The grievances of a failed reform: Chilean land reform and conflict with indigenous communities*

Dany Jaimovich†

Felipe Toledo-Concha‡

This version: August 29, 2024

Abstract

Land reforms are one of the most profound institutional changes in developing countries. Nevertheless, these reforms often fail, due to interruptions, reversals, and partial implementations. Unsuccessful land redistribution policies are likely to produce grievances and social unrest, further hindering economic development in areas with historically excluded populations such as peasants and indigenous groups. This paper analyzes the persistent effects of the Chilean land reform on a current indigenous self-determination conflict. A substantial land redistribution process occurred in the study area but was entirely reverted due to a counter-reform following a military coup. Using a detailed plot-level database, we find evidence of the persistent effects of this failed land reform on conflict. Our results indicate that expropriated plots are at least four times more likely to be invaded and attacked between 1990 and 2021, an effect that extends beyond historically contested indigenous territories. The impact on these newly contested territories suggests that the land reform and counter-reform have a significant impact on the extensive margin of the current conflict. These results are confirmed with instrumental variable estimates, based on our evidence that unexpected productivity shocks affected plot participation in the land reform. Potential channels explaining the results are the grievances of the failed reform, the implementation of current land restitution policies, and changes in the economic structure after the counter-reform.

JEL codes: Q15, D74, J15, N46, O13.
Keywords: Land reform, conflict, indigenous peoples, institutions.

*We benefited from the comments by Mike Albertus, Pedro Cayul, Alejandro Corvalán, Donn Feir, Felipe González, Felipe Jordán, Gianmarco León, Matthias Schündeln, and participants at several conferences, seminars, and workshops. We also thank Andrés Fontaine for his valuable assistance with data and figures.

†Corresponding author: Faculty of Economics and Business, University of Talca (Chile), Av. Lircay s/n, Talca, Chile. dany.jaimovich@utalca.cl. Jaimovich acknowledges financial support from ANID Chile project FONDECYT Regular 1230083 and the Institute for Research in Market Imperfections and Public Policy, MIPP (ICS13_002 ANID).

‡National Institute of Statistics (Chile).

1 Introduction

Land reforms have been one of the most profound institutional changes in developing countries. Their primary goal is to redistribute and reverse the structural inequalities in the ownership of a key factor of production in rural areas (Besley and Burgess, 2000; Adamopoulos and Restuccia, 2014; Montero, 2022). In Latin America, the region with the largest inequality in landholdings, most countries have implemented large land reform processes, but usually with limited success (De Janvry and Sadoulet, 1989; Albertus, 2015). Despite the de jure transfer of vast areas to landless peasants, local elites and autocratic regimes have often leveraged their de facto power to limit the extent of land redistribution (Acemoglu and Robinson, 2008; Albertus, 2021). The failure to implement this fundamental institutional change is likely to produce grievances and social unrest, leading to conflict and further deterring economic development in areas with historically excluded populations such as peasants and indigenous groups.

Extant literature is divided in terms of the expected effects of land reforms on conflicts. On the one hand, conflict may decrease if landless peasants become landholders, as this increases their opportunity cost of participating in a revolt and diminishes grievances related to unequal land distribution (Huntington, 1968; Grossman, 1994; Acemoglu and Robinson, 2006). On the other hand, conflict can be fueled if the reform signals that contested land will be redistributed, prompting potential beneficiaries to take violent actions to claim plots or encouraging large landholders to coordinate efforts to contest potential expropriations (Horowitz, 1993; Albertus, 2015; Kapstein, 2017). Empirical studies support both of these possible effects, depending on the settings in which reforms are implemented (Albertus and Kaplan, 2013; Albertus, 2020; Castaneda and Pfutze, 2020).

Furthermore, land reforms often fail due to interruptions, reversals, partial implementation, or being perceived as unfair by the intended beneficiaries. This has indeed been the case in many instances across Latin America (appendix table C1). The grievances stemming from these failed land reforms may lead to conflict that is even more intense than if the reform had never been attempted, though only scarce, mostly indirect, empirical evidence for this mechanism exists (Hidalgo et al., 2010; Domenech and Herreros, 2017; Fetzer and Marden, 2017). In this paper, we study the case of a land reform that was fully reverted by a counter-reform. Hundreds of haciendas, with a total surface of more than 650,000 hectares, were expropriated between 1970 and 1973 in the study area, the Araucanía region of Chile. Following the military coup in 1973, all expropriations were revoked or redistributed. This combined land reform and counter-reform is the main treatment in our empirical analysis. A distinctive feature is that indigenous communities and individuals were specifically targeted. The Mapuche, the largest indigenous group in Chile, actively participated in this land reform, claiming historical legal rights on reservations and traditional rights on other territories. In recent years, the region has been at the center of an increasingly violent self-determination conflict between the state, indigenous groups, and private agricultural and forestry producers. We empirically test the persistent effects of the land reform and counter-reform as determinants of the intensity and geographical expansion of this conflict between 1990 and 2021. For this purpose, we assemble a unique geocoded plot-level dataset, identifying more than 1,000 current plots that were part of 85% of the treated haciendas. Conflict at the plot-level are taken from the recently available geocoded data by Cayul et al. (2022), which report events such as land invasions, arson, firearms attacks, and others.

Our results provide evidence of persistent effects of the land reform and counter-reform on the ongoing indigenous self-determination conflict. Estimates from different OLS specifications suggest that treated plots are at least four times more likely to be involved in a conflict event between 1990 and 2021 than the rest of the rural plots in the region. This effect is similar for plots located within and outside indigenous reservations, suggesting that the treatment also affects plots located beyond the area where the Mapuche have historical legal claims over land. Despite controlling for a set of time-invariant and historical plot-level characteristics, the OLS estimates may be biased. A potentially relevant omitted variable is the intensity of historical conflict before the land reform, which is likely correlated both with the treatment and the current intensity of conflict. Also, measurement error when tracking plots over time is a possible concern. To deal with endogenity issues, we explore the effects of unexpected productivity shocks during the land reform. The productivity of wheat, the primary crop in Araucanía during the land reform, depends mainly on spring rainfall due to the limited availability of irrigation systems and other modern technologies. Even though these productivity shocks are expected to have only temporary effects, their impacts can be persistent when they occur during a relevant historical period (Dell, 2012; Jedwab et al., 2017). We present evidence supporting this type of path dependency within the context of Salvador Allende's presidential election, in which he won by a very narrow margin at the end of the winter of 1970. Allende's socialist agenda included a significant expansion of the land reform, introducing indigenous land restitution for the first time. Immediately after the election, there was a sharp increase in plot invasions, which created effective pressure for their expropriation. Our results suggest a very strong correlation between the intensity of plot-level spring rainfall in 1970 with the probability of invasions and subsequent expropriations. This increase in land invasions is consistent with a rapacity effect (Dube and Vargas, 2013) from the radical left-wing groups, who participated in the invasions alongside the Mapuche. Since this productivity shock is unlikely to affect current conflict through channels other than its effect on treatment, we use it as an instrumental variable. The IV estimates confirm the main results; the effect of land reform and counter-reform on current conflict is positive and statistically significant, with estimates that are larger than those in the OLS specifications. Given that complier plots were treated due to the occurrence of a positive productivity shock in 1970, but would not have been treated otherwise, we interpret the IV estimates as further evidence of the treatment effects on conflict events taking place beyond historically contested lands.

The self-determination conflict has evolved over time. An initial phase less intense and violent after the return of democracy in 1990, for which we find that the effect of land reform and counter-reform is mainly within indigenous reservations. This was followed by a phase of geographical expansion between 2006 and 2016, where the treatment has a large impact on conflict events in newly contested lands. Finally, a most recent phase of increased intensity, violence, and geographical expansion, in which the treatment continues to be a relevant determinant. In terms of the strategies employed by different indigenous groups, our results indicate that treatment increases land invasions within reservations and other historically contested plots, while attacks with firearms, arson, and demonstrations primarily increase in the newly contested lands. The treatment has limited spillover effects around treated plots, suggesting that the impact of the land reform and counter-reform is mostly driven by originally expropriated haciendas.

We present evidence about three potential mechanisms underlying our results. First, the grievances created by the failed land reform. We confirm that current Mapuche ownership remains lower in treated plots compared to other rural plots, suggesting lingering grievances over land that was initially granted but subsequently taken away during the counter-reform. Moreover, our results suggest that state repression during the re-expropriations was more intense within indigenous reservations. Second, recent indigenous restitution policies by the Chilean government have targeted plots that were part of the land reform, and we find that conflict is more intense in these plots. This effect relates to the fact that the program made these plots legally contestable once again, increasing incentives for actions aimed at pressuring their acquisition. Third, one of the main economic outcomes of the counter-reform was the initiation of forestry plantations in many of the reverted expropriations. This industry has had negative environmental effects, frequently impacting Mapuche communities, and is often a target of indigenous political violence (Carruthers and Rodriguez, 2009; Heilmayr et al., 2020). Our results confirm that treated plots are more likely to be currently used for forestry plantations and that conflict is more intense on these plots.

This study contributes to the literature on the empirical analysis of institutional change and the persistence of institutions in developing countries. Land reforms are a challenge to long-standing institutions that have ruled landholdings in regions with high inequality (Acemoglu and Robinson, 2008; Bhattacharya et al., 2019). The initial empirical studies of land reforms focused on direct effects such as farm productivity, poverty reduction, and land distribution (Besley and Burgess, 2000; De Janvry et al., 2001). More recent studies have focused on unintended effects, such as migration (De Janvry et al., 2015), electoral results (De Janvry et al., 2014), environmental outcomes (Liscow, 2013), the formation of cooperatives (Montero, 2022), inter-generational mobility (Galán, 2020), and –the focus of our work– the effect on social conflicts and violence (Fetzer and Marden, 2017; Albertus, 2020; Castaneda and Pfutze, 2020). We contribute by showing that the effects of the failed land reform on conflict can be persistent after several decades. We also show that temporary productivity shocks that take place in relevant historical periods can lead to path dependency, with persistent effects on conflict and other outcomes. Moreover, this study is the first, to our knowledge, to empirically analyze specifically the effect of a land reform process on conflict with indigenous communities.[1] As historical claims over land are at the center of indigenous demands, understanding the effects of failed restitution policies is relevant to guiding related public policies. More generally, we provide evidence on the historical determinants of self-determination conflicts, which are prevalent around the world, but until recently there have been few empirical studies for cases where intensity is below full-scale war (Cunningham, 2014; Germann and Sambanis, 2021). In terms of methodology, one of our contributions is to develop an analysis at the plot level, instead of using counties, states, or other more aggregated units. To our knowledge, the only other study to use plot-level data to analyze the effects of land reforms is Montero (2022). We also contribute to other literatures, such as the recent studies on indigenous economics (Dippel, 2014; Leonard and Parker, 2021; Feir et al., 2024), path-dependency and economic development (Dell, 2012; Jedwab et al., 2017), and the historical determinants of current conflicts (Besley and Reynal-Querol, 2014; Michalopoulos and Papaioannou, 2016; Fenske and Kala, 2017).

The rest of the paper is organized as follows. The next section presents the background and context. In section 3, we present the data. Section 4 presents the main results on the persistent effects of the land reform and counter-reform. Section 5 describes additional results and explores potential mechanisms and the last section provides a brief conclusion.

2 Background and context

The Mapuche are the historical indigenous inhabitants of South-Central Chile. In contemporary Chilean society, they constitute a significant demographic segment, estimated at approximately 1.7 million individuals as per the 2017 Census data. This is nearly 80% of the total indigenous population in the country and approximately 10% of the overall population. Many Mapuche currently live in urban areas, but a large rural population

[1] A recent study by Elizalde (2020) has focused on how traditional structures of indigenous groups in Mexico have an impact on the success of the implementation of the land reform.

remains in the country's southern regions. There are around 170,000 rural Mapuche in the Araucanía region, two-thirds of its total rural population, which persists as one of the most economically disadvantaged groups within Chilean society (Agostini et al., 2010). The historical Mapuche territory was incorporated under the effective Chilean sovereignty in a series of military occupations and confrontations between 1860 and 1883 (Pinto, 2003; Bengoa, 2000). Before this occupation, the Mapuche had remained mostly independent from the Chilean Spanish colony and the Chilean State, though interlinked through trade and cultural interactions. After the Conquest of Araucanía, the Mapuche ancestral land was divided into plots and distributed among settlers. Between 1884 and 1929, the Mapuche were confined to almost 3,000 indigenous reservations, covering ca. 500,000 ha. Even though the original intention was that land considered part of a reservation could not be transferred to non-Mapuche, in reality, many reservations further lost part of their land, usually as a consequence of legal loopholes and illegal actions (Aylwin et al., 2003). Nearly 80% of the area of the original reservations is located in the Araucanía region (appendix figure B1), which is the focus of our study.[2]

Invoking their historical rights over land, several Mapuche communities and people participated in the land reform process that started in 1962. The original land reform laws were not designed to target the indigenous land claims but rather to favor peasants, mainly those living within large haciendas. Nevertheless, the Mapuche realized that the land reform could be a legal way to solve their claims, and started to demand expropriations in their favor with protests and plot invasions. These claims were contested by the large landowners of the region, including episodes of violent confrontation. This implied that very few plots were expropriated in the Araucanía region until 1970 and only a handful in favor of Mapuche (Correa et al., 2005; Cuesta et al., 2017). This situation changed when the socialist Salvador Allende was unexpectedly elected as president in September 1970 by a very narrow margin of votes. Land invasions in Araucanía expanded rapidly after Allende's election, as a joint strategy of Mapuche communities and leftist radical groups to put pressure on expropriations to the new government (appendix figure B4). The land reform became part of a broader socialist program, wherein expropriated haciendas were transferred to new owners as common property and required to operate as cooperatives. In the case of Araucanía, Allende explicitly recognized, for the first time, that the land reform laws were going to be used to favor Mapuche communities. The new administration demanded a cessation of land invasions to allow for the continuation of land reform through legal mechanisms. The Ministry of Agriculture and the *Corporación de la Reforma Agraria* (CORA), the state agency responsible for the implementation of

[2]The Araucanía is a large region, roughly the size of Belgium, with important geographical and economic diversity. It is currently the poorest region in the country. Considering outcomes before the colonization, Maloney and Valencia-Caicedo (2016) identified Araucanía as one of the few regions with a historical reversal of fortunes within Latin America.

the land reform, were temporarily relocated to Temuco, the regional capital of Araucanía, to expedite the process in the region (Gall and Sanders, 1972; Steenland et al., 1977). As a result, a total of 564 haciendas were expropriated during Allende's regime (appendix figure B3), representing an area exceeding 650,000 ha. Correa et al. (2005) report that at least 163 of the expropriated haciendas, encompassing a total area of ca. 150,000 ha., had direct participation of Mapuche communities. A large share of these haciendas were located within the historical limits of the indigenous reservations, but several others were outside them. Furthermore, the involvement of Mapuche peasants was also significant in the cooperatives formed in the rest of the expropriated haciendas.

The military coup of September 1973 abruptly and violently terminated the land reform process. One of the Military Junta's initial actions was to implement a counter-reform, converting CORA into the institution responsible for re-expropriations. Reverting the land reform in many areas of the country was difficult because of the risk of insurrection and the fact that many peasants had been smallholders for more than a decade.[3] However, most expropriations in Araucanía were recent, with some still in the process of legal registration, making these haciendas easier to re-expropriate (Bellisario, 2007; Cuesta et al., 2017). Notably, all expropriations carried out during Allende's regime were included in the counter-reform. There were two main actions by the military authorities during the counter-reform: (i) Some of the expropriations were revoked, and the entire plot was either returned to the original owners, transferred to new owners (who were not beneficiaries of the land reform), or auctioned. The new owners included the military and forestry companies. That was the case for 323 of the 564 haciendas expropriated by Allende's government (57%). (ii) In the remaining 241 haciendas, the military authorities assumed control and allotted them into multiple plots. These plots were allocated to certain members of the land reform cooperatives and to new owners who were not original beneficiaries. Very few Mapuche obtained land ownership through this forced allotment process (Correa et al., 2005). The counter-reform was often violent, particularly in the first years, when most re-expropriations took place (appendix figure B3). The original beneficiaries of the land reform lost not only their newly acquired land plots but also the agricultural assets and other investments they had made (Barrena et al., 2016).

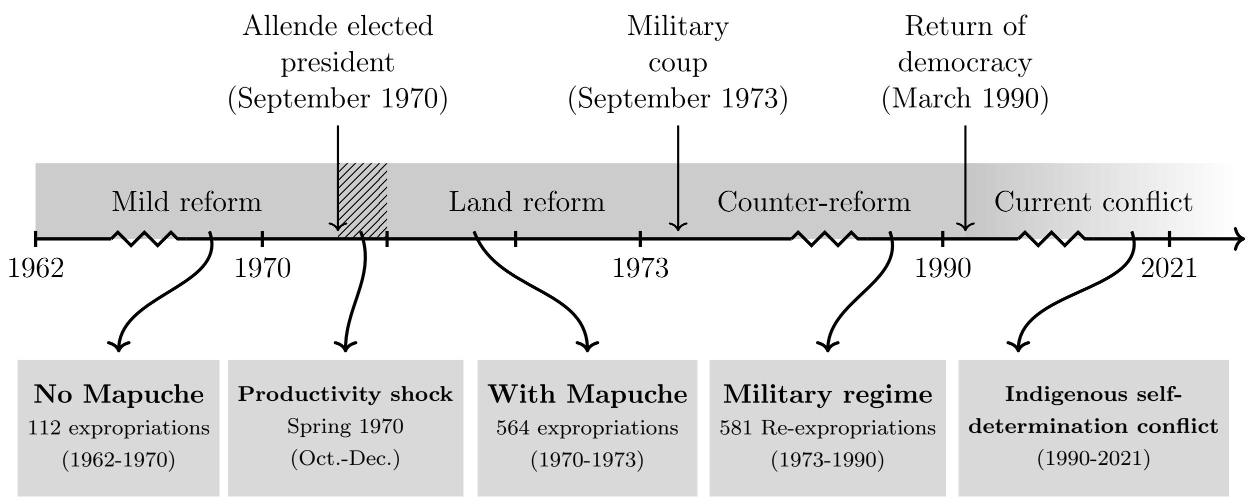
After the return of democracy in 1990, the governments have sought to address Mapuche historical demands. A land restitution program was established, along with the National Corporation for Indigenous Development. Despite these efforts, the indigenous longstanding social and economic deprivation has mostly persisted. Already in 1992, a series of indigenous demonstrations and land invasions initiated a conflict with landholders

[3]Araucanía was by far the region with the larger counter-reform intensity (Cuesta et al., 2017). In the rest of the country, the reversion of the land reform was only partial and the hacienda system was mostly replaced by small landholders, with landowners losing an important part of their political and economic influence (González, 2013; Albertus, 2015).

and forestry companies, which then evolved to progressively more violent strategies, including arson and the use of firearms (Pairicán, 2014; Cayul et al., 2022). The response from the Chilean State has involved increasingly violent repression, including episodes of excessive use of force and discriminatory prosecution, as reported by international human rights organizations. (DOS, 2018; HRW, 2019). This new phase of the self-determination conflict between the Mapuche and the Chilean State has diverse drivers, mostly linked to historical land claims. Other relevant factors include the environmental effects of widespread forestry plantations, the excessive bureaucracy of land restitution policies, and claims for constitutional recognition (Carruthers and Rodriguez, 2009; González, 2020; Bauer, 2021). This conflict remains one of the most relevant in Chile, involving important property destruction and the continuous disruption of economic activities and social order. Moreover, in recent years, the self-determination conflict has become intertwined with criminal activities such as illegal logging.

Figure 1 presents a timeline summarizing the most relevant historical events for our empirical analysis.

Figure 1: Timeline of relevant events in the Araucanía region



Note: This timeline presents relevant historical events for the empirical analysis. Expropriations and re-expropriations refer to the number of haciendas involved, using data from Correa et al. (2005) and Cuesta et al. (2017). The re-expropriations include all haciendas that were part of the land reform between September 1970 and 1973.

3 Data description

In this section, we describe our data. We have assembled a new plot-level geocoded database for the study area, using several original sources, many of them never used before for quantitative empirical analysis.

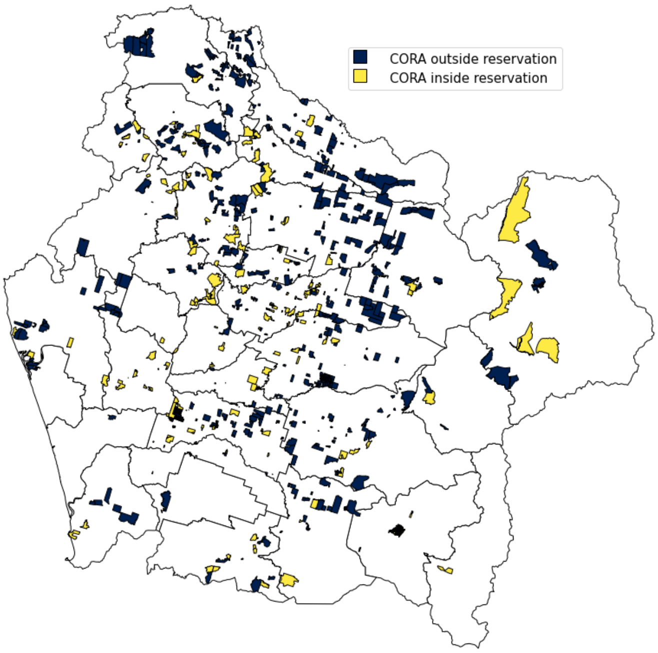
The initial set of data is based on the CORA archives, which contain detailed information on the haciendas involved in the land reform and counter-reform. Our primary source is the digitized version by Cuesta et al. (2017), which we complement with the comprehensive description of the reform process in the study area by Correa et al. (2005) and Correa (2023). Appendix table A1 presents a summary of the main variables in this database. There were 676 haciendas expropriated in Araucanía, but in the main analysis we only consider the 564 haciendas expropriated by the Allende regime between 1970 and 1973 (figure 1), i.e., 83% of the total. Data for haciendas expropriated earlier (1962-1969) are used only for robustness checks. To track plots over time, we merge the data from the CORA archives to the plot-level data of Araucanía's rural land cadaster 2013. This geocoded data set contains information for all rural plots legally registered in the region, a total of 143,260 plots. To match haciendas with current plots, we take advantage of the tax IDs and other information available in both datasets. In the Data Appendix (section A), we describe the matching procedure in detail.

We find at least one match in the land cadaster for 480 haciendas, 85% of the total. In appendix table A2 we compare the characteristics of the matched and non-matched haciendas. There are no statistically significant differences in the mean values of variables for both samples, except for plot size. Nevertheless, that difference is driven by a handful of very large plots, mostly located in mountainous regions which are currently National Parks (which are not included in the land cadaster). If these large plots (more than 5,000 ha.) are excluded, the difference in plot size between the two samples is insignificant. The 1,066 matched plots from the land cadaster are the set of treated plots in the main empirical analysis, labeled as the variable $CORA$. Figure 2 displays the distribution of the treated plots on a map of the region. Despite the efforts to follow plots over time, it is likely that in some cases we were not able to track all the current plots into which the original haciendas were divided. According to CORA administrative data, the total area of the matched 480 haciendas is 486,104 ha., while the combined area of the treated plots' polygons is 241,247 ha. To address this issue, we use the geocoded data to construct the alternative treatment variable $CORA_{contiguous}$, which includes all matched plots and their immediate neighbors.[4] Considering this variable, the number of treated plots rises to 6,843, with a combined area of 606,711 ha. The fact that this area is larger than the area of the expropriated haciendas is both due to differences between the administrative data in the 1970s and the geocoded data, as well as because likely some neighbor plots were not part of the originally expropriated hacienda, though were very close to it. All the treatment variables used in the empirical analysis are described in appendix table A3.

The georeferenced plot-level data are used to add additional relevant variables from

[4]In the $CORA_{contiguous}$ treatment variable we exclude the top 1% of the largest neighboring plots. This is the case because these very large plots were likely separate haciendas, and our data do not confirm that they were part of the land reform.

Figure 2: Treated plots in the Araucanía region



Note: The map shows the location of the 1,066 treated plots (CORA) in the sample. A treated plot was originally within a hacienda expropriated during the land reform between 1970 and 1973 and then was part of the military counter-reform. Plots located within the historical boundaries of indigenous reservations are identified.

other geocoded datasets. For the conflict variables, we use the latest version of the MACEDA dataset on the conflict between the Mapuche and the Chilean State by Cayul et al. (2022). These unique database describes 4,530 conflict events for the period 1990-2021, using mostly media reports as the main source. 61% of the events occurred in the Araucanía region, with the remaining events taking place in other regions of Chile. We focus on events occurring in rural areas, which account for two-thirds of the total and include the most violent incidents, including 88% of conflict-related deaths. A total of 850 plots in our sample have at least one conflict event that takes place within its geocoded polygon.[5] The most common conflict events are attacks, mostly arson or the use of firearms, which took place in 368 plots in our data. We record land invasions in 163 plots, demonstrations in 150 plots, and state coercion (such as police raids, arrests, and other actions) in 167 plots. For additional results, we also consider plots located within a distance of 250m, 500m, and 1km from the conflict event. The conflict variables used in the empirical analysis are described in appendix table A3.

To identify historical Mapuche claims over land we use the geocoded location of indigenous reservations by CONADI (2021), displayed in appendix figure B1. Around one-third of the treated plots are located with historical reservations, as shown in figure

[5]A total of 1,861 conflict events took place within these 850 plots. Most of the plots, 62% of the total, record only one event, and 90% record a maximum of four events. The most extreme case is a plot where 81 conflict events took place.

2. Plots within reservations are different to the rest of the rural plots in Araucanía in terms of a larger current Mapuche ownership but also in most other characteristics, as shown in appendix table A4. For some additional results, we also use the data on the participation of Mapuche communities in the land reform by Correa et al. (2005). These data were collected using anthropological techniques and are useful to identify Mapuche participation outside reservations. Nevertheless, this type of data collection is prone to measurement error and selection bias by considering only communities willing to share their information. Historical wheat productivity shocks are computed using monthly rainfall records from the WorldClim 2.1 dataset (Fick and Hijmans, 2017). These data are based on satellite images with a spatial resolution of 2.5 minutes (around 21 km^2 in the study region).[6] In the empirical analysis, we use plot-level rainfall estimates based on the inverse distance-weighted interpolation from the centroids of the plots. In most specifications, we use the productivity shock of 1970, whose spatial distribution is shown in appendix figure B2.

Additional information for the empirical analysis is taken from the rural land cadaster 2013 and other sources described in appendix table A3.

4 Empirical strategy and main results

4.1 OLS estimates

We use our unique plot-level database to analyze the effects of the land reform and counter-reform on the current indigenous self-determination conflict. The variable $CORA$ identifies treated plots, named after the institution responsible for expropriations during the land reform and re-expropriations during the counter-reform. The treated plots were part of haciendas expropriated during Allende's government (1970-1973) and subsequently re-expropriated during the military regime (figure 1). Accordingly, the main empirical specification is as follows:

$$y_p = \alpha + \beta_1 CORA_p + \beta_2 CORA_p \times Reservation_p + X_p' \gamma + \mu_p, \tag{1}$$

where y_p is a dummy taking the value one for plots with a conflict event in the period 1990-2021, $Reservation_p$ is a dummy identifying plots that are located within the historical limits of indigenous reservations, and X_p is a vector of plot-level historical and geographical covariates. Inference is based on two assumptions on the structure of the

[6] To check the accuracy of the WorldClim 2.1 data, we compared these data with rainfall records from 14 weather stations in the Araucanía region available during the period of analysis. We found a large and significant correlation with the satellite data around those stations.

data. Current treated plots were all part of haciendas expropriated during the land reform. Some plots have the same area they had during the land reform, though the majority have been divided into several smaller plots. Therefore, the treatment status of the plots is spatially clustered in the original haciendas. We do not have information on former haciendas for all plots, but the land cadaster defines a geographic area where a group of plots are located, termed "place," which often corresponds to the boundaries of former haciendas. Therefore, we use standard errors cluster-robust at the "place" level. We also account for spatial correlation using a 50km cut-off, which, as shown in appendix table C4, provides the most conservative estimate. As the main sample, we use all the plots in the rural land cadaster, and then check the robustness of our results in different sub-samples.

Table 1 shows the OLS estimates of equation 1. The results in the first two columns suggest that treated plots are ten times more likely to participate in current conflict events with respect to the sample mean (displayed at the bottom of the table), a result that is statistically significant at the 1% level. The estimates remain virtually unchanged when plot-level controls are included in the model. This is also the case if municipality fixed-effects are included (appendix table C2). The result is confirmed when using $CORA_{contiguous}$, the treatment variable which also considers plots contiguous to $CORA$ plots, with a coefficient that implies that conflict is four times larger than in the average plot (column 3). In the results in column 4, the interaction term is not statistically significant, implying that the increase in conflict due to the land reform and counter-reform is similar for treated plots located within and outside of historical indigenous reservations. The fact that the treatment effect is large for plots outside reservations suggests that a possible impact of the participation in the failed reform is a geographical extension of the conflict. When the extended treatment variable $CORA_{contiguous}$ is considered, the treatment effect within reservations is significantly larger, though the effect on treated plots outside reservations remains large and significant.

The intervention of the haciendas by the military authorities during the counter-reform was either to revoke the expropriation or to allot and redistribute plots from the expropriated hacienda. In the last column of table 1 we test if the treatment effect is different for these two procedures. The results imply that conflict is not significantly different in treated plots that come from allotted haciendas (captured by the variable $CORA_{allotted}$). This result is consistent with the description in the literature that very few Mapuche families were granted ownership of the allotted plots (Correa et al., 2005; Correa, 2023).[7]

[7] In fact, current Mapuche ownership in plots allotted during the counter-reform is similar to or lower than that of plots from haciendas where the expropriation was revoked. Within reservations, Mapuche ownership is 35% for the former and 42% for the latter. Outside reservations, Mapuche ownership is similar for both of them, around 5%.

Table 1: OLS results: The effects of land reform and counter-reform on current conflict

	(1)	(2)	(3)	(4)	(5)	(6)
$CORA$	0.066***	0.065***		0.059***		0.078***
	(0.015)	(0.014)		(0.013)		(0.023)
	[0.018]***	[0.017]***		[0.018]***		[0.026]***
$CORA_{contiguous}$			0.026***		0.018***	
			(0.003)		(0.003)	
			[0.003]***		[0.004]***	
$CORA \times Reservation$				0.017		
				(0.033)		
				[0.039]		
$CORA_{contiguous} \times Reservation$					0.020***	
					(0.006)	
					[0.006]***	
$CORA_{allotted}$						-0.028
						(0.027)
						[0.026]
N	143260	143260	143260	143260	143260	143260
$\overline{Conflict}$	0.006	0.006	0.006	0.006	0.006	0.006
Controls	NO	YES	YES	YES	YES	YES
p-value interaction=0			0.000	0.018	0.000	0.002

Note: This table displays OLS estimates of equation 1, where the dependent variable is a dummy taking value one if conflict events occurred within a plot between 1990 and 2021. $CORA$, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. *Reservation* is a dummy taking value one if the plot is within an indigenous reservation. $CORA_{contiguous}$ is a dummy taking value one for $CORA$ and for all immediate neighbour plots. $CORA_{allotted}$ is a dummy taking value one for treated plots allotted during the land counter-reform. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis and Conley inference, taking 50km as spatial cutoff, in brackets.

The OLS estimates are robust to different specifications. Appendix table C2 shows that the main results remain when including municipality fixed effects, preserving only large plots in the sample (more than 10 ha.), and using a sample of plots that includes only observations sharing the common support of a propensity score matching estimate of $CORA$. Additional OLS results are displayed in appendix table C3. In the first column, we include a variable identifying plots that participated in the early stage of the land reform ($CORA_{1962-69}$). The coefficient for the effect of this set of plots on conflict is small and not significant. This is expected, as there were only a few expropriations, reduced Mapuche participation, and most of these plots were not part of the counter-reform. The results in columns 2 and 3 show evidence that the main effect is driven by the set of $CORA$ plots matched from the expropriated haciendas. When estimated jointly with $CORA$, the effect of $CORA_{contiguous}$ is significant but smaller. The effect for the latter coefficient has two complementary interpretations. Firstly, it captures the effect on plots that were part of the expropriated haciendas but that we were not able to track in time. Additionally, it captures the spillover effect for plots that were not treated, but were located besides treated plots. As the effect for neighboring plots beyond those contiguous is small, and not significant after 1km, we conclude that the treatment effect is mostly localized within plots splinted from expropriated haciendas. The last column of appendix table C3 further explores the significance of the treatment effect in plots located outside reservations. The results suggest that part of this effect is driven by plots located outside reservations in which the participation of Mapuche communities was verified by Correa et al. (2005). The effect is also significant by the set of treated plots located outside reservations but contiguous to them, where likely Mapuche participation was also relevant.

4.2 IV estimates

The OLS estimates in the last section suggest a strong and significant effect of the land reform and counter-reform on conflict after many decades. Even though the estimates remain almost unchanged after adding a series of control variables and fixed effects, we cannot disregard the potential effect of other confounding factors. For instance, historical events predating the land reform, such as battles during the Conquest of Araucanía in the nineteenth century or actions by the Indian Courts (Jordán and Heilmayr, 2024), may predict both the treatment status and current conflict. This is particularly likely in areas within and around reservations, where there have been continuous Mapuche efforts to claim contested plots. Also, measurement error when tracking plots over time is a possible concern. To deal with the potential endogeneity problems, in this section we implement IV estimates using productivity shocks at the time of the land reform as the instrumental variable. Therefore, the exclusion restriction relies on the fact that unexpected rainfall variations in the 1970s are unlikely to be correlated with current conflict events in a plot, except for its effect on land reform participation.[8] We first present the main IV estimates and then a series of tests supporting the validity of our empirical strategy.

In rural areas with high poverty levels, scarce development of irrigation systems and other modern technologies, and low crop diversity, rainfall is a well-documented driver of agricultural productivity (Duflo and Udry, 2004; Jayachandran, 2006). These characteristics are prevalent in the setting of our study, the Araucanía region in the 1960s and 1970s. The main crop was wheat, which represented around 48% of the cultivated area in the region according to the 1965 Agricultural Census. Our assumption is that temporary productivity shocks during the intensification of the land reform in 1970 had persistent effects by influencing the probability of a plot being expropriated, thereby correlating with the treatment status $CORA_p$. The instrument $Shock_{p,t}$ is constructed

[8] One relevant characteristic of our instrument, the productivity shock, is that it is measured at the plot level, and not at more aggregate levels as in previous studies using a similar identification strategy, such as Miguel et al. (2004), Jayachandran (2006), and Hidalgo et al. (2010). We are able to use this fine-grained specification because rainfall distribution varies significantly within the region we study, due to differences in elevation and proximity to both the Pacific Ocean and the Andes.

as $\frac{rain_{p,t}-\overline{rain_p}}{\sigma_{rain_p}}$, with $rain_{p,t}$ the rainfall-level in period t, $\overline{rain_p}$ the historical mean value of rainfall in p, and σ_{rain_p} its historical standard deviation. Therefore, the shock is the deviation of rainfall in a given period t from its long-term mean. To build $\overline{rain_p}$, rainfall's long-term mean, we consider the period 1980-2009. We used a long period after the land reform because detailed rainfall data prior to it (i.e., before 1962) was not available. We do not include years after 2009 given the existence of a "mega-drought" in the region of study starting in 2010 (Garreaud et al., 2020). The agronomic literature for the region shows that rainfall levels during spring are the relevant determinants of land productivity for wheat production. Accordingly, we use a measure based on rainfall between October and December (Southern Hemisphere's spring).

In principle, any rainfall shock during the years of the land reform could have affected expropriations in the study area. Nevertheless, the unexpected election of Salvador Allende as president at the end of the winter of 1970 provides us with a relevant natural experiment. After this unforeseen event, in which he won the election by a very narrow margin of votes and against most predictions, the increased expectations of an expansion in the land reform implied an outburst of land invasions (appendix figure B4). Most of these invaded haciendas were subsequently expropriated. As the productivity shock (spring rainfall) takes place exactly after Allende's unexpected election (figure 1), we expect that a positive(negative) shock increases(decreases) the probability of plot invasion, which in turn raises(reduces) the likelihood of expropriation. This is consistent with a rapacity effect (Dube and Vargas, 2013) from the radical left-wing groups who participated in the invasions alongside the Mapuche. We see three reasons for this: (i) they could benefit from wheat profits from the February and March 1971 harvest; (ii) they had incentives to claim the expropriation of the most productive haciendas to demonstrate that collective farms could be as productive as private ones, and (iii) quickly increasing wheat production was necessary to support the government's policies by counteracting the blocking actions by the opposing large landowners (Floto, 1979). This was also consistent with Allende's program, which sought to develop large-scale production of wheat in the Araucania region to stop depending on foreign markets (Gall and Sanders, 1972).

Accordingly, in the empirical analysis our instrument is $Shock_{70}$, the rainfall shock of spring 1970. The distribution of this variable is displayed in the map of appendix figure B2, which shows important geographical variation. The first stage is as follows:

$$CORA_p = \alpha + \lambda_1 Shock_{p,70} + \lambda_2 Shock_{p,70} \times Reservation_p + X_p'\gamma_1 + \eta_p. \qquad (2)$$

In the specifications testing the heterogeneous effect for plots located within historical indigenous reservations, the interaction term $Shock_{p,70} \times Reservation_p$ is included as an additional instrument. The second stage is as follows:

$$y_p = \alpha + \delta_1 \widehat{CORA}_p + \delta_2 \widehat{CORA_p \times Reservation}_p + X_p' \gamma_2 + \nu_p, \quad (3)$$

where $\widehat{CORA}_p$ is the predicted value of plot treatment status from the first stage and $\widehat{CORA_p \times Reservation}_p$ is its predicted interaction with $Reservation_p$, which is included in some of the specifications.

Table 2 presents the IV estimates. The first stage results in columns 1 to 3 (panel B) confirm that the productivity shock $Shock_{70}$ is a strong predictor of the treatment variables $CORA$ and $CORA_{contiguous}$. The effect is positive and statistically significant at the 1% level, with weak identification tests above the usual critical values. The first stage estimates in column 2 (panel B) imply that a $Shock_{70}$ of 0.1 standard deviations above the historical mean increases in 20% the probability that a plot is expropriated. The coefficients for the second stage estimates are positive, statistically significant, and larger than in the OLS estimates (panel A, columns 1 to 3). The larger IV estimates may be explained, at least partially, by attenuation bias attributable to measurement error in the OLS model. Moreover, the coefficients must be interpreted as the effect on a complier plot, which in this case is a plot that was treated due to the occurrence of a positive productivity shock in 1970, but would not have been treated otherwise. Consequently, the IV estimates provide further evidence of the treatment effects on conflict events taking place in newly contested plots, i.e., beyond historically contested areas.

The first stage estimates in columns 4 and 5 (panel B) imply that the instrument $Shock_{70}$ has a low correlation with treatment status in plots located within indigenous reservations. This result confirms that the instrument is less relevant in predicting expropriations within historically contested plots, which is consistent with these plots being "always takers," i.e., those that enter treatment regardless of temporary shocks.[9] The instrument is not strong in the specification in which the interaction term $CORA \times Reservation$ is included (panel A, column 4), implying that the second stage results, which confirm the OLS estimates, must be taken with caution. In the case when the interaction considers $CORA_{contiguous}$, the instrument has more prediction power, and the results are also consistent with the OLS estimates (panel A, column 5).

The result in the last column of table 2 implies that the treatment effect holds in plots allotted by the military authorities during the counter-reform. In appendix table C5 we

[9] Plots within reservations are likely to be "always takers" because these plots will always be contested given historical reasons previous to the land reform. Additionally, wheat production was much less important in the Mapuche communities in the 1970s than for the rest of the region (Jordán and Heilmayr, 2024). Therefore, the productivity shock is less likely to have an effect in areas within and around reservations. The additional results in appendix table C5 confirm that the productivity shock only weakly correlates with treatment status within and besides reservations. An exception is the interaction $CORA_{contiguous} \times Reservation$, for which the first stage coefficient is significant, though the magnitude is smaller than for plots outside reservations.

Table 2: IV results: The effects of land reform and counter-reform on current conflict

	(1)	(2)	(3)	(4)	(5)	(6)
			A: IV estimates (second stage)			
$CORA$	0.671***	0.716***		0.399***		
	(0.176)	(0.237)		(0.146)		
	[0.311]**	[0.367]*		[0.211]*		
$CORA_{contiguous}$			0.113***		0.067***	
			(0.024)		(0.016)	
			[0.046]**		[0.032]**	
$CORA \times Reservation$				0.789		
				(0.502)		
				[0.844]		
$CORA_{contiguous} \times Reservation$					0.104**	
					(0.044)	
					[0.054]*	
$CORA_{allotted}$						1.058***
						(0.387)
						[0.505]**
N	143260	143260	143260	143260	143260	143260
$\overline{Conflict}$	0.006	0.006	0.006	0.006	0.006	0.006
Controls	NO	YES	YES	YES	YES	YES
IV F-test (cluster)	20.384	12.499	58.544	3.260	16.587	10.236
IV F-test (spatial)	16.726	13.363	24.876	1.883	8.471	12.998
IV Anderson-Rubin	0.000	0.000	0.000	0.000	0.000	0.000
			B: First stage results			
$Shock_{70}$	0.019***	0.014***	0.089***	0.026***	0.153***	0.009***
	(0.004)	(0.004)	(0.012)	(0.007)	(0.018)	(0.003)
	[0.005]***	[0.004]***	[0.018]***	[0.007]***	[0.034]***	[0.003]***
$Shock_{70} \times Reservation$				-0.022***	-0.115***	
				(0.008)	(0.020)	
				[0.009]***	[0.035]***	
$\overline{CORA}$	0.007	0.007	0.048	0.007	0.048	0.003
p-value interaction=0				0.246	0.005	

Note: This table displays instrumental variables estimates of equations 3 and 2. In panel A, the results for the second stage, where the dependent variable is a dummy taking value one if conflict events occurred within a plot between 1990 and 2021. $CORA$, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. *Reservation* is a dummy taking value one if the plot is within an indigenous reservation. $CORA_{contiguous}$ is a dummy taking value one for $CORA$ and for all immediate neighbour plots. $CORA_{allotted}$ is a dummy taking value one for treated plots allotted as a result of the land counter-reform. In panel B, the results for the first stage, where the instrument $Shock_{70}$ is the rainfall shock of spring 1970. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis and Conley inference, taking 50km as spatial cutoff, in brackets.

show results confirming that the IV estimates are robust to using only the sample with larger plots or the sample with the common support from the propensity score (columns 1 to 4).

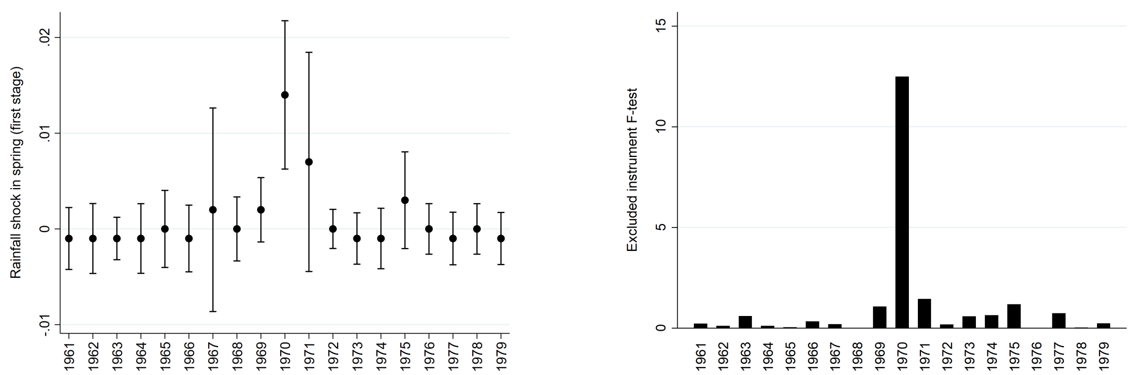
4.3 Evidence in Support of the Identification Assumptions

In this section, we provide further evidence in support of the identification assumptions related to the IV estimates, as well as for the relevance of the productivity shocks and the mechanisms through which they affect expropriations during the land reform.

We have assumed that the productivity shock of 1970 is particularly relevant because the spring rainfall of that year occurred immediately after the unexpected election of Salvador Allende. If this is the case, rainfall shocks in other years should have no effects on $CORA$, the treatment indicator. Figure 3 presents evidence supporting that this is the case. The results are placebo tests for the first stage considering nine placebo years before and after 1970. Figure 3, panel A, displays a graphical representation of the estimates of the placebo first stages. No coefficient, apart from the instrumental variable $Shock_{70}$, is statistically different from zero. This is confirmed in figure 3, panel B, which shows the placebo F-statistics for the test of weak identification, all of them with very low values, except for the year 1970. These results imply that serial or spatial correlation is unlikely to drive the first stage results. As further evidence in this regard, in appendix table C7 we show the results of a "horse race" between $Shock_{70}$ and the placebo productivity shocks in the first stage estimates. After controlling for the placebo shock in years between 1961 and 1979, the effect of $Shock_{70}$ remains stable and always statistically significant, while all the estimates for the placebo shocks are close to zero and never significant. As complementary evidence, in the first column of appendix table C6 we show that $Shock_{70}$ has no predictive power for expropriations that took place before 1970.

Figure 3: Placebo estimates for the instrument

(a) First stage coefficients (b) Excluded instrument F-test



Note: The figures present placebo estimates for the instrumental variables results in column 2 of table 2. Figure (a) shows point estimates and confidence intervals at the 90% level for the first stage results of equation 2, considering $Shock_y$ for the years between 1961 and 1979. Figure (b) displays the Kleibergen-Paap F-test values for the excluded instrument $Shock_y$ for the years between 1961 and 1979, considering robust standard errors clustered at the "place" level.

Another threat to the exclusion restriction is that $Shock_{70}$ could be correlated with recent rainfall shocks that affect contemporaneous conflict. In appendix table C8 we display reduced form coefficients of the effect of $Shock_{70}$ on conflict, including as a covariate the rainfall shock for years between 1990 and 2009. Some estimates of the contemporaneous rainfall shocks are strongly correlated with conflict, as predicted by the literature on weather and conflict. Nevertheless, the coefficient for $Shock_{70}$ keeps its magnitude and significance in all specifications, implying that it is not correlated with recent rainfall shocks.

The productivity shock relates to wheat production, by far the most relevant crop in Araucanía during the land reform. We have defined $Shock_{70}$ as deviations from historical spring rainfall. This relates to the local agronomic literature, which describes that in a context with no irrigation systems, reduced rainfall before and during the season of planting and germination implies a severe reduction in productivity. The results in column 2 of appendix table C6 imply that rainfall during the rest of 1970 does not affect treatment. In appendix figure B5 we show that during other years around the land reform, rainfall outside spring also does not predict treatment. Our instrument captures deviations from historical values, but does not necessarily rely on extreme events. In fact, 1970 was a year of mean value close to the historical rainfall average (appendix table A3) and without extreme events of excess rain or droughts (appendix table C9). Moreover, extreme events in other years around 1970 tend to have no effect on treatment (appendix table C9). To further demonstrate that spring rainfall has an impact on wheat productivity, in columns 3 and 4 of appendix table C6 we present interactions of $Shock_{70}$ with a wheat suitability index in the first stage. The plot-level wheat suitability, which has always been included as a covariate in the empirical analysis, is provided by CIREN (2013) and is based on time-invariant geographical characteristics. This interaction is positive and significant, suggesting that the effect of the shock is larger in plots that are more suitable for wheat production. Similarly, the effect of $Shock_{70}$ is larger in plots located in municipalities with a larger share of wheat production at the time of the land reform (table C6, columns 5 and 6).

The proposed mechanism underlying the instrumental variable implies that incentives to invade plots increase with positive realizations of the productivity shock. Matching data from González and Vial (2021) with our plot-level data, we find that 10% of the treated plots were part of 74 haciendas invaded after Allende was elected in 1970. All these haciendas were subsequently expropriated by CORA, which corroborates that invasions were an effective pressure for the inclusion of an hacienda in the land reform. In appendix table C10 (columns 1 to 3), we show that $Shock_{70}$ is a strong predictor of the invasion of a plot in these years, an effect mostly driven by plots located outside reservations. The results suggest that a positive productivity shock increases the probability of plot invasion and subsequent expropriation.[10] The magnitude is similar to in the first stage of table 2, with a $Shock_{70}$ of 0.1 standard deviations above the historical mean increasing in 20% the probability that a plot was invaded in 1970 or 1971 (column 1). The set of plots invaded between 1970 and 1971 are also relevant to explain the current conflict. Columns 4 and 5 of appendix table C10 show that conflict is more intense in these plots than in the rest of the treated plots, an effect confirmed in the IV estimates of columns 6 and 7.

5 Additional results and potential mechanisms

5.1 Additional results

The indigenous self-determination conflict has evolved during the period under analysis (Pairicán, 2014; Cayul et al., 2022). The first phase, after the return of democracy in 1990, was marked by low intensity and reduced use of violent tactics. The results in columns 1 and 2 of appendix table C11 show that the land reform and counter-reform have an impact on conflict during this period, which is most intense within indigenous reservations. The coefficients for the IV estimates in column 3 are small and not significant, implying that during the period 1990-2005 there is no treatment effect on plots that were expropriated given the productivity shock. This evidence is consistent with a first phase of the conflict in which events took place on reservations and other historically contested lands. In a second phase of the conflict, between 2006 and 2016, there were more actors, an increase in violent tactics (mostly arson), and a geographical expansion of the conflict. The results in columns 4 to 6 of appendix table C11 indicate that in this phase the treatment has a large impact on conflict, both in the OLS and IV estimates, that takes place mostly outside reservations. We interpret this evidence as the persistent effect of the land reform and counter-reform driving part of the geographical extension of the conflict to newly contested lands, i.e., an increase of conflict in the extensive margin. In the latest phase of the conflict in our data (2017-2021), the number of events increased considerably, violent tactics (now including extensive use of firearms) expanded, and further areas became involved. The treatment effect in this phase is positive and significant, but with a magnitude reduced with respect to the previous phase. We interpret this as a possible reduction in the persistent effect as the conflict evolved to areas beyond the newly contested plots that were part of the land reform and counter-reform.

In terms of the strategies employed by different indigenous groups, attacks are the most prevalent in our data, occurring in approximately 40% of the plots with conflict events. The attacks involve arson to crops and property, the use of firearms, and other

[10]Our finding differs from previous evidence by Hidalgo et al. (2010), in which the opportunity cost effect is predominant for land invasions in rural Brazil.

strategies that often imply loss of property and wounded or killed persons. The treatment effect is large for attacks, mostly outside indigenous reservations (appendix table C12). The effect is similar in the case of demonstrations, which are often non-violent, though roadblocks and protests sometimes lead to confrontations. In the case of land invasions, a strategy also used during the land reform and most intensively used during the first phase (1990-2005), the treatment effect is larger within historical reservations and the IV estimates are not significant. We interpret this as evidence that land invasions are primarily used as a strategy in historically contested plots.

In the empirical analysis, our main definition of conflict consists of a dummy taking value if a plot registers a conflict event within its polygon. Nevertheless, events may spill over to neighboring plots, or the geographical coordinates of the event may not be precise. To explore these issues, in appendix table C13 we present estimates of the treatment effect using a dependent variable defined as rings around the conflict event point coordinates. The results imply that the treatment effect does not extend far beyond the coordinates point of the conflict event, as only plots within the closest ring of 250m are statistically significant. In appendix table C14, we show that the main results are robust to a dependent variable defining conflict as all plots located within 250m from the conflict event point coordinates.

5.2 Potential mechanisms

In this section, we explore potential channels explaining the persistent effects of land reform and counter-reform on the current indigenous self-determination conflict.

The land reform between 1970 and 1973 aimed to solve historical indigenous land claims, and the Mapuche had direct participation in most expropriations in the region. Nevertheless, the counter-reform reverted the process, likely creating grievances. If the failure to restitute land has been persistent, the lack of current ownership is a potential mechanism for the use of conflict strategies to claim these plots. Considering the surnames of the owners in the rural land cadaster, the first two columns of panel A in table 3 present evidence suggesting that current Mapuche ownership is lower in treated plots. The coefficient implies that in $CORA$ plots Mapuche ownership is reduced by one-third with respect to the mean ownership in the sample (column 1). This effect is particularly large within reservations and in plots contiguous to the treated plots (column 2). The results in appendix table C15 suggest that the magnitude of the reduction in Mapuche ownership is similar in plots that were allotted as a result of the counter-reform.

The counter-reform process was most intensively implemented in the first years after the military coup (appendix figure B3). During these years the state repression against

Table 3: Potential mechanisms

A: The effects of land reform and counter-reform on potential mechanisms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mapuche ownership (2013)		State repression (1974)		Land restitution (1994-2021)		Forest plantations (2013)	
CORA	-0.152***	0.006	0.351***	0.213***	0.059***	0.026*	0.123***	0.102***
	(0.021)	(0.014)	(0.096)	(0.039)	(0.014)	(0.013)	(0.027)	(0.027)
	[0.022]***	[0.017]	[0.099]***	[0.041]***	[0.015]***	[0.009]***	[0.031]***	[0.033]***
$CORA \times Reservation$		-0.233***		0.379**		0.014		-0.029
		(0.083)		(0.158)		(0.034)		(0.045)
		[0.093]***		[0.173]**		[0.033]		[0.053]
$CORA_{contiguous}$		-0.079***		0.001***		0.030***		0.034***
		(0.010)		(0.000)		(0.004)		(0.005)
		[0.017]***		[0.003]***		[0.005]***		[0.007]***
N	143260	143260	143260	143256	143256	143260	143260	143260
$\overline{y}$	0.458	0.458	0.003	0.003	0.010	0.010	0.014	0.014

B: The effects of mechanisms on conflict (dependent variable is always $Conflict$)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Mechanism: State repression (1974)	Mechanism: Land restitution (1994-2021)			Mechanism: Forest plantations (2013)		
Mechanism	-0.020	0.038***	0.037***	0.031***	0.035***	0.032***	0.027***
	(0.028)	(0.007)	(0.007)	(0.007)	(0.005)	(0.005)	(0.005)
	[0.032]	[0.010]***	[0.008]***	[0.008]***	[0.010]***	[0.006]***	[0.006]***
$Mechanism \times CORA$			0.018			0.052	
			(0.040)			(0.033)	
			[0.031]			[0.036]	
$Mechanism \times CORA_{contiguous}$				0.026*			0.037**
				(0.015)			(0.015)
				[0.014]*			[0.018]**
N	143260	143260	143256	143256	143256	143260	143260
$\overline{Conflict}$	0.006	0.006	0.006	0.006	0.006	0.006	0.006

Note: Panel A presents estimates of equation 1, in which y_p is one of the mechanisms. Panel B presents estimates of equation 1 in which the mechanisms are explanatory variables and y_p is a dummy taking value one if conflict events occurred within a plot between 1990 and 2021. The proxy variables for the mechanisms are: (i) *Mapuche ownership* is a dummy taking value one if the owner of the plot is a Mapuche in 2013; (ii) *state repression* is a dummy taking value one if a plot was part of the military land counter-reform in 1974 and the original expropriation was not related to hacienda size; (iii) *forest plantations* is a dummy taking value one if the main activity in a plot was forestry plantations in 2013; and (iv) *land restitution* is a dummy taking value one if a plot was part of the indigenous land restitution program by the Chilean government between 1994 and 2021. *CORA* is a dummy variable taking the value one if a plot was part of the land reform and counter-reform. *Reservation* is a dummy taking value one if the plot is within an indigenous reservation. $CORA_{contiguous}$ is a dummy taking value one for *CORA* and for all immediate neighbour plots. Robust standard errors clustered at the "place" level in parenthesis and Conley inference, taking 50km as spatial cutoff, in brackets. In Panel B, columns 1 to 4, 6, and 7 control for *CORA*, and columns 5 and 8 control for $CORA_{contiguous}$. All specifications include as covariates a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects.

Mapuche and peasants was hardest, including torture and assassinations. This repression may have created additional persistent grievances that explain the current conflict. Geocoded data on state repression during the counter-reform period is not available, but we have created a proxy variable following the description of the process in previous studies (Steenland et al., 1977; Correa et al., 2005). Repression by the military authorities was particularly intense during the first months after the coup and was especially prominent in re-expropriation cases where the legal basis for the original expropriation was weak. The latter is the case of haciendas that were included in the land reform for reasons different than total productive area (González and Vial, 2021; Correa, 2023). Accordingly, our proxy for state repression is a dummy taking value one if a plot was part of the military land counter-reform from September 1973 to December 1974 and the original expropriation was not related to hacienda size. In column 3 of table 3 (panel A) we show that, using our proxy variable, in 35% of the treated plots there was state repression during the counter-reform, and column 4 shows that this repression was more intense on treatment plots within indigenous reservations, i.e., targeting Mapuche communities. State repression was mostly prevalent in expropriations revoked during the land reform and not in allotted haciendas (appendix table C15). While military repression likely created grievances, it does not imply that treated plots will be a direct target of the current conflict. In panel B of table 3 we add the potential mechanisms as explanatory variables in equation 1, always including the treatment variable $CORA$ as a control. The results in column 1 imply that conflict is not more intense in plots that suffered state repression than in the rest of the treated plots.

The most relevant land restitution policy in recent years is a program implemented by CONADI, the government's indigenous agency. The program targets communities that can demonstrate loss of territory within their reservations and has acquired more than 150,000 ha. in Araucanía between 1994 and 2021 (CONADI, 2021). Despite its contribution to solving land claims by the Mapuche, the land restitution program has been criticized for its cumbersome bureaucracy and lengthy processes. As a consequence, some communities have resorted to land invasions and other conflict strategies to claim plots through the restitution program (Bauer, 2021). Moreover, the program often compensates demonstrated losses by purchasing plots for Mapuche communities outside their reservations. This implies that plots outside reservations, including $CORA$ plots, become legally contestable, thereby increasing incentives for actions aimed at pressuring their acquisition. Using geocoded data on plots acquired for land restitution from CONADI (2021), in panel A of table 3 we show evidence that treated plots are more likely to be part of the program. These plots tend to be located outside reservations, but are more likely to be either contiguous to them or to have been identified as having Mapuche participation during the land reform outside reservations (appendix table C15). These results suggest that plots that were part of the land reform created a precedent for land claims outside historically contested lands. Moreover, the results in panel B of table 3 confirm that conflict is more intense in plots acquired by the land restitution program, an effect that is larger in $CORA$ treated plots (columns 3 and 4). In these plots, attacks and land invasions are more intense than in other treated plots, particularly in the initial phase of the period (appendix table C16). We take the results as suggestive evidence that the land restitution program is a potential mechanisms by making legally contestable *CORA* plots after 1994, therefore increasing incentives for invasions and other actions to pressure for its acquisition in favor of Mapuche communities.

One of the consequences of the counter-reform was the initiation of new economic activities. 14% of the expropriated plots in our data were used for forestry plantation in 2013, compared to less than 2% in the rest of the plots. Those plantations are mostly owned by firms that started their operations after the counter-reform, receiving subsidies and other benefits from the military regime (Bopp et al., 2020). These large-scale forestry plantations have had negative environmental impacts, often affecting Mapuche communities (Clapp, 1998; Heilmayr et al., 2020). Previous literature has described that these forestry firms are one of the main targets of the Mapuche political violence (Carruthers and Rodriguez, 2009). Using information from the land cadaster on plots with forestry as the main activity, the last columns of panel A in table 3 corroborate that many of the haciendas that were part of the land reform became forestry activities after the counter-reform (Correa et al., 2005; Carruthers and Rodriguez, 2009). This took place mainly in revoked expropriations as well as in plots contiguous to reservations, but not within them (appendix table C15). The last columns of panel B confirm that plots with forestry plantations are a usual target of conflict events, an effect that is larger in treated plots. These plantations are more intensively attacked, particularly in the first phase of the conflict (appendix table C16). Therefore, we conclude that the economic structure after the land counter-reform is a possible channel to explain the results. In particular, this mechanism is useful to understand the persistent effect in plots located outside reservations.

Taking the evidence together, we can confirm that the land reform failed to solve historical indigenous land claims, as the lack of ownership in treated plots has persisted. This persistent dispossession has likely created grievances, which may be further exacerbated by state repression against Mapuche communities during the counter-reform. While recent restitution policies have targeted plots that were part of the land reform, conflict is more intense in these plots, likely due to inefficiencies and pressure from the indigenous communities. Additionally, the forestry industry that developed on many treated plots after the counter-reform has had negative environmental effects, frequently impacting Mapuche communities and often becoming a target of indigenous political violence.

6 Conclusion

The process of institutional change is complex and often contested by local elites. In developing countries, land reforms have aimed to redistribute and allow for the reversal of structural and persistent inequalities in the ownership of a key factor of production in rural areas. Despite attempts to implement land reforms in a large number of countries, the process has often failed, typically leading to conflict and further deterring economic development in areas with historically excluded populations. In this paper, we analyze the case of the Chilean land reform, which was fully reverted by a counter-reform in the study area. Using a unique geocoded plot-level database, we find evidence of the persistent effects of the failed land reform on the current indigenous self-determination conflict in this area. Our results imply that expropriated plots are at least four times more likely to be invaded and attacked between 1990 and 2021, a relevant effect also beyond historically contested indigenous territories. The impact on these newly contested territories suggests that the land reform and counter-reform have a significant impact on the extensive margin of the current conflict. The persistent effect is partially explained by path dependency originating from unexpected productivity shocks in the most intensive years of the land reform. These shocks provide a source of exogenous variation that we use as our identification strategy to implement IV estimates that confirm the main findings. Potential channels explaining the results are the grievances of the failed reform, the current land restitution policies, and changes in the economic structure after the counter-reform.

Our study contributes to the literature on the empirical analysis of institutional change and the persistence of institutions in developing countries. In particular, the unexpected consequences of failed land reforms, arising within the context of stark land inequality and historical indigenous land claims. This study also contributes to the recent literature on indigenous economics and the historical determinants of conflicts. The main findings shed light on self-determination indigenous conflicts, a kind of conflict common worldwide, but also one of the least studied, despite its relevant impact on social and economic development in rural areas of the world (Cunningham et al., 2019; Cayul et al., 2022). Our evidence is relevant for the implementation of policies aimed at indigenous communities and other groups involved in conflicts fueled by failed land reforms, as well as other unsuccessful restitution and distribution policies.

References

Acemoglu, D. and Robinson, J. A. (2006), *Economic origins of dictatorship and democracy*, Cambridge University Press.

Acemoglu, D. and Robinson, J. A. (2008), 'Persistence of power, elites, and institutions', *American Economic Review* **98**(1), 267–93.

Adamopoulos, T. and Restuccia, D. (2014), 'The size distribution of farms and international productivity differences', *American Economic Review* **104**(6), 1667–97.

Agostini, C. A., Brown, P. H. and Roman, A. C. (2010), 'Poverty and inequality among ethnic groups in Chile', *World Development* **38**(7), 1036–1046.

Albertus, M. (2015), *Autocracy and redistribution: The Politics of Land Reform*, Cambridge University Press.

Albertus, M. (2020), 'Land reform and civil conflict: Theory and evidence from Peru', *American Journal of Political Science* **64**(2), 256–274.

Albertus, M. (2021), *Property Without Rights: Origins and Consequences of the Property Rights Gap*, Cambridge University Press.

Albertus, M., Brambor, T. and Ceneviva, R. (2018), 'Land inequality and rural unrest: theory and evidence from Brazil', *Journal of Conflict Resolution* **62**(3), 557–596.

Albertus, M. and Kaplan, O. (2013), 'Land reform as a counterinsurgency policy: Evidence from Colombia', *Journal of Conflict Resolution* **57**(2), 198–231.

Aylwin, P., et al. (2003), Informe de la comisión verdad histórica y nuevo trato con los pueblos indígenas, Technical report, Comisionado Presidencial para Asuntos Indígenas.

Barrena, J., Hernando Arrese, M. and Rojas Marchini, F. (2016), 'Antecedentes históricos sobre el complejo forestal y maderero Panguipulli, provincia de Valdivia, centro-sur de Chile', *Bosque (Valdivia)* **37**(3), 473–484.

Bauer, K. (2021), *Negotiating Autonomy: Mapuche Territorial Demands and Chilean Land Policy*, University of Pittsburgh Press.

Bellisario, A. (2007), 'The Chilean agrarian transformation: Agrarian reform and capitalist partial counter-agrarian reform, 1964–1980', *Journal of Agrarian Change* **7**(1), 1–34.

Bengoa, J. (2000), *Historia del pueblo mapuche:(siglo XIX y XX)*, Vol. 7, LOM ediciones.

Besley, T. and Burgess, R. (2000), 'Land reform, poverty reduction, and growth: Evidence from India', *The Quarterly Journal of Economics* **115**(2), 389–430.

Besley, T. and Reynal-Querol, M. (2014), 'The legacy of historical conflict: Evidence from Africa', *American Political Science Review* **108**(02), 319–336.

Bhattacharya, P. S., Mitra, D. and Ulubaşoğlu, M. A. (2019), 'The political economy of land reform enactments: New cross-national evidence (1900–2010)', *Journal of Development Economics* **139**, 50–68.

Bopp, C., Engler, A., Jara-Rojas, R. and Arriagada, R. (2020), 'Are forest plantation subsidies affecting land use change and off-farm income? a farm-level analysis of chilean small forest landowners', *Land Use Policy* **91**, 104308.

Carruthers, D. and Rodriguez, P. (2009), 'Mapuche protest, environmental conflict and social movement linkage in Chile', *Third World Quarterly* **30**(4), 743–760.

Castaneda, P. and Pfutze, T. (2020), 'Land titles and violent conflict in rural Mexico', *Journal of Development Economics* **144**, 102431.

Cayul, P., Corvalan, A., Jaimovich, D. and Pazzona, M. (2022), 'Introducing MACEDA: New micro-data on an indigenous self-determination conflict', *Journal of Peace Research* **59**, 903–912.

CIREN (2013), Sistema territorial integrado de información predial de la Araucanía, Geocoded data, Centro de Información de Recursos Naturales (CIREN).

Clapp, R. A. (1998), 'Regions of refuge and the agrarian question: peasant agriculture and plantation forestry in Chilean Araucania', *World development* **26**(4), 571–589.

CONADI (2021), Sistema de información territorial indígena (SITI), Geocoded data, Corporación Nacional de Desarrollo Indígena (CONADI).

Correa, M. (2023), *La revancha, golpe en La Araucanía*, Ceibo.

Correa, M., Otárola, R. M. and Fuenzalida, N. Y. (2005), *La reforma agraria y las tierras mapuches: Chile 1962-1975*, Lom ediciones Santiago.

Cuesta, J., Díaz, J., Gallego, F., González, F. and Marshall, G. (2017), 'La reforma agraria chilena: Hechos estilizados a la luz de una nueva base de datos', *Estudios Públicos* **146**, 7–48.

Cunningham, K. G. (2014), *Inside the Politics of Self-determination*, Oxford University Press.

Cunningham, K. G., Dahl, M. and Frugé, A. (2019), 'Introducing the strategies of resistance data project', *Journal of Peace Research* .

De Janvry, A., Emerick, K., Gonzalez-Navarro, M. and Sadoulet, E. (2015), 'Delinking land rights from land use: Certification and migration in Mexico', *American Economic Review* **105**(10), 3125–3149.

De Janvry, A., Gonzalez-Navarro, M. and Sadoulet, E. (2014), 'Are land reforms granting complete property rights politically risky? electoral outcomes of Mexico's certification program', *Journal of Development Economics* **110**, 216–225.

De Janvry, A. and Sadoulet, E. (1989), 'A study in resistance to institutional change: The lost game of Latin American land reform', *World Development* **17**(09), 1397–1497.

De Janvry, A., Sadoulet, E. and Wolford, W. (2001), *Access to land and land policy reforms*, Vol. 3, UNU World Institute for Development Economics Research Helsinki.

Dell, M. (2012), 'Path dependence in development: Evidence from the Mexican revolution', *Mimeo, Harvard University* .

Dippel, C. (2014), 'Forced coexistence and economic development: evidence from Native American reservations', *Econometrica* **82**(6), 2131–2165.

Domenech, J. and Herreros, F. (2017), 'Land reform and peasant revolution. Evidence from 1930s Spain', *Explorations in Economic History* **64**, 82–103.

DOS (2018), *Country Reports on Human Rights Practices for 2018*, United States Department of State.

Dube, O. and Vargas, J. F. (2013), 'Commodity price shocks and civil conflict: Evidence from Colombia', *Review of Economic studies* **80**(4), 1384–1421.

Duflo, E. and Udry, C. R. (2004), Intrahousehold resource allocation in Cote d'Ivoire: Social norms, separate accounts and consumption choices, Technical report, NBER Working Paper No. 10498.

Elizalde, A. (2020), 'On the economic effects of indigenous institutions: Evidence from Mexico', *Journal of Development Economics* **147**, 102530.

Feir, D. L., Gillezeau, R. and Jones, M. E. (2024), 'The slaughter of the bison and reversal of fortunes on the great plains', *Review of Economic Studies* **91**(3), 1634–1670.

Fenske, J. and Kala, N. (2017), '1807: Economic shocks, conflict and the slave trade', *Journal of Development Economics* **126**, 66–76.

Fetzer, T. and Marden, S. (2017), 'Take what you can: Property rights, contestability and conflict', *The Economic Journal* **127**(601), 757–783.

Fick, S. E. and Hijmans, R. J. (2017), 'Worldclim 2: new 1-km spatial resolution climate surfaces for global land areas', *International journal of climatology* **37**(12), 4302–4315.

Floto, E. (1979), 'Chile: the secular food crisis', *Food Policy* **4**(2), 95–106.

Galán, J. S. (2020), 'Tied to the land? intergenerational mobility and agrarian reform in Colombia', *Working paper, U. de los Andes* .

Gall, N. and Sanders, T. G. (1972), *The Agrarian Revolt in Cautín*, Vol. 19, American Universities Field Staff.

Garreaud, R. D., Boisier, J. P., Rondanelli, R., Montecinos, A., Sepúlveda, H. H. and Veloso-Aguila, D. (2020), 'The central Chile mega drought (2010–2018): A climate dynamics perspective', *International Journal of Climatology* **40**(1), 421–439.

Germann, M. and Sambanis, N. (2021), 'Political exclusion, lost autonomy, and escalating conflict over self-determination', *International Organization* **75**(1), 178–203.

González, F. (2013), 'Can land reform avoid a left turn? evidence from Chile after the Cuban revolution', *The BE Journal of Economic Analysis & Policy* **13**(1), 31–72.

González, F. and Vial, F. (2021), 'Collective action and policy implementation: Evidence from Salvador Allende's expropriations', *Journal of Economic History* **2**(81), 405–440.

González, A. (2020), Understanding indigenous conflict in Chile: January 2019 - August 2020, Technical report, Armed Conflict Location & Event Data Project (ACLED).

Grossman, H. I. (1994), 'Production, appropriation, and land reform', *The American Economic Review* **84**(3), 705–712.

Heilmayr, R., Echeverría, C. and Lambin, E. F. (2020), 'Impacts of Chilean forest subsidies on forest cover, carbon and biodiversity', *Nature Sustainability* **3**(9), 701–709.

Hidalgo, F. D., Naidu, S., Nichter, S. and Richardson, N. (2010), 'Economic determinants of land invasions', *The Review of Economics and Statistics* **92**(3), 505–523.

Horowitz, A. W. (1993), 'Time paths of land reform: A theoretical model of reform dynamics', *The American Economic Review* **83**(4), 1003–1010.

HRW (2019), *Human Rights Watch World Report 2019*, Human Rights Watch.

Huntington, S. P. (1968), *Political order in changing societies*, Yale University Press.

Jayachandran, S. (2006), 'Selling labor low: Wage responses to productivity shocks in developing countries', *Journal of political Economy* **114**(3), 538–575.

Jedwab, R., Kerby, E. and Moradi, A. (2017), 'History, path dependence and development: Evidence from colonial railways, settlers and cities in Kenya', *The Economic Journal* **127**(603), 1467–1494.

Jordán, F. and Heilmayr, R. (2024), 'Who benefits from individual rights over indigenous lands? evidence from the Mapuche', *Unpublished manuscript* .

Kapstein, E. B. (2017), *Seeds of stability: land reform and US foreign policy*, Cambridge University Press.

Leonard, B. and Parker, D. P. (2021), 'Fragmented ownership and natural resource use: evidence from the Bakken', *The Economic Journal* **131**(635), 1215–1249.

Liscow, Z. D. (2013), 'Do property rights promote investment but cause deforestation? quasi-experimental evidence from Nicaragua', *Journal of Environmental Economics and Management* **65**(2), 241–261.

Maloney, W. F. and Valencia-Caicedo, F. (2016), 'The persistence of (subnational) fortune', *The Economic Journal* **126**(598), 2363–2401.

Michalopoulos, S. and Papaioannou, E. (2016), 'The long-run effects of the scramble for Africa', *The American Economic Review* **106**(7), 1802–1848.

Miguel, E., Satyanath, S. and Sergenti, E. (2004), 'Economic shocks and civil conflict: An instrumental variables approach', *Journal of political Economy* **112**(4), 725–753.

Montero, E. (2022), 'Cooperative property rights and development: Evidence from land reform in El Salvador', *Journal of Political Economy* **130**(1), 48–93.

Pairicán, F. (2014), *Malon: La rebelión del movimiento mapuche, 1990-2013*, Pehuén.

Pinto, J. (2003), *La formación del Estado y la nación, y el pueblo mapuche. De la inclusión a la exclusión*, Santiago de Chile: DIBAM.

Steenland, K. et al. (1977), *Agrarian reform under Allende. Peasant revolt in the South.*, University of New Mexico Press.

Appendix

A Data appendix

To match haciendas from the CORA archives with recent plots from the rural land cadaster 2013 of Araucanía, and bearing in mind that each hacienda was usually divided into several plots, we consider the following variables:

1. Tax ID: Both datasets include the tax ID of the property, including more than one ID for most haciendas. We were able to match the exact tax ID for 572 plots, more than half of the total matched plots. Additionally, we take advantage of that in cases of plots splinted from haciendas, usually the first part of the tax ID is maintained. For example, we confirmed that an hacienda with the original tax ID 135-9 was later divided into plots with IDs 135-106 and 135-107 (and other plots).

2. Surnames of the owner: We have information on the original hacienda owner (several owners in some cases) and the current plot owner in the land cadaster. We take advantage of the Spanish naming custom, in which two surnames are always recorded, to find matches for inherited plots.

3. Hacienda name: Usually divided plots maintain at least part of the name of the original hacienda. Moreover, the land cadaster contains a small geographical unit denominated "place", which includes a group of plots. The name of the "place" is, in many cases, the same as the original hacienda, an additional piece of information we use for the match. We also take advantage of the geocoded data in the cadaster to obtain additional information about the plot name using Google Maps.

4. Municipality in which a plot is located: To use this information, we track in time municipalities created after 1973. Also, we consider that some large haciendas were located between contiguous municipalities.

5. Area from the administrative records: In some cases, the total area registered in the administrative data of CORA archives and the cadaster was identical. This was only possible to use in plots that remained undivided after they were registered in the CORA database.

We define a match if there is a coincidence in at least three of these variables. To cross-check the accuracy of our matching procedure, we used additional data. For a subset of seven municipalities, we got access to the Temuco Property Registry, which allows us to use the tax ID to track plots over time and confirm if they were part of an expropriated hacienda in the past. In cases where we have doubts regarding a match of a set of contiguous plots, we further analyzed the shape of their polygons in the cadaster to assess whether they could have belonged to the same hacienda in the past.

The data for treated haciendas from the CORA archives is described in table A1. A comparison between the treated haciendas that we match to the rural land cadaster with those non-matched is presented in table A2. Table A3 presents descriptive statistics and information for the main plot-level variables used in the empirical analysis, and in table A4 there is a comparison for these variables within and outside indigenous reservations.

Table A1: Descriptive statistics: Treated haciendas (CORA archives)

Variable	Mean	Std. Dev.	Min	Max
Plot area (ha.)	1,165.609	2,457.189	5.7	27,405
Urban	0.066	0.247	0	1
Mapuche participation	0.174	0.379	0	1
Expropriation year	1971.727	0.826	1970	1973
Re-expropriation year	1975.2	2.336	1973	1989
Re-expropriation allotted	0.427	0.495	0	1
	N=564			

Note: This table displays descriptive statistics for the main variables in the original CORA archives for the land reform and counter-reform in Araucanía. This version is based on the data described by Cuesta et al. (2017). *Mapuche participation* comes from Correa et al. (2005). *Urban* is a dummy taking the value one if the hacienda was located in the three municipalities with the larger urban population. *Re-expropriation allotted* is a dummy taking value one for haciendas allotted by military authorities during the counter-reform.

Table A2: Descriptive statistics: Comparison between matched and non-matched haciendas

Variable	Matched haciendas Mean	Non-matched haciendas Mean	Difference of means t-test (p-value)
Plot area	1012.717	2039.277	0.001
Plot area (<5,000 ha.)*	809.349	888.584	0.373
Urban	0.071	0.036	0.231
Mapuche participation	0.179	0.174	0.901
Expropiation year	1971.727	1971.75	0.815
Re-expropiation year	1975.254	1974.871	0.204
Re-expropiation alloted	0.433	0.393	0.489
	N=480	N=84	

* Plots larger than 5,000Ha are excluded. N=470 for matched and N=78 for non-matched.
Note: This table displays the mean values for the variables described in table A1 for the sample of haciendas from the CORA archives matched with plots from the rural land cadaster 2013 and the sample of non-matched haciendas. The last column presents a t-test of the difference in means.

Table A3: Descriptive statistics: Main database

Variable	Mean	Std. dev.	Description	Source
			Conflict variables	
$Conflict$	0.006	0.077	Dummy taking value one if a plot participated in a conflict event (1990-2021)	Cayul et al. (2022)
$Conflict_{250m}$	0.035	0.183	Dummy taking value one for plots located within 250m from a conflict event (1990-2021)	Cayul et al. (2022) & land cadaster (2013)
$Attacks$	0.003	0.051	Dummy taking value one if a plot participated in an attack event (1990-2021)	Cayul et al. (2022)
$Land\ invasions$	0.001	0.034	Dummy taking value one if a plot participated in a land invasion event (1990-2021)	Cayul et al. (2022)
$Demonstrations$	0.001	0.032	Dummy taking value one if a plot participated in a demonstration event (1990-2021)	Cayul et al. (2022)
			Treatment (land reform and counter-reform)	
$CORA$	0.007	0.086	Dummy taking the value one for plots treated in land reform (1970-73) and counter-reform (1973-89)	Cuesta et al. (2017) & Correa et al. (2005)
$CORA \times Reservation$	0.003	0.052	$CORA$ plots within Mapuche reservations	Cuesta et al. (2017) & CONADI (2021)
$CORA_{contiguous}$	0.048	0.214	Dummy taking value one for $CORA$ and for all immediate neighbour plots	Cuesta et al. (2017) & land cadaster (2013)
$CORA_{allotted}$	0.003	0.059	Dummy taking value one for plots allotted as a result of the land counter-reform (1973-89)	Cuesta et al. (2017) & Correa et al. (2005)
$CORA_{1962-69}$	0.001	0.022	Dummy taking value one for plots expropriated between 1962 and 1969	Cuesta et al. (2017) & Correa et al. (2005)
			Other variables	
$Shock_{70}$	-0.091	0.189	Deviation of rainfall shock in spring 1970 from historical mean	Fick and Hijmans (2017)
$Reservation$	0.609	0.488	Dummy taking value one if the plot is within an indigenous reservation	CONADI (2021)
$Wheat\ suitability$	0.596	0.491	Time-invariant plot-level index for the suitability of wheat cultivation $[0, 1]$	land cadaster (2013)
$Wheat\ municipality$	0.559	0.496	Dummy taking value one for municipalities above the median of wheat production in 1965	Agricultural Census 1965
$Mapuche\ ownership$	0.458	0.498	Dummy taking value one if the owner of the plot is a Mapuche in 2013 (identified by the last name)	land cadaster (2013) & MDP (2018)
$State\ repression$	0.003	0.051	Dummy taking value one if a plot was not expropriated by its size and was re-expropriated in 1974	Cuesta et al. (2017) & Correa et al. (2005)
$Forest\ plantations$	0.014	0.119	Dummy taking value one if the main activity in a plot was forestry plantations in 2013	land cadaster (2013)
$Land\ restitution$	0.010	0.100	Dummy taking value one if a plot was part of the indigenous land restitution program (1994-2021)	CONADI (2021)
$Invaded_{1969-71}$	0.001	0.027	Dummy taking value one if a plot was invaded during the land reform (1969-1971)	González and Vial (2021)
	N=143,260			

Note: This table displays descriptive statistics for the main plot-level variables used in the empirical analysis.

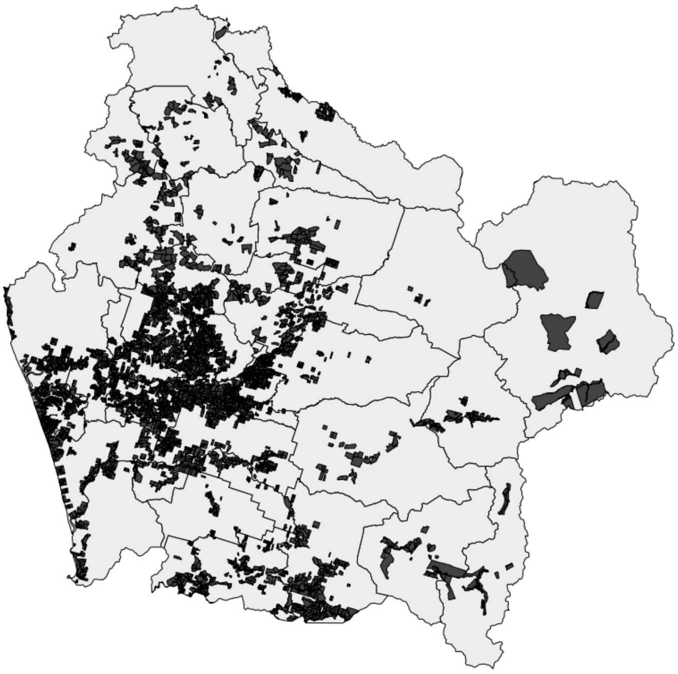
Table A4: Descriptive statistics: Comparison between plots outside and within reservations

	Outside reservations	Within reservations	t-test
Mapuche ownership	0.070 (0.255)	0.708 (0.455)	<0.001
Plot area (ha)	33.501 (256.194)	15.306 (442.282)	<0.001
$CORA$	0.012 (0.109)	0.004 (0.066)	<0.001
$CORA_{contiguous}$	0.078 (0.269)	0.028 (0.165)	<0.001
$Conflict$	0.007 (0.083)	0.005 (0.072)	<0.001
$Shock_{70}$	-0.078 (0.200)	-0.100 (0.182)	<0.001
Distance Temuco (km)	64.201 (25,583)	42.312 (27.451)	<0.001
Wheat suitability	0.473 (0.499)	0.675 (0.468)	<0.001
Forest plantations	0.029 (0.169)	0.005 (0.069)	<0.001
Land restitution	0.018 (0.132)	0.005 (0.072)	<0.001
N	56,083 (39.1%)	87,177 (60.9%)	

Note: This table displays the mean (s.d) values for the variables described in table A3 for the sample of plots within and outside historical Mapuche reservations. The last column presents a t-test of the difference in means.

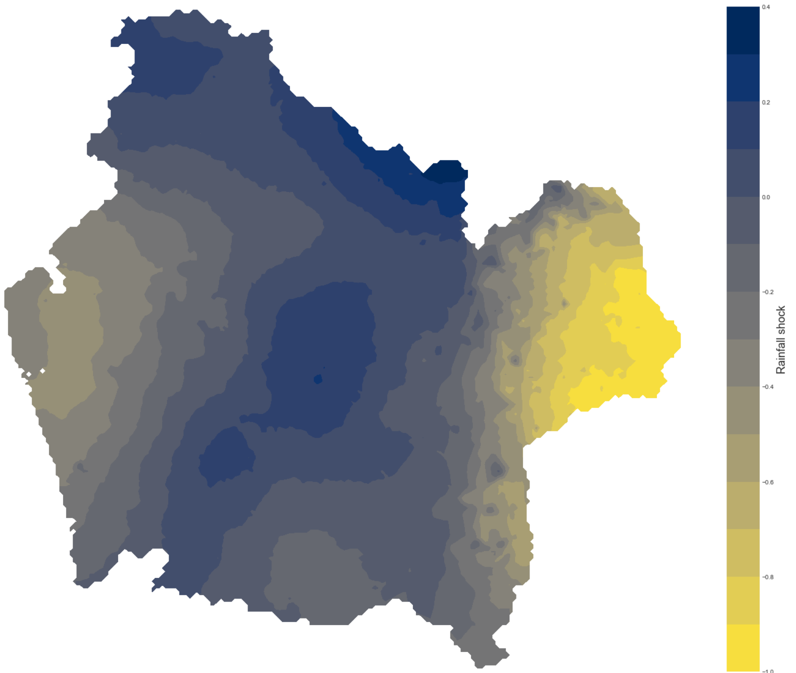
B Additional figures

Figure B1: Indigenous reservations in the Araucanía region



Note: The map shows the historical boundaries of indigenous reservations within the Araucanía region.

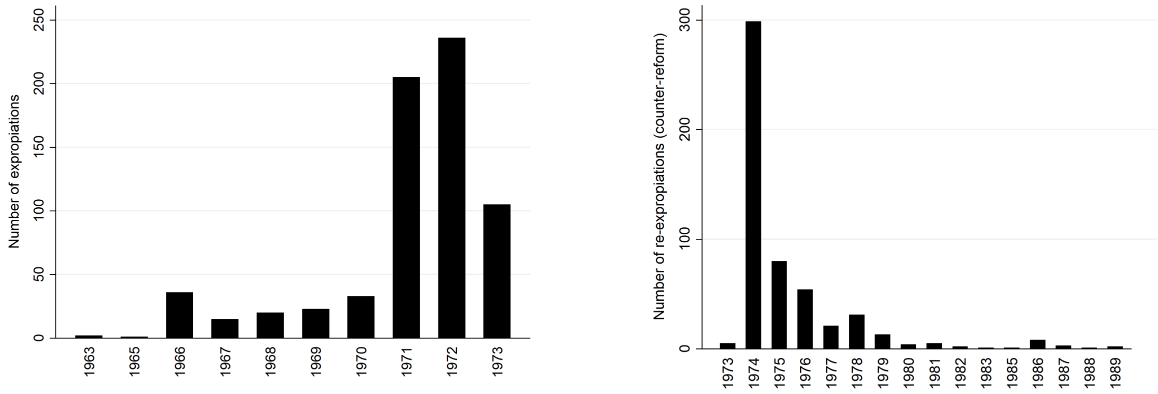
Figure B2: Distribution of the productivity shock ($Shock_{70}$)



Note: Map of the Araucanía region with the distribution of productivity shock ($Shock_{70}$) in the spring of 1970. The scale represents standard deviations from historical rainfall levels. Based on data by WorldClim 2.1.

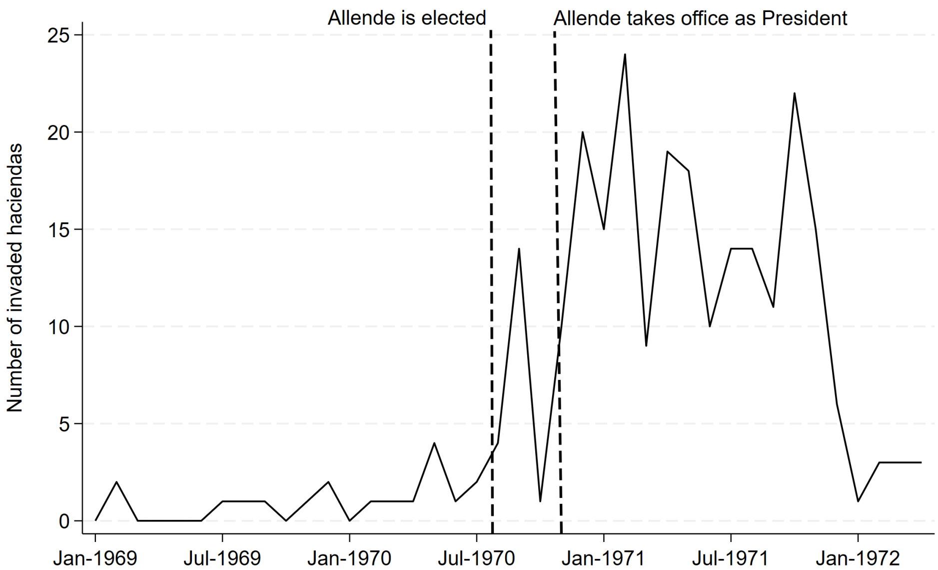
Figure B3: Expropriations during the land reform and re-expropriations in the counter-reform

(a) Expropriations (b) Re-expropriations



Note: Panel A displays the yearly number of haciendas expropriated during the land reform, and panel B the yearly number of haciendas re-expropriated during the counter-reform. Data from Cuesta et al. (2017) and Correa et al. (2005).

Figure B4: Invasions of haciendas in Araucanía (1969-1972)

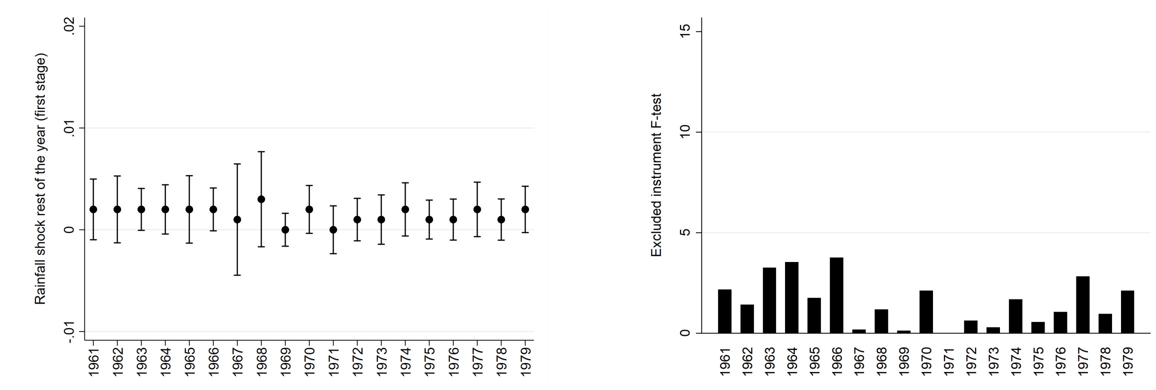


Note: Allende was elected in September 1970 and took office as President in November 1970. The monthly number of invaded haciendas is based on data by González and Vial (2021). A total of 214 invaded haciendas in Araucanía are reported by them.

Figure B5: Placebo estimates for the instrument: Rainfall during the whole year, except spring

(a) First stage coefficients

(b) Excluded instrument F-test



Note: The figures present placebo estimates for the instrumental variables results in column 2 of table 2 but taking as instrumental variable $Shock_y^{rest\ of\ year}$, which considers rainfall outside the spring in each year. Figure (a) shows point estimates and confidence intervals at the 90% level for the first stage estimates of equation 2, considering $Shock_y^{rest\ of\ year}$ for the years between 1961 and 1979. Figure (b) displays the Kleibergen-Paap F-test values for the excluded instrument $Shock_y^{rest\ of\ year}$ for the years between 1961 and 1979, considering robust standard errors clustered at the "place" level.

C Additional tables

Table C1: Failed and partially implemented land reforms in Latin America

Country	Years	Description
Brazil	1964-1985	Stagnated land reform by military regime (Hidalgo et al., 2010; Albertus et al., 2018).
Brazil	1988-2000s	Partial reform benefiting less than 10% of the intended beneficiaries. (Hidalgo et al., 2010; Fetzer and Marden, 2017; Albertus et al., 2018).
Chile	1962-1973	Land reform partially reverted after a coup d'état.
Colombia	1961-1970s	Partial reform where less than 10% of the intended land was redistributed (Galán, 2020; Albertus and Kaplan, 2013).
Ecuador	1964-1966	Partial land reform halted by military regime (De Janvry and Sadoulet, 1989).
El Salvador	1980-1982	Partial land reform, only initial phase implemented (Montero, 2022).
Guatemala	1952-1954	Land reform reverted after a coup d'état (Albertus, 2015).
Honduras	1962-1975	Land reform halted by military regime (De Janvry and Sadoulet, 1989).
Nicaragua	1979-1980s	Land reform with limited implementation and halted by civil conflict (Liscow, 2013).
Peru	1969-1976	Incomplete reform in agrarian zones. The reform was halted after a regime change. (Albertus, 2020).

Note: This table shows a list of failed land reforms in Latin America, including the one studied in this paper. The list is not necessarily exhaustive.

Table C2: Robustness checks for OLS results: Different specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$CORA$	0.065***	0.065***		0.058***	0.061***	0.062***		0.081***	0.065***	
	(0.017)	(0.016)		(0.017)	(0.016)	(0.015)		(0.013)	(0.013)	
$CORA_{contiguous}$			0.025***				0.027***			0.035***
			(0.004)				(0.003)			(0.004)
$CORA \times Reservation$				0.020		-0.001			0.054	
				(0.036)		(0.036)			(0.036)	
N	143258	143258	143258	143258	74424	74424	74424	37118	37118	37118
$\overline{Conflict}$	0.006	0.006	0.006	0.006	0.007	0.007	0.007	0.016	0.016	0.016
p-value interaction=0				0.030		0.077			0.001	
specification	FE	FE	FE	FE	PSM	PSM	PSM	>10Ha	>10Ha	>10Ha
Controls	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES

Note: This table displays different specifications for the OLS estimates of equation 1, where the dependent variable is a dummy taking value one if conflict events occurred within a plot between 1990 and 2021 and $CORA$, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. Specification FE includes fixed effects at the municipality level. Specification PSM includes only observations that share the common support of a propensity score matching estimates of $CORA$, where explanatory variables are the control variables and plot size. Specification 10Ha includes only plots with an area above 10 ha. *Reservation* is a dummy taking value one if the plot is within an indigenous reservation. $CORA_{contiguous}$ is a dummy taking value one for $CORA$ and for all immediate neighbour plots. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the municipality-level in columns 1 to 4 and at the "place" level in columns 5 to 9.

Table C3: Robustness checks for OLS results: Additional results

	(1)	(2)	(3)	(4)
$CORA$	0.065***	0.047***	0.047***	0.047***
	(0.014)	(0.014)	(0.014)	(0.012)
$CORA_{1962-69}$	0.008			
	(0.014)			
$CORA_{contiguous}$		0.019***	0.013***	
		(0.003)	(0.003)	
$CORA_{500m}$			0.003**	
			(0.001)	
$CORA_{1km}$			0.003***	
			(0.001)	
$CORA_{2km}$			0.001	
			(0.001)	
$CORA_{5km}$			0.001	
			(0.001)	
$CORA \times Reservation$				0.029
				(0.033)
$CORA \times Reservation_{contiguous}$				0.017**
				(0.007)
$CORA \times Mapuche_{outside}$				0.122**
				(0.049)
N	143260	143260	143260	143260
$\overline{Conflict}$	0.006	0.006	0.006	0.006

Note: This table displays different specifications for the OLS estimates of equation 1, where the dependent variable is a dummy taking value one if conflict events occurred within a plot between 1990 and 2021 and $CORA$, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. $CORA_{1962-69}$ is a dummy taking value one for plots that were part of the "mild" land reform between 1962 and 1969. $CORA_{contiguous}$ is a dummy taking value one for $CORA$ and for all immediate neighbor plots. $CORA_{500m}$, $CORA_{1km}$, $CORA_{2km}$, and $CORA_{5km}$ are dummies taking the value one for $CORA$ and all the plots within 500mts, 1km, 2km, and 5km, respectively. $Reservation$ is a dummy taking value one if the plot is within an indigenous reservation. $Reservations_{contiguous}$ is a dummy taking value one for plots outside reservations that are neighbor to a $CORA$ plot within a reservation. $Mapuche_{outside}$ is a dummy taking value one for $CORA$ plots outside reservations with Mapuche participation according to Correa et al. (2005). Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C4: Robustness checks: Inference

	(1)	(2)	(3)	(4)	(5)
			A: OLS estimates		
$CORA$	0.065***	0.065***	0.065***	0.065***	0.065***
	(0.014)	(0.013)	(0.015)	(0.017)	(0.020)
			B: IV estimates (second stage)		
$CORA$	0.716***	0.716***	0.716**	0.716*	0.716**
	(0.237)	(0.253)	(0.308)	(0.367)	(0.315)
			C: First stage results		
$Shock_{70}$	0.014***	0.014***	0.014***	0.014***	0.014***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)
N	143260	143260	143260	143260	143260
cluster-robust	place	10 km	20 km	50 km	100 km

Note: This table displays additional robustness checks for the inference in the main specifications of tables 1 and 2 (column 2). Panel A presents OLS estimates and panel B IV estimates using $Shock_{70}$ as the instrument, where the dependent variable is a dummy taking value one if conflict events occurred within a plot in each period. $CORA$, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. In panel C, the results are for the first stage estimates of panel B, where the dependent variable is $CORA$. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. The different specifications include robust standard errors clustered at the "place" level in column 1 and Conley inference taking 10km, 20km, 50km, and 100km as spatial cutoff in columns 2 to 5.

Table C5: Robustness checks for IV results: Additional results for the second stage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				IV estimates			
$CORA$	0.548**		0.859***				
	(0.224)		(0.223)				
	[0.314]*		[0.326]***				
$CORA_{contiguous}$		0.101***		0.153***			
		(0.027)		(0.029)			
		[0.044]**		[0.053]***			
$CORA \times Reservation$					1.781**		
					(0.821)		
					[1.318]		
$CORA_{contiguous}$ $\times Reservation$						0.258***	
						(0.065)	
						[0.119]***	
$CORA$ $\times Reservation_{contiguous}$							2.087**
							(1.050)
							[1.703]
N	74424	74424	37118	37118	143260	143260	143260
$\overline{Conflict}$	0.007	0.007	0.016	0.016	0.006	0.006	0.006
IV F-test (cluster)	8.956	48.053	22.337	66.219	5.573	29.687	4.277
IV F-test (spatial)	10.094	22.364	12.139	13.346	3.537	14.144	1.860
IV Anderson-Rubin	0.000	0.000	0.000	0.000	0.000	0.000	0.000
specification	PSM	PSM	>10Ha	>10Ha	ALL	ALL	ALL
				First stage results			
$Shock_{70}$	0.018***	0.096***	0.030***	0.169***	0.006**	0.038***	0.005**
	(0.006)	(0.014)	(0.006)	(0.021)	(0.002)	(0.004)	(0.002)
	[0.006]***	[0.020]***	[0.009]***	[0.045]***	[0.003]*	[0.010]***	[0.004]
$\overline{CORA}$	0.010	0.057	0.020	0.114	0.003	0.021	0.005

Note: This table displays additional specifications for the second stage instrumental variable estimates of equation 3. The dependent variable is a dummy taking value one if conflict events occurred within a plot between 1990 and 2021. $CORA$, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. $CORA_{contiguous}$ is a dummy taking value one for $CORA$ and for all immediate neighbor plots. $Reservation$ is a dummy taking value one if the plot is within an indigenous reservation. $Reservations_{contiguous}$ is a dummy taking value one for plots outside reservations that are neighbors to a $CORA$ plot within a reservation. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis and Conley inference, taking 50km as spatial cutoff, in brackets.

Table C6: Robustness checks for IV results: Additional results for the first stage

	(1)	(2)	(3)	(4)	(5)	(6)
	$CORA_{1962-69}$	$CORA$	$CORA$	$CORA_{contiguous}$	$CORA$	$CORA_{contiguous}$
$Shock_{70}$	0.001	0.016**	0.009**	0.065***	0.008**	0.099***
	(0.000)	(0.007)	(0.004)	(0.013)	(0.004)	(0.015)
	[0.001]	[0.006]***	[0.004]**	[0.021]***	[0.005]	[0.022]***
$Shock_{70}^{rest\ of\ year}$		-0.001				
		(0.001)				
		[0.002]				
$Shock_{70}$			0.012*	0.060***		
$\times$ *wheat suitability*			(0.007)	(0.018)		
			[0.008]	[0.031]*		
$Shock_{70}$					0.020*	0.033
$\times$ *wheat municipality*					(0.011)	(0.025)
					[0.014]	[0.044]
N	143260	143260	143260	143260	143260	143260
$\overline{CORA}$	0.001	0.007	0.007	0.048	0.007	0.048
$Shock_{70}$ = interaction		0.002	0.824	0.906	0.281	0.077

Note: This table displays additional specifications for the first stage instrumental variable estimates of equation 2. The dependent variables are different treatment variables: $CORA$ is a dummy variable taking the value one if a plot was part of the land reform and counter-reform. $CORA_{contiguous}$ is a dummy taking value one for $CORA$ and for all immediate neighbor plots. $CORA_{1962-69}$ is a dummy taking value one for plots that were part of the "mild" land reform between 1962 and 1969. $Shock_{70}$ is the rainfall shock of spring 1970 and $Shock_{70}^{rest\ of\ year}$ is the rainfall shock for the rest of the year 1970. *Wheat suitability* is a time-invariant plot-level index for the suitability of wheat cultivation. *Wheat municipality* is a dummy taking value one for municipalities above the median of wheat production according to the agricultural census 1965. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis and Conley inference, taking 50km as spatial cutoff, in brackets.

Table C7: Placebo estimates for the instrument: "Horse race" with shocks in different years

	1970	1961	1962	1963	1964	1965	1966	1967	1968	1969
$Shock_{1970}$	0.014***	0.014***	0.014***	0.014***	0.014***	0.014***	0.014***	0.020***	0.018***	0.019***
	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.007)	(0.006)	(0.007)
$Shock_{year}$		0.000	0.001	0.000	0.000	0.001	-0.000	-0.009	-0.005	-0.005
		(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.008)	(0.003)	(0.004)
		1971	1972	1973	1974	1975	1976	1977	1978	1979
$Shock_{1970}$		0.014**	0.015***	0.014***	0.014***	0.014***	0.016***	0.014***	0.015***	0.014***
		(0.007)	(0.004)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.003)
$Shock_{year}$		-0.000	0.000	-0.000	-0.001	0.001	0.002	-0.000	0.002	0.000
		(0.009)	(0.001)	(0.001)	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)
N=143260										
$\overline{CORA}=0.007$										

Note: This table displays OLS estimates where the dependent variable is $CORA$, a dummy variable taking the value one if a plot was part of the land reform and counter-reform. $Shock_{70}$ is the rainfall shock of spring 1970 and $Shock_{year}$ is the placebo rainfall shock in each respective year. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C8: Reduce form estimates: The effect of the instrument on current conflict

	1970	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
$Shock_{1970}$	0.010***	0.010***	0.010***	0.010***	0.011***	0.010***	0.009***	0.011***	0.010***	0.012***	0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$Shock_{year}$		0.003*	0.000	0.002	0.001	-0.001	0.002	0.001	0.002*	-0.008***	0.001
		(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.003)	(0.001)	(0.002)	(0.003)
		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
$Shock_{1970}$		0.012***	0.010***	0.014***	0.016***	0.009***	0.010***	0.010***	0.011***	0.010***	0.011***
		(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
$Shock_{year}$		-0.005***	0.000	-0.004***	-0.007***	-0.003*	-0.004***	0.001	0.005*	0.003	0.001
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.002)
N=143260											
$\overline{CORA} = 0.007$											

Note: This table displays OLS estimates where the dependent variable is $Conflict$, a dummy taking value one if conflict events occurred within a plot between 1990 and 2021. $Shock_{70}$ is the rainfall shock of spring 1970 and $Shock_{year}$ is the rainfall shock in each respective year. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C9: Placebo estimates for the instrument: Alternative definitions of the productivity shock

		1961	1962	1963	1964	1965	1966	1967	1968	1969
$Excess_{spring}$		-	-	0.009**	-	-	-	-	0.004	0.002
				(0.004)					(0.006)	(0.005)
$Excess_{summer}$		-	-	-0.001	-	-	0.005	-0.002	-0.003	-
				(0.004)			(0.005)	(0.006)	(0.005)	
$Drought_{spring}$		-0.009**	-0.007	0.003	-0.006*	-0.004	-0.003	-0.006	-	-0.004
		(0.004)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)	(0.007)		(0.006)
$Drought_{summer}$		-	-	0.003*	-0.002	-	-0.001	-	-	-
				(0.002)	(0.004)		(0.003)			
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
$Excess_{spring}$	-	-	-0.005	0.010**	-	-	-0.003	0.011***	-	0.008*
			(0.005)	(0.005)			(0.005)	(0.004)		(0.004)
$Excess_{summer}$	-	0.004	-	0.002	-	0.005	0.003	-0.005	0.001	0.004
		(0.004)		(0.005)		(0.006)	(0.004)	(0.003)	(0.004)	(0.003)
$Drought_{spring}$	-	-	0.002	0.001	-0.004	-	-0.003	-0.003	-	0.003
			(0.006)	(0.004)	(0.004)		(0.002)	(0.005)		(0.004)
$Drought_{summer}$	-	-	-0.003	0.001	0.001	0.008	0.002	-0.001	-0.004	0.008
			(0.005)	(0.003)	(0.003)	(0.010)	(0.002)	(0.003)	(0.004)	(0.005)
N=143260										
$\overline{CORA} = 0.007$										

Note: This table displays OLS estimates where the dependent variable is $CORA$, a dummy variable taking the value one if a plot was part of the land reform and counter-reform. For each year, the explanatory variables are different definitions of a productivity shock (each one in a separate regression). $Excess_{spring}$ and $Excess_{summer}$ are dummies taking value one if a plot has rainfall above one standard deviation of the historical value in spring and summer. $Drought_{spring}$ and $Drought_{summer}$ are dummies taking value one if a plot has rainfall below one standard deviation of the historical value in spring and summer. Control variables include the productivity shock of each year and season, a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C10: Additional results: Plots invaded in 1970-71

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$Invaded_{1970-71}$	$Invaded_{1970-71}$	$Invaded^{contiguous}_{1970-71}$	$Conflict$	$Conflict$	$Conflict$	$Conflict$
$Shock_{70}$	0.002***	0.003***	0.023***				
	(0.001)	(0.001)	(0.004)				
	[0.001]***	[0.001]***	[0.005]***				
$Shock_{70} \times Reservation$		-0.002***					
		(0.001)					
		[0.001]***					
$CORA$				0.052***			
				(0.013)			
				[0.017]***			
$CORA \times Invaded_{1970-71}$				0.129***		5.310***	
				(0.046)		(1.896)	
				[0.037]***		[2.013]***	
$CORA_{contiguous}$					0.021***		
					(0.003)		
					[0.005]***		
$CORA_{contiguous}$					0.029***		0.443***
$\times Invaded^{contiguous}_{1970-71}$					(0.008)		(0.111)
					[0.007]***		[0.159]***
N	143260	143260	143260	143260	143260	143260	143260
$\bar{y}$	0.001	0.001	0.008	0.006	0.006	0.006	0.006
p-value interaction=0		0.155		0.000	0.000		
IV F-test (cluster)						10.205	29.550
IV F-test (spatial)						7.719	11.810
IV Anderson-Rubin						0.000	0.000

Note: This table presents analysis related to the variable $Invaded_{1970-71}$, which is a dummy taking the value one if a plot was invaded between 1970 and 1971, according to the data by González and Vial (2021). Columns 1 to 3 are OLS estimates where $Invaded_{1970-71}$ is the dependent variable and $Shock_{70}$ is the rainfall shock of spring 1970. $Invaded^{contiguous}_{1970-71}$ is a dummy that takes the value one for $Invaded_{1970-71}$ and all the immediate neighbours. Columns 4 and 5 present OLS estimates and columns 6 and 7 IV estimates, where the dependent variable is $Conflict$, a dummy taking value one if conflict events occurred within a plot between 1990 and 2021 and $CORA$, the main treatment variable, is a dummy variable taking the value one if a plot was part of the land reform and counter-reform. $CORA_{contiguous}$ is a dummy taking value one for $CORA$ and for all immediate neighbor plots. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C11: Additional results: The evolution of the conflict over time

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Conflict 1990-2005			Conflict 2006-2016			Conflict 2017-2021		
$CORA$	0.023***	0.015***	0.015	0.037***	0.036***	0.585***	0.023***	0.023***	0.377***
	(0.006)	(0.006)	(0.052)	(0.009)	(0.009)	(0.188)	(0.006)	(0.007)	(0.129)
$CORA \times Reservation$		0.023			0.003			-0.001	
		(0.018)			(0.020)			(0.013)	
N	143260	143260	143260	143260	143260	143260	143260	143260	143260
$\overline{y}$	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003
IV F-test (cluster)			12.499			12.499			12.499
IV F-test (spatial)			13.363			13.363			13.363
IV Anderson-Rubin			0.777			0.000			0.000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Conflict 1990-2005			Conflict 2006-2016			Conflict 2017-2021		
$CORA_{contiguous}$	0.006***	0.003**	0.002	0.013***	0.010***	0.092***	0.012***	0.009***	0.059***
	(0.001)	(0.001)	(0.008)	(0.002)	(0.002)	(0.018)	(0.002)	(0.002)	(0.013)
$CORA_{contiguous}$		0.008***			0.007*			0.009**	
$\times Reservation$		(0.003)			(0.004)			(0.004)	
N	143260	143260	143260	143260	143260	143260	143260	143260	143260
$\overline{y}$	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003
IV F-test (cluster)			56.072			56.072			56.072
IV F-test (spatial)			23.870			23.870			23.870
IV Anderson-Rubin			0.777			0.000			0.000

Note: This table displays additional results for the conflict in different periods. Columns 1, 2, 4, 5, 7, and 8 are OLS estimates, columns 3, 6, and 9 IV estimates using $Shock_{70}$ as the instrument. The dependent variable is a dummy taking value one if conflict events occurred within a plot in each period. $CORA$, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. $CORA_{contiguous}$ is a dummy taking value one for $CORA$ and for all immediate neighbor plots. *Reservation* is a dummy taking value one if the plot is within an indigenous reservation. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C12: Additional results: Types of conflict event

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Attacks			Land invasions			Demonstrations	
CORA	0.038***	0.034***	0.440***	0.025***	0.018***	0.028	0.007**	0.006*	0.173**
	(0.009)	(0.008)	(0.148)	(0.007)	(0.006)	(0.038)	(0.003)	(0.003)	(0.070)
CORA × *Reservation*		0.010			0.020			0.001	
		(0.021)			(0.018)			(0.006)	
N	143260	143260	143260	143260	143260	143260	143260	143260	143260
$\overline{y}$	0.003	0.003	0.003	0.001	0.001	0.001	0.001	0.001	0.001
IV F-test (cluster)			12.499			12.499			12.499
IV F-test (spatial)			13.363			13.363			13.363
IV Anderson-Rubin			0.000			0.450			0.001
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Attacks			Land invasions			Demonstrations	
$CORA_{contiguous}$	0.012***	0.009***	0.069***	0.006***	0.004***	0.004	0.004***	0.002**	0.027***
	(0.002)	(0.002)	(0.015)	(0.001)	(0.001)	(0.006)	(0.001)	(0.001)	(0.009)
$CORA_{contiguous}$		0.008**			0.007***			0.003	
×*Reservation*		(0.004)			(0.002)			(0.002)	
N	143260	143260	143260	143260	143260	143260	143260	143260	143260
$\overline{y}$	0.003	0.003	0.003	0.001	0.001	0.001	0.001	0.001	0.001
IV F-test (cluster)			56.072			56.072			56.072
IV F-test (cluster)			23.870			23.870			23.870
IV Anderson-Rubin			0.000			0.450			0.001

Note: This table displays additional results for the different types of conflict events described by Cayul et al. (2022). Columns 1, 2, 4, 5, 7, and 8 are OLS estimates, columns 3, 6, and 9 IV estimates using $Shock_{70}$ as the instrument. The dependent variable is a dummy taking value one if a plot participated in arsons and another type of attacks (columns 1 to 3), land invasions (columns 4 to 6), and demonstrations (columns 7 to 9). *CORA*, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. $CORA_{contiguous}$ is a dummy taking value one for *CORA* and for all immediate neighbor plots. *Reservation* is a dummy taking value one if the plot is within an indigenous reservation. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C13: Additional results: Conflict spillovers

	(1)	(2)	(3)	(4)	(5)	(6)
	Conflict ring 250m		Conflict ring 500m		Conflict ring 1km	
CORA	0.024**	0.026**	0.006	0.008	0.002	-0.004
	(0.012)	(0.012)	(0.007)	(0.009)	(0.019)	(0.014)
CORA × *Reservation*		-0.005		-0.007		0.016
		(0.018)		(0.014)		(0.035)
N	143260	143260	143260	143260	143260	143260
$\overline{y}$	0.029	0.029	0.038	0.038	0.096	0.096

Note: This table displays additional OLS estimates, where the dependent variable is a dummy taking value one if a plot is located within a distance of 250 meters, 500 meters, and 1km of a conflict event. In the 250m ring, plots where the conflict event took place are excluded, in the 500m ring the 250m buffer aroung the conflict event is excluded, and in the 1km ring the 500m buffer is excluded. *CORA*, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. *Reservation* is a dummy taking value one if the plot is within an indigenous reservation. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C14: Additional results: Conflict within 250m

	(1)	(2)	(3)	(4)	(5)	(6)
$CORA$	0.089***	0.085***			4.486***	
	(0.022)	(0.019)			(1.469)	
$CORA \times Reservation$		0.012				
		(0.045)				
$CORA_{contiguous}$			0.041***	0.028***		0.707***
			(0.006)	(0.006)		(0.148)
$CORA_{contiguous}$				0.034***		
$\times Reservation$				(0.011)		
N	143260	143260	143260	143260	143260	143260
$\overline{y}$	0.035	0.035	0.035	0.035	0.035	0.035
IV F-test (cluster)					12.499	58.544
IV F-test (spatial)					13.363	23.870
IV Anderson-Rubin					0.000	0.000

Note: This table displays additional results where the dependent variable is a dummy taking value one if a plot is located within a distance of 250 meters of a conflicts event. Columns 1, 2, 3, and 4 are OLS estimates, columns 5 and 6 IV estimates using $Shock_{70}$ as the instrument. $CORA$, the main treatment variable, is a dummy taking the value one if a plot was part of the land reform and counter-reform. $CORA_{contiguous}$ is a dummy taking value one for $CORA$ and for all immediate neighbor plots. *Reservation* is a dummy taking value one if the plot is within an indigenous reservation. Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C15: Additional results: The effects of land reform and counter-reform on potential mechanisms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Mapuche ownership (2013)		State repression (1974)		Land restitution (1994-2021)		Forest plantations (2013)	
$CORA$	-0.161***	-0.074***	0.597***	0.210***	0.069***	0.043***	0.187***	0.125***
	(0.024)	(0.013)	(0.103)	(0.041)	(0.022)	(0.014)	(0.051)	(0.028)
$CORA \times CORA_{allotted}$	0.018		-0.534***		-0.022		-0.138**	
	(0.042)		(0.104)		(0.028)		(0.054)	
$CORA \times Reservation$		-0.229***		0.383**		0.026		-0.020
		(0.083)		(0.158)		(0.035)		(0.046)
$CORA$		-0.001		0.006		0.043***		0.026**
$\times Reservation_{contiguous}$		(0.019)		(0.007)		(0.012)		(0.013)
$CORA$		0.090**		0.038		0.082**		0.065
$\times Mapuche_{outside}$		(0.041)		(0.065)		(0.042)		(0.066)
N	143260	143260	143260	143260	143260	143260	143256	143256
$\bar{y}$	0.458	0.458	0.003	0.003	0.010	0.010	0.014	0.014

Note: This table displays additional results for the effects of $CORA$ on potential mechanisms, as in panel A of table 3. $CORA_{allotted}$ is a dummy taking value one for haciendas allotted as a result of the land counter-reform. *Reservation* is a dummy taking value one if the plot is within an indigenous reservation. $Reservations_{contiguous}$ is a dummy taking value one for plots outside reservations that are neighbor to a $CORA$ plot within a reservation. $Mapuche_{outside}$ is a dummy taking value one for $CORA$ plots outside reservations with Mapuche participation according to Correa et al. (2005). Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.

Table C16: Additional results: The effects of mechanisms on different conflict variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Mechanism: Land restitution (1994-2021)					Mechanism: Forest plantations (2013)				
	Attacks	Invasions	90-05	06-16	17-21	Attacks	Invasions	90-05	06-16	17-21
$Mechanism$	0.024***	0.010***	0.019***	0.018***	0.005**	0.019***	0.008***	0.008***	0.016***	0.012***
	(0.006)	(0.003)	(0.005)	(0.006)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)	(0.003)
$Mechanism \times CORA$	0.051	0.056*	0.048	-0.009	0.033	0.017	-0.000	0.054**	-0.017	0.035*
	(0.037)	(0.033)	(0.032)	(0.027)	(0.028)	(0.023)	(0.016)	(0.023)	(0.018)	(0.021)
N	143260	143260	143260	143260	143260	143256	143256	143256	143256	143256
$\bar{y}$	0.003	0.001	0.002	0.003	0.003	0.003	0.001	0.002	0.003	0.003

Note: This table displays additional results for the effect of the potential mechanisms on different conflict variables, following the specification in panel B of table 3. The dependent variable is a dummy taking value one if a plot participated in arsons and another type of attacks (columns 1 and 6), land invasions (columns 2 and 7), or conflict events taking place in the period 1990-2005 (columns 3 and 8), 2006-2016 (columns 4 and 9), and 2017-2021 (columns 5 and 10), Control variables include a dummy for plots that were part of a reservation, an index for cultivation suitability, altitude, distance to Temuco (the regional capital), distance to water bodies, and province fixed effects. Robust standard errors clustered at the "place" level in parenthesis.