How did the quasi-dollarization policy impact income inequality in Argentina?

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HOW DID THE QUASI-DOLLARIZATION POLICY IMPACT INCOME INEQUALITY IN ARGENTINA?

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1 Executive summary

We employ the synthetic control method to analyze the impact of the quasi-dollarization policy implemented in 1991 on income inequality in Argentina. The findings suggest that the Currency Board had a significant effect on increasing income inequality in Argentina. Additionally, we observe that this policy led to a rise in the unemployment rate and a deterioration of Argentina's external balance. These elements enable us to attribute the observed increase in inequality to a loss of Argentina's competitiveness due to the appreciation of the peso following the currency board, which resulted in higher unemployment rates, thereby exacerbating income inequality.

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Contents

2 Acknowledgements

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3 Introduction

The 2023 elections in Argentina, which resulted in the victory of the ultra-liberal Javier Milei, highlighted an unconventional economic policy. The newly elected leader, partly propelled by his proposal to fully replace the peso with the dollar, has embarked on a process of deregulation and complete liberalization of the Argentine economy to achieve economic stability by combating the high inflation rate, which exceeded 130% in 2023. The pinnacle of President Milei's policy is the complete dollarization of the economy in the long term, once economic stability is attained.

This situation is not new in Argentina. In the 1990s, when inflation exceeded 2000%, the Minister of Economy, Domingo Cavallo, launched a first attempt at dollarization in April 1991 in the form of a Currency Board to counter hyperinflation. Although this initiative initially achieved its economic stability objectives, it was not ultimately successful and had to be abandoned in 2001 following the economic crisis that shook the country. Many questions remain about the impacts of this radical policy on various segments of the Argentine population and the inequalities that may have resulted.

To address these questions and study the impact of the dollarization policy on inequality in Argentina in depth, we aim to answer the following question: "How did the quasi-dollarization policy impact income inequality in Argentina?"

The analysis of inequality will be conducted using the synthetic control method. By creating a synthetic control for Argentina, we compare the evolution of inequality in Argentina throughout the dollarization period with a synthetic Argentina that did not experience the dollarization policy.

Various tests reveal that the Currency Board policy in Argentina led to an increase in inequality. In 2001, ten years after the establishment of the Currency Board, we observe, through the Gini index, a 20.3% increase in inequality compared to the 1991 level, with a positive gap of 3.44 points between the real Argentina and its synthetic equivalent created using the synthetic control method.

To deeply understand the causes of the increase in inequality and the transmission channels that led to this increase, we apply the same methodology to Argentina's unemployment rate and external balance. This analysis highlights a transformation of the Argentine economy due to an overvaluation of the peso, causing a loss of trade competitiveness for Argentina. Indeed, the external balance on goods and services in Argentina, expressed as a percentage of GDP, is higher in our synthetic control than in the actual Argentina. While the external balance of our synthetic control remains positive, that of the real Argentina turns negative, indicating a predominance of imports over exports.

The loss of competitiveness led to a contraction of employment in the industrial and agricultural sectors. This contraction of employment itself led to an increase in income inequality in Argentina. The unemployment rate in Argentina rose from 5.4% to 18.8% in the four years following the implementation of the quasi-dollarization. This gradual increase in unemployment also explains the delayed and prolonged impact of the Currency Board on inequality.

The Currency Board period has been widely discussed in the scientific literature, not least with regard to income inequality. Numerous studies have sought to understand the factors influencing these inequalities and the behavior of the labor market during this period (see Aschinger (2002), Cruces and Gasparini (2008), and Waisgrais (2003) and Cruces and Gasparini (2008)). However, previous research has primarily focused on the evolution of inequalities in the urban area of the Greater Buenos Aires area.

In this study, we propose an analysis covering the entire Argentine territory by utilizing inequality data from the SWIID database. To achieve this, we employ the synthetic control method developed by Abadie and Gardeazabal (2003), which has proven effective in studying income inequalities (see Fuentes Cordoba and Uliczka (2021), Grier and Maynard (2016), Hartwell et al. (2022), and Jordan et al. (2021)) and has already been applied to the topic of the Currency Board in Argentina in the work of Hallren (2014). The application of this method in our context allows us to create our own control unit by combining a set of untreated units, thereby overcoming the limitation of finding a single untreated unit similar to Argentina.

Our analyses and conclusions are strengthened by conducting various robustness tests, which lend credibility to our results. We compared our findings to a variant of the synthetic control, performed placebo tests to confirm that our observations are attributable to the Currency Board, and adjusted various parameters

such as the intervention year, the length of the optimization period, our donor pool, and used a normalized Gini coefficient. All these tests enable us to demonstrate the reliability of our results.

4 Historical Perspective on Dollarization and Currency Boards

Dollarization is defined as the decision of a state to adopt the US dollar as its official currency, thereby abandoning its national currency. This adoption can be either partial, with the country retaining its national currency and allowing the two currencies to coexist, or complete, with the dollar entirely replacing the national currency. It is important not to confuse dollarization with a monetary union. In dollarization, the country renouncing its national currency completely forfeits its monetary autonomy and central bank, which constitutes a significant change for the economy. In contrast, in a monetary union, such as the eurozone, member countries share responsibility for monetary policy by creating common institutions, allowing each member country to retain some influence over monetary policy, which is not the case for a country that has opted for complete dollarization.

The first country to officially introduce dollarization was Panama in 1904, followed by other nations such as Ecuador in 2000 and El Salvador in 2011. Other countries, like the Marshall Islands, Palau, and Micronesia, also use the dollar as their national currency. Since the creation of the European Union, the term "euroization" has been used when non-eurozone countries adopt the euro as their national currency without establishing an agreement with the eurozone. This is notably the case for Monaco, San Marino, Vatican City, Montenegro, and Kosovo.

When dollarization is official, the dollar fulfills the three essential functions of money: store of value, medium of exchange, and unit of account. The dollar is then also officially recognized by institutions as the national currency. The term dollarization is also used in the literature to describe a phenomenon where the dollar is used as a store of value or unit of account but not necessarily as a medium of exchange, which is referred to as unofficial dollarization of the economy.

Numerous reasons can drive an economy to dollarize, whether officially or unofficially. A primary reason is the lack of financial institutions capable of managing a national currency, which can be the case for smaller territories or Pacific islands. In such instances, a country may choose to adopt the dollar for economic and administrative convenience. A second reason is the pursuit of economic stability, particularly in countries experiencing high inflation. The process begins with the substitution of the national currency with the dollar as a store of value. If inflation persists, certain goods start being priced in dollars, establishing it as a unit of account. Finally, the last function of money affected by dollarization is its role as a medium of exchange, primarily for significant transactions such as real estate purchases (Calvo & Végh, 1992).

In the context of this study, when we refer to dollarization, we mean monetary substitution where the dollar assumes all three functions of money. Conversely, if it does not fulfill all these roles, we will refer to it as partial dollarization.

Despite the seemingly radical nature of this new dollarization initiative proposed by President Milei, Argentina had already implemented a dollarization policy in the 1990s. This initial experience of dollarization, launched in April 1991 under the direction of Minister of Economy Domingo Cavallo, took the form of a Currency Board.

The Currency Board, presented as an alternative to dollarization, emerges as a deliberate strategy for stabilizing the exchange rate by pegging it to another currency, notably the dollar. This policy offers the advantage of promoting the use of the national currency while preserving its value through reference to a foreign currency. However, this approach also entails a loss of monetary autonomy. Thus, while its form and implementation differ from dollarization, the underlying principles and implications of these two strategies remain similar.

The Currency Board is a monetary policy adopted by countries such as France and the United Kingdom in their colonies, as well as by smaller countries and territories seeking to establish a currency recognized internationally. A second frequently observed scenario, similar to dollarization, involves countries facing high inflation that leads to significant monetary instability, complicating international exchanges. This situation

also fosters the development of a shadow economy where the currency used does not correspond to the country's official money. The case of Argentina in 1991 exemplifies this second scenario precisely.

Indeed, during the period from 1982 to 1991, inflation in Argentina averaged 794%, peaking at over 3000% in 1989. This hyperinflation created extremely unstable monetary conditions, leading to detrimental consequences for trade and the national economy. In this context, the adoption of the Currency Board aimed to counter rampant inflation, stabilize the national currency, and restore an environment conducive to both domestic and international economic exchanges.

Although Argentina was not the first country to implement a Currency Board, this initiative marked several significant milestones. Firstly, it stood out as a pioneering effort in terms of population size, which reached 33 million in 1991.

Additionally, the establishment of the Currency Board represented a revolutionary development for the economic power of the targeted country. In 1980, Argentina ranked as the eleventh largest economy in the world, measured by nominal gross domestic product [1]. This significantly diverged from other nations involved in similar strategies. For instance, in 1991, Hong Kong was the most populous region applying the Currency Board, with a population of only 5.7 million, more than 5.5 times smaller than Argentina's at the same time.

Dollarization and the Currency Board are often perceived as measures of last resort to restore monetary stability when the central bank can no longer stabilize the national currency's exchange rate. In the case of Argentina, numerous attempts had been made in the past to restore monetary stability. Since the beginning of the war of independence in 1810, Argentina struggled to achieve a stable monetary equilibrium over time. Once independence was achieved, and for nearly 80 years, a great diversity of currencies issued by different provinces and entities circulated within Argentina.

Argentina's first monetary unification, with the issuance of the Peso Moneda Nacional in 1881, occurred after pegging the national currency to the French franc when Argentina joined the Latin Monetary Union. Established in 1865 by several European countries, including France, this union aimed to establish interconvertibility between different standardized currencies to facilitate international trade, based on a monetary parity between gold and silver.

However, Argentina abandoned the gold standard in 1914. Subsequently, the peso was pegged to the US dollar in 1927 following the dissolution of the Latin Monetary Union, and then to the British pound from 1933 to 1939. During this period and beyond, the Great Depression of 1929 and World War II severely impacted the Argentine economy, leading to numerous currency devaluations.

In 1970, the Peso Ley was introduced at a conversion rate of 100 to 1, replacing the existing currency that had lost all value due to a first wave of hyperinflation. This Peso Ley was replaced in 1983 by the Peso Argentino, introduced at a rate of 10,000 Pesos Ley to 1 Peso Argentino, following a new wave of hyperinflation that began in 1981. In 1985, a new currency, the Austral, replaced the Peso Argentino at a rate of 1,000 to 1, as the Argentino proved ineffective in curbing hyperinflation. The Austral and its accompanying economic measures also failed to stabilize the persistent high inflation in the country. Despite these efforts and various attempts, Argentina continued to face persistent challenges in maintaining a stable monetary environment.

The Austral was then replaced in 1991 by the Peso Convertible, pegged to the US dollar through the establishment of a Currency Board, in response to another wave of hyperinflation and as a radical attempt to eradicate the inflation plaguing the Argentine economy. This transition will be examined here. The Currency Board was abandoned in 2001 due to the challenges faced by the Argentine state in maintaining the monetary peg, amidst deteriorating public finances. These difficulties were notably fueled by the inflation crisis in Brazil and the depreciation of the real, which significantly impacted the Argentine economy and its trade by undermining its competitiveness. The end of convertibility inevitably led to a new wave of inflation.

The recent proposal by the new Argentine president aligns with the efforts of his predecessors, aiming to stabilize the exchange rate and achieve monetary stability. However, it raises questions about its potential implications in a country of this scale, where previous attempts to change the currency have not been

[1] Source : International Monetary Fund, World Economic Outlook Database, 2024

successful. Indeed, by analyzing Figure 1, which depicts the logarithm of the exchange rate between the Argentine currency and the U.S. dollar, it appears that Argentina has adopted a new form of currency five times since 1970. However, none of these attempts have succeeded in achieving long-term monetary stability. These concerns also prompt questions about the potential repercussions on economic stability and social inequalities that such a radical measure as abandoning the national currency in favor of another might entail.

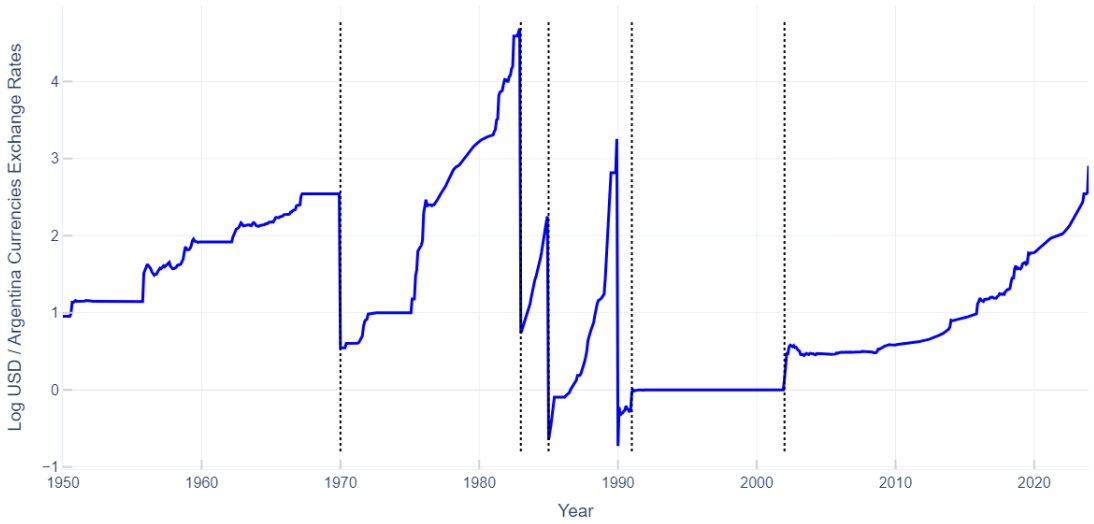

Figure 1: Change in the Log USD/Argentina currencies exchange rates between 1950 and 2023. *Note*: The blue line represents the logarithm of the exchange rates between the Argentine currency and the USD from, 1950-2023. The dotted vertical lines indicate the years of each currency substitution: 1970, 1983, 1985, 1991, and 2001.
Source: Argentina Ministry of Economy from http://www.economia.gob.ar.

5 Literature review

5.1 Macroeconomic and Microeconomic Impacts of Quasi-Dollarization

The effect of quasi-dollarization, such as the one experienced by Argentina in the 1990s, on macroeconomic and microeconomic variables has not yet been clearly established by the existing literature. This phenomenon is particularly difficult to analyze when it comes to a currency board and not a total dollarization, due to the low number of countries that have adopted such measures. Quasi-dollarization is a process that starts in a country before government intervention, indeed Antinolfi et al. (2007), showed that in developing countries when inflation increases, economic agents substitute their national currency with active dollars considered as stable, thereby reducing capital investment in the economy. This substitution makes national monetary policies less effective, increases participation in the underground economy, diminishes the influence of the government, and favors tax evasion and corruption, thus widening the fiscal deficit (Feige, 2003). A high degree of dollarization also increases the risk of credit and liquidity crises, notably due to the decline of confidence in the national currency (Rennhack & Nozaki, 2006). One solution national government may consider to address these problems is the complete dollarization of the economy or a similar system; in the case of Argentina, this refers to a fixed exchange rate.

Dollarization entails both advantages and disadvantages, which largely depend on the degree of similarity between the economic structures of the adopting country and the issuing country of the currency. For countries that are very different from the United States in economic terms, dollarization may not yield much

benefit unless it is accompanied by a deep integration of markets (Berg & Borensztein, 2003) similar to what has been achieved in the European Union. However, it is acknowledged that dollarization of an economy reduces the inflation rate of the country concerned (Edwards & Magendzo, 2003) and can be very effective in combating persistent hyperinflation (Hallren, 2014). Dollarization also has the advantage of increasing investor confidence and attracting foreign capital by reducing exchange rate risks. On the other hand, the benefits of dollarization could be offset by the loss of national income associated with the disappearance of seigniorage revenues, which in the case of an economy with a high dollar holdings rate would be relatively negligible (Berg & Borensztein, 2003). Moreover, the loss of monetary autonomy linked to the absence of a national central bank and a proper currency is a significant downside. Dollarization is an irreversible process, which can have lasting effects on the dollar holdings of economic agents, even after the stabilization of inflation (Kamin & Ericsson, 2003).

5.2 Monetary Policy, Inflation Control, and Its Effect on Inequality

The scientific literature shows a lack of research establishing a correlation between dollarization and inequalities. Therefore, given that one of the objectives of dollarization is to reduce inflation, we will address this limitation by assessing the implications of inflation itself on income disparities. The fundamental objectives of the economic policy implemented in Argentina in 1991 were to eliminate hyperinflation, a condition characterized by its self-sustaining nature, easy to trigger but difficult to contain and stop, thus constituting a major challenge for developing countries (Phillips, 1998). Previous research (Blejer & Guerrero, 1990) highlighted the importance of policies aimed at containing and controlling inflation, as well as their impacts on income inequalities. Restrictive policies on inflation showed positive effects on income inequalities, while expansionary policies were associated with adverse consequences on these inequalities. Thus, there is a significant correlation between monetary policies focused on controlling inflation and inequalities. Countries with higher inflation rates display on average higher levels of income inequalities (Al-Marhubi, 1997). Inflation tends to reduce the real wages of the segments of the population with the lowest incomes (Easterly & Fischer, 2001) which can lead to an increase in income inequalities.

Many studies have highlighted positive relationships between inflation and inequalities. However, a study conducted by Coibion et al. (2017) observes a negative and persistent impact of monetary policies on inequalities, without being able to explain the increase in income inequality since the early 1980s. Jiménez-Huerta (2008) also points out that inequalities in Argentina reached higher levels after the policies aimed at reducing hyperinflation, thus questioning this correlation. These links seem to be conditioned by the political system in place in the country, with the correlation between inflation and income inequalities being stronger in countries with democratic features, political competitiveness being a key condition for the existence of this correlation (Beetsma & Van Der Ploeg, 1996; Desai et al., 2005).

Beetsma and Van Der Ploeg (1996) and Desai et al. (2005) observes in their work that in economies where money is used for transactions and where income disparities are largely attributable to external differences in human capital, the larger holding of cash by low-income households, caused by a high cost of adopting alternative payment methods, makes them more vulnerable to an increase in inflation. Access to financial markets, which would allow protecting oneself from inflation, however, presents a barrier to entry, making them inaccessible for low-income households (Cysne et al., 2005).

This relationship between inflation and inequalities is strongly disputed, Björklund (1991) challenging the idea that inflation can have positive effects on low-income households since inflation reduces the value of their debts. Many studies reveal a non-linear relationship between inflation and inequalities, adopting the shape of a U-curve (Monnin, 2014). This approach explains that, at low levels of inflation, income inequalities are high and they tend to decrease as inflation approaches a threshold around 13%, before increasing again with higher inflation. Other studies reach similar conclusions regarding a non-linear U-shaped relationship (Nantob, 2015). Galli (2002), speaking of the “paradox of inflation and inequalities”, emphasizes that when initial inflation is low, the negative effects of disinflation may outweigh the positive effects. Nevertheless, the literature agrees that the transition from hyperinflation to more controlled inflation has little negative impact on income inequalities and offers benefits at all levels of GDP per capita (Bulíř, 2001).

5.3 Economic Phases and Income Inequality During Argentina's Currency Board Era

In Argentina, numerous academic studies have examined the period of the Currency Board, focusing on both the reasons that led the government to abandon this policy and the impact of dollarization on the Argentine economy. Damill et al. (2002) highlights two distinct economic phases following dollarization: an initial period of expansion, briefly interrupted by a small recession in 1995, followed by a recovery and then a prolonged recession beginning in 1998, culminating in the 2001 crisis.

Regarding income inequality, the hyperinflation crisis of the 1980s in Argentina had already contributed to rising inequality, but public policies in the 1990s further exacerbated this trend (Cruces & Gasparini, 2008). While the 1990s saw a stabilization of inequalities in many Latin American and Caribbean countries (Busso & Messina, 2020), Argentina experienced an increase in inequality. The literature demonstrates that this rise was primarily due to the costs associated with price stabilization (Waisgrais, 2003) and the high unemployment rate following dollarization, which significantly affected inequality levels. Although the poverty rate decreased partly due to changes in the labor force, both the poverty gap and the severity of poverty increased (González-Rozada & Menendez, 2006).

Frenkel and Ros (2004)'s research shows that the rise in unemployment in Argentina was largely attributable to job losses in the manufacturing sector, which saw a nearly 30% reduction. The real appreciation of the peso had devastating effects on the competitiveness of the goods sector. A significant portion of the Argentine economy, which was based on the processing of natural resources and the production of exportable industrial goods, was unable to offset the job losses in the manufacturing sector, which produced import-competing goods. The economic restructuring due to lost competitiveness led many businesses to close, replaced by imported products, particularly due to the crises affecting Mexico and Brazil.

The increase in the unemployment rate was the primary driver behind the rise in the Gini coefficient, which adversely affected income distribution by reducing the number of actively employed individuals receiving an income and disproportionately impacting less educated and already low-wage workers. Although the post-dollarization economic expansion in Argentina achieved the dual objectives of price stabilization and increased production, the unemployment rate, after an initial decline in 1991-1992, reached a peak in 1996. The fact that unemployment began rising well before the economic downturn highlights the Argentine economy's weakness in generating jobs under the new economic conditions (Damill et al., 2002).

Starr (1997) emphasizes that this surge in unemployment is directly linked to the dollarization policy. The Currency Board restricted the government's ability to combat recession, rising unemployment, or poverty. The only way for the government to finance these needs was by sourcing capital from private markets. The stabilization of the Argentine economy attracted significant international investment, creating the so-called "Argentine miracle." However, from mid-1994 onwards, several events led to a flight of foreign capital: the devaluation of the Mexican peso, concerns about Mexico's debt repayment capabilities, the overvaluation of the Argentine peso, fiscal challenges, and upcoming presidential elections.

While the Currency Board successfully eliminated hyperinflation and attracted foreign capital, the overvaluation of the peso reduced Argentina's competitiveness and increased its fiscal deficit, with the lack of monetary flexibility exacerbating these issues (Aschinger, 2002). Although the rising unemployment rate particularly affected the manufacturing sector, the increase in income inequality did not occur within manufacturing jobs but rather due to the growth in service sector jobs, including public sector positions, which often require higher education levels and are less impacted by the loss of competitiveness (Frenkel & González Rozada, 2001).

The literature on the effects of the currency board, as adopted in Argentina, reveals a contrast between theoretical expectations and the actual outcomes. On the one hand, the currency board was intended to stabilize the economy, reduce inflation, and attract foreign investment, with the hope of overall economic improvement and reduced inequalities. However, in practice, the Argentine experience shows that these policies exacerbated inequalities. While inflation was indeed controlled, it came at the cost of a significant increase in unemployment, particularly in the manufacturing sector, which worsened income distribution. The loss of economic competitiveness due to the appreciation of the peso, combined with the state's inability to adapt its economic policies to external shocks, led to a rise in inequality and poverty. This situation high-

lights the limitations of the currency board in a complex economic context and underscores the importance of flexible and adaptive economic policies to achieve genuine stability and equity.

6 Methodology and Data

6.1 Methodology

The econometric objective of this study is twofold: first, to estimate the effect of the Currency Board policy on a measure of income inequality, and second, to delve into the underlying causes that may have contributed to the observed results.

Previous research on the evolution of inequality in Argentina has largely focused on urban inequalities in the Greater Buenos Aires area, primarily due to the availability of data. Studies by Waisgrais (2003) examined factors influencing inequality post-dollarization through OLS models. Aschinger concentrated on analyzing inequality trends across different socio-economic segments, while González-Rozada and Menendez (2006) focused on labor market behavior during the 1990s and its impact on income inequality, using empirical evidence on labor market trends. Cruces and Gasparini (2008) employed a microeconometric decomposition approach to analyze changes in the Gini coefficient, utilizing individual-level wage and labor equations.

The aim of this study is not merely to conduct an analysis of the Greater Buenos Aires area, but to extend it to the entire Argentine territory. To achieve this, a control group is required to assess the evolution of the variable of interest in the absence of the policy under study. Since such a control group does not naturally exist, we will construct a synthetic control by using the characteristics of countries comparable to Argentina before dollarization. This approach will employ the synthetic control method developed by Abadie and Gardeazabal (2003) and further extended by Abadie et al. (2010).

This method is particularly suited for comparative studies aiming to isolate the effect of an intervention on an observed unit. In this framework, the unit affected by the intervention is referred to as the treated unit, while unaffected units are categorized as untreated units. In our study, the units are countries, and the intervention corresponds to the implementation of the Currency Board, which took effect in 1991.

The main appeal of this method lies in its ability to create an unique untreated unit, which is a weighted combination of untreated units, ensuring that the pre-intervention values of the outcome variable closely match those of the treated unit. This synthetic untreated unit serves as a counterfactual, representing what would have happened had the treated unit not undergone the intervention. The post-intervention trajectory of the outcome variable will then be used to estimate what this variable would have been for the treated unit in the absence of the intervention. By comparing the evolution of inequality in Argentina with that of the synthetic control, the effect of the intervention will be determined by the difference between the actual trajectory of the outcome variable and that of the synthetic control.

The primary challenge in constructing the synthetic control lies in the selection of countries that will constitute our control group. Since no country has experienced a quasi-dollarization process with characteristics identical to Argentina's, it is crucial to carefully choose countries that allow us to create a synthetic control independent of the dollarization policy. The construction of the donor pool, which will include these countries, will be elaborated on later in the analysis.

Another major challenge involves assigning weights to each of the selected countries. These weights must be non-negative and sum to 1. To appropriately weight the countries with performance indicators similar to Argentina's, we will select a series of predictors and minimize the difference between the weighted average of these indicators and the observed values for Argentina. Countries whose predictors most closely match those of Argentina will receive higher weights in the construction of the control group. Additionally, predictors with a more significant influence on the outcome variable will be weighted more heavily.

The length of the pre-intervention period is also critical, as the credibility of our analysis largely depends on the quality of the pre-intervention match between the treated unit and the synthetic control. To maximize this period and considering data availability, we will define the start of the pre-intervention period in 1983, the year the Peso Argentino was introduced. The validity of this choice will be examined further in the

robustness test.

Few scientific studies have applied the synthetic control method to the specific case of the Currency Board policy in Argentina. However, we can mention Hallren (2014)'s study, which examined the Currency Board's impacts on inflation and income, and demonstrated the feasibility of using synthetic control to analyze this particular policy.

Other studies, while not focusing specifically on the dollarization episode, have utilized inequality indicators as outcome variables, providing insight into the relevant control variables and procedures for our analysis. Notable examples include the work of Fuentes Cordoba and Uliczka (2021) on the impact of Hurricane Katrina, the studies by Grier and Maynard (2016) on Hugo Chávez's policies in Chile, the research by Hartwell et al. (2022) on the discovery of natural resources, and the work by Jordan et al. (2021) on labor law legislation in the United States. These studies offer valuable examples of how to implement synthetic control and select appropriate control variables for our analysis.

6.2 Data

Regarding the outcome variable, we will utilize the Gini coefficient measured on disposable income, sourced from the Standardized World Income Inequality Database (SWIID) developed by Solt (2020). This database is preferred over the World Income Inequality Database (WIID) due to its broader coverage in terms of countries and years, thus providing a more comprehensive basis for international comparisons. However, this preference for the SWIID involves a trade-off in terms of the number of available indicators. Unlike the WIID, the SWIID does not present the full distribution of income, limiting itself to the Gini coefficient and its derivatives, such as disposable income, market income, relative distribution, and absolute redistribution. Consequently, we will not be able to assess the evolution of inequalities across specific population segments due to this limitation.

A consideration arises regarding the disparity in available data between these two databases, with the SWIID offering a more extensive historical dataset. Taking South America as an example, the differences in coverage between the SWIID and WIID can be attributed to WIID's research focus primarily on post-2000 data. Moreover, efforts within the WIID to extend the timeframe to the 1990s have yet to fully materialize due to apparent inconsistencies between various data sources (Rosa et al., 2020). Nonetheless, survey data is already available, providing an initial database. It is also noteworthy that the SWIID data for South America primarily relies on information provided by the Socio-Economic Database for Latin America and the Caribbean (SEDLAC).

For the selection of predictors, we align with the research by Hartwell et al. (2022) and the literature on inequality predictors, particularly that of Roine et al. (2009). The selected predictors include the sum of exports and imports as a percentage of GDP, the percentage of infant mortality, life expectancy at birth, and the percentage of the rural population, all analyzed over the period 1983-1991. Additionally, we will use GDP per capita for the period 1985-1991, obtained from the World Bank's World Development Indicators (WDI) database; the democracy index derived from the Polity V (Marshall & Robert Gurr, 2020) database for the period 1983-1991; the percentage of the population without education, established by Barro and Lee (2013), over the period 1983-1991; trade openness, the share of investments, and government consumption, obtained via the Penn World Table for the period 1983-1991; the Gini coefficient and our explanatory variables with a time lag; and the data on ethnic fragmentation established by Alesina et al. (2003), also for the period 1983-1991. The set of predictors used in the different analyses and models, together with a statistical summary of each predictor, is provided in Table 3.

7 Results

7.1 The control countries

In the process of selecting the control group, a conventional approach adopted by many studies using this methodology is to prioritize nations that are geographically or culturally close. We could have selected only

countries from Central America, South America, and the Caribbean to form our control group. However, the freedom to choose the countries for our control group will not be constrained by geographical considerations. This flexibility is necessary given that Argentina has the lowest Gini coefficient among geographically close countries for the initial years considered in our analysis (Fig. 2). Consequently, constructing a synthetic control group based on a geographically restricted selection of countries becomes impractical due to the positive weight restriction, necessitating an expansion of the control group.

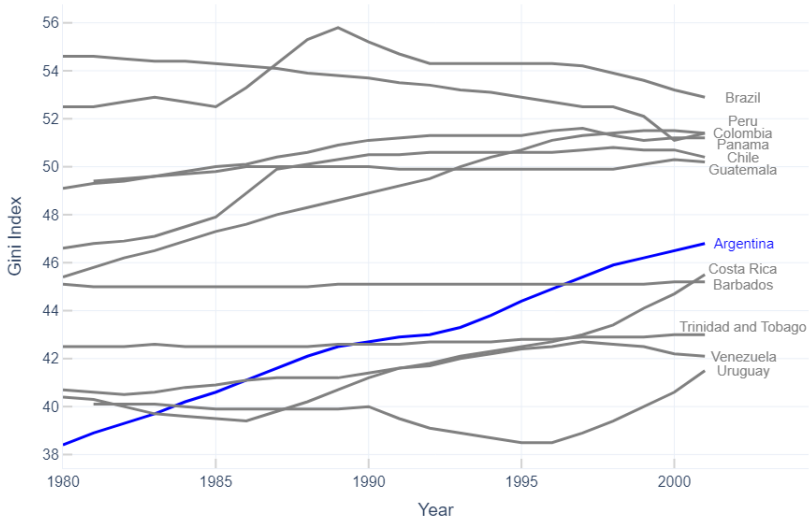

Figure 2: Change in the gini index between 1980 and 2001. *Note*: The solid line represents the observed Gini index, 1980-2001. The blue line represents Argentina, while the gray lines represent the other countries. We include all the countries in South, Central, and Caribbean America for which data is available.
Source: Solt, 2020

Although no initial geographic criteria are considered, other criteria must be taken into account in constructing our control group. The selected countries must not be engaged in a monetary substitution process, must not have adopted currency boards, and must not be members of a monetary union. Furthermore, the exchange rate of their national currency must be fully floating throughout the studied period. These stringent restrictions significantly reduce the number of eligible countries, excluding most European nations, former Soviet Union countries, as well as countries in the CFA franc zone and the Eastern Caribbean Currency Union.

Subsequently, an in-depth country-by-country analysis must be conducted to ensure that no major event during the studied period could have significantly influenced inequalities, thereby excluding affected countries. Examples include the Gulf War (1990-1991), the Rwandan genocide (1994), and the Sudanese civil war (1983), among other major events. These various restrictions are imperative to improve the validity of the obtained results.

Finally, the last element restricting our pool of countries is the availability of data. Many countries meeting the previous criteria do not have sufficient data on inequalities to be included in our control pool. By coupling the countries for which we have sufficient data with our various selection criteria, we obtain a control group composed of 27 countries (Table 1).

Country	Continent	Currency	Country	Continent	Currency
Bangladesh	Asia	Taka (BDT)	Pakistan	Asia	Pakistani Rupee (PKR)
Chile	South America	Chilean Peso (CLP)	Peru	South America	Peruvian Sol (PEN)
Colombia	South America	Colombian Peso (COP)	Philippines	Asia	Philippine Peso (PHP)
Costa Rica	North America	Costa Rican Colón (CRC)	Sierra Leone	Africa	Sierra Leonean Leone (SLL)
Egypt	Africa	Egyptian Pound (EGP)	South Africa	Africa	South African Rand (ZAR)
Fiji	Oceania	Fijian Dollar (FJD)	Sri Lanka	Asia	Sri Lankan Rupee (LKR)
Indonesia	Asia	Indonesian Rupiah (IDR)	Sweden	Europe	Swedish Krona (SEK)
Iran	Asia	Iranian Rial (IRR)	Tanzania	Africa	Tanzanian Shilling (TZS)
Japan	Asia	Japanese Yen (JPY)	Thailand	Asia	Thai Baht (THB)
Kenya	Africa	Kenyan Shilling (KES)	Trinidad and Tobago	North America	Trinidad and Tobago Dollar (TTD)
Malaysia	Asia	Malaysian Ringgit (MYR)	United Kingdom	Europe	British Pound Sterling (GBP)
Malawi	Africa	Malawian Kwacha (MWK)	Venezuela	South America	Venezuelan Bolívar (VEF)
Mexico	North America	Mexican Peso (MXN)	Zambia	Africa	Zambian Kwacha (ZMW)
Norway	Europe	Norwegian Krone (NOK)			

Table 1: Pool of countries composition. *Note*: The ”Currency” column lists the national currency used in each country throughout the entire period under study, from 1983 to 2001. The name of the currency is followed by its abbreviation. Of the 27 countries represented, 9 are from Asia, 7 from Africa, 4 from South America, 3 from North America, 3 from Europe, and only 1 from Oceania.

7.2 The synthetic control

In applying the synthetic control method, the algorithm offers two starting points: either a starting point based on an OLS regression or a starting point where all our indicators begin with an equal distribution. We choose the latter option, as the OLS optimization start tends, in our numerous tests, to assign significant importance to the indicators used to represent the Gini coefficient and to give a zero or non-significant weight to all other indicators. This would render our results, as well as the use of the synthetic control method, less relevant.

We also choose to use the Nelder-Mead optimization method. This method proves the most satisfactory in our case and less restrictive than other optimization methods due to its generality and ease of implementation.

Once the algorithm is applied to create our synthetic Argentina, we obtain a control group composed of 63.7% Chile, 1.9% Costa Rica, 15% Japan, 12.1% Sweden, 5.3% Bangladesh, and 2% Zambia (Table 4). When we use this control group to predict the Gini coefficient for Argentina over the period 1983-1991, we obtain a Mean Absolute Error (MAE) of 0.095.

In the figure 3, we compare the evolution of the Gini coefficient for Argentina over the period 1983-1991 with a Gini coefficient constructed from the average of the Gini coefficients obtained by considering only South American, Central American, and Caribbean countries (Geo. Avg), as well as all the countries in our control group (Donor pool avg.). While our synthetic Argentina has an MAE of 0.095, the geographical restriction yields an MAE of 5.265, and the donor pool group yields an MAE of 0.724.

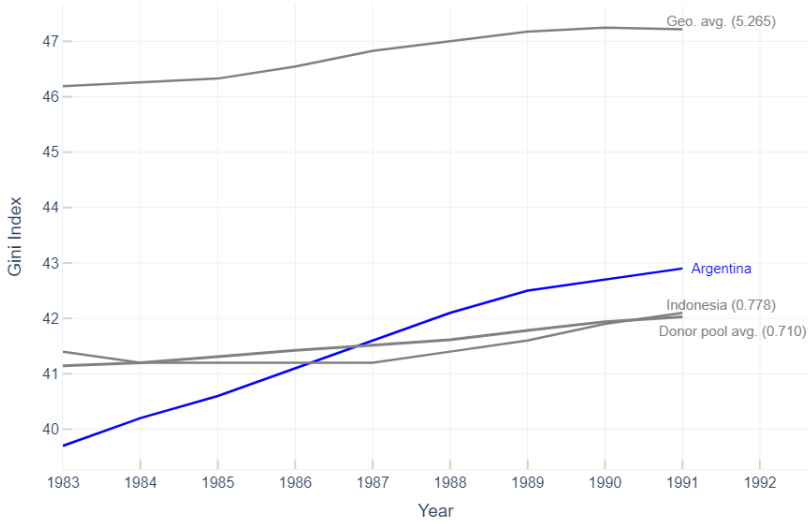

Figure 3: Potential controls using geographic averages and donor pool average. *Note*: The solid line represents the observed Gini index, 1983-1991. The blue line represents Argentina, while the gray lines represent potential controls using geographic averages, the donor pool average, and Indonesia. The countries composing the Geo avg. are the the same as those shown in figure 2. The mean average error is provided in the brackets.
Source: Solt, 2020 and own computation.

We also illustrate on this graph the country from our donor pool with the smallest MAE: Indonesia, with an MAE of 0.778 compared to Argentina. Although Indonesia better matches our data than our control group or our geographical restriction, the fit remains significantly inferior to that obtained via our synthetic control algorithm. The figure 4 illustrates the fit obtained through the synthetic control method (SCM) and its superior ability to represent the evolution of the Gini coefficient for Argentina, thus highlighting the sound choice of this method.

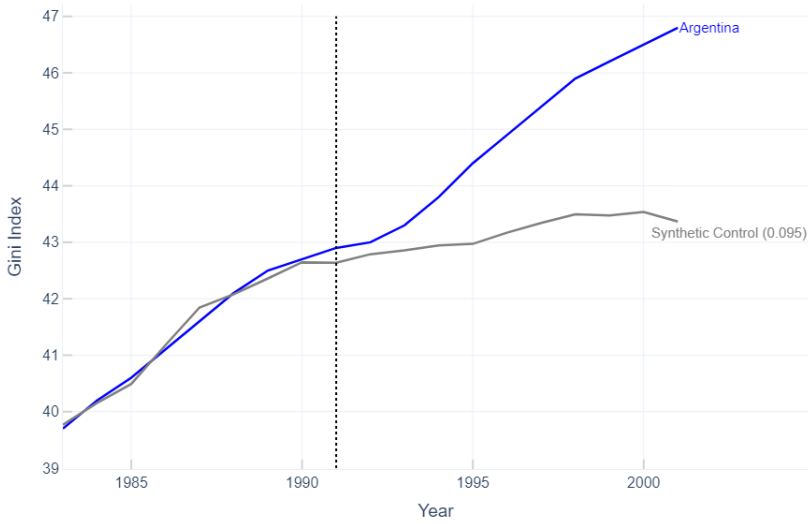

Figure 4: Gini Index in Argentina before and after dollarization. *Note*: The solid line represents the Gini index observed in Argentina, 1983-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991). The mean average error is provided in the brackets.

7.3 Main results

Now that we have established our synthetic Argentina, we can use it as a basis to compare the evolution of the Gini coefficient of the actual Argentina to that of a synthetic Argentina that did not implement a dollarization policy and retained its national currency. We will study the effects of this policy during the post-treatment period from 1992 to 2001, years during which the Currency Board was in place.

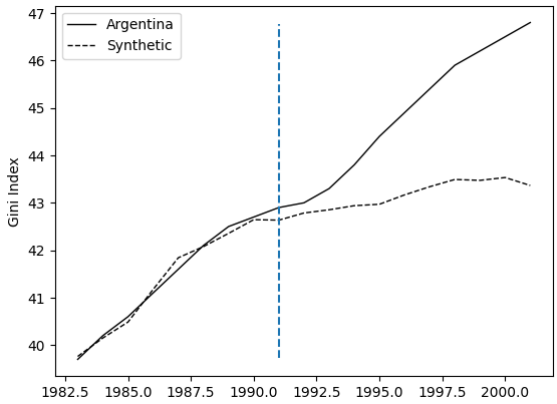

Figure 5: Gini Index in Argentina before and after dollarization. *Note*: The solid line represents the Gini index observed in Argentina, 1983-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991).

Figure 5 illustrates the evolution of the Gini index for both synthetic Argentina and actual Argentina, with the vertical line indicating the year of the intervention. This allow us to validate our synthetic Argentina model, as it accurately replicates the Gini index trend over the period from 1983 to 1991. Moreover, the control variables presented in Table 2 closely match the real variables. In this table, the first column (Actual)

represents the values of each variable during the pre-treatment period, while the column labeled Synth indicates the values of the same variables during the training period for synthetic Argentina. The V-Matrix column, on the other hand, shows the weight assigned to each dependent variable in the construction of synthetic Argentina.

The synthetic Argentina mirrors the continuous upward trend of the Gini index during the treatment period. Figure 6, which presents the gaps (the difference between the treated unit and the synthetic control) over time, reveals that synthetic Argentina begins to deviate from the rising trend of the Gini index starting in 1992, one year after the implementation of the dollarization policy. Subsequently, the two series diverge significantly, with an increasing gap resulting from a notable reduction in the Gini index increase in synthetic Argentina, which is not observed in the case of actual Argentina.

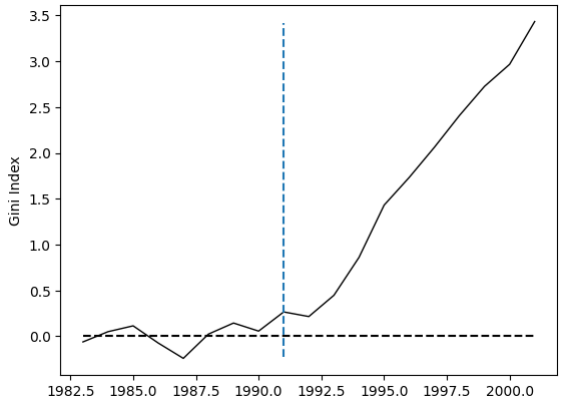

Figure 6: Gap between Argentina and synthetic Argentina. *Note*: The solid line represents the difference between the Gini index observed in Argentina and its synthetic control, 1983-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991).

Variables	Actual	Gini Index	
	(1983-1991)	Synth	V-Matrix*
Gini	41,333	41,333	0,125
Gini 1983	39,7	38,893	0,072
No Schooling Attained in Pop (%)	4,896	7,325	0,119
Ethnic fragmentation	0,103	0,436	0,05
Investment Share at 2005 constant prices	16,925	16,917	0,069
Government Consumption at 2005 constant prices	9,159	8,45	0,119
Mortality rate, infant (per 1,000 live births)	26,675	28,04	0,065
Life expectancy at birth, total (years)	70,382	70,883	0,119
Rural population (% of total population)	14,379	26,105	0,105

* Only V-Matrix weights with an value greater than 0.05 are displayed

Table 2: Inequality indicator's fits & V-matrix. *Note*: The table shows the values of the indicator variables and the average result variable before the Currency Board for Argentina Actual and Synth. Average results are calculated over the period 1983-1991. The column of the V matrix comprises the diagonal entries of the V matrix. They determine the weight of each indicator variable in the weight minimization problem.

In 2001, for the actual Argentina, we observe a positive gap of 3.9 points compared to its Gini level in 1991, which was 42.9 versus 46.8 in 2001, as well as a gap of 3.44 points compared to the synthetic Argentina of 2001, which had a coefficient of 43.36. The synthetic Argentina, on the other hand, only saw its Gini coefficient increase by 0.73 points between 1991 and 2001. It therefore seems that the dollarization policy implemented in Argentina had a significant impact on inequalities, with an increase of 7.93% between the 2001 gini index level for real Argentina and the synthetic Argentina.

7.4 Placebo test

To assert that the observed evolution of the Gini coefficient is attributable to the dollarization policy, we need to obtain an out-of-sample indication in the absence of intervention. This will allow us to determine whether the observed impact is due to the Currency Board, a general loss of predictability after 1991, or a poor synthetic control for Argentina, which would render our results irrelevant. To achieve this, we conduct a placebo test on each of the countries in our control pool using the same characteristics in our synthetic control algorithm as those used to create synthetic Argentina. This way, we will obtain a synthetic control for each of the 27 countries in our control pool.

The placebo will be conducted for the period 1983-1991, and we can then compare the evolution of the Gini coefficient with that of synthetic Argentina post-intervention. Once these placebos are conducted, we will graphically represent the gaps between the placebos and the actual controls, excluding placebos whose predicted mean squared error is 20 times greater than that of our synthetic Argentina, leading us to eliminate 9 countries whose pre-intervention placebo was not satisfactory for drawing conclusions. This graphical representation allows us to make the placebo divergences comparable.

Despite the elimination of 9 countries, we can draw conclusions from the remaining 18 countries and identify potential reasons for significant divergences. The graph below (Fig. 7) shows that all placebos experience a general increase in gaps, but synthetic Argentina experiences one of the largest divergences; only one synthetic country has a greater divergence.

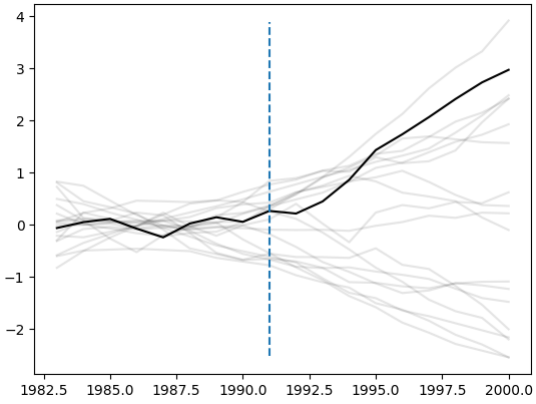

Figure 7: Placebo test. *Note*: The bold line represents the difference between the observed Gini index in Argentina, 1983-2001, and the synthetic control; the synthetic control is normalized to zero. Grey lines represent placebo tests: deviations from synthetic control for other countries in the dataset excluding placebos whose pre-intervention predicted root-mean-square error is 20 times greater than that of the synthetic Argentina.

This is Sri Lanka, a country that experienced a civil war between 1983 and 2009, opposing the government to northern separatists. This war led to the death of 80,000 to 100,000 people according to the UN. With this information, it is clear that Sri Lanka cannot be considered a valid placebo for our synthetic control, as the civil war likely had significant effects on inequality trends. The weight of Sri Lanka in our synthetic Argentina is zero, so it does not invalidate our analysis, having no influence on the construction of our synthetic Argentina.

We can also highlight the two placebos with the largest negative divergences. First, there is Thailand, a country that experienced a military coup in February 1991, the same year as our intervention. This abrupt change in government led to a change and an observed inversion in the Gini coefficient trend due to changes in public policies.

Secondly, there is the Fiji placebo, which also experienced a significant negative divergence. Upon analyzing its Gini coefficient, it appears that it remained identical at 41.4 from 1977 to 1991 before gradually decreasing. This stable coefficient throughout the pre-treatment period led to a poor establishment of our synthetic control, with the algorithm lacking information on the variability of Fiji's Gini coefficient.

We observe a strong effect of dollarization on synthetic Argentina, while none of the other countries in the synthetic control group experienced a significant impact from dollarization or at least not as substantial as in Argentina, without a satisfactory explanation for this difference. None of the countries in the control group experienced an increase in the Gini coefficient comparable to that observed in Argentina, which supports our conclusion that the dollarization policy had a significant impact on inequalities.

7.5 Robustness tests

7.5.1 Augmented synthetic control method

To test the robustness of our results, we will apply a variant of the synthetic control method to examine the sensitivity of the results to the optimization method used. We will use the Augmented Synthetic Control Method developed by Ben-Michael et al., 2021. This method adapts the classical synthetic control method to achieve better pre-treatment fit by using ridge regression, which controls for overfitting by adding a penalty. The Augmented Synthetic Control Method also allows for the assignment of negative weights to control units.

The solidity and relevance of the results obtained via the synthetic control method largely depend on the validity of the pre-treatment fit, which must be as precise as possible. By applying this new method and obtaining a higher-quality pre-treatment fit, we can compare our previous results with the new ones to determine if the conclusions hold.

All parameters other than the optimization method, such as the optimization period, the pool of countries, and the variables used, remain identical to those used previously in the initial synthetic control method. Here, we obtain a MAE of 0.069, compared to 0.095 via the SCM. The main objective of the Augmented Synthetic Control Method, which is to minimize the pre-treatment error, has thus been achieved, compared with that of conventional synthetic control.

Regarding the weights assigned to each country, we obtain slightly different results from those observed previously. In this case, Colombia receives the highest weight with 40.9%, rather than Chile, which nonetheless has a weight of 28.2%. Following are the United Kingdom and Sweden, with weights of 13.8% and 17%, respectively. Finally, Costa Rica and Peru have weights of 0.2% and 0.5%. The other countries in our control group are assigned weights less than a tenth of a percent, either positively or negatively (Table 6).

Graphically (Fig. 8)., the major difference manifests at the point of divergence (Fig. 24), which occurs not in 1992 but two years later, in 1994. This can be explained by a latency between the implementation of political measures and their impact on inequality figures. In this case, our synthetic Argentina reaches a higher Gini level than that observed via the classical synthetic control method. Although the impact of dollarization is less pronounced in this case, the conclusion remains the same with an increase in inequalities following this measure.

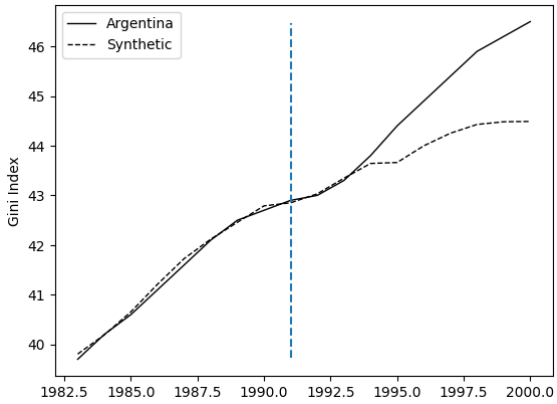

Figure 8: Gini Index in Argentina before and after dollarization via the Augmented Synthetic Control Method. *Note*: The solid line represents the Gini index observed in Argentina, 1983-2001; the dotted line represents synthetic control obtained using the Augmented Synthetic Control Method. The vertical dotted line indicates the year in which the Currency Board was established (1991).

We also conduct the same placebo test as previously (Fig. 9). In this case, we obtain a placebo for 20 countries whose pre-treatment mean squared error is less than ten times the mean squared error observed for Argentina. The error threshold has been reduced here to account for the reduction in pre-treatment error offered by the Augmented Synthetic Control Method compared to the classical synthetic control method. Graphically, we also observe that the synthetic Argentina shows the greatest positive divergence in inflation, omitting, as before, Sri Lanka for the same previously mentioned reasons.

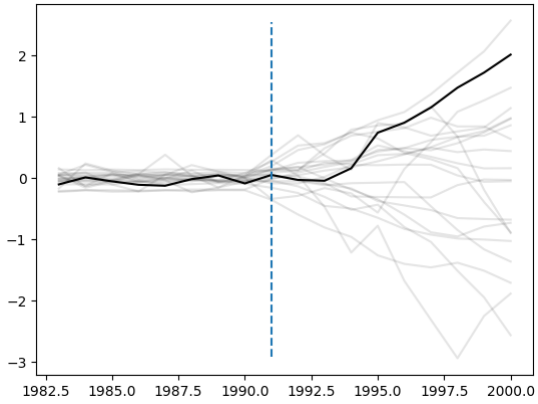

Figure 9: Augmented Synthetic Placebo test. *Note*: The bold line represents the difference between the observed Gini index in Argentina, 1983-2001, and the synthetic control obtained using the Augmented Synthetic control method; the synthetic control is normalized to zero. Grey lines represent placebo tests: deviations from synthetic control for other countries in the dataset excluding placebos whose pre-intervention predicted root-mean-square error is 10 times greater than that of the synthetic Argentina.

This new analysis thus supports our hypothesis on the impact of the dollarization policy. The use of the Augmented Synthetic Control Method proves relevant as an additional analysis, and we will use it as a complement to other robustness tests to be presented.

7.5.2 Dollarization intervention

To strengthen the relevance of our results, we will hypothesize that the currency board was implemented in 1988 instead of 1991. We will keep the same indicator variables and the same pool of countries, changing only the optimization period, now set to 1983-1988. This will create a new synthetic Argentina whose results we can compare with those obtained previously. This test allows us to verify the integrity of our results and determine if they are due to randomness or the inefficacy of our model in predicting Argentina's out-of-sample results.

Our new synthetic Argentina presents a lower MAE, 0.0837 compared to 0.095 previously. However, the composition of the control group is relatively modified, with a significant decrease in the weight of Chile and the emergence of other countries such as Peru, Venezuela, and the United Kingdom in significant proportions. Peru and the United Kingdom were already present in our synthetic Argentina created via the Augmented Synthetic Control Method, but not Venezuela (Table 7).

Graphically (Fig. 10), we observe a loss of precision in our ability to track the real Argentina, with a divergence starting as early as 1988. However, this divergence only significantly amplifies starting in 1992 (Fig. 25), similar to when the intervention period was set in 1991. This loss of precision can be attributed to the shorter pre-treatment period, now only six years, and thus a lack of information provided to our optimization algorithm.

Applying the same process using the Augmented Synthetic Control Method , we obtain results closer to those previously obtained with this method, with a MAE of 0.108 compared to 0.069. This difference is due to a slight constant lag between the real Argentina and the synthetic Argentina. The composition of the synthetic control remains relatively similar, though with a reduced weight for Chile and the United Kingdom in favor of Japan. Here, we observe very little loss in post-intervention predictability compared to our previously obtained results. The same conclusions support our earlier findings, indicating that the dollarization policy increased income inequality in Argentina.

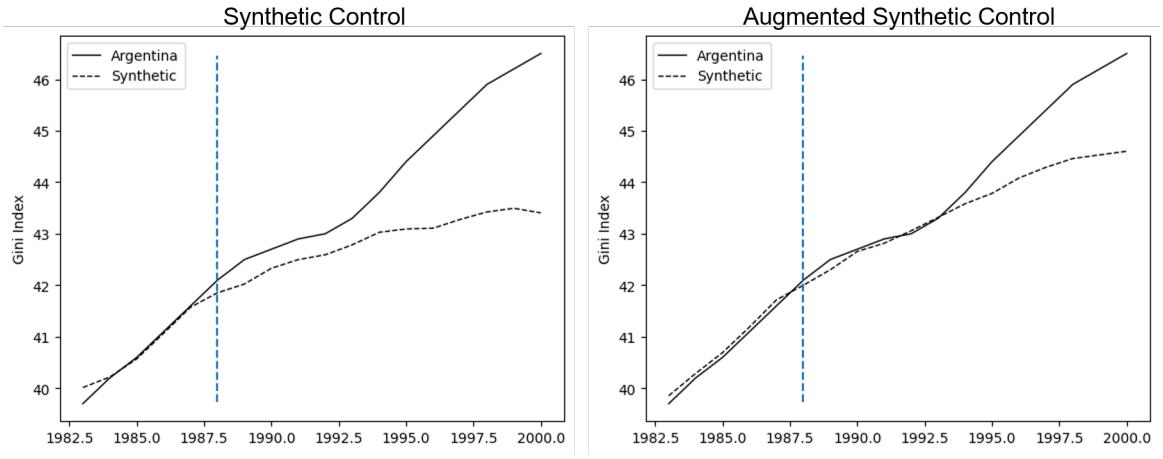

Figure 10: Gini Index in Argentina before and after dollarization after intervention test. *Note*: In both graphs, the solid line represents the observed Gini index in Argentina from 1983 to 2001, while the dashed line represents the synthetic control. The vertical dashed line marks the newly defined intervention year (1988). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

7.5.3 Pre-treatment period

During our analyses, we used a pre-intervention period spanning from 1983 to 1991, starting this period based on the launch of the third Argentine peso, which was in use from May 5, 1983, to June 15, 1985. This choice was made to maximize the pre-intervention period necessary for the proper functioning of our

algorithm. In the following test, we will restrict this pre-intervention period to 1985-1991 to correspond to the period of the last national currency in use before dollarization, considering the period of the austral, which replaced the peso at a rate of 1000 to 1.

Only the pre-intervention period is modified here, all other parameters remaining identical to our initial optimisation. The MAE obtained here is 0.088, which gives a better fit to the pre-intervention data than our initial model, which had an MAE of 0.095, though the difference is relatively small. Regarding the weights assigned (Table 8), Chile loses importance to Costa Rica and the United Kingdom, while Sweden no longer receives any weight. This phenomenon seems to recur in various robustness tests and will be examined in more detail in our analysis with the exclusion of various countries from our control group. Graphically (Fig. 11 and 26), we obtain results similar to those observed when the pre-intervention period was set starting from 1983.

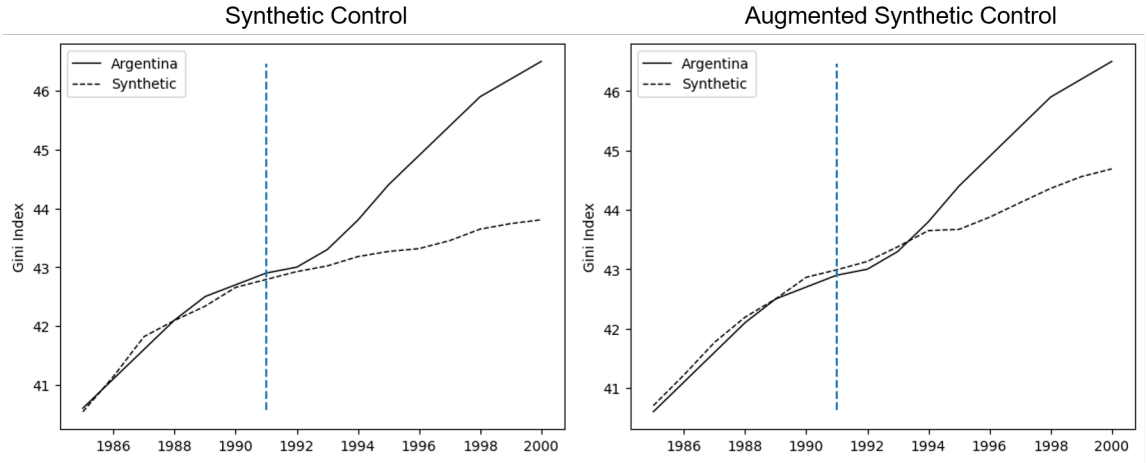

Figure 11: Gini Index in Argentina before and after dollarization after Pre-treatment test. *Note*: The solid line represents the Gini index observed in Argentina, 1985-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

With the Augmented Synthetic Control Method, the results are also similar, with an MAE of 0.108, comparable to that obtained when the intervention period was changed to 1988. We also observe the appearance of weights assigned to South Africa and a significant increase in the weight assigned to Costa Rica. Graphically, the results are similar to those observed previously, with an increase in inequalities post-intervention period.

These tests provide strong arguments in favor of our choice to set the pre-intervention period in 1983 rather than 1985, in order to maximize the number of available data points without altering the results obtained or the conclusions drawn from them, and without unreasonably increasing the pre-treatment MAE.

7.5.4 Alternative Donor Pool

As an additional test, we will create three new synthetic Argentinas by excluding Chile, Colombia, and the United Kingdom from our donor pool, resulting in donor pools consisting of 26 countries. The objective is to determine whether our model is overly dependent on the weights assigned to these countries. These countries were chosen because they received the most weight in our previous analyses and tests.

First, when we remove Chile from our donor pool, we obtain a Mean Absolute Error (MAE) of 0.2675 for the classical synthetic control method and 0.0678 for the Augmented Synthetic Control. This indicates that the pre-treatment fit is of lower quality for the classical method and equivalent for the Augmented Synthetic Control compared to the fit obtained when our model included Chile. This loss of precision for

the pre-treatment fit is not surprising given that Chile represents the largest weight in our main model. By removing it, we eliminate important information for the precision of our algorithm. The weight attributed to Chile is primarily redistributed between Colombia and the United Kingdom (Table 9 and 10), prompting us to verify the importance of these countries as well.

Graphically (Fig. 12 and 27), for the classical method, considering the lower quality of the pre-treatment fit, we obtain results similar to those obtained when including Chile. With the Augmented Synthetic Control Method, we first observe a negative divergence before seeing the same positive divergence in 1994 as that observed before Chile was removed from our control pool. Despite a loss of precision for the classical method and an initial effect of dollarization that would have reduced the increase in inequalities until 1994 for the Augmented Synthetic Control, the final consequences remain the same, with an increase in inequalities due to the currency board policy.

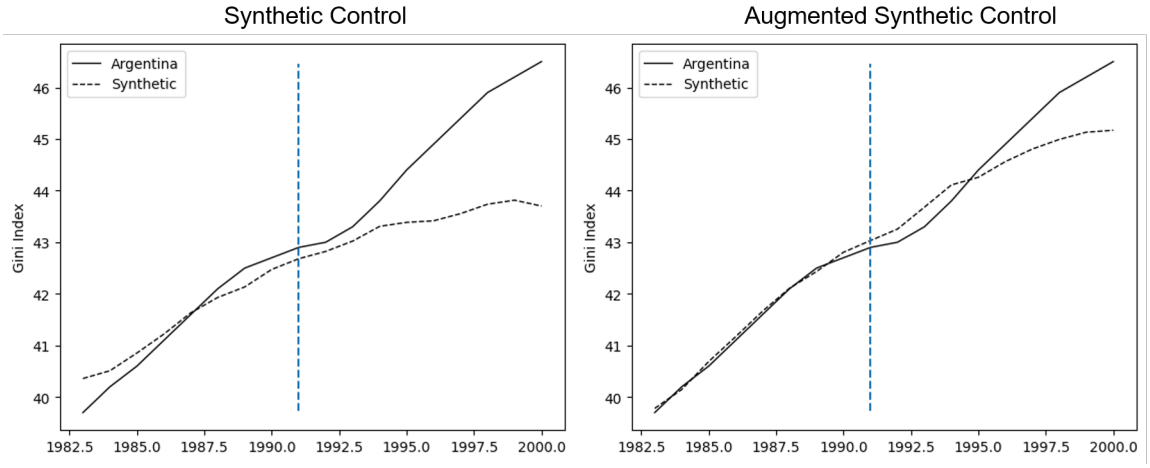

Figure 12: Gini Index in Argentina before and after dollarization, after removing Chili from the donor pool. *Note*: The solid line represents the Gini index observed in Argentina, 1983-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Second, when we remove Colombia from our donor pool, we observe a loss of precision in our pre-treatment fit for the classical synthetic method, with an MAE of 0.1777, double that of our base model, even though Colombia initially received no weight. This loss of precision can be attributed to a different starting point in our model optimization, indicating that Colombia plays an indirect role in the robustness of our results. This is even more pronounced in the results obtained via the Augmented Synthetic Control. Although the pre-treatment MAE is better, with a score of 0.0484, the model was not able to identify the countries with the most influence and assigned weight to all countries (Table 9 and 10), both positively and negatively, to achieve the best pre-treatment MAE. Graphically (Fig. 13 and 28), the conclusion remains the same, although for the Augmented Synthetic Control, the divergence only appears from 1994.

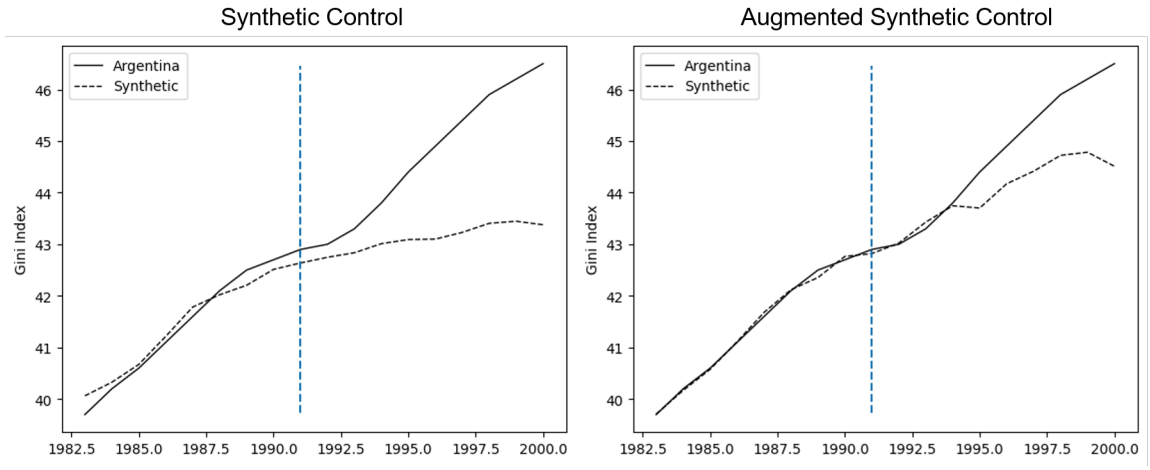

Figure 13: Gini Index in Argentina before and after dollarization, after removing Colombia from the donor pool. *Note*: The solid line represents the Gini index observed in Argentina, 1983-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Finally, when we remove the United Kingdom from our donor pool, we obtain results similar to those observed when removing Colombia (Fig. 14 and 29), with an indirect influence of the United Kingdom on our synthetic control and a loss of necessary information for our model to effectively determine the countries contributing the most to our synthetic Argentina (Table 9 and 10), although this time the fit pre treatment is of better quality with a MAE of 0.1042.

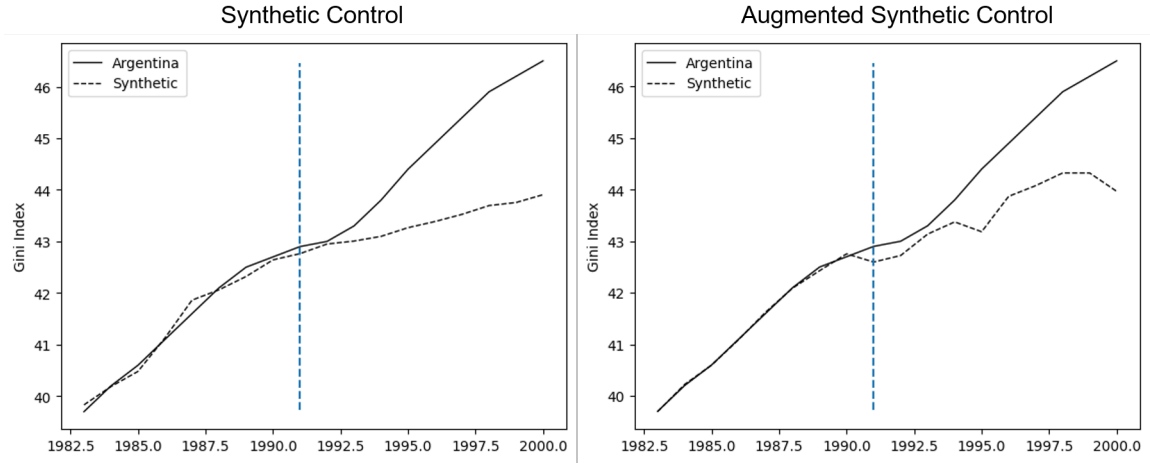

Figure 14: Gini Index in Argentina before and after dollarization, after removing the United Kingdom from the donor pool. *Note*: The solid line represents the Gini index observed in Argentina, 1983-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

The presence of Chile, Colombia, and the United Kingdom is therefore necessary for optimal optimization, providing useful information to our model. However, their presence is not indispensable, as despite the

alternative removal of these three countries, the conclusions remain the same with an increase in inequalities in Argentina due to the dollarization policy.

7.5.5 Normalisation

We will adopt an alternative measure of the Gini index by normalizing it to enhance the optimization of our algorithm. This approach allows the algorithm to avoid the challenge of balancing a country with a lower Gini coefficient than Argentina with one that has a higher Gini coefficient. This method is particularly effective when the number of donors is limited, as it alleviates the challenge for our algorithm in matching the initial scale of the Gini coefficient. It has proven effective in the work of Grier and Maynard (2016) in eliminating the misalignment of their country weights, which led to assigning a high weight to a country that did not correspond to their target countries. Consequently, this approach helps prevent our study from assigning a high weight to a country whose Gini coefficient diverges significantly from that of Argentina. To do this, we will divide each year's Gini index by the Gini index of 1983. All other parameters remain fixed, except that we will remove the 1983 Gini index from our indicator variables. Since all countries have a Gini index set to 1 for the year 1983, this indicator variable loses its significance. The results we obtain are consistent with what was observed previously, whether using the classical synthetic method or the Augmented Synthetic Control (Fig. 15, 30 and table 11).

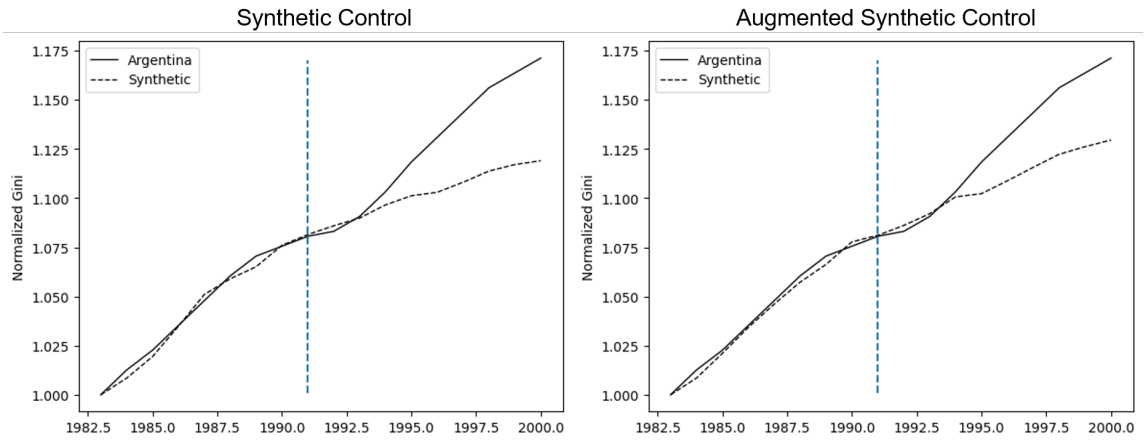

Figure 15: Gini Index in Argentina before and after dollarization after normalisation. *Note*: The solid line represents the normalized Gini index observed in Argentina, 1983-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

This new test becomes particularly interesting when applied to our previous test where we deliberately removed Chile, Colombia, or the United Kingdom from our donor pool. The tests conducted without Chile and Colombia had shown unsatisfactory pre-treatment fits, making the interpretation of results more difficult and less relevant.

If we perform the same test using the normalized Gini index, we obtain a satisfactory pre-treatment fit and results consistent with what we have observed throughout our tests (Fig. 16 and 17). The normalization of the data thus allowed us to strengthen our overall conclusion by resizing the data on a common scale. It also enhanced our previous test by improving the results obtained.

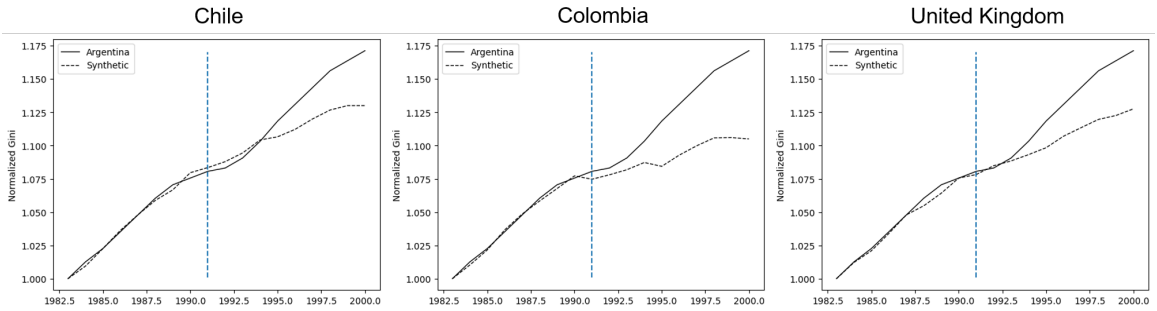

Figure 16: Gini index in Argentina before and after dollarization, after alternately removing Chile, Colombia and the United Kingdom from the donor group. *Note*: The solid line represents the normalized Gini index observed in Argentina, 1983-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991). The left graph represents Chile's withdrawal from the donor pool, the center graph represents Colombia's withdrawal from the donor pool, and the right graph represents the United Kingdom's withdrawal from the donor pool. All three graphs were generated using the Synthetic Control Method.

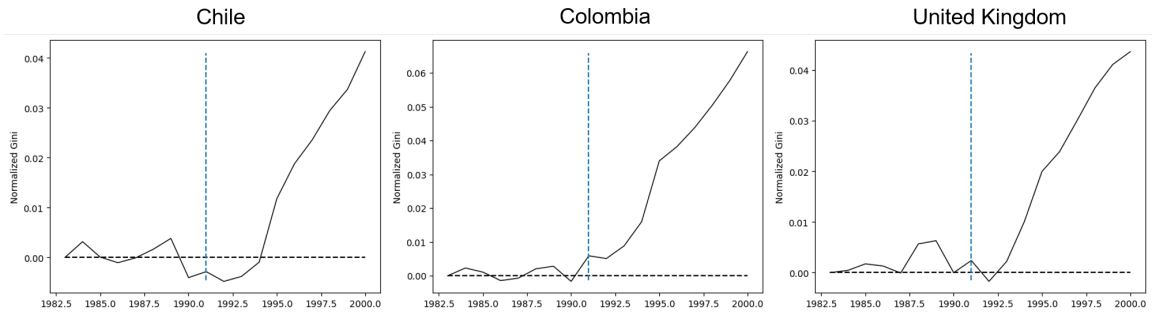

Figure 17: Gap between Argentina and synthetic Argentina after alternately removing Chile, Colombia and the United Kingdom from the donor group. *Note*: The solid line represents the difference between the Gini index observed in Argentina and its synthetic control, 1983-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991). The left graph represents Chile's withdrawal from the donor pool, the center graph represents Colombia's withdrawal from the donor pool, and the right graph represents the United Kingdom's withdrawal from the donor pool. All three graphs were generated using the Synthetic Control Method.

8 Discussion

All our tests consistently indicate that the Currency Board policy implemented in Argentina in 1991 increased income inequality in the country with a 20.3% rise in the Gini index between 1981 and 2001. Our analysis indicates a 3.44 point gap between actual Argentina and synthetic Argentina in terms of income inequality levels in 2001. However, this must be contextualized. In 2001, Argentina still had the third-lowest Gini index in South America, behind Uruguay and Venezuela. Its index remained lower than that of its largest neighbor and trading partner, Brazil.

Moreover, the rise in inequality in Argentina was already a marked trend in the 1980s. The failure of the dollarization policy regarding income inequality lies not so much in a significant increase in inequality but in its inability to stabilize this rise, contrary to the trend observed in other South American countries.

While the Gini index offers a simple interpretation and great comparability between different countries, making it ideal for applying the synthetic control method, it does not reveal the underlying structure of income in Argentina and its evolution over the years. We can only deduce that incomes were more unevenly

distributed after the dollarization policy than before, without identifying the real winners and losers of this policy.

It would have been interesting to use other indicators of inequality, such as the income distribution within population deciles, or to study other inequality-based indices like the Atkinson index, which better captures income structure. Unfortunately, the lack of reliable data and datasets prevents us from conducting this analysis.

Thus, we cannot gain additional insights into the distribution of income in Argentina through the use of additional inequality measures. However, to better understand the phenomenon, we could explore the transmission channels between the dollarization policy and its impact on Argentine society, resulting in increased inequality. This additional analysis could provide new avenues for understanding the real losers of this Currency Board.

8.1 Unemployment

Frenkel and Ros, 2004 highlighted the roles of the Currency Board in the increase of the unemployment rate in Argentina as well as in the economic situation that led to the abandonment of the Currency Board in 2001. The rise in the overall unemployment rate in Argentina was largely due to job losses in the manufacturing sector, where unemployment increased by nearly 30%. This was a consequence of the real appreciation of the peso following the implementation of the Currency Board, which had devastating effects on the competitiveness of the goods sector. Between 1970 and 1990, Argentina experienced an unemployment rate fluctuating between 2% and 7%, which then surged from 5.4% to 18.8% within four years from 1991 to 1995. During the dollarization period from 1992 to 2001, the average unemployment rate was 13.797% with a variance of 12.54, compared to an average rate of 5.268% with a variance of 1.4 for the period 1983-1991 (Fig. 18). This indicates a significant increase in both the unemployment rate and its variability after dollarization in Argentina.

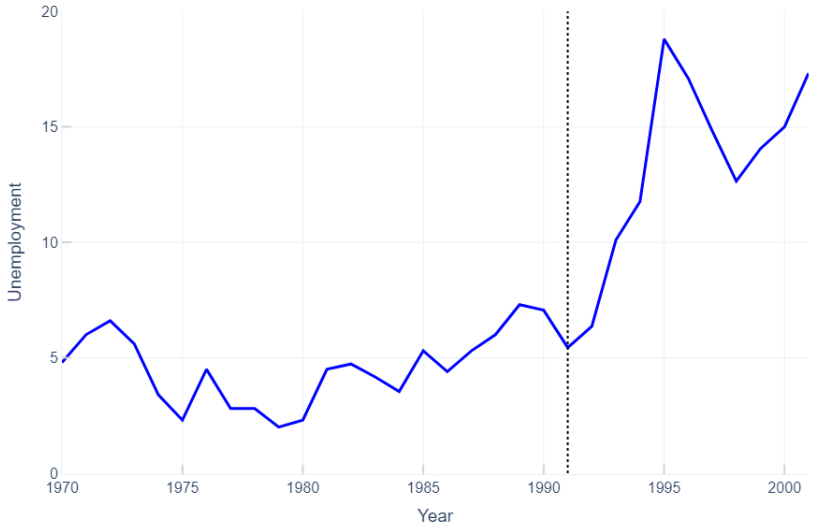

Figure 18: Change in the Unemployment rate in Argentina between 1970 and 2001. *Note*: The blue line represents the unemployment rate in Argentina expressed as a percentage, 1970-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991).
Source: World Development Indicator: SL.UEM.TOTL

To support our findings, we will apply the same synthetic control method used for the Gini coefficient. Some adjustments will be made to the previous model: changes in the predictor variables to better represent

the evolution of unemployment (Table 5), and a reduction in the pre-treatment period to 1984-1991 due to data limitations, which necessitates a trade-off between the number of countries in our control pool and the length of the pre-treatment period. Consequently, our control pool will include only 18 countries (Table 12), excluding, for example, Costa Rica among the countries which received the most weight in previous models, due to lack of data.

Despite these restrictions, our model yields a Mean Absolute Error (MAE) of 0.4083 and a satisfactory pre-treatment graphical fit. The countries receiving the most weight are Japan, Egypt, and Trinidad and Tobago countries not previously highlighted in our Gini index model (Table 12). This discrepancy is not alarming, as the goal is not to create a synthetic Argentina identical in every aspect to the real Argentina, but rather to align closely with our variable of interest. Graphically (Fig. 19 and 31), a significant divergence appears in 1993 between our synthetic and real Argentina, reaching over 10 points by 1995.

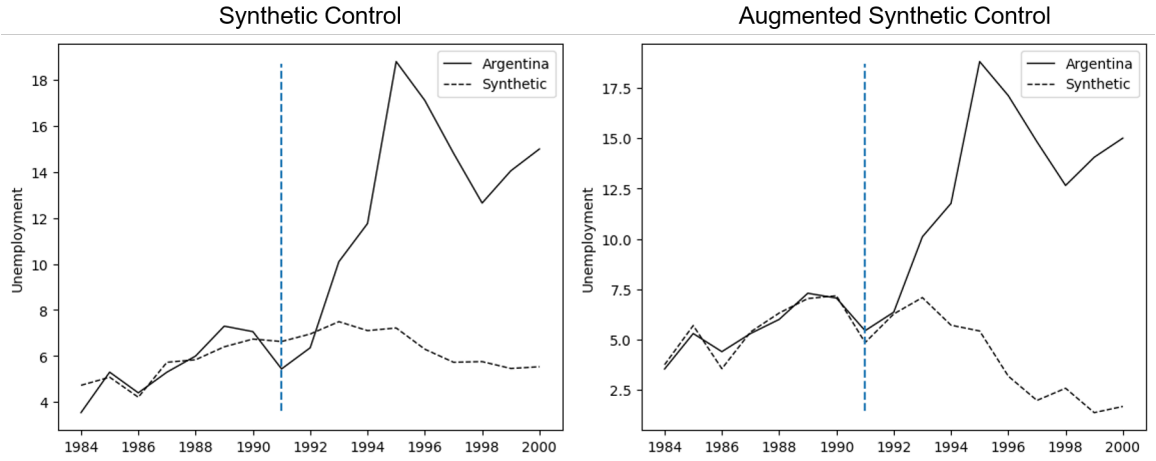

Figure 19: Unemployment rate in Argentina before and after dollarization. *Note*: The solid line represents the observed unemployment rate in Argentina expressed as a percentage, 1984-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Placebo tests (Fig. 20) across our control pool support our hypothesis regarding the impact of dollarization on Argentina's unemployment rate. Among all placebo tests, Argentina shows the largest positive divergence between synthetic and real unemployment rates.

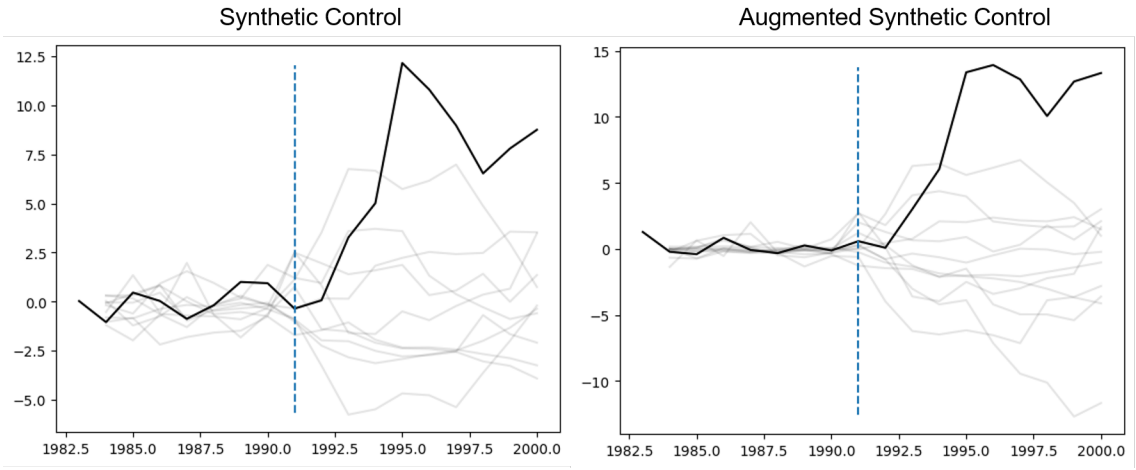

Figure 20: Unemployment placebo test. *Note*: The bold line represents the difference between the observed unemployment rate in Argentina, 1984-2001, and the synthetic control; the synthetic control is normalized to zero. Grey lines represent placebo tests: deviations from synthetic control for other countries in the dataset excluding placebos whose pre-intervention predicted root-mean-square error is 5 times greater than that of the synthetic Argentina. The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

We performed the same optimization using the Augmented Synthetic Control Method, obtaining similar results (Fig. 19, 31 and 20).

Thus, we can assert with reasonable certainty that the Currency Board led to an increase in the unemployment rate in Argentina between 1991 and 2001. This rise in unemployment subsequently contributed to increased income inequality in Argentina. This transmission channel also explains the latency between the intervention period in 1991 and the observed divergence in our inequality data. Income was not directly impacted post-dollarization but was affected subsequently due to job losses among a portion of the population. González-Rozada and Menendez, 2006's work also highlights this transmission channel, suggesting that during the period 1991-2001, the increase in the unemployment rate contributed to over 75% of the rise in the Gini coefficient.

8.2 External Balance

The Currency Board policy led to a rapid increase in the unemployment rate in Argentina. Given that dollarization, as a policy, does not directly impact unemployment, a thorough analysis is required to understand how it transformed the Argentine economy and caused a contraction in labor demand.

The work of Aschinger, 2002 on the Argentine crisis and its causes provides insights into the origins of this rapid unemployment increase. The reduction in inflation brought about by dollarization and the revaluation of the dollar relative to most currencies resulted in an overvaluation of the Argentine peso, decreasing its competitiveness in the international market.

Examining Argentina's external balance (Fig. 21) between 1983 and 1991 reveals an average surplus of 3.43, indicating that the country exported more than it imported, benefiting from the competitiveness provided by a weak national currency. However, after the implementation of the Currency Board, Argentina lost this competitive advantage and experienced a decline in its external balance. The average from 1992 to 2001 was -1.388, indicating that Argentina imported more goods than it exported. This deficit led the country to accumulate foreign debt, one of the factors contributing to the collapse of the dollarization policy. This phenomenon was exacerbated starting in 1998 when the Brazilian real experienced a 50% devaluation against the dollar in response to the neighboring country's financial crisis, further diminishing the competitiveness of Argentine products on the international market.

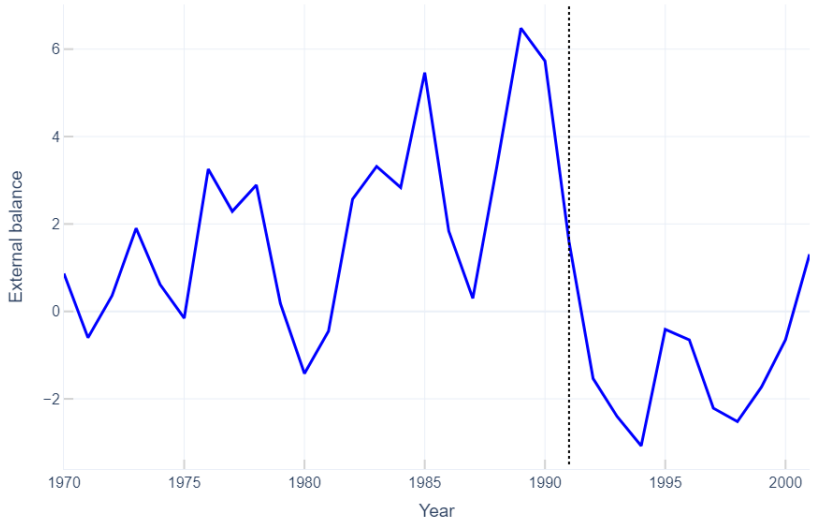

Figure 21: Change in the External balance in Argentina between 1970 and 2001. *Note*: The blue line represents the External balance on goods and services in Argentina expressed as a percentage of the GDP, 1970-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991).
Source: World Development Indicator: NE.RSB.GNFS.ZS

To substantiate our claim and more confidently assert that the decline in Argentina's external balance was due to the Currency Board policy, we will once again use the synthetic control method. We will reuse many parameters from our previous models, adding variables such as the percentage of imports and exports relative to GDP, as well as the percentage of GDP represented by the external balance, with a primary focus on the latter variable (Table 5). The pre-treatment period will be set to 1983-1991. Our control group will comprise 23 countries (Table 13), excluding Malawi, Tanzania, Trinidad and Tobago, and Zambia due to data unavailability.

For our optimization, we achieve a Mean Absolute Error (MAE) of 1.33, a relatively high score due to the algorithm's difficulty in closely matching our real data, primarily because of the large variance. However, the synthetic Argentina follows a similar trend with comparable amplitude to the real Argentina (Fig. 22). After 1991, we observe a negative divergence of 2 to 4 points in the synthetic Argentina's external balance (Fig. 32), which decreases but never falls below -1. The most significant weights are attributed to Colombia, Japan, and Venezuela (Table 13), countries that also received significant weights in our previous analysis on Gini coefficients.

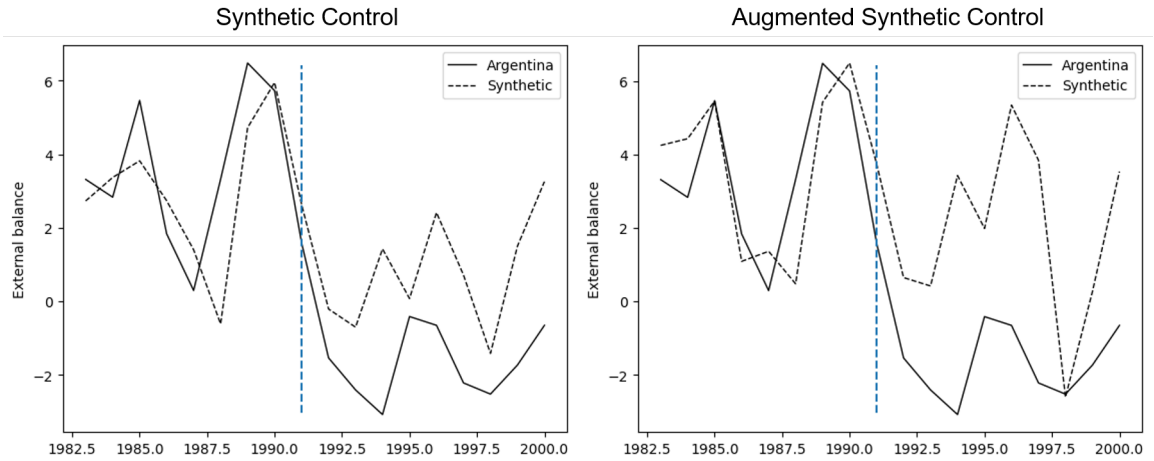

Figure 22: External balance in Argentina before and after dollarization. *Note*: The solid line represents the observed External balance on goods and services in Argentina expressed as a percentage of the GDP, 1983-2001; the dotted line represents synthetic control. The vertical dotted line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Analyses conducted with the Augmented Synthetic Control Method show similar results, though this time the external balance never goes negative before 1991. Starting in 1998, it begins to follow a negative trend, influenced by the 1997-1998 Asian financial crisis, which impacted many countries in our control group.

In light of these analyses, we can support the argument that dollarization impacted Argentina's external balance by reducing its competitiveness, transforming the country from a net exporter to one that imports more than it exports. Dollarization led to an overvaluation of the Argentine peso, causing a loss of competitiveness on the international stage and resulting in increased unemployment. Analyzing the value added to GDP in different economic sectors such as industry, agriculture, and services provides further insight into the rise in unemployment and income inequality in Argentina.

Graphically (Fig. 23), the value added to GDP by the services sector showed a significant increase of over 10% from 1990 to 2001, before returning to pre-1990 levels. In contrast, the industrial sector experienced a general downward trend in value added, with a more pronounced decrease between 1991 and 2001. A similar pattern is observed in the agricultural sector, with a 4 point drop between 1990 and 1992, followed by an increase of more than 6 points by 2001.

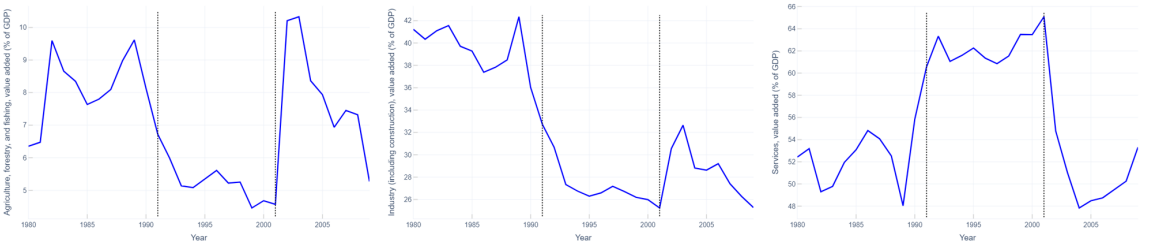

Figure 23: Value added to GDP by sector in Argentina. *Note*: The blue line represents the value added by sector in Argentina expressed as a percentage of the GDP, 1980-2010. The dotted vertical line indicates the Currency Board period, 1991-2001. The left graph represents the agriculture, forestry, and fishing sector, the center graph represents the industry sector (including construction), and the right graph represents the services sector.
Sources: World Development Indicator: NV.AGR.TOTL.ZS, NV.IND.TOTL.ZS, NV.SRV.TOTL.ZS

These observations allow us to hypothesize that the rise in unemployment is due to the loss of competitiveness in the agricultural and industrial sectors, while the services sector was less affected by this loss of competitiveness. Results obtained by Frenkel and González Rozada (2001) also indicate that the contraction in employment is primarily due to a reduction in jobs in the manufacturing and industrial sectors, while employment levels in the services sector increased.

These elements reinforce the argument that the policy of dollarization had significant repercussions on the Argentine economy, particularly in the distribution of employment and income across different economic sectors.

9 Conclusion

Using the synthetic control method, we examined the impact of the Currency Board policy on income inequality in Argentina by estimating how these inequalities would have evolved if the quasi-dollarization policy had not been implemented in 1991. Our estimates provide new evidence of the detrimental effect of the Currency Board on income inequality. Indeed, although income inequality would have slightly increased without the implementation of the Currency Board, this policy led to a significant rise in inequality, as measured by the Gini coefficient. Furthermore, our analysis shows that the Currency Board resulted in a worsening unemployment rate and a deterioration of Argentina's external balance compared to a synthetic Argentina that was not affected by dollarization. These findings help us explain the channel through which dollarization impacted Argentina, leading to increased inequality. Firstly, a loss of competitiveness, observed through the external balance, caused a rise in unemployment in the agricultural and industrial sectors, which, in turn, led to increased income inequality. These analyses proved robust across various tests we conducted, including placebo tests, adjustments to different parameters, and the application of the Augmented Synthetic Control Method to reinforce our findings.

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11 Appendix

	Donor pool				Argentina				
Variable	Mean	St.Dev	Min	Max	Mean	St.Dev	Min	Max	Source
Gini	41,994	8,712	21,5	61,4	43,347	2,189	39,7	46,8	
Gini 1983	41,144	9,295	21,5	59,5	39,7	-	-	-	
No Schooling Attained in Pop (%)	21,482	20,611	0,07	80,13	4,315	0,691	3,48	4,96	Barro Lee
Avg. Years of Total Schooling	6,605	2,47	1,75	11,38	8,397	0,396	7,85	8,73	
Avg. Years of Primary Schooling	4,372	1,433	1,23	7,03	6,107	0,207	5,86	6,32	
Avg. Years of Secondary Schooling	1,961	1,104	0,17	4,88	1,985	0,213	1,69	2,17	
Avg. Years of Tertiary Schooling	0,272	0,226	0,01	0,94	0,305	0,057	0,24	0,38	
Democracy index	3,218	6,46	-9	10	7,473	0,513	7	8	Polity V
Ethnic fragmentation	0,521	0,267	0,01	0,861	0,113	0,01	0,097	0,131	Drazanova
Openness at 2005 constant prices	56,494	34,864	13,811	199,86	28,995	10,028	17,307	43,646	
Investment Share at 2005 constant prices	21,708	9,078	-33,14	52,159	19,067	2,922	13,047	23,923	Penn World Table v7.1
Government Consumption at 2005 constant prices	8,475	4,19	2,729	25,747	7,069	2,075	4,919	11,138	
Broad money (% of GDP)	48,102	37,026	9,297	229,204	21,647	5,965	10,556	31,848	
Trade (% of gdp)	56,115	31,818	14,1448	220,408	18,016	3,565	12,346	23,35	
Inflation, GDP deflator (annual %)	36,789	301,762	-8,717	6261,239	392,582	807,618	-3,561	3046,091	
GDP (current US$)	2,42188E+11	7,47597E+11	490181456	5,54556E+12	1,96955E+11	81807394989	76629657863	2,98948E+11	
GDP (current US$) 1985	1,14519E+11	2,86117E+11	856890498	1,42702E+12	88416666666	-	-	-	
GDP per capita (current US$)	5293,122	9287,294	127,554	44197,619	5744,177	2060,979	2382,336	8250,673	
Labor force participation rate, female (% of female population ages 15+)	44,977	16,209	7,94	86,21	37,605	7,12	27,85	46,8	
Unemployment, total (% of total labor force)	7,395	4,976	0,481	29,88	9,814	5,125	3,54	18,8	
Unemployment, total (% of total labor force) 1985	6,671	4,421	2,02	13,89	5,3	-	-	-	
Mortality rate, infant (per 1,000 live births)	47,603	40,51	3,1	162,8	23,226	3,859	16,8	29,9	World Development Indicators
Life expectancy at birth, total (years)	65,596	9,976	42,071	81,416	72,02	1,625	69,195	74,186	
Population growth (annual %)	1,862	1,039	-1,765	5,785	1,364	0,155	1,099	1,558	
Population, total	44057928	46567847	693593	217112437	33512334	2558220	29377137	37480493	
Rural population (% of total population)	50,034	22,802	12,15	90,296	12,798	1,591	10,671	15,806	
Domestic credit to private sector (% of GDP)	41,786	45,729	0,001	217,76	21,41	5,865	12,587	39,717	
Current account balance (% of GDP)	-2,311	5,522	-21,016	28,712	-2,344	1,831	-4,844	3,22	
External balance on goods and services (% of GDP)	-1,322	6,789	-29,724	25,051	0,894	2,981	-3,074	6,479	
External balance on goods and services (% of GDP) 1985	-0,304	5,941	-12,038	7,857	5,46	-	-	-	
Imports of goods and services (% of GDP)	28,718	15,511	6,809	100,597	8,561	2,748	4,631	12,934	
Exports of goods and services (% of GDP)	27,396	16,989	3,396	121,311	9,455	1,801	6,598	13,058	

Table 3: Indicator sources and summary statistics. *Note*: The table provides a statistical summary of all the variables used in the study. These variables are analyzed over the period from 1983 to 2001, except where a specific year is indicated in the ”Variable” column. The ”Donor Pool” section presents the average statistics for the entire donor pool, while the ”Argentina” section includes statistics exclusively for Argentina. In each section, the first column represents the mean, the second the standard deviation, the third the minimum, and the fourth the maximum. Horizontal bars (-) indicate statistics that are not relevant. The sources for each variable are listed in the ”Source” column.

Country	Weight
Bangladesh	0,053
Chile	0,637
Costa Rica	0,019
Japan	0,15
Sweden	0,121
Zambia	0,02
Mean Average Error	0,0955

Table 4: Synthetic control weights. *Note*: The table contains the weight assigned to each country to create the synthetic control, with only those non-zero weight countries indicated. The mean average error for the pre-treatment period is also included.

Variable	Actual	Gini Index		Actual	Unemployment		Actual	External Balance	
	1983-1991	Synth	V-Matrix	1984-1991	Synth	V-Matrix	1983-1991	Synth	V-Matrix
Gini	41,333	41,333	0,125	41,75	30,848	0	41,333	37,38	0
Gini 1983	39,7	38,893	0,072	-	-	-	-	-	-
No Schooling Attained in Pop (%)	4,896	7,46	0,119	4,89	9,39	0,147	4,896	9,05	0,166
Democracy index	7,75	1,227	0,003	7,714	7,186	0,013	7,75	8,941	0,009
Ethnic fragmentation	0,103	0,35	0,05	0,104	0,166	0,127	0,103	0,328	0,078
Openness at 2005 constant prices	19,11	37,016	0,032	-	-	-	-	-	-
Investment Share at 2005 constant prices	16,925	18,191	0,125	-	-	-	-	-	-
Government Consumption at 2005 constant prices	9,159	8,371	0,069	9,13	9,085	0,135	-	-	-
Broad money (% of GDP)	-	-	-	-	-	-	19,834	91,474	0,002
Trade (% of gdp)	-	-	-	-	-	-	15,706	29,853	0,159
Inflation, GDP deflator (annual %)	-	-	-	140,502	33,838	0	118,146	33,027	0
GDP (current US$)	-	-	-	-	-	-	1,08881E+11	1,01478E+12	0,002
GDP (current US$) 1985	-	-	-	-	-	-	88416670000	6,47819E+11	0,008
GDP per capita (current US$)	4325,004	7461,451	0,03	4325,004	1496,889	0,006	4325,004	10192,37	0,052
Unemployment, total (% of total labor force)	-	-	-	5,557	5,498	0,167	-	-	-
Unemployment, total (% of total labor force) 1985	-	-	-	5,3	4,527	0,03	-	-	-
Mortality rate, infant (per 1,000 live births)	26,675	21,732	0,065	26,214	23,948	0,109	26,675	22,988	0,083
Life expectancy at birth, total (years)	70,382	72,041	0,119	70,541	72,417	0,077	70,38	7,263	0,019
Population growth (annual %)	1,51	1,327	0,041	1,504	0,98	0,002	-	-	-
Population, total	30991430	32788520	0,045	31225470	31520750	0,187	-	-	-
Rural population (% of total population)	14,379	2,2988	0,105	-	-	-	14,379	2,439	0,16
Domestic credit to private sector (% of GDP)	-	-	-	-	-	-			0,008
External balance on goods and services (% of GDP)	-	-	-	-	-	-	3,659	3,015	0,156
External balance on goods and services (% of GDP) 1985	-	-	-	-	-	-	5,463	3,821	0,057
Imports of goods and services (% of GDP)	-	-	-	-	-	-	6,024	13,419	0,001
Exports of goods and services (% of GDP)	-	-	-	-	-	-	9,683	16,434	0,05

Table 5: Indicator's fits & V-matrix for inequality, unemployment and external balance SCM model. *Note*: The table shows the values of the indicator variables and the average result variable before the Currency Board for Argentina actual and synthetic. The column of the V-matrix comprises the diagonal entries of the V-matrix. They determine the weight of each indicator variable. They determine the weight of each indicator variable in the weight minimization problem. The first section presents indicators for the synthetic control on the Gini Index, with average results calculated over the period 1983-1991. The second section provides indicators for the synthetic control on the unemployment rate, with averages calculated over the period 1984-1991. The third section displays indicators for the synthetic control on the external balance on goods and services as a percentage of GDP, with averages calculated over the period 1984-1991. Horizontal lines (-) indicate variables that were not used in this model.

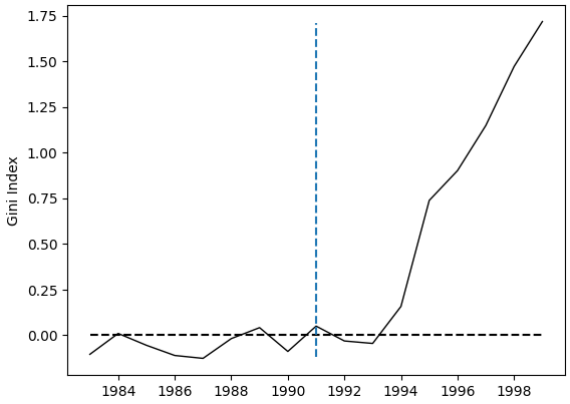

Figure 24: Gap between Argentina and synthetic Argentina via the Augmented Synthetic Control Method. *Note*: The solid line represents the difference between the Gini index observed in Argentina and its synthetic control obtained using the Augmented Synthetic control method, 1983-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991).

Country	Weight	
	Synthetic control	Augmented synthetic
Bangladesh	0,053	0
Chile	0,637	0,282
Colombia	0	0,409
Costa Rica	0,019	0,002
Egypt	0	0
Fiji	0	0
Indonesia	0	-0,001
Iran	0	0
Japan	0,15	0
Kenya	0	-0,001
Malaysia	0	0
Malawi	0	-0,001
Mexico	0	-0,001
Norway	0	0
Pakistan	0	0
Peru	0	0,005
Philippines	0	0
Sierra Leone	0	-0,001
South Africa	0	-0,001
Sri Lanka	0	0
Sweden	0,121	0,17
Tanzania	0	0
Thailand	0	0
Trinidad and Tobago	0	-0,001
United Kingdom	0	0,138
Venezuela	0	0
Zambia	0,02	0,001
Mean Average Error	0,0955	0,0697

Table 6: Augmented Synthetic control weights. *Note*: The table contains the weight assigned to each country to create the synthetic control, obtained using the Synthetic control method (left) and the Augmented Synthetic control method (right). The mean average error for the pre-treatment period is also included. The decimals are rounded to the nearest thousandth.

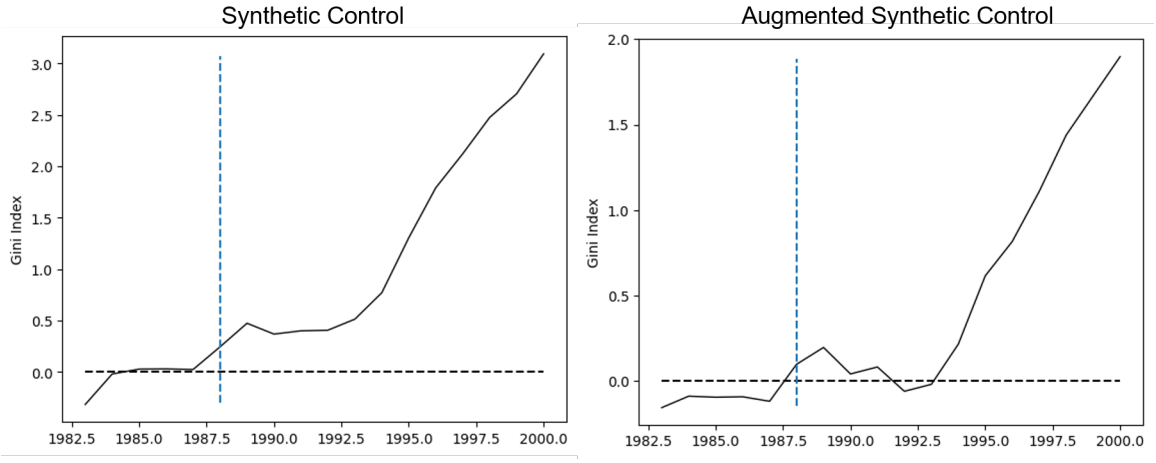

Figure 25: Gap between Argentina and synthetic Argentina after intervention test. *Note*: The solid line represents the difference between the Gini index observed in Argentina and its synthetic control after the intervention test, 1983-2001. The dotted vertical line indicates the newly defined intervention year (1988). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Country	Weight		Country	Weight	
	Synthetic control	Intervention test		Augmented synthetic	Intervention test
Bangladesh	0,053	0	Bangladesh	0	0
Chile	0,637	0,159	Chile	0,282	0,249
Colombia	0	0,042	Colombia	0,409	0,432
Costa Rica	0,019	0,115	Costa Rica	0,002	0,001
Egypt	0	0	Egypt	0	0
Fiji	0	0	Fiji	0	0
Indonesia	0	0	Indonesia	-0,001	-0,001
Iran	0	0	Iran	0	-0,001
Japan	0,15	0	Japan	0	0,192
Kenya	0	0	Kenya	-0,001	-0,001
Malaysia	0	0	Malaysia	0	-0,001
Malawi	0	0	Malawi	-0,001	-0,001
Mexico	0	0	Mexico	-0,001	0
Norway	0	0	Norway	0	0
Pakistan	0	0	Pakistan	0	-0,001
Peru	0	0,13	Peru	0,005	0,011
Philippines	0	0	Philippines	0	-0,001
Sierra Leone	0	0	Sierra Leone	-0,001	-0,001
South Africa	0	0	South Africa	-0,001	-0,001
Sri Lanka	0	0	Sri Lanka	0	0
Sweden	0,121	0	Sweden	0,17	0,07
Tanzania	0	0	Tanzania	0	-0,001
Thailand	0	0	Thailand	0	-0,001
Trinidad and Tobago	0	0,01	Trinidad and Tobago	-0,001	-0,001
United Kingdom	0	0,269	United Kingdom	0,138	0,057
Venezuela	0	0,274	Venezuela	0	0
Zambia	0,02	0	Zambia	0,001	0
Mean Average Error	0,0955	0,0837	Mean Average Error	0,0697	0,108

Table 7: Dollarization intervention test weights. *Note*: The table contains the weight assigned to each country to create the synthetic control, obtained using the Synthetic control method (left) and the Augmented Synthetic control method (right). The weights are compared between the baseline synthetic models and the intervention test with the newly defined intervention year (1988). The mean average error for the pre-treatment period is also included. The decimals are rounded to the nearest thousandth.

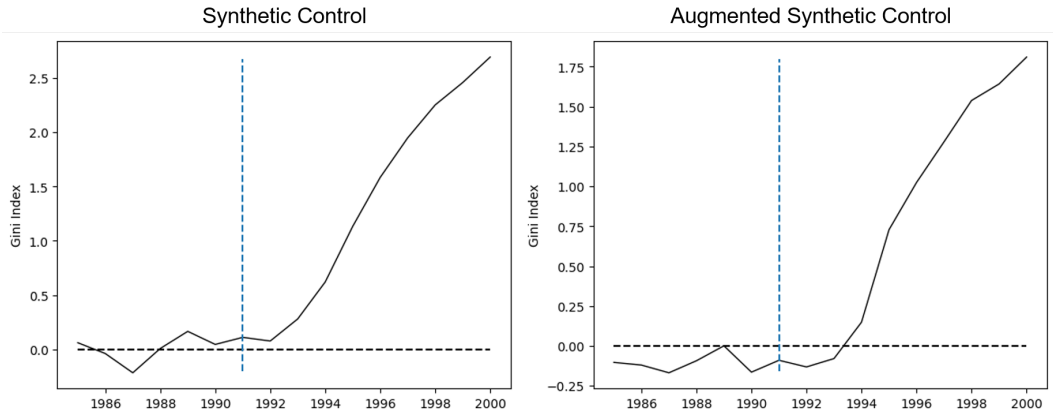

Figure 26: Gap between Argentina and synthetic Argentina after Pre-treatment test. *Note*: The solid line represents the difference between the Gini index observed in Argentina and its synthetic control after the pre-treatment test with the newly defined pre-treatment period (1985-1991), 1985-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Country	Weight		Country	Weight	
	Synthetic control	Pre-treatment test		Augmented synthetic	Pre-treatment test
Bangladesh	0,053	0,076	Bangladesh	0	0
Chile	0,637	0,411	Chile	0,282	0,203
Colombia	0	0	Colombia	0,409	0,147
Costa Rica	0,019	0,152	Costa Rica	0,002	0,142
Egypt	0	0	Egypt	0	0
Fiji	0	0	Fiji	0	-0,001
Indonesia	0	0	Indonesia	-0,001	-0,001
Iran	0	0	Iran	0	-0,001
Japan	0,15	0,103	Japan	0	0
Kenya	0	0	Kenya	-0,001	-0,001
Malaysia	0	0	Malaysia	0	-0,001
Malawi	0	0	Malawi	-0,001	-0,001
Mexico	0	0	Mexico	-0,001	0,001
Norway	0	0	Norway	0	0
Pakistan	0	0	Pakistan	0	-0,001
Peru	0	0,099	Peru	0,005	0,009
Philippines	0	0	Philippines	0	-0,001
Sierra Leone	0	0	Sierra Leone	-0,001	0,005
South Africa	0	0	South Africa	-0,001	0,142
Sri Lanka	0	0	Sri Lanka	0	-0,001
Sweden	0,121	0	Sweden	0,17	0,106
Tanzania	0	0	Tanzania	0	0
Thailand	0	0	Thailand	0	-0,001
Trinidad and Tobago	0	0	Trinidad and Tobago	-0,001	-0,002
United Kingdom	0	0,159	United Kingdom	0,138	0,257
Venezuela	0	0	Venezuela	0	0
Zambia	0,02	0	Zambia	0,001	0,001
Mean Average Error	0,0955	0,088	Mean Average Error	0,0697	0,108

Table 8: Pre-treatment test weights. *Note*: The table contains the weight assigned to each country to create the synthetic control, obtained using the Synthetic control method (left) and the Augmented Synthetic control method (right). The weights are compared between the baseline synthetic models and the Pre-treatment test with the newly defined Pre-treatment period (1985-1991), 1985-2001. The mean average error for the pre-treatment period is also included. The decimals are rounded to the nearest thousandth.

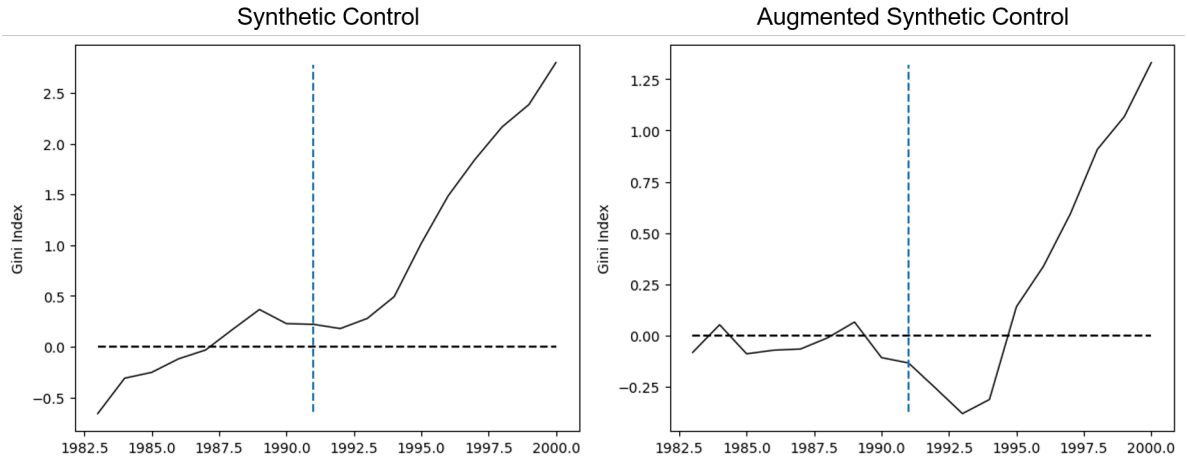

Figure 27: Gap between Argentina and synthetic Argentina after removing Chili from the donor pool. *Note*: The solid line represents the difference between the Gini index observed in Argentina and its synthetic control after removing Chili from the donor pool, 1983-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Country	Weight			
	Synthetic control	Chile	Colombia	United Kingdom
Bangladesh	0,053	0	0	0,078
Chile	0,637	-	0,275	0,585
Colombia	0	0,144	-	0
Costa Rica	0,019	0,131	0,09	0,103
Egypt	0	0	0	0
Fiji	0	0	0	0
Indonesia	0	0	0	0
Iran	0	0	0	0
Japan	0,15	0,049	0,126	0,227
Kenya	0	0	0	0
Malaysia	0	0	0	0
Malawi	0	0	0	0
Mexico	0	0,089	0	0
Norway	0	0	0	0
Pakistan	0	0	0	0
Peru	0	0,21	0,183	0
Philippines	0	0	0	0
Sierra Leone	0	0	0	0
South Africa	0	0	0	0
Sri Lanka	0	0	0	0
Sweden	0,121	0	0	0,007
Tanzania	0	0	0	0
Thailand	0	0	0	0
Trinidad and Tobago	0	0	0	0
United Kingdom	0	0,277	0,213	-
Venezuela	0	0,1	0,112	0
Zambia	0,02	0	0	0
Mean Average Error	0,0955	0,2675	0,1777	0,1042

Table 9: Alternative donor pool weights with synthetic control. *Note*: The table contains the weight assigned to each country to create the synthetic control, obtained using alternative donor pool. The weights are compared between the baseline synthetic models and the alternative donor pool. The mean average error for the pre-treatment period is also included. The left section represents Chile's withdrawal from the donor pool, the center section represents Colombia's withdrawal from the donor pool, and the right section represents the United Kingdom's withdrawal from the donor pool. The three sections were generated using the Synthetic Control Method. The decimals are rounded to the nearest thousandth.

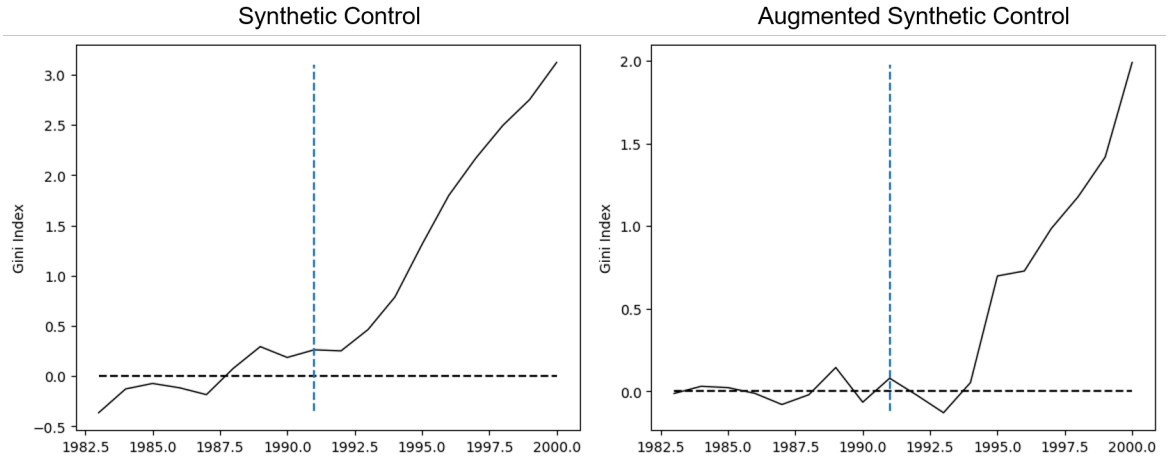

Figure 28: Gap between Argentina and synthetic Argentina after removing Colombia from the donor pool. *Note*: The solid line represents the difference between the Gini index observed in Argentina and its synthetic control after removing Colombia from the donor pool, 1983-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Country	Weight			
	Augmented synthetic	Chile	Colombia	United Kingdom
Bangladesh	0	0	0,284	0,49
Chile	0,282	-	0,267	0,39
Colombia	0,409	0,648	-	0,441
Costa Rica	0,002	0,001	0,15	0,141
Egypt	0	0	0,056	-0,002
Fiji	0	0	0,203	0,195
Indonesia	-0,001	-0,001	0,074	0,029
Iran	0	0	0,118	0,179
Japan	0	0	-0,01	-0,072
Kenya	-0,001	-0,001	-0,496	-0,403
Malaysia	0	-0,001	-0,086	-0,073
Malawi	-0,001	-0,001	-0,028	-0,02
Mexico	-0,001	0,001	-0,124	-0,304
Norway	0	0	-0,155	-0,156
Pakistan	0	-0,001	-0,282	-0,226
Peru	0,005	0,005	0,382	0,384
Philippines	0	-0,001	-0,094	-0,062
Sierra Leone	-0,001	0,024	-0,108	-0,138
South Africa	-0,001	-0,001	0,124	0,084
Sri Lanka	0	0	0,028	-0,128
Sweden	0,17	0,069	0,238	0,369
Tanzania	0	0	0,18	-0,067
Thailand	0	-0,001	0,093	0,163
Trinidad and Tobago	-0,001	-0,001	-0,313	-0,283
United Kingdom	0,138	0,26	0,085	-
Venezuela	0	0	0,392	0,054
Zambia	0,001	0,001	0,024	0,017
Mean Average Error	0,0697	0,0678	0,0484	0,0251

Table 10: Alternative donor pool weights with augmented synthetic control. *Note*: The table contains the weight assigned to each country to create the synthetic control, obtained using alternative donor pool. The weights are compared between the baseline synthetic models and the alternative donor pool. The mean average error for the pre-treatment period is also included. The left section represents Chile's withdrawal from the donor pool, the center section represents Colombia's withdrawal from the donor pool, and the right section represents the United Kingdom's withdrawal from the donor pool. The three sections were generated using the Augmented Synthetic Control Method. The decimals are rounded to the nearest thousandth.

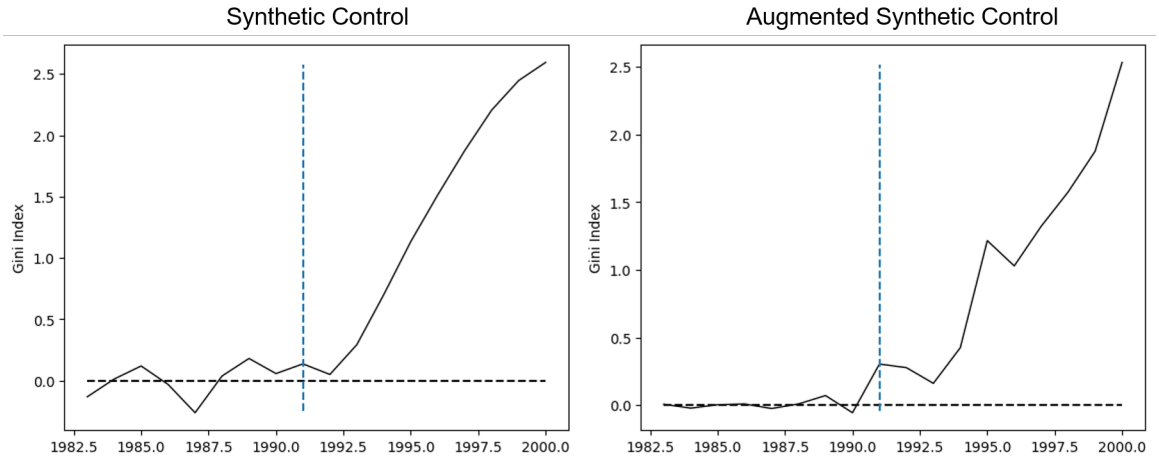

Figure 29: Gap between Argentina and synthetic Argentina after removing the United Kingdom from the donor pool. *Note*: The solid line represents the difference between the Gini index observed in Argentina and its synthetic control after removing United Kingdom from the donor pool, 1983-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Country	Weight		Country	Weight	
	Synthetic control	Normalisation		Augmented synthetic	Normalisation
Bangladesh	0,053	0,011	Bangladesh	0	0,03
Chile	0,637	0,258	Chile	0,282	0,091
Colombia	0	0	Colombia	0,409	0,063
Costa Rica	0,019	0,101	Costa Rica	0,002	0,032
Egypt	0	0	Egypt	0	0,046
Fiji	0	0	Fiji	0	0,011
Indonesia	0	0	Indonesia	-0,001	0,013
Iran	0	0	Iran	0	0
Japan	0,15	0,151	Japan	0	0,109
Kenya	0	0	Kenya	-0,001	0
Malaysia	0	0	Malaysia	0	0
Malawi	0	0	Malawi	-0,001	0,019
Mexico	0	0	Mexico	-0,001	0,026
Norway	0	0	Norway	0	0
Pakistan	0	0	Pakistan	0	0,027
Peru	0	0,107	Peru	0,005	0
Philippines	0	0	Philippines	0	0,01
Sierra Leone	0	0	Sierra Leone	-0,001	0,021
South Africa	0	0	South Africa	-0,001	0,019
Sri Lanka	0	0	Sri Lanka	0	0,051
Sweden	0,121	0	Sweden	0,17	0,085
Tanzania	0	0	Tanzania	0	0,045
Thailand	0	0	Thailand	0	0,037
Trinidad and Tobago	0	0	Trinidad and Tobago	-0,001	0,009
United Kingdom	0	0,191	United Kingdom	0,138	0,203
Venezuela	0	0,182	Venezuela	0	0,031
Zambia	0,02	0	Zambia	0,001	0,022
Mean Average Error	0,0955	0,0022	Mean Average Error	0,0697	0,0022

Table 11: Donor pool weights after normalisation. *Note*: The table contains the weight assigned to each country to create the synthetic contro, obtained using the Synthetic control method (left) and the Augmented Synthetic control method (right). The weights are compared between the baseline synthetic models and the normalization test with the newly defined normalized Gini Index. The mean average error for the pre-treatment period is also included. The decimals are rounded to the nearest thousandth.

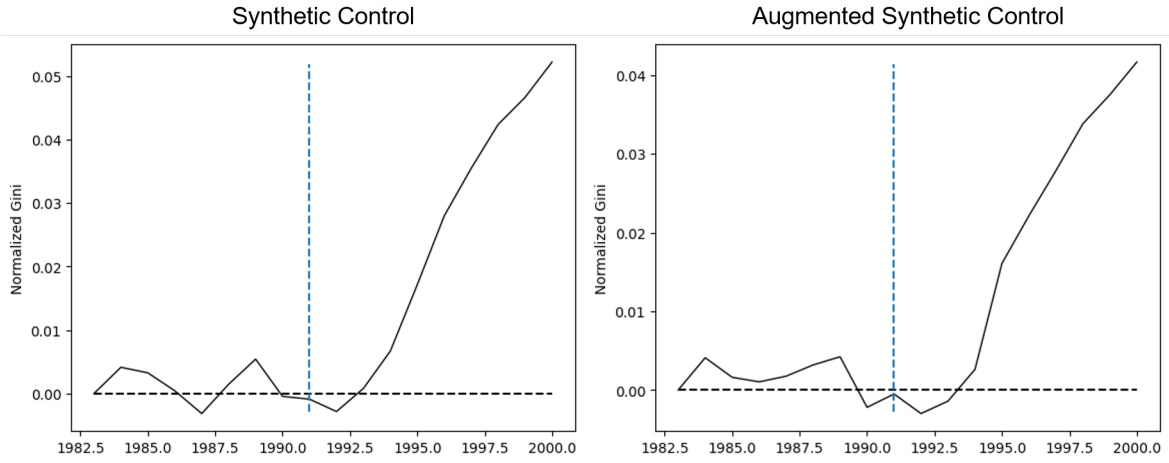

Figure 30: Gap between Argentina and synthetic Argentina after normalisation. *Note*: The solid line represents the difference between the normalized Gini index observed in Argentina and its synthetic control, 1983-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Country	Weight	
	Synthetic control	Augmented synthetic
Bangladesh	0	-0,025
Chile	0	-0,14
Colombia	0	-0,07
Egypt	0,139	0,274
Fiji	0,013	0,368
Indonesia	0	-0,24
Japan	0,167	0,048
Malaysia	0	0,214
Malawi	0	-0,104
Norway	0,482	0,406
Pakistan	0	-0,043
Peru	0,079	0,372
Philippines	0	-0,16
Sweden	0	-0,177
Thailand	0	0,396
Trinidad and Tobago	0,12	0,106
United Kingdom	0	-0,104
Venezuela	0	-0,122
Mean Average Error	0,4083	0,0318

Table 12: Unemployment weights. *Note*: The table contains the weight assigned to each country to create the synthetic control for unemployment, obtained using the Synthetic control method (left) and the Augmented Synthetic control method (right). The mean average error for the pre-treatment period is also included. The decimals are rounded to the nearest thousandth.

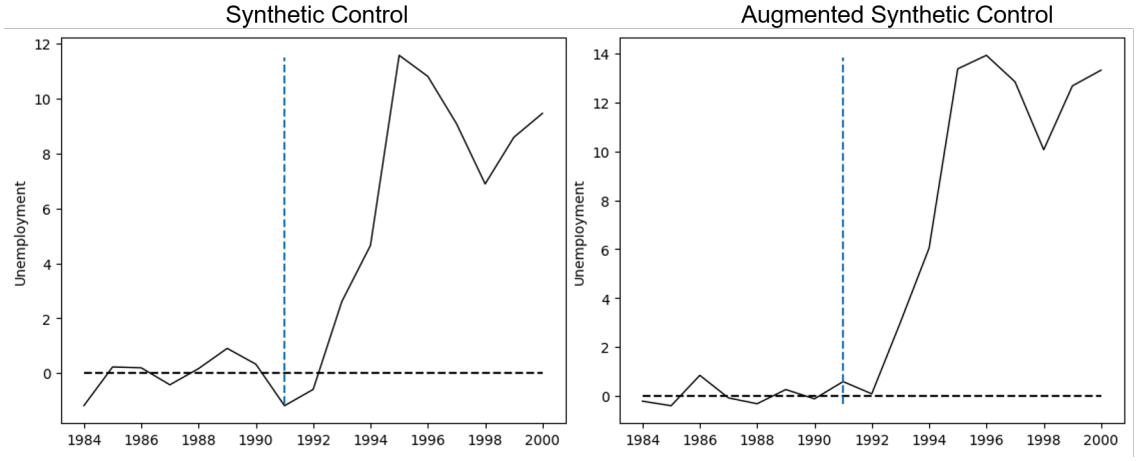

Figure 31: Gap between Argentina and synthetic Argentina. *Note*: The solid line represents the difference between unemployment rate in Argentina expressed as a percentage and its synthetic control, 1984-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.

Country	Weight	
	Synthetic control	Augmented synthetic
Bangladesh	0	0,031
Chile	0	0,001
Colombia	0,202	0,038
Costa Rica	0	-0,001
Egypt	0	-0,005
Fiji	0	0,159
Indonesia	0	-0,02
Iran	0	0,014
Japan	0,435	0,038
Kenya	0	-0,037
Malaysia	0	-0,094
Mexico	0,011	0,03
Norway	0	0,237
Pakistan	0	-0,007
Peru	0,091	0,086
Philippines	0	0,007
Sierra Leone	0	0,059
South Africa	0	0,245
Sri Lanka	0	-0,019
Sweden	0	0,006
Thailand	0	-0,013
United Kingdom	0	0,009
Venezuela	0,261	0,236
Mean Average Error	1,3345	1,1259

Table 13: External balance weights. *Note*: The table contains the weight assigned to each country to create the synthetic control for External balance on goods and services, obtained using the Synthetic control method (left) and the Augmented Synthetic control method (right). The mean average error for the pre-treatment period is also included. The decimals are rounded to the nearest thousandth.

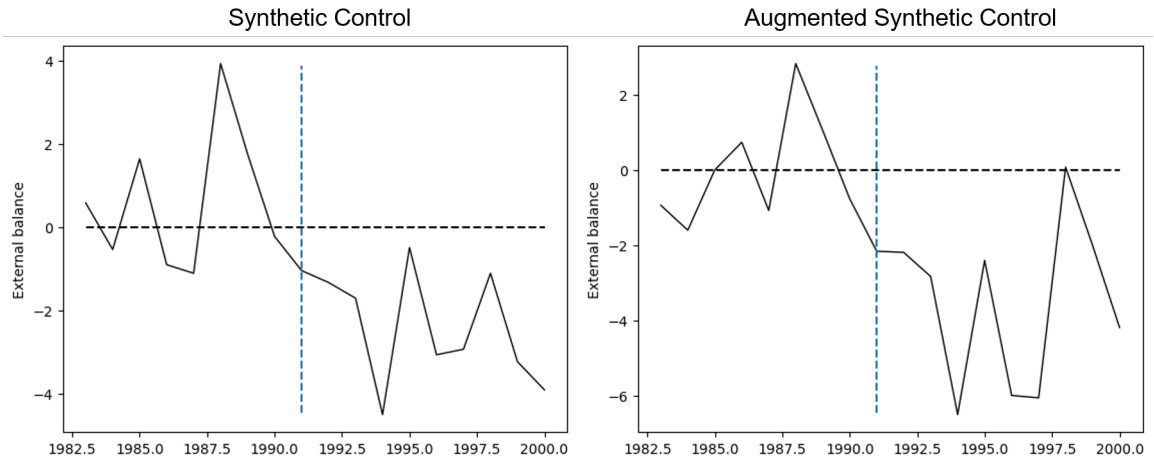

Figure 32: Gap between Argentina and synthetic Argentina. *Note*: The solid line represents the difference between external balance on goods and services in Argentina expressed as a percentage of the GDP, 1983-2001. The dotted vertical line indicates the year in which the Currency Board was established (1991). The left-hand graph was generated using the Synthetic Control Method, whereas the right-hand graph was produced using the Augmented Synthetic Control Method.