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ARTICLE

The Influence of Pinochet on the Chilean Miracle

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Abstract

This article analyzes the impact of Augusto Pinochet's autocracy on the Chilean economy. The study compares outcomes under Pinochet's leadership with those in a synthetic counterfactual made of a weighted average of countries with similar characteristics. It finds that, relative to the control, Chilean income per capita greatly underperformed for at least the first fifteen years after Pinochet's coup. The results are robust to extending the pool of donor countries and expanding the pretreatment period by switching data sets to capture potential heterogeneity of effects. The evidence suggests that Chile's remarkable economic growth during the period 1985–1997 did not depend on Pinochet's autocracy. These results further bring into question the effectiveness of the regime to enhance economic growth and the narrative of the Chilean miracle.

Keywords: autocracy; economic growth; synthetic control

JEL: O11; O43; P51

Resumen

Este artículo analiza el impacto de la dictadura de Augusto Pinochet en la economía chilena. El estudio compara resultados bajo el liderazgo de Augusto Pinochet con aquellos en un control sintético compuesto de un promedio ponderado de países con características similares. Se encuentra que, en comparación con el control, la renta per cápita chilena presenta un rendimiento significativamente menor por lo menos por los primeros quince años después del golpe de Pinochet. Los resultados son robustos al extender la selección de la muestra de países y al expandir el periodo anterior al tratamiento cambiando el conjunto de datos para capturar la potencial heterogeneidad de efectos. La evidencia sugiere que el notable crecimiento económico de Chile durante el periodo 1985–1997 no dependió de la dictadura de Pinochet. Estos resultados cuestionan, además, la efectividad del régimen para estimular el crecimiento económico y la narrativa del milagro chileno.

Palabras clave: autocracia; crecimiento económico; control sintético

Despite the ongoing march of democracy around the world, how political institutions affect human well-being remains open to debate (Besley and Persson 2019). Boettke (2004) claims that autocracies provide a more efficient mechanism to encourage development through their credible and binding commitment to limiting government predation. If leaders do not establish and signal a credible commitment to the population,

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then reform measures will lack trust and business endeavors will move to the underground economy or to nonproductive activities intended to favor friends of the government (Baumol 1990).[1]

Economies such as China, Singapore, Hong Kong, and the United Arab Emirates are often used to support the argument that some top-down regimes may play a critical role in economic growth. According to this argument, autocracies with good leaders produce good economic outcomes despite constraining civil liberties. Much of this performance could be due to regime stability. Stable political regimes cope better with economic crises, domestic conflict, and civil war. A long-lived autocracy could establish a system of rules that foster growth. According to Butkiewicz and Yanikkaya (2007), stability can be as crucial for growth as property rights are, especially in autocratic regimes. Although there is no consensus among scholars regarding the link between regime type and growth, autocracies do display higher levels of variance in growth rates than do democracies (Blaydes and Kayser 2011; Weede 1996). Nonetheless, Easterly (2011) claims that most of the stories of benevolent autocrats are ultimately unfalsifiable.

Augusto Pinochet, who ruled Chile for seventeen years, is a typical example and a test case for this hypothesis. Pinochet is a controversial figure who led a coup d'état, rewrote Chile's constitution, and restructured its economy. Conventional wisdom tends to attribute the outstanding Chilean performance to the "free market reforms instituted by the administration of General Augusto Pinochet from 1973 to 1989" (Barro 2000, 22). However, his regime systematically violated human rights and imposed strong censorship (Alonso 2019). The Valech Report documented 38,254 victims who were held as political prisoners and tortured.[2] During this time, and mainly after, poverty fell, Chile grew economically, investments moved to the country, local industries flourished, and many perceived Pinochet as a hero. Even more recently, Chileans support political movements that they identify as the heirs of the Chilean strongman (MORI 2015).

The violent coup to establish his regime and the subsequent growth raise the question of whether the reorientation of the Chilean economy and the effects of economic policies under Pinochet's tenure were made possible by the characteristics of his vertical leadership. Pinochet's autocracy seems to represent a critical contradiction in using force to establish free markets.[3] Several reforms during the Pinochet regime were also groundbreaking elsewhere in the world. The pioneering Chilean economic reforms preceded reforms in the United States and Great Britain in the 1980s. For Packenham and Ratliff (2007), Chile became "the first country in the world to make that momentous break with the past—away from socialism and extreme state capitalism toward more market-oriented structures and policies."

I construct a counterfactual by using the synthetic control method, which assesses the economic effects of Augusto Pinochet's regime on Chile. The article focuses specifically on economic growth, which is often presented as the greatest achievement of autocracy. Chile began the period under examination as a politically and economically turbulent country in the 1960s and 1970s. Shortly after Pinochet's coup in 1973, and during the 1980s, the country began to move in the direction of economic liberalism while remaining politically repressive (Lawson and Clark 2010). A synthetic control will allow observation of the direct

[1] Gilson and Milhaupt (2011) argue that authoritarian regimes promote the economic success of their countries by taking them into global commerce. Similarly, Holcombe and Boudreaux (2013) find that autocrats whose countries have the highest average annual improvement in economic institutions over their tenures, have the longest tenures, on average. While these studies focused on differences among autocrats, others have emphasized the differences between autocrats and other leaders. Most findings attribute predatory behavior to autocracies, especially when autocrats accept foreign aid (Bueno de Mesquita et al. 2002).

[2] The Valech Report (Comisión Nacional sobre Prisión Política y Tortura 2005) is a record of abuses committed in Chile between 1973 and 1990 by agents of Augusto Pinochet's military regime.

[3] See Klein (2008) for an extensive critique.

relation of Pinochet's regime to what later came to be known as the Chilean miracle.[4] Friedman (1982) saw Chile in this regard due to the average growth of 8 percent between 1976 and 1980 after inflation was reduced from 700 percent a year in mid-1974 to less than 10 percent a year.

In order to investigate the economic effects of Pinochet's regime, I compare the income per capita of a synthetic Chile with that under Pinochet.[5] Synthetic Chile is a weighted average of control countries that best fit Chile's experience in the thirteen years before Pinochet's coup. The results show that income, measured as real GDP per capita, did not improve significantly more than it would have in the absence of Pinochet's coup until several years after the coup. Maybe more striking, the autocracy underperformed in terms of economic growth compared to the counterfactual during this period. The positive gap between the control and the treated unit begins in 1988, fifteen years after the introduction of the military regime.

Chile's takeoff and autocracies

Currently, Chile is a highly urbanized, economically stable South American country of roughly nineteen million people.[6] Like many other countries in South America, after gaining independence in 1818, the country did not enjoy a continuously peaceful transfer of power from one party to another. Democracies and dictatorships alternated through the nineteenth century and the first part of the twentieth century. In 1964, a few years before Pinochet's coup, Eduardo Frei, the leader of the Chilean government, confronted increasing opposition from socialists, who claimed his reforms were insufficient, and from conservatives, who thought they were excessive. By the time Frei ended his term, he had not fully achieved his party's ambitious goals.[7]

In the 1970 election, Chileans elected as president Senator Salvador Allende, who became the first socialist president elected democratically in the world. One year later, Augusto Pinochet was named commander of the Santiago Army Garrison. The next year, in 1972, Pinochet was appointed general chief of staff of the army. With increasing internal contention in Chile, Pinochet was appointed commander in chief of the army on August 23, 1973, by Allende. The nomination came the day after the Chamber of Deputies approved a resolution claiming the Allende administration had failed to respect the constitution. A few days later, on September 11, 1973, the combined Chilean Armed Forces—the army, navy, air force, and *carabineros* (police force)—overthrew Allende's government in a coup, during which the presidential palace, La Moneda, was shelled and Allende committed suicide.[8] A military junta was established following the coup that exercised both executive and legislative functions of the government. Among the junta's first actions was to dismantle the economic and political framework Allende had developed. Most state enterprises were privatized along with part of the social security, education, and health care systems. Congress and the constitution were immediately suspended. Following that, the junta imposed strict censorship and restrictions, banned all parties, and halted all gatherings and protests.

[4] "Commanding Heights: Milton Friedman," PBS, interview conducted October 1, 2000.

[5] There is not enough data to evaluate inequality. The GINI index measures Chile from 1987 onward.

[6] Protests in 2019 could potentially shift the economic institutions in the country (Alfaro and Jeong 2019). In 2020 Chile held a plebiscite where 78 percent voted to change the Constitution.

[7] See "Eduardo Frei Montalva (1911–1982)," Memoria Chilena, Biblioteca Nacional de Chile, http://www.memoriachilena.gob.cl/602/w3-article-3366.html#presentacion.

[8] A full analysis of the events and policies of Chile prior to the coup is beyond the scope of this paper. See Hudson (1994) for an historical perspective.

It is imperative to notice the events before the treatment period to understand the relevance of producing a counterfactual for this analysis. During Allende's administration (1970–1973), the state assumed a dominant role in the economy by controlling prices, interest rates, credit, and capital movements. President Allende's government encouraged expansionary fiscal policies, including a sharply rising public payroll, which meant a hefty increase in the budget deficit, on the order of 20 percent of GDP in 1973 (Billmeier and Nannicini 2013). By then, numerous factors were affecting the Chilean economy, including the massive expropriation of businesses by Allende's government, price controls, protectionist policies, and populist discourse (Hawkins and Rovira Kaltwasser 2017). Inflation was 600 percent, foreign reserves had been depleted, and GDP was rapidly decreasing (Soto 2007). According to Piñera (2005), before Pinochet's coup, there was a chaotic succession of events that created general misery and malaise. For Chileans, those days meant rationing, hyperinflation, scarcity of essential goods, a large fiscal deficit, unemployment, and so forth (Piñera 2005, 22).

Pinochet centralized power in the presidency, but the regime decentralized some economic activities. Besides removing price controls, Chile increased trade by eliminating nontariff barriers to imports and reducing tariffs in general. The new policies created a capital market and liberalized foreign investment. Additionally, the regime established the independence of the central bank. Another critical measure was the introduction of flexibility within labor markets: entry barriers were eliminated for most jobs, and government intervention in private negotiations was restricted. The military regime provided the opportunity for individuals to invest in privately owned retirement accounts. Reforms extended to health care and higher education by reducing bureaucracy and shifting subsidies from universities to elementary and secondary schools. The final judgment of the quality of education was given to the consumers of these services. Many other services were decentralized, such as sanitation and transportation, among others (Codevilla 1993).

Pinochet perpetrated multiple waves of human rights violations, which included torture of opposition leaders and kidnapping. Therefore, according to the substantial research linking institutions to growth, the reforms under Pinochet's autocracy should affect the Chilean economic performance over the whole period. Still, how relevant the role of Pinochet was in the direction of the change remains a question to be answered. Importantly, Pinochet is considered by many as a pro-growth autocrat who improved the lives of average Chileans (MORI 2015). However, many others considered his regime as one that severely violated human rights and damaged the Chilean economy (Petras and Vieux 1990). This discussion suggests the need to establish a convincing counterfactual to assess the economic influence of this autocracy correctly.

A synthetic control for Chile

Methodology

Abadie, Diamond, and Hainmueller (2010) developed the synthetic control method in order to test the effect of terrorism in the Basque Country. Later, the method was applied to the economic effects of German reunification (Abadie, Diamond, and Hainmueller 2015), crime-reducing policies (Freire 2018), natural disasters (Cavallo et al. 2013), and additional analysis of terrorism (Gautier, Siegmann, and Van Vuuren 2009; Montalvo 2011) among others. The method creates a synthetic counterfactual, a weighted average of control donors with similar conditions, using pretreatment data. The synthetic control design serves to track pretreatment outcomes and match the treated unit on the values of several indicator variables.

A frequent problem in exploring the relationship between political regimes and the economic results often attributed to leaders is the absence of a counterfactual for each

case. The ability of the synthetic control method to choose comparison units in comparative case studies and to obtain accurate quantitative inferences (Abadie and Gardeazabal 2003) makes it an ideal analytical tool for this specific case. This article empirically evaluates the effect of Pinochet's regime on Chile's economic well-being using what few data are available. It constructs a consistent counterfactual to Chile under Pinochet to assess the impact of his regime on the performance of the Chilean economy during his regime.

No single country can approximate the indicators of the economic growth of Chile before Pinochet. The synthetic control offers a systematic way to choose comparison units. The method selects weights given to countries according to how well their characteristics (which include the outcome and familiar predictors of this outcome, such as education and population growth) resemble the characteristics of the treated unit in the pretreatment period. This operation also gives considerable weight to those variables with higher predictive power on the outcome of interest, GDP per capita in this case. Having established that those untreated units have similar behavior during the pretreatment period with the treated unit, any variation in the outcome variable after the treatment should be attributed to the treatment itself (Abadie, Diamond, and Hainmueller 2015; Abadie 2021).

The control countries

For Abadie and Gardeazabal (2003), the efficacy of the synthetic control technique depends on the choice of countries: they must have similar economic and institutional characteristics to the country with the treatment. To capture similar conditions of culture, history, and geography, I use most Latin American nations for the overall analysis. Besides these countries, the control includes Spain and Portugal, which had similar political conditions during the period under analysis and share a cultural connection with Chile, given their past as colonizers of most Latin American countries. In the robustness checks, I also include additional countries with significant copper production to capture that effect on the Chilean income per capita. By using two different data sets, donor pools, and pretreatment periods, I examine one outcome indicator: GDP per capita. Table 1 includes the list of countries for each synthetic control analysis, along with their weights assigned. In total, for the first experiment, I consider eighteen control countries as donors and a pretreatment period of thirteen years. I limit the donor pool to countries with similar processes to the treated country. Conveniently, there are available data for every year for the two synthetic controls.[9]

The role of the predictors is to capture the similarity of processes between donor countries and Chile during the pre-Pinochet period. The synthetic control method selects those countries where the relationship of the predictor and the outcome is more similar to the relationship in the case of Chile. Therefore, through the algorithm, I use time-invariant indicators and minimize the difference between the weighted average of these indicators for the synthetic counterfactual and the indicators for Chile. The units that present a closer approximation to the indicator variables of Chile will obtain a higher weight in building the counterfactual. The algorithm also places more value on predictors that have a similar influence over the outcome variable. Table 2 summarizes the sources and predictor variables used for the construction of the controls and checks.

The method requires indicator variables that are known to be good predictors of the outcome variable. To calculate the GDP per capita for the first and main experiment, the control considers income indicators from four pre-Pinochet years (1960, 1965, 1970,

[9] To capture the historical copper production in Chile, I use most of the main copper producers with available data during the research period. I consider an expanded dataset of countries compared to the restricted sample in Appendix A.1.

Table 1. Estimated synthetic control weights for each outcome variable.

	Outcome variables	
Donors	Income 1	Income 2 (Expanded pool and pretreatment period)
Argentina	**3.20**	**39.5**
Australia	—	0.00
Bolivia	0.00	**2.30**
Brazil	0.00	0.00
Canada	—	0.00
China	—	0.00
Colombia	0.00	0.00
D.R. of the Congo	—	0.00
Costa Rica	0.00	0.00
Dominican Republic	0.00	**27.1**
Ecuador	0.00	0.00
Guatemala	0.00	0.00
Honduras	0.00	0.00
Mexico	0.00	0.00
Nicaragua	0.00	0.00
Panama	**53.2**	**7.50**
Peru	0.00	**1.10**
Philippines	—	0.00
Portugal	0.00	0.00
South Africa	—	0.00
Spain	0.00	**6.00**
United States	—	**16.5**
Uruguay	**43.60**	0.00
Venezuela	0.00	0.00
Model fit pre-intervention		
RMSPE	0.096	0.218

Note: Columns show the weight assigned to each country in the synthetic controls for Chile for both experiments. RSMPE provides information on the root square mean prediction error for the unit of comparison.

and 1972).[10] The average population growth rate from 1960 to 1973 also contributes to the results, as does openness to trade in 1960 and 1972, both indicators from the Penn World Tables (Aten and Heston 2011), and two educational-attainment variables in 1960 and 1970 from the Barro and Lee (2013) database—specifically, the average years of primary and total school attendance. Grier and Maynard (2016) use similar

[10] Controlling for different years does not change the essence of the results or their significance. The study uses 1960, 1965, 1970, and 1972. I use the World Bank dataset for this experiment at constant 2010 US$. World Bank, World Development Indicators, TC Data 360, https://tcdata360.worldbank.org/indicators/e4dda7e5?country=BRA&indicator=28108&viz=line_chart&years=1960,2020.

Table 2. Data and sources.

Variable	Countries	Years	Source
Life expectancy, 1960–1988	18	28	World Bank (2022)
GDP per capita, 1960–1988	18	28	
Average population growth, 1960–1973	18	—	
Investment share, 1960	18	—	Penn World Table v. 7.0 (Aten and Heston 2011)
Investment share, 1972	18	—	
Government share, 1960	18	—	
Government share, 1972	18	—	
Openness, 1960	18	—	
Openness, 1972	18	—	
Polity II, 1960	18	—	Polity IV dataset (Marshall, Gurr, and Jaggers 2016)
Polity II, 1972	18	—	
Executive constraints, 1960	18	—	
Executive constraints, 1972	18	—	
Durability, 1960	18	—	
Durability, 1972	18	—	
Average years of school, 15+, 1960	18	—	Barro and Lee (2013)
Average years of school, 15+, 1972	18	—	
Average years of primary school, 15+, 1960	18	—	
Average years of primary school, 15+, 1972	18	—	
Adolescent fertility rate, 1972	18	—	Health of Nations dataset (World Bank 2022)
Crude birth rate, 1972	18	—	

indicators to assess Hugo Chávez's effect on the Venezuelan economy. I used similar predictors for the second control, but I extended the potential donor countries and expanded the pretreatment period to 1951. In this case, the control considers the GDP per capita and population growth provided by the Penn World Tables 9.1 (Aten and Heston 2011), which presents information from 1950.[11] The results from executing the algorithm for both synthetic controls, and the corresponding errors, are shown in table 2.

Results analysis

This section offers an analysis of the estimates obtained through the synthetic control method of the causal impact of Augusto Pinochet's regime on GDP per capita in Chile. These estimators do not disentangle direct and indirect underlying effects of Pinochet's

[11] For robustness checks, this study uses predictors such as data on fertility and crude birth rates in 1972 from the World Health Organization. It also includes investment and government share for 1960 and 1972 from the Penn World Tables. In addition, the robustness checks consider a set of variables related to the political process such as Polity II and, from the Polity IV dataset, executive constraints and durability of the regime for both 1960 and 1972 (Marshall, Gurr, and Jaggers 2016).

regime. Accordingly, they do not focus on any particular subsequent policies or consequences of the regime.[12] The controls assess the overall performance of the Pinochet effect on the Chilean economy. Though some authoritarian regimes had introduced some free market elements, none had supported a free market economy as a "matter of principle"; in this sense, "Chile is an exception, not the rule" (Friedman 1982, 1). These characteristics made Pinochet's intervention a particular treatment among several autocratic regimes. Finding a valid comparison for Chile under Pinochet is a challenging endeavor because of the particular conditions prior to Pinochet's coup and during the democratic transition between 1988 and 1990, when Pinochet left the government. Despite the complexity of this process, the prevailing belief is that Pinochet was a positive and determining factor role in creating the Chilean miracle. Becker (1997) indicated that Chilean annual growth in per capita real income from 1985 to 1996 averaged 5 percent, far above the average of the region.

As with every process to determine a causal connection, drawing a conclusion from the synthetic control method depends on the assumptions previously established. The effectiveness of this method assumes there are no other treatments that could be affecting the results. It is challenging to rule out completely the influence of confounding treatments. For instance, the decline in GDP per capita during the first two years of the Pinochet regime resulted from the populist policies of President Allende. However, it is less likely that those policies produced the general underperformance that the Pinochet regime displays relative to the counterfactual for fifteen years. Another possible cofounding treatment is the crisis of 1982–1983 that produced a surge in unemployment and struck the financial sector, which resulted, ironically, in the nationalization of the two biggest banks (Fisher 2015). It is worth noting that this particular crisis resulted from Pinochet's government policies that affected the financial sector (Salazar and Pinto 2002).

The results show income increments that could be attributed to economic reforms established in 1975. This could be another potential treatment, but this economic burst is also captured by the counterfactual, meaning that they were not exclusive to Chile under Pinochet. Similarly, the burst registered in 1984 as a result of a new set of economic policies is in the same direction as the counterfactual. One additional important assumption is that the treatment did not affect any other donor country. This assumption rests on the uniqueness of the Chilean experience and the pioneering measures of the Pinochet regime. With these considerations, it is feasible to assume the effects in GDP per capita are due to Pinochet only and the stable unit treatment value assumption (SUTVA) holds.[13]

Results on per capita income

Synthetic Chile serves as a representation of actual Chile with no Pinochet, and I seek to see whether economic outcomes (per capita income, specifically) under Pinochet's regime deviate from this counterfactual and if so in what direction and the relevance of the magnitude. The control matches the real outcomes closely for the previous thirteen years in the predictors I have selected. Below, figure 1 plots a comparison between actual and synthetic Chile over the pre-Pinochet period. As can be seen, synthetic Chile closely tracks actual Chile during the events before the treatment, which provides a visual indication

[12] Billmeier and Nannicini (2013) try to assess the effects of economic liberalization in Chile by setting 1976 as the treatment period. However, the preliberalization drop in GDP makes it difficult for their synthetic control algorithm to find a suitable counterfactual.

[13] I consider alternative specifications, dropping all the donors that were assigned a weight, autocracies, and using alternative sets of predictors. My conclusions are similar to those presented here. I discuss these robustness checks in the appendix.

Table 3. Indicator fits, GDP per capita.

Variables	Actual Chile	Synthetic Chile
Average GDP per capita	4037.13	4218.48
Population growth rate	2.10	1.97
Openness, 1960	29.17	67.91
Openness, 1972	23.06	74.87
Total education, 15+, 1960	5.22	4.75
Primary education, 15+, 1960	3.98	3.83
Total education, 15+, 1970	6.09	5.46
Primary education, 15+, 1970	4.46	4.12

Note: Table shows the values of indicator variables and the average pre-Pinochet outcome variable for actual Chile and synthetic Chile. World Bank Data are in constant 2010 U.S. Dollars.

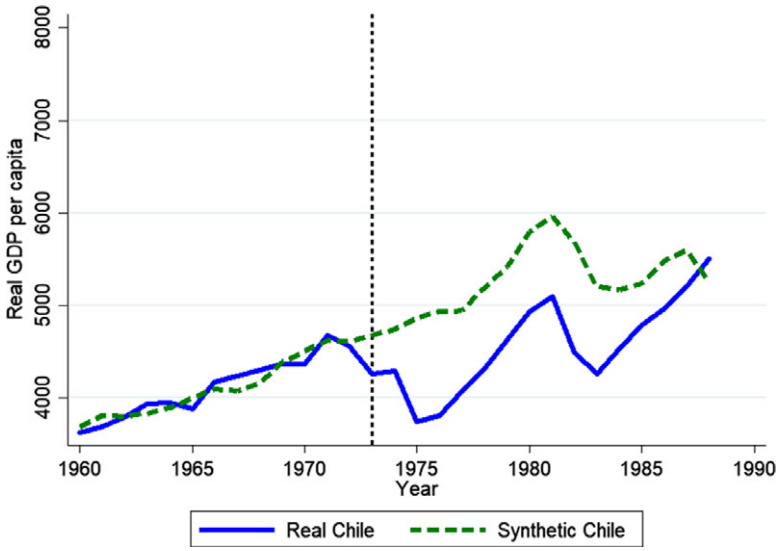

Figure 1. GDP per capita. The solid line represents observed per capita income in Chile, 1960–1988; the dashed line represents the synthetic control for the same period. World Bank data are in constant 2010 US dollars.

that the control has been correctly created. I use data from the World Bank in constant 2010 US dollars.

Only three of the fifteen potential donors tested as controls for the construction of synthetic Chile received a weight greater than zero: Argentina (3.2 percent), Panama (53.2 percent), and Uruguay (43.6 percent). Table 3 reports the pre-Pinochet values of the predictors for both actual Chile and the synthetic control. Each value is close to its corresponding indicator, which reflects an appropriate match in the pretreatment period. The model fit pre-intervention root-mean-squared prediction error (RMSPE) for the unit of comparison is 0.096.

After the introduction of the treatment, one can notice a widening gap between both series. At 1973, the trajectory of the synthetic GDP per capita continues to outmatch the

series of actual Chile. There is a previous decline prior to Pinochet's coup that the regime was not able to contain. By 1975, Chilean per capita income is almost $1,500 below that of synthetic Chile, and the gap remains around $1,000 in all following years until 1983, when the gap narrows but continues to underperform synthetic Chile for five years more. This divergence would mean, at first glance, that Pinochet's regime had a negative impact on the country's GDP per capita. From 1973 onward, it is clear that synthetic Chile experienced higher levels of GDP per capita at least until 1988, fifteen years after the treatment.

The mediocre average GDP per capita growth resulted from two specific events. First, a monetary contraction aimed to control the hyperinflation inherited from the Allende administration. There was a reduction of government spending and public payroll which shrank the economy 13 percent in 1975 (Muñoz 2008). The growing connectivity of the Chilean economy to the world and the intervention in the banking system in 1981 played a role in creating another recession in 1982, when Chile's GDP per capita fell to 14.3 percent. The regime had to nationalize banks and industries, moving away from free market principles (Friedman and Friedman 1998).

Expanding the donor pool and pretreatment period

The conventional wisdom is that the Pinochet government, despite its multiple violations of human rights, established some policies and institutions that produced a fundamental and positive change in the Chilean economy. My initial experiment suggests the story may be more complex. To verify what seem to be surprising results, I run a second experiment with a different dataset obtained from the Penn World Tables that registers the GDP per capita since 1951. I also expand the pool of donors to countries with significant copper production to capture the historical influence of this commodity on the Chilean economy. My findings reach similar conclusions.[14] Figure 2 shows a comparison between actual and synthetic Chile over a longer pre-Pinochet period, which goes back nine more years, until 1951, in this experiment. As in the previous comparison, synthetic Chile closely tracks actual Chile during the events before the treatment.

Table 4 reports results for each indicator. Similar to the previous experiment, the covariate values for the synthetic control match closely, or even better in some cases. Each calculation is close to its corresponding indicator, which reflects an appropriate match in the pretreatment period. This second experiment operates as a robustness check by switching to a different data set that includes more donors and pretreatment periods. Though the trends are similar, the gap is larger; this is expected due to the different base of the new dataset. By 1975 actual Chile underperforms the synthetic counterfactual by a little more than $2,500, and it continues to underperform synthetic Chile for the entire post-treatment period with a wider gap that reaches $3,000 for several post-treatment periods.

Inference tests

The synthetic control methodology allows me to conduct inference tests to increase confidence in the results. It is possible to offer information about the statistical significance of the findings in the former section. The pretreatment matching in figures 1 and 2 presents a good indication that the methodology was executed correctly and suitable counterfactuals were constructed using two different datasets and pretreatment periods. Additionally, the

[14] The appendix includes additional robustness checks changing the predictors and using the copper producers with the first dataset from the World Bank. It also includes the list of donor countries and the synthetic control weights for Chile.

Table 4. Indicator fits, GDP per capita.

Variables	Actual Chile	Synthetic Chile
Average GDP per capita	5,999.68	6001.98
Population growth rate	2.10	2.10
Openness, 1960	29.17	29.18
Openness, 1972	23.06	31.52
Total education, 15+, 1950	4.81	4.58
Primary education, 15+, 1950	3.73	3.73
Total education, 15+, 1970	6.09	6.12
Primary education, 15+, 1970	4.46	4.38

Note: Table shows the values of indicator variables and the average pre-Pinochet outcome variable for actual Chile and synthetic Chile. Penn World Table 9.1 data chained PPPs (2011 US$) from 1950.

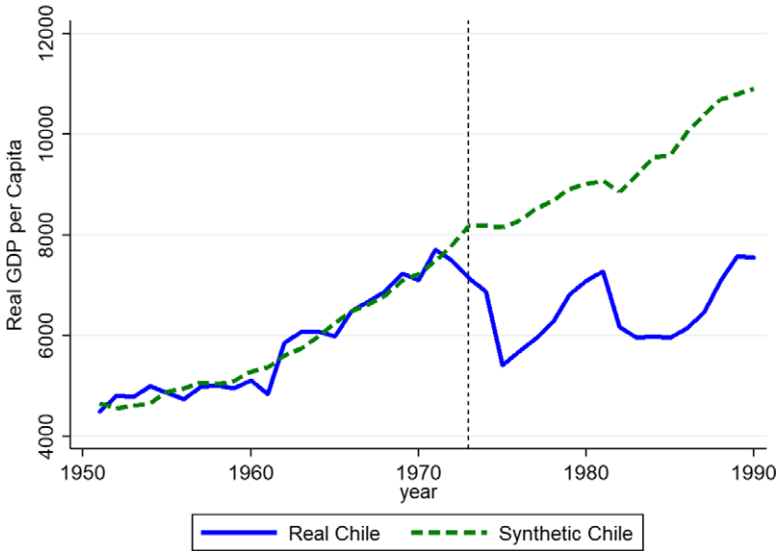

Figure 2. Real GDP per capita at chained PPPs (in mil. 2011 US$). Penn World Table 9.1 going back to 1950 and expanded donor pool.

methodology provides the alternative to conduct in-time and in-place placebo tests to increase the confidence in the results (Powell, Clark, and Nowrasteh 2017).

In this particular case, the in-time placebo is not suitable because there are no available data to maintain a similar level of observations before the treatment year, at least in the first central experiment. Therefore, it is more convenient to use a placebo on the geographical location that will simulate a control for each of the other donor countries. The in-place placebo test will serve to increase the confidence that the departure from the performance of synthetic Chile stems from the Pinochet treatment rather than a general deterioration in the predictive power of the synthetic counterfactual. The placebo produces a synthetic version of each control country that did not experience the Pinochet effect. It tests whether the difference between the control and its corresponding synthetic version after 1973 is more significant than the difference in Chile.

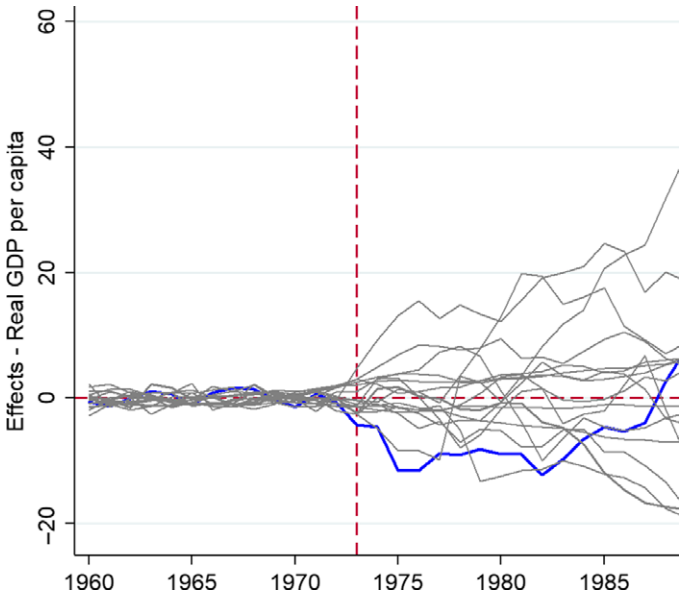

Figure 3. GDP per capita placebo tests. The blue line represents the difference between observed income in Chile, 1960–1988, and the synthetic control; the synthetic control is normalized to zero. The graph shows placebo tests (light blue lines) for all other countries in the dataset.

Confidence in the result that Chile's per capita income was affected by Pinochet's autocracy would be weakened if the magnitude of the in-place effect was similar for Chile and other countries. Figure 3 illustrates the synthetic control method in every country in our sample. The result shows that Chile does not have consistent growth in income per capita after Pinochet's coup. There is a change in the trend years later, which may refer specifically to the establishment of broader liberalization reforms or other variables besides the political regime. Chile has a very noticeable change after introducing the treatment that persists over the post-treatment period, unlike most of the other control countries, which do not have a similar performance for the post-treatment period, 1973–1988.

To increase the robustness of the analysis, the synthetic control method enables the calculation of a significance level (p-value) for the estimated Pinochet impact. It is a modified version of the method presented by Cavallo et al. (2013).[15] The process considers the absolute value of each period's treatment effect and ranks it among the absolute values of the period's placebo effects. The number of placebos with a more extensive estimated effect divided by the total number of placebos provides the p-value for each post-treatment period. This calculation evaluates the effect and the evolution of statistical significance over time. Therefore, the execution of the algorithm considers all countries, treated and donors, but it is important to notice that those countries with a poor fit in the pretreatment period are more likely to present more substantial deviations in any post-treatment period, decreasing the significance in some years of the post-treatment period.

Figure 4 shows the results of the calculations of the unique p-values for each post-treatment period with the placebo averages. This evidence and the initial results on the synthetic counterfactual suggest that Pinochet's autocracy either caused a statistically significant decline in GDP per capita, or did not improve the ongoing decline from the

[15] See also Absher, Grier, and Grier (2020) for an application.

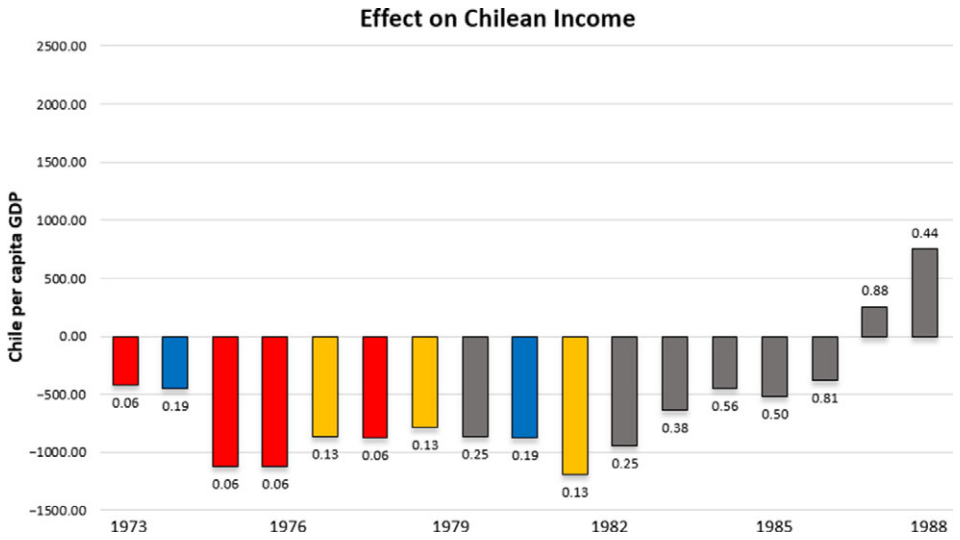

Figure 4. This figure shows the estimated treatment effect on per capita GDP for each period following the Pinochet treatment. Effects in red are significant at the .06 level, effects in yellow are significant at the .13 level, effects in blue are significant at the .19 level. Effects in grey are insignificant.

previous regime. This decline was consistent during the first ten years after the coup. The control shows a reverse in the direction of GDP per capita around 1983, and it presents nonsignificant results in the final years of the post-treatment period.

Conclusion

Contrary to conventional wisdom, Pinochet's autocracy does not seem to have had a decisive positive effect on per capita income, at least when the junta took power in 1973. Rather, it seems the turbulence caused Chile to perform worse in comparison to a synthetic counterfactual formed as a weighted average of similar countries that did not experience the regime of Augusto Pinochet. The results, robustness checks, and inference tests question the relevance of Pinochet to a positive influence on the income per capita that Chile experienced at the end of the twentieth century, or at least it questions how pro-growth the policies were under Pinochet. The confidence of the results may suggest that the economic growth in Chile depended much more on variables other than the introduction of the autocracy.

The findings support other empirical analyses, such as that of Easterly and Pennings (2018).[16] For them, the stories about benevolent autocrats, or even autocratic systems and growth successes, have not resulted in supporting evidence in the contemporary literature. In this view, the relevance of Pinochet's autocracy to more substantial economic growth is overrated. Carden and Lawson (2010) find a similar trend in their studies. Human rights abuses reduce rather than accelerate the pace of economic liberalization. Additional empirical studies have found democratic institutions and policies to be more supportive of economic progress than authoritarian political regimes are. A cross-country analysis

[16] Nannicini and Ricciuti (2010) examine the impact of autocratic transitions on real GDP per capita, comparing different countries. Their results are similar in the case of Chile. However, the "autocracy" treatment reports insignificant, negative, and positive effects overall.

strengthens the relationship and shows that more economic freedom and globalization encourage governments' respect for human rights (Dreher, Gassebner, and Siemers 2012). Rode and Gwartney (2012), for example, find that transitions to democracy are associated with subsequent increases in economic growth. This is also evident in Chile; the income per capita growth is far more impressive during the democratic era after Pinochet (Becker 1997).

It is difficult to support a positive economic effect of Pinochet's regime by looking at the income per capita, especially if this performance is compared to a weighted average of similar coutries, which is what I elaborated in this article by producing a synthetic counterfactual. There is no noticeable positive difference resulting from the political regime per se. Furthermore, the synthetic control evaluation of the Pinochet effect seems to support the claim that regardless of the conditions of the political regime, stable polities promote growth (Butkiewicz and Yanikkaya 2007). If society can remove obstacles to the entrepreneurial spirit and unleash the market process, the results are similar most of the time. The presence of autocrats appears to have a secondary role if, as in the Chilean case, there is a will to eliminate hindrances to increasing the quality of economic and political institutions and allowing more extensive space for the market in public policies.

Studying the Glorious Revolution in England, North and Weingast (1989) examined the political factors underpinning economic growth, focusing on both the rules governing economic exchange and the institutions governing how these rules were enforced. The degree to which the regime was committed to or bound by these enforcement rules determined the economic growth and the development of markets. Even though I have not tested this hypothesis in the case of Chile during the Pinochet regime, my results are consistent with it.[17] It is also possible that greater access to political institutions after Pinochet made the nascent economic growth stronger, following the theory provided by Acemoglu and Robinson (2012).

After the 1973 coup, the Chilean government undertook several economic reforms. Later, in 1980, Chileans approved a new constitution, which scheduled a referendum for 1988, in which voters decided if Augusto Pinochet should remain in power until 1997 or not. The "NO" won the referendum and Pinochet accepted the results. A joint presidential and parliamentary election took place the following year. As in early modern England, it is possible the expected transition to democracy served as a credible commitment for the government not to backslide to bad economic policies. Prior to the presidential election of 1989, the Pinochet regime and the opposition agreed to fifty-four modifications to the Constitution that expanded political rights but maintained the economic reforms (Uggla 2005). These changes could reflect an attempt to make credible the government's ability to continue the path to economic growth and possibly be a factor more relevant than Augusto Pinochet for the Chilean economy.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/lar.2022.54

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[17] Uhr, Uhr, and Ely (2017) use the same methodology to evaluate the impact of the transition to democracy in Chile. Their results confirm the hypotheses provided and show that the reintroduction of democracy had a larger positive effect on the Chilean GDP per capita.

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