

# **Collective action and policy implementation: Evidence from Salvador Allende's expropriations\***

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The Cold War triggered the implementation of U.S. sponsored re-distributive policies in Latin America with the goal of decreasing the influence of the Soviet Union. We study how organized groups of workers affected the implementation of one of the largest programs of the time, Salvador Allende's land reform in Chile (1970-1973). Using original data in an event study research design, we find that the local political actions of workers – proxied by land invasions – affected the intensity and location of expropriations. We argue this result can be explained by a threat of political unrest.

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# 1 INTRODUCTION

The Cold War motivated the implementation of U.S. sponsored re-distributive policies in Latin America to fight communism, diminish the influence of the Soviet Union, and avoid the appearance of a “second Cuba” (Taffet, 2007).<sup>1</sup> Among these efforts, agrarian reform programs were one of the most important. More than 40 million hectares were expropriated in Brasil, Bolivia, Chile, Colombia, Ecuador, Guatemala, Mexico, Peru, and Venezuela (Albertus, 2015). Despite their relevance, there has been little empirical attention to how these policies were implemented on the ground. Studying how expropriations took place is not only important to understand the economic impact of land reform programs across the American continent; it also reveals the potential effectiveness of these international policies as tools of political influence during the Cold War.

This paper shows that organized groups of workers affected the implementation of one of the largest policies of the time: Salvador Allende’s land reform in Chile (1970-1973). After being elected president in a contentious election, Allende attempted to create a “democratic road to socialism” and used the existing land reform program to expropriate more than six million hectares with the goal of empowering agricultural workers. In this context, groups of workers exerted pressure to radicalize policies and accelerate the transition to socialism. We show that the collective actions of workers influenced the government to expropriate plots in certain localities and we interpret this response as an attempt to avoid an uprising (Acemoglu and Robinson, 2006).

Chile is an interesting case study for several reasons. Historically, the pressure from radical groups of workers has been suggested as a leading cause behind the economic collapse of Allende’s government and the 1973 coup that followed (Boorstein, 1977; Sigmund, 1977). We provide novel evidence of economic policy responding to workers’ actions and thus our results support the historical importance of these groups as sources of influence. Institutionally, the entity in charge of the land reform program kept records of all expropriated plots, allowing us to observe the location and date of expropriations. The collective actions of workers, as measured by land invasions, are also well documented in police reports with their exact locations and dates. These invasions reveal that

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<sup>1</sup>The program began with John F. Kennedy and the *Alliance for Progress* in 1961. The U.S. invested 20 billion dollars, from a total of 80 billion to be spent, during a ten-year period. See Taffet (2007) for economic details of the program, Darnton (2012) for a discussion about its origins, and Lowenthal (1991) for country case studies.

the pressure from workers to radicalize policies began to appear at different points in time across the country. We combine all these data to construct a panel dataset of counties observed monthly during the government of Salvador Allende.

The empirical strategy uses month-by-month invasions of plots and the number of expropriations across hundreds of agricultural counties in an event study research design to estimate the impact of collective action on policy implementation. This strategy exploits the staggered appearance of collective actions after Salvador Allende rose to power in November 1970. Differences in the dates and locations of these actions allow us to control for unobserved heterogeneity by county and month using fixed effects. We estimate that the initial invasion triggered an additional 6-7 invasions in the following 12 months and together these collective actions induced an additional 2-3 expropriations during the same period, an increase of almost 40%. This increase cannot be explained by the displacement of expropriations from the future. Moreover, invasions seem to have increased the intensity of the program as the total number of hectares expropriated increased by 20%. These results are robust to the removal of counties without invasions and to the removal of counties with a first invasion within three months of Allende's rule. Moreover, we obtain similar results if we allow for a demanding specification with time shocks across clusters of nearby counties and if we control for the availability of large plots interacted with Allende's period.

Why was the government responding to the collective actions of workers? The answer is far from obvious. One explanation is that Allende's government colluded with groups of workers to organize invasions and thus create a legal justification to expropriate these plots.<sup>2</sup> Although invasions were *not* a legal reason to expropriate, these actions can exert pressure for the landowner to offer the plot. An alternative interpretation of results is that radical groups of workers were threatening with a revolt and expropriations were implemented as an attempt to prevent uprisings. Historical and empirical evidence suggests the latter interpretation is relatively more important in the context of Salvador Allende's government. Radical political groups to the left of the coalition in power encouraged and assisted workers to invade plots, creating a "threat to the government's commitment to legality and controlled change" (Winn and Kay, 1974, p. 141).

We end our empirical analysis with a bounding exercise to calculate the aggregate contribution

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<sup>2</sup>In fact, there is some evidence of political parties coordinating land invasions with the goal of acquiring land in the context of a land reform program in Italy (Percoco, 2019).

of collective actions to expropriations. Event study estimates reflect within-country comparisons and thus the national effect is confounded by a potential displacement of expropriations across locations. We assume that displacement occurs across nearby counties and estimate a conservative displacement rate of 38%. Using this number we calculate that 6-15% of Salvador Allende's expropriations would not have taken in the absence of the collective actions of workers.

The importance of collective action is well documented across the social sciences. However, the empirical study of groups and their effect in the *implementation* of a policy at the micro-level is more limited.<sup>3</sup> In contrast, there is a relatively rich literature studying how collective action can affect policies theoretically. Researchers have emphasized the informational role of group actions and their potential effect in the policy-making process (Battaglini, 2017). The goal of most of these studies is to understand the conditions under which information can be aggregated, when it can be used by the policymaker, and when it can influence voters (Lohmann, 1993, 1994).<sup>4</sup> The main insight from this literature is that there exists a set of conditions under which groups can send signals with valuable and reliable information. We contribute to this literature by showing empirically how organized groups of workers affected the implementation of expropriations in the context of a large land reform program during the Cold War.

The re-distributive nature of land reform makes this paper also related to a literature studying the extension of voting rights under the threat of revolution (e.g. Acemoglu and Robinson 2000, 2006; Aidt and Franck 2015). A collection of results suggest that elites can choose to extend voting rights strategically in order to prevent an uprising, a process of enfranchisement that can also be interpreted as an increase in re-distributive policies (Meltzer and Richard, 1981). In contrast to previous research, we exploit month-to-month frequency of expropriations to emphasize that collective actions can also serve as revolutionary threats and affect the implementation of a policy.

The implementation of land reform programs across the world has also received a significant

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<sup>3</sup>Related studies have shown how collective action can affect the formation of political movements, political preferences, and the work of incumbent politicians (Madestam et al., 2013; Aidt and Franck, 2015; Larreboure and González, 2019). There is, however, a large literature studying social unrest, conflict, and their economic and political effects (e.g. Acemoglu and Robinson 2006). See Blattman and Miguel (2010) for a review of the early literature.

<sup>4</sup>Another part of this literature uses theory to understand why individuals participate in collective actions when there are private costs and the benefits are common to the group (Olson, 1965). There is also a small but growing literature attempting to answer this question empirically (e.g. Manacorda and Tesei 2020; Enikolopov et al. 2020; González 2020; Cantoni et al. 2019).

amount of attention from scholars. Previous research has suggested that collective actions affected the *redistribution* of plots in Mexico, Colombia, and Italy (Dell, 2012; López-Urbe, 2019; Percoco, 2019). However, that research uses mostly cross-sectional analyses and it does not differentiate between expropriation and redistribution of plots. As a consequence, the effect of collective action on policy implementation has been difficult to establish. In contrast, we exploit the timing in which collective actions appear using relatively high-frequency data. By using panel data this paper emphasizes the interactions between the policymaker and potential beneficiaries in a highly politicized context.<sup>5</sup> Finally, the study of land invasions is relatively more scarce and emphasizes the role of economic conditions in driving these actions, particularly in contexts of high inequality (Hidalgo et al., 2010; Albertus et al., 2016a).

## 2 HISTORICAL BACKGROUND

### 2.1 *Land reform and Salvador Allende*

Chile’s land reform program began in 1962 shortly after the creation of the Alliance for Progress, an economic program between the U.S. and Latin American countries to prevent a “second Cuba” in the region (Wright, 2000; Taffet, 2007). The original program contained a limited number of legal causes to expropriate a plot and thus only a few plots were expropriated by Jorge Alessandri’s right-wing government (1958-1964). However, after a second land reform law was enacted in 1967, president Eduardo Frei (1964-1970) was able to increase expropriations. This second law allowed to expropriate “large” or “inefficient” plots, the latter being relatively more discretionary because it was poorly defined (Loveman, 1976). The process intensified even more under Salvador Allende’s government (November 1970-September 1973). Allende rose to power after a contentious election in which he got 36.6% of the vote running under the umbrella of left-wing coalition known as Popular Unity (U.P. in spanish).<sup>6</sup>

The land reform program was a crucial part of Salvador Allende’s policy platform during the

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<sup>5</sup>An extensive literature has estimated the effects of land reform and expropriations. See Besley and Burgess (2000), Ghatak and Roy (2007), Albertus and Kaplan (2012); Albertus et al. (2016b), Fetzer and Marden (2017), Pino (2018), Uribe-Castro (2019), Montero (2019) among others, and González (2013), Lillo (2018) for the case of Chile.

<sup>6</sup>Recently declassified documents reveal that Richard Nixon attempted to prevent his confirmation at the Congress (Kornbluh, 2003; Qureshi, 2009). For more details about the land reform program see Garrido (1988); Huerta (1989); Bellisario (2007a,b) and Valdés and Foster (2015).

1970 presidential election. The program of the U.P. reveals the pillars of his plan: to nationalize all strategic and large companies, regulate prices, increase the wages of workers, and increase the intensity of expropriations in the context of the existing land reform program (Popular Unity, 1969). These policies had the goal to create a “democratic road to socialism.” Although the first half of Allende’s government was relatively successful, the second half was characterized by an economic collapse and social unrest (Boorstein, 1977, p. 111).

Chile’s experiment with socialism ended with a U.S. backed coup in September 1973 followed by a seventeen-year dictatorship (Qureshi, 2009). The relative contribution of internal versus external forces behind the fall of Salvador Allende remains debated. For example, Fidel Castro famously stated that “the Chilean experiment was failing because of Allende’s reluctance to become ‘more radical’” (Davis, 1985, p. 44). Internal forces came from left-wing groups and included included strikes, occupations, and land invasions (Haslam, 2005, p. 97). External causes included a U.S. “invisible economic blockade” propelled by president Richard Nixon to “make the [Chilean] economy scream” (Kornbluh, 2003, p. 83).

## *2.2 Land invasions as collective actions*

Land invasions were another key characteristic of the countryside during Allende’s rule. A number of historians have documented these invasions using case studies from different regions of Chile (e.g. Sánchez 2012; Redondo 2015; Robles-Ortiz 2018). The most common interpretation of these collective actions is that they represented a pressure from the countryside to increase the intensity or “radicalize” the land reform program (Robles-Ortiz, 2018; Navarrete, 2018). Scholars also emphasize the importance of Allende’s victory to increase the overall intensity of invasions, and the acquisition of land rights as invaders’ main objective (Bravo, 2012; Redondo, 2015).

Why did peasants use land invasions as strategy to improve their economic conditions? Peasants began to invade plots because landowners learned to simply replaced workers during traditional strikes, and invasions prevented them to do so (Bengoa, 1972). In addition, a change in workers’ demands was key, who moved from demanding better labor conditions to demanding ownership in the context of the agrarian reform (Redondo, 2015, p. 159). The increasing demand for land ownership was at least partially explained by the importance of land reform as a policy

during political campaigns in the eve of the 1970 presidential election (Petras, 1971).

Invasions were usually non-violent acts in which workers took control of a property's entrance, typically setting up a camp at the main gate (Robles-Ortiz, 2018). An example comes from the chronicles of American journalist Norman Gall: “[the invasion] of the Tres Hijuelas farm came just a few weeks after the inauguration of the Marxist *Unidad Popular* regime of President Salvador Allende, and was the visible beginning of the present wave of peasant insurrection (...) families from the neighboring *Reducción Alhueco* quietly threaded their way across the wheat fields of Cautín Province in southern Chile to pitch crude tents of wheat sacks and old blankets under a hillside cluster of eucalyptus trees on the farm (...) posting guards at the deserted clapboard farmhouse of the Fundo Tres Hijuelas – the Owner, Carlos Taladriz, lived in the neighboring town of Lautaro and was away in Santiago at the time – as well as at the machine shed, at the roadside entrance to the farm and at the bridge of planks that crossed over a small stream to the house. The only persons living on the 1,250-acre farm at the time were a shepherd and a tractor driver.”

An important question to understand the timing and intensity of land invasions is how were agricultural workers able to solve the collective action problem. This is a hard question to answer but we hypothesize that the 1967 unionization law was an important factor. This law effectively allowed workers in rural areas to collectively bargain to improve their labor conditions and therefore increased the benefits of collective action. Accordingly, unionization numbers began to rise after the enactment of this law. When Allende took office 140 thousand rural workers were unionized, and another 100,000 organized in cooperatives. Moreover, union membership grew by 50% during Salvador Allende's first year in office (Gómez and Klein, 1972).

Historical accounts support the idea that unions were instrumental for invasions. The majority of workers who participated in unions lived in rural estates, and were therefore better off than seasonal workers. Politically, unions supported the Christian democrats, but they became more radicalized after Allende's victory (Winn and Kay, 1974). The work of Robles-Ortiz (2018) provides a clear example of how unions were linked to land invasions: “the local *miristas* [left-wing radicals] decided to take over the Neltume estate [...] thus challenging the Popular Unity. The clash took place in the labour union assembly, which voted in favour of taking control of Neltume. The toma took place on December 9, 1970. It was carried out by some 390 workers ‘with the sup-

port of two extremists’ who were ‘university students and members of the MIR [left-wing radical movement]’.” According to this investigation, members of the radical left routinely engaged with workers organized in unions and together led invasions.

### 3 DATA AND DESCRIPTIVE EVIDENCE

This section describes the data sources we use to measure these historical processes. We then explain how we constructed the panel data used in the empirical strategy and offer a comparison of counties with and without invasions.

#### 3.1 *Land reform files and invasions*

To measure the implementation of the land reform program we use historical files documenting the universe of expropriations. An institution named Corporation of Agrarian Reform Expropriations (*Corporación de Reforma Agraria*, CORA) was in charge of these expropriations and kept administrative records of the entire process. The original data consists of 5,800 files, each one describing an expropriation in a two-sided sheet. The description includes the exact date of expropriation (month and year), the county in which the expropriated plot was located (there were 280 counties), the size of the plot in hectares, and the legal cause used to justify the expropriation.

Table 1 presents descriptive statistics that confirm the overall intensity of the program, and the legal causes used, across the three governments of the time. This table makes it clear that expropriations were very intense during the Allende years. Using the 1965 agricultural census as a benchmark we calculate that 2% of the total number of plots was expropriated during this period (4,298 plots), which constituted 20% of all agricultural hectares in the country (6.2 million hectares). Half of these plots and agricultural land was redistributed. Empirically, the three most important legal causes used by the corporation to expropriate plots were: (i) the plot was larger than 80 hectares, (ii) the plot was abandoned or inefficient, and (iii) the plot was offered by the owner. Under Allende’s government these causes explain more than 90% of expropriations.

Our work uses countrywide data during the Allende years, combined with the exact dates of expropriations, to study the implementation of this policy. Previous research has studied the



land reform program regionally (Robles-Ortiz, 2018), the long-run effects of redistribution (Cuesta et al., 2017; Lillo, 2018), and the political impacts of Eduardo Frei's policy (González, 2013). The study of the implementation of this policy at the micro level can lead us to reinterpret the long-run impacts and to put regional studies into a more general historical perspective. Figure 1-A presents the number of expropriations by month, revealing the stark differences between the two halves of Allende's government. Similarly, this is the first effort to combine the land reform files with land invasions data and unions in a countrywide dataset of counties observed monthly.

We also digitized the universe of recorded land invasions during the Allende years, which reveals new historical patterns. We measure the exact location and time of land invasions using data from police reports that were published by the Chilean Congress in May 1972 as part of Ordinary Session V in which the state of the countryside was discussed. The origins of the data can be found in allegations of a congressman who accused the government to orchestrate these invasions to intensify the land reform program. After several rounds of discussions with the Ministry of Agriculture, the congressman mandated the Ministry of the Interior to construct a registry with all the invasions. The police was in charge of constructing this report, which they sent to the congress, generating a discussion about invasions, expropriations, and the role of the government. We account for the inherent reporting bias in these reports by using county-level fixed effects.

Although previous research has used qualitative information from the reports as part of regional studies (Sánchez, 2012; Redondo, 2015), the universe of the data in this report has never been used before to construct a national study. Moreover, a quantitative analysis of these invasions and its relation to expropriations has been notably absent. The report includes 1,747 land invasions happening between November 1970 and April 1972 with the *county* in which each one took place. We complement these data with the number of invasions by *province* before Allende reported in Klein (1972). Provinces are larger administrative units than counties, so we employ counties throughout the analysis but complement it with province data when needed. Figure 1-B presents the number of land invasions per year. Taken together, all of these sources confirm that most invasions took place under Allende's government (1,700 of 2,200), although the increase in invasions began before his government, a pattern that has not been recognized before and that we hypothesize is related to the 1967 unionization law. Figure 2-A presents the number of invasions per month,

revealing a significant amount of persistence and variation in their intensity throughout this period.

### 3.2 *The importance of unions*

We hypothesize that the historical origins of invasions can be found in the 1967 unionization law previously described. As a consequence of this law the number of unions spread rapidly throughout the country. We digitized data on the number of *sindicatos* (unions) by county, registry originally constructed by Gómez and Klein (1972) to understand the state of local organizations. The authors define their work as a census derived from their collaboration with the Institute for Agricultural Development, an entity created by the agrarian reform law which operated under the umbrella of the Ministry of Agriculture. The goal was to “develop a global quantitative report of public use that serves as a guide for workers in the agricultural sector” (p. 1, own translation). This census was implemented between the last week of January and the first week of February of 1972. Most of these unions met weekly or monthly.

These data supports the existence of a link between unions and invasions. Figure 3-A shows that there is a positive partial correlation between unionization per county and invasions. Moreover, Figure 3-B shows a similar province-level relationship between these variables in the period 1967-1970. This is, unions seem to have helped to coordinate invasions, and this suggestive evidence appears both during Allende but also before. This evidence is revealing as most previous studies argue that it was the election of Allende that triggered invasions. This and previous patterns suggest that his election could have accelerated this process, but invasions and their foundations were there before his arrival. Figure A.1 and Table A.1 add control variables to this analysis to show that this is a robust correlation. Overall, we interpret these patterns together with historical accounts as suggestive evidence consistent with our hypothesis regarding the importance of this law.

### 3.3 *Descriptive statistics*

We constructed a panel of 221 counties observed between November 1969 and December 1973 for a total of 11,050 county-month observations.<sup>7</sup> A county enters our final sample if it experienced

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<sup>7</sup>Land invasions data only spans the period between November 1970 and April 1972, but we add expropriation data before and after these dates to improve our event study design described in the next section.

at least one occupation or one expropriation during this period. There are 176 (80%) counties with at least one invasion and 45 counties (20%) with zero invasions but at least one expropriation. Counties without expropriations and invasions host mostly urban centers or very small towns. Figure A.2 presents a map of the country with expropriations, invasions, and the final sample of counties. The average county in the final sample experienced 8 land invasions between November 1970 and April 1972, i.e. 0.43 invasions per month or 2.6 invasions every 6 months. A total of 12 plots were expropriated in the average county, i.e. one every two months.

We also use data from the 1955 and 1965 agricultural censuses originally digitized by Cuesta et al. (2015). From this data we obtain measures of agricultural production at the county level, a land inequality measure (gini), the number of agricultural workers, agricultural equipment, and plot sizes. Although we cannot combine the agricultural censuses with expropriations data at the plot level, we can do this at the county level. The census data provides us with a baseline measure of the state of the agrarian economy at the local level before the land reform process and invasions began. We also digitized electoral outcomes from the 1970 presidential election.

Table 2 offers a comparison of these variables across counties with and without invasions. Columns 1 and 2 present the average and standard deviation. Column 3 presents the difference between averages in previous columns and its statistical significance. Counties that experienced invasions have on average more plots and more agricultural workers. Although at the time Chile exhibited high inequality and volatile economic conditions, counties with and without land invasions had similar economic characteristics, as measured by inequality in land property rights and productivity per hectare or worker. Similarly, both types of counties had experienced the agrarian reform similarly until 1969 and were located at the same distance of the capital.

In terms of political affiliation and organizational characteristics, the two groups of counties exhibited similar political support for Allende in the 1970 presidential elections and similar political participation as measured by total votes over population in 1970. Finally, the number of social organizations per 10,000 inhabitants formed before Allende's government is slightly higher in counties with invasions but the difference is not statistically significant at conventional levels.<sup>8</sup> All in all, we conclude that the two sets of counties were somewhat different, reinforcing the im-

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<sup>8</sup>These organizations include any non-profit group registered in the official state institution. Examples of these are sport and social clubs, neighbors' organizations, and religious groups.

portance of using county-level fixed effects to account for these differences.

#### 4 EMPIRICAL STRATEGY

To estimate the effect of the collective actions of workers on expropriations of agricultural plots, we use an event study research design. This method is a generalization of a difference-in-difference model in which the “treatment” occurs at different points in time and was popularized by financial economists (Campbell, 1997). Crucial in this methodology is the definition of the “event” (i.e. the treatment) to be studied. We define the event as the *first* invasion of a plot after November 1970, when Allende rose to power. In contrast, we could have studied *all* invasions. However, first invasions were arguably exogenous and thus unexpected while subsequent invasions were not. An example of this comes from an important agricultural region in the south of the country, where the first wave of invasions “took Panguipulli by storm in the summer of 1971” (Robles-Ortiz, 2018, p. 13). Importantly, invasions could have been part of a “package” of political actions unobserved to us and therefore we interpret invasions as a proxy for the collective actions of workers.

Motivated by the previous observations, we centered the data around first invasions and focus on the months before and after these events, which allows us to control for county- and month-level unobservable variables by using fixed effects. The strategy effectively exploits the *timing* in which invasions began to appear in different parts of the country. We begin by using a semi-parametric version of this strategy and estimate the following regression equation by ordinary least squares:

$$Expropriations_{ct} = \sum_{k=-12}^{12} \beta_k D_{ct}^k + \gamma_c + \lambda_t + \varepsilon_{ct} \quad (1)$$

where  $D_{ct}^k$  are a set of indicators for the months before and after the first invasion in a county, e.g.  $D_{ct}^1$  is equal to one in county  $c$  in month  $t$  only if the first land invasion took place in the previous month. In addition,  $\gamma_c$  and  $\lambda_t$  are a full set of county and month fixed effects, which control for unobserved time-invariant differences across counties and temporal factors affecting all counties. The former accounts for the fact that some counties are simply more exposed to land reform because of, for example, their economic structure, and the latter for reasons such as the arrival of a socialist government increasing the probability of expropriations. The error term  $\varepsilon_{ct}$

has a mean of zero and we allow it to be correlated within counties over time.

The coefficients of interest are  $(\beta_{-12}, \beta_{-11}, \dots, \beta_{12})$  and measure the change in expropriations in the twelve months before and after the first invasion of a plot in Allende's government.<sup>9</sup> Operationally, the indicator  $D_{ct}^0$  takes the value of one in the month of the first invasion and we omit the indicator  $D_{ct}^{-1}$  from equation (1). Therefore, the coefficients of all remaining indicators need to be interpreted relative to the month before the event. For example, if  $\beta_1 > 0$  then there was increase in the number of expropriations in the following month after the first invasion, relative to the month before the event. In this sense, the coefficients  $\beta_k$  with  $k \in [-12, -1]$  serve as a measure of the trend in expropriations in a county before it experienced the first invasion.

Equation (1) can be considered a fairly non-parametric estimate of how land invasions affected expropriations. As complement, we also estimate the following parametric version:

$$Expropriations_{ct} = \beta D_{ct} + \gamma_c + \lambda_t + \varepsilon_{ct} \quad (2)$$

where  $D_{ct}$  takes the value of one for the twelve-month period after the first invasion and zero otherwise. Note that in this equation  $\beta$  captures the *average* change in expropriations in the months after the event, and we are also imposing that the coefficients before the event are zero. In this sense, this equation contains fewer information and more restrictions but it is nevertheless useful because it is a simpler model and it allows us to improve efficiency by estimating fewer parameters. All remaining variables in equation (2) are defined as in equation (1).

Column 4 in Table 2 presents suggestive evidence for the validity of our design. Our concern are omitted variables changing over time that affected the appearance of first invasions and expropriations. To check for this we estimate a cross-sectional regression using the month of first invasion across counties as dependent variable and a large set of pre-determined variables as predictors.<sup>10</sup> Column 4 presents estimates and their standard errors using standardized predictors to facilitate their interpretation. In almost all cases a one standard deviation in a predictor has a

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<sup>9</sup>In order to estimate the coefficients for the twelve months before the arrival of Allende and the twelve months after the end of the invasions data, we use the panel of expropriations from November 1969 until December 1973.

<sup>10</sup>The month of first invasion takes the value of one if the first invasion was in November 1970, and increases by one each chronological month since that date until the value of 18 if the first invasion was in April 1972 (last month in our invasions data). The average of this variable is 4.7 and its standard deviation is 3.8.

small and statistically insignificant effect in the month of first invasion. The exceptions are productivity per hectare and distance to Santiago: more productive counties located closer to Santiago experienced first invasions later on. Moreover, province-level invasions before Allende have little predictive power of the average month of first invasion in a province. All in all, the timing of first invasions appears unlikely to be driven by variables that affected expropriations.

Finally, we emphasize that there are modeling decisions when estimating equations (1) and (2). These decisions are important for both interpreting results and to check for their robustness. In the first place, we measure expropriations in different ways, including the total number of plots expropriated, the total number of hectares expropriated, and the percentage of hectares in the county that were expropriated, among others. In addition, when estimating equation (1) we can only consider first invasions during Allende’s government because invasions by month are unavailable for other periods. As expected, many of the first invasions in the data occurred at the beginning of the new government. Thus in the following section we check if the dispersion of events has some effect on results. And third, given the observed differences between counties with and without invasions we estimate both equations using (i) all counties, and (ii) counties with at least one invasion.

## 5 MAIN RESULTS

Using the previously described event study research design, this section shows that the collective actions of workers affected the intensity and location of expropriations. We then present and discuss a battery of empirical exercises that suggest these results represent robust findings.

### 5.1 *Invasions and local political actions*

Figure 4-A present estimates of  $\beta_k$  in equation (1), with their corresponding 95 percent confidence interval, using land invasions as dependent variable. The motivation to begin with this specification is that after the first plot was invaded by agricultural workers there might be more invasions and political actions afterwards. Testing for the dynamics of these collective actions is important to understand the event in our research design. The  $x$ -axis in this figure denotes the months relative to the first land invasion ( $t = 0$ ) and the  $y$ -axis measures the change in the number of invasions. The

coefficients to the left of the event represent invasions before the first invasion and are by definition equal to zero. The coefficients to the right measure the change in land invasions after the first one.

The estimated coefficients reveal that in the months following the first invasion in a county there are significantly more invasions within the same location. In particular, in the month of the first invasion there were on average 1.6 invasions. This is, it was usual that the first invasion came together with another invasion. This result is consistent with the notion that invasions were part of a package of political actions. Moreover, in the following six months we observe approximately four more invasions, an increase of approximately 150 percent over the sample average. The number of invasions within months 6 and 12 of the first invasion also increases, but in a smaller magnitude than in the first six months. Estimates of equation (2), the parametric version of the event study, show similar magnitudes and can be found in Table 3 column 1.

The dynamic pattern of land invasions across the country is important because it means that the majority of invasions were not randomly allocated across space and time. Indeed, invasions were significantly more likely to occur after the first one took place. There are multiple potential explanations for this pattern, including the diffusion of information, social effects, and packages of political actions. Regardless of the explanation, this result implies that when we study expropriations in the months after the event, the estimated coefficients represent the effect of multiple political actions which were triggered by the first one. In this sense, our strategy relies on the plausibly exogenous timing of *first* invasions across the country.

## 5.2 Policy implementation: Expropriations

Figure 4-B presents estimates of equation (1). The omitted category is the month before the first invasion. These estimates show that the total number of plots expropriated in a county increased significantly after the first plot was invaded. All coefficients after the event are positive and most are statistically significant ( $p$ -values $<0.05$ , except for the first and last two). By integrating coefficients, we calculate that there were on average 2-3 more plots expropriated within six months of the event. Given that all coefficients after the event are positive, the displacement of expropriations from months in the future to the present is unlikely to be an explanation behind our results. In terms of elasticities, the number of monthly expropriations increased by approximately 20%

(Figure A.4-A). Similarly, the intensity of expropriations also increased between months 6 and 12 but in a relatively smaller magnitude. The effect of invasions appeared two months after the first invasion and peaked for about three months before slowly fading out.

Importantly, the number of expropriations did not exhibit a trend *before* the event. All coefficients before the first invasion hover around zero, are statistically insignificant at conventional levels, and the point estimates are of remarkable small economic magnitude. Our identification assumption is that in the absence of a first invasion the number of expropriations would have been similar, a counterfactual that in this case corresponds to other counties without (yet) a first invasion. Although essentially untestable, the absence of pre-trends before the study and the high-frequency of the data suggest this assumption is likely to hold.

Similarly to the increase in the number of plots expropriated, Figures 4-C and 4-D show that the probability of a county experiencing at least one expropriation and the number of hectares expropriated also increased. In the former case we estimated our main equation using an indicator that takes the value of one if the county experienced at least one expropriation and zero otherwise. In the latter, we use the logarithm of hectares expropriated.<sup>11</sup> In the months following the first invasion the probability of a county experiencing an expropriation in a month increased by an average of 2-3 percentage points, with a peak of 8-10 percentage points within months 3-5, from a base of 17% in the sample average. The number of hectares expropriated increased by 21% in the average county with a peak of 70-80% again within months 3 to 5. In both cases the absence of statistically significant trends before and the fading out of expropriations after the sixth month remains as a characteristic of the estimates. As a consequence of these patterns, the average size of an expropriated plot increased (Figure A.4-B).

Table 3 presents estimates of equation (2) using the same four previous outcomes. This specification is a relatively more parametric version of equation (1) in which we constrain coefficients before the event to be equal to zero and estimate a single indicator variable for the period after the event. Then, the coefficient associated with the latter indicator captures the average increase in a single month. Column 1 shows that the first invasion was followed by 0.6 invasions each month. In column 2 we observe that there were an additional 2.2 plots expropriated within one year of the

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<sup>11</sup>Because many county experienced zero expropriations in a month, we use the hyperbolic sine transformation proposed by Burbidge et al. (1988), which in this case allow us to interpret coefficients as semi-elasticities.



event ( $0.18 \times 12$  months), an increase of 27% over the annual average. Finally, column 3 shows the probability of experiencing at least one expropriation increases by 3 percentage points in a given month and the number of hectares expropriated increased by 21% twelve months after the first plot was invaded. Table 4 shows that two-thirds of these expropriations used the legal cause of large plots, while one-third was a plot offered by the owner to the corporation. The remaining causes were barely used after an invasion took place.

### 5.3 *Robustness of results*

This section provides statistical exercises that check for the robustness of previous estimates. We begin by addressing the fact that most events took place at the beginning of Allende's rule. Then we show that results are unaffected by our specification decisions. We end the section by presenting and discussing more flexible specifications that account for unobserved heterogeneity over time across groups of nearby counties.

Half of the counties in our sample experienced a first invasion within three months of Allende's government. This dispersion of events could constitute a threat to the validity of our research design if unobserved time shocks in the beginning of the new government coincide with the location of counties experiencing a first invasion. An example of this are the local elections held in April 1971, which could be driving the timing of expropriations. To test for this concern, we remove from the estimation all counties with a first invasion within three months of Allende's rule. This restriction ensures that the events are relatively spread throughout the period of study, minimizing concerns about unobserved time shocks. Column 1 in Table 5 presents results. The estimated coefficient is still positive, statistically significant, and of similar magnitude than when using the full sample. If anything, the point estimate is actually larger than before (0.26 versus 0.21). We conclude that the dispersion of events is unlikely to be driving results.

Approximately 20% of our sample of agricultural counties never experienced an invasion. In terms of observable variables, Table 2 shows that these counties were somewhat different from other counties. Hence, never-invaded counties might constitute a poor counterfactual and could produce bias in our estimation in the presence of unobserved time factors interacting with some fixed county characteristic. To check for this potential threat we estimate equation (2) using only

the sample of 176 counties with at least one invasion in the period of study. When imposing this restriction, identification arises only from the *timing* in which first invasions began to appear across counties. Results are presented in Table 5 column 2. Estimates remain of similar magnitude and statistical significance and hence this is unlikely to be a concern. Similarly, results are also robust to different measures of the dependent variables (Table A.2).

Yet another potential threat is the presence of correlated unobserved time shocks. A leading concern is the availability of large (expropriable) plots which made the county subject to expropriations and invasions right from the beginning of Allende’s government, perhaps creating a spurious correlation between these variables. Reassuringly, results are similar when we control for the county-level availability of large plots – as measured by the 1965 agricultural census – interacted with time (calendar) fixed effects (Figure A.5). More generally, any time-variant policy that affects counties in the south or the north of the country differentially constitutes a potential threat. To address these concerns we estimate equation (2) using region-by-year fixed effects. Chile was divided in 13 regions, administrative units composed by clusters of counties. This specification allows for non-parametric regional trends in both invasions and expropriations. Column 3 in Table 5 present estimation results for the four expropriation outcomes and estimates remain virtually unchanged. In addition, column 4 shows that all results are robust to the inclusion of county-specific linear trends. Finally, our inference remains unchanged when using two-way clustering to allow correlation of outcomes within event dates (Brown and Warner, 1985), and it is also similar when we allow for spatial correlation across counties during each time period (Conley, 1999).<sup>12</sup>

## 6 MECHANISMS AND INTERPRETATION

This section evaluates two interpretations of previous results. First, we analyze if the actions of workers can be considered a threat to revolt. Second, we evaluate the possibility that collective actions were orchestrated by the government to facilitate expropriations. We end this section by offering back-of-the-envelope calculations of the aggregate effects of invasions.

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<sup>12</sup>Figure A.6 presents results. To allow for spatial correlation we use a heteroskedasticity and autocorrelation consistent covariance estimation with distances from the centroids of counties and a Bartlett kernel. Results are also similar if we follow Bertrand et al. (2004) and group months into larger periods such as quarters (Figure A.7).

### 6.1 *The threat of a revolution and collusion*

Historians have emphasized that organized groups invaded plots to try to exert pressure on the government to radicalize policies and increase redistribution in the short-run (e.g. Robles-Ortiz 2018).<sup>13</sup> This is also a classical theoretical argument formalized by Acemoglu and Robinson (2006). Under this framework, the government observes invasions and chooses to either repress collective actions or expropriate the plot. If repression is chosen, there is a probability of a revolution and the government could be overthrown or impeded to follow its economic and political plans. Then, if we observe the government expropriating after an invasion, we say that existing conditions made the latter option more attractive because of the “threat of a revolution.”

Another interpretation of results is that the government was orchestrating invasions to facilitate expropriations. Although none legal cause can appeal to invaders as a reason to expropriate, the government could have incentivized workers to invade plots with the goal of exerting pressure on the landowner to offer it to the corporation. This legal cause accounted for 22% of expropriations in the Allende years (see column 3 in Table 1), therefore at first sight this interpretation might be important. However, historical analysis suggests that Allende could have orchestrated invasions only towards the end of his government. In contrast, radical left-wing groups outside of the government seem to have triggered most of the early invasions, which lends credibility to our econometric focus on early invasions and the “threat of a revolution” interpretation. Moreover, a battery of empirical exercises suggest that a potential collusion between Allende and invaders is unlikely to explain the empirical relationship between invasions and expropriations we have documented.

The role of left-wing radical groups in triggering early invasions has been previously documented by historians, and the majority claim that the goal was to exert pressure to radicalize the land reform program and “speed up” the revolution. The most well-known groups exerting this pressure were the Revolutionary Left-wing Movement (MIR) and the Peasant Revolutionary Movement (MCR). An example of the role of the former comes from Winn and Kay (1974, p. 141), who emphasize its role early on: “With the encouragement and assistance of MIR, the revolutionary movement to the left of the Unidad Popular, these tomas [invasions] had assumed powerful

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<sup>13</sup>Some scholars argue that social movements aiming to pressure Allende are one of the explanations behind the social instability and Allende’s overthrow. See Goldberg (1975); Sigmund (1977) for a discussion.

proportions by the first months of 1971. To the Allende government, this pressure from below represented both an opportunity for speeding up the rural revolution and a threat to the government's commitment to legality and controlled change.”<sup>14</sup> Similarly, Robles-Ortiz (2018, p. 142) emphasize the role of the MCR in triggering some of these early invasions: “Confronting the workers, Governor Hodges argued that the toma [invasion] was illegal, and it would only be prejudicial to President Allende, because the opposition would use it to blame the government for the ‘state of chaos’ in the countryside. Hodges did not persuade the MCR workers; an MCR ‘emissary’ went to his office to inform him that they would take over all the cordillera latifundia.”

To empirically assess a potential role of the government in driving our results, we performed three empirical exercises. First, we have reestimated our main specification exploiting only the first invasions that occurred within six months of Allende's government. We do this to be conservative and assume that invasions towards the end of 1971 and 1972 could have been orchestrated by the government. Reassuringly, panel (a) of Figure 5 shows that results are similar, suggesting that estimates are unlikely to be driven by government actions. Second, Winn and Kay (1974) argue that some invasions were planned by the government at the regional level. At the time Chile was divided in 13 regions. These plans could constitute a threat if we are omitting regional factors driving invasions and expropriations. However, results in panel (b) of Figure 5 are again similar when we include region-by-month fixed effects, suggesting unobservables at the regional level are unlikely to be an econometric threat. And third, if the government planned invasions we might expect this to occur in places where they had more political support. However, Figures A.8 shows that invasions were if anything more likely to have taken place in locations where Allende obtained *fewer* votes in the 1970 presidential election. In sum, the evidence is inconsistent with a role of the government in driving the empirical relationship between invasions and expropriations.

## 6.2 *Local and aggregate effects of invasions*

Our estimates represent the impact of first invasions after Allende rose to power using other counties as counterfactuals over time. Without further assumptions, these within-country comparisons

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<sup>14</sup>The pressure from invasions was not envisioned by Allende: “Another active form of peasant participation in the expropriation process, one not envisioned in the UP program, has been the tomas [...] The tomas were a form of pressure on the government bureaucracy to accelerate the expropriation process [...]” (Winn and Kay, 1974, p. 143).

prevent us from gauging the total amount of land expropriated because of these collective actions. In this sense, our results should be interpreted as the *local* impact of invasions. It is certainly possible that these expropriations could have taken place in a different location or moment in time.<sup>15</sup> Although this potential displacement does not invalidate previous estimates, it affects our interpretation of the importance of invasions for the intensity of expropriations. To estimate the *aggregate* amount of land expropriated because of these actions we need (i) an estimate of the total amount of hectares expropriated in a world in which Allende is in power but invasions did not take place anywhere, or (ii) an estimate of the structure and strength of displacement rates. We now attempt to provide bounds for these numbers.

We argue that temporal displacement within counties seems unlikely to be a concern in our context. In this case we worry that an invasion-induced expropriation in time  $t$  would have occurred anyways in some time  $t + \tau$  with  $\tau > 0$ . However, we note that if  $\tau$  is lower than 12-months and displacement occurs, we should observe a *decrease* in expropriations at some point in the 12-months period of time after the first invasion. In contrast, Figure 4 reveals that all point estimates in this period are positive.<sup>16</sup> Spatial diversion of expropriations is likely to be more relevant. Unfortunately we lack a counterfactual for the country as a whole, so the best we can do is to generate bounds for the aggregate importance of invasions by imposing structure on displacement.

We begin with two simple benchmarks using (i) expropriation trends in counties without invasions, and (ii) our estimates from previous sections. Panel (a) in Figure 6 presents the former case. Expropriations were increasing in both types of counties between 1962 and 1970. After Allende rose to power expropriations kept increasing, but the increase was larger in counties with invasions. In the absence of displacement across counties with and without invasions we can recover how expropriations changed due to invasions by simply using the trend change from counties without invasions, effectively using these locations as counterfactual country under Allende.<sup>17</sup> The *increase* in expropriations in these counties after 1970 is perhaps suggestive of little displacement.

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<sup>15</sup>This could be the case if, for example, the government has limited capacity to implement expropriations and invasions are diverting the implementation of this policy from one place to another.

<sup>16</sup>Unfortunately we cannot test the possibility of temporal displacement in a longer period of time because of the 1973 coup that ended the Allende government.

<sup>17</sup>Although counties with invasions differed in other dimensions that also affect expropriations, note that we are extrapolating the linear trend from the years before 1970, so we are accounting for this in a parametric fashion. Estimates are larger if we consider the 1967-1970 period to calculate this trend, so our calculations are conservative.

This calculation suggests that 1.4 million hectares were expropriated because of invasions. This number corresponds to 23% ( $1.4/6.2$ ) of Allende’s expropriations. Similarly, we can assume no displacement and use our estimates from section 5.2. In this case, there were 176 first invasions causing an increase in hectares expropriated per month over a 12-month period, for a total of 0.6 million hectares expropriated due to invasions, or 10% of Allende’s expropriations.

We interpret the 10-23% numbers as lower and upper bounds for the aggregate effects of invasions in the absence of displacement. Panel (b) in Figure 6 shows how these bounds mechanically decrease in the presence of displacement. We are unfortunately unaware of estimates of displacement for the implementation of policies such as expropriations. Therefore, it is a priori unclear to us what displacement rate could be reasonable. As an exercise, we assume that displacement occurs only across *adjacent* counties. In practice, we estimate equation (2) using the sum of hectares expropriated in the three closest counties as the dependent variable. A negative estimate would indicate the presence of displacement. However, after the first invasion in a county we estimate that expropriations *increased* by 300 hectares in nearby counties. We can conservatively use the confidence interval  $[-100, 700]$  and reject a displacement rate larger than 38% ( $-100/261 = 0.38$ ).<sup>18</sup> Using this rate as yet another bound, we calculate that the contribution of invasions to the aggregate number of hectares expropriated during the Allende years lies in the interval 0.4-0.9 million hectares or 6-15% of expropriations in this period. The area expropriated due to invasions is equivalent to 10-23% of expropriations implemented by Eduardo Frei or approximately the size of Puerto Rico.

## 7 CONCLUSION

The role of collective action as a factor that can affect the implementation of a policy has been relatively overlooked empirically. In this paper we have studied Chile’s peasant social movement in the beginning of the 1970s and the implementation of Salvador Allende’s land reform program to show how organized groups of agricultural workers affected the location and intensity of expropriations. We find that in the months following the invasion of a plot the number of plots and

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<sup>18</sup>We also used the five and ten closest counties and reject any rate of displacement, i.e. confidence intervals are always positive. Of course, the displacement structure could be more complex than across adjacent counties – as in Dell (2015) – but the potential number of structures is large and we test for the most intuitive one.

the number of hectares expropriated in the same area increased significantly. We argue that the government is expropriating plots after invasions to avoid an uprising.

Understanding the interactions between organized groups of individuals and the response of the state is likely to be an important area of study in the next years. The availability of new information technologies has decreased the cost of coordination significantly and hence collective actions are likely to be more common (Enikolopov et al., 2020). In our context the unionization law of 1967 acted as a decrease in the cost of coordination and hence land invasions and other collective actions spread throughout the country. We believe this historical context then provides a useful case study to understand the interplay between organized groups and the policymaker.

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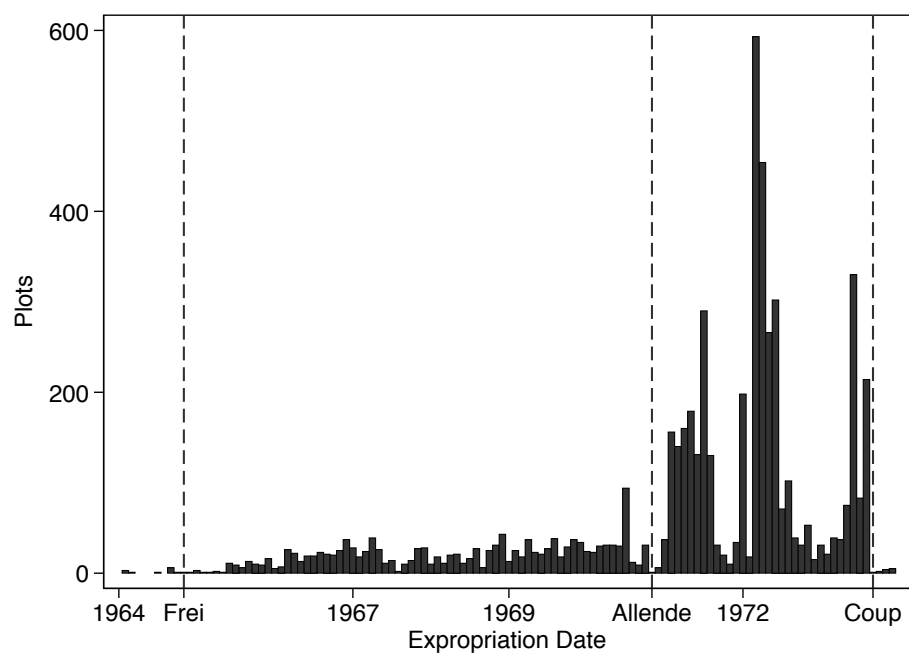


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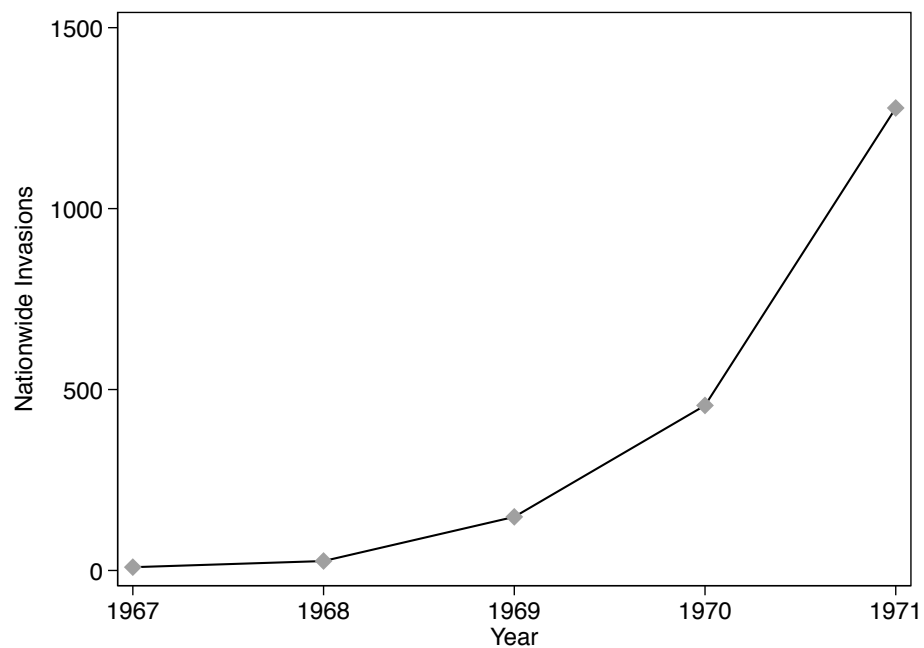
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**Figure 1:** Implementation of Chile's agrarian reform and land invasions



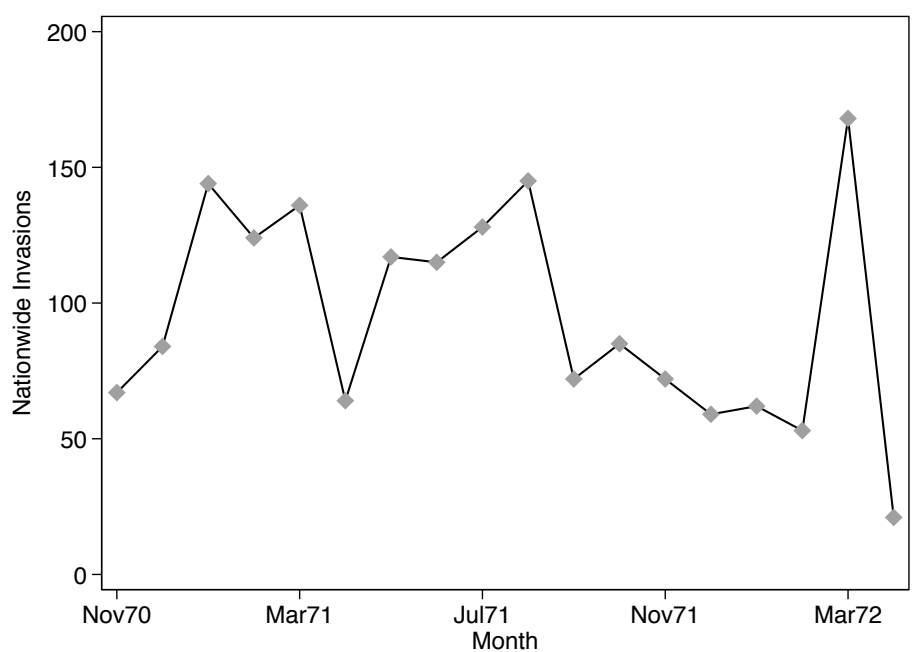
(a) Number of plots expropriated



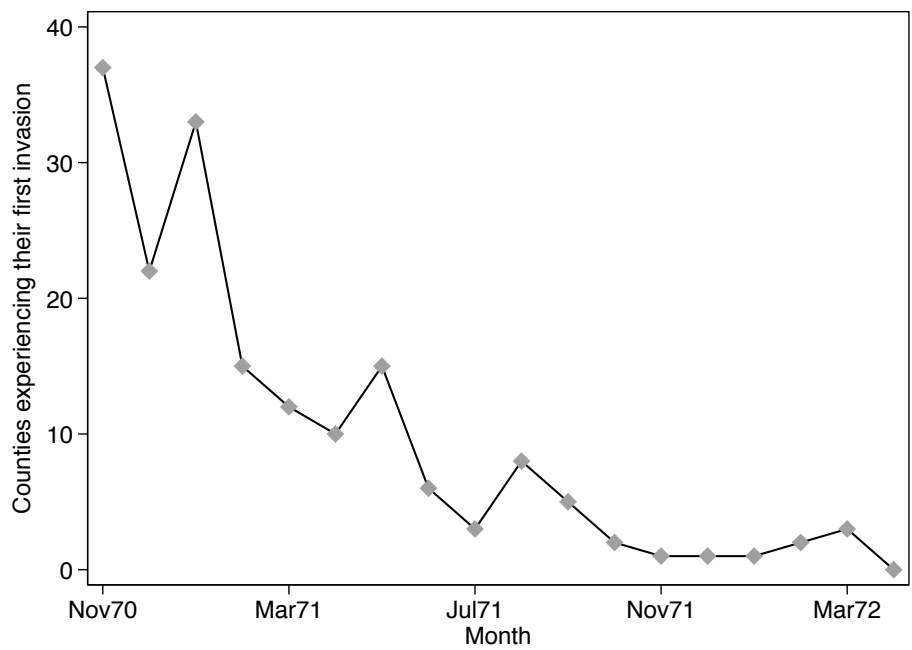
(b) Number of land invasions

Notes: Own construction based on land reform data files and police reports of land invasions.

**Figure 2:** Land invasions during Salvador Allende’s government



(a) Land invasions by month



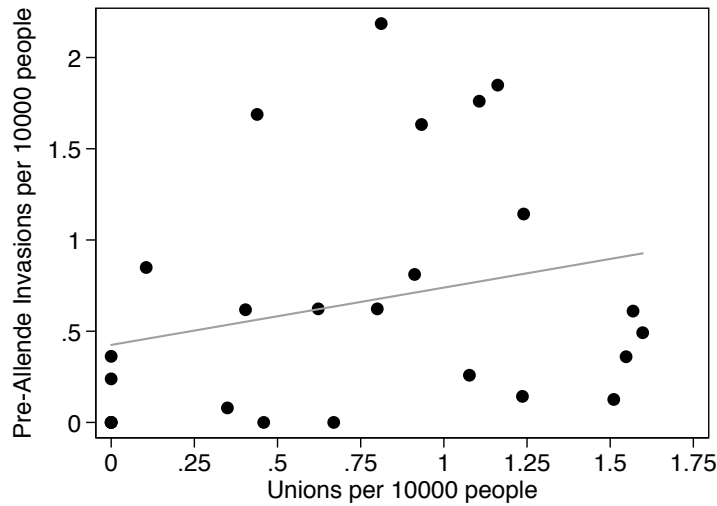
(b) Counties experiencing first invasion

Notes: Own construction based on police reports of land invasions.

**Figure 3:** Land invasions and the 1967 unionization law



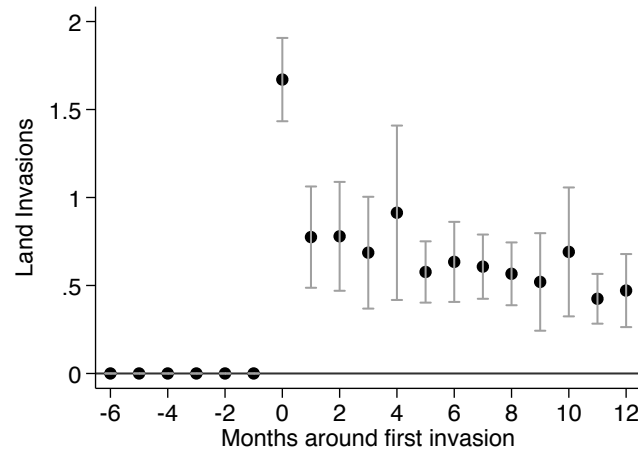
(a) Unions and invasions *during* Allende's government (1970-73). County-level relationship.



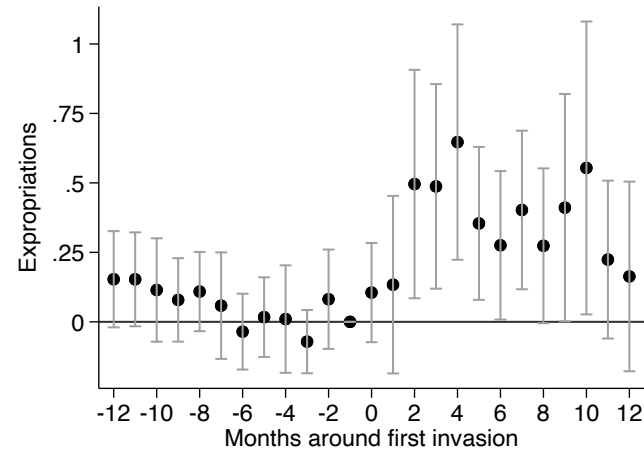
(b) Unions and invasions *before* Allende's government (1967-70). Province-level relationship.

Notes: Panel (a) presents a bin scatter plot and linear fit between the number of land invasions per 10,000 inhabitants in the period 1970-1972 (y-axis) and the number of unions per 10,000 inhabitants (x-axis) at the county level. Panel (b) presents a scatter plot and linear fit between the number of land invasions per 10,000 inhabitants in the period 1967-1970 (y-axis) and the number of unions per 10,000 inhabitants (x-axis) at the province level. Data on invasions before 1970 is only available at the province level. Both panels are own construction based on police reports of land invasions and data on the number of unions from Gómez and Klein (1972).

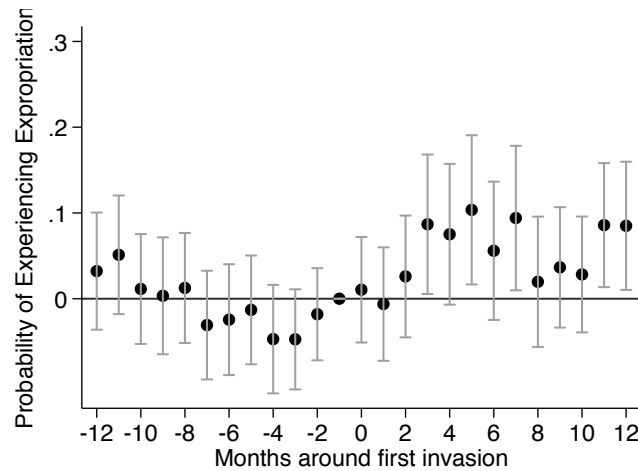
**Figure 4: Land invasions and expropriations**



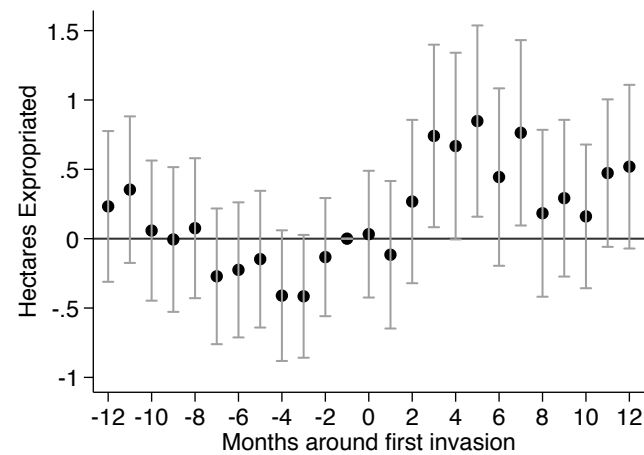
(a) Land invasions and more invasions



(b) Number of plots expropriated



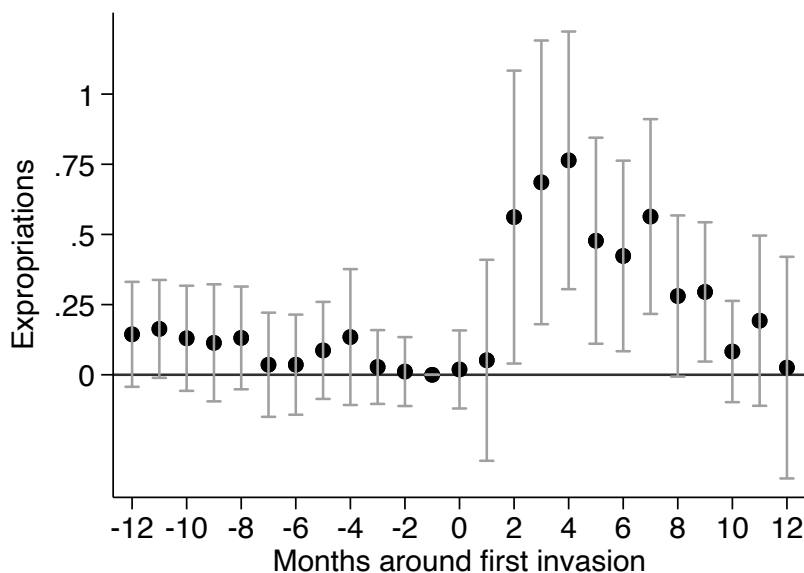
(c) Probability of expropriation



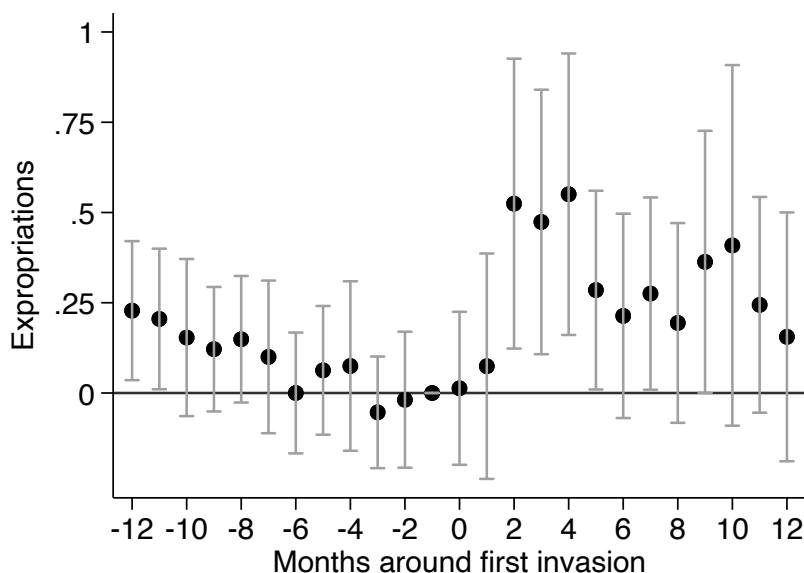
(d) Hectares expropriated

Notes: These figures present estimates of equation (1) with their corresponding 95 percent confidence interval. Each panel uses one of four different dependent variables.

**Figure 5:** Collusion between workers and the government



(a) Using only early invasions

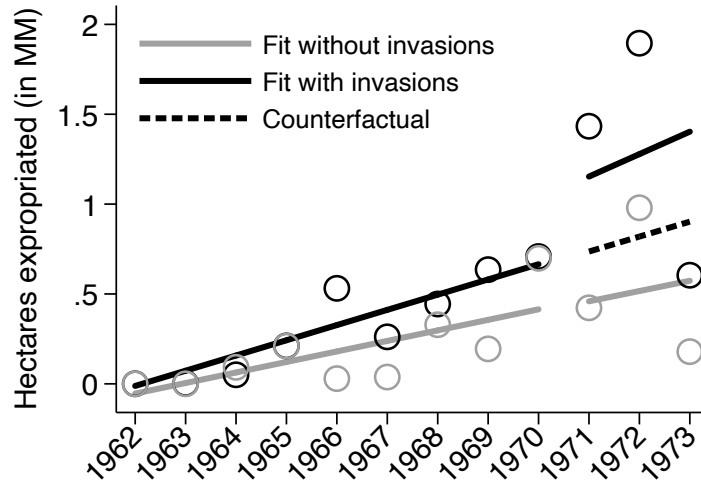


(b) Region-by-month fixed effects

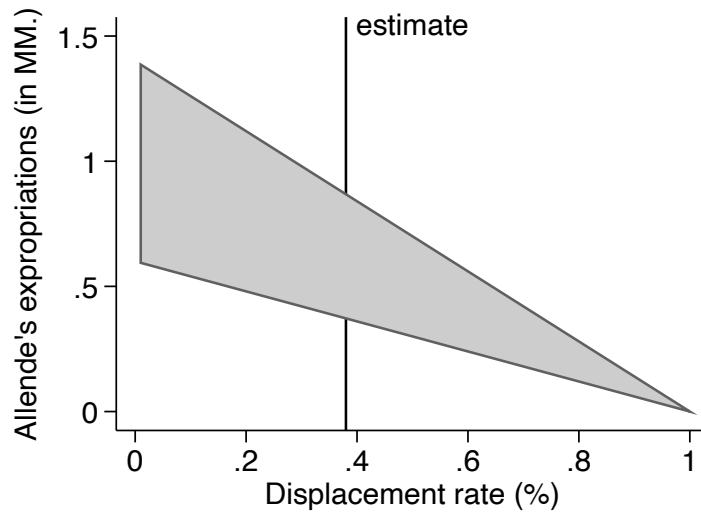
Notes: Panel (a) presents estimates of equation (1) with their corresponding 95 percent confidence interval using only invasions within 6 months of Salvador Allende's government (November 1970 - May 1971). According to historical accounts these early invasions are unlikely to be orchestrated by the government. Panel (b) presents estimates using our main specification but augmented with region-by-month fixed effects, administrative unit in which the government appears to have organized some invasions. Both panels constitute evidence against the collusion mechanism.



**Figure 6: The aggregate effect of invasions**



(a) Upper bound



(b) Upper and lower bounds

Notes: Results from a bounding exercise to calculate the aggregate effects of land invasions on the total amount of hectares expropriated by Salvador Allende. Panel (a) uses the trend change in counties without invasions as an estimate for expropriations in a counterfactual Allende government without invasions. Panel (b) uses our main estimates (lower bound) and the counterfactual exercise (upper bound) to provide bounds for the aggregate effect under different displacement rates. In the paper we estimate a conservative displacement rate of 38%. Then we calculate that Allende expropriated between 0.4 (lower bound) and 0.9 (upper bound) million hectares because of land invasions. More details in section 6.2.

**Table 1:** The land reform program under different governments

	Jorge Alessandri (1958-1964)	Eduardo Frei (1964-1970)	Salvador Allende (1970-1973)
	(1)	(2)	(3)
Number of plots expropriated	21	1,436	4,298
<i>% of agricultural plots in 1965</i>	<i>&lt;0.1%</i>	<i>&lt;0.1%</i>	<i>2%</i>
Number of plots redistributed	16	1,188	2,447
<i>% of expropriated plots</i>	<i>76%</i>	<i>83%</i>	<i>57%</i>
Number of hectares expropriated	137,838	3,948,253	6,193,851
<i>% of agricultural hectares in 1965</i>	<i>&lt;0.1%</i>	<i>13%</i>	<i>20%</i>
Number of hectares redistributed	120,813	2,922,977	3,050,984
<i>% of expropriated hectares</i>	<i>88%</i>	<i>74%</i>	<i>49%</i>
Number of land invasions	0	501	1,720
<b>Legal causes to expropriate</b>			
Plot was divided in 1965-1967	0%	6%	0%
Plot can serve social purpose	0%	0%	0%
Plot is larger than 80 hrb.	14%	25%	46%
Plot abandoned or inefficient	0%	0%	21%
Plot is large and was divided	0%	2%	0%
Plot owner is legal person	0%	5%	7%
Plot has multiple owners	0%	0%	2%
Plot was offered by owner	5%	26%	22%
Plot expropriated before 1964	0%	7%	0%
Unknown	81%	29%	1%

Notes: This table presents descriptive statistics of land expropriations under different governments. The upper panel describes the total number of plots and hectares expropriated, together with the number of land invasions. The lower panel present the legal causes used to expropriate plots. Own construction based on agrarian reform files and police reports of land invasions.

**Table 2:** Description of counties before Allende's government (1970-1973)

	Counties with invasions	Counties without invasions	Difference	Month of first invasion (avg. 4.7)
<b>Agriculture before 1970</b>	(1)	(2)	(1) – (2)	(4)
Number of agricultural plots	1,126 (861)	733 (449)	393*** (133)	0.8 (0.9)
Hectares in agricultural plots	20,259 (19,238)	13,993 (14,890)	6,266** (3082)	-0.5 (0.6)
Agricultural workers	3,961 (3,085)	2,259 (1,177)	1,701*** (469)	-0.8 (0.7)
Land gini	0.97 (0.02)	0.97 (.03)	-0.002 (.004)	-0.8 (0.5)
Productivity per hectare <sup>†</sup>	118.3 (108.9)	126.6 (243.7)	-8.3 (24.4)	1.6 (1.3)
Productivity per worker <sup>†</sup>	793 (793)	883 (1905)	-90 (185)	-0.3 (0.6)
Agrarian reform until 1969	0.09 (0.16)	0.05 (0.1)	0.04 (0.02)	0.0 (0.3)
Log of province-level invasions <sup>∇</sup>	–	–	–	-0.5 (0.4)
<b>Other variables</b>				
Distance to Santiago (in km.)	387 (350)	389 (439)	-2 (62)	-5.4* (3.2)
Distance to regional capital (in km.)	107 (116)	141 (140)	-34* (20)	-0.1 (0.6)
Vote share Salvador Allende in 1970	0.33 (0.11)	0.35 (0.14)	-0.02 (0.02)	0.8* (0.5)
Turnout in 1970	0.26 (0.12)	0.26 (0.13)	0.00 (0.02)	-0.1 (0.3)
Social organizations per 10,000 inhab. in 1970	6.2 (13.8)	4.7 (7.7)	1.5 (2.1)	0.2 (0.2)
Counties	176	45		

Notes: Descriptive statistics for rural counties in Chile. Column 1 describes counties with at least one invasion during Allende's government, column 2 describes counties without invasions, and column 3 presents the difference between columns 1 and 2. Column 4 presents coefficients from a cross-sectional regression using the month of first invasion as dependent variable (month 1 is November 1970, month 18 is April 1972) and (standardized) variables and region fixed effects as predictors. The average of the month of first invasion is 4.7 and its standard deviation is 3.8. Standard deviations in parentheses in columns 1-2 and standard errors in columns 3-4. <sup>†</sup>Measured in thousands of Chilean pesos. <sup>∇</sup>Comes from a separate regression using province-level invasions before 1970 and provinces as units of observation. Statistical significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

**Table 3:** Land invasions and expropriations using an event study analysis

	Number of invasions	Number of plots expropriated	Indicador at least one expropriation	Number of hectares expropriated	Number of plots redistributed	Number of hectares redistributed
	(1)	(2)	(3)	(4)	(5)	(6)
Indicator for 12-month period after first invasion	0.58*** (0.06)	0.18*** (0.07)	0.03** (0.01)	0.21** (0.09)	0.18*** (0.06)	0.20** (0.08)
Counties	221	221	221	221	221	221
Observations	11,050	11,050	11,050	11,050	11,050	11,050
County fixed effects	X	X	X	X	X	X
Month fixed effects	X	X	X	X	X	X

Notes: Each column presents estimates of equation (2) – the parametric version of the event study methodology – using a different dependent variable. Each observation corresponds to a county-month pair in the period between 01/1970 and 04/1972. The number of hectares expropriated and distributed use the hyperbolic sine transformation proposed by Burbidge et al. (1988). Standard errors are clustered by county. Statistical significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

**Table 4: Legal causes used to expropriate plots after invasions***The dependent variable is the number of expropriations*

	Plots expropriated under legal cause			
	Large plot	Abandoned or inefficient	Owner is legal person	Plot offered by owner
Panel A – Plots expropriated	(1)	(2)	(3)	(4)
Indicator for 12-month period after first invasion	0.13** (0.05)	-0.02 (0.01)	0.01 (0.01)	0.05** (0.02)
Panel B – Hectares expropriated				
Indicator for 12-month period after first invasion	0.19** (0.08)	0.00 (0.04)	0.05 (0.04)	0.10** (0.05)
Counties	221	221	221	221
Observations	11,050	11,050	11,050	11,050
County fixed effects	X	X	X	X
Month fixed effects	X	X	X	X

Notes: Each estimate and its standard error come from an estimation of equation (2). Panel A uses the total number of expropriations as dependent variable and Panel B the total number of hectares expropriated. Different columns use expropriations under different legal causes. Each observation corresponds to a county-month pair in the period between 01/1970 and 04/1972 except otherwise noticed. Standard errors are clustered by county. Statistical significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

**Table 5:** Robustness of parametric event study results

Dependent variable	Sub-samples		Region-by-year fixed effects	County-specific linear trends
	Removes counties with events within 3 months of Allende's rule	Removes counties without events		
	(1)	(2)	(3)	(4)
Number of plots invaded	0.47*** (0.09)	0.52*** (0.01)	0.53*** (0.06)	0.57*** (0.07)
Number of plots expropriated	0.26** (0.13)	0.17** (0.08)	0.17** (0.07)	0.19*** (0.07)
Indicator at least one expropriation	0.02 (0.02)	0.02* (0.01)	0.02* (0.01)	0.03** (0.01)
Number of hectares expropriated	0.08 (0.16)	0.17* (0.10)	0.16* (0.09)	0.21** (0.09)
Number of plots redistributed	0.22** (0.1)	0.17** (0.07)	0.17*** (0.06)	0.17*** (0.06)
Number of hectares redistributed	0.12 (0.13)	0.19** (0.08)	0.16** (0.07)	0.19** (0.08)
Counties	129	176	221	221
Observations	2,967	8,800	11,050	11,050
County fixed effects	X	X	X	X
Month fixed effects	X	X	X	X

Notes: Each estimate and its standard error come from an estimation of equation (2) using a different dependent variable. Rows represent different outcomes and columns denote the robustness exercise implemented. Each observation corresponds to a county-month pair in the period between 01/1970 and 04/1972 except otherwise noticed. The number of hectares expropriated and redistributed use the hyperbolic sine transformation proposed by Burbidge et al. (1988). Standard errors are clustered by county. Statistical significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

# ONLINE APPENDIX

## *Collective Action and Policy Implementation: Evidence from Salvador Allende's Expropriations*

Felipe González      Felipe Vial

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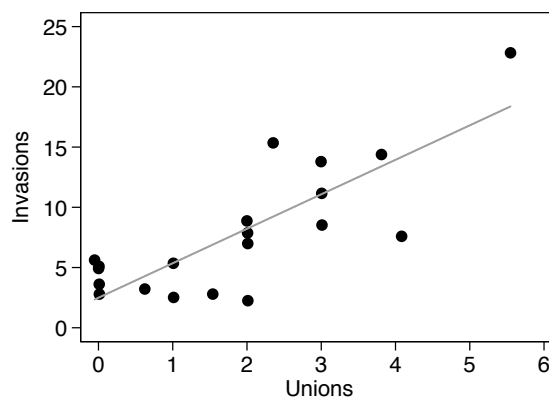
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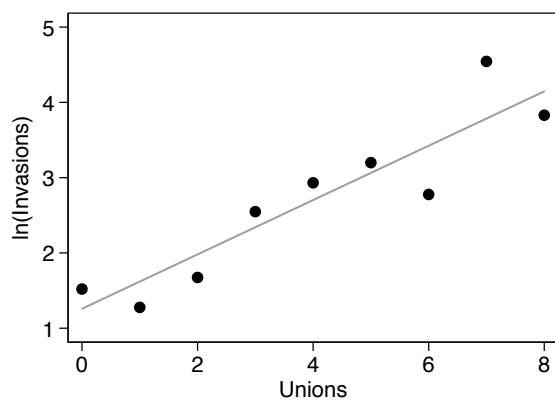
**Figure A.1: More results on unions and invasions**



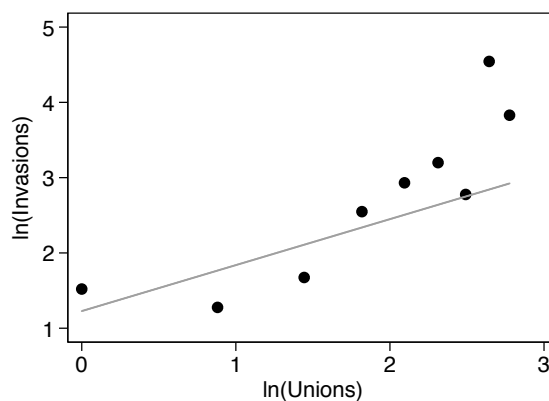
(a) Number of invasions



(b) Population control



(c) Semi-elasticity

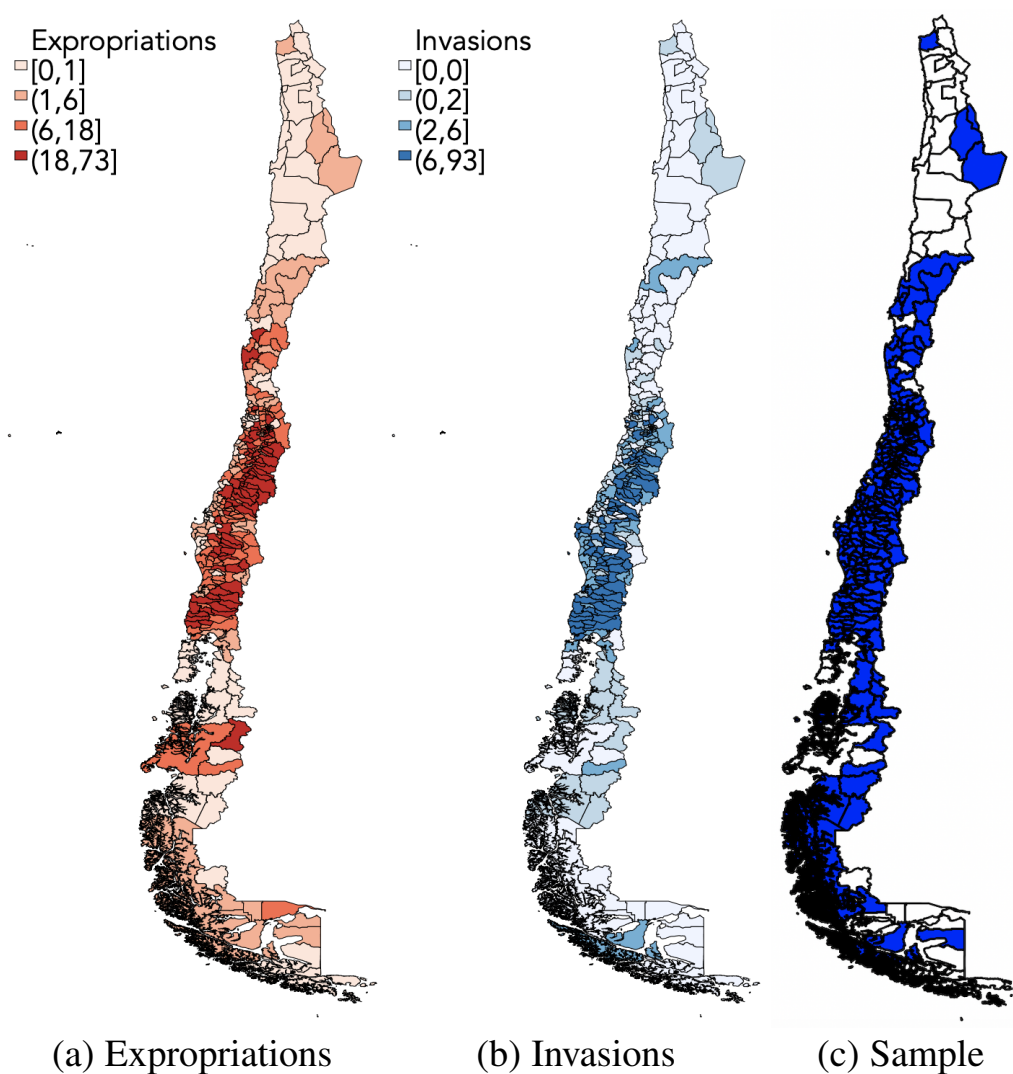


(d) Elasticity

Notes: Binscatter plots representing the cross-sectional relationship between the total number of plots invaded between 1970-1973 (y-axis) and the total number of unions using different functional forms. Straight lines denote linear fits.

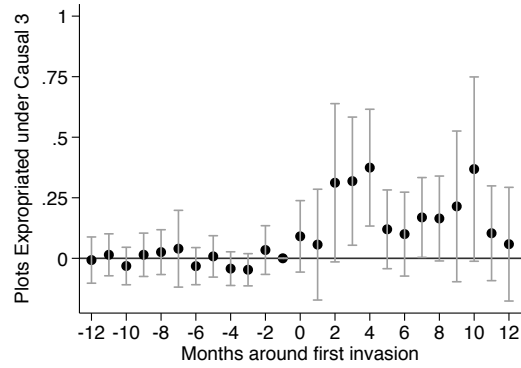


**Figure A.2: Maps**

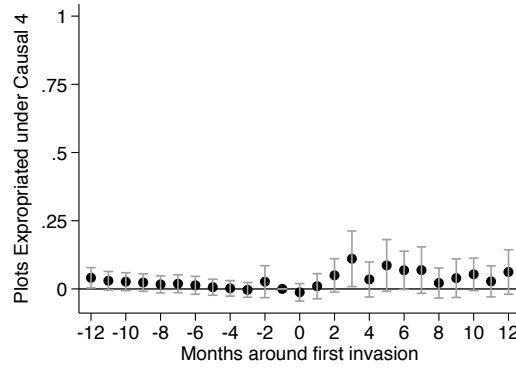


Notes: Maps of Chile showing the number of expropriations per county during Salvador Allende's government (panel A), the number of invasions per county in the same (panel B), and the counties in our estimation sample.

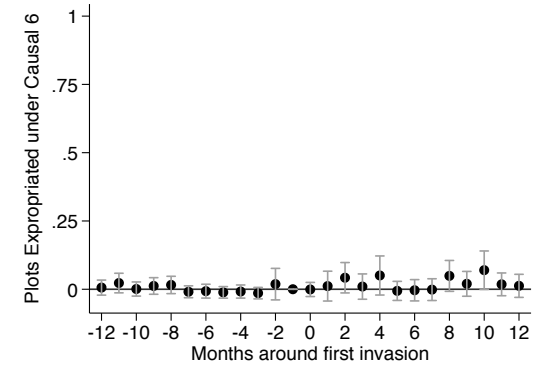
**Figure A.3: Legal reasons and plots' outcomes**



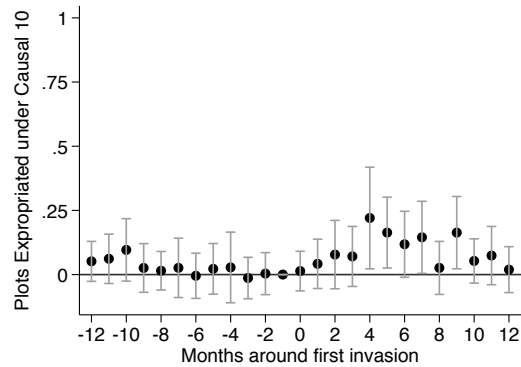
(a) Large plot



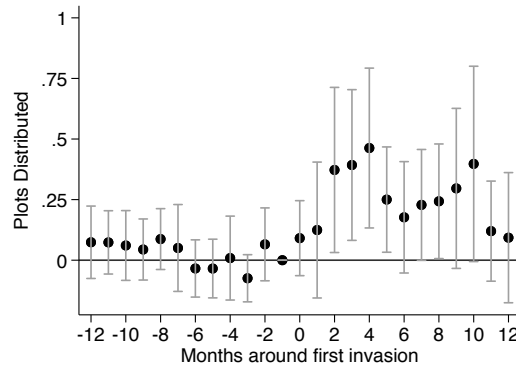
(b) Plot was inefficient



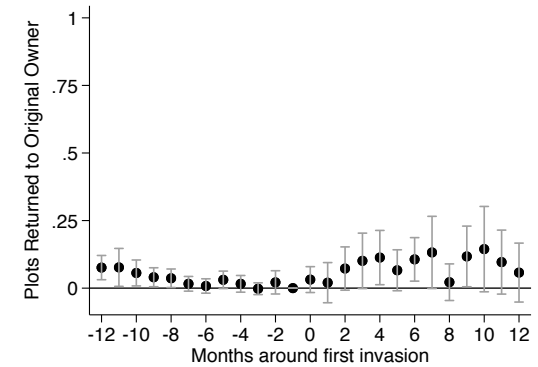
(c) Plot owner is legal person



(d) Plot owner offered plot



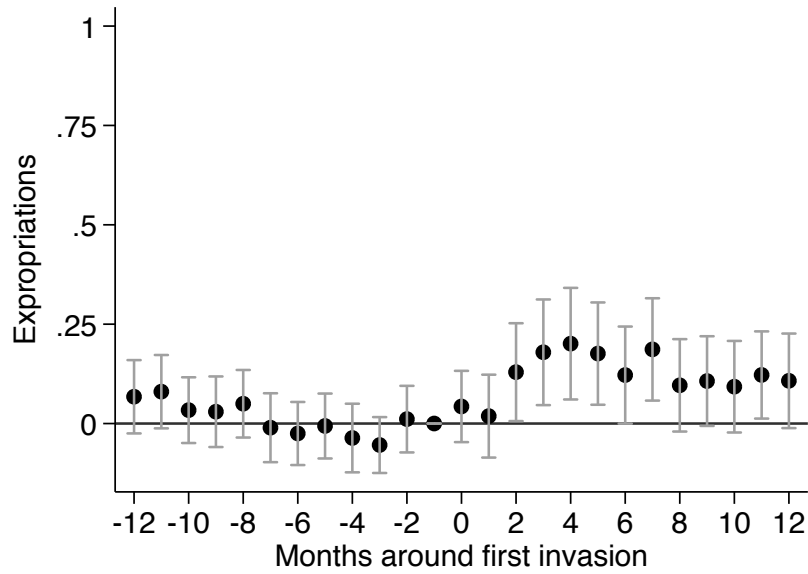
(e) Plot was redistributed



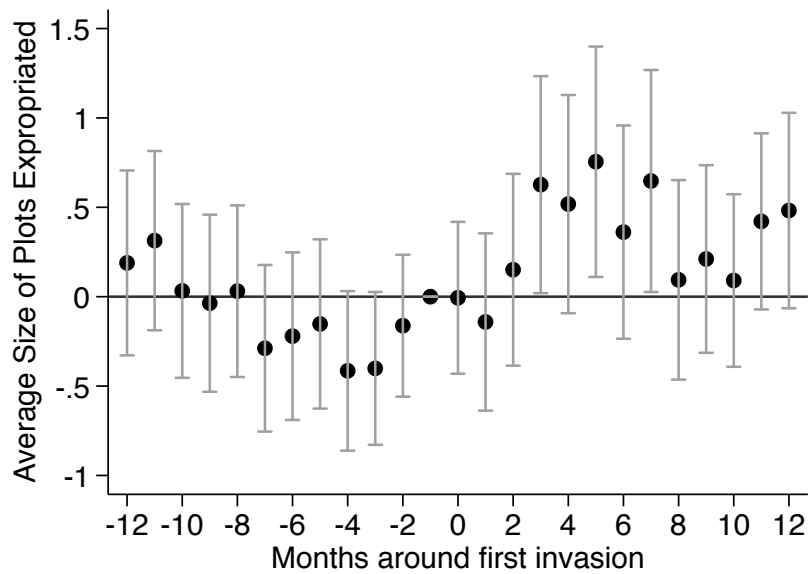
(f) Plot was returned

Notes: These figures present estimates of equation (1) with their corresponding 95 percent confidence interval. Each panel uses a different dependent variable. Each dependent variable in panels (a)-(d) corresponds to the number of expropriations using a different legal cause. Panels (e) and (f) use the number of plots redistributed or returned to the original owner – two possible and mutually exclusive outcomes after expropriating a plot – as dependent variable.

**Figure A.4:** Additional semi-parametric results



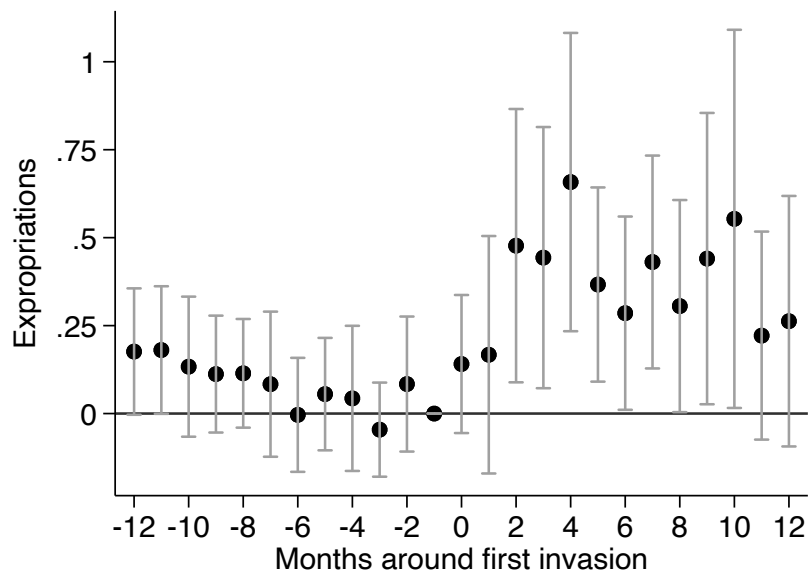
(a) Log plots expropriated



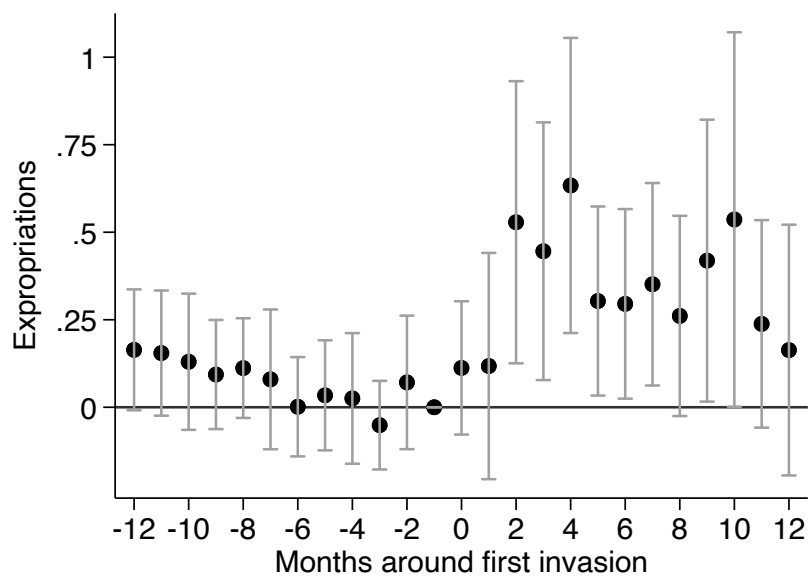
(b) Average size of expropriated plots

Notes: These figures present estimates of equation (1) with their corresponding 95 percent confidence interval. Each panel uses a different dependent variable. Panel A uses the hyperbolic sine transformation proposed by Burbidge et al. (1988) as dependent variable, and Panel B uses the average size of expropriated plots.

**Figure A.5:** Robustness, controlling for availability of large plots



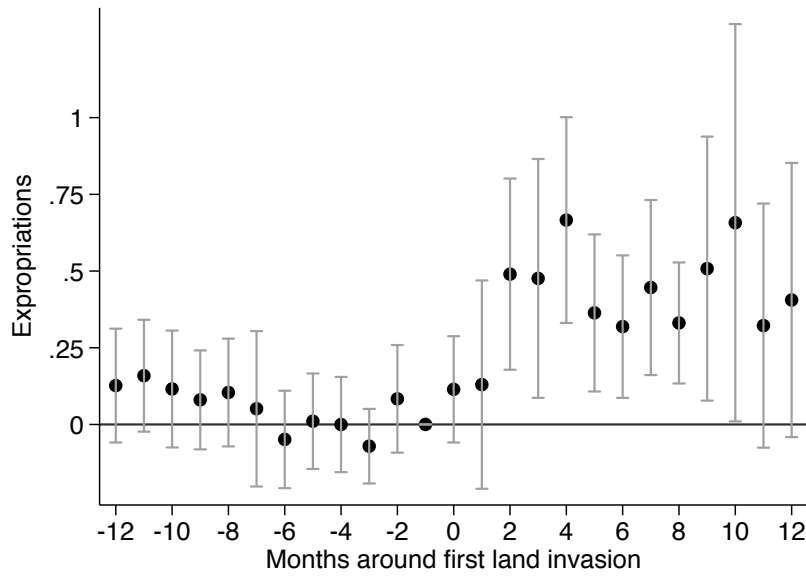
(a) Share of plots larger than 50 hectares



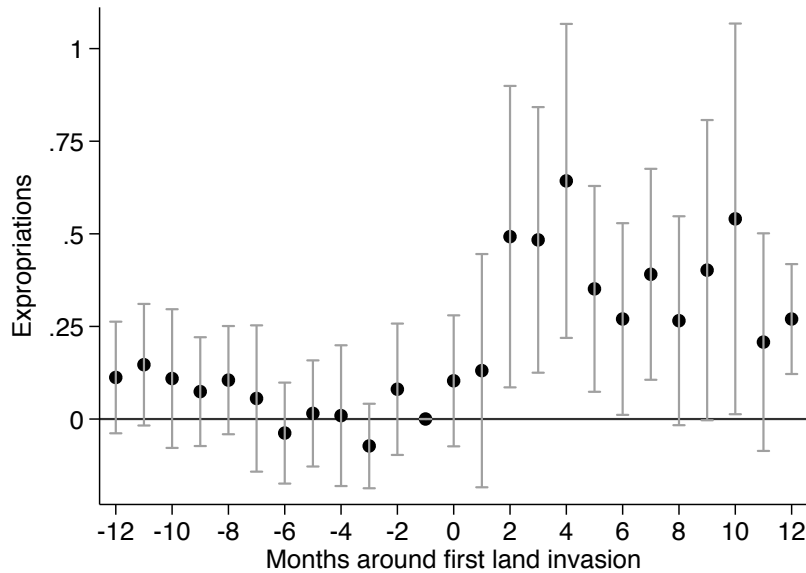
(b) Quintiles of average plot size

Notes: These figures present estimates of equation (1) with their corresponding 95 percent confidence interval. Panel (a) presents estimates of our main specification augmented with interaction terms between time fixed effects and indicators for quintiles of the distribution of average plot size across counties. Panel (b) presents estimates of our main specification augmented with interaction terms between time fixed effects and the share of plots smaller than 50 hectares.

**Figure A.6: Alternative clustering methods**



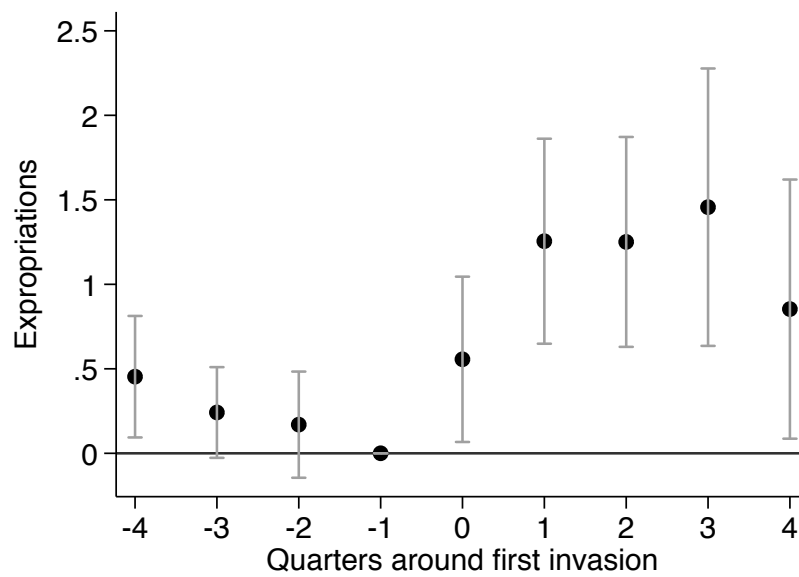
(a) Two-way clustering



(b) Spatial correlation

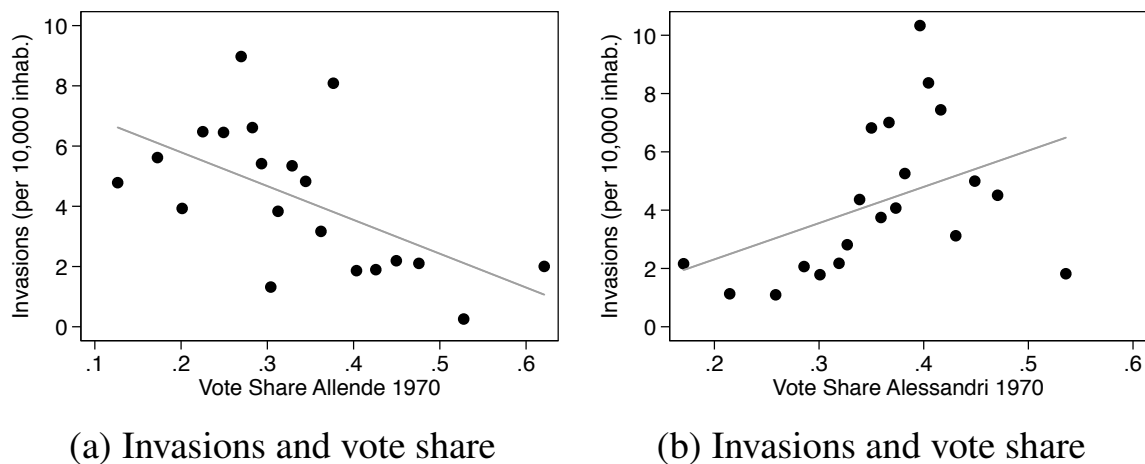
Notes: These figures present estimates of equation (1) with their corresponding 95 percent confidence interval using alternative clustering methods for standard errors. Panel A follows Brown and Warner (1985) and uses two-way clustering to allow correlation of outcomes within event dates. Panel B follows Conley (1999) and allows for spatial correlation of outcomes across counties during each time period. The latter uses a heteroskedasticity and autocorrelation consistent covariance estimation with distances from the centroids of counties and a Bartlett kernel.

**Figure A.7:** Alternative periods of time



Notes: This figure presents estimates of equation (1) with their corresponding 95 percent confidence interval but using an alternative frequency of periods, namely quarters instead of months.

**Figure A.8:** Land invasions and votes in the 1970 election



Notes: Binscatter plots representing the cross-sectional relationship between the total number of plots invaded per 10,000 inhabitants (y-axis) and the vote shares for Salvador Allende (Panel A) and Jorge Alessandri (Panel B) in the 1970 presidential election.

**Table A.1: Unions and land invasions***Dependent variable: log of total number of plots invaded*

	Unit of observation:					
	Counties (1970-1973)			Provinces (1967-1970)		
	(1)	(2)	(3)	(4)	(5)	(6)
Number of unions	0.36*** (0.05)	0.28*** (0.05)	0.21*** (0.05)	0.07*** (0.02)	0.04 (0.04)	0.17 (0.10)
Observations	221	221	221	25	25	25
R-squared	0.17	0.34	0.56	0.25	0.55	0.91
Controls		X	X		X	X
Province fixed effects			X			
Region fixed effects						X

Notes: Cross-sectional estimates of the total number of plots invaded (in logarithm) on the total number of unions. Data on the number of unions by county comes from Gómez and Klein (1972). The set of “Controls” include: land inequality in 1965, agricultural surface (in hectares), agricultural production in 1965, the total number of agricultural workers, the 1970 population, the intensity of land reform until 1969. Statistical significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .



**Table A.2:** Robustness of results to different functional forms

	Share of plots expropriated	Total number of hectares expropriated	Logarithm of hectares expropriated	Total number of hectares distributed
	(1)	(2)	(3)	(4)
ix. Indicator for 12-month period after first invasion	0.02** (0.01)	261 (271)	0.32** (0.13)	30.2 (100.6)
Counties	221	221	176	221
Observations	11,050	11,050	1,625	11,050
County fixed effects	X	X	X	X
Month fixed effects	X	X	X	X

Notes: Each coefficient comes from an estimation of equation (2) using a different dependent variable. Each observation corresponds to a county-month pair in the period between 01/1970 and 04/1972 except otherwise noticed. Standard errors are clustered by county. Statistical significance: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .