were the conservative Emiliano Figueroa and the radical-socialist Edmundo Salas. By more than 75% of the votes, Figueroa was elected Chilean president (Etchepare 2006).

obtained by the candidate at *comuna* level for reference purposes. Predictions follow specifications from Table 2-5 with all control variables at their mean/median.

More importantly, the placebo test presented in Table 2-5, Columns (6) and (7) presents null effects. This exercise provides evidence that radio transmitter locations were not decided based on political criteria, reducing the exogeneity challenge that might decrease the validity of results.

Column (1) from Table 2-5 shows results for Alessandri's campaign. Results exhibit that a higher signal quality reception in each *comuna* is related to a higher share of electoral support. Furthermore, the coefficient is positive and significant when looking at the relationship between the pro-Conservative radio signal strength and the candidate's vote share. Moreover, the quadratic term included in the model shows a concave relationship in which the effect of radio signal strength changes when there is a higher quality reception of pro-Conservative radio stations (see Figure 2-4 Panel A). Holding everything else equal, an increase of one standard deviation in the signal strength is associated with an approximately 5.3 percentage-point increase in electoral support for Alessandri (signal strength coefficient less the quadratic term moderation, i.e., 7.08 – 1.74 = 5.34 impact). Moreover, the placebo variable non-partisan signal strength shows nonsignificant results at the 5% decision rule for Alessandri. Results are robust to different specifications with no substantial variations (see Appendix 2C for details).

	Dependent variable: Vote Share (%)						
			1958			*1925 (Placebo)*	
	Alessandri	Allende	Frei	Bossay	Zamorano	Figueroa	Salas
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Pro-Conservative Sig. Strength	**7.08*****	-1.17	-0.69	0.70	-0.62	-0.02	0.02
	(1.59)	(1.75)	(1.12)	(1.19)	(0.66)	(0.02)	(0.02)
Pro-Conservative Sig. Strength^2	**-1.74****	-0.16	-0.26	0.01	0.28	0.01	-0.01
	(0.83)	(0.93)	(0.60)	(0.64)	(0.35)	(0.01)	(0.01)
Pro-Socialist Sig. Strength	1.77	**-2.97***	-0.67	-6.12***	**2.68*****	0.06	-0.06
	(1.71)	**(1.63)**	(1.05)	(1.11)	**(0.62)**	(0.05)	(0.05)
Pro-Socialist Sig. Strength^2	-0.13	**1.54***	-0.08	1.60***	**-1.31*****	-0.03	0.03
	(0.91)	**(0.85)**	(0.54)	(0.58)	**(0.32)**	(0.02)	(0.02)
Pro-Christian Dem. Sig. Strength	2.61*	-1.28	**1.78***	-2.59**	-0.35	-0.02	0.02
	(1.67)	(1.71)	**(0.94)**	(1.17)	(0.65)	(0.02)	(0.02)
Pro-Christian Dem. Sig. Strength^2	-1.29	-0.18	**-0.34**	1.11*	-0.003	-0.002	0.002
	(0.85)	(0.87)	**(0.42)**	(0.59)	(0.33)	(0.01)	(0.01)
Pro-Radical Sig. Strength	-1.79	-1.83	0.60	**3.73*****	-1.90***	-0.005	0.005
	(1.43)	(1.47)	(1.10)	**(1.00)**	(0.56)	(0.02)	(0.02)
Pro-Radical Sig. Strength^2	-0.38	1.10*	0.36	**-0.60**	0.22	-0.001	0.001
	(0.64)	(0.66)	(0.56)	**(0.45)**	(0.25)	(0.01)	(0.01)
Non-Partisan Sig. Strength	-1.74	1.59	0.56	-1.91*	1.50***	-0.02	0.02
	(1.43)	(1.47)	(0.94)	(1.00)	(0.56)	(0.02)	(0.02)
Non-Partisan Sig. Strength^2	1.17*	-1.12*	-0.17	0.35	-0.23	0.01	-0.01
	(0.65)	(0.67)	(0.43)	(0.45)	(0.25)	(0.01)	(0.01)
Constant	54.41***	24.61**	4.65	20.01***	-3.69	0.6***	0.4***
	(10.24)	(10.51)	(6.73)	(7.16)	(3.99)	(0.13)	(0.13)
Observations	281	281	281	281	281	252	252
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.37	0.25	0.15	0.38	0.20	0.18	0.18
Adjusted R^2	0.34	0.21	0.10	0.35	0.15	0.12	0.12
Res. Std. Error	11.12	11.40	7.31	8.01	4.33	0.14	0.14
F Statistic	9.9***	5.5***	2.9***	16.2***	4.1***	3.2***	3.2***

Note: $^{*}p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$

Table 2-5: Pro-partisan radio signal OLS model estimating electoral support.

The case of pro-Socialist radio signals is intriguing. Allende's model exhibits a negative and significant relationship between the parameters of interest (see Table 2-5, Column (2) and Figure 2-4 Panel B). The relationship between pro-Socialist signal strength and electoral support for Allende is a convex shape. Ceteris paribus, for a one standard deviation change in signal strength, shows a decrease of approximately 1.4 percentage points in his electoral support (-2.97 + 1.54 = -1.43). On the contrary, the second socialist candidate, Antonio Zamorano, shows a somewhat different effect (see Table 2-5, Column (5), and Figure 2-4 Panel E). In his case, the strength of radio signal reception at the *comuna* level positively correlates with his vote share. A one standard deviation increase in pro-Socialist signal strength is associated with an approximately 1.3 percentage point increase in his electoral support (2.68 – 1.31 = 1.37). These results could be explained by the lower number of pro-socialist radio stations across the country or the effect Zamorano's model exhibits. Also, it might be possible that the candidacy of Zamorano hurt Allende's chances of obtaining a higher share of votes through the impact of radio broadcasting. Nevertheless, even though results from the placebo variable show nonsignificant coefficients for Allende's model, estimates from Zamorano's regression present significant results at the 5% decision rule, meaning that other factors might be influencing the relationship.

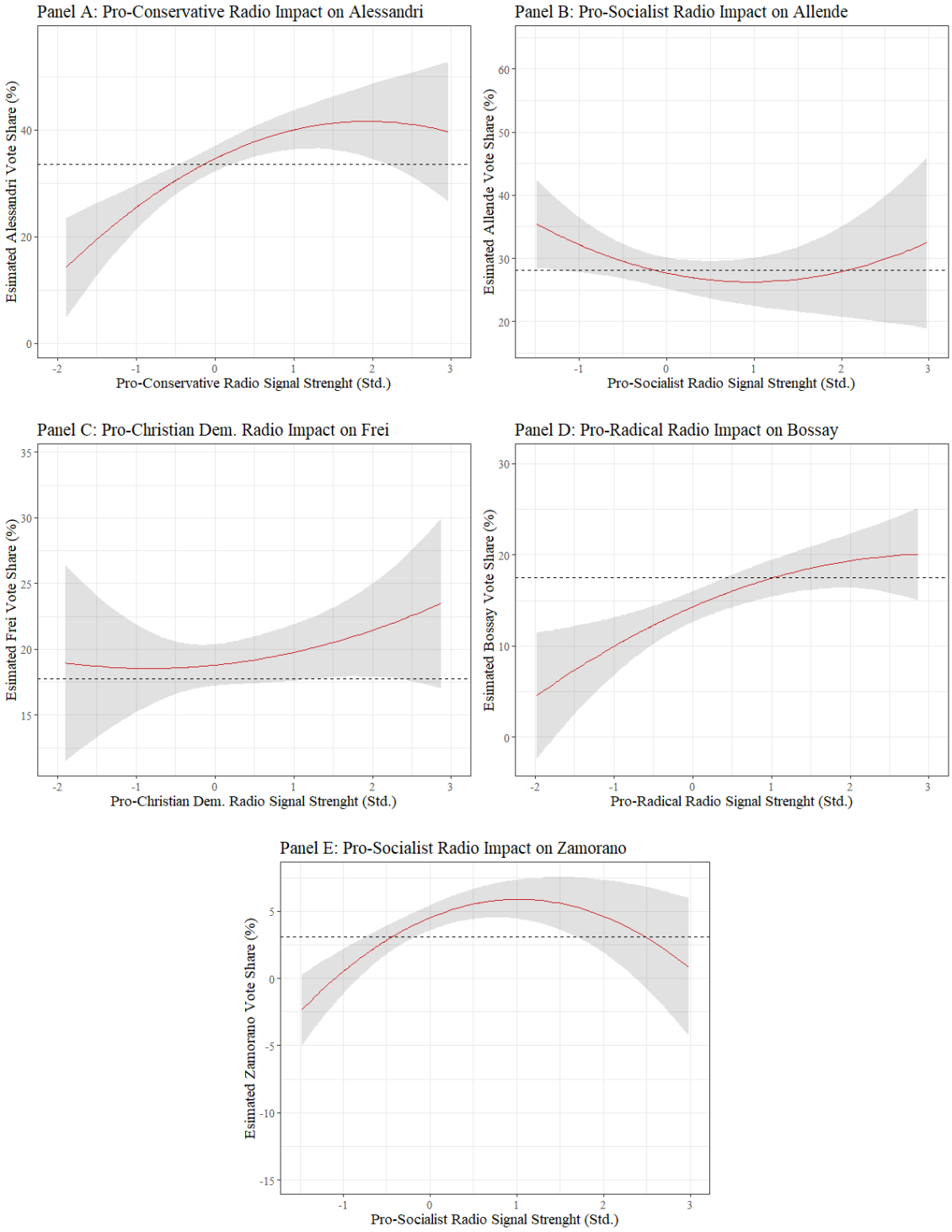

Figure 2-4: Pro-partisan radio signal strength effect on vote share.

The pro-Christian Democratic radio strength signal presents an unforeseen result (see Table 2-5, Column (3), and Figure 2-4 Panel C). While the relationship between Frei's vote share and radio signal strength is positive, it is only significant at a 10% decision rule. Alternative specifications[21] for the model show that the impact seems significant and positive, with an effect ranging from one to two percentage points. However, the results are not robust enough to indicate the influence of radio signals on Frei's electoral support at the *comuna* level.

Lastly, the pro-Radical signal strength measurement presents results following theoretical expectations. A higher radio signal strength is associated with increased electoral support for Bossay's candidacy (see Table 2-5, Column (4), and Figure 2-4 Panel D). Furthermore, the relationship shows a concave curve between both parameters of interest robust to different specifications. One standard deviation increase in radio signal quality is associated with an increase of approximately three percentage points in the vote share obtained by the Radical candidate (3.73 - 0.6 = 3.13). Moreover, the placebo test variable non-partisan signal strength presents null results.

In summary, results are coherent with theoretical expectations in most cases. The pro-Conservative radio signal is associated with an electoral boost for Alessandri. In contrast, pro-Socialist radio waves increase the rate of votes in favor of Zamorano, and pro-Radical radio signal strength is related to an increase in vote share for Bossay's candidacy. Moreover, the analysis presented in this research offers a clear picture of the

[21] Baseline models presents significant results at the 1% decision. For further details, see Appendix 2C.

effect of pro-Conservative radio signal strength on the electoral support obtained by Alessandri's campaign. Results are robust to different specifications and provide significant evidence for the idea that control of radio waves might be part of the triumph of the right-wing candidate in the 1958 presidential race. Nevertheless, the different models demonstrate that results for Frei models must be taken with caution, explicitly avoiding generalizing because of the lack of robustness. Lastly, including the non-partisan signal strength placebo variable provides evidence of the validity of the results.

2.7. Discussion.

Could radio have saved a candidacy during the presidential election of 1958? Results show a significant and positive effect of the reception quality of pro-partisan radio stations over vote choice on four of the five candidates in 1958. Moreover, the strength and substantial impact of pro-Conservative radio signal strength on Alessandri's electoral support presents new evidence that control of information is an important factor in understanding the triumph of the right-wing candidate in the presidential election contest.

Overall, the results show two crucial insights. First, control over informational channels influences electoral results when specific societal and institutional settings are present. This finding supports the theoretical argument advanced by Lawson and McCann (2005). It proves that information is essential in understanding political dynamics even in earlier times of democratic development in Latin American countries. Second, the results provide a new way of understanding the evolution of Chilean democracy and provide an interesting approach to understanding political parties' political decisions in the subsequent decades.

Specifically, during the 1960s and 1970s, Chile's Socialist and Communist parties were engaged in an aggressive strategy to expand their control over media outlets (Fernández 2015). For instance, in 1970, Salvador Allende's supporters bought Radio Minería and its regional affiliates, controlling one of the major radio corporations in the country (Salgado 2020). Considering this research evidence, is it not impossible to think that the strategic expansion of pro-Allende media outlets after his narrow loss in 1958 might be part of the factors that explain his triumph in 1970, becoming the first democratically elected socialist president.

By looking at the results, the aggregate level models show that the availability of radio signals from pro-right-wing radio stations is associated with an increase in electoral support for Jorge Alessandri. Moreover, pro-Conservative and Christian Democratic radio signal strength is related to a decrease in electoral support for Salvador Allende. Therefore, the favorable results for the right-wing candidate Jorge Alessandri might help explain his three-percentage point narrow margin triumph over Allende in the September 4 presidential contest.

These results are important for three reasons. First, controlling radio waves gave politicians a substantive boost in their electoral support. As related research has evidence, an electoral benefit exists for those politicians and parties who control radio waves. Second, it shows how in the face of institutional novelty and specific voter characteristics, information control in developing democracies can genuinely change the destiny of candidates. Lastly, it provides new evidence of campaign effects in a Latin American country, taking advantage of underexplored data.

In examining the 1958 presidential campaign in Chile, this article improves the literature's scope and extension of campaign effects. Perhaps a fundamental reason to study campaigns in novel institutional environments is to deepen our understanding of the conditions that allow our discipline to explore the impact that, under normal conditions, could be hidden. The introduction of new voters, new rules, and more effective safeguards to celebrate elections made 1958 a vital contest in Chilean history, and this research shows a new perspective to explain why the right-wing faction recovered power after 20 years out of office.

CHAPTER THREE. THE ELECTORAL LEGACY OF TERROR: PINOCHET'S REGIME OF REPRESSION AND THE 1988 PLEBISCITE IN CHILE.

Abstract.

The use of repression by dictatorships is commonplace among non-democratic governments. Its social and political effects differ significantly depending on the context and temporality. In this regard, Pinochet's dictatorship is a perfect example of crude repression and a non-violent exit from the regime, transforming his case into a point of interest for political science. With reformed institutions and special political conditions, the case of Chile presents a novel opportunity to explore a possible effect of repression on the direct support of the citizenry for the continuity or exit of a dictatorship. Indeed, this research aims to explore the role that different periods of repression may have played in the defeat of Pinochet in the 1988 plebiscite. Analyses are carried out using a two-part methodological approach. First, an ecological model that takes advantage of a two-stage instrumental variable estimation to overcome endogeneity problems. Second, a multilevel logistic approach with survey data to assess the possible influence of different levels of repression on individual self-reported vote choice. Results show a null relationship between the variables of interest, establishing that factors such as demographic-territorial characteristics and the effect of television would have been the major factors explaining the dictator's defeat at the polls. Nevertheless, it is not possible to reject the idea that repression doomed Pinochet's regime because its effect could be mediated by television and campaign ads.

3.1. Introduction.

What forces a dictator out of power? From a short-term factor perspective, researchers have hypothesized the effects of campaigns and elections (Boas 2015, Donno 2013), specific decisions made by the regime (Constable and Valenzuela 1989, Thompson and Kuntz 2004) and economic fluctuations (Wright et al. 2013). In comparison, a second set of studies focuses on structural factors and long-term forces, such as inequality and redistribution (Acemoglu and Robinson 2006), international pressure (More 1998), political actors' views and perceptions about democracy (Mainwaring and Perez-Liñan 2013), citizen's preexisting political values and ideas (Morales and Rubilar 2017), and the balance between the distribution of costs (such as violence and liberties restrictions) and benefits under authoritarian rule (Wintrobe 2001).

This stream of research is crucial for understanding democratic development and institutional stability or change within transitions from autocratic regimes to democratic forms of government. From the novel work of O'Donnell and colleagues (1986) to the recent trends on the influence of elections (Lindberg 2009, Donno 2013, Boas 2015), dictatorship´s arrogance (Constable and Valenzuela 1989, Birch 2002) and exposure to repression (Bautista et al. 2021), the field is still a developing arena.

At a time when modern authoritarian regimes are extensively using the ropes of democracy to disguise the true nature of their power, the question of how repression might influence or contribute to the collapse of their ruling efforts is a crucial task within political science. The effect of violence on political behavior is a growing body of literature (Bali 2007, Bashi and Gandhi 2013, Weintraub et al. 2015, Boland and Godsell 2020) that

acknowledges the relevance of violence and repression as crucial tools employed by dictatorships to survive over time (Escriba-Folch 2013). However, its effect might also trigger popular discontent that threatens the capacity of regimes to stay in power. Thus, the relationship between repression and support for a non-democratic regime is complex. Moreover, violence is usually targeted at specific groups (Tarzi 1991, Esberg 2021), meaning that as a non-random phenomenon, it does not allow to directly look at its relationship with other political outcomes, such as support for a particular autocratic government.

A remarkable case of an autocratic regime that employed fearful repression and was forced out of power through elections is the Chilean triumph of democracy. After 17 uninterrupted years in power, the Pinochet´dictatorship was defeated in an unprecedented national referendum. Moreover, a recent article by Bautista and colleagues (2021) provides evidence of the influence of the location of military bases on killings and forced disappearances, mobilization, and vote choice in the 1988 plebiscite in Chile. However, a comprehensive exploration of the dictatorship repression machinery's unique periods and the re-birth of democratic institutions presents an ideal opportunity to expand our theoretical and empirical knowledge on the subject.

Certainly, the relationship between repression and support against Pinochet is a complex task because of the different strategies conducted by the regime to target its victims and the possible mediated effect of theoretically relevant factors such as television ads and campaigns (Boas 2015, Gonzalez and Prem 2018). Thus, any analysis aiming to explore the impact of repression on the 1988's referendum needs to find a way to separate

the relationship of violence with preexisting political and geographical factors while controlling for other crucial elements without being worried about biased estimations. This research employs a two-part methodological approach to overcome challenges; effectively separating the effect of repression from preexisting political factors, analyzing the different stages of violence throughout Pinochet's dictatorship, and avoiding possible ecological fallacy issues by using a two-stage instrumental variable ecological method and a multilevel survey data model. This idea is based on five main arguments.

First, recent evidence shows how the regime persecuted, detained, and eliminated political opposition. By aiming to appeal to backing supporters and boost legitimacy and public support for their system, Pinochet and the Junta targeted non-elite individuals in specific regions and zones of the country that had a higher likelihood to support their government (Esberg 2017, 2021). This research proves this assumption, finding that Pinochet's dictatorship established a fearless mechanism to capture and repress civilians that lasted during the entire scope of his rule and that was correlated with pre-coup political preferences.

Second is the distinction between three different moments in Pinochet's machinery of repression. A decentralized repression system was in place during the dictatorship's first months. Every branch of the military and public order forces imposed their police system (Silva 2022), and under the rhetoric of an internal enemy (Huneeus 2000), they tried to demonstrate a state of war between Chileans. In the aftermath of the coup and as Pinochet's power increased, the autocratic government created the Dirección de Inteligencia Nacional (DINA), which served as the repression muscle of the regime between 1974 and 1978.

Finally, once the dictatorship aimed to boost its legitimacy, Pinochet's secret police was established under the Central Nacional de Informaciones (CNI), which operated from 1978 until the end of his non-democratic administration, targeting civilians and stoping manifestations against the regime (Bravo 2017a). From 1973 to 1990, approximately 3,000 Chileans died, and more than 30,000 were detained and tortured.

Third, the relationship between the preexisting military and police infrastructure and the cases of death and disappearances during Pinochet's dictatorship. The construction of police stations and military regiments was determined by conditions that precede regime installation, and even if it is not random, they are related to population size and other variables that can be controlled for in the analysis. In the same line as evidence provided in related research (Bautista et al. 2021), this article shows a clear relationship between pre-existing available security infrastructure and repression levels.

Fourth, a substantial geographical variation component in the distribution of deaths and disappearances. According to data retrieved from the National Commission for Truth and Reconciliation (1996), deaths and disappearances during the dictatorship are not evenly distributed. Instead, they were primarily focused on highly populated areas. Furthermore, following the National Commission for Political Imprisonment and Torture (2005) report, torture centers detained mostly people from big cities and were established near urban areas.

Lastly, results from the 1988 referendum show vast variation across municipalities. For instance, 96% of voters in General Lagos favored Pinochet's continuity, while less than 24% of the valid votes in the mining city of Lota supported the "Yes" option. Therefore,

and notwithstanding the impressive rate of repression and dispersion of results, academic attention has not fully explored the possible relevance of the local component and its relationship with Pinochet's reign of terror. As a result, this study asks if the voting dynamics of the 1988 plebiscite could be locally influenced by different periods of repression or if it might respond to other theoretically important factors.

In this sense, this research contributes to voting behavior and democratization in three ways. First, empirically testing the impact of human rights violations on voting behavior across different moments of Pinochet's dictatorship develops our understanding of how the hubris of dictators might cement their path to losing power. Secondly, it explores the relevance of local variations to explain nationwide phenomena, even in the most sensitive topics such as repression and terror. Furthermore, the two-part empirical strategy provides insight into the factors influencing aggregate and individual level voting decisions during a non-democratic regime, revisiting its relevance for democratic recovery.

The rest of this paper is structured as follows. The first section reviews Pinochet's human rights violations, the regime's mechanism to target certain individuals in specific country zones to appeal to their supporters, the relationship between the army and police infrastructure, and the cases of death and disappearances. The second part describes the historical background of the 1988 referendum; this section discusses the factors traditionally used by social scientists to explain the defeat of a non-democratic regime and presents a theoretical framework to understand the possible impact of repression and political violence on vote choice. The fourth section describes the data, variables, and empirical strategies conducted to explore the impact of repression on electoral results.

Section 3.5 introduces the outcomes of the statistical models and presents a brief overview of the meaning of the null outcomes. An alternative explanation to the outcomes is presented in the subsequent section, and a reflection on possible data issues is introduced. Lastly, the final section discusses the results considering theoretical expectations and contrasts to findings from related literature.

3.2. Pinochet's regime of terror.

3.2.1. Human rights violations

After the 1973 military coup, Pinochet's dictatorship established a wide-ranging state-led system of oppression, torture, and killing (Constable and Valenzuela 1991). As a result, more than 3,000 Chileans lost their lives, and more than 30,000 individuals were detained and tortured at several locations across the country. During the 17-year-long autocratic government, the nation was heavily de-mobilized, free and fair democratic institutions were gone, and citizens of the country continued with their lives divided between those who supported the general and those who were too afraid to oppose him (Politzer 1989). The state-sponsored terror regime included the extensive use of government agencies – infamously known as the DINA and CNI – and a widespread propaganda system to expand and maintain a sense of "war" among the population (Shu-Yun 1999). In addition, plans such as the "Caravan of Death" were fulfilled by the regime to detain and target local "subversives" that, thanks to military courts, quickly became prisoners found guilty and sentenced to prison and execution (Verdugo 2001). In other words, repression – understood as restrictions or violence which reduces freedoms and uses

physical enforcement of power (through means such as torture) that spreads fear and breaks dissent (Tanneberg 2020) – was an integral part of the politics of the regime.

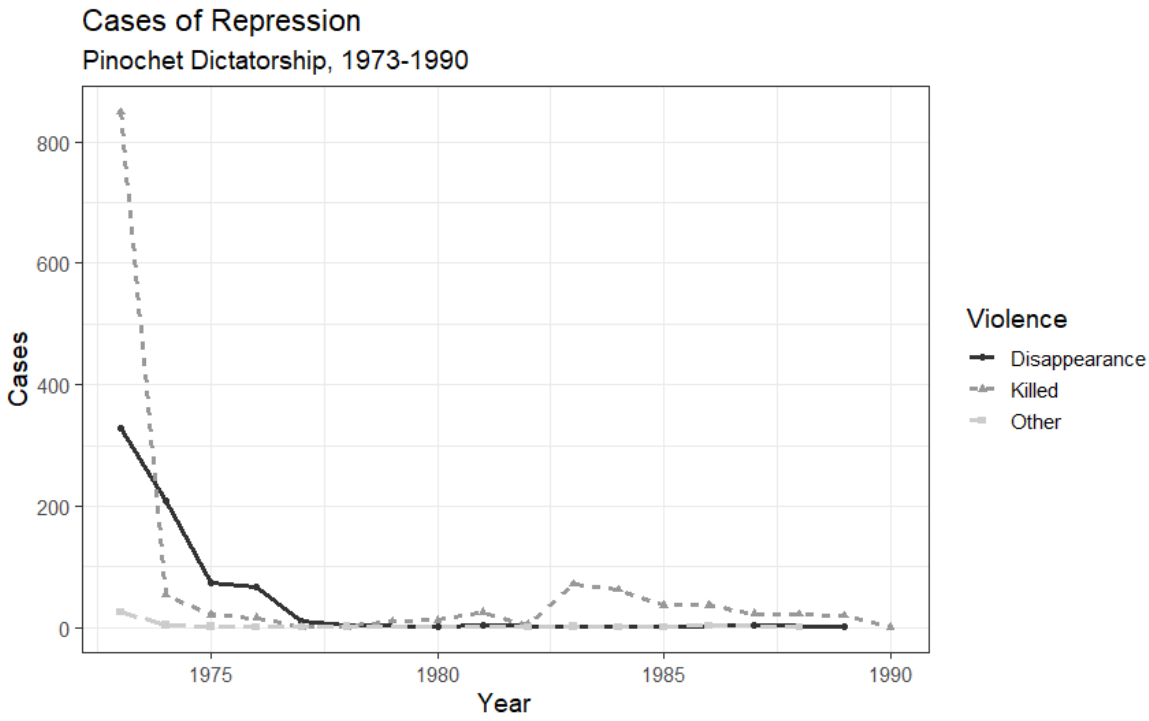

Figure 3-5: Cases of repression, Pinochet dictatorship 1973-1990[22]

According to the Chilean National Commission on Truth and Reconciliation (known as Rettig Report), 853 Chileans disappeared while the regime assassinated 1331 individuals. Even though most of the deaths happened during the first year following the military coup (see Figure 3-1), the killing never stopped throughout the autocratic government. Moreover, during Pinochet's dictatorship, torture, kidnapping, and detention were everyday phenomena that peaked during his first years in power, such as deaths and disappearances. Information obtained from the National Commission on Political Imprisonment and Torture in 2005 (known as Valech Report) shows that Chileans suffered

[22] Source: National Commission for Truth and Reconciliation (1996).

from the repression machinery generated by Pinochet and his lackeys all over the territory but with a higher concentration in large cities and urban zones (Valech Report 2005).

From a historical point of view, it is possible to differentiate several moments within the repression machinery installed by the military dictatorship. Immediately after the coup, all branches of the armed forces operated their security divisions without any central coordination agency. The result was massive incarceration and repression machinery spread all over the country. While inside Chile, the Generals in power constructed a war framework that included the closure of opposition newspapers and radio stations and placed heavy censorship over tv channels; outside of the country, the world accepted many Chileans who fled into exile after the coup (Bohoslavsky et al. 2019).

Institutions such as the Church took a more passive standing, targeting their efforts to aid and help the victims through committees and organized groups during the first year after the military coup (Valech Report 2005). In synthesis, while the decentralized police forces captured, tortured, and killed tens of thousands of men and women victims of the dictatorship, civil society could not secure assistance or provide help to counter what was happening across the country.

A few months after the military coup, Pinochet and the Junta decided to create a new secret police known as Dirección de Inteligencia Nacional (DINA). During the following four years of the regime, the new intelligence office recruited personnel from every branch of the armed forces and police and was placed under the direct order of the Junta (Silva 2022). As a result, the repression machinery now had an institutionalized framework to operate across the territory, implementing new concentration camps and

local offices and taking power over police stations and military centers, which devastated the population (Stern 2006).

The central role of DINA was to carry out an extensive search for unsubordinated groups across the country and keep tight control of the members of every branch of the armed forces and policy. The reach of its power was even seen outside the country by pursuing and keeping records of several opposition leaders across Europe and Latin America. The case of former Minister Orlando Letelier, killed in US territory in 1976, is a remarkable example of the machinery put in place by the dictatorship to target and control opponents inside and outside of Chile (Silva 2022).

Between 1974 and 1977, DINA was responsible for the highest number of assassinations, tortures, kidnaps, and forced disappearances of Chileans. Historians consider these years a brutal period when the regime targeted left-wing supporters to fulfill their national security doctrine rhetoric (Zalaquett 2012). However, the effect of the dictatorship's repression machinery encounters a powerful adversary in civil society, with human rights supporters and families of those who disappeared organizing in groups with the public showing discontent against the regime (Huneeus 2000). Furthermore, from 1977 onwards, historical records show how students and relatives of those who lost their lives because of Pinochet's secret intelligence police stood and fought against oppression from within and outside the country (Verdugo 2001).

After the dissolution of DINA in 1977, the regime created the Central Nacional de Informaciones (CNI). The new secret police came with a different repression strategy – leaving behind the persecution of historical leaders, figures, and prominent members of

parties and groups related to Allende's government – by starting a widespread mechanism to prevent protest against the regime (Silva 2022). From 1978, the repression mainly resulted from public detentions against strikers and individuals marching against the regime. Indeed, data retrieved from the Vicaria de la Solidaridad (1988) shows an explosive increase in arrests between 1977 and 1978, from 346 to 1623, i.e., a 369% increment in one year.

The economic crisis of 1982 placed heavy pressure on the dictatorship because of popular revolts and public protests against the dictatorship (Bravo 2017a). As a result, repression took a different approach, transforming itself into an attempt to prevent, dissolve and eliminate possible public manifestations of opposition against the regime through police brutality (Bravo 2017a). In addition, the crisis triggered a popular movement that took the agenda of human rights violations and repression (Bravo 2017b). However, as the decade progressed, electoral politics became a vital force within families and politicians, placing the topic of repression and victims in a secondary stage of the public agenda (Sanchez 2019).

As the Valech Reports (2005) exhibit, protests against the regime increased the number of political prisoners and public detentions between 1984 and 1986. As a result, public discontent against Pinochet's rule grew, and political organizations and movements emerged from the ashes after more than a decade of being forced to stand in the shadows (Sanchez 2019).

In synthesis, Pinochet’s regime’s human rights violations can be categorized into three central moments. First is the installation period in which every branch of the armed

forces and police acts independently without central coordination (hereafter referred to as the Pre-DINA period). Second, the establishment of the DINA centralized secret police directly under the Military Junta's supervision and rule (hereafter referred to as the DINA period) and aimed to target prominent left-wing figures and supporters. Lastly, the reformed secret police, known as CNI, sought to keep public protests against the regime under control (hereafter referred to as the CNI period).

The following two subsections explore the dictatorship's selection mechanism to target victims and the relationship between repression and security infrastructure across the country. Besides the theoretical relevance of both, it is crucial to understand their relationship to find a valid approach that might serve as an instrument to estimate the effect of repression on vote choice without bias.

3.2.2. Political targets. Dictatorship's human rights abuses mechanism.

How did Pinochet's regime justify political repression, killings, and disappearances? The question is a central element in understanding how a dictatorship might operate within the borders of its power to activate a human rights abuse machinery that can effectively control opposition leaders and possible threats to the regime's survival. Autocratic regimes usually need to find a delicate balance between using repression to hold power and the consequences it might cause. As Tannenberg (2020) points out, political repression is a complex puzzle that dictators consider when making strategic decisions about facing opposition and keeping legitimacy over their rule.

One crucial aspect of understanding Pinochet's strategy is distinguishing between those in power's external and internal reasoning. The former concerns the public sphere, in which efforts from the regime focus on how everyday citizens will accept living under the shadow of an autocratic government, facing heavy civil and political rights restrictions in the name of order and stability. The latter seeks to understand how decisions are made within the boundaries of power, acknowledging the realistic perspective that regimes require a strategy to remain in charge of the country.

The traditional view has recorded the state-sponsored system of repression perpetrated by Pinochet as the transformation of the regime's anti-Marxist rhetoric into action (Huneeus 2000). In comparison, recent evidence has placed attention on the mechanism followed by the autocratic government to target civilians and politicians (Esberg 2017, 2021) and the effect of the repression on survivors (Bautista 2016a, 2016b, 2016c). The complicated relationship between oppression and the necessity of dictatorship to keep a solid base of support from citizens created a special incentive for the Chilean regime. This reason establishes an obligation for the autocratic government to balance the use of extreme force – i.e., incarcerations, torture, and assassinations – and other ways to confront "enemies" and opponents – such as exile.

In her comprehensive study of the effects of repression on political engagement in Chile, Bautista (2016a) presents evidence showing how the political involvement of those repressed fell compared with those who did not experience any repression-traumatic event in almost any form of political participation. Nevertheless, this is not the case for specific groups of citizens. In essence, highly involved individuals and students reinforce a sense

of identity and double their efforts to push back the regime (Bautista 2016b). Moreover, evidence also exhibits that the siblings of those repressed tend to replicate their brothers and sisters' actions and political involvement, i.e., they have a lower interest in politics and are more inclined to participate in human rights organizations (Bautista 2016c).

In this regard, it is important to note two aspects: first, the repressed became more active in human rights organizations – being able to publicize the excesses of the autocratic regime; and, secondly, the longstanding effect of repression over those repressed and their social networks.

Evidence reported by Esberg (2017, 2021) highlights Pinochet's strategic decision to exile those politicians with a higher level of electoral support and, at the same time, exhibits the mind-setting of the regime. First, to try to avoid by any means decreasing public support. Moreover, further evidence shows that the necessity to maintain support from the regime's "backing coalitions" generated that the system specifically targeted civilians in those districts in which right-wing conservative parties held the most popular votes during the 1970s.

The second challenge is to obtain a picture of the mechanism employed by the Pinochet dictatorship to locate its opponents and neutralize them. Data from the National Commission on Truth and Reconciliation (1996) is explored. Following the logic of different moments in the development of the dictator's repressive machinery, analyses are carried out to explore possible trends that may have existed during the pre-DINA, DINA, and CNI periods. Likewise, results are reported for the totality of the years in which the dictatorship was in control of the country.

Table 3-1 shows descriptive data regarding where detentions took place by period. Results exhibit a clear pattern between different moments in Pinochet's repression machinery and the nature of the physical location where human rights violations occur. For instance, 31% of the detentions during the pre-DINA period took place at the home of the victims, a rate that systematically decreased over the period when DINA and CNI was the repressive police agency (14.5% during the last period, i.e., a decrease of nearly 53%). Contrariwise, human rights violations in public spaces increased systematically across different periods of Pinochet's repression machinery. During the CNI period, 81.4% of the total cases of assassinations and disappearances occurred after the apprehension of a victim in a public space. While during the first stage of the dictatorship's repression machinery, only 32.1% of those cases happened after as the outcome of public detention.

In synthesis, data retrieved for different periods shows how Pinochet's terror regime changed. For example, targets were apprehended in private locations during the first stages of the autocratic government. In contrast, after the installation of CNI, victims were arrested in public spaces.

	Home	In Custody	In Public	Work	Frequency
No data	17.2%	31.0%	41.4%	10.3%	29
CNI Period	14.5%	0.7%	81.4%	3.4%	296
DINA Period	28.0%	6.8%	58.9%	6.2%	453
Pre-DINA Period	31.0%	21.6%	32.1%	15.4%	1150
Total	27.5%	15.0%	46.1%	11.3%	1928

Table 3-6: Physical place of repression by period.

Another vital aspect is the political characteristics of those apprehended after the military coup. Figure 3-2 shows comparative descriptive statistics for each period by both

the capture space and the political affiliation of the victims. Results show a clear difference across periods. During the pre-DINA period, most victims who belonged to or were related to Allende's parties and movements were the main targets of Pinochet's regime; indeed, more than 50% of those apprehended in private and unknown places were affiliated with the left-wing. The trend systematically increased during the DINA years, the only period in which those detained in public spaces were overwhelmingly related to Unidad Popular organizations. Lastly, during the CNI period, most of those apprehended by Pinochet's police and security departments were non-partisan individuals.

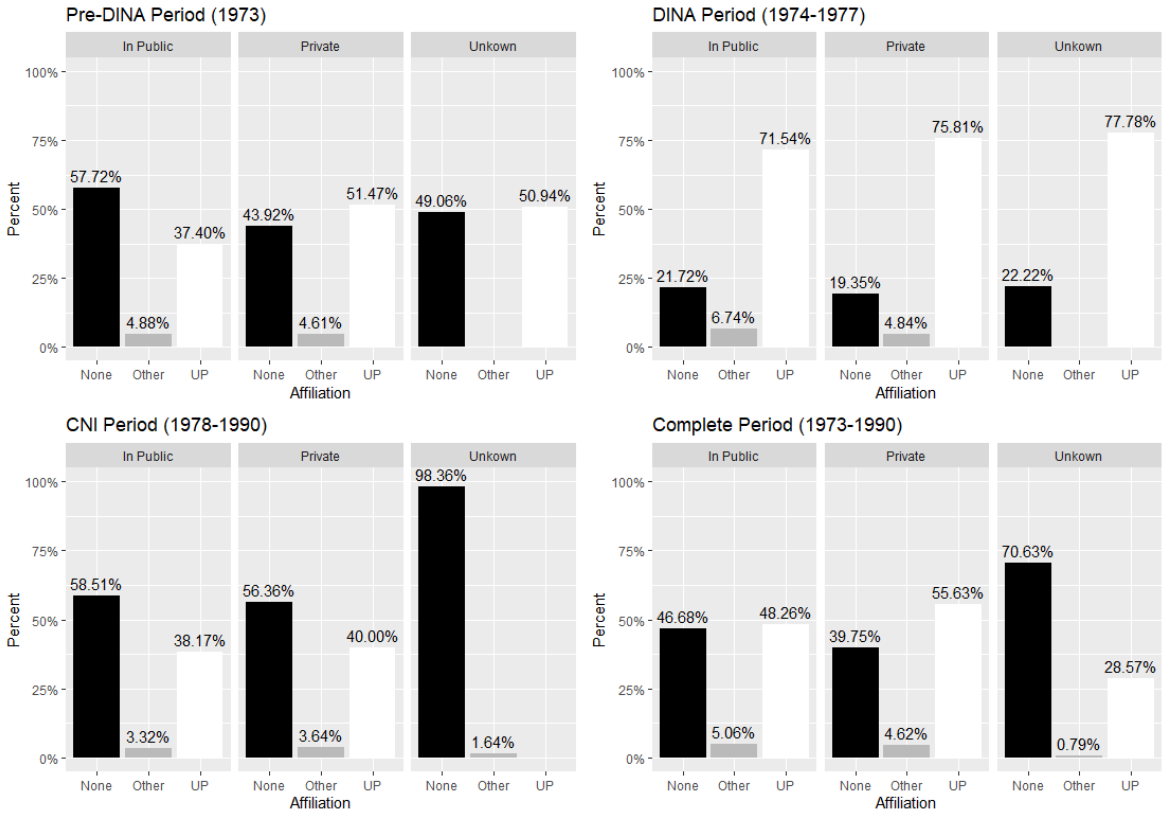

Figure 3-6: Repression by period, detention place, and political affiliation[23].

[23] Affiliation is constructed from a case-to-case analysis from the National Commission on Truth and Reconciliation Report. The "UP" category includes individuals who were connected with

The extent of previous findings presents a clear view of how Pinochet and his organizations targeted different individuals from a political perspective across periods. Moreover, after the initial turmoil caused by the military coup, the only moment in which public detentions were focused on civilians with no party affiliation was during the rule of the CNI as the central intelligence agency of Pinochet's regime of terror.

Even if descriptive statistics show the vast differences in Pinochet's mechanism to target victims across his dictatorship, one question remains open. Were victims the result of a conscious strategic decision made by the regime due to political reasons? Or was the outcome of the decision-making process in which internal security reasons were the main driver? To approximate a plausible answer, and considering evidence from Esberg (2017, 2021) and Bautista (2016a, 2016b, 2016c), this research constructs a multivariate model in which preexisting electoral support for right-wing candidates predicts repression levels. This logic argues that repression was a strategic resource to boost Pinochet's support among groups that traditionally supported right-wing politicians might be plausible.

Indeed, Figure 3-3 shows results from a multivariate OLS model to test the previous hypothesis. Estimates exhibit a positive and significant relationship in 3 out of 4-period models, i.e., evidence supports the idea that Pinochet's repression is associated with vote share for right-wing parties/candidates in the preceding decades. At a maximum-minimum prediction level, the substantive effect of this relationship is approximately 1.1 standard

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parties and government organizations part of the Popular Union (Unidad Popular) coalition. The "Other" category includes individuals who were part of other parties (such as the Christian Democratic Party), syndicates, unions, or territorial organizations. Lastly, the "None" category includes those cases in which civilians with no clear identification with Allende's government or other organizations or political parties were victims of Pinochet's repression machinery.

deviations. In other words, evidence from descriptive statistics and regression models points toward the idea that Pinochet's rule enforced a strategic mechanism to target victims in territories with bigger population sizes, overwhelmingly urban, and in which the right-wing had better historical electoral results.

Furthermore, as Esberg (2017, 2021) argues, Pinochet's targeting mechanism focused on supporter districts, i.e., zones in which the right had historically higher rates of electoral support. The logic is based on the idea of a "justification dilemma" that the authoritarian regime faced during its rule. As legitimacy supporting Pinochet's rule came from the argument that subversives were threatening the survival of the Chilean state, then the autocratic government's survival depended on the existence of fears of a left-wing threat among supporters. This rhetoric created the incentives to inflate the possible communist menace, killing alleged terrorists and using media and newspapers to expand the justification rhetoric publicly[24].

[24] An archival search for usually known pro right-wing newspapers (El Mercurio, La Segunda), shows the public framing of the justification dilemma rhetoric. Indeed, and especially during the first years of Pinochet's rule, the press commonly reports combats and fights between military personnel and left-wing "terrorist" groups as part of the task the Military Junta must do to "normalize" the country (Garay 2007). One of the most exemplar cases is the attempted assassination against Pinochet in 1986, perpetrated by the Frente Patriotico Manuel Rodriguez in which El Mercurio titled in its front page: "His Excellency saved from attack" (September 8, 1986).

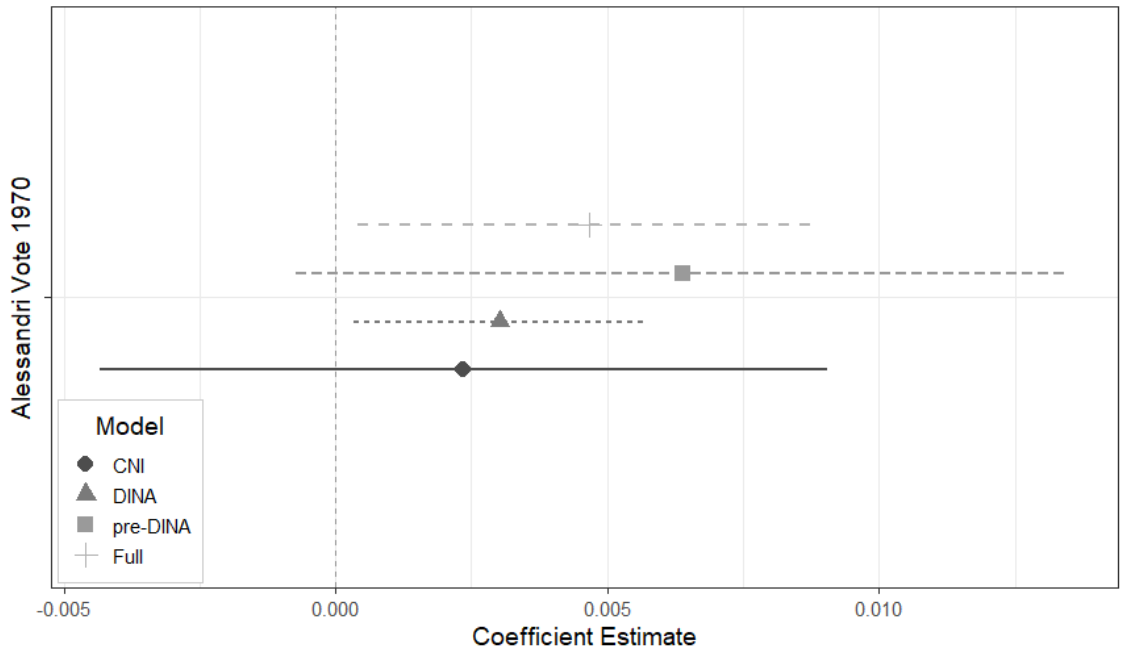

Figure 3-7: Predicting repression by Right-wing support (%)[25].

Comparative evidence shows how an autocratic government targets opposition leaders in the preceding months from an election while avoiding targeting voters to avoid losing support when an election is coming (Bashin and Gandhi 2013). Considering evidence from Figure 3, this might help explain why there is a clear relationship between repression and right-wing vote during the pre-DINA and DINA periods but not across the years in which the CNI was the repressive machinery of the dictatorship.

More importantly, two significant effects emerge. First, it shows that Pinochet followed a specific pattern of action to repress civilians by conducting public prosecutions

[25] Dependent variable is a standardized version of the frequency of repression cases accounted on the Report of the National Commission on Truth and Reconciliation (1996). The Independent variable is the share of votes obtained by Alessandri's campaign in 1970. Models follow an OLS estimation method, including controls for population size (log) and rurality level. Results for the full and DINA periods are significant at the 5% threshold, while pre-DINA is significant at the 10% threshold. For complete results and descriptive statistics, see Appendix 3A.

and arrests to appeal to his supporters and sustain the regime's legitimacy. Second, it exhibits that the action pattern was based on an effort to eliminate "threats" and a deliberate action made by the regime's institutions and officials to survive. In both cases, the decision-making process of the machinery of human rights abuses is based on retrospective thinking, not looking at future electoral prospects or the long-term survival of the regime. As a result, the decision rule followed by the authoritarian government might be associated with preexisting political factors, which presents a significant challenge in estimating repression's effect on the 1988 referendum.

In synthesis, if the number of victims of repression is related to right-wing support during pre-Pinochet elections, then a simple correlation between repression and electoral outcomes is not enough to obtain valid estimates. Thus, the relationship between vote choice and repression requires more than a standard regression technique to avoid possible biased estimators. The following subsection looks at how preexisting police and army infrastructure might serve as an instrumental variable to overcome the previous challenge.

3.2.3. The geography of repression: Cases and centers.

If repression levels are associated with preexisting political factors, then any direct correlation between repression and vote choice in the 1988 referendum will be biased. This research can solve this problem by using a two-stage instrumental variable estimation in which preexisting military and police infrastructure serve as an instrument to estimate repression levels which are then used to predict vote choice. The first task to assess this

possibility is to look for geographical variations in repression cases and the existence of police stations and army bases across the country.

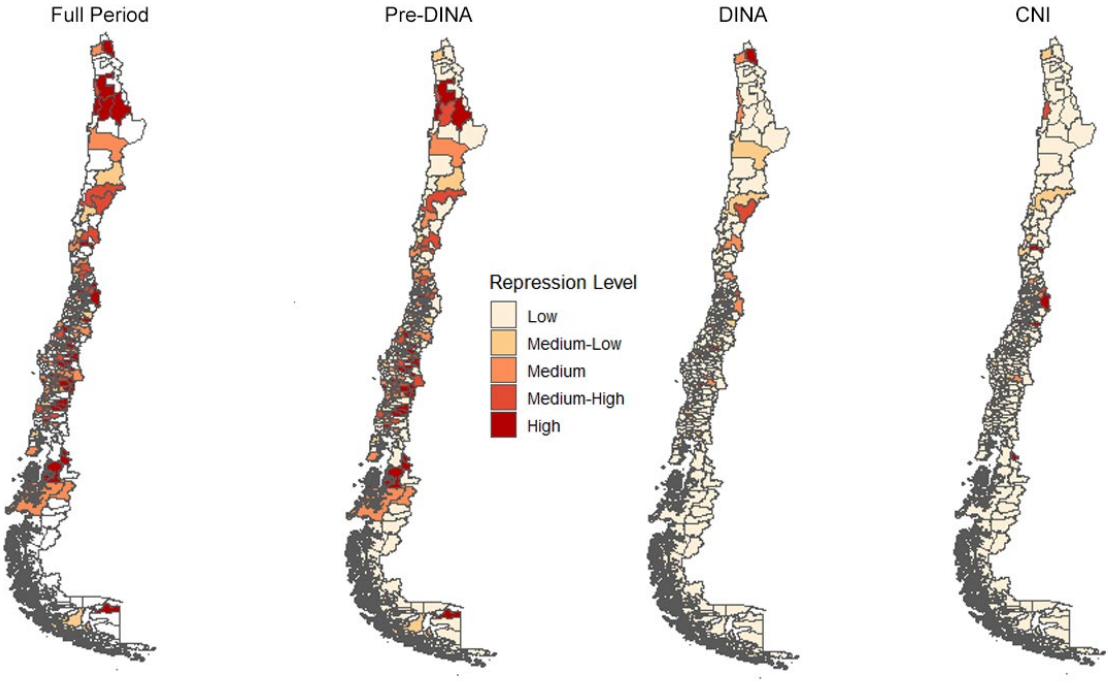

Figure 3-8: Pinochet's political repression map by period[26].

As pointed out in previous sections, Pinochet's regime deployed vast and powerful repression machinery that was strategically designed to control opposition groups and members and kept complete control over the territory. Nevertheless, when looking at cases per 100,000 inhabitants across municipalities in Chile, repression levels[27] – measured as

[26] Repression levels categorize equally for all periods to allow comparison at the comuna level. The low level indicates more than 0 and less than 1 case per 100,000 inhabitants. Medium-low levels indicate between 1 and less than 4 cases per 100,000 inhabitants. The "Medium" level's category indicates between 4 and less than 11 cases per 100,000 inhabitants. The "Medium-high" category indicates between 11 and less than 15 cases per 100,000 inhabitants. The "High" category indicates 15 or more cases per 100,000 inhabitants. Data were retrieved from the National Commission on Truth and Reconciliation (1996).

[27] It is important to notice that a crucial data limitation is present. Because of confidentially agreements between victims and the Chilean government, it is not possible to account for

the number of deaths and forced disappearances – decreased during the DINA and CNI period (see Figure 3-4). The across time and geography pattern presents an important distinction. Thus, any attempt to see the relationship between repression and vote choice must look at the possible effects in different periods.

Furthermore, the Valech Report (2005) also includes an extensive account of torture, killing, and detention centers during the 17 years of Pinochet's rule. As Seguel (2020) shows, repression was systematically carried out by every branch of the military and security forces, transforming the inclusion of all possible military, navy, air force, and police bases and stations as a critical element to correctly address the extent of human right abuses. Figure 3-5 shows a map with the number of repression centers by 100,000 inhabitants at the *comuna* level in the country. As with deaths and disappearances, detention and torture centers vary depending on the period of Pinochet's machinery of repression. This variation is consistent with different levels of repression across time, meaning that the correlation between repression and detention places is a genuine possibility. Nevertheless, as fewer details of some locations are available, 94% of the 771 total repression centers can be categorized as preexisting locations used during the pre-DINA, DINA, and CNI periods.

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geographical variations in the number of survivors that suffered torture from the dictatorship's human right abuses. As a result, repression in this research only accounts for deaths and forced disappearances.

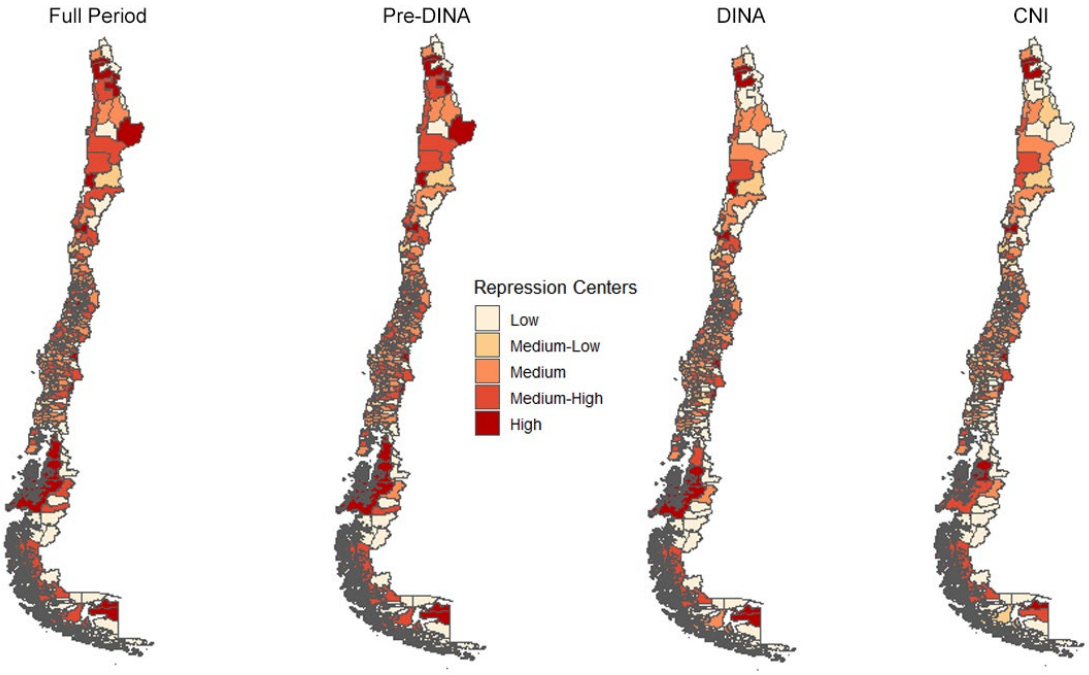


Figure 3-9: Pinochet's repression centers map by period[28].

Indeed, the systematic differences in assassinations and disappearances, as the number of army bases and police stations across different periods exhibit a pattern requiring further attention. When comparing both security centers and cases of repression that ended in death and disappearances, a vital question is how both factors are related.

Figure 3-6 shows a simple linear model looking at the relationship between preexisting security infrastructure and the total cases per period at the municipal level.

[28] Repression centers categorize equally for all periods to allow comparison at the comuna level. Centers include army, navy, air force and police stations, public locations, and jails employed during the length of the dictatorship and that existed before the military coup. A low level indicates more than 0 and less than one center per 100,000 inhabitants. Medium-low levels indicate between 1 and less than four centers per 100,000 inhabitants. The "Medium" level category indicates between 4 and less than 11 centers per 100,000 inhabitants. The "Medium-high" category indicates between 11 and less than 15 centers per 100,000 inhabitants. The "High" category indicates 15 or more centers per 100,000 inhabitants. Data retrieved from the National Commission on Political Imprisonment and Torture (2005).

Results show a clear and significant relationship, i.e., the higher the number of army and police bases, the higher the total amount of victims. However, even though the relationship is strong and statistically significant, it only explains around 40% of the variance in the number of victims. Other factors, such as population size and rurality, also impact different levels of repression. More importantly, the relationship between preexisting available infrastructure and repression holds significance even after controlling for those variables.

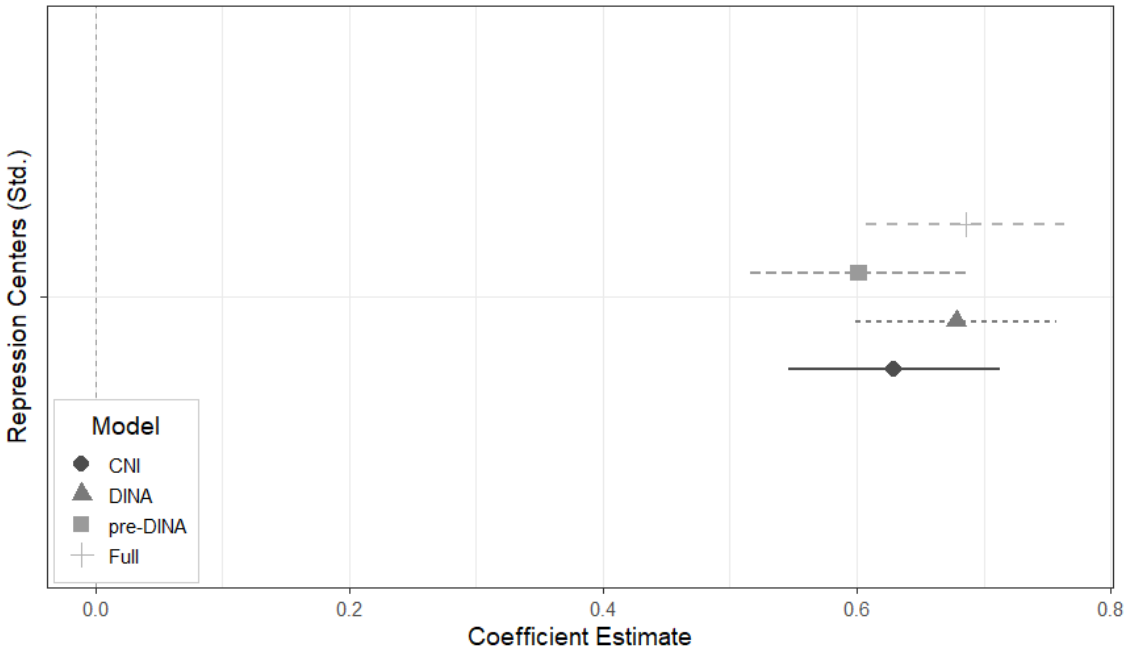


Figure 3-10: Predicting repression by Security infrastructure[29].

As results show, repression is primarily concentrated in areas where Pinochet's regime had an installed infrastructure to carry out persecution and detention. These results

[29] Simple OLS model estimates, comuna level analysis. The dependent variable is a standardized version of the number of victims. The independent variable is a standardized version of the number of torture and repression centers. All results are statistically significant at a 0.1% confidence level even after controlling for population size and rurality (not reported). Pearson correlation coefficient for the whole period is 0.69, for the pre-DINA period equal to 0.6; for the DINA period is 0.68, while for the CNI period equals 0.63. For complete results and descriptive statistics, see Appendix 3A.

make the availability of military and security forces infrastructure across the territory a determinant element in explaining the different levels of repression faced by Chileans during the dictatorship. In other words, repression is conditional on the preexistence of available police and military infrastructure. Furthermore, expanding on related evidence concerning military bases (Bautista et al. 2021), results show a clear relationship between repression levels and pre-existing security infrastructure during the regime. Nevertheless, there is a crucial distinction between the approach by Bautista and colleagues (2021) and the one proposed in this research. As introduced in previous sections, historical evidence (Seguel 2020) acknowledges that repression was conducted by every branch of the armed forces and police and not only by military members. Therefore, this research uses every available preexisting police station and armed forces bases operating before the military coup. In contrast, data regarding Bautista and colleagues' analysis employs a measurement of military proximity (distance) between each *comuna* and the location of military bases across 36 *comunas* in the country. This distinction is not trivial because it represents the different approaches taken to obtain the instrument which will be employed in the analysis.

In synthesis, preexisting available police and military infrastructure are associated with repression levels. As a result, using infrastructure as an instrument to estimate the effect of repression on electoral results will prevent bias from confounders (such as political factors detailed in Section 3.2.2.), becoming a necessary step to effectively assess the possible influence of Pinochet's regime of terror on the 1988 national referendum results. Therefore, the following section looks at the context in which Pinochet was

defeated in the plebiscite and the theoretical framework explaining how and under which conditions violence might be part of 1988's vote choice mechanism.

3.3. Defeating the dictator: The 1988 plebiscite.

3.3.1. New institutions and the democratizing framework.

After fifteen years of concentration of political power in the figure of Augusto Pinochet, the transitory provisions of the Constitution approved in 1980 established that in 1988, a referendum would be celebrated. The goal of this plebiscite was to determine the continuity of the General in power or to initiate a democratic transition that would include the election of a new president. Although this fact was the culminating point of a gradual process of democratic institutionalization in Chile since 1981, its celebration was subject to many pressures both locally and internationally.

Thus, from 1985 the foundations that would culminate in the celebration of the 1988 referendum would begin to be laid down. In November 1985, constitutional organic law number 18460 was approved, and the Qualifying Court of Elections (TRICEL) was created. In October of the following year, it constituted the Electoral Service (SERVEL) that began the enrollment of citizens in the electoral registry in February of 1987. The last institutional step was the passage of law number 18603, which allows and regulates political parties' formation. By February of 1988, the newly created parties had taken a stand toward the plebiscite to be celebrated later that year, producing the Concertación of Parties for Democracy (opposition to Pinochet) and the block of parties that supported the continuity of the regime (Union Demócrata Independiente and Renovación Nacional). In a

way, and as Cea (1988) argued, the progressive establishment of norms that regulated and ensured the electoral process gave rise to a "framework of democratic or democratizing legitimacy incomparable with those carried out in January of 1978 and September of 1973" (103).

The options presented to the Chileans established Pinochet's end or continuity as the executive office's head. They represented the country's opening towards a process of unparalleled democratic transition. As a result, and with approximately 98% of the possible registered voters participating (Cea 1988) - about 7,450,000 people - an unprecedented democratic transition experience took place in Chile.

On October 5th, 1988, Chileans went by masses to cast their vote in the first competitive, free and fair electoral event in more than fifteen years. There were two options on the ballot. First, vote "Yes" and allow Pinochet to retain the power of the executive office for another eight more years and call for elections for local governments and Congress. The second option was to vote for the "No" option, force Pinochet out of power, and celebrate the first presidential election in almost two decades in 1989. After hours of high tension and General Matthei admitting the triumph of the "No," Chileans raced to the streets to celebrate. In other words, the *"day-to-day fear of the present"* did not outweigh *"the fear of the past"* on which the dictatorship gambled the campaign (Heine 1989, 245). Nonetheless, a significant share of Chilean voters (see Table 3-2) decided to support Pinochet's continuity in power.

Option	Votes	Percentage
No	3967569	55.99%
Yes	3119110	44.01%
Blank	70660	0.97%
Null	94594	1.30%
Turnout	7251933	97.53%

Table 3-7: 1998 plebiscite results[30].

The political effects of the 1988's referendum are common ground among scholars to explain electoral outcomes and political strategies during the democratic consolidation process in Chile. Authors like Tironi et al. (2001), Garreton (2020), and Contreras and Navia (2013) argue that the referendum and its binary decision between supporting or being against the continuity of Pinochet in power constructed a deep division in Chilean society. As a result, the causes that might explain the impressive defeat of Pinochet are vital to understanding the voting patterns and political decisions that took place during the installment of the first democratic governments in the country.

3.3.2. Voting against a dictatorship and the electoral influence of terror.

The decision to support the continuity of an authoritarian regime against the option of democratic exit is a complex paradox for unraveling. On the one hand, there is an incentive for greater political, civil, and social freedom spaces. On the contrary, there is the possibility of avoiding anxiety or possible fear in the face of memories of instability, violence, and polarization. At the academic level, two theories have explored the underlying reasons that increase or decrease a dictatorship's survival rate.

[30] Source: Etchepare 2006

First, a policy-economic perspective emphasizes the necessity for legitimacy that non-democratic regimes aim to obtain. By delivering a sense of economic security and prosperity, the autocratic government provides public goods and policy benefits to maximize the public support for the regime (Desai et al. 2009, Shen 2007). This line of research also highlights the use of repression to show strength outside the policy realm, creating an environment in which citizens observe the power and capacity of the dictatorial machinery as a demonstration of public safety (Magaloni and Wallace 2008). Following Hipsher (1996), the sense of strength from the Chilean regime had been systematically eroded by the efforts conducted by the opposition mobilization efforts in urban poles of the country. Because of this, the author argues that the triumph of democracy was cemented gradually since the crisis of 1982, where the continuous efforts of the political elite to recruit and organize political groups resulted in a broad mass of public protest.

The second body of literature highlights elections and campaigns' role in democratization. Known as "democratization via elections," these studies highpoint how repeated electoral exercises might open spaces for institutional reform and a channel to escape the rule of the autocratic ruler (Lindberg 2009, Donno 2013). In Latin America, cases like Mexico represent examples of how the consecutive practice of undemocratic elections provides an opportunity for opposition parties to *"push the government for political liberalization"* (Klesner 1998, 492). However, as Boas (2015) explains, the case of Chile is different from the previous literature, being part of a second subcategory in which a dictator is forced out of power by an unexpected electoral result in what – they believed – was a secure victory. Under this view, if institutional guarantees are in place,

campaigns might have the capacity to influence electoral outcomes. Indeed, evidence from Chile shows how campaign effects are an essential explanatory factor in understanding the triumph of the "No" option (Boas 2015, Gonzalez and Prem 2018). More specifically, the televised campaign influenced a boost in opposition to the continuity of Pinochet in power. Furthermore, Boas (2015) argues that a combination of crucial elements explains why the political campaign strongly affected voters. Factors such as the novelty of the televised campaign, the lack of reliable party identification, and a drastic change from a one-sided media monopoly to a broader spectrum of options to acquire information were factors that help to explain why television advertising affected voting behavior in the 1988 plebiscite.

Despite the evidence and insight that previous studies have introduced, the highly divisive nature of Pinochet's regime in Chile (Tironi et al. 2001, Lopez 2004) – which constitutes, to some academics, a deep division in the social structure and political behavior of citizens (Torcal and Mainwaring 2003) – shows how longer-time forces must influence the decision-making mechanism. In this research, that underlying force that fueled part of the opposition to Pinochet's continuity in power is the consequence of its actions, i.e., the systematic reign of terror that the authoritarian regime set up in Chile. Indeed, evidence from Bautista and colleagues (2021) supports the idea that municipalities in which pre-existing military bases were located suffered higher deaths and forced disappearances, mobilizing their residents to register and vote against the continuity of Pinochet’s dictatorship.

The influence of terror, death, and violence is not a novel argument in political science. Our discipline has theorized and empirically tested the effect of events such as

terrorist attacks (Bali 2007, Berrebi and Klor 2008), ongoing internal conflicts (Weintraub et al. 2015), and war casualties (Kriner and Shen 2007, Boland and Godsell 2020) over voting decisions in different scenarios and historical moments. Evidence from these studies shows how a violent event can boost the mobilization of citizens who are usually less likely to participate in politics (Bali 2007), increase the support of parties and candidates who oppose the terror event even a long time after the incident (Weintraub et al. 2015), and have both local and national effects (Berrebi and Klor 2008). In the case of war casualties, the literature exhibits the local impact that human losses generate on voting decisions, focusing on the role that personal connection and local media might play in voting decisions (Kriner and Shen 2007).

Following the previous body of argumentation, voters punish the incumbent regime for death and violence that impact their communities and the country. As Tannenberg (2022) argues, " violence *reproduces the punishment puzzle in authoritarian regimes: the chances are that it will fuel, not discourage dissent"* (27). However, two main conditions must be adequate for repression to produce political effects. First, the population must be aware of the State's violence against civilians. Second, there must be an environment where free information about State violence can reach the public without censorship. In democratic regimes, repression or violence can effectively produce political outcomes because free and fair media coverage allows individuals to receive information about events and cases successfully. On the contrary, an autocratic regime usually suppresses free media and cancels individual liberties (such as association or speech), preventing

citizens from receiving information about repression and, therefore, having sufficient awareness of the State's violence.

In the Chilean context, Pinochet's dictatorship controlled and censored media throughout its time in power, drastically reducing the impact that local newspapers and radios could have had because of the inexistence of free and fair coverage (Castro 1991, Rivera 2008). Therefore, keeping in mind the previous discussion concerning the decision rule put in place by the repression machinery perpetrated by Pinochet's dictatorship, the only option for citizens to be aware of human rights abuses and repression perpetrated by the regime was through friends, family, or their own experience. As Bautista and colleagues (2021) reason, proximity to military bases might influence vote choice by providing citizens with new information about repression or exposing them to higher intensity of State violence after the coup. Following the previous argument, this research maintains that individuals who were residents of specific areas where repression levels were higher have a higher likelihood of opposing Pinochet than those who did not directly face death and terror.

From an individual-level psychological perspective, including new norms and safeguards to prevent public exposure to the decision to vote against the dictator might act as a gatekeeper to express true beliefs and help citizens safely and privately dissent from the current regime safely and privately. As Burchard (2020) argues, fear appears to have a backlash effect on incumbents, decreasing their support rate among voters who do not have clear political attachments. Moreover, fear and anger might be critical drives for voter

mobilization and participation, which would be against the incumbent regime that sponsors violence.

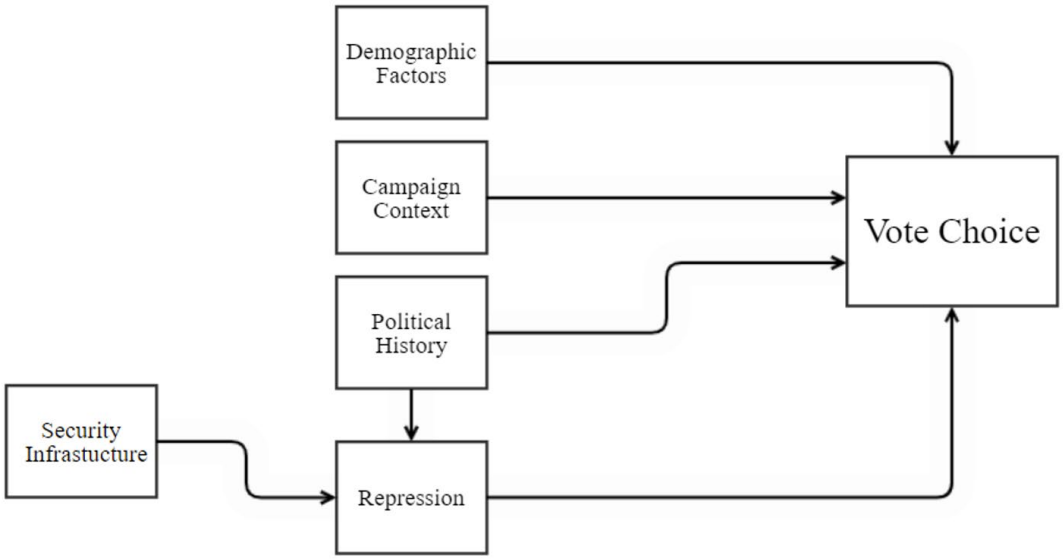


Figure 3-11: Theoretical diagram, repression and vote choice.

Considering the nature of human rights violations in Chile, theoretical arguments, and empirical evidence provided by literature, this research argues that the mechanism under which repression impacts voting patterns and individuals' vote choice is a complex dynamic in which a unique set of elements must be in place. Figure 3-7 shows a diagram of the proposed theoretical mechanism, in which vote choice is a combination of short- and long-term forces that include factors such as television campaign ads and repression in Pinochet's defeat. Because of the unique conditions in which the 1988 plebiscite took place, political history should be an essential predictor of vote choice, but without enough strength to hide the impact of other variables like campaign context and repression. Furthermore, demographic factors should follow what is expected theoretically. For instance, younger voters should be more likely to vote against Pinochet's continuity.

Figure 3-7 also shows the identification technique proposed by this research. Again, security infrastructure is treated as the instrument variable to overcome endogeneity problems depicted by the relationship between political preexisting factors and repression during Pinochet's dictatorship. For a complete discussion about the instrument validity and the exclusion restriction, see Section 3.4.2.

3.4. Methods.

3.4.1. Data and Variables.

This research explores the impact of different periods of human rights violations perpetrated by Pinochet's dictatorship on the likelihood of supporting the continuity of his regime in the 1998 referendum. For this, two sets of data will be employed and combined. The first set of data was retrieved from the Chilean 1992 census (closest information from the election), aggregate electoral data from the Chilean electoral service, a compilation of cases of deaths and disappearances because of human rights violations retrieved from the National Commission for Truth and Reconciliation reports (1996), and the number of pre-existing security infrastructure[31]. With all these sources, a *comuna*-level dataset is constructed. The main variables include the electoral support for each electoral option (excluding blank and null votes), the frequency and type of human rights violation perpetrated by the regime in each specific city, and several demographic characterization

[31] Because infrastructure is employed as the instrument in the different analysis, only those army, navy, and air force bases and police stations that existed before the installation of the regime are included in the analysis.

indicators such as television access (percentage of households), percentage of the rural population, literacy rate, poverty rate, population size, and the 1970s electoral results.

Table 3-3 shows the descriptive statistics for the ecological variables—discussion about these highlights three crucial sets of results. First, the mean vote share for the "No" option acknowledges the vast aggregate difference in results across units within the country, with a range between 10% and 80% percentage of the total votes. Second, repression cases present a decreasing rate across periods, with the higher number of events during the pre-DINA period and the lower within the CNI years. Lastly, repression centers also present across-time dissimilarities. Following repression cases, the highest number of centers was present during the pre-DINA years (maximum of 21 centers in a single municipality), and the lower during the CNI period (maximum of 13 centers in a particular *comuna*). Finally, it is essential to notice that the variable security infrastructure excludes particular locations (like CNI torture houses) constructed and used as repression centers during the dictatorship.

	Mean	Std. Dev.	Min.	Max.
Vote Share NO	0.5	0.1	0.1	0.8
Repression Cases				
Total	4.8	9.0	0.0	54.0
pre-DINA	3.1	6.3	0.0	41.0
DINA	0.8	2.4	0.0	15.0
CNI	0.9	2.4	0.0	13.0
Security Infrastructure				
Centers Total	2.1	3.0	0.0	21.0
Centers pre-DINA	2.0	2.7	0.0	21.0
Centers DINA	1.5	2.0	0.0	14.0
Centers CNI	1.3	1.7	0.0	13.0
No. of Observations		303		

Table 3-8: Ecological variables descriptive statistics[32].

Second, individual-level data were retrieved from a post-electoral public opinion survey conducted in October 1988 by the Centro de Estudios de la Realidad Contemporánea (CERC). The full dataset includes 1,700 observations from residents in 58 *comunas*. The questionnaire consists of questions about the decision to accept (Yes) or reject (No) the continuity of Pinochet as the ruler of the executive branch and includes questions regarding politics, self-reported ideological attachment, and background demographic information (including age, gender, religion, socioeconomic condition, and *comuna* of residence). In addition, ecological level variables measuring repression and security infrastructure are appended to the database to fulfill the multilevel condition.

Table 3-4 shows descriptive statistics for the individual-level survey and the incorporation of ecological data regarding repression and security infrastructure. Bias towards the "No" option is the result of including only those responses in which a clear position was reported. As a result, only 48 *comunas* have representation in the final

[32] Only dependent and key independent factors were reported. For complete descriptive statistics, see Appendix 3B.

database because in 10 different locations respondents provided no valid responses. Furthermore, the previous condition reflects descriptive statistics for repression cases and centers within different municipalities. Therefore, due to the previous condition, the mean number of repression cases and centers is higher in the multilevel database than in the ecological observations. For instance, during the pre-DINA period, the ecological database shows an average of 3.1 cases per municipality, while the multilevel frame shows 10.2 cases per geographical unit.

	Mean	Std. Dev.	Min.	Max.
Vote Share NO	0.7	0.4	0.0	1.0
Repression Cases				
Total	18.6	9.8	0.0	46.0
pre-DINA	10.2	4.0	0.0	40.0
DINA	3.8	4.4	0.0	15.0
CNI	4.3	6.0	0.0	13.0
Security Infrastructure				
Total	8.5	6.0	0.0	21.0
pre-DINA	7.7	5.6	0.0	21.0
DINA	5.7	4.0	0.0	14.0
CNI	4.9	3.5	0.0	13.0
No. of Observations		804 / 48 *comunas*		

Table 3-9: Individual-level variables descriptive statistics[33].

The final dataset can be used both for assessing the impact of human rights violations on electoral choices and, at the same time, control for key individual, local, and political variations. However, concerns about data limitations due to a restrictive sample incorporating individual-level responses from only major cities are present. As previous sections show, repression was concentrated in major cities, but the variability reduction

[33] Only dependent and key independent factors were reported. For complete descriptive statistics, see Appendix 3B.

might influence the causal mechanism. Therefore, interpretation of results should be taken with caution due to the differences in each level of analysis.

3.4.2. Analysis.

As a result of the combination of aggregate data and individual-level survey observations, two different empirical strategies are employed to explore the phenomenon in depth. The first strategy uses a two-stage least squares (TSLS) instrumental variable approach to model an ecological analysis. The second strategy uses a multilevel logistic regression combining a post-electoral survey and geographical data on death and disappearances cases in Chile during Pinochet's dictatorship. The combination of both overcomes possible ecological fallacies issues, observing the effects of repression's geographical variation at the aggregate and estimating its impact at the individual level.

a. Instrumental variable regression.

The ecological analysis of this research uses a TSLS instrumental variable approach in which the dependent variable is the share of votes that the option "No" received by each *comuna* in the country. The leading independent variable is the number of deaths and disappearances that occurred in a particular locality during the length of the dictatorship. This measurement is incorporated into the models as the standardized version of the frequency count to secure comparability and fulfill normality assumptions.

Nevertheless, endogeneity is present in any linear model because repression cases are associated with pre-existing security and police infrastructure across the country. A Two-Stage Least Squared (TSLS) estimation with robust standard errors is employed to

overcome this challenge. In the first stage, the formula aims to use pre-existing security infrastructure as an instrument to correctly address the influence that repression might have over aggregate vote choice. The predicted values from the first stage are incorporated into the equation during the second stage of the model to assess the impact of repression over vote choice in the 1988 plebiscite.

Instrumental variables estimation requires looking at several possible methodological problems that may arise. First, weak instruments might compromise the validity and consistency of estimations, especially when the instrument is not strongly correlated to the endogenous regressor (Andrews et al. 2019). However, in the case of repression centers as an instrument, empirical validity proves a correlation between the independent endogenous factor and the instrument, as stated in previous sections.

Secondly, for security infrastructure to serve as a valid instrument it must meet the exclusion restriction and the exogeneity assumption. Following Wooldridge (2010), these requirements would be violated if reverse causation exists, the instrument correlates with an omitted variable, or the instrument has an impact through an omitted variable.

Therefore, following the first condition, the argument of this research will be void if the Chilean State decides to install army and police infrastructure in certain territories to repress citizens. This seems completely unlikely because of two reasons. First, building army bases and police stations was extensively made by democratic governments over time. Second, to violate the assumption, the construction should be a decision made by government and security offices, not because of population growth or human settlements but instead as anticipation of what a dictatorship might do in the future. As Pinochet's

dictatorship employed several secret locations to torture Chileans, those specific locations should be left outside any analysis to prevent violating this condition. Moreover, historical evidence regarding the nature of the territorial establishment Chilean army reflects that most of its expansion is because of economic and geopolitical reasons shaped by 19th-century wars (Guajardo 2008).

Security infrastructure should be correlated with causal omitted variables for the second condition to be violated. For example, because there could be a relationship between factors such as rurality, and population size with the construction of army bases and police stations, this might cause a correlation of the instrument with the error term. Nevertheless, controlling for these conditions in the TSLS model would overcome this challenge.

Lastly, security infrastructure should impact vote choice through an omitted variable for the third condition to be violated. Mainly, preexisting security stations and bases may shape factors such as conflict or public safety in particular regions of the country, but this should not directly influence the electoral decision of individuals. No research has explored if crime increased or decreased the support for Pinochet's continuity in power. Nevertheless, crime rates in Chile during the previous years of the plebiscite were relatively stable (Paz Ciudadana 1996), meaning that no effect should be expected.

In synthesis, as Sovey and Green (2010) argue, an instrumental variable should be *"determined by forces that have little apparent connection to unmeasured causes of Y"* (p. 190). Theoretically, using preexisting security infrastructure as an instrumental variable is an ideal setting because the existence of military and police bases in previous moments to

the establishment of Pinochet's dictatorship is unlikely to influence the electoral performance of the dictator in 1988 plebiscite. However, a possible source of concern might come from the likelihood that places with more military bases and police stations should have more military units or police members, which ought to be expected to support the continuity of Pinochet in power. Because the total number of military units and police members was relatively low comparing with the electoral registry (1.67%[34] of the total number of registered Chileans to vote), this alternative should not influence aggregate voting patterns.

Control variables for the TSLS model include crucial sociodemographic information such as television access at the household level by *comuna*, poverty rate, literacy level, population size, rural population rate, and the share of votes in favor of Alessandri during the 1970 election[35].

b. Multilevel regression.

The second strategy to assess the impact of terror on electoral outcomes combines *comuna* level data with responses from a post-electoral survey conducted by Centro de Estudios de la Realidad Contemporanea (CERC) in October of 1988. The data exploits the flexibility of the maximum likelihood estimation to observe how particular individuals might be more likely to cast a vote against the dictatorship if they were residents of

[34] Following data from World Bank (2022) for 1989 military personnel and Guzman (1999) for police units.
[35] According to Sovey and Green (2010), the inclusion of exogenous covariates might help to overcome "the assumption that the near-random instrumental variable is independent of disturbance" (p. 189).

comunas in which different levels of human rights abuses were perpetrated. The primary dependent variable is an individual-level dichotomous electoral vote choice (yes/no) measurement. In addition, the model includes political television ads exposure (*franja* viewership), age, gender, religion (Catholic denomination), income group, and ideology as individual controls.

For the multilevel element of the analysis, the primary independent measurement is the frequency of human rights violations perpetrated by the regime in the *comuna* where the individual resides. Because of the complexities associated with the endogeneity of the independent variable, Appendix 3C shows a secondary model that uses repression centers as a proxy for repression geographical variations.

Nevertheless, results from multilevel analysis must be taken with caution. While the ecological analysis employs a TSLS, Woolridge (2010) does not recommend its use with binary-response models because of the possibility of inconsistent estimates and biased results. Just as an exercise, Appendix 3C shows an alternative reduced version of the main model including security infrastructure as the independent variable to explore its possible direct impact on vote choice.

3.5. Results.

Two empirical strategies are employed to identify the possible effect of the repression carried out by the Pinochet dictatorship on the voting decision of Chileans in the 1988 plebiscite. First, this research analyzes aggregate behavioral patterns at the *comuna* level using a TSLS. As discussed in previous sections, this strategy allows observing how the level of repression during the military dictatorship might have affected

Chileans' aggregate voting patterns. The results of this analysis are presented in Section 3.5.1.

Second, a multilevel model is used. This model combines the aggregate-level repression data with self-reported voting decision responses captured by the CERC survey in 1988. This strategy allows, in turn, to control for variables that the literature estimates influenced the voting decision of Chileans and avoid possible ecological fallacy complications in the final interpretations of results. The results of this method are shown in section 3.5.2.

3.5.1. Local-level analysis.

The analysis is based on the total number of full cases (*comunas*). Therefore, observations include information for 303 municipalities (for first stage results, see Appendix 3C).

The results of the TSLS analyses are presented in Table 3-5. Each column included represents a distinctive period of Pinochet's repression machinery. Thus, the first column of each group displays results for indicators of violence during the entire period of the dictatorship, while the following columns use the observations corresponding to the period in which the police apparatus was decentralized (the period before the establishment of DINA), concentrated in DINA (1974-1977) or CNI (1978-1990).

	Dependent variable: Vote Share No Option			
	Full	Pre-DINA	DINA	CNI
Repression Inst.	**-0.002**	**-0.002**	**-0.0003**	**0.001**
	(0.01)	**(0.01)**	**(0.01)**	**(0.01)**
TV Access (%)	0.49***	0.49***	0.49***	0.49***
	(0.07)	(0.07)	(0.07)	(0.07)
Alessandri 70 (%)	-0.01***	-0.01***	-0.01***	-0.01***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)
Population (log)	0.02***	0.02***	0.02***	0.02***
	(0.003)	(0.004)	(0.003)	(0.004)
Rurality (%)	-0.001***	-0.001***	-0.001***	-0.001***
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Literacy	-0.27**	-0.27**	-0.27**	-0.28**
	(0.12)	(0.12)	(0.12)	(0.12)
Constant	0.56***	0.56***	0.56***	0.57***
	(0.11)	(0.11)	(0.11)	(0.11)
Observations	303	303	303	303
R^2	0.65	0.65	0.65	0.65
Adjusted R^2	0.64	0.64	0.64	0.64
Res. Std. Error (df = 295)	0.07	0.07	0.07	0.07
Weak Instruments	0.0***	0.0***	0.0***	0.0***
Wu-Hausman	0.97	0.78	0.67	0.87

*Note: *p<0.1, **p<0.05, ***p<0.01*

Table 3-10: Comuna vote share "No" option, TSLS estimation results.

The first four columns correspond to the models that incorporate all possible observations. The results show that electoral support for Alessandri in the 1970 presidential election, the proportion of rural inhabitants, population size, television access, and literacy levels are the most robust predictors in explaining the percentage of votes obtained by the "NO" option.

On the other hand, the independent variable (repression) is non-significant in every one of the four specifications presented. Thus, the evidence supporting the central research hypothesis finds little empirical support. Moreover, these results differ significantly from the evidence provided by Bautista and colleagues (2021), who find a significant relationship between repression levels and vote choice. The difference between both outcomes could be the result of the different approaches taken to build the instrument (as discussed in Section 3.2.3), the selection of independent variables, or even the theoretical decision to explore the relationship between the geographical variation of repression and vote choice taking Pinochet´s dictatorship as a single moment in time or as different periods based on its repression machinery. As an exercise, Appendix 3C presents a comparison between a reduced form of the model and the instrumental variable estimation with a restricted version of the included independent variables. Results show a significant effect of security infrastructure and the instrument when television access is omitted.

Nevertheless, as presented in Table 3-5 and the alternative version of the model restricting the number of observations for only those with at least one case of death and forced disappearances, the results present nonsignificant coefficients for the main independent variable (see Appendix 3C).

Moreover, the strength of security infrastructure as an instrument presents relevant evidence. In every model, the null hypothesis regarding weak instruments is rejected, and the Wu-Hausman test shows non-significant results, meaning that the empirical approach has solved the endogeneity problems.

Beyond the independent variable, the results of the control variables indicate specific possible approaches to consider. First, there seems to be a clear relationship between pre-dictatorship voting patterns and the referendum results. Regardless of the period of repression, right-wing electoral support is statistically significant. In other words, the higher the electoral support for Alessandri 18 years before the referendum, the lower the support for the "No" option. Results from this variable are consistent across different models.

Second, the level of the rural population and the population size emerge as solid predictors of Pinochet's support in the voting booth. Indeed, areas with a lower share of the urban population are associated with a lower percentage of votes for the "No" option. Meanwhile, more populous municipalities are associated with a higher share of voters supporting the return of democracy in Chile.

Lastly, television access is a significant and robust predictor at the ecological level in every model. The higher the rate of households accessing television at the *comuna* level, the higher the electoral support for the “No” option. These results follow what previous research has shown for the 1988 plebiscite.

In summary, the results of the models at the aggregate level indicate that there might be no direct effect of repression on the rate of electoral support for the "NO" option. In all the TSLS models, statistical non-significance is present. Nevertheless, one should not immediately conclude that repression does not influence individual vote choice. The following subsection provides evidence on how different levels of repression might impact the likelihood of supporting any of the two alternatives.

3.5.2. Multilevel analysis

The results of the second methodological approach employ a multilevel analysis that incorporates observations at the individual level and the indicator of political repression in its different versions. The results shown in Table 3-6 include four columns, which correspond to the different periods of the repressive apparatus of the dictatorship used in previous sections. The main independent variable is the standardized indicator of repression cases (for alternative specifications, see Appendix 3C). The total number of valid cases includes 804 individual observations from 48 different *comunas*.

The results for the entire period of Augusto Pinochet's dictatorship highlight the statistical insignificance of the political repression variable. Thus, there is no evidence that the repression in a territory during the military dictatorship directly impacted the voting decision in the 1988 plebiscite. Despite this, variables that the literature emphasizes as relevant (such as exposure to electoral publicity before the election) are significant and in the expected direction. Greater exposure to the campaign advertising increases the probability of supporting the "NO" option.

Indeed, factors such as age, income, *franja* viewership, and ideology reported by respondents are also significant for the model. For example, the higher the income, the higher the probability of supporting Pinochet's continuity in power. While individuals who identify with the left present a higher likelihood of supporting "NO" than those with no ideological attachment. Finally, the age variable reports a significant effect, with younger individuals presenting a higher probability of supporting the option against the continuity of the dictator.

	Full	pre-DINA	DINA	CNI
Repression (Std.)	**0.03**	**0.03**	**0.02**	**0.02**
	(0.04)	**(0.04)**	**(0.04)**	**(0.04)**
Franja View (b. = Never)				
Some days	0.326	0.325	0.326	0.333
	(-0.422)	(-0.422)	(-0.422)	(-0.421)
Almost every day	0.953**	0.958**	0.943**	0.974**
	(-0.454)	(-0.454)	(-0.454)	(-0.452)
Every day	1.34***	1.34***	1.334***	1.345***
	(-0.45)	(-0.45)	(-0.45)	(-0.45)
Age	-0.03***	-0.03***	-0.03***	-0.03***
	(-0.01)	(-0.01)	(-0.01)	(-0.01)
Women	-0.102	-0.101	-0.104	-0.101
	(-0.228)	(-0.228)	(-0.228)	(-0.228)
Catholic	-0.457	-0.457	-0.461*	-0.451
	(-0.279)	(-0.279)	(-0.279)	(-0.279)
Income (b. = Lower)				
Middle	-0.475*	-0.474*	-0.474*	-0.477*
	(-0.262)	(-0.262)	(-0.262)	(-0.262)
High	-1.398**	-1.392**	-1.405**	-1.411**
	(-0.63)	(-0.63)	(-0.63)	(-0.62)
Education (b. = None)				
Primary	0.646	0.65	0.639	0.654
	(-0.56)	(-0.56)	(-0.56)	(-0.56)
Higher School	0.44	0.447	0.427	0.45
	(-0.611)	(-0.61)	(-0.611)	(-0.611)
Superior	1.017	1.021	1.008	1.018
	(-0.738)	(-0.738)	(-0.738)	(-0.737)
Ideology (b. = Left)				
Center	-2.79***	-2.79***	-2.79***	-2.79***
	(-0.73)	(-0.73)	(-0.73)	(-0.73)
Right	-6.02***	-6.02***	-6.03***	-6.01***
	(-0.76)	(-0.76)	(-0.76)	(-0.76)
Independent	-3.67***	-3.69***	-3.69***	-3.69***
	(-0.79)	(-0.79)	(-0.79)	(-0.79)
Constant	4.773***	4.766***	4.799***	4.771***
	(-1.08)	(-1.08)	(-1.08)	(-1.08)
Observations	804	804	804	804
Log. Likelihood	-272.996	-273.031	-272.882	-273.084

*Note: *p<0.1; **p<0.05; ***p<0.01*

Table 3-11: Self-reported vote choice "No," Multilevel probit model.

The non-significant result of the repression variable in the full model is repeated in all the others. Thus, the multilevel evidence indicates that repression would not directly affect the voting decision. In the pre-DINA period and the DINA and CNI, the independent variable has no impact on the probability of supporting one or the other electoral option. In light of previous results, it is possible to indicate that the repression carried out by Pinochet would not have directly affected the voting decision of Chileans. However, this does not mean that repression could have impacted plebiscite results indirectly through television (more about this discussion in the subsequent sections).

In summary, it is essential to highlight the effect of *franja* viewership, age, income, and ideological position. Thus, as theoretically supported, it is possible to argue that these factors are critical to understanding Pinochet's defeat at the polls. Furthermore, the primary independent variable in this analysis is not significant. Despite this, and due to the data limitations of this research, the following section attempts to explain the reason behind the findings.

3.6. Alternative explanations.

Although there is theoretical support that would explain the relationship between repression and voting decisions, the results presented in previous sections do not support this hypothesis. Nevertheless, certain limitations in the available data could help understand the gap between the theoretical model and the empirical observations.

First, the data used to illustrate the repression of the Pinochet regime only include cases of assassinations and disappeared detainees during the 17 years that the dictatorship was in power. Although this indicator incorporates the most emblematic and violent cases,

it fails to capture the extent of the machinery of repression that victimized the tortured, arbitrarily detained, and police violence in the streets during demonstrations and manifestations. This situation limits the power of the variable to capture the extent of Pinochet's machinery effectively. While it would be ideal to have information on arrests and cases of violence in events such as marches and public demonstrations, there is no information available that measures this dimension of repression. The physical infrastructure available to the dictatorship was used as an instrument to approximate this phenomenon. However, it is impossible to establish whether it is the best indicator for the case.

Secondly, the complex theoretical relationship between urban areas, electoral results before the coup d'état, and repression generates a challenging causal framework to address. Indeed, this research sought to produce evidence at the aggregate and individual levels to overcome the previous challenge. Nevertheless, there is a distinct possibility that repression's effect is hidden behind more robust relationships, such as population size, the urban-rural divide, and television consumption.

Regardless, the role of the media requires further consideration. With a political system that was just opening real options for democratic competition and with social factors such as low political self-identification, it was to be expected that repression would play a relevant role in voting patterns. Moreover, there is also the possibility that the power of the televised campaign - where images of repression took place in the construction of the campaign of the opposition to Pinochet – hides the effect that repression may have accumulated during the years of dictatorship.

Indeed, this research proposed to look at the geographical relationship between repression and voting, arguing that individuals would have been aware of repression close to the comunas they reside in, making them more likely to vote against Pinochet. This mechanism occurred in the context of media censorship, in which the *franja* was the first massive alternative to provide information without direct censorship. Even though the televised campaign did not directly address cases or levels of repression in specific *comunas* of the country, it did include human rights abuses in a permanent but subtle way (García 2006). As a result, if individuals learned about repression through the *franja*, it should not be expected to see any effect of the geographical levels of repression on vote choice. In synthesis, if repression was an essential factor in explaining voting patterns, it matters because individuals learned about it differently than just a geographical proximity factor.

3.7. Discussion.

Did human rights violations influence the 1988 plebiscite results? Even though theoretical reasons, recent evidence, and possible alternative explanations might provide a different view, results show a clear path: levels of repression's geographical variation were not directly associated with the defeat of Pinochet. Nevertheless, repression might be important through a different mechanism. One of the key conditions for repression is individual awareness of the situation. This crucial element is absent in the context of authoritarian media control. Moreover, people may have received information about repression not through conventional media or personal experience but the 1988 opposition campaign and television ads.

From this analysis, one should not conclude that repression was not crucial for understanding Pinochet's defeat at the polls in 1988. Geographical variation in the intensity of repression is not the only way repression might influence the result. Effects such as television ads and citizen fatigue in a system that restricted their civil and political liberties could be more significant as defining elements. Moreover, as Boas (2015) and Gonzalez and Prem (2018) exhibit, the 1988 campaign devastated Pinochet's plans to concentrate power. As discussed in the previous section, there is a possibility that the effect of repression is contained within the impact of television. Despite this assertion's data and methodological limitations, it is an important dimension to consider in future studies.

Indeed, the results obtained are essential to understanding Chile's recent political history. First, it gives a different notion of the Pinochet dictatorship's divisive nature on the country. Thus, the rhetoric used by politicians and leaders - which was employed as an important heuristic to deliver information to voters about candidates and parties – might have more to do with overall Pinochet's regime of terror than with the repression's spatial variation that took place during the 17 years of the dictatorship. For the same reason, the failure to find evidence to support the hypothesis that different levels of geographical variation of repression impact the share of votes obtained by the "No" option led us to rethink the nature of the political effect of the dictatorship on Chilean voters.

Undoubtedly, as a vast body of literature shows (Garreton 2000, Tironi 2001, Contreras and Navia 2013), the traces of the dictatorship left a clear mark on the generation that suffered it. Nevertheless, its electoral effects may result from a political activation rather than a local impact of the dictatorship's repressive machinery.

In short, and despite not finding evidence to support a direct relationship between geographical variations in repression levels and voting patterns, this research presents relevant evidence to understand the role of political violence on the survival dynamics of non-democratic regimes. As Tannenberg (2020) argues, the delicate balance that dictatorships must consider between their repressive apparatus and the regime's survival is critical in understanding citizens' support for them or the extent and strength of opposition to the regime. Moreover, when a strong wave of competitive authoritarian regimes is sweeping over Latin America, the time and duration of repression could be critical in understanding how they perpetuate themselves in power.

Finally, the findings regarding the mechanism employed by the Pinochet dictatorship to select its victims are worth noting. The results presented in Section 2 of this research raise the real possibility that the repressive apparatus functioned as a strategy implemented from the heart of the dictatorship to remain in power. Therefore, researchers should give special attention to the differences between periods when approaching the phenomenon of political repression in Chile from 1973 to 1990.

CHAPTER FOUR. REDUCING RESIDUAL VOTES IN PARAGUAY AND PERU: TECHNOLOGICAL INNOVATIONS, BUREAUCRATIC DISCRETION, AND PARTY ACTIVISTS

Abstract.

Residual votes are usually seen as a manifestation of discontent with the political system (protest) or as the consequence of mistakes made by inattentive citizens (error). Electronic voting in democracies has reduced the second type of invalid voting. Traditional explanations include the design of ballot cards and the reduction of complexities associated with the voter's choice process. However, researchers have neglected the role that electoral bureaucratic agencies and party activists might play in the call of invalid votes as a probable mechanism. This research argues that technological interventions reduce residual votes by decreasing complexities and reducing the discretion and power of electoral officials and partisan agents. Exploiting the natural experiment in 2018 in Peru and 2003 in Paraguay, countries with seemingly straightforward paper-pencil and e-voting procedures, this research aims to understand the causal effect of electronic voting over residual votes. Combining in-depth qualitative evidence from interviews and using a group-time difference-in-difference statistical model, results show that the implementation of new voting technologies is associated with a decrease in the rate of residual votes that can be attributed to the user—error reduction and the elimination of administrative rules and procedures to call a vote invalid. The final implication of this type of intervention resulted in thousands of citizens being effectively part of the democratic decision process.

4.1. Introduction.

Conventional political science research usually has focused its attention on the final vote count during elections, its causes, and consequences. However, a growing body of literature (Driscoll and Nelson 2004, Power and Garand 2007, Kouba and Lysek 2016, Cohen 2018) has placed its concern on residual votes, i.e., citizens' votes cast for neither the incumbent nor the challenger(s). Past evidence attributes invalid voting as a form of protest, a consequence of voters' specific characteristics, or a by-product of complex features in the design of ballot structure and the electoral process. The distinction between them is both a theoretical and empirical discussion, and even though a general picture is yet to emerge, significant evidence points toward every path. A pragmatic view across the issue argues that protest and error might co-exist and that the election infrastructure and norms mediate the latter. Moreover, the incentives created by formal structures might create the conditions for agents to intervene and influence the rate of residual votes. In this regard, invalid votes matter for their impacts on the quality of elections, legitimacy, and the broader public attention that allegations of fraud currently have in developing democracies.

Current research focuses its primary attention on developed democracies. By looking at cases in the US and Europe, cumulative evidence points to the idea that ballot cards' technical design and implementation might effectively influence the rate of residual votes and produce notorious impacts on electoral results (Kimbal et al. 2004, Mebane 2004, Allers and Kooreman 2009).

By contrast, literature from developing countries commonly studies the phenomenon from an individual perspective, arguing that dissatisfaction/protest or errors are the main drivers behind invalid voting. Both arguments highlight different notions. While some argue that residual votes reflect how voters show their discontent or make a rational choice to protest against the system and political actors, others pursue the idea that invalid voting is a by-product of inattentive citizens that do not possess enough abilities to navigate through complex electoral procedures (McAllister and Makkai 1993, Power and Garand 2007, Hill and Young 2008, Driscoll and Nelson 2014, Cohen 2018). Moreover, operational and technical elements might also influence invalid voting. Evidence points to factors such as ballot design (Hanmer et al. 2010, Pachon et al. 2017), voting systems, and the number of candidates (Ansolabehere and Stewart III 2005) might be part of the answer. Besides traditional approaches, researchers acknowledge that residual votes might result from electoral malpractices and fraudulent maneuvers made by political agents (Kouba and Lysek 2018), effectively disenfranchising voters (Debnath et al. 2017, Pachon et al. 2017, Schneider and Senters 2018). Indeed, the implementation of electronic voting machines in Brazil resulted from an attempt to prevent electoral fraud, allowing more vulnerable voters a chance to influence the democratic decision-making process (Hidalgo 2012, Nicolau 2015, Schneider et al. 2020).

This article argues a comprehensive vision by which residual votes result from a complex causal mechanism that involves demographic factors, protest-based decisions, technical complexities, institutional norms, and the actions of political activists that intentionally try to invalidate votes. Political scientists have mostly neglected the possible

role of party activists in the causal complexity of invalid votes primarily because of data limitations and scarce qualitative evidence (Kouba and Lysek 2018). In particular and given the importance of the topic for democratic development, this research presents a new theoretical framework that combines previous elements and takes advantage of a quantitative-qualitative methodological approach to explore the possible impact that institutional innovations – like the implementation of electronic voting machines - might have on the role that bureaucratic officials and party activists have on null and blank ballots. In the context of Latin America, one of the regions with higher rates of residual votes (IDEA 2021), the implementation and use of electronic voting to reduce residual votes is both a normative and practical inquiry. According to the International Institute for Democracy and Electoral Assistance - IDEA (2021), countries like Paraguay and Peru (see Figure 4-1) – part of the top-ten list of the democracies with higher levels of invalid voting in nationally-contested elections – face a problematic democratic scenario when a substantial share of their voters do not cast a valid vote.

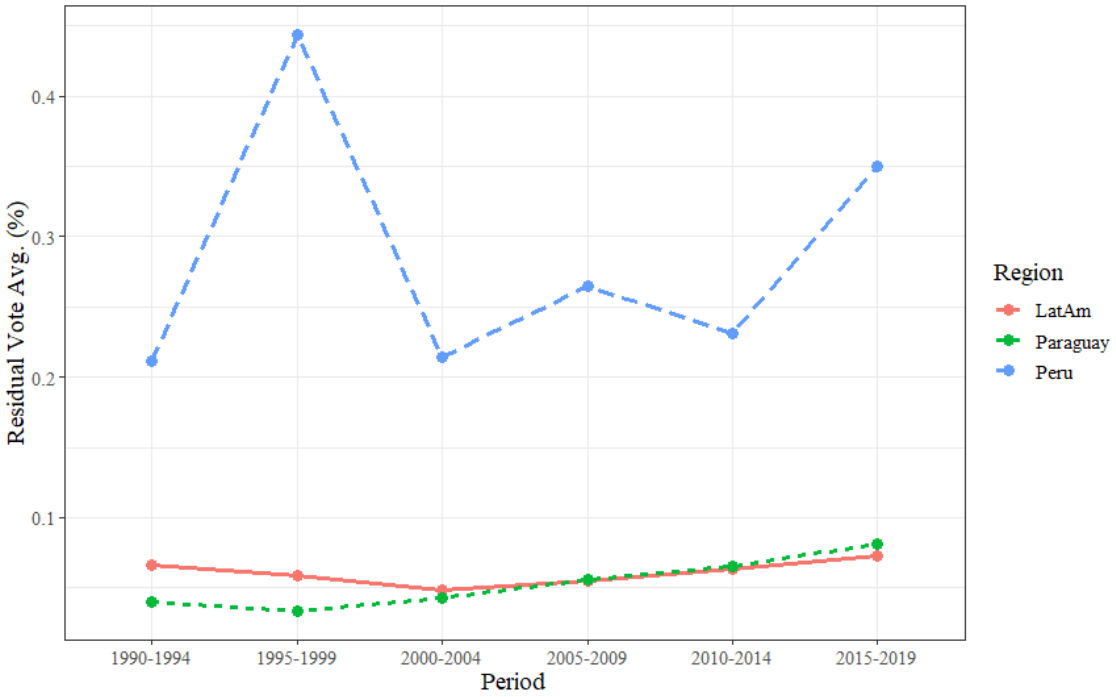


Figure 4-12: Residual votes in Latin America, 1990-2019[36]

Moreover, every time contested elections are in place, multiple allegations of fraud and vote manipulation are part of articles, everyday conversations, and politicians' strategies. Due to weak electoral body management (EBM) and the intromission of political activists during elections, public opinion creates a hostile atmosphere for democratic legitimacy (Hernandez-Huerta and Cantu 2021). Cases like Paraguay and Peru, both countries with a history of cases of electoral fraud committed by party members[37] and

[36] All data points correspond to lower-chamber elections. Data for Latin American countries were retrieved from IDEA International (2021). The percentage of residual (invalid) votes for Paraguay and Peru were obtained from official sources (Tribunal Supremo de Justicia Electoral for Paraguay and Oficina Nacional de Procesos Electorales for Peru).

[37] For instance, in a Paraguayan municipal election in 2015 a party representative tried to mark almost 40 votes with the goal to call them invalid (Lezcano 2015). For the Peruvian case, one of the most remarkable examples is found during the 2016 presidential second round, in which party activists tried to challenge more than 247 electoral acts that would have changed the final outcome (Fowks and Cule 2016).

direct democratic promotion interventions by the Organization of American States (Arceneaux and Pion-Berlin 2007), are exemplary cases to shed light on the way institutional frameworks, standard political practices, and agents' incentives change as the result of technological innovation.

This article provides three unique contributions to the field. First, it offers a new theoretical framework to understand invalid votes not solely as a form of protest, error, or institutional setting but as part of a complex setting in which political agents play a crucial role. Second, it takes advantage of Paraguay and Peru's different approaches to the implementation of electronic voting in mandatory voting settings characterized by different levels of enforcement but an important commonality: the power of party activists to intervene during the process. Lastly, it overcomes ecological methodological complications by approaching the analysis through a novel average-treatment effect estimation known as the group-time difference-in-difference method.

The rest of the paper is structured as follows. First, a discussion of the mechanics that underlie residual votes, the difference between protest and error-prone votes, and the relationship between technology and invalid voting are presented. This review serves as a starting point to understand how the reduction of administrative procedures to call a vote invalid might help to reduce residual votes in an election despite the type of ballot card that a country's electoral bureaucratic agents choose to implement and have an exploratory notion of the role those party activists might play in the share of invalid voting. Second, a brief description of Peru and Paraguay's characteristics and background information is accompanied by a detailed description of the development and installation of electronic

voting in each country. Then, data and methods are discussed under a framework of the advantages and disadvantages of both cases. Next, the as-if-random natural experiment result is analyzed using a group-time difference-in-difference (DiD) model. Fifth, it presents qualitative evidence retrieved from in-depth interviews with electoral officials and party activists. Sixth, alternative explanations for the local treatment effect are discussed. Lastly, evidence from the analysis is debated in the light of theoretical expectations, with a brief statement of the topic's relevance to democratic principles and ideals.

4.2. Explaining residual votes: Error, protest, or something else?

In most countries, voters face two sets of decisions in every election. First, they must choose to go to the polls, and second, they must choose which candidate/party to support. However, this dual-decision process involves a third option, to choose to vote but not support any actor of the available options. In this case, the question transforms from whom to support to why people decide not to back anyone. The democratic theory argues that elections are an expression of public will, and the availability to protest against the options itself comprehends another way of political participation.

However, this notion would reduce the nature of residual votes to an expression of popular discontent, and voters may also cast an invalid vote for different reasons. Thus, literature has placed increasing attention on the phenomena of residual votes in the last decades (McCallister and Makkai 1993, Mebane 2004, Katz and Levin 2018, Cohen 2018). Overall, research efforts have a general conclusion: voters cast invalid votes as a way of protesting because they do not have enough abilities (education, information, or a combination of both) to understand the electoral mechanics underlying the process, or as a

result of inefficient ballot cards and electoral practices designs (Pachon et al. 2017, Superti 2020, Aron and Superti 2021). Another element that scholars have focused their attention on is the existence of residual votes in mandatory systems. In them, the option to avoid voting is increasingly reduced by a legal system of enforced voting (Hill and Young 2008) – even though the degree of enforcement varies greatly within cases (Power and Garand 2007).

From a theoretical standpoint, mainstream political science observes the phenomenon from three different approaches. First, from an individual perspective, scholars argue that invalid voting results from voters' specific characteristics, in which factors such as education and resources (Power and Garand 2007, Driscoll and Nelson 2014, Cohen 2017, Cohen 2018) are the main determinants. Second, and continuing with the micro-level framework, political scientists argue that voters' residual votes are mainly a way of protesting candidates or a political system that does not represent their opinions or views (Kouba and Lysek 2016). Lastly, researchers look at how institutional variables influence the phenomenon, paying particular attention to how rules, norms, and procedures involving elections impact citizens' invalid votes (Ansolabehere and Stewart III 2005, Hill and Young 2008, Pachon et al. 2017).

Moreover, traditional models acknowledge two primary actors: voters and electoral authorities. While voters cast invalid votes when they do not feel engaged with candidates or parties or do not have enough sophistication or information to navigate the system, electoral authorities might influence the rate of residual votes when they act as judges, ruling the disqualification of votes. In the following subsections, this article presents a

general view of each of the current trends, developing a new approach for understanding the role of bureaucracies and political activists in Section 4.3.

4.2.1. Resource Model

What do citizens need to navigate through elections successfully? The question is crucial not only for democratic development but also for governments and politicians. If citizens do not have enough abilities, i.e., intellectual or physical capabilities, to cope and understand the electoral process – including, but not limited to, campaigns, issues, challenges, and the core fundamental aspects of the democratic infrastructure – then the democratic ideal of equality and fairness might not be fulfilled. Therefore, voters need a minimum level of sophistication to decide from whom to vote and cast a valid ballot for one of the candidates.

Even though the idea that voters without enough education, knowledge, or skills directly points to individual-level evidence (Driscoll and Nelson 2014, Socia and Brown 2014), most studies on the topic of spoiled ballots include measurements of educational attainment, literacy, or average schooling at an ecological level (Power and Garand 2007, Kimball and Kropf 2005, Kouba and Lysek 2016). An overwhelming majority of studies find a clear relationship between education and invalid votes, i.e., lower literacy levels or educational attainment among the population are associated with a higher rate of residual votes election after election.

There is an underlying notion behind the influence of education, as information is crucial for understanding why citizens cast a valid or invalid ballot. Indeed, evidence

supports the notion that in more complex informational environments, citizens face more challenges in reaching a decision, and a direct outcome of those barriers is an increase in the rate of residual votes (Driscoll & Nelson 2014). To some extent, the interaction between information and education might be an important explanatory factor of residual voting because as citizens have more capacities to have a clear view of what is going on in the political sphere, they are more suited to make a voting decision.

However, resources are not limited to citizens' educational attainment. A second vital element to grasp the logic of the theoretical model is the capacity of citizens to face sanctions or penalties due to abstention from voting. In compulsory voting systems with an effective enforcement mechanism, vulnerable voters – who usually are those with lower levels of education – are forced to cast a ballot even when they do not want to or when they do not know whom to support in the pools (Haman 2021). Under this view, poverty or vulnerability might influence country/ district level residual voting; in the same direction, wealth might be negatively associated with casting an invalid vote, but mainly as a result of the interaction between socioeconomic level and political awareness (Socia and Brown 2014, Cohen 2018).

Other considerations taken into the literature regarding an individual's capabilities or social position include the relevance of urbanization (Rodríguez-Pose 2018), employment (Driscoll and Nelson 2014), and age (Socia and Brown 2014).

4.2.2. Institutional Model

If citizens do not have enough resources to overcome informational complexities, governments should construct efficient mechanisms to assist them during the voting process. Indeed, institutions play a crucial role from a mechanical and norm perspective (Franklin 2004, Power and Garand 2007, Kouba and Lysek 2016). According to this view, the rules in which democratic contests happen are vital elements in understanding the potential rate of residual votes.

The mechanism underlying this notion acknowledges the importance of institutional incentives and the effect that elements such as political competition (Kouba and Lysek 2016), voting rules and enforcement (Hircky 1994), norms and procedures (Ansolabehere and Stewart III 2005), and even the quality of democratic systems (Cohen 2018) might have over the likelihood of citizens casting an invalid vote.

Evidence from countries around the world presents a clear view of the subject. First, when ballot design increases the complexities of the voting process, residual votes tend to increase, meaning that a substantial share of the population cannot effectively choose between options (Hanmer et al. 2014). Secondly, mandatory voting is the best predictor of invalid voting, and the efficiency of enforcement of obligatory voting laws influences the share of voters that cast a spoiled vote (Kouba and Lysek 2018). Furthermore, electoral rules and the party politics settings in a particular territory influence the share of invalid votes that the electorate casts during the election (Muraoka 2021).

The mechanism behind the relationship between mandatory voting and residual votes is widely discussed among scholars. While a standard view acknowledges that district

magnitude and electoral disproportionality create political alienation that drives voters to cast an invalid ballot (Power and Garand 2007), institutions should be understood from a broader view to have a fully holistic idea of the process. From this perspective, the design and procedures surrounding elections are part of a broader phenomenon that creates specific conditions under which effective participation rates vary.

The interaction between party settings, candidates, and electoral infrastructure creates conditions that are likely to produce more difficulties for voters to cast valid votes. Evidence from advanced democracies shows that the ballot design (Kimball and Kropf 2008) and the number of candidates that compete in a given electoral race (Franklin 2004) are critical determinants of understanding the phenomenon. However, Cohen (2018) presents evidence pointing in a different direction, arguing that a higher number of candidates is associated with a decrease in the share of invalid votes.

In synthesis, the rules that govern elections – ranging from electoral formulas to district designs and ballot infrastructure – are essential factors in the complex mechanism explaining residual voting dynamics.

4.2.3. Protest-base Model

Nevertheless, even if citizens have enough skills to navigate through elections and institutional frameworks and create an excellent environment to reduce the complexities associated with the process, many voters still decide to cast a null or blank vote. This third theoretical model acknowledges the possibility that residual votes result from a strategic choice made by citizens when they cast a vote.

Several examples show the strength and historical importance of invalid votes in the Latin American context. For instance, during Argentina's 1957, 1958, and 1960 elections, Peron's party was proscribed from presenting candidates. The former president called all his supporters to vote in blank to protest his exile and exclusion from politics (Snow 1965). As a result, more than 2.2 million blank votes were cast during the 1960's congressional elections, surpassing the Radical party (Snow 1963). Protesting via invalid votes was so effective that even classic party-class linkages were broken during that contest (Lupu and Stokes 2009).

In their study of Bolivia, Driscoll and Nelson (2014) found that invalid voting was most common among highly sophisticated voters, i.e., the decision to cast a null or blank vote was the direct outcome of a conscious decision made by individuals with enough resources of knowledge to appreciate the informational complexities surrounding elections. More importantly, evidence provided by Moral (2016) and Cohen (2017) suggests that a substantial portion of voters' invalid choices are a direct outcome of intentional vote invalidation in Latin America. Even though more alternatives might mean a higher rate of effective voting, elements such as the menu of candidate options and the size of the candidate menu are still recognized as essential factors in understanding the motivations behind invalid voting.

Outside the Latin American context, Superti (2021) provides evidence of how invalid voting is a strategic choice made by voters to protest current institutions and politicians. This political practice results from organizations' mobilization effort that

appeals to specific territories and a diffusion moment in which political affinity drives voters' decisions.

In synthesis, and as Katz and Levin (2018) argue, invalid voting is also a way of abstaining from democratic processes, meaning that the decision made by voters is not only intentional but strategic as both a reflection of voters' disagreement with democratic performance and disenchantment with candidates and parties. More importantly, as Aron and Superti (2021) show, the consequence of residual votes might trigger a populist party's establishment and growth by transforming the individual contentious repertoire into an opportunity to advance their rhetoric in the political system.

4.3. Residual votes, electronic voting, and political agents.

As previous sections show, traditional research pays attention to two main actors that might intentionally or unintentionally impact the rate of residual votes in an election (Kouba & Lisek 2018). However, in Latin American politics, a third actor must be included to grasp a holistic view of the process: party activists. Beyond voter errors or dissatisfaction, two of the intrinsic motivators behind invalid voting, the role of political agents requires more attention. Both bureaucratic agents – usually known in the literature as electoral agencies or officials of electoral management bodies – and party agents can influence the transformation of preferences into votes.

In summary, when there is enough bureaucratic discretion, i.e., ambiguous norms and laws that create a field of decision for state agencies and authorities to interpret electoral norms and procedures, there is a greater likelihood that error or fraud might

happen. Conversely, if party activists, known in Latin America as electoral "*apoderados*" or "*personeros*," have too much space to intervene due to rule discretion in the vote-counting moment, deceit is more likely to be present.

Even though research on bureaucratic discretion argues that higher levels of discretion are associated with higher performance levels (MacDonald and Franko 2008, Miller and Whitford 2016), the relevance of autonomy in bureaucratic institutions is a crucial determinant of this relationship. Indeed, Jeong (2016) finds that political systems incentivizing personal vote-seeking increase bureaucratic effectiveness. However, this might not be the case when concerning electoral institutions. For example, Rosas (2010) shows that the level of autonomy of electoral management bodies substantially impacts the legitimacy and transparency of elections, i.e., the capacity of bureaucrats and the offices to act to produce meaningful outcomes that are crucial for democratic performance.

Moreover, the implementation of e-voting in several Latin American and other developing countries reveals profound democratic effects (Fujiwara 2015, Nicolau 2015, Schneider et al. 2020) that should be adequately discussed to have a comprehensive framework of the likely impact on officials and party activists in the region. To achieve this goal, the following subsections present an overview of the possible influence of bureaucratic offices, party activists, and several key developing democracies examples.

4.3.1. Electoral laws and electoral body management.

During elections, electoral agencies and authorities play a critical role in the quality of electoral democracy (Hartly et al. 2008). They serve as gatekeepers of democracy and

have vast power to influence electoral results. Their control over the process is the direct outcome of norms ruling elections, the critical role during the installation of voting stations, and the characteristics of the electoral management body (EMB) that oversees elections. Concerns about the role authorities play are not a common element in Latin American literature, and only a limited amount of research pays direct attention to the issue (Hartly et al. 2008, Rosas 2010, Birch 2011). In every one of them, the focus of the research relies on the autonomy or dependence that EMBs have on political parties, which places pressure on officials and authorities to create a transparent system that provides confidence and accountability over electoral processes.

Evidence looking at the relationship between electoral body management and invalid votes is limited. Exploring Argentina's case, Ronconi and Zarazaga (2014) look at the distribution of the voting acts to find anomalies and locate the characteristics of the districts in which irregularities are present. According to the authors, problems during vote count happen because of officials´ incapacity or intentional errors that mainly affect regions with higher rates of poverty and lower educational skills. Aldashev and Mostrobuoni (2016) present a complementary perspective, arguing that election officers place more effort into detecting invalid ballots when elections are more competitive, i.e., they take an intentional approach to overlook results when invalid votes might effectively change the course of a contest.

The idea that electoral body management might influence the rate of invalid votes presents a perspective by which reforms that increase electoral body management's attributions, powers, and capacities could produce electoral effects. Furthermore, the

previous assumption would argue that institutional innovations might influence several electoral factors, such as turnout, suffrage extension, and vote choice. For instance, evidence from the implementation of the secret ballot shows how a combination of institutional novelty and party machinery action can produce substantial democratic alterations. During the 1950s, Chile and Brazil introduced secret ballots. While Chile's innovation led to an increase in voters' effective enfranchisement (Baland and Robinson 2012), the case of Brazil shows the deliberate consequence of this innovation was suffrage restriction (increasing residual votes because of the complexities associated with the new system), particularly over poor and dependent voters (Gingerich 2019). To some extent, literature on ballot reform shows that if better electoral norms are present, the invalidation rate should decrease after an institutional reform that provides improved controls and regulations to prevent fraudulent action by party activists during elections.

Regarding the countries of observation for this research, Peru´s recent history presents three electoral norms that have changed the mechanism under which the electoral body management connects to party activists (*personeros*[38]). First, 1997 law no. 26,859 established a new inscription system for personeros and allowed each political organization a maximum of one per voting table. Second, the 2010 National Office of Electoral Processes (ONPE because of its acronym in Spanish) code for *personeros*, in which there was established the creation of mandatory credentials for personeros that included relevant

[38] In Peru, the first time p*ersoneros* were legally established was in the 1931 Electoral Act. Article 88 indicates that every candidate has a right to be represented by a legal *personeros* during the vote-counting moment. However, no limits were established by the law. Furthermore, the 1997 electoral law was the first legal body to establish a clear and precise list of duties, responsibilities and capacities for *personeros*.

information. Lastly, the 2018 resolution (n° 0075-2018-JNE) established a new electronic system to inscribe *personeros*, forcing a mandatory digital signature and electronic mailing direction for each. Finally, in Paraguay, electoral reforms starting in 1995 established new rules for *personeros*, first through creating an inscription system that gave Junta Cívicas the power to inscribe and provide accreditation for partisan activists.

Figure 4-2 shows the rate of invalid votes in parliamentary elections in Peru and Paraguay. Red lines represent the rate of residual voting while horizontal lines represent new electoral laws that produced reforms regarding *personeros*. Each panel show that previous institutional reforms are associated with a decrease in the share of invalid votes in the subsequent election. For instance, after 1997´s electoral reform in Peru, a reduction of 33 percentage points in invalid votes was present between the 1995 and 2001 parliamentary elections; the same trend was present after the implementation of a new procedure to inscribe *personeros*, with a decrease of three percentage points in the share of invalid votes cast during the 2011 parliamentary contest. Lastly, after the 2018 resolution, approximately 16 percentage points were reduced when comparing the 2016 and 2020 parliamentary contests. For Paraguay, after the 1996 electoral reform that created new procedures for *personeros*, a reduction of approximately one percentage point happened.

In synthesis, institutional reforms are likely to reduce the rate of invalid votes if they provide electoral management bodies with higher attributions to control the presence of *personeros*. The Peruvian example remarkably shows that after new rules and norms allow bureaucratic offices to control more effectively the inscription of *personeros*, a significant reduction of invalid voting is in place.

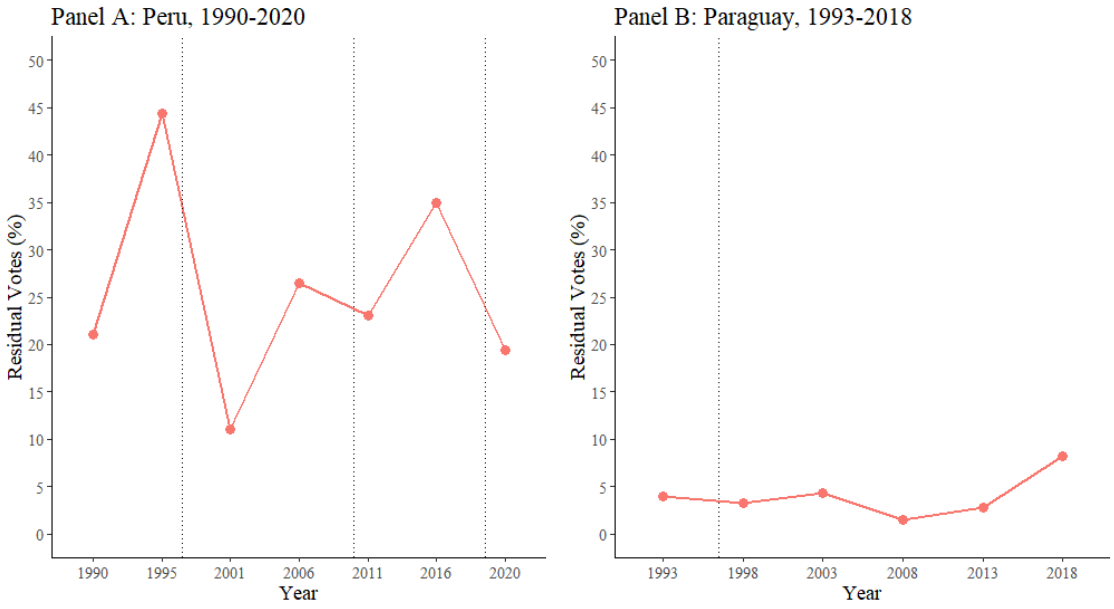


Figure 4-13: Peru and Paraguay's parliamentary invalid vote share and electoral reforms[39].

4.3.2. Party activists: protectors of democracy?

Party activists are usually categorized as crucial protectors of transparency and democracy. Their theoretical role is to observe democracy, provide legitimacy to electoral procedures, and safeguard fundamental civil and political rights (Abad 1999). For that, they are allowed by electoral body managements to be in place during elections, signing voting records and acting as faithful witnesses of the development of each moment during election day.

Nevertheless, is there any possibility that party activists might attempt to achieve electoral victories through fraudulent maneuvers? Galvez and Ruiz (2011) noted that one of the main dangers concerning elections in Latin America is that political agents (party members, activists, or corrupt officials) could alter ballots by introducing marks or other

[39] Source: IDEA, 2021.

alterations that would invalidate votes. Indeed, literature shows a set of usual fraudulent maneuvers employed by party activists during elections that include techniques such as ballot stuffing, voter supplantation, exclusion or intimidation, alteration of ballot cards, and invalidation of votes, among others (Lehocq 2008). For instance, Mexican political history shows that 4.5% of the requests for declaring null elections between 1940 and 1946 resulted from intentional vote invalidation by political activists (Molina and Lehocq 1999). As Schmidt (2005) argues, *personeros* not only defend their candidates but also aim to capture other candidates' votes through vote invalidation.

The 2000 election in Peru, a well-known case of electoral fraud in Latin America, is a remarkable example of political activists and corrupt state officials' influence on electoral results. Taylor (2000) exhibits a wide variety of techniques and fraudulent maneuvers that Fujimori's campaign employed to steal the 2000 presidential race in Peru. Ballot stuffing, propaganda during election day, use of State officials and resources to pressure citizens, and several electoral malpractices during the vote-counting moment were employed by Fujimori's supporters to secure his reelection. Schmidt (2005) goes one step further and presents evidence of how political *personeros* committed systematic fraud during the vote-counting process, invalidating political opponents' votes by taking advantage of the electoral flaws of the system. Indeed, his analysis shows that voting polls (tables) in which Fujimori's *personeros* were present drastically increased the share of invalid votes for other candidates.

Historical accounts of how *personeros* broke the rules and tried to change citizens' will are reported in several electoral observation missions ruled by the Organization of

American States (OAS) in Peru and Paraguay. For instance, during the 1998 Peruvian municipal election, two *personeros* were caught changing voting records to invalidate ballots in the city of San Juan de Lurigancho (OAS, 1999). In Paraguay, during the 2013 national election, the OAS's mission reported several issues regarding party *personeros* and vote-buying, and inaccurate voting acts (OAS, 2014).

4.3.3. Developing democracies and electronic voting.

Experience from developing democracies shows the profound democratic impact that the introduction of electronic voting can produce. Indeed, the replacement of paper-ballot votes using electronic machinery shows multiple effects in Brazil, ranging from reducing null and blank votes (Nicolau 2015) to an increase in the allocation of public resources (Fujiwara 2015, Schneider et al. 2020). In political terms, Zucco and Nicolau (2016) exhibit evidence noting that e-voting increases party label votes, mainly as a reduction of voter error that increases the system's capacity to enfranchise voters. From a public policy perspective, Fujiwara (2015) highlights the possibility that e-vote changed politicians' incentives because newly enfranchised voters positively affected the provision of health services among less-educated voters. Complementarily, Schneider and colleagues (2020) show that electronic voting caused de facto voter enfranchisement that affected the allocation of federal public spending. Furthermore, the introduction of electronic voting machines also changed the dynamics of electoral competition by increasing viable candidates' vote share and decreasing nonviable candidates' electoral support (Schneider and Senters 2018).

Besides democratic and public policy outcomes, Zucco and Nicolau (2016) argue that electronic voting might have reduced potential fraud at times of voting, counting, or tallying votes that quantitative methods have not adequately measured. Additionally, Fujiwara (2015) also acknowledges that electoral fraud reduction is part of the effects of the introduction of e-voting. A more in-depth exploration of the effect is presented by Schneider (2020), who argues that the introduction of new technologies to voting procedures undercut election fraud. However, at the same time, it increases the chances that voters illegally vote more than once, i.e., it replaces one type of fraud committed through irregularities in vote counting with another type of fraud known as ballot stuffing. Furthermore, evidence from pilot tests in Argentina and Colombia shows how electronic voting might increase voters' trust in elections, boosting democratic legitimacy and reducing fear across the population of possible fraudulent actions (Alvarez et al. 2009, Alvarez et al. 2011).

Evidence from India also connects the implementation of electronic voting to reducing electoral fraud. For example, Debnath and colleagues (2017) show how the introduction of electoral voting machines systematically decreases the rate of rejected (invalid) votes and prevents politicians and activists from stuffing ballot boxes and producing fraudulent mechanisms that effectively alter results.

In synthesis, literature shows a clear picture of the effect of electronic voting machines on residual votes and democracy, i.e., new technologies help to effectively reduce the possibilities of fraudulent elections and maneuvers and change the dynamics of party competition and valid turnout.

4.3.4. A comprehensive framework to understand e-vote and invalid voting.

Integrating current theoretical models makes it possible to establish a cohesive hypothesis involving political activists as part of the explanatory diagram. According to this paper's view, residual votes are the outcome of a function involving voter characteristics, the role of electoral authorities, and political activists' actions.

Acknowledging the role of *personeros* and the importance of effective electoral body managements, incentives become an essential element influencing actors to use fraudulent maneuvers or tactics to break people's democratic will. In this regard, this paper argues that party activists are part of the complex causal model that helps to explain the phenomenon.

Even though there might be an unintentional or intentional factor behind casting a null or blank vote, it seems plausible to hypothesize that voters are primarily unaware of *personeros'* actions because of institutional norms that provide enough space and incentives to act without substantial costs. Furthermore, political activists have enough rewards for deploying their strategies and seeking actions to produce vote invalidation.

Figure 4-3 shows a diagram that provides a holistic view of residual votes. Two moments must be differentiated. First, the actor involved and the action that might influence the outcome of a residual vote. Here, voters might cast an invalid vote because of their resources or as a form of protest; bureaucratic officials might call a vote invalid as a deliberate fraud or as an unintentional error; finally, political activist might deploy their strategies to induce officials to error or directly create an invalid vote. These actions could impact the rate of invalid voting during the preference selection moment, while residual

votes that happen in the vote count might be a direct consequence of the action of bureaucratic officials or party activists.

The distinction between them is not trivial. When a technological intervention happens in a democracy, but no other changes affect the electoral system – for example, there is no electoral system innovation that might increase the number of candidates or parties – there is a theoretical chance to observe the impact that bureaucratic agents and political activists might have over the rate of residual votes.

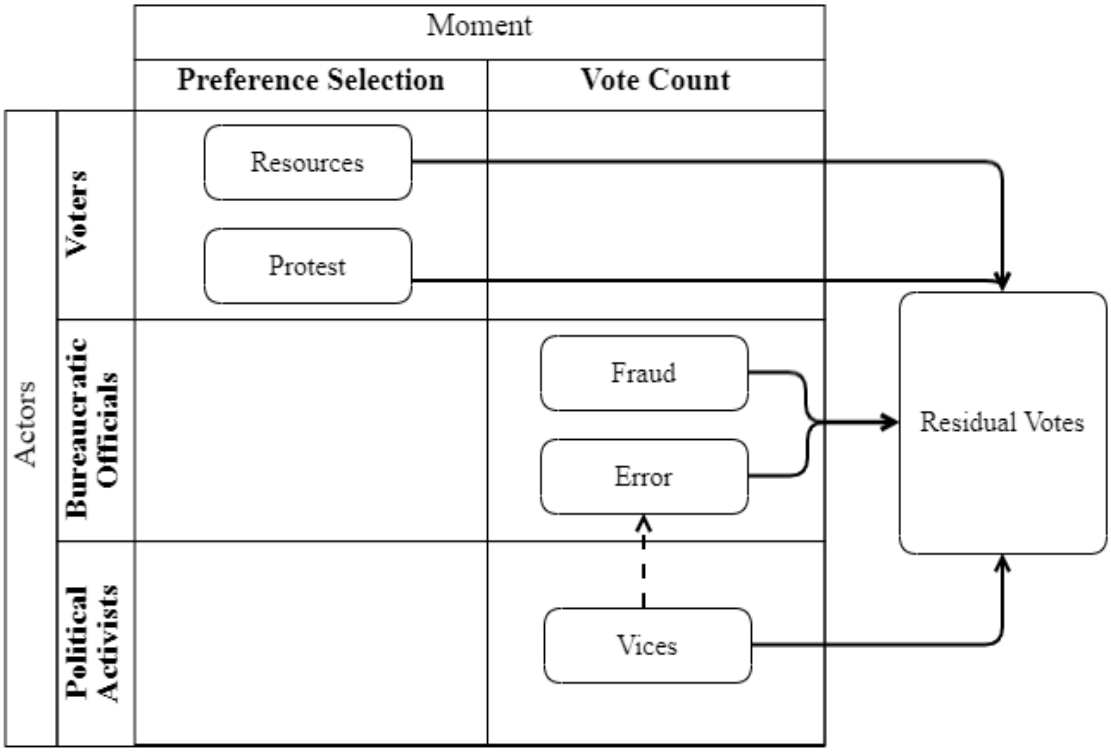


Figure 4-14: Theoretical mechanism of residual votes

4.4. Overview of Paraguay and Peru

If the goal is to observe how technological interventions can overcome institutional incentives that promote the damaging action of political activists, then several structural elements must be present throughout the selected cases. The comparable units must have a longstanding history of problematic elections, an easy enough voting system, high levels of bureaucratic discretion, and a high rate of residual votes. Suppose these conditions are present and a decrease in bureaucratic discretions occurs due to technological intervention. In that case, there are theoretical reasons to expect that these events will reduce political activists' capacity to intervene during the vote count moment of the election and, thus, this will lead to a decrease in the rate of invalid voting.

To assess previous remarks, the subsequent subsections present a general overview of Paraguay and Peru's political systems, main characteristics, and a description of the installation process of e-voting in both countries. Even though significant contrast exists in both Latin American democracies, history and political outcomes present enough similarities to use them as valid frameworks to dig deeper into the phenomenon of residual votes from a novel perspective.

4.4.1. Paraguay's political system.

Paraguay's political system presents three key features. First, an unstable political system characterized by an incomplete democracy and hegemonic political parties controlled public institutions and electoral norms. Indeed, the end of Stroessner's dictatorship gave place to a continuity environment under the rule of the Colorado Party –

the official party that supported the general – between 1988 and 2008 (Alcantara 2013). This period of authoritarian transition created reduced spaces for democracy, with a party system in which movements and small parties had small chances to defeat the incumbents.

Moreover, the constitutional convention of 1991 and congress until 2008 were dominated mainly by the same political agents. However, the number of parties that contested the election varied significantly during the first two decades of democratic installation, achieving its highest point during the 2003 race (Alcantara 2013).

A second characteristic of the Paraguayan political system is its mandatory system with a low level of enforcement. Constitutionally, voting in the country is mandatory; however, no actual law enforcement places sanctions or penalties on citizens if they do not show up. In this context, the mandatory voting system does not fully operate. From a legal perspective, the law that regulates the fines associated with non-voting never had the required procedural rule to place the duty and right of charging the fine (ABC 2015); meanwhile, from a scientific perspective, evidence of it is the systematic decrease in turnout since the end of the dictatorship in 1988 (Lopez 2014).

Thirdly, Paraguay is mainly an agricultural-based economic system with low formal education levels, high illiteracy within its population, and low development of local ethnic identities (Sondrol 2014). Even though the 1992 Paraguayan constitution enables all citizens over the 18-year-old threshold to vote at elections, the practical capacities of an ample proportion of individuals could be effectively disenfranchised due to their lower level of resources to understand and comprehend the electoral process (Alcantara 2013).

In synthesis, Paraguay presents the conditions to decrease voter incentives to cast null and blank ballots because while a strong core of parties dominates the political competition, citizens can effectively choose not to go to the polls. Furthermore, the relatively low-level sophistication of voters and the lack of emergence of a local ethnic identity during the first fifteen years of democratic transition might have induced voters to create an electoral-choice habit behavior.

4.4.2. The OAS assistantship and the pilot test of electronic voting

After more than three years, and with the assistance of the OAS and the economic support from the United States and Brazil, Paraguay implemented in April of 2003 a complete pilot test for electronic voting using the Brazilian technological infrastructure (OEA 2008). This policy intervention transformed Paraguay into the first Latin American Hispanic country to implement any technology within the electoral process. However, due to the characteristics of an unstable and hegemonic political system, the Paraguayan electoral competitions presented several procedural concerns. The initial step for the technology intervention started during the local elections of 2001 when six districts employed electronic voting. After this first approach, the Supreme Tribunal of Electoral Justice (TSJE because of its acronym in Spanish) decided to go further and use the system in 33 districts that make up almost half of the Paraguayan electoral registry. Following official records (TSJE 2003), the selection mechanism to introduce electronic voting in a particular district were based on three main elements, which included population size, educational level of residents and social characteristics of the territories. The districts that

used electronic voting in Paraguay include: Asunción, Caacupe, Atyra, Villarrica; Coronel Oviedo, Caaguazu, Caazapa, Maciel; Encarnacion, Carmen del Parana, Ciudad del Este, Aregua; Capiata, Fernando de la Mora, Guarambare, Ita; Itagua, Augusto Saldivar, Lambare, Limpio; Luque, Mariano Rqoue Alonso, Nueva Italia, Nemby; San Antonio, San Lorenzo, Villa Elisa, Villeta; Ypacarai, Ypane and Pedro Juan Caballero.

One of the most relevant characteristics of the process in Paraguay was that besides the organization of the TSJE, the major political parties of the country participated during the whole preparation and execution process of the intervention, having a voice and vote during the logistical procedure and the accountability of the counting and security procedures during the election. Keeping in mind that the Paraguayan political system during the first decade after the end of the military dictatorship emerged as a hegemonical structure dominated by the Partido Colorado, it should not be a surprise that political agents wanted to keep some degree of control over a system that threatens their constituencies. Nevertheless, the official documents from the OAS reflected that the system's full implementation was stopped because of the pressures and lobbying from the traditional parties (OEA 2008).

The official documents from the electoral bureau showed the trial's success, with an increase in turnout and a reduction in the counting time of the votes, and a positive reaction from the public (TSJE 2003).

In terms of the ballot structure, the Paraguayan paper-pencil system employed a system in which the voters were presented with the electoral options based on number and colors. Leaving aside other features such as the party logos, and only in the presidential

election, the photographs of the candidates were available. In order to cast a valid vote, citizens must mark with an eligible mark the quadrant below the name of the candidate and the party/movement for which he/she ran (see Figure 4-4, left panel). However, any mark outside the box could make a ballot invalid if the official in charge of the voting location – or the electoral delegates from the parties – believes that it does not picture a "clear electoral option" (TSJE 2003), leaving an extensive amount of discretion to officials that the representatives of the major parties may pressure. Meanwhile, the electronic ballot card followed the Brazilian mechanism, in which numeric pads allowed the citizen to choose an electoral option, revise that option and save his/her choice (see Figure 4-4, right image).

The proven effectiveness of this system in Brazil (OEA 2008) and the logistical simplicities carried out made the process an easy option for both the bureaucratic electoral agency and voters. In this case, the individual could cast a blank vote, and invalid votes resulted from citizens introducing wrong/non-existent candidate/party identification numbers. Thus, residual votes might be a combination of protest and error, but more importantly, the discretion given to officials is immediately reduced by automatic vote-counting in which administrators or electoral delegates cannot interfere.

Figure 4-15: Paraguay's ballot cards, paper versus e-voting system[40].

From an electoral perspective, the implementation of the Brazilian electronic system came at a time of increasing party competition after an initial decade of democratic transition in which the Paraguay system was dominated by the two main parties (Lopez 2004). In the 2003 election, fourteen different political parties and organizations contested the legislative race, an increase of about 75% compared with the last national race celebrated in 1998 (Gomez 2003). Moreover, as Alcantara (2013) shows, the 2003 election was the first contest that broke down the dominant two-party competition. For the first time since the end of Stroessner's dictatorship, the number of influential parties included a new participant. As a result of the dynamics of electoral competition in Paraguay and the increasing amount of possible electoral choices, citizens should be expected to face more complexities with casting their ballot. Therefore, an increase in the rate of residual votes is present during the technological intervention. More importantly, the question is whether the increase in residual votes is smaller than it would have been if e-voting had not been introduced.

[40] Right picture shows a sample paper ballot for a senatorial race in Paraguay, while the left image shows a sample of the electronic voting system used during the pilot test.

In sum, the pilot test of electronic voting in Paraguay would produce a mechanism to effectively reduce the rate of residual votes made by mistakes of inattentive citizens. The policy intervention should result from fewer complexities in casting a ballot and eliminate bureaucratic agents and activists. Moreover, given the circumstances of the Paraguayan political system during the first fifteen years after the end of Stroessner's dictatorship, the 2003 election should also show an increase in the rate of invalid votes in those non-treated units. The growing rate should be a by-product of the gradual end of a hegemonic party system and the incorporation of new political parties and movements in Paraguay.

4.4.3. Peru's political system.

In the case of Peru, at least four crucial elements characterize contemporary politics. First is the systematic inclusion of a disenfranchised group of citizens that did not have the skills or age to vote. With the reforms of the 1970s and 1980s, the Peruvian electoral registry increased substantially (more than 30%). The new registry includes illiterates and individuals between 18 and 21 years old. Additionally, the maintenance of the compulsory voting system in the new constitution of 1993 and the Peruvian system's high penalties aimed to create an equally participative political environment. Within those penalties, the Peruvian system includes the loss of policy benefits and the impossibility of celebrating public contracts and obtaining public documents such as passports and other relevant certificates (del Aguila 2009).

Second, a weak party system institutionalization, i.e., the link between voters and parties, has not been fully developing because of factors such as electoral rules that favor

nonparty politicians (Levitsky and Cameron 2003) and the rise of populist politicians that shaped the system to carry democracy without the need of parties (Levitsky 1999). Previous factors have also produced a high rate of citizens that change their electoral support from election to election. For example, in national congress races, the average rate of volatility across elections from 1990 to 2006 exceeded 50%, meaning that approximately 1 out of 2 citizens voted for different parties in successive elections (Alcantara 2013). This concerning phenomenon only increases the complexity of elections, leaving citizens without enough heuristics to navigate through a system in which dozens of parties fade away after every election cycle, and a marginal number emerges.

Third, the deinstitutionalization of politics and the emergence of influential charismatic leaders that control the tides of the political realm. After the end of the authoritarian state reconstruction of the Fujimorismo, Peru entered a phase of democratic reconstruction characterized by substantial challenges toward stability (Carrion and Palmer 2014). On the one hand, rapid economic growth and dramatic social change placed a heavy load of stress on the Peruvian state (Carrion and Palmer 2014). On the other, the legacy of Fujimori not only eroded traditional political institutions but also constructed a system in which personalistic politics are more important than the organization (Alcantara 2013). As Degregori (2008) might have pointed out in the case of President Toledo, only a good economy and the existence of influential political figures could preserve democracy in a context of high political ineffectiveness.

Lastly, Peru has undergone a recent upheaval of social and economic change. During the last decades, the country's per capita income has risen from 2,150 USD in 1998

to almost 6,600 USD in 2018. The population's literacy level has also increased dramatically during the last two decades, reaching almost 95% of the population in 2017. However, inequality (43.3 Gini index in 2017) also strives across the country (World Bank 2019).

In short, Peru is an exemplar case to explore the effect of e-voting as a result of the combination of relative-effective enforcement of compulsory voting laws, a democracy that exists without stable parties but with a high number of low-level institutionalization factions and movements, the relevance of solid leadership, and the societal characteristic.

4.4.4. Implementation of electronic voting

Beginning in 1996, the ONPE started developing several proposals for the Peruvian State to implement a system of electronic voting in the country. Nine years later, the Congress of Peru voted for an institutional reform that allowed the bureaucratic agency – progressively and gradually – the replacement of the paper-pencil ballot system with an electronic voting mechanism. The policy's goal was to guarantee safety and transparent electoral processes, the complete confidentiality of voting choices, and the construction of a system that reduced the complexities of the voting process for disadvantaged and vulnerable populations (Velarde 2016).

In 2005, the office for electoral processes started, as the law and government allowed them, a gradual path of trial and error to start e-voting in the country. The first stage included an initial test of the technological system at a local contest in 2011 in Pucaran. Three years later, the system was expanded to seven different districts for the

municipal and regional elections of 2014, all of them small-density zones where the ONPE could observe the difficulties and benefits of the new system. After this initial phase, the electoral agency started broader testing in the Province of Lima and other relevant districts within the country, including 19 districts in the 2016 national general election and 23 during the 2018 municipal and regional race. Even though the chosen districts did not follow a randomization strategy, the ONPE chose them based on technical capability criteria and proportional representation that allowed the closest-to-ideal balance between those regions with and without the new system (ONPE 2018a). Overall, the province of Lima is the most demographically equilibrated zone in which the bureaucratic agency has implemented electronic voting, with 21 out of 43 districts using the system, representing 20% of the total electoral registry, and a wide variety of districts with different economic, educational, and ethnic backgrounds[41]. Following the official documents from ONPE (2018a) the selection mechanism for choosing a district for the implementation of electronic voting followed four main elements, including population size, climate conditions, characteristics of the district (public safety indicators is used as a proxy of this factor), and social characteristics (educational level and poverty rates) of residents. At a national level, the districts that used electronic voting for the 2018 election include 39 zones: Alexander Von Humboldt, Barranco, Castillo Grande, Chaca; Chaclacayo, Cieneguilla, El Porvenir, La Molina, La Punta, La Yarada los Palos; Lince, Los Chankas, Lurín, Magdalena del Mar, Mi Perú, Miraflores; Neshuya, Pacaran, Pachacamac, Pichos,

[41] For instance, the e-voting system includes both largely urban and wealthier districts like Miraflores, and other districts in with the population largely lives under the line of poverty such as Chaclacayo.

Pucacolpa, Pucayacu; Pucusana, Pueblo Libre, Punta Hermosa, Punta Negra, Roble, Rocchac; San Bartolo, San Borja, San Isidro, San Luis, Santa Anita, Santa María del Mar; Santiago de Surco, Santiago de Tucuma, Santo Domingo de Anda, Surquillo, and Villa Kintiarina. Complementarily, districts that started using electronic voting since 2014 includes 23 zones: Barranco, Chaclacayo, Cieneguilla, La Molina, La Punta, Lince; Lurín, Magdalena del Mar, Miraflores, Pacaran, Puchamac, Pucusana; Pueblo Libre, Punta Hermosa, Punta Negra, San Bartolo, San Borja, San Isidro; San Luis, Santa Anita, Santa María del Mar, Santiago de Surco, and Surquillo.

A key feature to consider during the modernization process of the Peruvian democratic system is the design of the ballot structure for elections. After more than a decade of research and innovation, the ONPE implemented a ballot that decreases the differences between the electronic and paper suffrage card by using a similar design (see Figure 4-5, left image for the paper ballot and right picture for e-voting card) that followed the basic features of those who had been used in the past. The ballots included the candidates' names and party/movement official symbols. The most relevant differences in the actual ballot designs were the use of a photograph of each candidate in the paper-pencil design (a feature not always available for e-voting) and the different sizes of the ballot card between the paper and screen versions (maximum of 26 cm. long for the regional governor's race on the paper card, and a screen of at least 11 inches in the e-voting machines). Additionally, the system included an automatic audio assistance procedure for those who employed the e-voting booths and the availability to directly choose different languages to cast a vote (ONPE 2018b). However, maybe the essential aspect that could

trigger a difference in terms of the rate of residual votes is the administrative procedures by which a vote is determined to be invalid in the paper-based and e-vote systems.

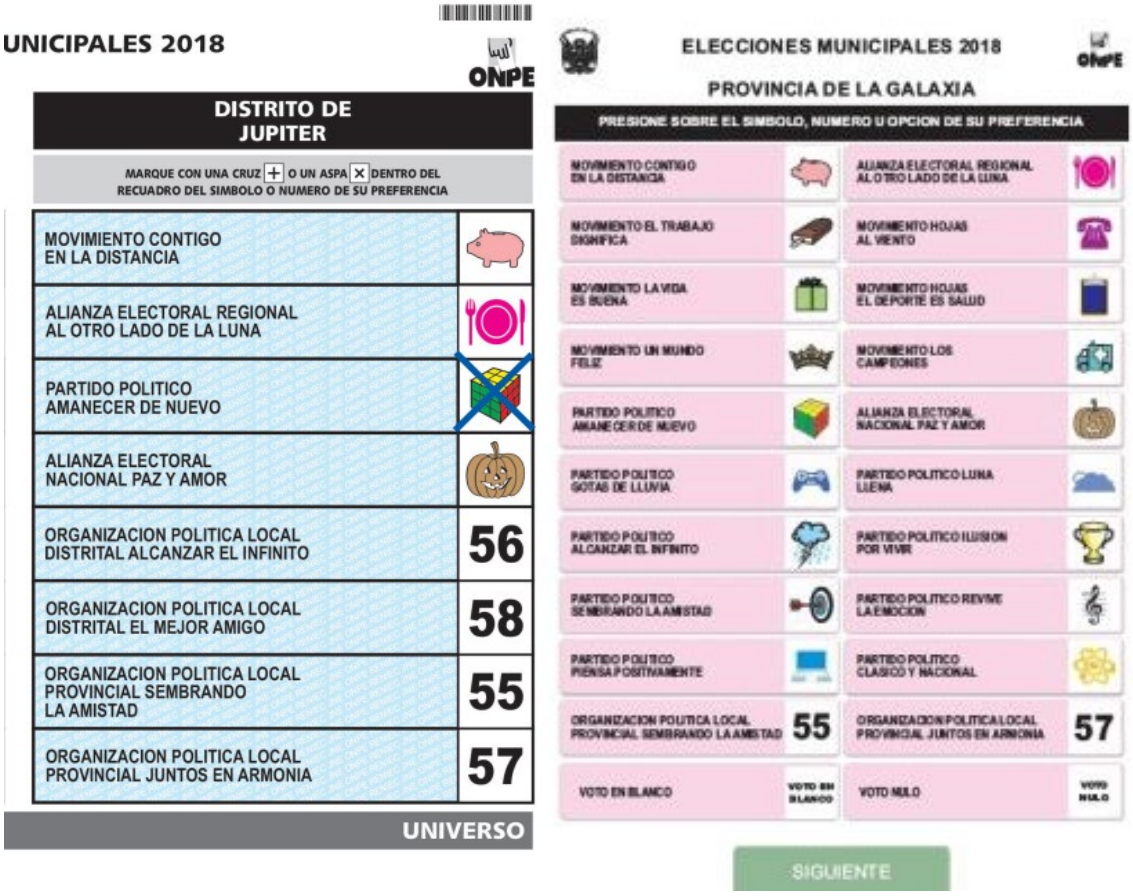


Figure 4-16: Peru's ballot cards, paper versus e-vote system[42].

Meanwhile, votes must be marked and registered invalid if the voter does not follow the exact procedures in the paper-pencil system. The e-voting system allows citizens to choose one potential option, including null and blank votes. The traditional system's rules enforced by the ONPE only allowed citizens to mark their votes in two ways: only above the candidate's picture or the symbol of the political organization. If voters mark the

[42] Right picture shows a sample paper ballot for a local race in Peru, while the left image shows a sample of the electronic voting system used during the 2018 local contest.

candidate's name or use any other symbol that was not a cross or an "X" – for instance, a dot, a circle, a ticket, or a painted region – then the vote must be counted as invalid (ONPE 2018b). Moreover, the introduction of the electronic voting system leaves outside of the counting process political entrepreneurs that seek to "protect" the votes of their candidates and try to take away votes from their opponents that might look dubious. Thus, the technology intervention reduces the complexities of the voting system by introducing a more straightforward mechanism (based on more oversized ballot cards and more accessibility features) and prevents errors and mistakes by inattentive voters or less-educated individuals that cannot understand the administrative rules of the democratic process.

From a political perspective, the electronic system's introduction was developed under an increasing number of political competitors. When Peruvians celebrated their local elections on Sunday, October 8th of, 2018, and following the logic of a political system without stable parties and with a high degree of electoral instability, more than 12,000 candidates ran for a seat at some of the open positions in the district governments and more than 2,000 fought for a position as governors across the country. However, only in the province of Lima, 637 candidates competed for the mayor position at the district level (average of approximately 15 candidates per district), and 20 sought the provincial office. Compared with 2014, the total amount of district candidates increased by 24% (513 candidates in 2014), and in the provincial race, the boost was even more prominent (54% increase, with 13 candidates competing in 2014). Considering that higher electoral complexities are associated with the increasing rate of null and blank votes (Ansolabehere

and Stewart III 2005), the implementation of e-voting in the province of Lima is expected to be under a trend of the growing rate of residual votes. This phenomenon should also occur during the 2016 national election, where the number of political agents seeking office in the executive and legislative branches increased substantially compared to the previous contest.

In synthesis, the implementation of e-voting in Peru introduced an effective mechanism to reduce mistakes made by voters and leaves an open window to those citizens who would prefer to cast an invalid vote as a way of protesting. However, voters have more electoral options than ever before in an increasing number of political candidates and parties/movements, and inattentive citizens might easily commit mistakes. Moreover, e-voting also eradicates election judges who call invalid votes and leaves party agents outside of the voting process that might seek to eliminate dubious votes in favor of opponents. Therefore, the policy intervention should reduce the rate of residual votes on the treated units, even if the same indicator rises in the control districts as the product of the increasing number of parties/candidates that participate in the Peruvian political system.

4.5. Methods

This research employs a mix-methodological approach to understand the impact of technological innovations on residual votes in Paraguay and Peru. The first strategy exploits the timing of implementation of electronic voting machines through a statistical analysis known as group-time difference-in-difference estimation. Details about this strategy are presented in Section 4.5.1. and 4.5.2. The second strategy uses anonymous in-

depth qualitative interviews[43] collected from bureaucratic officials and party activists for countries of analysis. For the qualitative analysis, 16 interviews were conducted. In all of them, the respondents were asked about their experience during elections, their perception of the implementation of e-voting, and the possible impact of *personeros* on residual votes.

The combination of both methods allows this research to estimate the impact of the policy intervention and explore the possible impact that the innovation had on residual votes, overcoming the usual challenges that quantitative research presents and improving our understanding of the phenomenon through the development of a novel theoretical framework (Kouba and Lysek 2018).

4.5.1. Data

An original dataset is employed to explore the Peruvian and Paraguayan cases with data collected from each country's national electoral offices (ONPE for Peru and TSJE for Paraguay). The independent variable for all analyses is the share of invalid votes at the district level; this rate is the sum of all null and blank votes over the total cast in each electoral contest.

The Peru dataset includes five elections (2002, 2006, 2010, 2014, and 2018), in which data were collected for every district. Data includes the total, valid, and residual votes in raw and percentual versions every year. Demographic, social, and climate data are also appended to electoral observations. This collection includes information about population size (in thousands), unemployment rate, poverty rate, literacy, percentage of

[43] Protocol number 6548X.

women and elderly groups, the average age of voters, number of political actors competing in each election, climate conditions for each district which is relevant for the selection of districts implementing e-voting, public safety indicators, and turnout level at the district level. All data corresponds to each election's most proximate census or publicly available measurements. Overall, the complete dataset includes 1629 observations from every Peruvian district. However, only 46 districts per year are part of the final analysis. The reduction is because the selection mechanism for treated units limits the number of valid treated districts, decreasing the number of needed matched units. For more details about the matching, refer to Section 5.2.1.

For the case of Paraguay, the dataset includes a lower number of elections but a higher quantity of treated observations. Addressing information retrieved from the statistical books of the TSJE a total of two general (lower chamber contest) elections are available (1998 and 2003), and one municipal (local juntas contest) election (2001) is included. Besides the rate of residual votes, the dataset incorporates demographic, social, and political measurements, including population size (in thousands), unemployment rate, literacy, the share of women and elderly within each district's population, and the total number of candidates competing for a seat. Demographic and social variables were retrieved from the closest official information source to each election, including publicly available social information from the national bureau of statistics and the 2002 national census; unfortunately, climate data for Paraguay was not available. Overall, the entire dataset includes observations for 214 districts. However, as in the case of Peru, only 62 of those observations were used for statistical analyses.

Descriptive statistics for the whole dataset (see Table 4-1) show the vast imbalance in core attributes between treated and non-treated units. Variables incorporated in Table 4-1 are different for both countries because they depend on the factors declared by the TSJE (2003) and ONPE (2018a) that were used to select the districts in which e-voting would be implemented (see details in Sections 4.4.2 and 4.4.4). In Paraguay's case, literacy, population size, and the share of older adults living in the treated and non-treated units present statistically significant differences. As official reports acknowledge that those factors were the most determinant variables for treating a unit, the vast mean differences would invalidate any effort to estimate an average treatment effect.

For Peru, this also is present for literacy, population size, public safety index, and poverty rate being solely climate conditions a common ground for those districts in which electronic vote was implemented and those were not. Treated districts have a higher population size, a higher share of educated individuals, better public safety statistics, and a much lower poverty rate.

Again, the same problem as in the Paraguayan case is present, creating the necessity to find a methodological strategy to overcome the imbalance of core attributes and the progressive incorporation of e-voting in each country. Paraguay's treated units have a higher likelihood of having a higher population size, a higher share of youth, and a more educated population.

	Paraguay			Peru		
	Control	Treated	p-value	Control	Treated	p-value
n	183	31		1606	23	
Literacy	0.93 (0.03)	0.95 (0.02)	0.001***	0.83 (0.06)	0.92 (0.06)	0.001***
Population (log)	3.98 (0.35)	4.69 (0.44)	0.001***	3.52 (0.58)	4.47 (0.68)	0.001***
Public Safety	-	-	-	145.2 (792)	1416.2 (1922)	0.001***
Poverty	-	-	-	45.25 (21.2)	15.59 (16.13)	0.001***
Elderly	0.15 (0.04)	0.13 (0.03)	0.001***	-	-	-
Climate	-	-		13.0 (3.71)	12.0 (0.0)	0.198

*Standard deviations in parenthesis / P-value * >= 0.05, **>= 0.01, *** >= 0.001*

Table 4-12: Comparison of unmatched samples, Paraguay and Peru

4.5.2. Analysis

a. Propensity score matching

By understanding the policy intervention as a quasi-experimental phenomenon, units exposed to electronic voting for the first time should – theoretically – present different outcomes than those not treated. In an ideal setting, treated units would have been randomly selected from a pool of options, allowing one to estimate an average treatment effect without worrying about possible covariates that might influence the validity and robustness of results.

However, electronic voting in Paraguay and Peru did not follow a random selection process. Furthermore, the decision-making process – by both the TSJE and ONPE – was influenced by each bureaucratic office's capacities and technical availability (as was discussed in Sections 4.1.2 and 4.2.2). As a result, districts that were treated constitute a small number of the total available districts, and they have specific characteristics that, as

was shown in Table 4-1, present significant limitations to conducting a robust estimation of the average treatment effect without worrying about selection bias or possible variables that could influence the outcome.

An increasingly common practice in social sciences is matching to overcome this challenge. In matching, the goal is to construct a control group that resembles the critical characteristics of the treated units. In the case of Paraguay and Peru, the primary variables for constructing the propensity score matching are those that the official electoral body management institutions employed as the selection mechanism for treated units. In the first case, the rate of literacy, the population size, and the percentage of older adults living in each district are the determinants of the matching procedure. For Peru, factors include literacy rate, population size, an official public safety index, poverty rate, and climate conditions for each district.

Table 4-2 presents the results for matching (for details about the matching procedure and robustness checks, see Appendix 4A). Overall, results show that matching overcome significant differences for Paraguay in terms of literacy rate and elderly population. Nevertheless, the difference in population size remains significant but is only around two-thirds of one standard deviation of the logarithmic version of population size (in thousands of individuals). The case of Peru presents a close-to-ideal outcome for matching because none of the crucial variables for the selection process present a statistically significant difference.

	Paraguay			Peru		
	Match	Treated	p-value	Match	Treated	p-value
n	31	31		23	23	
Literacy	0.95 (0.01)	0.95 (0.02)	0.076	0.91 (0.06)	0.92 (0.06)	0.768
Population (log)	4.39 (0.23)	4.69 (0.44)	0.001 ***	4.49 (0.73)	4.47 (0.68)	0.907
Public Safety	-	-	-	1508 (2122)	1416 (1922)	0.878
Poverty	-	-	-	14.3 (15.19)	15.59 (16.13)	0.782
Elderly	0.14 (0.04)	0.13 (0.03)	0.135	-	-	-
Climate	-	-		12.48 (2.57)	12.0 (0.0)	0.378

*Standard deviations in parenthesis / P-value > 0.05 *, 0.01 **, 0.001 ****

Table 4-13: Comparison of matched samples, Paraguay and Peru

b. The group-time difference in difference regression

The goal of a difference in difference estimation design is to evaluate the causal effects of interventions. In traditional versions of this analysis strategy, there are only two groups and two periods; in the first of them, none of the units is treated, while in the second moment, only a group of them is exposed to the innovation (Goodman-Bacon 2021). However, both the case of Paraguay and Peru do not present this ideal setting, leaving a wide range of complications to estimate a robust average treatment effect of the policy intervention. Indeed, the implementation of e-voting in both countries occurred during multiple periods, meaning that variation in the time of treatment is present.

A recent solution to this sort of challenge was presented by Callaway and Sant'Anna (2021), in which the canonical difference-in-difference (DiD) estimation is fixed to account for a progressive intervention within different units. Known as a Group-Time DiD, the model aims to estimate an average treatment effect of an intervention over different units in different moments over time.

Following Callaway and Sant'Anna's (2021) specifications, a group-time DiD regression relies on key assumptions to estimate a robust and valid average treatment

effect. First, there must be limited treatment anticipation. In the case of this research, this means that individuals who reside in treated districts selected by the bureaucratic offices should have little a priori information about the intervention. Acknowledging that this is not the case, results must be taken with caution based on possible alternative explanations. Secondly, once a unit has been treated for the first time, it should remain to implement the policy intervention in subsequent moments of the observational period. In this regard, both the cases of Peru and Paraguay present ideal settings. All the districts that used electronic voting initially kept these characteristics for future elections.

The flexibility of the proposed model allows observing the effect of e-voting under two different specifications that combined provides four ways of looking at results, first, by looking at the calendar time or event moment of the intervention, and secondly, by exhibiting results with and without covariates that might influence the parallel trend assumption. The first distinction shows how average treatment effects might vary across groups intervened by the new technological innovation (calendar-time model) or by the length of exposure to the intervention. The second allows observing the average impact of the treatment event with and without possible covariates that might be influencing results. In all these models, it is possible to estimate a cumulative effect to present an aggregate view of the implementation of e-voting in Paraguay and Peru.

4.6. Statistical results

4.6.1. Parallel trends analysis

A first look at the results is presented in Figures 4-6 and 4-7, respectively, for Paraguay and Peru. In every one of them, the baseline delivers information for the first observation (1998 for Paraguay and 2002 for Peru), while red lines provide estimates and 95% confidence bands for pre-treated unit periods; according to the null hypothesis of the parallel trend assumption, these should be equal to zero[44]. As can be explored, the condition is reached in every one of the panels in both Figures. Additionally, blue points and confidence level bands provide the treatment effect of implementing e-voting in Paraguayan and Peruvian districts.

To reach a clear view of preliminary results, every Figure shows unconditional and conditional results for both a calendar time effect and an event effect. The exercise concerning unconditional and conditional models tests if the parallel trend assumption holds in the absence or presence of covariates. Simultaneously, it shows a first picture of how exogenous factors might influence the effect of technological innovation. Finally, the bottom panels of each figure show an event model for cases, acknowledging the influence that time might have over the implementation of electronic voting.

Figure 4-6 shows the results of Paraguay's technological innovation. At first sight, unconditional models (top and bottom left panels) exhibit statistically significant results.

[44] A Wald-test conducted to check the null hypothesis concerning the parallel trend assumption showed non-significant statistical results for every one of the cases. In other words, the core assumption behind Difference-in-Difference models stands, meaning that no significant differences between treated and the matched control units was present.

For both the 2001 and 2003 treated groups, e-voting is associated with a decrease in the share of invalid voting. The impact ranges between 1 and 3 percentage points. Specifically, the group of districts treated first shows a significant result starting from the first time of the intervention, like the 2003 group. However, these results must be taken with particular caution; compared with the outcome from conditional models, those districts treated during 2001 do not present a significant result during the first year of the intervention.

The average event models – both unconditional and conditional – show a clearer picture of the impact of the implementation of e-voting. In both bottom panels from Figure 4-6, results show a statistically significant effect of the technological intervention during the first and second moments of the intervention. Even though unconditional models show a greater impact, it is safe to argue that the implementation of e-voting decreased the share of invalid votes present in each contest.

In synthesis, preliminary results show that in 9 out of 10 possible outcomes, there is a significant effect of the implementation of e-voting over the rate of residual votes. An upcoming concern, which is analyzed in the second part of this section, is the intervention's substantial impact on the outcome of interest.

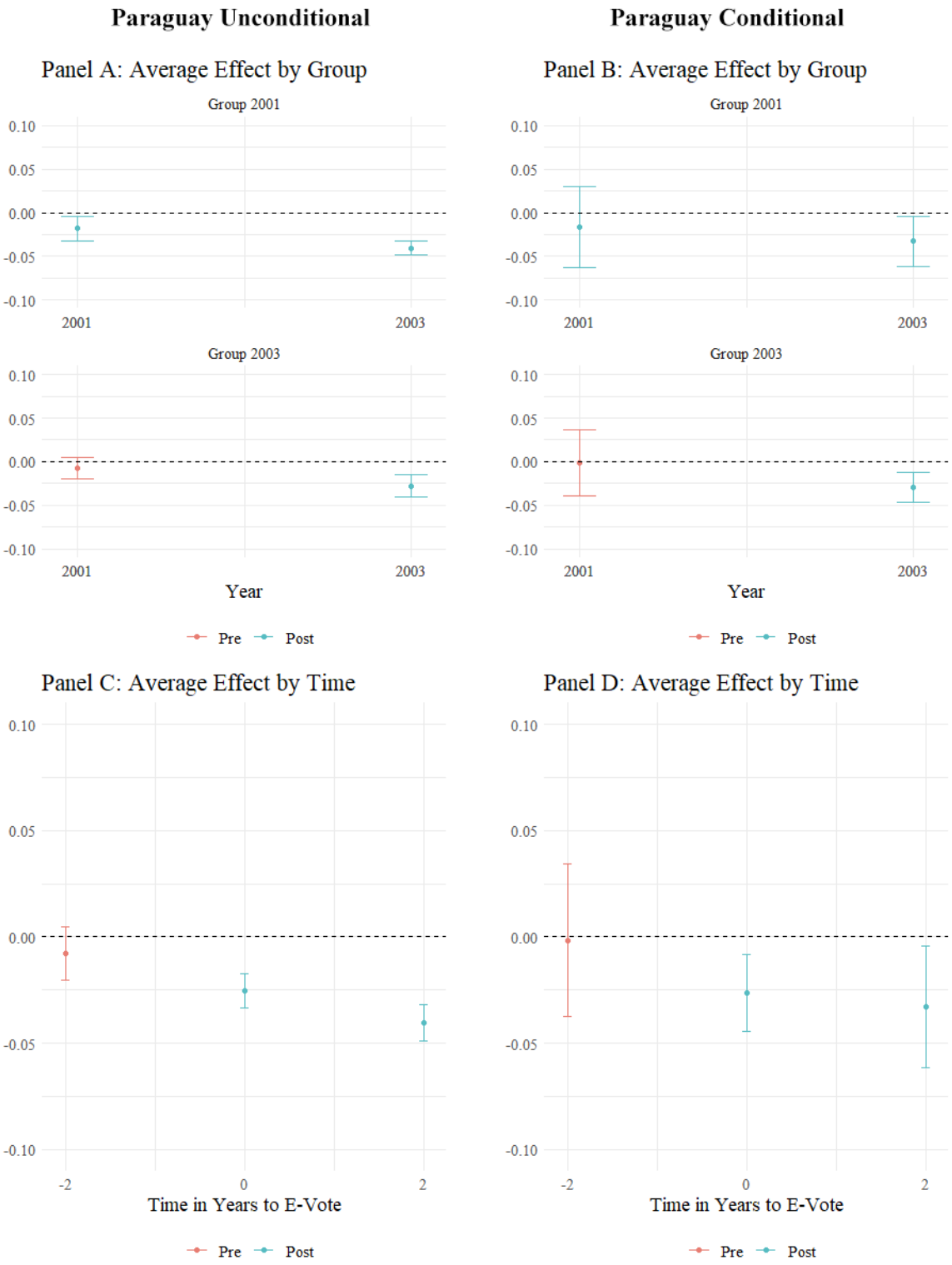


Figure 4-17: Paraguay E-vote Average Effect by Group and Time, unconditional and conditional covariates models.

The Peruvian case shows a somewhat different picture. Preliminary results shown in Figure 4-7 exhibit a more complex scenario to reach a conclusive idea of the possible impact of electronic voting over residual votes. Indeed, both the unconditional and conditional models from the top left and right panels in Figure 4-7 show only limited evidence supporting the central hypothesis. For a calendar time effect, only 2 out of 6 outcomes exhibit a statistically significant result, with an impact that ranges a decrease between 4 and 5 percentage points in invalid voting. Furthermore, the units treated during 2014 do not show a significant impact of the intervention for their first moment, while it only exhibits some evidence in the unconditional models. This is a similar case when looking at the districts that were treated for the first time during 2018, in which only after controlling for covariates statistical results are present.

Moreover, an analysis of the event strategy models shows that units treated for the first time have a significant decrease in the rate of residual votes in both unconditional and conditional specifications. However, these results hold significance solely for the unconditional models for the second moment of the intervention. In other words, it seems that electronic voting did impact the share of invalid votes cast in a contest but that the effect might disappear over time depending on the presence of covariates. In synthesis, results show that in 5 out of 10 cases, evidence points out that the implementation of electronic voting in Peru is associated with a decrease in residual votes. However, a closer view must be explored to understand these results' dynamics.

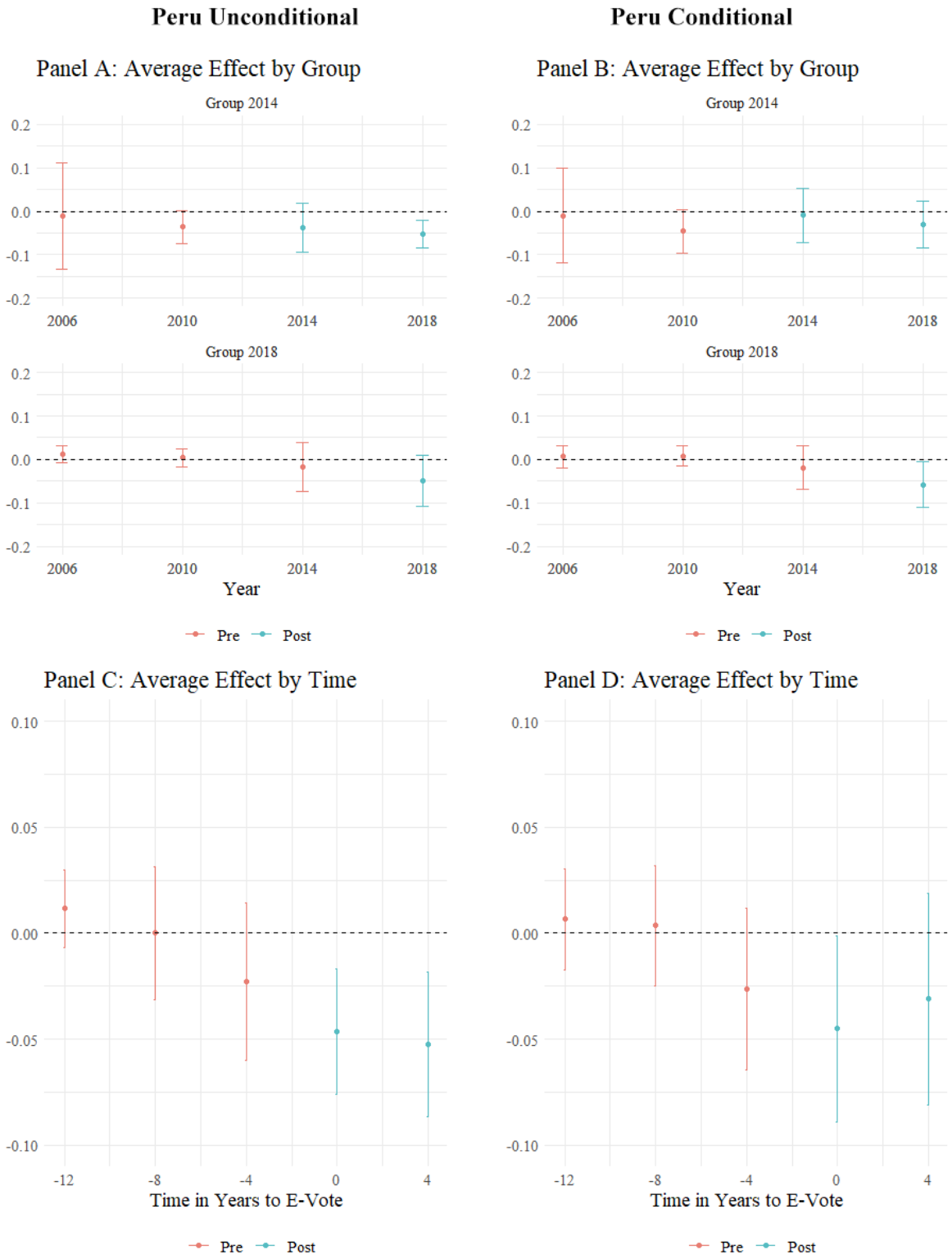


Figure 4-18: Peru E-vote Average Effect by Group and Time, unconditional and conditional covariates models.

4.6.2. Aggregated treatment effects estimates

To explore in-depth the extent to which the implementation of technological innovation might influence the rate of residual votes and simultaneously compare and contrast the outcomes of different models, Tables 4-3 and 4-4 present results for both the canonical and group-time DiD models. This exercise allows for a closer look at the difference between each empirical strategy and allows for a deeper understanding of the possible impact of e-voting on electoral results.

Results are presented in a partially aggregated version and in a single parameter estimation, which aims to estimate the overall average treatment effect of the policy intervention over the rate of residual votes. In addition, for each group-time DiD model, a version of results using an event and a calendar time effect are included in the summary tables (for a more detailed version of results, see Appendix 4B).

Table 4-3 shows the results for the case of Paraguay. The unconditional models show a significant effect in every case, with a ranging impact between 2 and 4 percentage points. The effect of electronic voting increases after the initial implementation, i.e., once a district is treated, the magnitude of the effect increases for the second time e-vote is used in a particular territory. Single models show a mean decrease of 3 percentage points in the rate of residual votes as a result of e-voting.

The scenario in the conditional models holds almost identical. With insignificant differences when comparing coefficients, estimates returning from models incorporating covariates show that e-voting decreased the rate of residual votes in Paraguay. Moreover, the longer the exposure of the treatment for a district, the higher the impact was.

Overall, summary parameters aggregated by event and calendar time show sufficient evidence to argue that the implementation of e-voting reduced the rate of residual points by an average of 3 percentage points.

	DiD model without covariates			***DiD model with covariates***		
	Partially aggregated		Single par.	Partially aggregated		Single par.
Canonical DiD						
Simple effect	-	-	-0.024***	-	-	-0.024***
	-	-	(0.01)	-	-	(0.01)
Group-time DiD						
Event effect	e=0	e=1		e=0	e=1	
	-0.025***	-0.040***	-0.033***	-0.026**	-0.04**	-0.03***
	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
Calendar time effect	t=2001	t=2003		t=2001	t=2003	
	-0.029***	-0.028***	-0.028***	-0.025*	-0.03***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
DoF		182			178	

*Standard errors in parenthesis / P-value * = 0.05, ** = 0.01 / *** = 0.001*

Table 4-14: Estimation of Group-Time Difference-in-Difference, Paraguay

As in preliminary results, the case of Peru needs further attention. Nevertheless, looking at the unconditional models, a fast conclusion points towards a significant and substantial reduction of residual votes due to the policy intervention. Each result shows a reduction between 4 and 5 percentage points in the share of invalid votes; this is also the case for the aggregated event and calendar type estimations, which are statistically indistinguishable from the canonical DiD estimation.

However, some concerns appear when examining evidence from models that conditions on covariates. First, a reduction in the rate of residual votes only occurs during the first moment of the technological intervention; this is reinforced by results from the

calendar time estimation, in which only those units treated during 2018 show a statistically significant result.

By contrast, summary parameters show statistically significant results in every model, and evidence points out that an overall negative impact on the rate of residual votes is substantive and statistically significant. In synthesis, results show that treated districts present, on average, a decrease in the rate of invalid voting that ranges between 4 and 5 percentage points.

	DiD model without covariates			***DiD model with covariates***		
	Partially aggregated		Single par.	Partially aggregated		Single par.
Canonical DiD						
Simple effect	-	-	-0.046***	-	-	-0.050***
	-	-	(0.01)	-	-	(0.01)
Group-time DiD						
Event effect	e=0	e=1		e=0	e=1	
	-0.046***	-0.052***	-0.049***	-0.045*	-0.031	-0.038*
	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)
Calendar time effect	t=2014	t=2018		t=2014	t=2018	
	-0.045**	-0.049*	-0.048*	-0.02	-0.058*	-0.048**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
DoF	226			222		

*Standard errors in parenthesis / P-value * = 0.05, ** = 0.01 / *** = 0.001*

Table 4-15: Estimation of Group-Time Difference-in-Difference, Peru

Overall, results suggest a negative effect of e-voting on residual votes in both countries, i.e., the implementation of electronic voting in Paraguay and Peru decreased the share of invalid votes casted during elections. However, results also show some crucial limitations. First, it seems that the implementation of electronic voting machines in Peru decrease the rate of residual votes only during the first election that employed the system.

Second, Paraguay presents persistent significant effects, but invalid vote rates are substantially lower than in Peru, reducing the possible impact of the policy intervention. Moreover, an alternative version of the model introducing anticipation to the treatment is presented in Appendix 4B; results from the exercise exhibit no statistical differences with those reported in Tables 4-3 and 4-4.

4.7. The view of electoral officials and party activists.

Up to this point this research shows that the introduction of electronic voting machines effectively reduces the rate of residual votes in Paraguay and Peru. However, the mechanism under which this relationship operates still does not present a clear picture. As theoretically argued, political activists and electoral officials might influence the share of invalid votes through intentional action during the vote counting moment. To assess this possibility, this section looks at qualitative evidence obtained from in-depth interviews. First, the role of electoral officials and the way they see the act of *personeros* is presented. Second, the perceptions and experience of party activists is brought in to have a clear understanding of the possible effect they might have on residual votes.

4.7.1. Pressure and conflict: The role of electoral officials

This section presents results from the interviews conducted on six electoral officials from both countries. Beyond formal structures and laws, electoral agencies rely on the performance of their authorities, which in turn are an outcome of the level of discretion. It is essential to consider the extent of these factors. A plurality of electoral officials acknowledges that the interpretation of electoral laws gives them and their peers a vast

space for calling votes valid or invalid. The interviewees noted that small elements, such as a dirt "spot" on the paper ballot or an incorrect mark, is enough for political activists to claim an annulment petition, which authorities must consider and resolve automatically. According to the interviewees, when such a claim happens and *personeros* of different parties are present in the counting moment, the environment becomes "complicated," and electoral authorities must cope with "vivid protests and cross allegations."

In Paraguay, electoral authorities acknowledge that their role is critical, and they act with "strict" respect with laws, but that pressures of the moment sometimes produce tension and fights that might induce authorities to error. As they acknowledge, errors usually mean that a vote could be cast as invalid even when there is some evidence of electoral preference. In Peru, the same seems to happen where contested elections create an adverse atmosphere that authorities must navigate with "prudence" and "courage." In this sense, a simple thing such as counting votes could trigger a "battlefield" where parties fight for every ballot. Even though all the interviewees recognize that electoral vices constitute minor and non-generalizable events, they also agree that high-tension events happen with higher frequency in smaller cities, when the press is not present, and when more tumults of people are around the ballot box.

Regarding technological interventions, one of the electoral authorities remembers that party activists had a high involvement during every aspect of the electoral process before installing the electronic voting. From the installation of the voting stations to the vote-counting process, *personeros* act as "loyal bodyguards" of the electoral interest of a powerful or incumbent candidate. In contrast, the implementation of e-voting reduced

activists' chances to intervene in the process, especially during the counting of votes, which simultaneously reduced the stress that authorities had when "vote battles" happened.

In summary, all interviewees acknowledge party activists' importance in elections. Not only as part of party machinery that could produce adverse democratic outcomes but as crucial actors to expand trust over electoral results. Even though they argue that their participation as "active participants" of the vote-counting process does not transform automatically into fraud or vices, their exclusion from the vote count moment creates a higher quality of electoral outcomes that should increase results legitimacy.

4.7.2. Blaming the opponent: Party activists and invalidation of votes

In theoretical models exploring residual voting, both voters and political agents are crucial actors. However, political activists' role during elections is almost wholly left behind. As bureaucratic agents acknowledge the relevance of *personeros* in elections and believe that they might influence the rate of votes cast as invalid, the exploration of the phenomenon requires a more in-depth understanding of their role during elections.

This research conducted ten conversations with citizens who acted as *personeros* during elections following the interview strategy. In general, activists see their role as an essential element in democratic accountability because they act as "defenders of people's will." They realize that their part during elections is primarily passive, being observers of the process and acting as a body of oversight and control. However, they also recognize that vices and problems arise constantly.

For example, one of the interviewees admits that he has witnessed how strong incumbents and "malicious" politicians use "*personeros*" as an "army of citizens" with the sole intention of gaining some advantage in the electoral arena. On one occasion, activists representing the candidacy of a traditional party were involved in, what he calls, a massive attempt to break democracy with a strategy known as "vote marking." In this tactic, political activists join in groups around a voting station and, taking advantage of the turmoil surrounding the counting moment, create a struggle that allows them to mark a vote by using a small piece of graphite installed on their nails. The more votes they can mark, the higher the chances of claiming an invalidation petition.

In another interview, an activist claim that one of the "*personeros*" preferred tactics is the "spill vote mechanism." In this strategy, activists use a special ink pen to create a smudge near the ballot area that presents the candidates. Then, if the electoral authorities are stressed enough, sufficient "evidence" exists to place a claim and leave a vote outside the final count.

From interviews, political activists seem to have a clear understanding of the influence they might have to fight in favor of their candidates, protect their votes from the action of their adversaries, and the mechanisms that run beneath the vote-counting moment of elections. In this regard, the interviewees acknowledge that introducing a technological innovation changes their capacity and ability to interact with officials, raising concerns about "powerful forces that want to keep power at any cost." Nevertheless, on the other hand, some of them also believe that new mechanisms – such as electronic voting – might

help to overcome vices and prevent errors in the short run, but that after a few rounds of elections, new problems and challenges will appear because "that is the way politics work."

Besides anecdotal evidence, what seems clear from interviews is that political activists might influence the rate of residual votes in an election. Even though interviewees believe that not all null votes are a result of the action of activists, they do admit that the combination between paper-pencil ballots and EMBs that provides a high level of discretion in favor of authorities are part of the phenomenon as vices as events that cause authorities to make mistakes. As *personeros* act amid electoral turmoil and tension, citizens have less information about the problems and possible vices during the vote-counting process.

Even while activists claim that bureaucrats usually act as objective officials during electoral processes, they also argue that parties have enough power to influence their decisions and change elections. Moreover, the strength of incumbent politicians and traditional parties forces them to be active observers due to their ability to place loyal supporters as members of the EMBs, which negatively affects the development of elections. In other words, when electoral officials have a strong connection with parties, there is a greater likelihood of problems and electoral vices during elections.

In synthesis, interviewees see their role as *personeros* as critical for democratic accountability, closing the bridge between electoral authorities and everyday citizens. However, they recognize that activists could have an impact over valid votes when laws and norms ruling elections give enough power to bureaucrats and parties to interfere.

4.8. Discussion

The most important contribution of this paper acknowledges the possible relevance of technology to overcome challenges that bureaucratic officials and party activists place over the possibility of casting valid political participation in democratic elections. By looking in parallel at the cases of Peru and Paraguay, countries with unique political system characteristics and different dimensions of enforcement of mandatory voting, this study found strong evidence to support the implementation of electronic voting.

Indeed, the result from group-time DiD analyses shows that in those districts in which the electronic voting system was used, a decrease in the share of residual/invalid votes was present. For Peru, the magnitude of the effect range between 103,002 and 190,225 citizens for the treated group at the municipal race. For instance, in the Peruvian case, 62% of the races were decided by less than 6% of the valid votes. Thus some of these results might have been different if electronic voting was present at different locations across the country. Meanwhile, in Paraguay, the magnitude of the effect was smaller, ranging between 22,567 and 34,691 citizens for the treated units.

From a methodological perspective, both cases present several advantages and drawbacks – as discussed in sections 4.5 and 4.6. However, the parallel analysis of both allows accounting for most of the validity challenges that arise. Furthermore, the expectations following the PTA assumption might raise concerns based on the growing rate of residual votes in the non-treated units. Nevertheless, the increasing number of parties and candidates and the unique political conditions under which the 2014-18

Peruvian elections and the 2003 Paraguayan race were celebrated account for the observed issue.

From a comparative perspective, one possible factor that might explain the difference in magnitude is the different levels of enforcement of mandatory voting in both countries. While Peru has a more robust mechanism to force voters to the polls, Paraguay is known to have a compulsory system with almost no effective enforcement of the law. This argument can be held in the face of a paper ballot design that simplifies the process by including photographs, but it cannot account for the possible impact of bureaucratic discretion or party activists. Furthermore, the reduction of residual votes due implementation of electronic voting machines might also be explained because of informational campaigns that official electoral bureaucracies made before the implementation of e-vote. Nevertheless, results from the Group-Time Difference-in-Difference models with anticipation of treatment do not significant chances on estimations compared with simple of multivariate models (see Appendix 4B for detailed results).

Even if electronic voting is continuously under public opinion scrutiny and in today's world may suffer from systematic erosion of trust in it, results from this analysis highlights the relevance that technology can play in the inclusion of segments of inhabitants that have been systematically left out of democratic decision-making process. Therefore, future research should estimate the impact of technology on vulnerable populations. Theoretically, if deprived citizens are forced to vote, they do not have sufficient skills to navigate through a system in which political parties' labels do not provide a hegemonic

party that has dominated enough information or politics for a long time. They might go to the polls but most likely will not participate in democratic decisions.

More importantly, the role of bureaucratic agents during the vote-counting process still needs further exploration. The extent to which technology reduces the complexities of elements of the electoral process – such as ballot cards, accessible information, or the inclusion of photographs or more straightforward mechanisms to mark an electoral option – is only part of the transformation that the use of e-voting produces over elections. The reduction of discretion that electoral officials and party agents - whose goal is to "defend" votes for their candidates - may also play an essential role in the mechanism under with technology reduces the rate of residual votes.

Lastly, from a normative perspective, an ideal democracy will aim to include all its citizens in the decision-making process and, at the same time would, maximize its efforts to reduce the cost associated with voting for more vulnerable portions of the population. On the contrary, the systems of Paraguay and Peru included a high degree of bureaucratic discretionary power that, even if it is not the principal determinant of residual votes, requires further research to discriminate its effects and consequences adequately.

APPENDIX

Appendix Chapter 2: Can radio save my campaign?

Appendix 2A: Campaign environment graphical evidence.

Figure 2A-1: Campaign environment photographic evidence, August 1958

Figure 2A-2: Presidential candidates debating in Radio Minería, 1958.

Appendix 2B: Radio signal strength measurement.

The Irregular Terrain Model (ITM) is a model of radio propagation for frequencies between 20 MHz and 20 Ghz. Also known as the Longley-Rice model, is based on electromagnetic theory and analyses of terrain features and radio measurements that allows the prediction of radio signal attenuation as a function of distance and time-space variation because of geographical and climate conditions (Longley and Rice 1968).

In this research, a point-to-potion mode (PTP) of the ITM is used to have a picture of radio signal attenuation between two points using the *itmlogic* package for Python (Oughton et al. 2020), and thus calculate its strength at a given city. The general input for the PTP is based on three main sources. First, an environmental parameter for the terrain including permittivity, conductivity, climate selection, and refractivity following suggestions by Hufford and colleagues (1982); Second, terrain elevation computed by the algorithm between two coordinates using a Digital Elevation Model (Ministerio de Bienes Nacionales 2019); Third, the signal parameters (frequency, antenna height). Eight key parameters are used in the algorithm, with values that corresponds to the central point of each *comuna* in the country when it is required. With these, the ITM algorithm computes a single value that represents the reference attenuation signal (path loss indicator) between two points in a geographical setting. The parameters include: (1) Distance between two terminals; (2) Antenna structural heights measured in meters; (3) Terrain elevation; (4) Terrain irregularity parameter; (5) Surface refractivity; (6) Earth's effective curvature; (7) Surface transfer impedance; and (8) Climate.

Using all information, the computation of the single that represents the path loss indicator (reference attenuation measurement - RA) is achieved. The indicator is the median attenuation between two given points at a 90% confidence interval relative to the free space path loss indicator. For full details about the algorithm refer to Hufford (2007) and for an application in Chile see Kaschel and colleagues (2018).

Once having the reference attenuation measurement for a single combination of coordinates, the next step is to calculate the signal strength at a specific location. This research employs the formula proposed by Peisakhin and Rozenas (2018). In this, radio signal strength at a given point in decibels is specified as:

$$Signal_i = 106.92 + 10\ Log(TP_{kw}) - 20 * \log(D) - RA + 107$$

In here, Signal*i* is the signal strength at city "*i"*, while TP_{kw} is the transmitter power in kilowatts for a specific station. Meanwhile, D is the distance in meters between the transmitter location and the city center for each *comuna* in Chile. Lastly, RA is the reference attenuation measurement obtained from the ITM.

For instance, to obtain the signal strength of Radio Minería in Santiago to the city of Concepción, the following equation is calculated:

$$Signal_{Minería,Concepción}$$

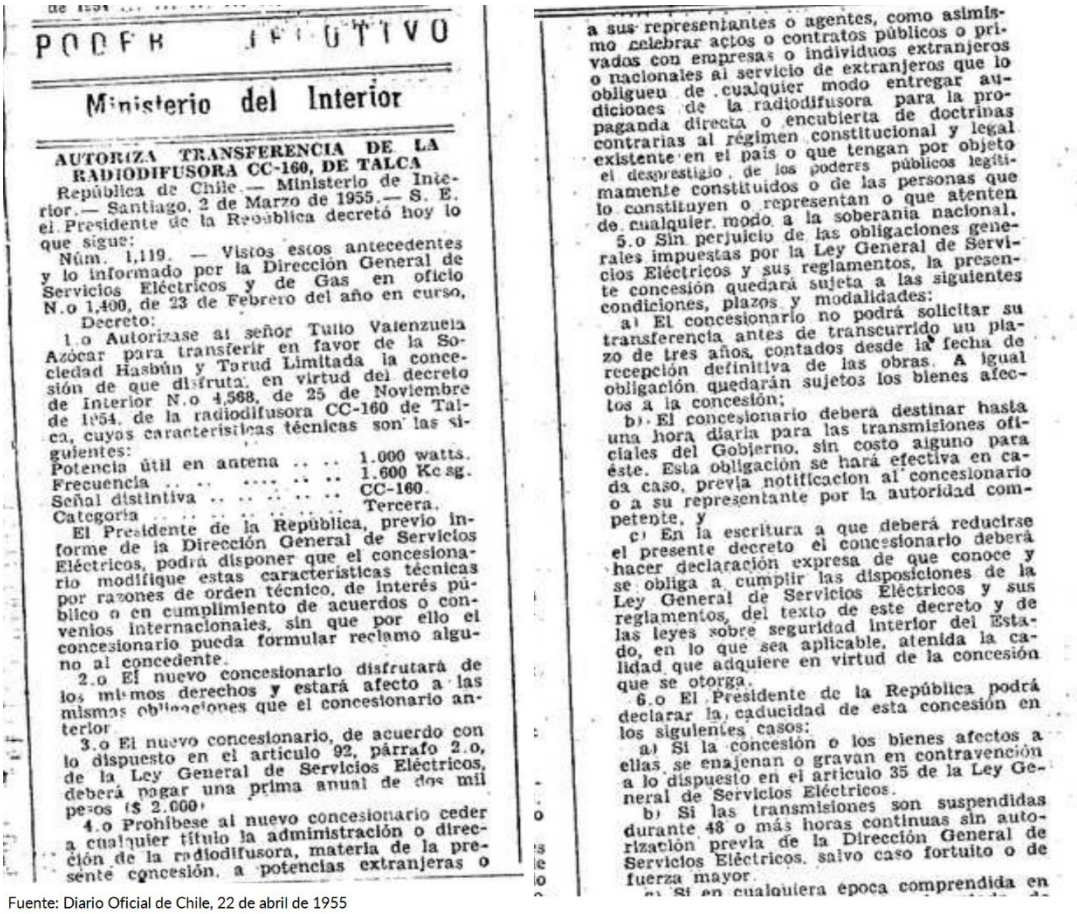
$$= 106.92 + 10\ Log(0.005) - 20 * \log(498770.8) - (42.05916) + 107$$

In this example, the power of the transmitter in kilowatts is equal to 0.005, while the straight-line distance between the transmitter of Radio Minería in Santiago and the city center of Concepción is 498,770.8, and the attenuation measurement for the signal equals

42.05916. The resulting outcome is equal to 34.89, which corresponds to the signal strength of Radio Minería in Concepción.

To obtain the specifications and ownership of each Chilean radio operating in 1958, archival research was conducted by looking at three sources of information. First, the Broadcasting Stations of the World (FBIS, 1957). Information was compared with official sources from Ministerio del Interior and Ministerio de Obras Públicas between 1932 and 1958 and official records from Diario Oficial for the same period. An example of the documents is presented in Figure 2B-1.

Table 2B-1 shows a description of the 88 radio stations operating in Chile that were used for this research. The data includes ownership and political inclination based on political ties between the owner and political parties. Some station names might be duplicated because they were given two or more frequencies by the Chilean State.



PODER EJECUTIVO

Ministerio del Interior

AUTORIZA TRANSFERENCIA DE LA RADIODIFUSORA CC-160, DE TALCA

República de Chile.— Ministerio de Interior.— Santiago, 2 de Marzo de 1955.— S. E. el Presidente de la República decretó hoy lo que sigue:

Núm. 1,119. — Vistos estos antecedentes y lo informado por la Dirección General de Servicios Eléctricos y de Gas en oficio N.o 1,400, de 23 de Febrero del año en curso,

Decreto:

1.o Autorízase al señor Tulio Valenzuela Azócar para transferir en favor de la Sociedad Hasbún y Tarud Limitada la concesión de que disfruta, en virtud del decreto de Interior N.o 4,568, de 25 de Noviembre de 1954, de la radiodifusora CC-160 de Talca, cuyas características técnicas son las siguientes:

Potencia útil en antena .. .. 1.000 watts.
Frecuencia .. .. 1.600 Kc sg.
Señal distintiva .. .. CC-160.
Categoría .. .. Tercera.

El Presidente de la República, previo informe de la Dirección General de Servicios Eléctricos, podrá disponer que el concesionario modifique estas características técnicas por razones de orden técnico, de interés público o en cumplimiento de acuerdos o convenios internacionales, sin que por ello el concesionario pueda formular reclamo alguno al concedente.

2.o El nuevo concesionario disfrutará de los mismos derechos y estará afecto a las mismas obligaciones que el concesionario anterior.

3.o El nuevo concesionario, de acuerdo con lo dispuesto en el artículo 92, párrafo 2.o, de la Ley General de Servicios Eléctricos, deberá pagar una prima anual de dos mil pesos ($ 2.000).

4.o Prohíbese al nuevo concesionario ceder a cualquier título la administración o dirección de la radiodifusora, materia de la presente concesión, a potencias extranjeras o a sus representantes o agentes, como asimismo celebrar actos o contratos públicos o privados con empresas o individuos extranjeros o nacionales al servicio de extranjeros que lo obligueu de cualquier modo entregar audiciones de la radiodifusora para la propaganda directa o encubierta de doctrinas contrarias al régimen constitucional y legal existente en el país o que tengan por objeto el desprestigio de los poderes públicos legítimamente constituidos o de las personas que lo constituyen o representan o que atenten de cualquier modo a la soberanía nacional.

5.o Sin perjuicio de las obligaciones generales impuestas por la Ley General de Servicios Eléctricos y sus reglamentos, la presente concesión quedará sujeta a las siguientes condiciones, plazos y modalidades:

a) El concesionario no podrá solicitar su transferencia antes de transcurrido un plazo de tres años, contados desde la fecha de recepción definitiva de las obras. A igual obligación quedarán sujetos los bienes afectos a la concesión;

b) El concesionario deberá destinar hasta una hora diaria para las transmisiones oficiales del Gobierno, sin costo alguno para éste. Esta obligación se hará efectiva en cada caso, previa notificación al concesionario o a su representante por la autoridad competente, y

c) En la escritura a que deberá reducirse el presente decreto el concesionario deberá hacer declaración expresa de que conoce y se obliga a cumplir las disposiciones de la Ley General de Servicios Eléctricos y sus reglamentos, del texto de este decreto y de las leyes sobre seguridad interior del Estado, en lo que sea aplicable, atenida la calidad que adquiere en virtud de la concesión que se otorga.

6.o El Presidente de la República podrá declarar la caducidad de esta concesión en los siguientes casos:

a) Si la concesión o los bienes afectos a ellas se enajenan o gravan en contravención a lo dispuesto en el artículo 35 de la Ley General de Servicios Eléctricos.

b) Si las transmisiones son suspendidas durante 48 o más horas continuas sin autorización previa de la Dirección General de Servicios Eléctricos, salvo caso fortuito o de fuerza mayor.

c) Si en cualquiera época comprendida en

Fuente: Diario Oficial de Chile, 22 de abril de 1955

Figure 2B-1: Radio concession official publication.

Radio	Owner	City	Political Inclination
Emisoras Del Norte	Cía. Chilena Com.	Antofagasta	Christian Dem
Emisoras Del Norte	Cía. Chilena Com.	Antofagasta	Christian Dem
Coya	Soc. Chilena de Radio	Antofagasta	Christian Dem
Libertad	Antonio Cajia Gonzalez	Antofagasta	Non-partisan
Libertad	Antonio Cajia Gonzalez	Antofagasta	Non-partisan
Calama	Pedro Vergara Keller	Calama	Non-partisan
La Discusión	Adriana Pageguy De Lagos	Chillan	Non-partisan
Nuble	Rafael Barrios Cárcamo	Chillan	Non-partisan
Condor	Cía. Chilena Com.	Concepción	Christian Dem
Araucanía	Harold Shar Christie	Concepción	Non-partisan
Simón Bolívar	Osvaldo Velilla Cáceres	Concepción	Non-partisan
El Sur	Mario Sáez Lagos	Concepción	Radical
Atacama	Soc. Chilena de Radio	Copiapó	Christian Dem
Guardiamarina Riquelme	Cesar Nieme Apey	Coquimbo	Radical
Condell	Alberto Guerra Cruzat	Curicó	Conservative
Del Salitre	Soc. Chilena de Radio	Iquique	Christian Dem
Esmeralda	Antonio Cajia Gonzalez	Iquique	Non-partisan
La Serena	Soc. Chilena de Radio	La Serena	Christian Dem
Soberanía	Julio Abasolo Alden	Linares	Non-partisan
Sn Agricultura	Soc. Nac. De Agricultura	Los Ángeles	Conservative
Soc Agrícola Y Granadera	Soc. Nac. De Agricultura	Osorno	Conservative
Norte Verde	Francisco Morales Castillo	Ovalle	Non-partisan
El Roble	Soc. Chilena de Radio	Parral	Christian Dem
Llanquihue	Cía. Chilena Com.	Puerto Montt	Christian Dem
Polar	Cía. Chilena Com.	Punta Arenas	Christian Dem
Austral	Soc. Chilena de Radio	Punta Arenas	Christian Dem
La Voz Del Sur	Eladio Fernandez Espina	Punta Arenas	Non-partisan
Militar Austral	Ejército De Chile	Punta Arenas	State
Militar Austral	Ejército De Chile	Punta Arenas	State
Chacabuco	Leopoldo Giraudo Giordano	Quillota	Non-partisan
Rancagua	Jorge Romero Ramírez	Rancagua	Christian Dem
El Cobre	Soc. Chilena de Radio	Rancagua	Christian Dem
Sargento Aldea	Humberto Agüero Quiroga	San Antonio	Non-partisan
Manuel Rodriguez	L Guerra Cruzat	San Fernando	Non-partisan

Continues from last page			
Centenario	Soc. Chilena de Radio	San Javier	Christian Dem
Cooperativa Vitalicia	Cía. Chilena Com.	Santiago	Christian Dem
Cooperativa Vitalicia	Cía. Chilena Com.	Santiago	Christian Dem
La Americana	Miguel Ramis Mascaro	Santiago	Christian Dem
La Americana	Miguel Ramis Mascaro	Santiago	Christian Dem
Osman Perez Freire	Soc. Chilena de Radio	Santiago	Christian Dem
Nacional	Soc. Chilena de Radio	Santiago	Christian Dem
Minería	Soc. Chilena de Radio	Santiago	Christian Dem
Minería	Soc. Chilena de Radio	Santiago	Christian Dem
Minería	Soc. Chilena de Radio	Santiago	Christian Dem
Chilena	Soc. Chilena de Radio	Santiago	Christian Dem
Bulnes	Carlos Briceño Olivares	Santiago	Non-partisan
Prat	David Bogalawsky	Santiago	Non-partisan
Cervantes	G Holthever Valdivia	Santiago	Non-partisan
Rapa Nui	Hernán Del Solar Aspillaga	Santiago	Non-partisan
La Reina	Luis Brain Sánchez	Santiago	Non-partisan
Latorre	Manuel Casabian	Santiago	Non-partisan
Del Pacifico	Ricardo Vivado Orsini	Santiago	Non-partisan
O'Higgins	Víctor A Marcos	Santiago	Non-partisan
Santiago	Soc. Nac. De Agricultura	Santiago	Conservative
La Aurora	Mauricio Arnoff Soto	Santiago	Conservative
La Aurora	Mauricio Arnoff Soto	Santiago	Conservative
Sn Agricultura	Soc. Nac. De Agricultura	Santiago	Conservative
Sn Agricultura	Soc. Nac. De Agricultura	Santiago	Conservative
Sn Agricultura	Soc. Nac. De Agricultura	Santiago	Conservative
Nuevo Mundo	Soc. Emisoras Nuevo Mundo	Santiago	Socialist
Nuevo Mundo	Soc. Emisoras Nuevo Mundo	Santiago	Socialist
Corporación	Corp. Chilena de Broad.	Santiago	State
Corporación	Corp. Chilena de Broad.	Santiago	State
Corporación	Corp. Chilena de Broad.	Santiago	State
Yungay	Corp. Chilena de Broad.	Santiago	State
Lircay	Hernan Vaccaro Zuniga	Talca	Non-partisan
Lautaro	Ramon Abasolo Aldea	Talca	Non-partisan
Almirante Latorre	Pablo D Lama	Talcahuano	Non-partisan

Continues from last page			
Cautín	Cía. Chilena Com.	Temuco	Christian Dem
La Frontera	Daniel De Mayo Levy	Temuco	Non-partisan
Toco	Soc. Nac. De Agricultura	Tocopilla	Conservative
Sur	Cía. Chilena Com.	Valdivia	Christian Dem
Baquedano	Carlos Kehler Schoereder	Valdivia	Conservative
Pampa	Soc. Nac. De Agricultura	Valdivia	Conservative
Prieto	Cía. Chilena Com.	Valparaíso	Christian Dem
Cooperativa Vitalicia	Cía. Chilena Com.	Valparaíso	Christian Dem
Cooperativa Vitalicia	Cía. Chilena Com.	Valparaíso	Christian Dem
Cooperativa Vitalicia	Cía. Chilena Com.	Valparaíso	Christian Dem
Valparaíso	Soc. Chilena de Radio	Valparaíso	Christian Dem
Caupolicán	Mario Castro Guzman	Valparaíso	Non-partisan
Cochrane	Wallace Y Cia Ltda	Valparaíso	Non-partisan
Sn Agricultura	Soc. Nac. De Agricultura	Valparaíso	Conservative
Cristobal Colon	Corp. Chilena de Broad.	Valparaíso	State
Universidad Técnica	U. Técnica Santa María	Valparaíso	State
Minería	Soc. Chilena de Radio	Viña Del Mar	Christian Dem
Recreo	Soc. Chilena de Radio	Viña Del Mar	Christian Dem
Minería	Soc. Chilena de Radio	Viña Del Mar	Christian Dem
Los Castaños	Joaquín Venegas V	Viña Del Mar	Non-partisan

Table 2B-1: Radio stations operating in Chile, 1958.

Appendix 2C: Baseline and alternative models.

	Dependent variable: Vote Share				
	Alessandri	Allende	Frei	Bossay	Zamorano
Biased Signal Strength	**3.40*****	**-1.15**	**1.98*****	**-1.24****	**0.91*****
	(0.80)	**(0.76)**	**(0.45)**	**(0.60)**	**(0.28)**
Constant	33.54***	28.14***	17.71***	17.48***	3.05***
	(0.79)	(0.76)	(0.45)	(0.59)	(0.28)
Observations	281	281	281	281	281
R^2	0.06	0.01	0.07	0.02	0.04
Adjusted R^2	0.06	0.005	0.06	0.01	0.03
Residual Std. Error	13.25	12.76	7.47	9.89	4.62
F Statistic	18.12***	2.27	19.42***	4.29**	10.86***

Note: $^{*}p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$.

Table 2C-1: Base model, biased signal strength on vote share.

	Dependent variable: Vote Share				
	Alessandri	Allende	Frei	Bossay	Zamorano
Pro-Conservative Signal Strength	**6.56*****	-2.22*	-0.91	-4.76***	-0.72***
	(1.25)	(1.25)	(0.73)	(0.85)	(0.45)
Pro-Socialist Signal Strength	0.46	**0.24**	-0.78	0.80	**1.33*****
	(1.28)	**(1.27)**	(0.75)	(0.86)	**(0.45)**
Pro-Christian Dem. Signal Strength	-2.15*	1.37	**2.03*****	-0.70	-0.56
	(1.17)	(1.17)	**(0.69)**	(0.79)	(0.42)
Pro-Radical Signal Strength	0.94	-2.31**	1.04*	**1.00**	-0.66**
	(0.92)	(0.92)	(0.54)	**(0.62)**	(0.33)
Non-Partisan Signal Strength	-2.47**	1.59	0.94	-1.35*	1.29***
	(1.10)	(1.10)	(0.64)	(0.74)	(0.39)
Constant	33.59***	28.13***	17.70***	17.52***	3.06***
	(0.75)	(0.75)	(0.44)	(0.51)	(0.27)
Observations	281	281	281	281	281
R^2	0.16	0.05	0.10	0.28	0.10
Adjusted R^2	0.14	0.03	0.08	0.26	0.08
Residual Std. Error	12.64	12.60	7.38	8.54	4.50
F Statistic	10.36***	2.68**	6.09***	20.98***	6.05***

Note: $^{*}p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$

Table 2C-2: Base model, all signal strength variables on vote share.

	Dependent variable: Vote Share				
	Alessandri	Allende	Frei	Bossay	Zamorano
	(1)	(2)	(3)	(4)	(5)
Pro-Conservative Signal Strength	**5.96*****	1.60	-0.81	-0.16	-0.65
	(1.45)	(1.83)	(1.12)	(1.20)	(0.65)
Pro-Conservative Signal Strength^2	**-1.50***	-0.76	0.06	0.10	0.43
	(0.85)	(1.00)	(0.61)	(0.66)	(0.35)
Pro-Socialist Signal Strength	0.02	**-1.67**	-0.75	-5.80***	**2.26*****
	(1.79)	**(1.48)**	(0.90)	(0.97)	**(0.52)**
Pro-Socialist Signal Strength^2	0.17	**1.45***	-0.14	1.50***	**-1.30*****
	(0.98)	**(0.87)**	(0.53)	(0.57)	**(0.31)**
Pro-C. Democratic Signal Strength	1.90	-0.64	**1.55**	-2.62**	-0.19
	(1.69)	(1.73)	**(1.05)**	(1.14)	(0.61)
Pro-C. Democratic Signal Strength^2	-1.63*	0.13	**0.38**	1.11*	0.01
	(0.89)	(0.91)	**(0.55)**	(0.60)	(0.32)
Pro-Radical Signal Strength	1.03	-4.34***	1.29	**3.34*****	-1.32***
	(1.33)	(1.36)	(0.83)	**(0.89)**	(0.48)
Pro-Radical Signal Strength^2	-1.82***	2.34***	-0.09	**-0.43**	-0.0000
	(0.60)	(0.61)	(0.37)	**(0.40)**	(0.22)
Non-Partisan Signal Strength	-3.14**	2.44	0.93	-1.93*	1.70***
	(1.47)	(1.50)	(0.92)	(0.99)	(0.53)
Non-Partisan Signal Strength^2	0.90	-1.03	0.02	0.31	-0.21
	(0.67)	(0.69)	(0.42)	(0.45)	(0.24)
Constant	37.36***	26.04***	17.48***	15.01***	4.11***
	(1.02)	(1.04)	(0.63)	(0.68)	(0.37)
Observations	281	281	281	281	281
Controls	No	No	No	No	No
Fixed Effects	No	No	No	No	No
R^2	0.26	0.12	0.10	0.37	0.18
Adjusted R^2	0.24	0.09	0.07	0.35	0.15
Residual Std. Error (df = 270)	11.93	12.19	7.44	8.03	4.32
F Statistic (df = 10; 270)	9.69***	3.83***	3.09***	16.01***	6.02***

Note: $^{*}p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$

Table 2C-3: Quadratic base model, all signal strength variables on vote share.

	Dependent variable: Vote Share						
	1958					1925 (Placebo)	
	Alessandri	Allende	Frei	Bossay	Zamorano	Figueroa	Salas
Pro-Conservative Signal Strength	**7.08*****	-1.17	-0.69	0.70	-0.62	-0.02	0.02
	(1.59)	(1.75)	(1.12)	(1.19)	(0.66)	(0.02)	(0.02)
Pro-Conservative Signal Strength^2	**-1.74****	-0.16	-0.26	0.01	0.28	0.01	-0.01
	(0.83)	(0.93)	(0.60)	(0.64)	(0.35)	(0.01)	(0.01)
Pro-Socialist Signal Strength	1.77	**-2.97***	-0.67	-6.12***	**2.68*****	0.06	-0.06
	(1.71)	**(1.63)**	(1.05)	(1.11)	**(0.62)**	(0.05)	(0.05)
Pro-Socialist Signal Strength^2	-0.13	**1.54***	-0.08	1.60***	**-1.31*****	-0.03	0.03
	(0.91)	**(0.85)**	(0.54)	(0.58)	**(0.32)**	(0.02)	(0.02)
Pro-Christian Dem. Signal Strength	2.61*	-1.28	**1.78***	-2.59**	-0.35	-0.02	0.02
	(1.67)	(1.71)	**(0.94)**	(1.17)	(0.65)	(0.02)	(0.02)
Pro-Christian Dem. Signal Strength^2	-1.29	-0.18	**-0.34**	1.11*	-0.003	-0.002	0.002
	(0.85)	(0.87)	**(0.42)**	(0.59)	(0.33)	(0.01)	(0.01)
Pro-Radical Signal Strength	-1.79	-1.83	0.60	**3.73*****	-1.90***	-0.005	0.005
	(1.43)	(1.47)	(1.10)	**(1.00)**	(0.56)	(0.02)	(0.02)
Pro-Radical Signal Strength^2	-0.38	1.10*	0.36	**-0.60**	0.22	-0.001	0.001
	(0.64)	(0.66)	(0.56)	**(0.45)**	(0.25)	(0.01)	(0.01)
Non-Partisan Signal Strength	-1.74	1.59	0.56	-1.91*	1.50***	-0.02	0.02
	(1.43)	(1.47)	(0.94)	(1.00)	(0.56)	(0.02)	(0.02)
Non-Partisan Signal Strength^2	1.17*	-1.12*	-0.17	0.35	-0.23	0.01	-0.01
	(0.65)	(0.67)	(0.43)	(0.45)	(0.25)	(0.01)	(0.01)
Electricity Access (%)	-2.94**	7.33***	-1.23	-3.03***	-0.12	-0.04**	0.04**
	(1.26)	(1.29)	(0.83)	(0.88)	(0.49)	(0.02)	(0.02)
Educ. Attainment	-2.14*	-2.25*	1.99**	2.57***	-0.17	0.02	-0.02
	(1.25)	(1.28)	(0.82)	(0.87)	(0.49)	(0.02)	(0.02)
Population (Log)	-1.75	1.19	0.95	-1.16	0.77*	0.01	-0.01
	(1.07)	(1.10)	(0.71)	(0.75)	(0.42)	(0.01)	(0.01)
Region (b. = North)							
Center	5.75*	-3.75	-1.44	-1.62	1.06	-0.01	0.01
	(2.97)	(3.05)	(1.95)	(2.08)	(1.16)	(0.04)	(0.04)
Center-South	5.22**	-1.77	-2.59	-2.14	1.29	0.05	-0.05
	(2.54)	(2.60)	(1.67)	(1.77)	(0.99)	(0.03)	(0.03)
South	7.91***	-0.40	-3.39*	-5.08***	0.96	0.03	-0.03
	(2.65)	(2.72)	(1.74)	(1.86)	(1.03)	(0.03)	(0.03)
Constant	54.41***	24.61**	4.65	20.0***	-3.69	0.60***	0.40***
	(10.24)	(10.51)	(6.73)	(7.16)	(3.99)	(0.13)	(0.13)
Observations	281	281	281	281	281	252	252
Adjusted R^2	0.34	0.21	0.10	0.35	0.15	0.12	0.12

Note: $^{*}p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$

Table 2C-4: Main model full results.

	Dependent variable: Vote Share				
	Alessandri	Allende	Frei	Bossay	Zamorano
Pro-Conservative Signal	0.72***	0.09	0.04	0.09	-0.15
	(0.22)	(0.36)	(0.23)	(0.24)	(0.14)
Pro-Conservative Signal^2	-0.003**	-0.001	-0.0004	-0.0003	0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Pro-Socialist Signal	-0.07	-0.54**	0.01	-0.60***	0.40***
	(0.35)	(0.22)	(0.14)	(0.15)	(0.08)
Pro-Socialist Signal^2	0.001	0.003**	-0.0003	0.003***	-0.002***
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Pro-C. Democrat Signal	0.63*	-0.02	-0.10	-0.53**	0.02
	(0.33)	(0.34)	(0.22)	(0.23)	(0.13)
Pro-C. Democrat Signal^2	-0.003*	-0.0002	0.001	0.002**	-0.0001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Pro-Radical Signal	0.04	-0.46*	0.21	0.39**	-0.17
	(0.27)	(0.28)	(0.18)	(0.19)	(0.11)
Pro-Radical Signal^2	-0.001	0.003*	-0.001	-0.002	0.001
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
Non-Partisan Signal	-0.38*	0.37	0.07	-0.19	0.13
	(0.22)	(0.23)	(0.15)	(0.16)	(0.09)
Non-Partisan Signal^2	0.002*	-0.002	-0.0003	0.001	-0.0004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.0004)
Electricity Access	-2.88**	7.32***	-1.26	-3.13***	-0.06
	(1.25)	(1.28)	(0.82)	(0.88)	(0.49)
Education (Average)	-2.11*	-2.29*	2.01**	2.57***	-0.18
	(1.25)	(1.28)	(0.82)	(0.87)	(0.49)
Population (Log)	-1.76	1.18	0.96	-1.13	0.75*
	(1.07)	(1.10)	(0.71)	(0.75)	(0.42)
Constant	5.91	47.07***	-5.15	64.78***	-12.60**
	(14.52)	(14.90)	(9.58)	(10.19)	(5.67)
Observations	281	281	281	281	281
Fixed Effects	Yes	Yes	Yes	Yes	Yes
R^2	0.38	0.26	0.15	0.42	0.20
Adjusted R^2	0.34	0.21	0.10	0.39	0.15
Residual Std. Error (df = 264)	11.08	11.37	7.31	7.77	4.33
F Statistic (df = 16; 264)	10.07***	5.65***	2.98***	12.18***	4.11***

*Note: *p<0.1, **p<0.05, ***p<0.01*

Table 2C-5: Main model, raw biased signal strength measurement.

	Dependent variable: Vote Share						
			1958			*1925 (Placebo)*	
	Alessandri	Allende	Frei	Bossay	Zamorano	Figueroa	Salas
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Biased Signal Strength	5.50***	-4.99***	1.18*	-0.05	1.69***	-0.02	-0.02
	(1.09)	(1.16)	(0.70)	(0.76)	(0.46)	(0.01)	(0.02)
Biased Signal Strength^2	-0.98*	1.33**	-0.25	0.94***	-0.80***	-0.002	0.002
	(0.51)	(0.57)	(0.35)	(0.35)	(0.23)	(0.01)	(0.01)
Electricity Access	-1.54	7.85***	-1.62**	-5.56***	-0.01	-0.02	0.04**
	(1.26)	(1.23)	(0.76)	(0.90)	(0.49)	(0.02)	(0.02)
Education (Average)	-1.93	-2.33**	1.76**	2.52***	0.20	0.01	-0.02
	(1.23)	(1.16)	(0.74)	(0.90)	(0.46)	(0.02)	(0.01)
Population (Log)	-2.42**	-0.09	1.30**	-0.50	0.35	-0.002	0.01
	(1.00)	(0.92)	(0.62)	(0.74)	(0.37)	(0.01)	(0.01)
Region (b. = North)							
Center	8.15***	-5.08*	-0.80	-4.49**	-0.73	-0.01	0.04
	(2.82)	(2.76)	(1.61)	(2.20)	(1.10)	(0.04)	(0.04)
Center-South	4.68*	-3.31	-1.17	-2.59	-0.43	0.05	-0.02
	(2.46)	(2.29)	(1.45)	(1.99)	(0.91)	(0.03)	(0.03)
South	6.04**	-2.81	-2.92*	-1.45	-0.60	0.02	-0.02
	(2.67)	(2.55)	(1.63)	(2.02)	(1.02)	(0.03)	(0.03)
Constant	59.00***	38.40***	1.03	15.53**	0.30	0.74***	0.23**
	(8.82)	(8.06)	(5.71)	(6.51)	(3.22)	(0.11)	(0.10)
Observations	281	281	281	281	281	252	252
R^2	0.27	0.23	0.12	0.24	0.09	0.11	0.12
Adjusted R^2	0.24	0.21	0.09	0.22	0.06	0.08	0.09
Residual Std. Error	11.87	11.38	7.35	8.81	4.54	0.14	0.14
F Statistic	12.30***	10.22***	4.54***	10.67***	3.41***	3.62***	4.02***

*Note: *p<0.1, **p<0.05, ***p<0.01*

Table 2C-6: Reduced model.

Appendix Chapter 3: The electoral legacy of terror

Appendix 3A: Pinochet Human Right Abuses full reports.

Statistic	N	Mean	St. Dev.	Min	Max
Repression Total (Std)	304	-0.04	0.38	-0.25	2.00
Repression pre-DINA (Std)	304	-0.04	0.58	-0.32	3.36
Repression DINA (Std)	304	-0.05	0.24	-0.13	1.32
Repression CNI (Std)	304	-0.04	0.64	-0.27	3.14
Alessandri '70 Vote (%)	304	34.83	9.08	7.74	61.45
Population (log)	304	9.63	1.36	4.08	12.52
Rurality (%)	304	45.29	30.33	0.00	100.00
Literacy (%)	304	0.87	0.07	0.64	0.98

Table 3A-1: Descriptive statistics, predicting repression victims by preexisting political factors.

	Dependent variable: Repression (Std)			
	Total	Pre-DINA	DINA	CNI
	(1)	(2)	(3)	(4)
Alessandri ’70 Vote (%)	0.005**	0.006*	0.003**	0.002
	(0.002)	(0.004)	(0.001)	(0.003)
Population (log)	0.095***	0.075**	0.058***	0.228***
	(0.018)	(0.030)	(0.011)	(0.028)
Rurality (5)	-0.003***	-0.004**	-0.001**	-0.002
	(0.001)	(0.002)	(0.001)	(0.002)
Literacy (%)	0.872**	0.441	0.708***	2.184***
	(0.419)	(0.708)	(0.263)	(0.653)
Constant	-0.972**	-0.586	-0.790***	-2.232***
	(0.401)	(0.677)	(0.252)	(0.625)
Observations	304	304	304	304
R^2	0.286	0.109	0.275	0.377
Adjusted R^2	0.277	0.097	0.265	0.368
Residual Std. Error (df = 299)	0.325	0.548	0.204	0.506
F Statistic (df = 4; 299)	29.995***	9.134***	28.328***	45.175***

Note: *p<0.1, **p<0.05, ***p<0.01

Table 3A-2: Predicting Repression Victims by preexisting political factors, multivariate OLS model by period.

	Dependent variable: Repression (Std)			
	Total	Pre-DINA	DINA	CNI
	(1)	(2)	(3)	(4)
Security Infrastructure (Std)	0.686***	0.602***	0.678***	0.629***
	(0.040)	(0.044)	(0.040)	(0.043)
Constant	-0.000	-0.000	0.000	-0.000
	(0.040)	(0.044)	(0.040)	(0.043)
Observations	335	335	335	335
R^2	0.470	0.362	0.460	0.396
Adjusted R^2	0.469	0.360	0.458	0.394
Residual Std. Error (df = 333)	0.729	0.800	0.736	0.778
F Statistic (df = 1; 333)	295.782***	188.887***	283.802***	218.326***

Note: *p<0.1, **p<0.05, ***p<0.01

Table 3A-3: Predicting repression by security infrastructure, simple OLS model by period.

	Dependent variable: Repression (Std)			
	Total	Pre-DINA	DINA	CNI
	(1)	(2)	(3)	(4)
Security Infrastructure (Std)	0.733***	0.625***	0.756***	0.561***
	(0.047)	(0.053)	(0.045)	(0.047)
Rurality (%)	0.096	0.134	0.138	-0.142
	(0.203)	(0.224)	(0.202)	(0.213)
Population (log)	-0.044	-0.003	-0.092***	0.021
	(0.030)	(0.033)	(0.030)	(0.031)
Literacy (%)	-0.023	-0.093	0.276	1.998**
	(0.855)	(0.942)	(0.844)	(0.889)
Constant	0.399	0.049	0.584	-1.863**
	(0.898)	(0.992)	(0.884)	(0.931)
Observations	335	335	335	335
R^2	0.477	0.364	0.483	0.425
Adjusted R^2	0.470	0.356	0.476	0.418
Residual Std. Error (df = 330)	0.728	0.802	0.724	0.763
F Statistic (df = 4; 330)	75.111***	47.172***	77.002***	60.941***

Note: *p<0.1, **p<0.05, ***p<0.01

Table 3A-4: Predicting repression by security infrastructure, multivariate OLS model by period.

Appendix 3B: Descriptive statistics full report

Statistic	N	Mean	St. Dev.	Min	Max
No Vote (%)	303	0.472	0.130	0.033	0.768
Repression (Total)	303	4.844	9.043	0	54
Repression (pre-DINA)	303	3.051	6.306	0	41
Repression (DINA)	303	0.829	2.362	0	15
Repression (DINA)	303	0.877	2.401	0	13
Infrastructure (Total)	303	2.129	2.977	0	21
Infrastructure (pre-DINA)	303	2.021	2.738	0	21
Infrastructure (DINA)	303	1.548	2.007	0	14
Infrastructure (CNI)	303	1.263	1.672	0	13
TV Access	303	0.407	0.121	0.019	0.683
Alessandri ’70 (%)	303	34.825	9.081	7.740	61.454
Rurality (%)	303	45.941	30.723	0.000	100.0
Literacy (%)	303	0.864	0.067	0.645	1.000
Population (log)	303	9.63	1.36	4.08	12.52

Table 3B-1: Descriptive statistics TSLS model.

Statistic	N	Mean	St. Dev.	Min	Max
Vote Choice (No Option)	804	0.749	0.434	0	1
Repression (Total)	804	18.616	12.176	0	46
Repression (pre-DINA)	804	10.195	9.828	0	40
Repression (DINA)	804	3.771	4.036	0	15
Repression (CNI)	804	4.302	4.430	0	13
Infrastructure (Total)	804	8.492	5.953	0	21
Infrastructure (pre-DINA)	804	7.672	5.572	0	21
Infrastructure (DINA)	804	5.675	3.981	0	14
Infrastructure (CNI)	804	4.850	3.531	0	13
Franja Viewership	804	2.951	0.937	1	4
Age	804	37.490	15.817	18	86
Women	804	0.504	0.500	0	1
Catholic religion	804	0.734	0.442	0	1
Income	804	1.388	0.568	1	3
Educational Level	804	2.722	0.720	1	4
Party Attachment	804	2.076	0.823	1	4

Table 3B-*2*: Descriptive statistics multivariate probit model.

Appendix 3C: Alternative models and full reports of results.

	Dependent variable: Death and Disappearances (Std)			
	Full	Pre-DINA	DINA	CNI
Security Infrastructure	0.711***	0.596***	0.747***	0.713***
	(0.047)	(0.053)	(0.042)	(0.043)
TV Access	-1.061	-1.017	-1.245*	-0.959
	(0.715)	(0.798)	(0.664)	(0.688)
Alessandri 70	0.004	0.005	0.006	0.010**
	(0.005)	(0.006)	(0.005)	(0.005)
Rurality	0.004	0.003	0.003	0.002
	(0.002)	(0.003)	(0.002)	(0.002)
Literacy	1.294	1.576	2.113*	1.989*
	(1.205)	(1.344)	(1.115)	(1.159)
Population (log)	0.131***	0.147***	0.127***	0.100**
	(0.046)	(0.051)	(0.043)	(0.045)
Constant	-1.206	-1.502	-1.884**	-1.917**
	(0.986)	(1.099)	(0.912)	(0.947)
Observations	303	303	303	303
R^2	0.496	0.373	0.567	0.533
Adjusted R^2	0.486	0.361	0.558	0.523
Residual Std. Error (df = 296)	0.750	0.836	0.695	0.722
F Statistic (df = 6; 296)	48.611***	29.405***	64.536***	56.264***

Note: *p<0.1, **p<0.05, ***p<0.01

Table 3C-1: First-stage OLS model.

	Dependent variable: "No" Vote Share			
	Reduced model		*IV model*	
	Restricted	Full	Restricted	Full
Security Infr. (Std.)	0.01**	0.01		
	(0.005)	(0.005)		
Repression (per 10,000)			0.01*	0.006
			(0.01)	(0.004)
TV Access (%)		0.27***		0.32***
		(0.08)		(0.09)
Literacy Rate (%)		0.05		-0.05
		(0.14)		(0.17)
Alessandri Vote 1970 (%)	-0.003***	-0.003***	-0.003**	-0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Allende Vote 1970 (%)	0.003***	0.003***	0.004***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Population Size (Log)	0.01***	0.01**	0.02***	0.01**
	(0.004)	(0.004)	(0.004)	(0.003)
Rurality (%)	-0.001***	-0.001***	-0.001***	-0.001**
	(0.0002)	(0.0003)	(0.0002)	(0.0003)
Regional Fix Effects	Yes	Yes	Yes	Yes
Observations	305	303	305	303
R^2	0.69	0.72	0.60	0.67
Adjusted R^2	0.68	0.70	0.58	0.65
Residual Std. Error	0.07 (df = 287)	0.07 (df = 283)	0.08 (df = 287)	0.003 (df = 283)

*Note: *p<0.1, **p<0.05, ***p<0.01*

Table 3C-2: Comparison of reduced and TSLS Models, restricted and full.

	Dependent variable: Vote Share "No"			
	Full	Pre-DINA	DINA	CNI
Repression Inst.	-0.09	-0.03	0.27	0.03
	(0.10)	(0.04)	(0.60)	(0.07)
TV Access (%)	0.47***	0.48***	0.51***	0.50***
	(0.13)	(0.12)	(0.16)	(0.12)
Alessandri 70 (%)	-0.004***	-0.005***	-0.01*	-0.01***
	(0.001)	(0.001)	(0.004)	(0.001)
Population (log)	0.04*	0.03**	0.002	0.02
	(0.02)	(0.01)	(0.04)	(0.02)
Rurality (%)	-0.001	-0.001	-0.0004	-0.001
	(0.0005)	(0.0004)	(0.001)	(0.0004)
Literacy	-0.12	-0.24	-0.62	-0.39
	(0.28)	(0.21)	(0.81)	(0.31)
Poverty (%)	0.18	0.39	1.06	0.68
	(0.41)	(0.24)	(1.26)	(0.43)
Observations	162	162	162	162
R^2	0.62	0.66	0.27	0.65
Adjusted R^2	0.61	0.65	0.24	0.64
Residual Std. Error (df = 155)	0.07	0.07	0.10	0.07

Note: *p<0.1, **p<0.05, ***p<0.01

Table 3C-3: TSLS Model with restricted observations.

		Dependent variable: Vote Choice (No)		
	Full	Pre-DINA	DINA	CNI
Security Infrastructure	0.135*	0.096*	0.079	0.071
	(0.072)	(0.056)	(0.052)	(0.050)
Franja View (b. = Never)				
Somedays	0.412	0.394	0.367	0.366
	(0.430)	(0.427)	(0.425)	(0.424)
Almost every day	0.939**	0.991**	0.959**	0.968**
	(0.462)	(0.455)	(0.454)	(0.453)
Every day	1.458***	1.430***	1.398***	1.391***
	(0.460)	(0.454)	(0.451)	(0.450)
Age	-0.031***	-0.029***	-0.029***	-0.029***
	(0.008)	(0.008)	(0.008)	(0.008)
Women	-0.063	-0.112	-0.115	-0.112
	(0.233)	(0.228)	(0.229)	(0.228)
Religion	-0.530*	-0.493*	-0.484*	-0.482*
	(0.285)	(0.280)	(0.280)	(0.279)
Income Group. (b. = Low)				
Middle	-0.387	-0.457*	-0.441*	-0.444*
	(0.267)	(0.263)	(0.263)	(0.263)
High	-1.239*	-1.304**	-1.305**	-1.316**
	(0.646)	(0.635)	(0.635)	(0.635)
Education Level (b = None)				
Primary	0.526	0.562	0.574	0.576
	(0.566)	(0.562)	(0.562)	(0.563)
Secondary	0.230	0.341	0.364	0.361
	(0.620)	(0.614)	(0.614)	(0.615)
Higher	0.838	0.934	0.973	0.967
	(0.748)	(0.740)	(0.740)	(0.741)
Ideology (b. = Left)				
Center	-2.766***	-2.792***	-2.797***	-2.788***
	(0.729)	(0.729)	(0.729)	(0.729)
Right	-6.097***	-6.068***	-6.063***	-6.049***
	(0.767)	(0.763)	(0.763)	(0.762)
Independent	-3.711***	-3.669***	-3.677***	-3.695***
	(0.788)	(0.785)	(0.785)	(0.785)
Constant	4.770***	4.695***	4.732***	4.730***
	(1.094)	(1.080)	(1.082)	(1.083)
Observations	781	804	804	804
Log Likelihood	-261.729	-271.558	-271.884	-272.058
Akaike Inf. Crit.	555.459	575.116	575.769	576.116

Note: *p<0.1, **p<0.05, ***p<0.01

Table 3C-4: Multilevel probit model, alternative independent variable

Appendix Chapter 4: Reducing residual votes in Paraguay and Peru.

Appendix 4A. Matching procedure description and quality assessment.

Matching techniques aim to balance the distribution of covariates in the treated and untreated / control groups (Austin 2011). Following Stuart (2010), four crucial steps are required to adequately address a matching procedure. First, define the distance measure to define if a unit if a sufficient match for a treated unit. Second, implement a matching procedure. Third, asses the quality of the resulting matching procedure and iterate the first two steps two check the robustness of results. Lastly, run the analysis through the appropriate statistical technique. Because of the nature of the implementation of electronic voting machines (EVM) in Paraguay and Peru, a DiD matching estimator is employed by comparing the conditional before-after rate of residual votes of districts that implemented EVM with those that were not selected.

The matching uses a propensity score method, as defined by Rosembaum and Rubin (1983). This technique is a balance method in which, *"conditional on the propensity score, the distribution of measured baseline covariates is similar between treated and untreated subjects"* (Austin 2011, 402). The propensity score matching procedure results shown in the article employs a nearest neighbor (NN) algorithm. In this, the unit from the comparison group is chosen as a matching partner for a treated district that is closest in terms of the propensity score.

When the parameter of interest is an estimation of the average treatment effect, the DiD propensity score estimator is based on the following identifying assumption, where t is the post and t' is the pretreatment period (Caliendo and Kopeining 2008).

$$E|[(0) - Y_{t'}(0)\,|P(X), D = 1\,| = E\,Y_t(0) - Y_{t'}(0)|P(X), D = 0]$$

Figure 4A-1 shows a descriptive assessment of the parallel trend assumption after the matching procedure. Meanwhile, Figure 4A-2 and 4A-3 shows quality assessments of the resulting matching group after implementation of a NN matching technique for Paraguay and Peru, respectively.

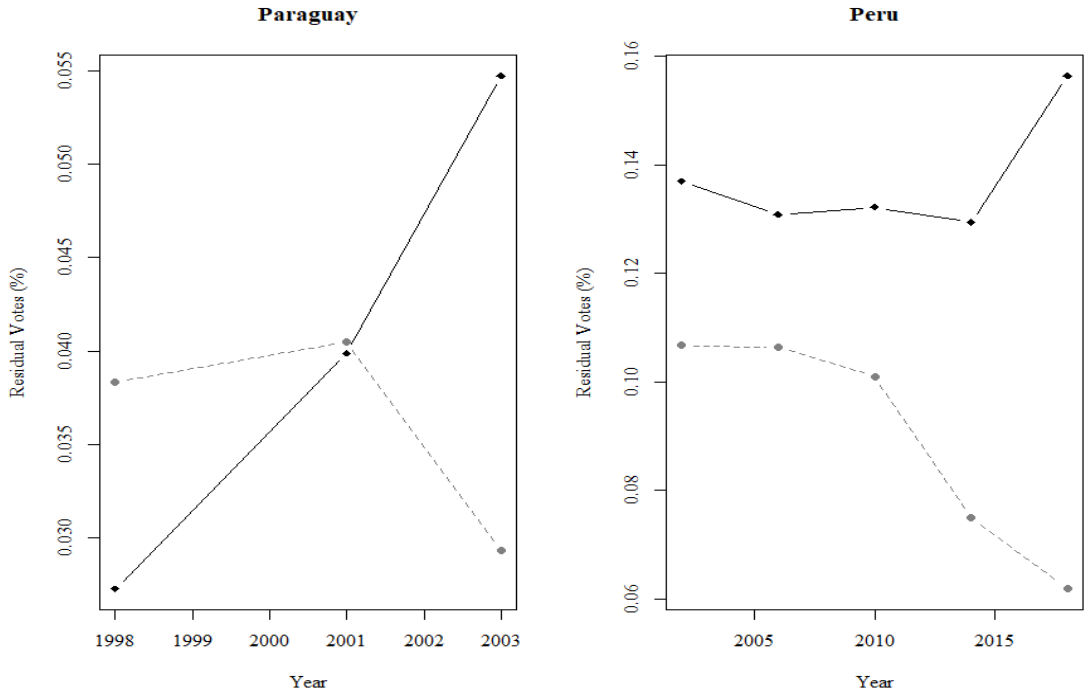


Figure 4A- 19: Descriptive parallel trend assumption after matching.

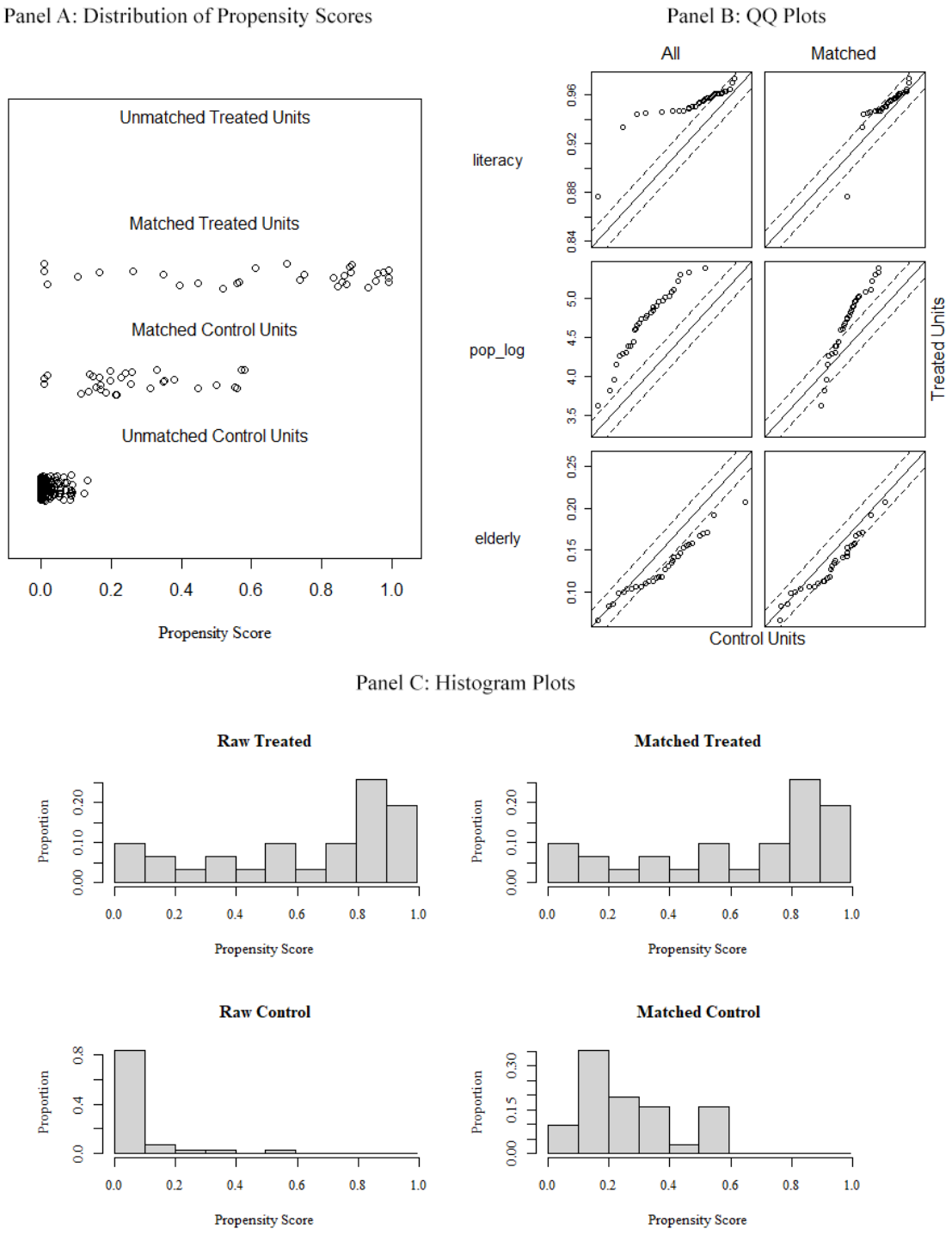


Figure 4A- 20: Paraguay's matching quality assessment.

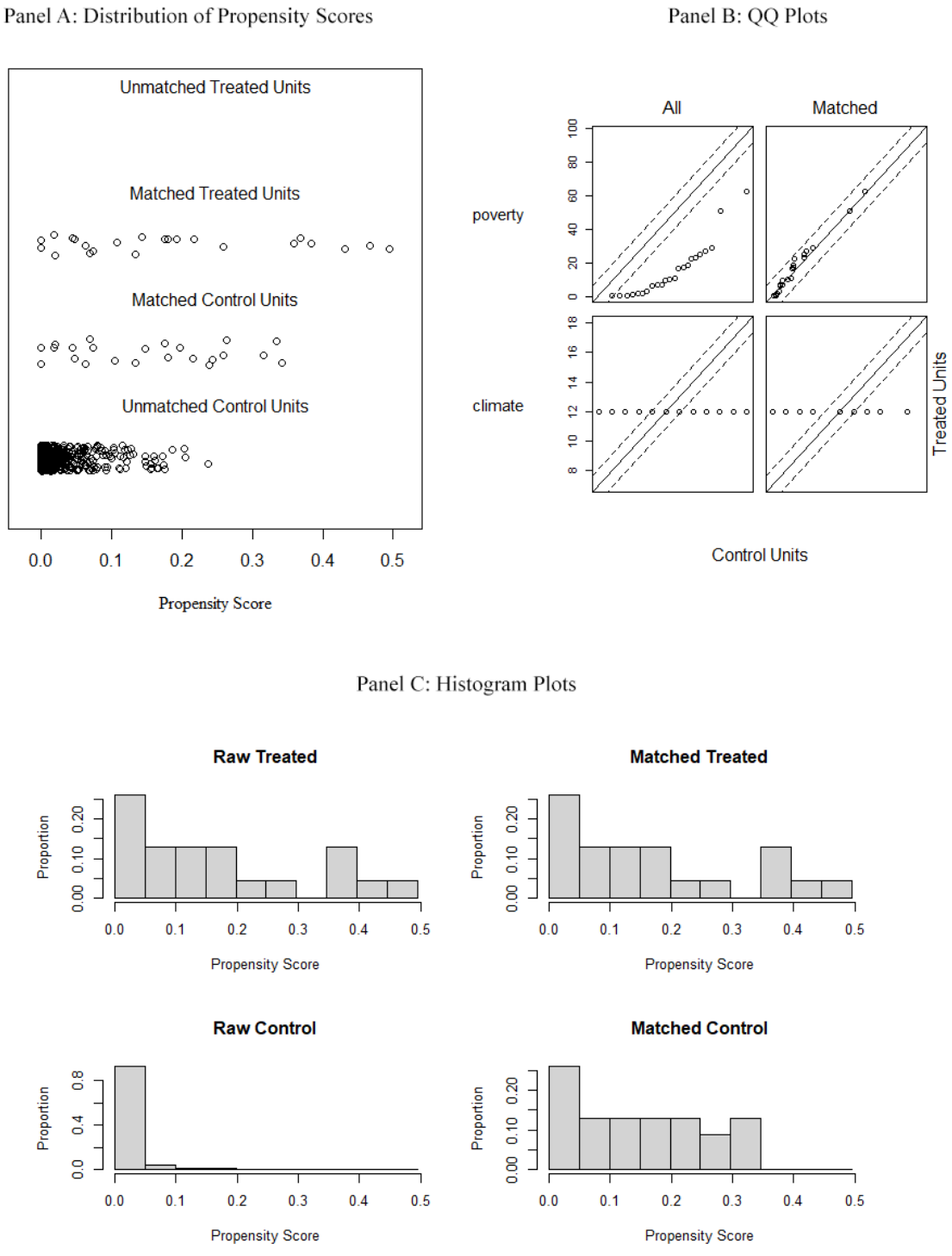


Figure 4A- 21: Peru's matching quality assessment.

Appendix 4B. Group-time Difference-in-Difference full report of results.

	Dependent variable: Residual Votes (%)			
	Paraguay		Peru	
	Simple	Multivariate	Simple	Multivariate
E-vote	0.01**	0.01	-0.03***	-0.03***
	(0.005)	(0.005)	(0.01)	(0.01)
Time	0.02***	0.02***	0.01	0.01
	(0.004)	(0.004)	(0.01)	(0.01)
Party Number		-0.0000		0.002***
		(0.0004)		(0.001)
Women (%)		0.40***		0.02
		(0.14)		(0.05)
Unemployment (%)		-0.04		0.05*
		(0.03)		(0.03)
Urban (%)		-0.001		0.03***
		(0.01)		(0.01)
E-Vote x Time	-0.02***	-0.02***	-0.05***	-0.05***
	(0.01)	(0.01)	(0.01)	(0.01)
Constant	0.03***	-0.15*	0.13***	0.05
	(0.003)	(0.08)	(0.01)	(0.03)
Observations	186	186	230	230
R^2	0.14	0.23	0.26	0.34
Adjusted R^2	0.13	0.20	0.25	0.32
Res. Std. Error	0.02 (df = 182)	0.02 (df = 178)	0.05 (df = 226)	0.04 (df = 222)
F Statistic	9.9***	7.6***	25.9***	16.2***

Note: *p<0.1, **p<0.05, ***p<0.01

Table 4B- 1: Paraguay and Peru Canonical Difference-in-Difference Model

		No Anticipation Models		t-1 Anticipation Models	
Group	Time	Simple	Multivariate	Simple	Multivariate
Panel A: Paraguay					
2001	2001	-0.015* (0.007)	-0.016 (0.02)	-0.018* (0.007)	0.016 (0.02)
2001	2003	-0.04* (0.004)	-0.033* (0.01)	-0.4* (0.003)	-0.033* (0.01)
2003	2001	-0.008 (0.006)	-0.002 (0.02)	-0.008 (0.01)	-0.002 (0.02)
2003	2003	-0.028* (0.01)	-0.03* (0.008)	-0.028* (0.007)	-0.03* (0.01)
Panel B: Peru					
2014	2006	-0.01 (0.05)	-0.01 (0.05)	-0.01 (0.055)	-0.01 (0.05)
2014	2010	-0.04 (0.02)	-0.046 (0.022)	-0.04 (0.02)	-0.046 (0.022)
2014	2014	-0.04 (0.02)	-0.01 (0.03)	-0.04 (0.03)	-0.01 (0.03)
2014	2018	-0.05* (0.01)	-0.03 (0.02)	-0.052* (0.015)	-0.03 (0.02)
2018	2006	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
2018	2010	0.004 (0.01)	0.01 (0.01)	0.004 (0.01)	0.01 (0.01)
2018	2014	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)
2018	2018	-0.05 (0.025)	0.06* (0.02)	-0.05 (0.02)	-0.06* (0.02)

*Note: *p<0.01*

Table 4B- 2: Paraguay and Peru Group-Time Difference-in-Difference Model.

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