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A Farewell to Arms: The Peace Dividend of Costa Rica's Army Abolition

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ABSTRACT *This paper estimates Costa Rica's peace dividend following the end of the civil war and the army's abolition in 1949 with synthetic control. We find that the country's average per capita GDP growth increased from 1.46% to 2.28% between 1950-2010, relative to a counterfactual Costa Rica that did not take this path. Three main mechanisms are offered to explain these results: After the end of the civil war and the proscription of the military, the country decided to invest substantially in infrastructure, education, and health, which drove economic development. Second, the new constitution reduced power concentration by the executive branch and increased its accountability. Third, the military's proscription guaranteed the survival and the long-run success of these political and socio-economic reforms.*

KEYWORDS: Civil war; economic growth; peace; economic development; Latin America; democratization

JEL CLASIFFICATION: D74; O43; O54

1. Introduction

Following a period of political violence and the end of the 1948 Civil War, Costa Rica abolished its military. Ever since and up to this day, Costa Rica has achieved some of the highest living standards and development indicators in Latin America. Unlike most countries in the region, Costa Rica's peace dividend has proved durable, without any periods of dictatorship nor any armed seizure of power since the abolition of its army.

Using synthetic control estimates and data from the Montevideo-Oxford Latin American Economic History database (Astorga et al., 2010), we study Costa Rica's "peace dividend", i.e. the long-term economic and political gains stemming from sustained peace combined with transformative reforms. Furthermore, we analyze Costa Rica's political history of the 1940s and 1950s to identify the mechanisms that facilitated growth and stability in the aftermath of the civil war and the military's dissolution.

Our estimates indicate that Costa Rica's per capita GDP grew at an average annual rate of 2.28% from 1950 to 2010, outpacing the synthetic control's estimated rate of 1.46%. Based on

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these estimates, we calculate that Costa Rica doubled its per capita GDP approximately every 30 years, whereas, without the abolition of the army and subsequent reforms, it would have taken 49 years to achieve the same growth. This effect is particularly notable in a Latin American context: prior to 1950, Costa Rica had the fourth-lowest GDP per capita growth in the region, but following these transformative changes, it rose to second-best.

Nevertheless, our work does not attribute all post-1950 growth solely to the abolition of the army. Rather, building on Costa Rican Civil War and Central American studies literature, we argue that the abolition served as a catalyst, enabling three main mechanisms drove long-term development. First, the army's abolition reallocated resources previously used to fund the military, enabling investments in infrastructure, education, and health, driving economic growth. These policies had additionally a demobilizing effect, channelling popular demands into political parties and contributed to redirect social mobilization towards the ballot box, marking a sharp contrast with the rest of Central America.

Secondly, newly implemented institutional reforms reduced executive power concentration and increased accountability. Finally, the proscription of armed forces stripped dominant groups of their primary tool of power in Latin American politics: the military. This in turn guaranteed that the welfare and political reforms became durable, fostering an environment of stable growth and governance.

This article adds to a large existing literature on the relationship between conflict and development. In general, civil wars have proven to be highly detrimental to economies. On average, per capita GDP declines during civil wars at an annual rate of 2.2% (Collier, 1999). Additionally, the immediate impact of a civil war has been estimated to reduce GDP growth by six percentage points, with a cumulative loss of three percentage points after a decade (Cerra & Saxena, 2008). More recent estimates find that civil wars reduce the GDP level on average by 9.1%; however, there is a significant degree of heterogeneity in the way economies react to conflicts: the effects on the GDP level can range from -33% (Sierra-Leone), -15.1% (Ukraine) to 32% (Nicaragua and Egypt) (Bluszcz & Valente, 2022; Bove et al., 2016).

Countries experiencing greater militarization tend to experience smaller gains in trade (Acemoglu & Yared, 2010), and lower military spending has been associated with increased investment (Mintz & Huang, 1990; Wisniewski & Pathan, 2014). At a microeconomic level, evidence from Ireland demonstrates the economic value of peace: house prices in areas unaffected by violence were 6–17% higher than in conflict-affected areas (Besley & Mueller, 2012).

Even after conflicts end, civil wars leave lasting negative impacts. They reduce educational expenditures, school enrollment, and completion rates (Chamarbagwala & Morán, 2011; Lai & Thyne, 2007; Verwimp & Van Bavel, 2014). Public health outcomes are similarly affected, with studies documenting declines in healthcare access and outcomes (Akresh et al., 2012; Gates, Hegre, Nygård, & Strand, 2012; Ghobarah et al., 2004; Minoiu & Shemyakina, 2014). Moreover, evidence shows that the negative effects of civil wars can be dispersed to nearby countries (Murdoch & Sandler, 2002, 2004).

This work contributes to the literature exploring on the relationship between military spending and economic growth, emphasizing how demilitarization, when paired with pro-growth policies, can yield positive economic outcomes. Prior studies provide evidence that military expenditure can hinder development by diverting resources from critical areas such as public services and infrastructure (Collier, 2006). Similarly, research highlights the broader adverse effects of military expenditure on economic growth and development (Alptekin & Levine, 2012; Dunne & Tian, 2016; Knight et al., 1996; Kollias & Paleologou, 2019; Mayberry, 2023; Yakovlev, 2007).

Further evidence demonstrates that successful coups lead to higher military spending compared to failed attempts, with studies employing synthetic control methods (Bove & Nisticò, 2014) and panel regression models (Leon, 2014). Expanding on this body of work, our analysis examines Costa Rica's unique experience, to illustrate how complete demilitarization combined with institutional reforms and reallocation of resources can generate long-term economic growth.

Achieving sustained peace and preventing cycles of political violence require post-conflict policies that promote inclusive growth and provide the poor with access to education, health, and employment opportunities (World Bank, 2020). However, while poverty alleviation and growth policies are essential, they alone are insufficient (Rohner & Thoenig, 2021; World Bank & United Nations, 2018). To avoid 'war traps', policies must simultaneously address poverty and political tensions, as peace and development objectives are strongly interdependent. Policies that target poverty without accounting for conflict dynamics risk backfiring and exacerbating instability (Rohner & Thoenig, 2021). Post-civil war economic recovery is also not automatic; deliberate government policy choices play a critical role in facilitating or hindering recovery (Kang & Meernik, 2005). Costa Rica serves as a compelling case study of a country that successfully escaped a cycle of political violence and avoided prolonged armed conflict. This work examines the economic, political, and institutional factors that underpinned sustained growth following the end of its civil war.

Therefore, we add to the literature on the characteristics that shape the wide-ranging outcomes of civil wars, such as their duration, geographical location,[1] schooling endowment of the country and foreign aid after the cease of conflict (Bove et al., 2016; Collier, 1999, 2011; Janus & Riera-Crichton, 2015; Kang & Meernik, 2005). As previously emphasized, this work derives inspiration from and contributes to an extensive body of literature. However, to the best of our knowledge, no other study estimates a post-conflict case involving complete demilitarization. In that regard, Costa Rica offers a unique case characterized by *'no guns and all butter'*. Additionally, by focusing on a single country and thoroughly reviewing its political and institutional history, we offer potential mechanisms that explain our results in detail while circumventing challenges posed by the heterogeneity of cross-country estimates.

The paper is structured as follows. The following section presents a brief history of the events that led to the 1948 civil war, the abolition of the army and its aftermath. In the second section we discuss the estimation method, the data and sample used in our model. The fifth section shows results and robustness checks. The sixth section discusses mechanisms, and the seventh section concludes.

2. Historical background

To understand the causes that led to a civil war, the abolition of the army and the aftermath of a decade of political conflict, it is crucial to comprehend the actors and main events present during the 1940s and 1950s. Specifically, this section[2] intends to: (1) show that the changes that led to the abolition of the army were not economically motivated, nor an unavoidable consequence of the political history of the country and, (2) provide evidence suggesting that the absence of an army to carry out coups d'état was essential for political stability in the long-run, which generated the necessary political and institutional environment for higher economic growth.

3. A brief history of the abolition of the army and its aftermath

The 1940s was a very turbulent decade in Costa Rica. During its early years, President Rafael Calderón Guardia passed reforms that laid the welfare state's foundations, establishing the

public health system and elevating labor rights protections to constitutional status[3] (Molina & Palmer, 2017), which were opposed by business sectors and oligarchs (Salazar, 1995). At the same time, the government arrested, exiled, and confiscated the properties of individuals accused of being associated with the Axis as part of its WWII commitments with the U.S., which generated significant consternation among citizens with German, Italian and Spanish ancestry (Díaz, 2015; Molina, 2016; Solís, 2008).

The political and social tensions escalated in the subsequent years, and political violence was recurrent. There were armed attacks on buildings of political parties, newspapers and worker unions, murder attempts on political leaders, and bombs placed in military headquarters, aqueducts, power lines and railways (Díaz, 2015; Solís, 2008). There were even failed assassination attempts against Calderón Guardia and the leader of the communist party, Manuel Mora (Díaz, 2015).

Presidential elections were held in February of 1948, and Calderón failed in his bid for re-election. His party, which had the majority in Congress, annulled the elections. This event triggered a civil war. José Figueres Ferrer -a political figure exiled in 1942- arrived in Costa Rica with revolutionary forces supported by other military figures in Central America and the Caribbean. This group was known as *'The Caribbean Legion'*, and their goal was to overthrow the authoritarian regimes of Honduras, Nicaragua and the Dominican Republic, replacing them with democratic governments (Díaz, 2015; Muñoz, 1990; Solís, 2008).

After the civil war, Figueres and a governing board ruled with absolute power and openly persecuted communists and Calderon's supporters. However, he did not destroy the previous social reforms but rather enacted new ones and expanded on the ones that already existed, which angered the agro-export elite of the country[4] (Bowman, 2002; Díaz, 2015; Molina & Palmer, 2017; Rovira, 2000). In this context, rebuilding the armed forces was a priority, but it was not possible for two main reasons. First, the U.S. was reluctant to allow Figueres to buy weapons unless he clarified the intended purposes of these arms and guaranteed that he would no longer continue the Caribbean Legion's campaign (Muñoz, 1990; Wilkerson, 2020). Second, the Costa Rican military clashed with the economic projects of the governing board and the intentions of *The Caribbean Legion* (Muñoz, 1990). Under these circumstances, on December 1st of 1948, the abolition of the army was announced and later enshrined in the 1949 Constitution.

Three unsuccessful attempts to overthrow the government followed the abolition of the military. The first attempt was in December of 1948, where former president Calderón and other political exiles invaded the country from Nicaragua with the support of its dictator Anastasio Somoza. Figueres and the governing board repelled the attack while invoking Article 3[5] of the Inter-American Treaty of Reciprocal Assistance of the Organization of American States (OAS) (Solís, 2008), also known as the Rio Treaty.[6] The second attempt was in April of 1949 and was supported by the country's oligarchy; the plotters demanded the retraction of many of the reforms enacted by the new government and the removal of the members of the Governing Board responsible for these measures (Solís, 2008). Finally, the third attempt took place in January of 1955 while Figueres was president. There was an armed uprising in the north of the country and an armed invasion from Nicaragua with the aid of Somoza's government. The third coup was supported by losers of the civil war and the Costa Rican business elite sectors, which feared the more active role assumed by the state in the economy after the civil war (Bowman, 2000). Again, this attempt was repelled by invoking the Rio Treaty (Bowman, 2000, 2002).

In this political environment, there was no consolidated democracy or confidence in the electoral process. Quite the contrary, the first elected government after the enactment of the new constitution was on the brink of being overthrown. Had there been a national army, the

opposition would not have needed to ally with Somoza, nor would Figueres have been able to request assistance from the OAS (Bowman, 2000, 2002).

As several studies point out, what ultimately protected Figueres and led to the eventual consolidation of Costa Rican democracy was the absence of an army to carry out a coup d'état (Bowman, 2000, 2002). The attempt to overthrow the government failed because, although the opposition had the will to overthrow Figueres, they lacked the means (Bowman, 2002). The dominant groups were thus deprived of what has traditionally been the fundamental instrument of power in Latin American politics (Vilas, 1994).

Ultimately, the failure of the third coup d'état made all the political actors realize the times they were a-changin': confronting internal enemies with external resources—as Figueres did in the civil war—was no longer possible (Solís, 2008). Furthermore, the dissolution of the military provided greater stability to Costa Rica's reforms and party regime. Without the need to compete with the military—as was the case in Honduras—political parties were able to control the pace and direction of social change (Vega-Carballo, 1989).

4. Synthetic control method

To measure the impact of Cosa Rica's peace dividend, we apply a synthetic control method estimation. This approach has been used in small sample comparative case studies (Abadie et al., 2010, 2011, 2015; Abadie and Gardeazabal, 2003) and where there is one unit that has been treated or received a shock instead of many. In one-unit cases, it is not easy to properly identify a counterfactual to determine the effect of a public policy or shock. Therefore, to address this issue, the synthetic control method creates a counterfactual (also known as the synthetic unit) for the unit of interest by estimating a weighted average of all the potential comparison units that best resemble the characteristics of the case of interest.

To begin, assume a sample of $J+1$ units, where $j=1$ is the treated unit (i.e. the unit exposed to the event or intervention of interest) and all the units from $j=2$ to $j=J+1$ are the potential non-treated comparison units that constitute the donor pool. Now, the method considers two time periods: T_0 and T_1. Where the former is the pre-treatment period for $j=1$, and the latter is the period after the treatment. The unit of interest is exposed to a treatment, shock or intervention in any period after T_0, and the objective of the estimator is to measure the effect of the event or intervention of interest on some post-intervention in T_1. Given this setup, the synthetic control method works on the premise that the pre-intervention characteristics of the treated unit can often be much more accurately approximated by a combination of untreated units than by any single untreated unit. Thus, the synthetic unit is a weighted average of the units in the potential comparison units that were not treated in T_0. A synthetic control can be represented as a $Jx1$ vector of weights $W=(w_2,...,w_{\{J+1\}})'$, with $0 \leq w_j \leq 1$ for $j=2,...,J+1$ and $w_2+...+w_{\{J+1\}}=1$. Then, selecting a W is equivalent to selecting a synthetic control.

W is selected in such a way that the synthetic control best approximates the characteristics of the treated unit. If X_1 is a $(kx1)$ vector containing the values of the pre-treatment characteristics of the treated unit, and X_0 is a (kxJ) matrix of the values of the same variables for the units in the donor pool, then the synthetic control method minimizes $X_1 - X_0 W$, which is the difference between the values of the treated unit and the weighted values of the comparison units. Formally, the method chooses weights that minimize the mean squared prediction error (MSE) $\sum_{m=1}^{k} v_m (X_{1m} - X_{0m} W)^2$ via a nested optimization procedure.

Where v_m is a weight that reflects the relative importance assigned to the $m_{\{th\}}$ variable when measuring the difference between $X_1 - X_0 W$[7]. In comparison to a regression approach, the synthetic control restricts the coefficients of the linear combination of each comparison unit to be

between zero and one. Therefore, extrapolation outside the data is not allowed under this method. Counterfactuals based on a linear regression may extrapolate beyond the support of comparison units, hence providing untruthful estimates of the counterfactual. In case studies such as this research, this could be very troublesome, because it is more likely to incorrectly estimate this counterfactual due to the existence of only one treated unit and many untreated units.

Similar to other studies on the costs of conflicts (Bluszcz & Valente, 2020), the Synthetic Control Method (SCM) offers multiple advantages for estimating the economic impact of Costa Rica's army abolition. For instance, unlike cost-accounting methods, SCM avoids extensive cost calculations that depend on detailed governmental data, instead allowing for statistical inference and uncertainty assessment. Compared to panel data and time series approaches, SCM handles unobserved, time-varying confounders by allowing for multidimensional heterogeneity. Additionally, SCM constrains weights to fall within the support of the data, reducing extrapolation risk and providing reliable counterfactuals even with one treated unit and multiple controls. In addition, SCM's sparse weights make each control unit's contribution transparent, adding robustness to our findings on Costa Rica's growth impact from the 1949 army abolition.

Finally, we argue that our approach fulfills the necessary SCM assumptions to identify the causal effect of Costa Rica's army abolition on its per capita economic growth. First, SCM assumes that no country anticipates the abolishment before the treatment period TTT and that there are no spillover effects on control regions post-treatment, as per the Stable Unit Treatment Value Assumption (SUTVA). Given the unexpected nature of Costa Rica's civil war rapid response to electoral fraud—this assumption is plausible. The war's brevity and the lack of broader geopolitical involvement meant its effects remained largely contained within Costa Rica, as discussed in our Historical Background section. Second, SCM assumes that all countries' outcomes conform to a linear model that captures time-varying unobserved heterogeneity, such as a factor model with interactive fixed effects (Abadie, Diamond, and Hainmueller 2010; Ahn, Lee, and Schmidt 2013). Drawing on established SCM applications that use GDP as the outcome variable, we regard this assumption as satisfied for our study (e.g. Abadie and Gardeazabal 2003; Costalli, Moretti, and Pischedda 2017; Horiuchi and Mayerson 2015).

The final assumption for SCM identification is that there exist optimal, non-negative weights summing to one, allowing the synthetic control to approximate Costa Rica by combining control countries that match pre-treatment covariates and outcomes. Interpolation bias, where synthetic control weights overly depend on countries with unobserved confounders, is minimized by selecting Latin American countries that retained their armies. Furthermore, as shown in the Historical Background, Costa Rica's unique political landscape and outcomes after the civil war were difficult to foresee. With a substantial pre-treatment period spanning three decades, this setup reduces the risk of interpolation bias, enabling the synthetic control to effectively capture Costa Rica's time-varying heterogeneity prior to the treatment period.

5. Data and sample

We use annual country- level panel data for most Latin American countries for the 1920–2010 period. Our data comes from the Montevideo-Oxford Latin American (MOxLAD) Economic History database (Astorga et al., 2010). This database contains a statistical series for a wide range of economic and social indicators covering twenty countries in the region for the twentieth century. Of particular interest are the series on national accounts, infrastructure,

demography and labor force variables that are comparable between the countries in the region.

After excluding Bolivia, the Dominican Republic, Haiti, Panama, and Paraguay due to a lack of data in the pre-treatment period, our donor pool of unaffected units consists of: Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Peru, Uruguay and Venezuela.

The dependent variable of interest is per capita GDP in PPP 1990 US dollars, which we employ as an overall indicator of development. The predictor variables used for our estimates are: population density, telephone density (number of telephone lines divided by total population), car density (number of cars divided by total population), railway density (length of open railways in kilometers divided by the country's area in square kilometers), road density (length of routes in kilometers divided by the country's area in square kilometers), manufacturing value added as percentage of GDP, agriculture value added as percentage of GDP, trade openness (exports plus imports as percentage of GDP), index of unit value of imports, index of unit value of exports, foreign direct investment as percentage of GDP, external debt as percentage of GDP, land area, length of coastline, inflation, the share of population enrolled in primary education and percentage of the population enrolled in secondary education. This set of predictor variables are all positively correlated with the country's economic activity and are expressed in the same terms for every country.

5.1. Synthetic control results

This section presents the results of the synthetic control model described in previous sections. Table 1 summarizes the main model's outcomes, which compares the pretreatment characteristics of the actual Costa Rica with that of the synthetic Costa Rica, as well as the mean values for the donor pool and the synthetic control weights given to each variable in order from the highest to the lowest weight. Figure 1 maps the weights by country of Latin America. These weights are not unexpected, with more than 80% of the synthetic control weights from other Central American countries. Additionally, the estimates include Chile and Uruguay, countries that historically have achieved similar development outcomes as Costa Rica. All other countries in the donor pool obtain zero weights[8].

Table 1. Costa Rica's Pre-army abolishment characteristics and synthetic control results, 1920–1949

Variable	Latin America sample	Costa Rica	Synthetic Costa Rica	Synthetic control weights
Secondary enrollment	0.003	0.002	0.002	0.176
Car density	0.006	0.005	0.004	0.168
Coastline	3071.75	1290	1180.623	0.162
Land area	1258388.5	51060	165395.306	0.146
Index of unit value of exports	43.902	32.433	37.517	0.109
FDI as percentage of GDP	0.312	0.415	0.378	0.079
Agriculture value added	0.326	0.398	0.397	0.062
Telephone density	0.007	0.005	0.005	0.053
External debt as percentage of GDP	0.374	0.361	0.21	0.019
Population density	0.015	0.013	0.035	0.012
Coastline per person	0.006	0.025	0.009	0.005
Index of unit value of imports	49.039	49.267	46.072	0.003
Trade Openness	0.424	0.585	0.394	0.002
Inflation	0.346	0.559	0.425	0.002
Primary enrollment	0.071	0.086	0.056	0.001

Source: Authors' estimates using MOxLAD database.

Figure 1. Country weights for the Synthetic control estimates.

Figure 2 plots Costa Rica's per capita GDP alongside its synthetic control estimate. After 1950—when peace started to consolidate—the two lines began to diverge noticeably. While the per capita GDP of synthetic Costa Rica continued with a modest upward trend, that of the real Costa Rica experienced a sharp increase. This gap suggests that the peace process initiated with the abolishment of the army had a sizable positive impact on the per capita GDP.

Table 2 further contextualizes this increase in Costa Rica's per capita GDP. It presents this variable's average growth rate and the number of years it would take the country to double its per capita GDP. The final two columns present the difference between these two indicators.

Before 1950, Costa Rica had the fourth lowest GDP per capita growth and the fourth highest number of years required to double its GDP per capita, given its average growth rate between 1919 and 1949. Following the abolition of the army and subsequent reforms, Costa Rica became the second-best country in each of these indicators. Furthermore, Costa Rica exhibits the second most prominent difference in per capita GDP growth between the pre and post-treatment periods and ranks third in reducing the number of years required to double its GDP per capita. These results strengthen the evidence presented in Figure 2, suggesting that the observe effect is a structural change in Costa Rica's growth trajectory.

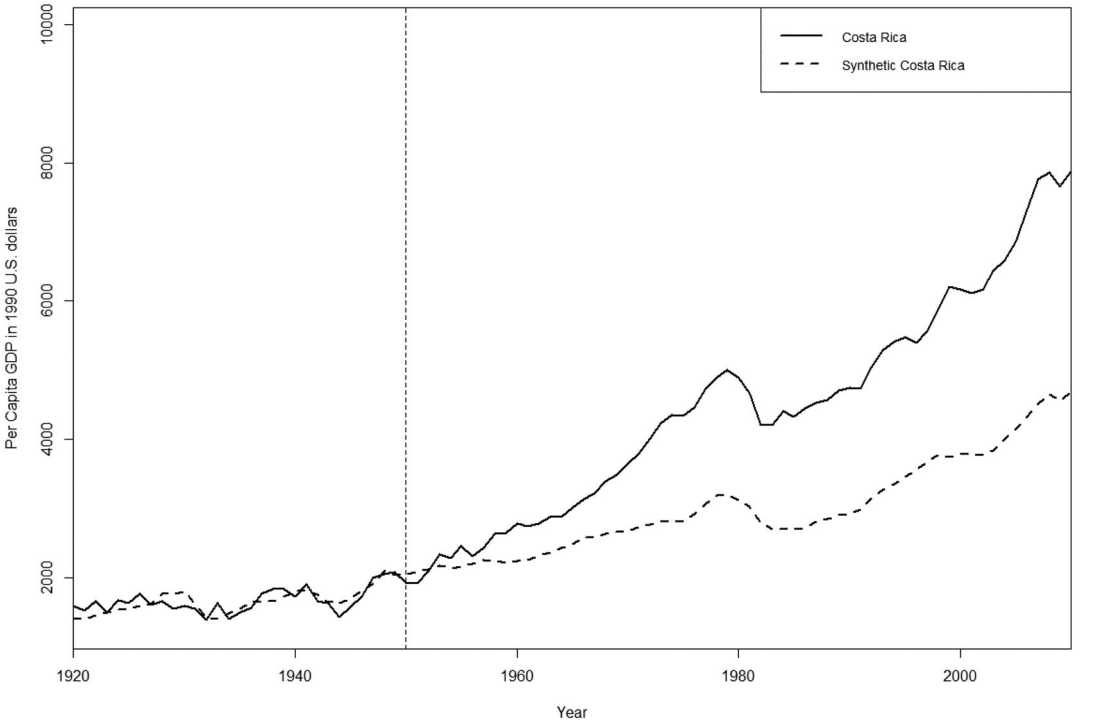

Figure 2. Per Capita GDP in 1990 PPP U.S. dollars for Costa Rica and Synthetic Costa Rica.

Table 2. Average per capita GDP growth rate and implied doubling time years by period

	Before abolishment 1919–1949		After abolishment 1919–1949		Differences	
Country	Per capita growth	Doubling time years	Per capita growth	Doubling time years	Per capita growth	Doubling time years
Argentina	1.53	45.57	1.46	47.66	−0.07	−2.09
Brazil	2.45	28.59	2.53	27.77	0.07	0.83
Chile	1.42	49.05	2.28	30.76	0.86	18.29
Colombia	2.73	25.76	1.94	36.08	−0.79	−10.32
Costa Rica	**1.31**	**53.29**	**2.28**	**30.8**	**0.97**	**22.49**
Cuba	2.22	31.57	1.3	53.71	−0.92	−22.14
Ecuador	1.86	37.59	2.14	32.78	0.28	4.81
El Salvador	2.18	32.12	1.15	60.45	−1.03	−28.33
Guatemala	2.45	28.65	1.26	55.45	−1.19	−26.8
Honduras	0.36	194.73	1.04	67.02	0.68	127.71
Mexico	0.93	74.91	2.14	32.8	1.21	42.1
Nicaragua	1.18	59.31	0.65	106.29	−0.52	−46.98
Peru	2.07	33.86	1.76	39.69	−0.31	−5.83
Uruguay	1.86	37.56	1.74	40.29	−0.13	−2.73
Venezuela	6.35	11.26	1.04	67.11	−5.31	−55.85

Note: Costa Rica is boldened for easier comparison.
Source: Author's estimates using MOxLAD database.

Furthermore, Costa Rica's average growth rates for 1950–1960 and 1950–1970 were 2.83% and 2.80%, respectively—1.5 percentage points higher than the pre-abolition rate, effectively doubling it. This suggests that the end of the civil war, army abolition, and subsequent peace sparked immediate economic growth. These rates also exceed the average for the 1950–2010 period,

indicating that growth slowed after 1970, supporting the idea that the growth boost was tied to changes around 1950 rather than later unobserved factors (explored further in the discussion).

6. Placebo studies

To evaluate the validity of our results, we examine whether they are randomly driven or influenced by similar events that occurred in the donor pool. We performed a series of placebo studies applying the same method to compute Costa Rica's synthetic control to other countries that did not abolish their miltary. This exercise assesses whether the difference found in Figure 2 is created by factors other than the army's abolition. Figure 3 displays this placebo study for Honduras, which was assigned the largest weight in the synthetic control estimates. For Honduras, the results do not show an upward pattern in the GDP per capita of Honduras after 1951, as in the case of Costa Rica. Thus, while the data of Honduras is useful at predicting Costa Rica, this is not because both countries went through similar shocks. Appendix A provides placebo studies for the remaining predictor from the donor pool; we reach the same conclusions.

We also estimated the gap between each country in our sample and its synthetic counterpart. In the pre-treatment period, gaps for most countries are near zero, indicating that the synthetic control method provides a good overall fit. In the post-treatment period, Costa Rica stands out as the only country with a sustained positive growth trend over the subsequent sixty years, highlighting the unique economic shift it experienced in 1950. For further support, we calculated the gap for the 1950–1970 period, finding that Costa Rica was the only country with a positive, increasing gap, reinforcing the hypothesis of a significant, Costa Rica-specific effect.[9]

To address concerns about potential biases arising from particularly negative treatment effects in some donor pool countries, we conducted leave-one-out (LOO) estimates, where we iteratively built synthetic Costa Rica, excluding one control country at the time among those units with positive weights in synthetic Costa Rica. The results of these robustness checks, presented in Appendix B, confirm that our findings remain consistent, further validating the results (Figure 4).

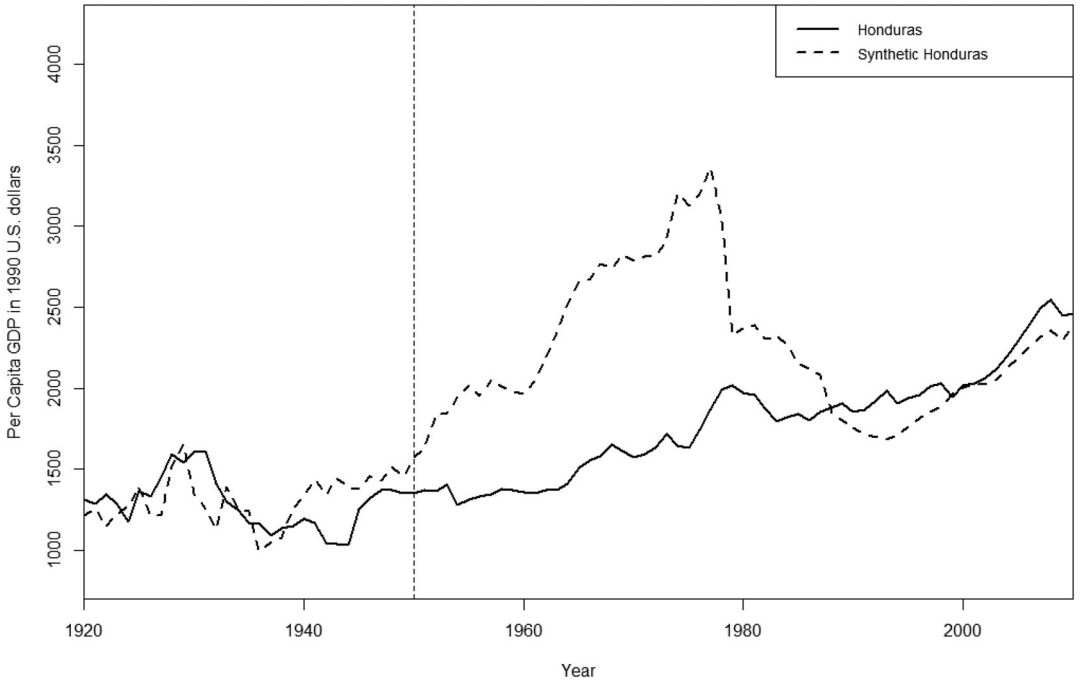

Figure 3. Placebo study: Honduras.

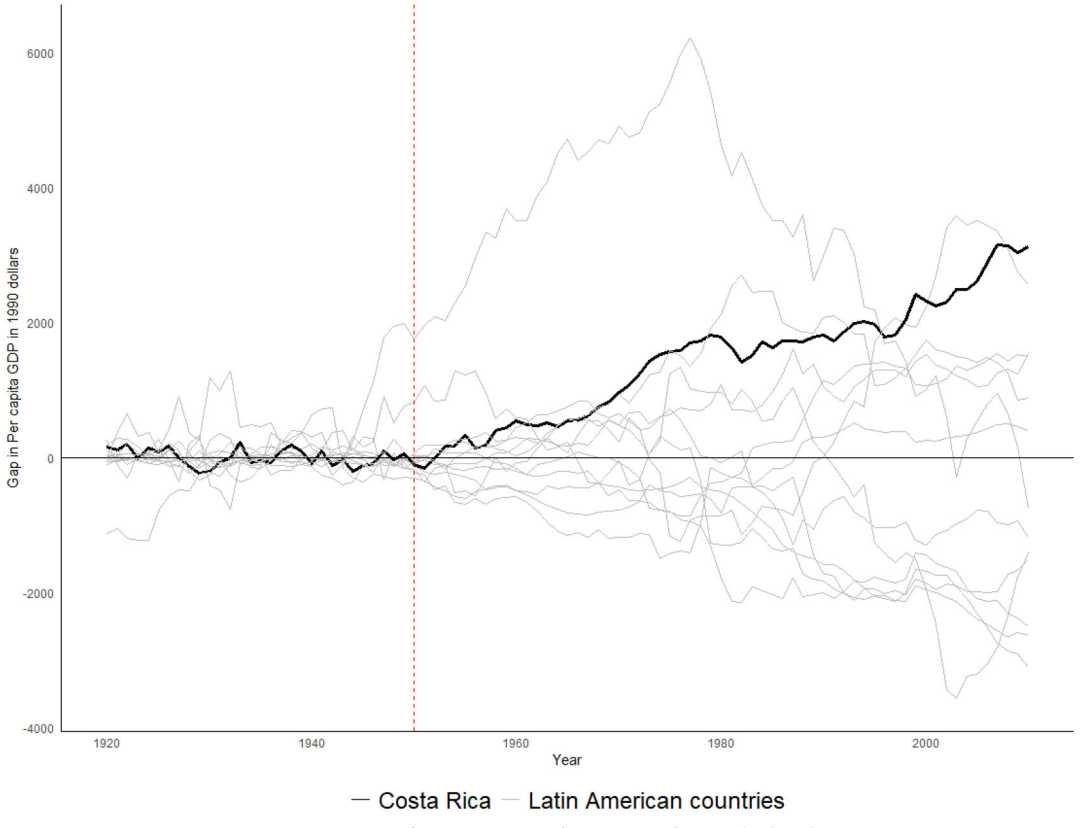

Figure 4. Per-capita GDP gaps in Costa Rica and placebos.

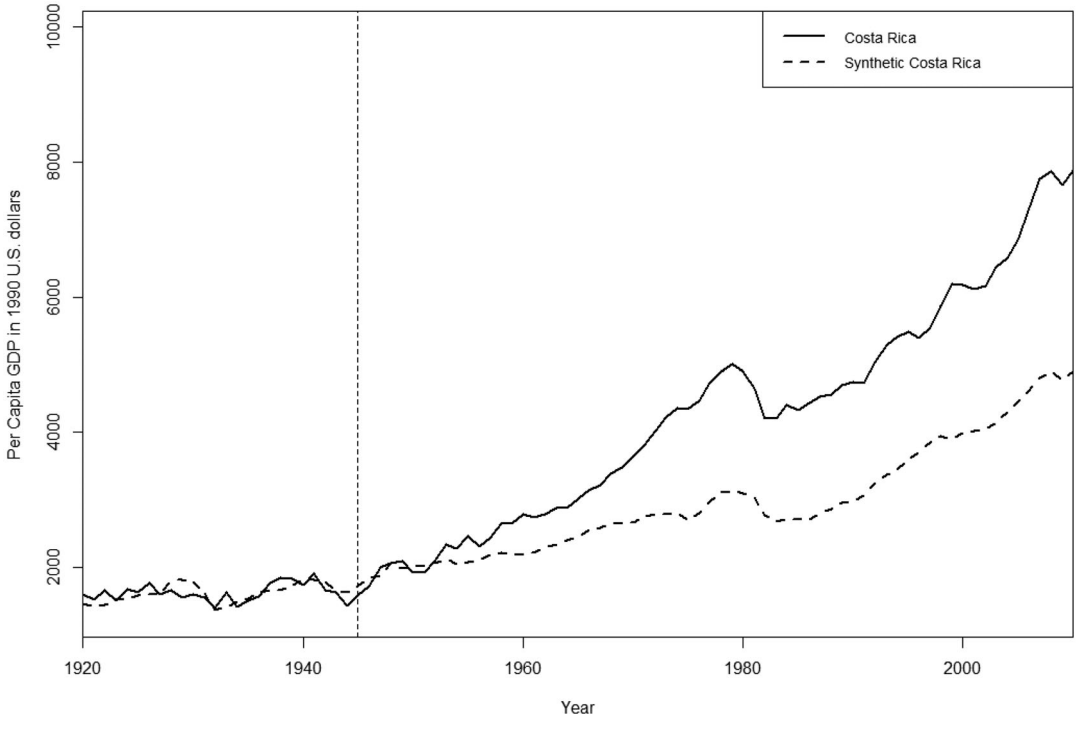

Figure 5. In-time placebo 1945.

Lastly, we also conducted an *in-time placebo* to discard large positive estimated effects in years without treatment. This placebo was backdated to 1945, and no perceivable effects are observed after that. The shape and magnitude of the gap in Figure 5 are similar to that of Figure 2, starting after 1950.

7. Alternative synthetic control models

In addition to previous robustness checks, we estimated the counterfactual Costa Rica using four alternative synthetic control methods. The first approach involved an ensemble model averaging multiple models, each built with a random selection of ten variables from the dataset, including three additional geographic variables: distance from the most populated city in each country to the U.S., distance between each capital and Washington, D.C. (Mayer & Zignago, 2011), and country ruggedness (Shaver et al., 2019).[10]

The second method used random forest regressions (Mühlbach & Nielsen, 2019) where pre-treatment data was split into training and validation sets to select hyperparameters and minimize RMSE.[11] The third approach employed out-of-sample fitting by splitting pre-intervention periods into training and validation phases to reduce potential overfitting (Abadie, 2021). Lastly, we implemented a specification that used outcomes from all pre-treatment periods as predictors, following recent literature (Ferman & Pinto, 2021; Abadie & L'Hour, 2021). Figure 6 shows the results of each of each alternative way of estimating synthetic Costa Rica, along with our main synthetic control estimate.

Table 3 summarizes the results from Figure 6. Overall, regardless of the estimation method, our results hold. Alternative methods yield similar RMSE values to those obtained with the primary synthetic control estimation. Regarding the estimated effect, the annual average growth rate of counterfactual Costa Rica between 1950 and 2010 is estimated to be between 1.39% and 1.77%. This implies that the estimated long-run effect of the abolition of the army and

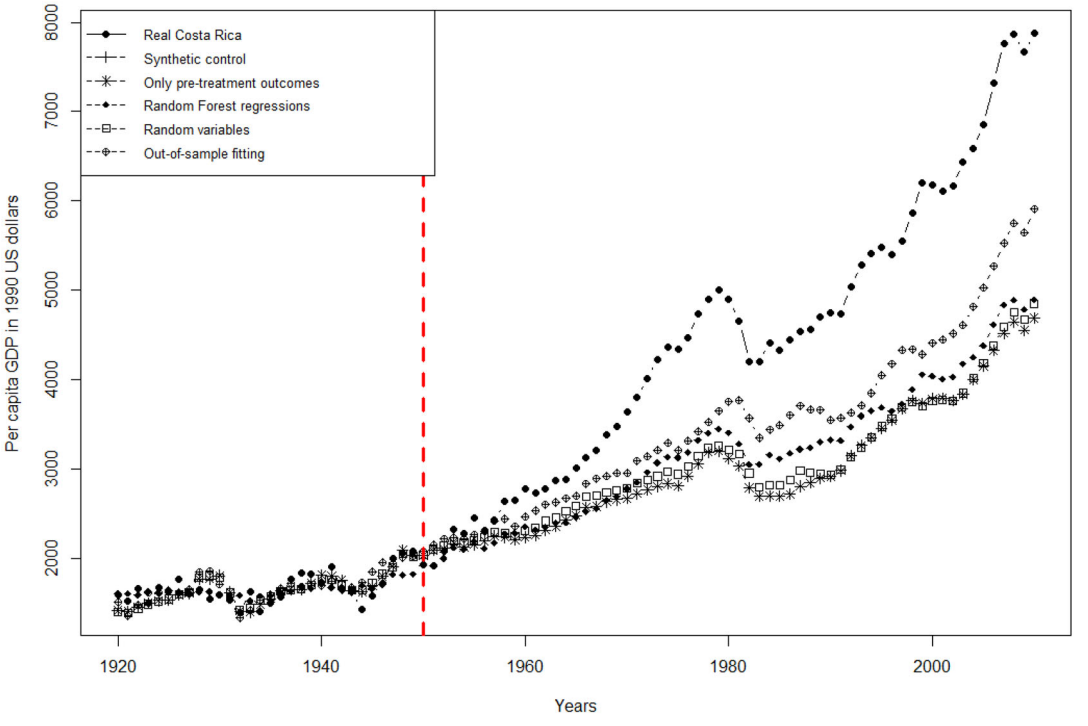

Figure 6. Alternative estimates.

Table 3. RMSE and estimated effects of alternative models

Model	RMSE	Estimated counterfactual growth rate 1950–2010 (%)	Estimated effect (%)
Original model	127.46	1.46	0.82
Random variables	129.42	1.39	0.89
Random forest regressions	130.5	1.59	0.69
Out-of-sample fitting	128.17	1.77	0.51
Only pre-treatment outcomes	144.21	1.46	0.82

Source: author's estimates.

subsequent reforms increased Costa Rica's annual per capita GDP growth rate between 0.51 and 0.82 percent points.

We also estimated a model with equal weights for all variables, as Appendix C shows. Although this model is visually similar to those in Figure 6, it exhibits a higher RMSE of 156.24, indicating that our model's weighted adjustment better fits the data than a model assuming equal weights. The estimated counterfactual growth rate from 1950 to 2010 is 1.52%, suggesting that the abolition of the army increased Costa Rica's annual per capita GDP growth rate by 0.76 percentage points.

Appendix D presents the estimated confidence intervals (Firpo & Possebom, 2018) for the effect of the army abolition, where the lower bound remains above zero. This allows to reject the null hypothesis of no effect, confirming that the estimated effect is significantly positive. Finally, to address the possibility of spillovers affecting other Central American countries, we follow prior work (Bluszcz & Valente, 2020; Cao & Dowd, 2019) and estimate a model testing for such spillovers. As shown in Appendix E, our results remain robust.

In sum, the placebo studies, alternative methods, and robustness checks, including varying country samples and variable sets, support the conclusion of a likely idiosyncratic structural break for Costa Rica following 1950.

8. Discussion and mechanisms

The events that unfolded in Costa Rica are consistent with what the theoretical literature predicts. More specifically, democratization models show how most policy choices create distributional conflict, and when elites are unhappy because of the high degree of re-distribution, they may undertake coups against the democratic government (Acemoglu & Robinson, 2006). Additionally, armed forces play a critical role in repressions, revolutions and coups and tend to represent better the interest and form coalitions with the elites (Acemoglu & Robinson, 2006). This theory aptly describes the Central American region, which Schulz characterized before 1978—with the notable exception of Costa Rica—as 'perennially somnolent under the rule of traditional oligarchies and military dictatorships' (Schulz, 1984, p. 3).

The proscription of the military sealed off this channel to take power. Furthermore, findings show how imposed arms embargoes -or equivalently, a decrease in arms imports- reduce the outset of battles and combatants' deaths (Benson & Ramsay, 2016; Gallea, 2019; Hultman & Peksen, 2017). The abolition of the military institution can be conceived as a de facto significant reduction of arms imports.

Moreover, the events that unfolded after the civil war and the challenges faced by the new government can also be explained in the light of the conflict literature. Some argue that the adverse economic consequences of a civil war are related primarily to the removal of legitimate authority, not to material destruction or military expenditure (Collier & Pradhan, 1998). Private agents are frightened of each other and frightened of the government in its various forms, so moving gradually to peace requires a transition from fear and the defensive responses which have become

ingrained (Collier & Pradhan, 1998). This is why the cessation of conflict does not recreate either the fiscal or the risk characteristics of the pre-war economy (Collier, 1999): there is a higher burden of military expenditure -as the new government tried to pursue- and a greater risk of renewed war, as the three failed coups d'etat confirm for Costa Rica. As the history section showed, even when the winners of the civil war tried to strengthen the army, the United States did not allow it (Muñoz, 1990; Wilkerson, 2020), and most importantly, it was the abolition of the military that made all the political actors desist from their aims to gain power via armed conflict and accept the democratic game as the only legitimate path to achieve power (Bowman, 2000, 2002; Solís, 2008).

However, the abolition of the army was not the only reform Costa Rica experienced following the end of the civil war. Sustained GDP growth requires good economics and solid political institutions, and after the cessation of conflict, significant changes occurred in the role of the government and its spending, as well as many institutional reforms brought by the 1949 constitution. The combination of these reforms, along with the absence of armed forces that guaranteed their subsistence over time, explain the high economic growth that followed after 1949.

As Figure 7 shows, public security funds experienced a steady decline after 1920. The trend changed in 1942 and reached 14% of the total government expenditures in 1948. After the abolition of the army, Costa Rica's government started devoting fewer resources to public security[12] and more to public education, health and infrastructure.

From 1940 to 1948, public security expenditures were, on average, 10% of total government expenditures. As soon as the civil war ended, it started a decreasing trend for the next 25 years. Infrastructure had a clear decreasing trend during the 40s that was reversed after the civil war was over, and from 1950 to 1974, it represented on average a 13.8% of total government expenditures. From 1920 to 1949, education spending was, on average, 15% of total government spending. After the civil war, it started increasing, and by 1969 it represented almost 35% of total government spending. Similarly, health expenditures began increasing in the 1960s, and by 1974 they represented 29% of total government spending.

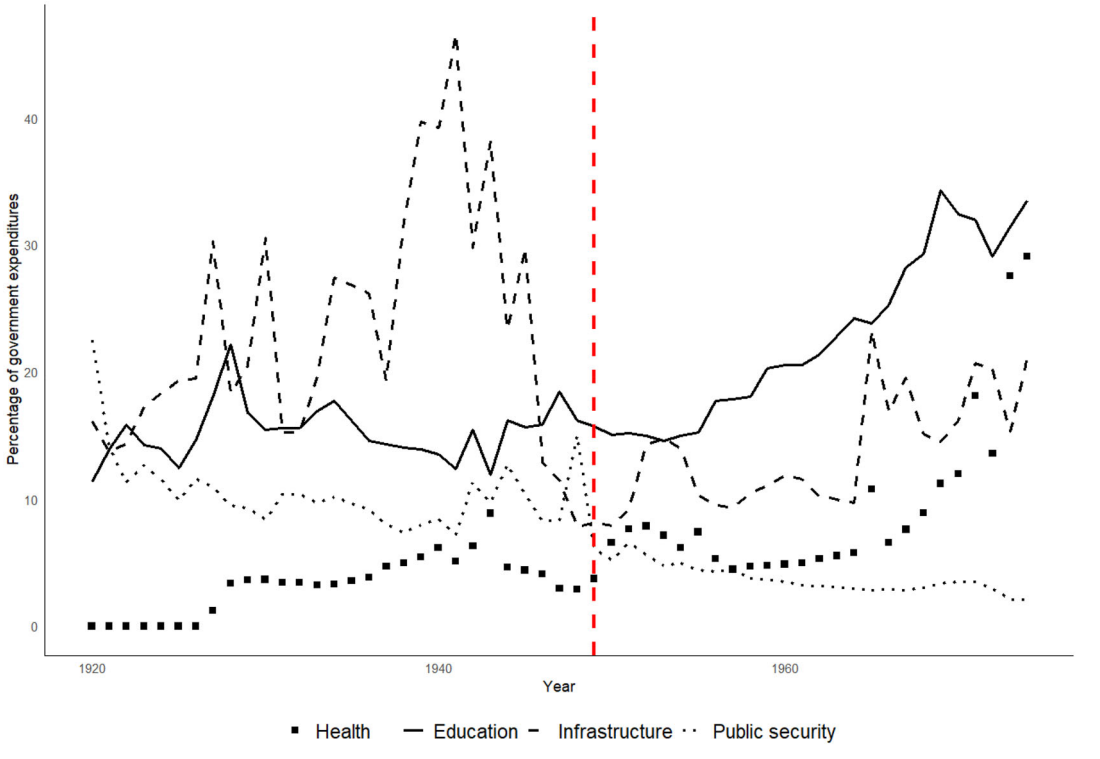

Figure 7. Government expenditures, 1920–1974.

The increased allocation of resources to infrastructure, health and education entailed a growth in government expenditure relative to the size of the economy. In 1950, government expenditures represented 9% of Costa Rica's GDP, and by 1974 it represented 17.7%. Furthermore, in 1950, infrastructure, health and education spending represented 2.6% of Costa Rica's GDP. By 1974, it represented 13.4%.

These larger investments yielded various positive effects on Costa Rica's economy and its general population. For instance, in 1949 the Costa Rican Institute of Electricity was created. During its first year, the installed capacity allowed the generation of 36.637 KW of electricity, but by 1980 this installed capacity had increased to 554.000 KW (Oficina de Planificación Económica [OFIPLAN], 1982). Education-wise, in 1949, there existed 884 primary schools built in the country; two years later, this number had increased 32% to 1175 (MEP, 1952). By 1960, there were 1.561, and by 1974 there were 2.610 (Ministerio de Educación Pública [MEP], 1964, 1974).

Regarding health expenditures, in 1949, 21% of the economically active population was covered by the country's health insurance. By 1965, this coverage had increased to 30% and to 66% in 1978(Caja Costarricense de Seguro Social, 1979). Complementing the main results of our paper, in Figure 8 we present the results of a synthetic control estimation where instead of using the per capita GDP as the dependent variable, we use the primary school enrollment as a percentage of the total population[13]. After the end of the civil war, there was a substantial increase in the country's primary education, which continued into the next decades

These trends in government expenditures are consistent with a decrease in civil war risk due to the absence of an army, which in turn increased investments in physical and human capital. By contrast, the literature predicts that military spending tends to increase after conflict and retards development by diverting government resources that could be put into public services, infrastructure, or lower taxes (Collier, 2006). Similarly, studies on countries with a coup d'etat (Bove & Nisticò, 2014; Leon, 2014) have found that successful coups increase military spending more than failed attempts. Regarding human capital, the literature also shows that civil wars negatively impact educational expenditures, school enrollment and completion rate (Chamarbagwala & Morán, 2011; Lai & Thyne, 2007; Verwimp & Van Bavel, 2014), and public health outcomes (Akresh et al., 2012; Ghobarah et al., 2004; Minoiu & Shemyakina, 2014) even

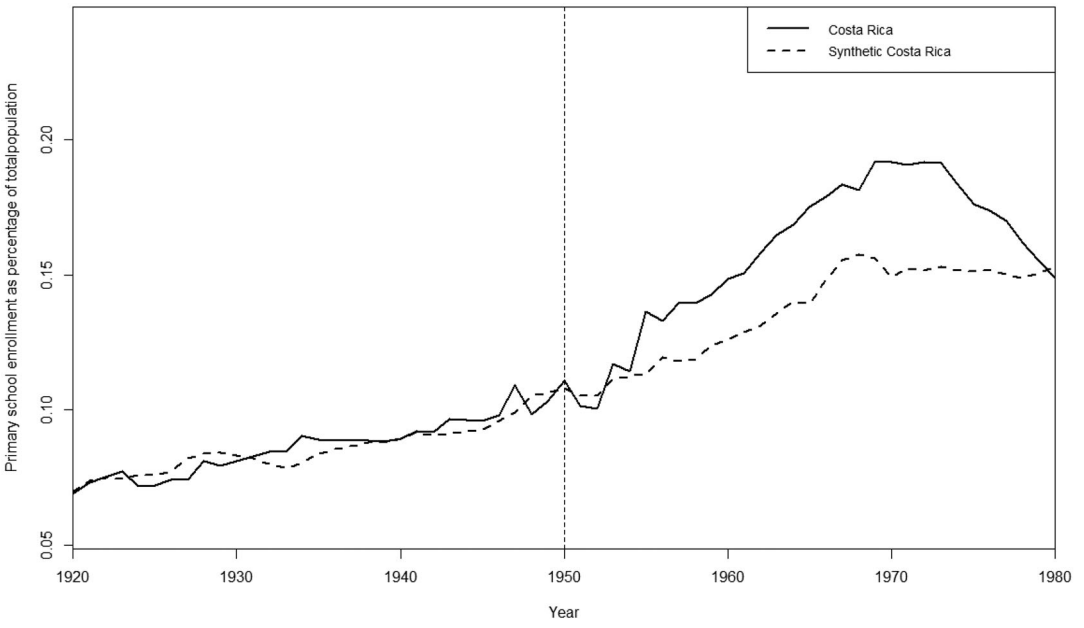

Figure 8. Synthetic control estimate: primary school enrollment as percentage of total population.

after the conflict is over. Hence, Costa Rica is also a consistent counterfactual case to the usual results found in the military spending and conflict literature.

In addition to the proscription of the military and reforms in the economic role of the government, the new constitution included other long-lasting institutional changes. One of the main objectives of the 1949 Constitution was to strengthen political stability and reduce the imbalance of power held by the country's president in the previous Constitution of 1871. These ideas led to the creation of autonomous state institutions, which are public institutions that enjoy administrative independence from executive power, and up to this date, are responsible for areas such as state banking, insurance services and electricity supply. The 1949 Constitution also gave the Supreme Electoral Tribunal a constitutional status; it created the civil service and implemented many other institutional changes that have endured since (Dabène, 2014). Therefore, the 1949 Constitution ended up being a redistribution of executive power and government spending in institutions and policies that fostered social development and government transparency and accountability in the long run.

Studies also highlight how these welfare reforms, on top of their development outcomes, demobilized social movements and revolutions (e.g. Bolaños 1982; Palma, 1980; Sojo, 1984). They emphasize the impact of these reforms in consolidating the political system's legitimacy, a redirection from social mobilization toward the party system and elections—a transformation of social mobilization into electoral mobilization (Vilas, 1994).

However, as explained in the historical section, the transition to democracy after the civil war and the implementation of the political and social reforms did not happen peacefully, nor was it the result of a pact between political leaders moving towards a stable democracy (Bowman, 2000). These changes would not have been possible had the attempts to overthrow the government been successful. It was only after 1955 that democracy was effectively consolidated in Costa Rica: political stability was fostered because it was no longer possible to overtake power via armed conflict. Although the new constitution distributed political power and put in place policies that contributed to Costa Rica's long- run development, all these advances endured thanks to the political stability granted by the absence of an army (Bowman, 2000; 2002; Solis, 2008; Vilas, 1994).

The contribution of the non-existence of the military to avoid future armed conflicts holds in a comparative perspective, where the history of Latin America has been sadly eloquent enough. Compared to the rest of Latin America, Costa Rica has barely experienced political and civil violence since 1951. This is evidenced in Table 3, showing the number of coups d'état and episodes of political violence in Latin America since 1951 (Table 4).

Since 1951, Latin America has experienced 97 successful or unsuccessful coups d'état, 21 episodes of international political violence, 134 episodes of civil political violence and 35 episodes of ethnic violence. Costa Rica and Uruguay are remarkably different from the other countries in Latin America in terms of episodes of political violence and coups d'etat. However, once dictatorships or years under autocratic governments are considered, Costa Rica's political history after 1950 has been remarkably different from the rest of the countries in the region. The country's only political violence episode was the attempt to overthrow Figueres' government in 1955. Nevertheless, this episode lasted less than a month and was solved via diplomatic channels rather than warfare.

To summarize, post-conflict societies require addressing poverty and political tensions jointly to avert war traps. Despite the importance of poverty alleviation and growth policies, they do not automatically eradicate conflict (Rohner & Thoenig, 2021; World Bank & United Nations, 2018). Along these lines, during the 1940s and 1950s, Costa Rica provides a successful combination of economic, political and institutional measures to prevent political conflict and developing policies that allowed it to achieve sustained peace.

After the end of the civil war and helped by freed-up resources used to fund the military, the country decided to invest in infrastructure, education, and health, which drove economic growth. These measures worked in tandem with other institutional reforms introduced after the civil war,

Table 4. Number of Coups d'etat and years of political violence involving the state, 1951–2010

		International		Civil		Ethnic violence	
Country	Coups d'état	Violence	Warfare	Violence	Warfare	Violence	Warfare
Argentina	15	0	1	1	5	0	0
Bolivia	17	0	0	1	0	0	0
Brazil	2	0	0	1	0	0	0
Chile	2	0	0	2	3	0	0
Colombia	1	0	0	36	10	0	0
Costa Rica	**1**	**0**	**0**	**1**	**0**	**0**	**0**
Cuba	1	1	0	0	3	0	0
Dominican Republic	5	0	0	1	0	0	0
Ecuador	7	1	0	0	0	0	0
El Salvador	4	0	1	0	14	0	0
Guatemala	12	0	0	1	0	0	31
Honduras	7	7	1	21	0	0	0
Mexico	0	0	0	5	0	4	0
Nicaragua	3	7	0	0	12	0	0
Panama	6	1	0	0	0	0	0
Paraguay	4	0	0	0	0	0	0
Peru	5	1	0	16	0	0	0
Uruguay	1	0	0	0	0	0	0
Venezuela	4	0	0	1	0	0	0

Note: Costa Rica is boldened for easier comparison.
Source: Author's estimates using the Integrated Network for Societal Conflict Research database.

reducing the executive branch's concentration of power, and increasing its accountability. Finally, not having an army ensured that Costa Rica could not undertake many of the costs associated with having one. Namely, the destruction of institutions and physical capital, political instability, and the ever-present opportunity cost of devoting resources to armed forces. The possibility of the reversal of these political and economic reforms is not only a theoretical plausibility but a historical reality: there were three coups d'état attempts after the abolition of the army. As explained in the historical background section, without the Rio Treaty, the invasions of armies supported by the oligarchs coming from Nicaragua would not have been deflected.

9. Conclusions

This paper estimates the effect of Costa Rica's peace dividend, i.e. the effect that the abolition of its army and economic and institutional changes had on its long-run development using synthetic control. We present three possible channels that allowed the country to achieve lasting peace after a civil war, consistent with historical evidence and the literature on democratization and conflict. Our synthetic control estimates show that Costa Rica's annual average per capita GDP growth increased an additional percentage point in the 1950–2010 period relative to a synthetic control Costa Rica that did not abolish its army. In other words, Costa Rica doubled its per capita GDP every 30 years rather than every 49.

Prior to 1950, Costa Rica was the country with the fourth lowest GDP per capita growth in Latin America; after the abolition of the army and subsequent economic reforms, the country became the second-best country in this indicator. The country's GDP per capita grew at an average annual rate of 1.42% from 1920 to 1949, this rate increased to 2.28% during 1950–2010; this change makes Costa Rica the country with the second largest positive increase in this indicator in Latin America. Furthermore, Costa Rica experienced a spur in economic growth in the immediate decades following the abolition of the army and subsequent reforms: the average

growth rates for the 1950–1960 and 1950–1970 periods were 2.83% and 2.80% respectively, which doubled the average pre-treatment growth rate.

We point out how the gap between Costa Rica's GDP and its counterfactual is explained by a multifactorial phenomenon that started after the end of the civil war. In the post-conflict period, a substantial expansion of spending on infrastructure, education, and health was undertaken, which increased economic growth and tempered social mobilization. This was accompanied by a democratization process that resulted in a new Constitution that reinforced the social reforms of the early 1940s and created new institutions that added checks and balances, reducing the imbalance of power exercised by the executive power present in the previous 1871 Constitution.

However, despite these reforms, there was no consolidated democracy, confidence in the electoral process or pacts between elites that granted economic and political stability. After three failed coups d'état between 1948 and 1955, all the political actors in Costa Rica realized there was no longer the possibility of overtaking power via an armed conflict. A crucial factor that fostered political stability and the subsistence over time of social spending and the institutional redesign was the absence of an army, contributing to the consolidation of democracy and, consequently, greater political and institutional stability.

In conclusion, we present a case of policies with a profound impact of prioritizing peace and development while navigating post-conflict rebuilding and institutional reform. This structural transformation not only fostered sustained economic growth but also cemented political stability and democratization, a case where war was not won by victory.

Notes

1. Civil wars may be confined to a small region of a country and consequently not have a systemic economic impact (Cerra & Saxena, 2008).
2. A more thorough and detailed version of this story is available upon request.
3. The reforms included the creation the 'Caja Costarricense del Seguro Social', the institution in charge of the majority of public health care provision services until this day. Other labor rights protections were given constitutional enshrinement, such as the right to a minimum wage, the right to form unions, the right to strike, the right to have health insurance and as well as the establishment of legal courts to litigate work-related problems (Díaz, 2015; Salazar, 1995).
4. These reforms included an increase in wages for workers in coffee and sugar cane plantations, the nationalization of banks, a new contract with the United Fruit Company that gave Costa Rica nearly 50% of all profits and a 10% tax on capital gains of more than about $8.000 (Bowman, 2002; Díaz, 2015; Molina & Palmer, 2017; Rovira, 2000).
5. ARTICLE 3: 1. The High Contracting Parties agree that an armed attack by any State against an American State shall be considered as an attack against all the American States and, consequently, each one of the said Contracting Parties undertakes to assist in meeting the attack in the exercise of the inherent right of individual or collective self-defense recognized by Article 51 of the Charter of the United Nations (Organization of American States, 1947).
6. For antecedents of the reciprocal assistance treaty which date back to the first half of the nineteenth century-, the politics involved for its approval and analysis of its applications and misapplications, see Sessions (1973), Garcia-Amador (1985) and O'Konski (2021).
7. For complete proofs and display of the mathematical background of this method, refer to (Abadie et al., 2010, 2011, 2015; Abadie & Gardeazabal, 2003).
8. Other synthetic control estimations with different sets of variables and length of pre-treatment periods were performed. The results do not vary significantly.
9. We do not present them in this paper for space reasons, but they are available upon request.
10. We also implemented this approach by randomly selecting 8, 9 and 11 variables in each iteration and randomly changing the pool of countries available. The results vary marginally but still support our main results. We do not present them in this paper for space reasons, but they are available upon request.
11. In this work, we show the result with the lowest RMSE we could find, which was achieved by estimating 10,000 trees, using all the variables and countries, and using two branches per tree. We also estimated this model with more branches, less variables and fewer trees. The results barely change and still support our main results. We do not present them in this paper, but they are available upon request.

12. This spending category constituted the country's military expenditure until 1950. After the abolition of the army, it included police expenditures and other spending related to national security that did not involve an army.
13. We conducted all the tests and robustness checks we performed for our main results. We do not show them in this version of the document to save space, but they are available upon request.

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No potential conflict of interest was reported by the author(s).

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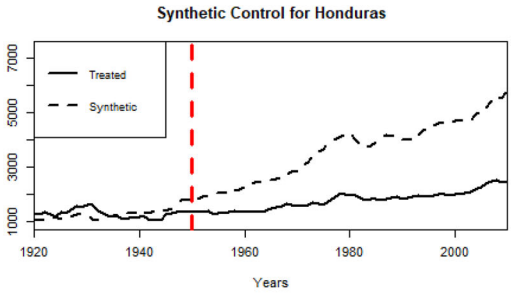
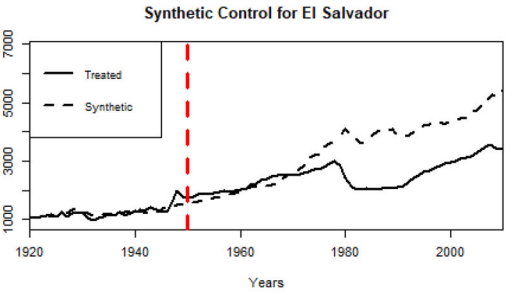
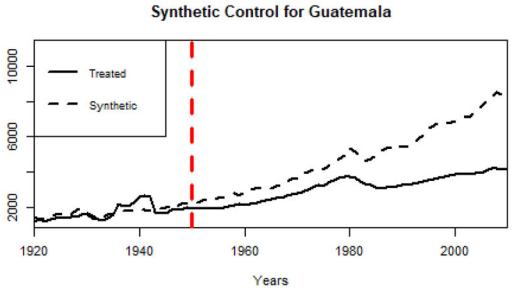
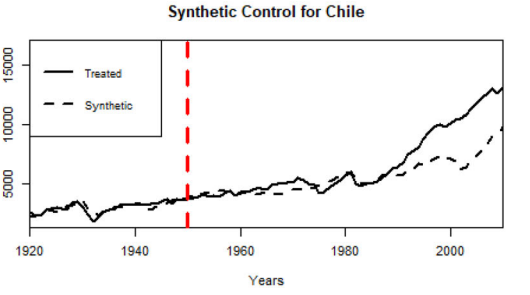
Appendix A

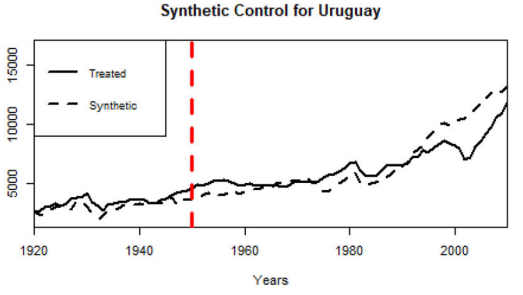
Placebo estimates





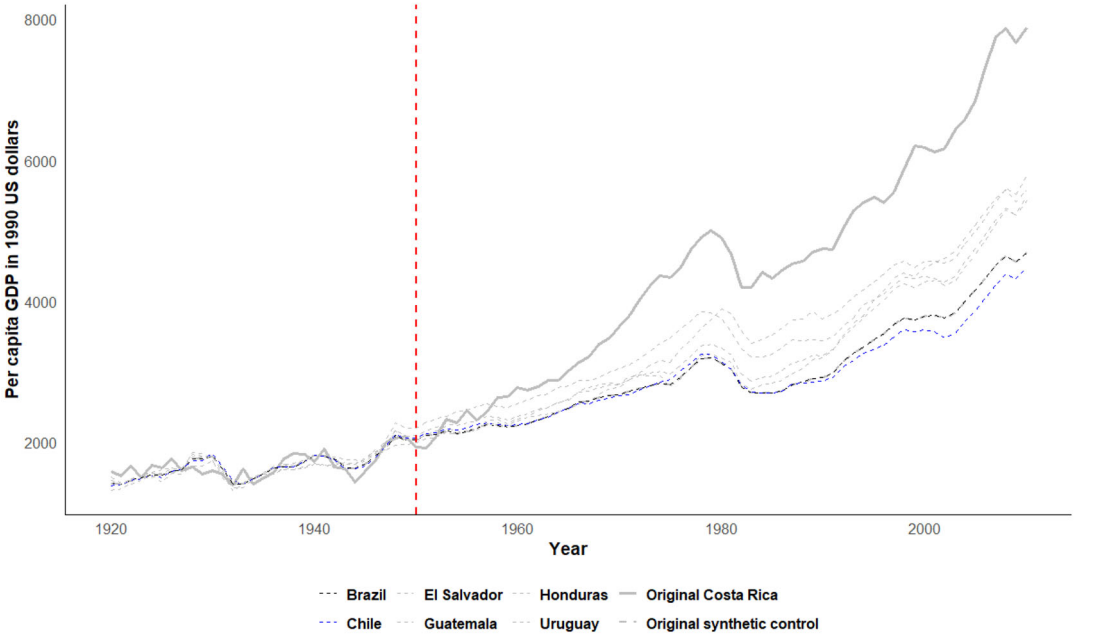






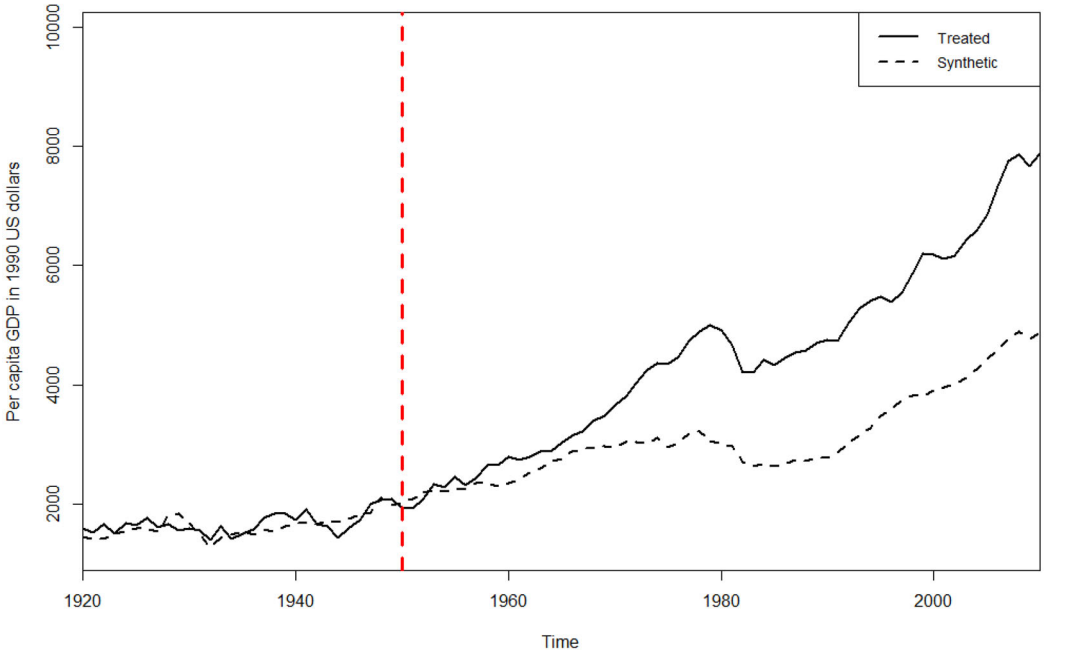
Appendix B

Leave-one-out estimates (LOO)

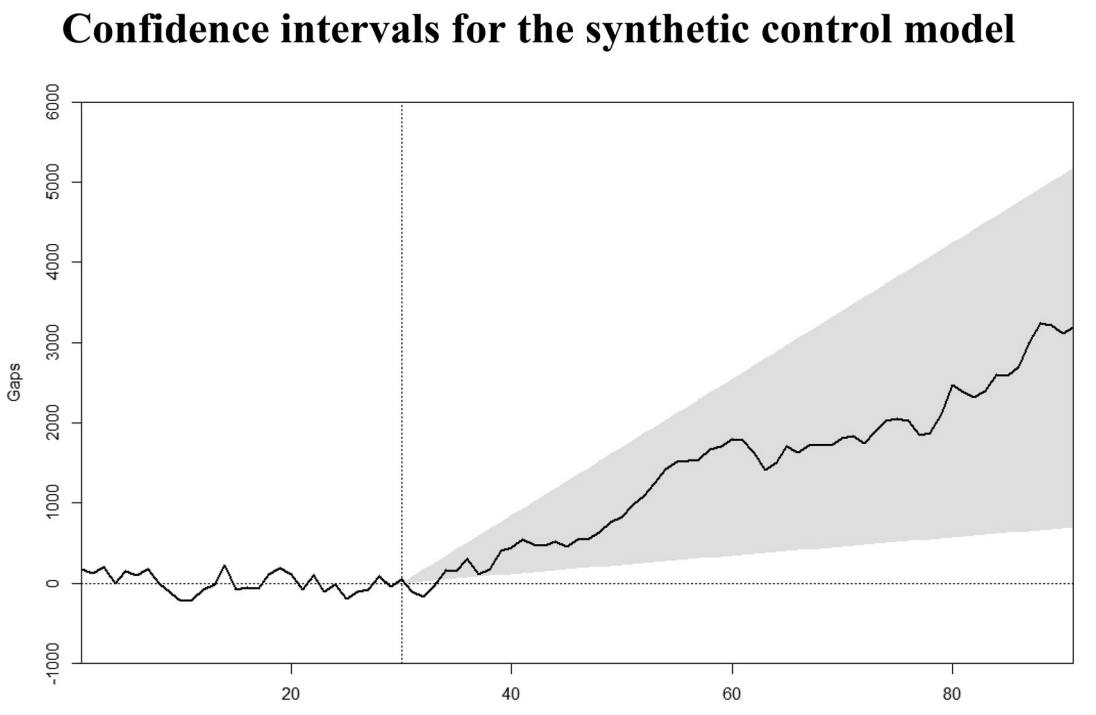


Appendix C

Equal weights model

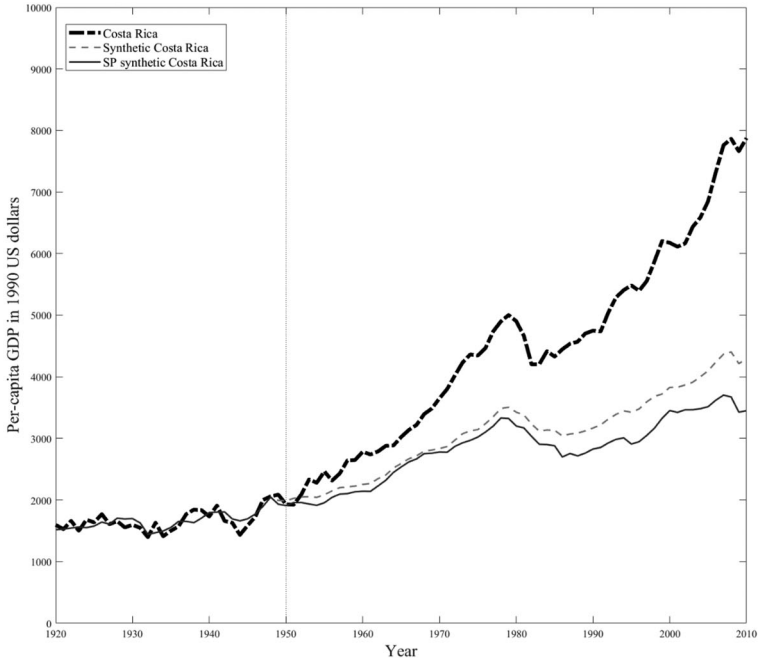


Appendix D


Confidence intervals for the synthetic control model
Gaps
6000
5000
4000
3000
2000
1000
0
-1000
20
40
60
80

Appendix E

Synthetic control and spillover estimates



Treatment effect estimates