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Measuring the Carnation Revolution:
A Synthetic Control Analysis of Economic Crisis in Portugal (1974-1992)[ϕ]

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Abstract

On 25 April 1974, a military coup toppled Western Europe's oldest dictatorship, Portugal's *Estado Novo*. The following years were characterized by political and economic instability with a wage explosion and the reduction of working hours for the country's labor force, the expropriation of the assets of the business elite and a process of capital flight, and the end of colonial trade and the arrival of about half a million repatriates with the end of the empire. As a result of these events the Portuguese economy slowed from its 1950s and '60s high growth and industrialization, when it had been counted among the fastest growing in the world. But measuring the impact of the "Carnation Revolution" is very difficult due to its coincidence with the 1970s oil shocks. What part of responsibility for the poor performance should be attributed to the international crisis and what part to the consequences associated with the revolution? To disentangle the problem, we use the synthetic control method with data for other OECD countries. We find that the Carnation Revolution and the subsequent events caused a negative structural break that made GDP per capita lower than it would have been in the absence of the revolution and the instability. We also analyze the effects on the current account and capital-labor ratios.

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Introduction

On 25 April 1974, a military coup toppled what was then Europe's oldest authoritarian regime, Portugal's *Estado Novo*. The event went down in History under the name of "Carnation Revolution" and it turned out to be more than just an episode of political change, as it also had vast economic implications. Portugal then fell into a complex political situation following a typical Cold War pattern, with political agents favoring a political democracy and a market economy opposed to others favoring a socialist regime. Labor unrest followed, determining a wage explosion and reduction of working hours for the country's labor force.

As the forces in favor of socialism seemed to gain the upper hand immediately after the coup, entrepreneurs and most of the business elite panicked and fled the country while placing their capital abroad. Soon the assets of the biggest of them would be expropriated in one of the largest nationalization programs ever to take place in Western Europe. As the main goal of the authors of the coup was to end a war with independence movements in Africa that had started in 1961, the fall of the regime also meant the end of the Portuguese empire. Therefore, the country had to stop trading with its colonial territories and accommodate the arrival of about 500,000 to 700,000 settlers (approximately 8% of the population) fleeing from those territories after the independence movements took power. In the wake of these events the economy immediately collapsed, which was followed by a decade of mediocre growth, reversing the situation of the 1950s and 60s, when Portugal had one of the fastest growing economies in the world.

Measuring the actual impact of the momentous economic changes brought on by the revolution has for long been a *vexata quaestio* of Portuguese economic history. Portugal was seen at the time as something of an economic laboratory, attracting such famous economists as Robert Solow, Paul Krugman, and Rudiger Dornbusch, who then visited the country as members of a series of Massachusetts Institute of Technology teams to advise Portuguese authorities (Krugman and Macedo, 1981, and Macedo, 2008). To this day, the events in Portugal remain a crucial opportunity to

understand the impact of social and economic revolution on growth in market economies. Many works stress the particular Portuguese situation, namely the combined effects of the international crisis caused by the 1973 oil shock *cum* the demise of the Bretton Woods system with those of the revolutionary crisis (Lopes, 1996, Costa *et al.*, 2016, and Amaral, 2019), but none has attempted to determine the impact of the two separately. The difficulty in analytically isolating one from the other has precisely to do with their coincidence: what part of responsibility for the poor post-revolutionary economic performance should be attributed to the international crisis and what part to the economic consequences of the revolution? This is the separation we undertake herein.

In order to disentangle the problem, we use a statistical method that has been increasingly applied to measure the effect of certain events or policy interventions on economic outcomes, the synthetic control method (SCM) proposed and developed by Abadie and Gardeazabal (2003), Abadie *et al.* (2010 and 2015) and Abadie (2021). Athey and Imbens (2017, p. 9) consider the SCM to be "arguably the most important innovation in the policy evaluation literature in the last 15 years", and that has been used to measure the economic impact of such disparate events as terrorism in the Basque country between the 1960s and the 1990s (Abadie and Gardeazabal, 2003), German reunification in 1990 (Abadie *et al.* 2010), Brexit in 2016 (Born *et al*., 2019) or, closer to the topic of this paper, the mass influx of white settlers returning to Portugal following the independence of the former Portuguese colonies in 1975 (Mäkelä, 2017).

The method compares a "treated unit" with a "donor pool". This is done in two steps: in the first step the treated unit (e.g. an economy) is compared with the donor pool (e.g. a group of relevant comparable economies) for a certain pre-treatment period in order to observe which combination of units from the donor pool best replicates the behavior of the treated unit. In the second step, after the treatment has taken place (e.g. a shock such as the Carnation Revolution), the procedure consists of observing how the behavior of the treated unit differs from the behaviour of the donor pool, which is taken to be the post-treatment counterfactual of how the treated unit would have behaved in the absence of the intervention.

We apply the method to the period 1955-1992, using the years between 1955 and 1973 as the pre-treatment period. The treatment period ranges from 1974 to 1992, to capture both the short-term impact of the revolution and its long-term impact on the growth performance of the economy. According to our results, the many economic and political events associated with the Carnation Revolution made the situation in Portugal worse than if the country had been affected by only the international crisis, and in various ways: it led to a steeper decline of economic growth in the short-term and to a stronger external imbalance crisis. The simultaneous occurrence of the two events created an economic policy dilemma: stimulating growth to lift the economy up from the crash would further deteriorate its external balance; or, seen from the other end, rebalancing the external situation of the economy would mean delaying the efforts to stimulate growth. The inability of policymakers to square the circle brought three IMF interventions, in 1977, 1978, and 1983. It was only after these interventions that both objectives were reached, in 1985, eleven years after the revolution. We view the decade between 1974 and 1985 as the transitional period to a post-revolutionary final settlement, marked by Portugal's entry into the European Economic Community (EEC) in 1986. After 1986, the economy started growing again at a fast pace, but not enough to get back to its previous growth path. By 1992, GDP per capita was 20% lower than it would have been in the absence of the revolution and the economic and political instability that followed.

To understand why the economy grew slower than it could have in the 20 years after the revolution we propose that, in terms of long-term growth impact, the revolution affected the economy's factor mix on two dimensions: a labor shock, due to the mass influx of repatriates (together with the slowdown of emigration and mustering out of soldiers with the end of the Colonial War), and a negative capital shock, a result of capital flight and subsequent capital scarcity due to the mass nationalization program of 1975. This combination of effects led to a persistently lower capital-labor ratio than what would have existed in the absence of the revolution. Our period of analysis stops in 1992 because that is the year of the signing of the Maastricht Treaty, which gave birth to the European Union (replacing the EEC) and set the participating economies on the path to creating the European

Monetary Union (EMU). From 1992 on, Portugal behaved as if it already belonged to the EMU, with the implication that the exchange rate of the Portuguese currency remained fixed from then until today. We believe this event to be a new shock with a specific impact that should be separated from that of the Carnation Revolution and, thus, should not be included in our analysis.

The remainder of this paper is as follows. Section 1 summarizes the main features of the Portuguese economy in the postwar period until the Carnation Revolution. Section 2 describes the international and national context of the 1970s Portuguese crisis: the international ripples of the demise of the Bretton Woods system and of the 1973 oil shock, and the national instability resulting from the revolution. Section 3 describes in detail the synthetic control method and the data used in the paper. Section 4 provides the results of the test as applied to the Portuguese economy in the period under study.

1. The Portuguese pre-revolutionary economy

1.1. Economic growth and change

The period between the end of World War II and 1973 was the best ever in terms of growth of the Portuguese economy. After more than a century of divergence in relation to the richer economies of the world, or at best non-divergence, the Portuguese economy converged in a consistent manner, with an especially strong pace during the 1960s (Figure 1). In 1950, GDP per capita in Portugal was 35% of the average of richer economies; by 1973, the level was 55%, a reduction in the gap of 20 percentage points. The process occurred despite quick growth in most rich economies, and this period has, since then, been designated the “golden age of economic growth”. High growth in Portugal was accompanied by industrialization, as is usual in processes of the kind: agriculture lost its prevalent position in both employment and output and gave place to industry and services. This is illustrated in Figure 2, where we can see employment in agriculture falling from more than 50% of the active population in 1950 to only 24% in 1973 On the contrary, industry employed only 21% of the active

population in 1950 but jumped to 35% in 1973, while the services sector became the largest employer (from 27% in 1950 to 40% in 1973) (Amaral, 2019).

Contrary to what happens in many countries subject to the same kind of episodes, industrialization and fast growth did not bring external imbalance (Figure 3). The economy had a persistent trade gap, with imports normally having a much higher level than exports, but was able to cover it thanks to emigrant remittances and some services exports, especially tourism. Remittances grew from the 1950s to the early 1970s, as a consequence of an emigration movement that involved close to one million persons (Baganha, 2003), reaching a peak of 9% of GDP in 1972, as shown by the item Transfers in the balance of payments in Figure 3. Tourism also grew in the 1960s, as Portugal became a favorite beach destination for many north Europeans (Marques, 2000) (Figure 3). Because of this, the current account stayed in balance.

1.2. The institutional setting

The *Estado Novo* was an authoritarian regime that presented itself as corporatist. Corporatism was to be understood as a "third way" between liberalism and socialism: the relationship between the Government and civil society was meant to overcome both the extreme individualistic atomization of liberalism and the excessive centralization of state socialism (Lucena, 1976, and Brito, 1989). In practice, the corporatist structure of the regime meant a high degree of Government intervention in the economy, as the corporatist organisms that were created put in place a vast centrally manipulated apparatus (Lucena, 1976, and Amaral, 2019).

The regime's institutional framework was generally unfavorable to labor. Unions were forced to be small by law and the Government intervened in almost every aspect of their operations, in a context whereby strikes were forbidden and little employment protection existed (Lucena, 1976, and Patriarca, 1995). No generalized unemployment benefit existed until late, and when introduced it. Working hours were long and holiday periods short or sometimes non-existent (Patriarca, 1995, and Amaral, 2019). This helped to pressure wages down and keep the cost of labor for firms low. However,

the rise of wages in this period shows that the industrial relations framework of the regime was not entirely effective in reaching the goal of keeping wages low, as they were pushed up by the scarcity of labor deriving from economic growth, mass emigration, and mobilization to the Colonial War (Lains *et al.*, 2013, and Amaral, 2019). As a matter of fact, real earnings of workers increased at a pace of 6.7% per year between 1960 and 1973, roughly at a par with the growth rate of the economy (Lopes, 1996, p. 202).

The regime also kept a non-Keynesian approach to budgetary and monetary matters, even at a time when that approach became the rule in most western countries (Battilossi *et al.*, 2010). Demand management through fiscal policy was not part of the acceptable policy arsenal of Portuguese authorities: budgets were to be balanced in an "orthodox" manner, a principle enshrined in the regime's Constitution. Consequently, the Bank of Portugal followed a principle of letting the money supply depend on a rule, in gold-standard fashion (Amaral, 2018). This orthodox stance allowed for low inflation until late in the regime, when emigrant remittances started pressuring prices up (Nunes and Valério, 2005, and Amaral, 2019).

The non-Keynesian approach of Portuguese authorities also implied a low level of public spending. We can see in Figure 4 how the Portuguese Government's expenditure level (as a percentage of GDP) remained considerably below the West European average until 1973. The differences reside not only in size but in structure as well. The main difference between Portugal and most other West European countries resulted from the low level of spending on social items: Social Security, Education, and Health Care. Part of the problem had to do with the military commitment of the Colonial War. Because of it, military expenditure was about 5-6% of GDP in 1973, a very heavy weight in the western context (World Bank Open Data, Lopes, 2005, and Amaral, 2019).

The Portuguese economy at the time was tightly connected with the Portuguese overseas empire. Until 1961, this economic relationship was based on a system of imperial preference whereby the colonies should provide foreign exchange to help the mainland's balance of payments and also supply it with raw materials for manufacturing as well as agricultural and tropical goods. The colonies

were also expected to serve as markets for homeland agricultural and industrial goods that Portuguese producers were not able to place in the world market (Clarence-Smith, 1985). This system disappeared when a free trade area within the empire was created in 1961. However, by this time, the empire was starting to lose importance for the Portuguese economy. According to Clarence-Smith (1985, pp. 230-231), trade with the colonies represented about 22% of all its trade in 1950 but only about 14% in 1973. Despite this loss of importance, the empire continued to play an important role as an attractor of a large number of settlers from the homeland (Newitt, 1981).

The survival of the empire became increasingly more difficult with time, due to international pressure, as the world public opinion was generally in favor of the decolonization of European empires. Independence movements triggered military activity in Angola, Guinea, and Mozambique between 1961 and 1964. The Portuguese response gave birth to 14 years of conflict on three unconnected fronts that came to be known as the Colonial War (Cann, 1997).

2. Two crises in the 1970s

2.1. A revolution within an international crisis

The economic and institutional structure described above was completely shattered by the 1974 Carnation Revolution, a military coup that toppled Europe's oldest authoritarian regime. However, attributing the post-1973 growth slowdown to the revolution is not a straightforward affair, because of its combination with the 1970s international crisis, caused by two major shocks: the end of the Bretton Woods system and the decision by the Arab countries of the Organization of Petroleum Exporting Countries (OPEC) to embargo oil exports to various Western countries in October 1973 (Crafts and Toniolo, 1996, and Eichengreen, 2007).

The revolution introduced an additional layer to this already complex situation. The events were initiated by a movement of junior military officers – an association to which they gave the name of Armed Forces Movement (*Movimento das Forças Armadas*: MFA). Their starting point was a general dissatisfaction with their career prospects and combat conditions in the Colonial War and their main

point was to bring that situation to an end. But they associated the end of the war with the overthrowing of the authoritarian regime. On 25 April 1974, in association with some senior officers, MFA orchestrated a military coup that toppled the regime and initiated a process of transition to install a new one (Reis, 1994, Ramos *et al*. 2009, and Amaral, 2019).

There was no consensus among the revolutionaries over the nature of the new regime. They split over the issue, together with the political actors and the society of the time. The division followed a typical Cold War pattern, with some favoring a democracy and a market economy, while others favored a socialist revolution (Reis, 1994, Ramos *et al*. 2009, and Amaral, 2019). Initially, significant importance was given to the abolition of the most notable aspects of Government intervention during the *Estado Novo*, not indicating a radical political course. Things soon started to change, however, and between September 1974 and March 1975, the groups that were committed to more radical socialist interpretations of the future of the country maneuvered into a position of control of its political levers (Reis, 1994, Ramos *et al*. 2009, and Amaral, 2019).

Labor unrest contributed greatly to the radicalization of the process, with the occurrence of various strikes and many episodes of occupation of firms by workers. The purpose of much of this activity was to obtain higher pay and shorter working hours. With the revolutionary authorities abstaining from repressing these actions, workers were generally successful: wages increased 7% and 14% in real terms in 1974 and 1975, respectively (Mateus, 2013). The various governments approved legislation favorable to labor: in May and June 1974 a national minimum wage was introduced; in August striking became legal; in March 1975 a general system of unemployment benefit was created; in April the old corporatist unions were abolished and unionization became free; in July a new Labor Code was approved, making individual firing almost impossible and collective firing also difficult (Amaral, 2019).

While this was taking place, the labor market was rocked by a massive shock deriving from the process of decolonization. Getting out of Africa was the main goal of the revolutionaries, and negotiations started in 1974 between the new Portuguese authorities and the African independence

movements started in 1974. As a consequence, panic spread among the colonists, who began an exodus in the direction of the Portuguese homeland. In one of the largest population movements ever in Portuguese history, about 500,000 to 700,000 people (approximately 8% of the homeland population), most of them economically active, entered the country between late 1974 and early 1976 (Pires *et al*., 1984, Carrington and de Lima, 1986, Mäkelä, 2017, and Bohnet *et al*., 2021).

The mass arrival of colonists was not the only shock to the labor market. The slowing of emigration, as the other European economies were also dealing at the time with the effects of the international crisis, and the deactivation of the soldiers involved in the Colonial War, were other major contributors (Cardoso and Morin, 2018). The labor supply expanded dramatically: active population grew by about 400,000 persons between 1973 and 1975, corresponding to growth rates of 3.1% in 1974 and 4.9% in 1975 (Amaral, 2009). Thus, at the very moment when both the international crisis and the increase in the supply of labor should have prompted wages to fall, the exact opposite occurred. Labor became a much dearer factor of production, not only because of wages, but also because of the reduction of working time brought about by the new labor legislation. Thus, firms, already threatened by the cost of energy (and by imported goods), were strait-jacked by unprecedented wage pressures. Capital flight started and unemployment, which was virtually non-existent in 1973 (1.7%), jumped to 6.2% in 1974 (Amaral, 2009 and 2019).

In the extremely volatile political environment of the period, the difficulties felt by firms to sustain regular activity were understood by the revolutionary authorities as “economic sabotage”. Pressures started growing for many companies to be taken away from their owners. Eventually, in March 1975, these pressures were translated into policy: the assets of the large business groups and of private firms operating in sectors that the revolutionary authorities considered to be “strategic” were nationalized (Amaral, 2019, and Valério, 2004). As a result, the Portuguese entrepreneurial public sector became one of the largest in the Western world, with the Government controlling totally or partially a wide range of sectors: the issuing of money, banking, insurance, basic metals,

shipbuilding and repair, cement, paper and paper pulp, chemicals and petrochemicals (Baklanoff, 1996).

As a result of all these events, the economy crashed, derailing the path of high growth and convergence of the previous 30 years (Figure 1). Moreover, the process was compounded by rapid deterioration in the balance of payments, as shown in Figure 3. The structure of international payments collapsed after 1974: the trade deficit without tourism grew from 7% of GDP in 1973 to 10%-15% in 1974 and 1975; the traditional amount of tourist payments and emigrant remittances would not have been enough to offset for such a deficit, but the situation became even worse as both fell in these years in response to political uncertainty (Figure 3). The difficulties in international trade were made even more complex thanks to the interruption of colonial trade. The current account passed from a small surplus in 1973 to a deficit between 5% and 6% of GDP in the years 1974 and 1975. The combination of economic collapse with massive external imbalance became the central economic issue (Krugman and Macedo, 1981). In the words of Schmitt (1981, p. 1), "the problem of managing economic growth with a balance of payments constraint was new to Portugal".

The political turmoil following the Carnation Revolution eventually calmed down by the end of 1975. The first elections after the revolution were won by political forces favorable to a Western-style democracy and market economy. A new Constitution was approved on 2 April 1976: its content reflected the clash between the initial revolutionary pressures and the new democratic setting. Even though the Constitution incorporated the most important elements of a liberal-democratic polity, it also included a vast socio-economic section with a marked socialist penchant. The latter aspect was reflected in the fact that the 1975 nationalizations were made irreversible and the "basic sectors" (i.e. those nationalized) were closed to private ownership. Also, the new labor legislation became a constitutional matter, making change by regular legislative processes almost impossible (Reis, 1994, Ramos *et al*. 2009, and Amaral, 2019).

2.2. Persistent external imbalance

Once the idea of keeping the Portuguese economy within the capitalist mold (albeit with considerable Government intervention) prevailed, the various governments from 1976 onward felt the need to fight the economic crash of the two previous years and to provide the population with "Welfare State" social programs. A major instrument to achieve both was public spending. This led to a radical transformation of the nature of fiscal policy in several ways: the first was that of size; if the *Estado Novo* had kept the Government small, the revolution changed that: in three years, the 20% gap between Portugal and the European average shrank by practically one half (to 10%), and the process would continue thereafter (Figure 4). The change in size also meant change in structure. If the *Estado Novo* governments spent very little on social items, the democratic regime did the opposite. Spending on defense plummeted suddenly after 1974, from around 6% of GDP to around 2% in 1977, reflecting the end of the Colonial War, and items concerning various dimensions of social policy grew (Lopes, 2005, and Amaral, 2019). One final dimension in which change in fiscal policy was drastic was in the matter of balance. The strict policy of budget balance disappeared from 1974 on (Lopes, 2005, and Amaral, 2019). Furthermore, Governments used the now vast arsenal of public companies (including the banks) to expand investment (Amaral, 2019).

These factors helped to lift the economy from the depth of the 1975 crash, but also deepened the imbalance in international payments that had appeared in 1974, leading Portuguese authorities to negotiate two IMF interventions, in 1977 and 1978 (Zorrinho, 2018, and Amaral *et al*, 2020). In 1977, the trade deficit reached 15% of GDP and the current account 10% (Figure 3). The IMF intervention packages were based on austerity principles, including wage caps, and price and tax increases. Another element was the depreciation of the Portuguese currency, the *escudo*, which was then inserted in a crawling peg mechanism, under which it would depreciate at the rate of 1% per month in relation to the currencies of the most important international partners (Dornbusch, 1981). Interest rates were raised in variable proportions (details in Amaral *et al*, 2020).

The results of the program were very effective in terms of international balance, visible in the return to balance of the current account in 1979, as Figure 3 shows. Some of this is attributable to exports, but, as imports also grew, the contribution of the trade balance was only marginal; the essential factors were remittances first, and tourism second, both returning in full force thanks to a new confidence in the new moderate post-revolutionary political situation (Figure 3). The worst fears concerning the negative impact of the IMF program on economic growth ended up not materializing, as the economy kept on growing robustly, as shown in Figure 1 (details in Amaral *et al.*, 2020).

In 1979 and the early 1980s, a new combination of external and internal shocks reversed these positive steps. The trigger was the 1979 oil shock. Much like the revolutionary governments of 1974 and 1975, although now for electoral reasons, the Government did not create room to accommodate the external shock. Its objectives were two: reduce inflation and spur economic growth (Amaral, 2019 and 2022). In 1980, the prices of the goods and services of public companies were frozen, and in May the *escudo* was reappreciated by 6% while the monthly rate of the crawling peg was reduced to 0.5% (Franco, 1994, and Lopes, 1996). The anti-inflationary effects of such policies were immediately visible – as a consequence, real wages improved substantially (Franco, 1994). Meanwhile, the expansion of public spending continued. The budget deficit reached 12% of GDP in 1982.

The deterioration of foreign balance then reached an unprecedented level: 12% of GDP in 1982 (Figure 3). After two years of hesitant policies, in September 1983 there was no alternative but to ask for a new assistance program by the IMF, covering the period until February 1985: Portugal was given financial assistance but again had to comply with a series of contractionary measures. The aim of the program was the same as in the first two interventions, although the measures were now more aggressive (as the situation was also more serious): reduce internal demand, increase external demand, attract foreign payments through interest rates and other instruments, control the budget deficit (Amaral, 2019 and 2022, and Zorrinho, 2018). Consequently, the *escudo* depreciated 12% in June 1983 and the crawling peg rate was increased to 1% (Franco, 1994). Investment programs by

public companies were curtailed, controlled prices were liberalized, taxes were raised, and public expenditure cut (Franco, 1994).

The results of the program appeared quickly, with foreign imbalance dropping rapidly: by 1984, the current account deficit had fallen to about 2% of GDP and in 1985 it had reached near balance (Figure 3). However, the price paid in terms of slower economic growth was now clear. The key to rebalancing this time was, precisely, the recession induced by the austerity measures, which improved the trade balance, as remittances and exchange brought in by tourists remained virtually the same: imports declined, as a consequence of reduction in demand, and exports as a share of GDP increased thanks to the fall of GDP itself (Figure 3). By 1985, fundamental external balance had been reached. The end of the third IMF intervention can be considered the end of the process of transition from revolution to democracy. Somehow sealing the transition, Portugal joined the European Economic Community (EEC) in 1986, opening new opportunities for the Portuguese economy and leading to a period of strong, albeit brief, growth between 1986 and 1992 (Amaral, 2010) (Figure 1).

The EEC project, however, was changing substantially, as the organization was entering a crucial new phase, marked by the adoption of both the Single Market and monetary union programs. In February 1992, the European Council gathered in Maastricht to sign a treaty that not only created the European Union (replacing the EEC) but also set a blueprint for the birth of the single currency, which was to be concluded by 1999 (James, 2012). Since the Portuguese Government decided to participate in the monetary union, the control of inflation became a central policy objective (Abreu, 2001). The crawling-peg exchange rate regime had been designed as an instrument to maintain competitiveness in a context of high inflation, but that was something that could not continue in a common currency. The Government progressively adopt a hard exchange rate policy from 1986 on. The pace of depreciation of the crawling-peg's monthly exchange rate started to be reduced in 1986, continuing until 1990, leading to a significant real appreciation of the *escudo* (Abreu, 2001). As these partial measures did not seem to be enough, the Government decided to take the more radical step of completely ending the crawling peg regime and pegging the *escudo* to a basket of five currencies

participating in European Monetary System (EMS) in 1990. The purpose was not only to control inflation but to prepare the escudo to enter the EMU. The nominal value of the escudo remained the same from 1992 on (except for a slight depreciation in 1994), thus making Portugal eligible to join the EMU (Amaral, 2019). In 1999, Portugal became one of its founding members.

Participating in the EMU was a new major shock to the economy, marking a break strong enough to be considered by itself. This means we should separate its effects from those of the Carnation Revolution. However, we must consider that its effects had started to be felt as early as 1992, when the Portuguese monetary authorities fixed the *escudo*'s exchange rate. In fact, for all practical purposes, that decision meant that the situation was tantamount to being part of the monetary union. This is why we stop our exercise in 1992.

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To sum up the post-revolutionary situation: the process of high growth that Portugal enjoyed in the postwar period was suddenly interrupted in 1974 by a combination of the 1970s international economic crisis with the economic impact of the revolution. To distinguish between what portion of that crash can be attributed to the international crisis and what portion to the Carnation Revolution and the instability that followed is one of the main purposes of this paper. Our second purpose is to assess the long-term impact of the revolution on the growth performance of the economy. In this respect, we posit the hypothesis that the revolution had a sizable effect over the economy's factor mix: it produced a labor shock, due to the mass influx of repatriates (together with the slowdown of emigration and demobilization of soldiers with the end of the Colonial War), and also a negative capital shock due to capital flight and subsequent capital scarcity, generating a persistently lower capital-labor ratio than it would have existed in its absence. In order to tackle these questions, we use a statistical method called synthetic control method whereby the performance of the Portuguese

economy is compared with a counterfactual performance in which the Portuguese economy would have been affected by only the international crisis and not by the revolutionary one.

The combination of an economic crash with a large external imbalance generated a dilemma for policymakers, once the most turbulent moments of the revolution had passed: they felt the need to stimulate the economy and expand social programs through public spending and large investment programs by public companies; but stimulating the economy in such a manner would bring further deterioration of external balance. In other words, they felt the need to rebalance the economy externally; but doing it would mean not applying measures to stimulate the economy and develop social programs. In the end, they chose to stimulate the economy and develop the Welfare State. As expected, external balance worsened, and adjustment programs had to be negotiated with the IMF in 1977, 1978, and 1983. The austerity methods used in these programs hindered the growth rate of the economy, but by 1985 external balance had been recovered and Portugal joined the EEC. That year marks the end of the decade-long transition to democracy. The economy was ready to benefit from the new setting, and indeed had a strong, although brief, spell of growth between 1986 and 1992.

To measure the impact of the revolution on the 1974 crash and the subsequent growth trajectory of the economy we implement three synthetic control method tests – applying them to GDP per capita, the current account balance, and the capital-labor ratio in Portugal between 1974 and 1992.

3. The Synthetic Control Method and the data used

The synthetic control method proposes a way of comparing a "treated unit" with a "donor pool". This is done in two steps: in the first, the treated unit (e.g., an economy) is compared with the donor pool (e.g., a group of relevant comparable economies) for a certain pre-treatment period in order to observe which combination of units from the donor pool best replicates the behavior of the treated unit; in the second step, after the treatment (e.g. the Carnation Revolution) has taken place, we then observe how the behavior of the treated unit differs from the behavior of the donor pool.

The behavior of the donor pool in the post-treatment period is taken to provide the counterfactual of how the treated unit would have behaved in the absence of the intervention.

In a more formalized way, a sample of $J + 1$ units (national economies, in the case of this study) is considered. Unit $j = 1$ is the unit we are interested in and units $j = 2$ to $j = J + 1$ are the potential units to compare. Following medical and statistical matching terminology, $j = 1$ is the "treated unit", i.e. the unit that is affected by the event we are seeking to measure the impact of (in this case the GDP crash caused by the Carnation Revolution), and $j = J + 1$ is the "donor pool". In order to avoid interpolation bias, the units that are part of the donor pool should be chosen from among units having similar characteristics in terms of structural processes: in the case of this investigation, the donor sample comprises OECD countries. All units are observed in the same time periods, $i = 1, \dots, T$. There is a pre-treatment period, defined as T_0, and a post-treatment period, defined as T_1, the overall time period being $T = T_0 + T_1$. The treatment does not affect unit 1 in T_0, affecting it only during T_1.

The synthetic control should be understood as a weighted average of the units in the donor pool and is defined by a $(J \times 1)$ vector of weights $W = (w_2, \dots w_{J+1})$, with each weight restricted to being positive and having a value between 0 and 1. X_1 denotes a $(k \times 1)$ vector of the pre-treatment features of the treated unit that we are trying to match in the best possible way and X_0 denotes the $k \times J$ matrix of the same variables in the units of the donor pool. The purpose is to find the values of the X_0 variables that are most similar to X_1, and the synthetic control, W^*, is the one minimizing the difference in the vector $X_1 - X_0 W$, which corresponds to the difference between the treated unit and a synthetic control. If $m = 1, \dots, k$, then X_{1m} is the value of the variable m in the treated unit and X_{0m} is a $1 \times J$ vector with the values of the variable m in the donor pool. W^* is the value of W minimizing

$$\sum_{m=1}^{k} v_m \, (X_{1m} - X_{0m} W)^2$$

in which v_m is a weight for the relative contribution of each of the variables.

Y_{jt} denotes the outcome of unit j at time t; Y_1 denotes a $(T_1 \times 1)$ vector containing the values of the outcome for the treated period after the treatment, and Y_0 is a $(T_1 \times J)$ matrix containing the

values of the outcome for unit $j+1$. The impact of the treatment is obtained by comparing the post-treatment outcomes between the treated unit and the synthetic control:

$$Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}$$

A more detailed explanation of the method can be found in Abadie and Gardeazabal (2003) or Abadie (2021). The main purpose of any statistical exercise is to use inference to establish the validity of the results. This would seem to be difficult with the synthetic control method, which operates in a context in which some essential conditions for statistical inference are absent, such as the randomization of the sample and a choice of sample units through probabilistic means. However, the method allows for some exercises that provide equally valid results. These falsification exercises are termed "placebos" (again following medical literature) and there are two types: in-time placebos and in-space placebos. Suppose we have found a strong impact of some intervention using synthetic control. We would have doubts about the true significance of the result if a similar or greater impact were found for a different time period. In order to control for this possibility, an in-time placebo test is implemented. To do it, we run the method but impose that the intervention occurs at a different date. If no impact is detected, we can be confident that the date chosen for the intervention is appropriate. Using the example of the current investigation, we have chosen the date 1974 for the impact of the Carnation Revolution. Suppose, instead, that we choose 1964 as the intervention year and find no impact. We would then be confident that 1974 is the appropriate year for the intervention (Abadie and Gardeazabal, 2003, and Abadie, 2021).

We would also have doubts of the true significance of the intervention if we were to find a similar or greater impact for the same date but on other members of the donor pool not subject to the same kind of intervention. To assess this possibility, we reassign the intervention to the units in the donor pool that were not directly exposed to the intervention. If we find that the other units were not affected by it, we can be sure that the intervention is unique to the treated unit. In this case, we can attribute numerical significance to our exercise by calculating p-values. These can be obtained by

estimating in-space placebo effects for each unit in the sample and then calculating the fraction of those effects that is greater or similar to the effect obtained for the treated unit. The p-value in this context will tell us the probability of finding a similar result for another unit (Abadie and Gardeazabal, 2003, and Abadie, 2021).

In our investigation, the Portuguese synthetic economy is obtained by applying the above procedure to a balanced panel sample of 20 OECD economies for the period 1955-1992: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Japan, the Netherlands, New Zealand, Norway, South Korea, Spain, Sweden, Switzerland, and United States, besides Portugal itself, of course. This list of countries deserves some comments: the synthetic control method requires that units having been subject to a similar intervention to the treated unit should be excluded from the sample. Four countries pose potential problems in that regard: Greece and Spain, as they transitioned to democracy during these years, similarly to Portugal – Greece in 1974, Spain in 1975; and Italy and the UK, as they were both subject to IMF interventions in 1977, the same year that Portugal was also subject to one. We decided to retain Greece and Spain, basing our decision on the notion that their transitions did not bring radical economic change of the kind that occurred in Portugal: no end of an overseas empire, no mass influx of expatriates, no sudden labor and wage shock, no pro-socialist revolution implying the nationalization of the main private business assets. Their political transitions were gradual and negotiated affairs with no fundamental and sudden disruption of the basis of the pre-democratic economy (Prados and Sanz, 1993, Melcarne *et al*, 2021, and Alogoskoufis, 2021). On the other hand, we decided to exclude Italy and the United Kingdom, basing our decision on the considerable similarity between the IMF interventions in the two countries and the one that took place in Portugal (Crawford, 1983, Spaventa, 1983, and Amaral *et al.*, 2020), thus introducing a confounding factor in the analysis.

The outcome variables of interest are: the level of GDP per capita, the current account measured as a percentage of GDP, and the economy's capital-labor ratio. The treatment period was defined as starting in 1974. The variables used to build the synthetic version of the Portuguese

economy differed depending on the outcome variable taken into consideration. In the case of GDP per capita the variables were consumption, investment, and Government consumption (all in per capita terms), under the logic that they are the components of GDP. To these, other variables were added, as they were considered to be additional determinants of economic growth: total factor productivity (TFP), trade openness, and the real effective exchange rate. In the case of the current account the variables used were consumption, investment, Government consumption, exports, imports (all in per capita terms), the effective exchange rate, and the real effective exchange rate. The rationale for choosing these variables is that they are the main components of the current account or (in the case of the exchange rates) essential determinants of its behavior. In this respect, the simultaneous use of the nominal and real exchange rate comes from the fact that they determine different payment flows: the nominal exchange rate determines capital and transfer movements (which were especially important in Portugal thanks to emigrant remittances), and that the real exchange rate determines the competitiveness of exports. In the case of the capital-labor ratio, the variables were also chosen on the basis of being the meaningful ones to explain capital accumulation. They were: the internal rate of return, the share of capital in national income, the share of gross fixed capital formation in GDP, the rate of capital depreciation, and, finally, the exchange rate, the latter's presence being explained by the fact that much of the investment in Portugal was due to emigrant remittances, which were highly determined by exchange rate movements, the same applying to foreign investment.

Data for GDP per capita, capital-labor ratio, consumption per capita, investment per capita, Government consumption per capita, exports per capita, imports per capita, trade openness, TFP, internal rate of return, share of capital in national income, capital depreciation, and share of gross fixed capital formation were obtained from PWT 10.0. Data for the current account were obtained from Pinheiro (1997) for Portugal, and Jordà *et al.* (2017) for the remaining countries. Data for the real exchange rate were obtained from Bruegel Datasets. Data for the nominal exchange rate were obtained from the IMF's International Financial Statistics and Jordà *et al.* (2017). In the case of the

current account, due to scarcity of data, the sample was restricted to a subset of 14 of the countries mentioned above, excluding Austria, Greece, Ireland, Israel, New Zealand, and South Korea.

4. Measuring the Carnation Revolution

4.1 GDP per capita

Figure 5a shows the performance of the Portuguese economy as compared to that of its synthetic counterpart. We can see that both fell in 1974 but that the actual one continued its downward trend in 1975, generating a structural break in relation to the synthetic one, which started recovering in that year. The actual Portuguese economy returned to growth after 1976, but not at a fast enough pace to come back to its previous path, continuing to diverge from the synthetic. Divergence was even more pronounced after 1980 and until 1985. Only then did the economy start to recover clearly, but it was never able to catch up with the synthetic until 1992 (Figure 5a). According to our estimate, Portuguese GDP per capita was 15% lower in 1976 than it would have been in the absence of the revolution, this figure corresponding to the difference between the GDP per capita level of the actual Portuguese economy and of its synthetic in that year. This can be considered the short-term impact of the revolution. By 1992, at the end of our period of analysis, the gap had widened to 20%, which can be considered the long-term impact of the revolution as measurable in that year. These results show that the Portuguese economy interrupted a process of quick catch-up coming from the 1950s, although such a process should have continued in the light of the convergence hypothesis, which states that poorer countries should catch-up with richer countries (Johnson and Papageorgiou, 2020).

We can see in Table I, column 1, the weight of the "donor" countries in the construction of the Portuguese synthetic counterfactual. The largest donor is South Korea, with a weight of 35.9%, followed by Ireland, with a weight of 31.7, Japan, with a weight of 25.4%, and Greece, with a weight of 7%. In one fundamental respect, the contributors to the donor pool make sense: much like Portugal, all of them were fast growing economies in the period from the 1950s to the mid-1970s. The presence

of South Korea and Japan might raise some questions, but only at first sight. Portugal's growth path in the period has been compared in some literature to those of the so-called "Asian Tigers" (South Korea, Taiwan, and Hong Kong) (Baklanoff, 1992, Mateus, 2006, and Amaral, 2019), of which Japan is a somewhat earlier version. As for the presence of Ireland and Greece, it also makes sense, as theirs were catch-up and relatively less developed economies in the 1950s, 60s, and early-1970s. The presence of Spain and Greece in the sample might constitute a confounding factor, as they had transitions to democracy occurring at the same time as in Portugal. To address this issue, in Appendix 1 we provide a synthetic control test for the impact of the Carnation Revolution on Portuguese GDP per capita leaving Spain and Greece out of the sample. We can see there that the removal of those countries does not affect the fundamental result. Table II, panel a) shows that the synthetic controls are reasonably close to the actual Portuguese ones in terms of the predictor variables. The table also provides a comparison with the possible alternative method of using the same countries in the sample with their contributions arising from an unweighted average. The synthetic exercise gives much closer results, showing that it should be preferred.

Falsification through placebo tests provides meaningful results. We first apply the in-space placebo test, the results of which appear in Table III, column 1. The overall probability of the effect being replicated with a different treated unit is 0%, according to the p-value displayed in the last row of the table. This can be interpreted, similarly to traditional statistical inference, as a 0% significance level, revealing the high adequacy of the exercise. This is confirmed by Figures 6a and 6b, in which we see the specificity of the post-treatment Portuguese economy, as well as its clear divergence from the pre-treatment period. We conclude that the estimated effect could not have resulted from applying the intervention to a different treated unit.

At a second stage, we conduct the in-time placebo test, which is done by artificially reassigning the treatment to a date before the intervention. We reran the model for the case in which the intervention is reassigned to the middle of the pre-treatment period in 1964. Figure 6c shows the results: synthetic Portugal reproduces very closely the GDP per capita performance for the new pre-

treatment period. Most importantly, there is no new significant divergence in the trajectory of the current account between Portugal and its counterfactual, thereby suggesting that the estimated gap after 1974 is indeed determined by the treatment.

4.2 Current account

Measuring now the impact of the revolution on the balance of payments, our findings are reported in Figure 5b: Portugal had a very serious international payments crisis starting in 1974, but its synthetic counterpart had a much slighter one. Also, "synthetic Portugal" returned to balance in 1975 while actual Portugal saw its position deteriorate, starting to recover only in 1978 and completing the recovery in 1979. But this was soon followed by a new and steeper deterioration until 1983, with the recovery starting only in 1984 and being achieved in 1985. From 1986 until 1992, the Portuguese economy maintained balance, replicating the synthetic. The relevant donor countries in this case are Japan, with a weight of 84.2%, followed by Spain, with a weight of 11.6%, Australia, with a weight of 2.6%, and Norway, with a weight of 0.6% (Table I, column 2). As noted when commenting on the results for GDP per capita, the large contribution of Japan confirms the Asian Tiger profile of the Portuguese economy before 1974. Japan, the Asian Tigers and Portugal in those decades enjoyed a growth process closely linked with increased openness and a healthy balance of payments. Contrary to Japan and the Asian Tigers, Portugal's consistently positive external balance did not result from an outstanding export success (although there was some), but mostly from the massive influx of emigrant remittances. However, in terms of the shape of the current account, one process is indistinguishable from the other, meaning that Japan should still be viewed as being a reasonable comparator. Of course, Japan's GDP per capita level was considerably higher than Portugal's since the beginning of the period, but Spain's was similar. Perhaps if the complete sample had been available for this exercise, we would have seen a large contribution to the donor pool coming from South Korea, an economy closer to Portugal in terms of GDP per capita level than Japan. The presence of Australia and Norway is essentially negligible and must be due to some sort of coincidental marginal similarity

between the external position of their economies and Portugal's. Table II, panel b shows that the synthetic controls are reasonably close to Portugal in terms of the predictor variables, with the slight exception of investment and Government consumption. The table also provides a comparison with the possible alternative method of using the same country sample with their contributions arising from an unweighted average. The synthetic exercise gives much closer results.

The overall in-space placebo yields a p-values of 0.7 (Table III, column 2, last row). We conclude that the probability of the estimated effect resulting from applying the intervention to a different treated unit is only 7%, a very good level of significance. However, this does not give the full picture. If we decompose the results by the individual years after the intervention, the years of 1976 (7%), 1977 (7%), 1978 (0%), 1980 (0%), 1981 (0%), 1982 (0%), and 1983 (7%) provide the best p-values. This is explained by the fact that those were the years when the Portuguese current account most diverged from its synthetic. In 1979, Portugal recovered from the imbalance, something that is indicated with a p-value of 0.36 (i.e. a 36% probability of finding a similar result for another possible treated unit), and in the years after 1985 the values are very high, showing the balance of the final years of the period. In 1975 the Portuguese specificity was not yet entirely evident, which is reflected in a 0.14 p-value. Figures 7a and 7b show the uniqueness of the Portuguese path in relation to the donor units. Figure 7c has the results of the in-time placebo when the intervention is reassigned to 1964: synthetic Portugal reproduces very closely the current account behavior for the new pre-treatment period. Most importantly, there is no new significant divergence in the trajectory of the current account between Portugal and its counterfactual, thus suggesting that the estimated gap after 1974 is indeed determined by the treatment.

4.3 Capital-labor ratio

As for the impact of the revolution on the capital-labor ratio, we can see in Figure 5c that it was negative. The revolution brought a structural break to capital accumulation in the Portuguese economy, leading to a persistently lower growth path than in the previous 20 years, and lower than it

would have been in the absence of the revolution. This is a decisive contribution to explain the consistently lower growth performance of the Portuguese economy in the long-term with respect to its counterfactual economy. The relevant donor countries for this exercise are Spain, with an 83% contribution, followed by Denmark, with a 17% contribution. Also present in the list is Greece, although with a negligible contribution. Spain's large contribution adds value to our argument that the most important effects of the Carnation Revolution for economic growth were the labor shock caused by the return of the colonial residents from Africa and the capital flight caused by the mass nationalization program of 1975, phenomena that were totally absent in Spain thanks to its much less traumatic transition to democracy, which did not bring the practical destruction of the previous economic organization. Denmark's contribution is due to some similarity in the pre-treatment path of capital accumulation, even though the countries were at two very different levels of development. Still, its contribution is only of relative importance.

Table II, panel c) shows that the synthetic controls are reasonably close to Portugal in terms of the predictor variables, with the slight exception of the exchange rate. The table also provides a comparison with the possible alternative method of using the same country sample with their contributions resulting from an unweighted average. The synthetic exercise gives much closer results.

In addition, the overall in-space placebo yields a p-value of 0.05 (Table III, column 3, last row). This means that the probability of the estimated effect resulting from applying the intervention to a different treated unit is only 5%, a very good level of significance. If we decompose the results by the individual years after the intervention, 1976 (0%) gives the best result, followed by the year 1975 (7%) and the period from 1977 to 1987, with a 5% significance level. Only in the final years of the series is significance unsatisfactory, with p-values between 0.16 and 0.21, but this does not compromise the general validity of the placebo. The result in the final years of the period is most probably due to a return of confidence in the economy, coming on the heels of the third IMF intervention and Portugal's entry into the EEC. Figures 8a and 8b show the uniqueness of the Portuguese path in relation to the donor units. Figure 8c displays the results of the in-time placebo when the intervention is reassigned

to 1964: synthetic Portugal reproduces the capital-labor behavior for the new pre-treatment period. Most importantly, there is only a very slight divergence in the trajectory of the variable between Portugal and its counterfactual, meaning that the estimated gap after 1974 is indeed determined by the treatment.

The three tests above allow us to conclude that the many political and economic events associated with the Carnation Revolution made the situation in Portugal worse than if the country had been affected by only the international crisis, with respect to both its growth performance and its external imbalance. The latter was very important, as it substantially reduced the ability of policymakers to put in place policies allowing for a quicker return to strong economic growth. In the end, the dilemma between rebalancing the economy externally and making it grow took a decade to be resolved. Moreover, the revolution brought negative structural change to the process of capital accumulation, leading to a lower growth path of the Portuguese economy

Conclusion

We used a relatively recent statistical technique, the synthetic control method, to measure the economic impact of the Carnation Revolution in Portugal, to separate it from the effect of the 1970s international crisis. The Carnation Revolution unleashed a series of political, social, and economic tensions that made the economic situation of the country extremely difficult: wage explosion, reduction of working hours for the country's labor force, capital flight, expropriation of the assets of the business elite, the end of colonial trade, the arrival of about 500,000 to 700,000 refugees from the empire, less emigrants' remittances, and fewer tourist visits. According to our results, this set of factors determined a steeper fall in GDP per capita after 1974 than what it would have happened had the country's economy been affected by only the 1970s international crisis. The economic events associated with the revolution were also responsible for a more severe current account crisis than the one that would have resulted from the impact merely of the international crisis, something that made the recovery more difficult. The simultaneous occurrence of the two events created a dilemma for the

country' policymakers between returning to growth and rebalancing the economy, making the achievement of reaching both objectives more difficult than in the absence of the disruption associated with the revolution. The dilemma afflicted the economy for a full decade. The impact of the revolution was also felt in the long-term growth prospects of the economy, through its effects on the supply of both labor and capital. Both the labor explosion and the capital flight/scarcity affected the factor mix of the economy negatively, putting it on a lower growth path than what would have happened without the revolution and the instability that followed.

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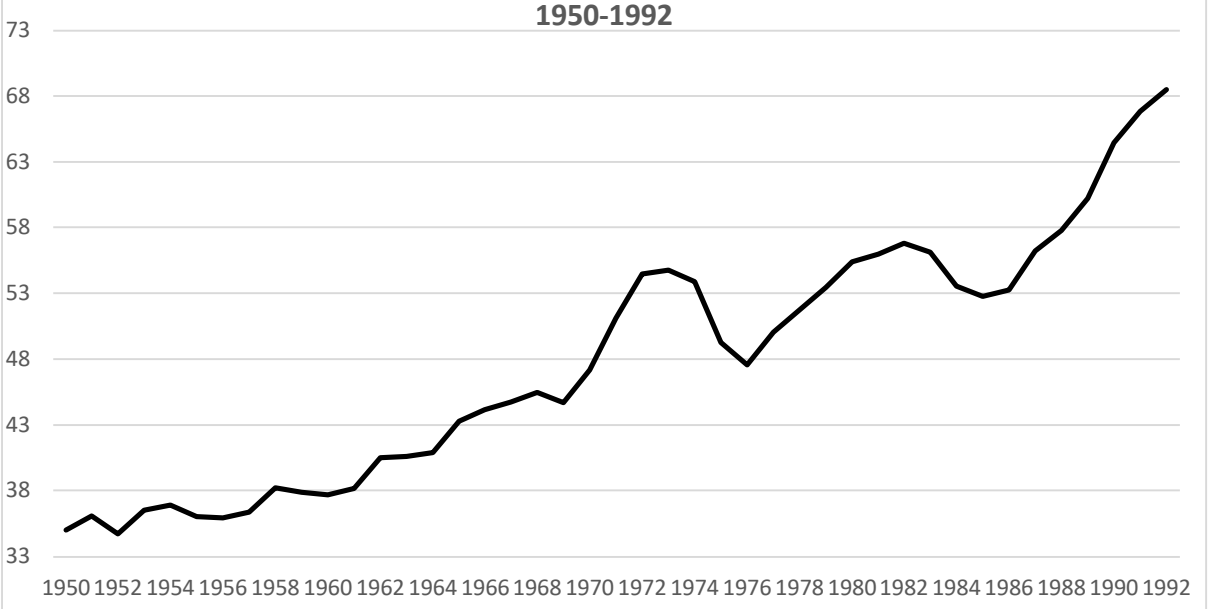
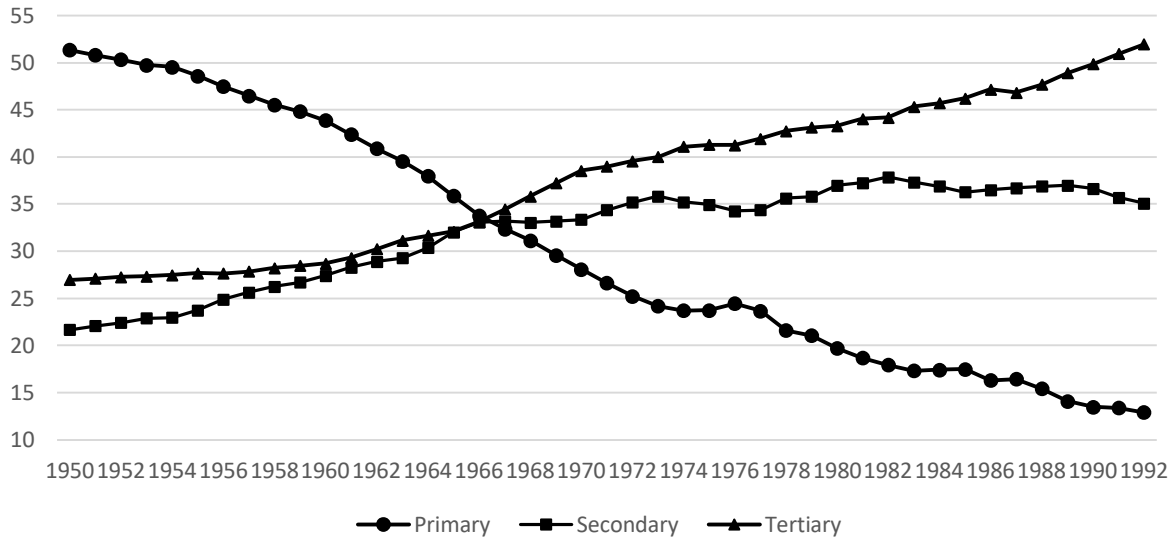
Figure 1
GDP per capita in Portugal as a % of GDP per capita in richer countries, 1950-1992



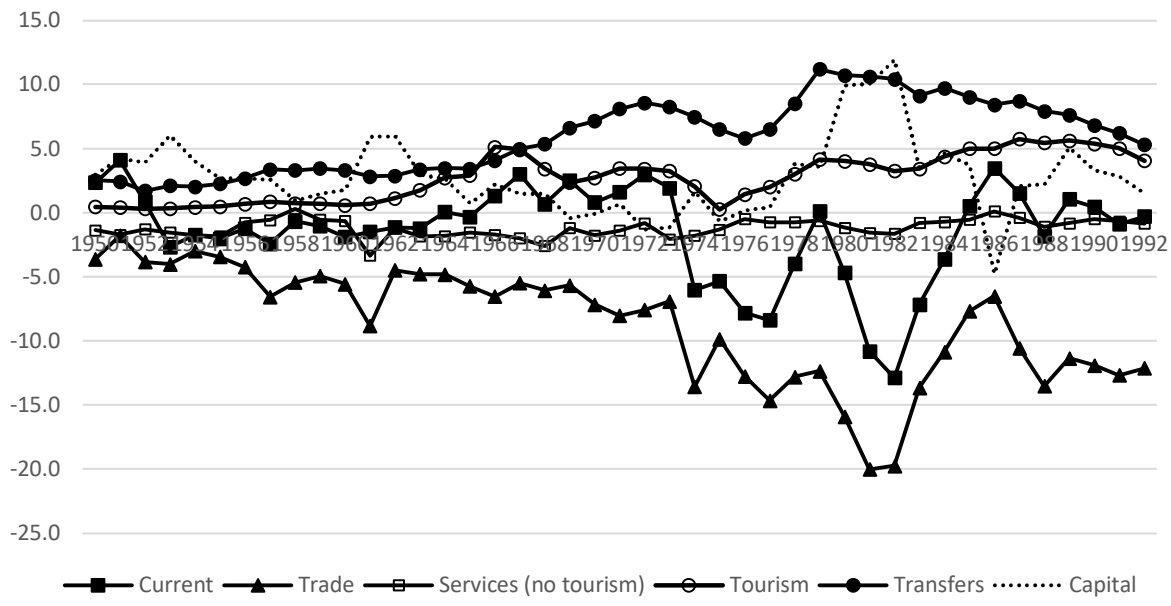
Note: countries represented in the sample: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, New Zealand, Norway, Sweden, Switzerland, UK and US
Sources: Portugal – Amaral (2009); for the other countries: The Conference Board
Unit: EKS 2017 US dollars, converted with 2011 PPP

Figure 2
Structure employment, Portugal, 1950-1992 (% overall employment)



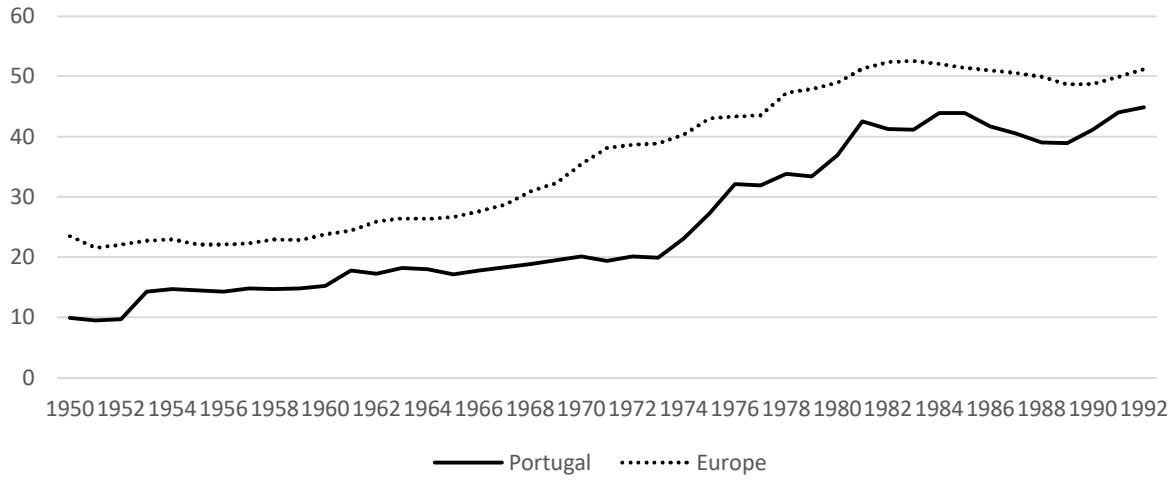
Note: Primary refers to Agriculture, Fishing, and Mining; Secondary refers to Manufacturing and Construction; Tertiary refers to Transportation, Communications, Commerce and Other Services
Sources: calculated by the authors using Nunes (2001) and Pinheiro (1997)

Figure 3
Balance of payments, Portugal, 1950-1992 (% GDP)



Source: Pinheiro (1997)

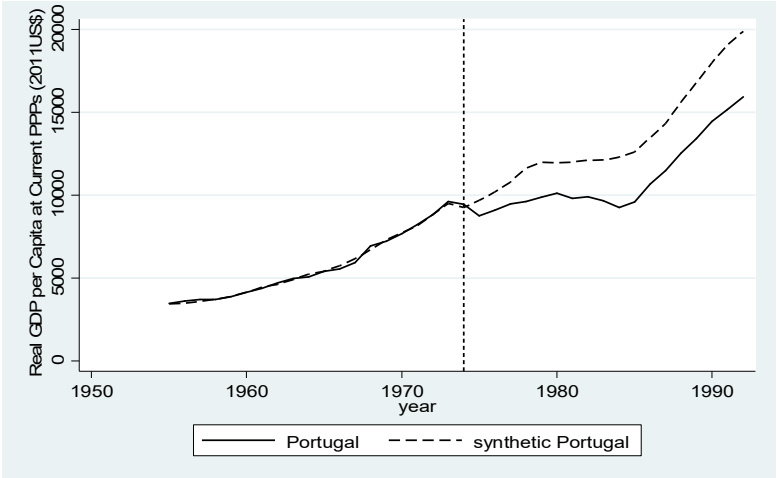
Figure 4
Public Spending, Portugal and average European countries, 1950-1992 (% GDP)



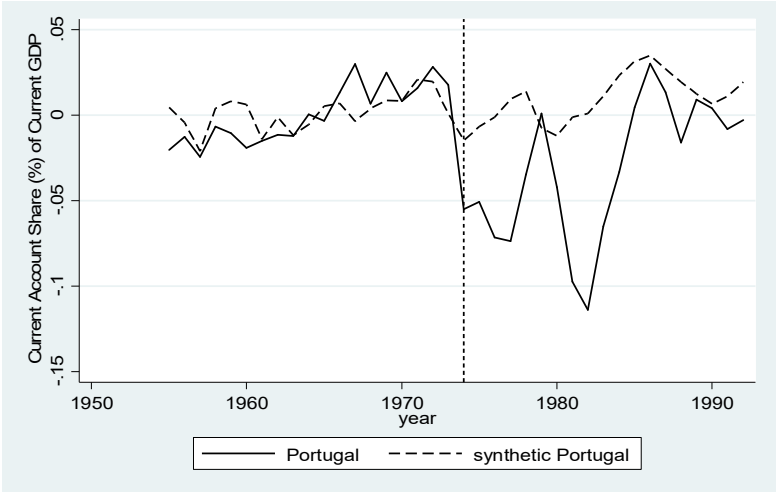
Source: Portugal: Pinheiro (1997); other countries: Mauro *et al*. (2013)
Note: the countries in the sample are the UK, Austria, Belgium, Denmark, France, Germany, Netherlands, Norway, and Sweden

Figure 5
GDP per capita, Current account, and capital-labour ratio: Portugal vs. synthetic (1955-1992), treatment: 1974

a) GDP per capita



b) Current account



c) Capital-labour ratio

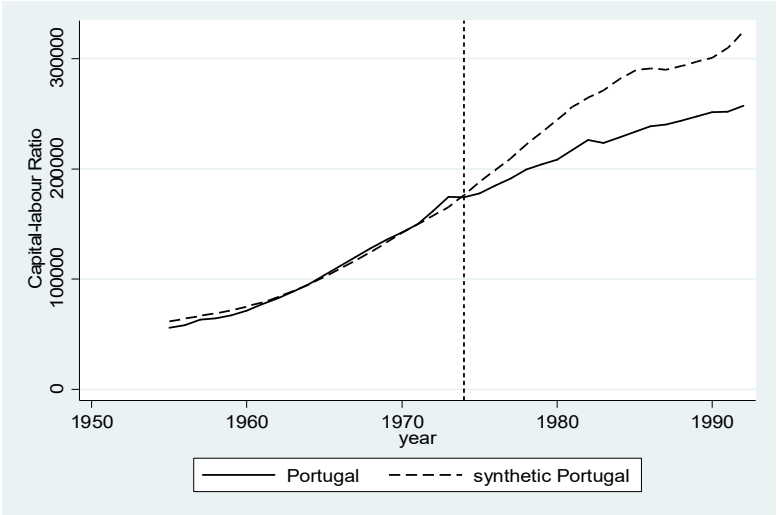


Table I
Country Weights for Synthetic Portugal, GDP per capita, current account and capital-labour ratio

Country	(1) Synthetic Control Weight GDP per capita	(2) Synthetic Control Weight Current account	(3) Synthetic Control Weight K-L ratio
Australia	0	0.026	0
Austria	0	nd	0
Belgium	0	0	0
Canada	0	0	0
Denmark	0	0	0.168
Finland	0	0	0
France	0	0	0
Germany	0	0	0
Greece	0.07	nd	0.01
Ireland	0.317	nd	0
Israel	0	nd	0
Japan	0.254	0.842	0
Netherlands	0	0	0
New Zealand	0	nd	0
Norway	0	0.006	0
South Korea	0.359	nd	0
Spain	0	0.126	0.832
Sweden	0	0	0
Switzerland	0	0	0
United States	0	0	0

Table II
Predictor Means for the Pre-treatment Period (1955-1973)

a) GDP per capita

	Portugal	Synthetic Portugal	OECD pool
Consumption Per Capita	4017.888	3568.905	7132.423
Investment Per Capita	1265.528	1513.959	3832.791
Government Consumption Per Capita	618.7027	840.5616	1791.256
Trade Openness	1419.383	1856.473	4932.29
Real Effective Exchange Rate	0.9513424	0.9773902	1.010556
TFP	0.8502527	0.6879624	0.7235818

b) Current Account

	Portugal	Synthetic Portugal	OECD pool
Consumption Per Capita	4017.888	4370.91	7954.383
Investment Per Capita	1265.528	2739.907	4492.512
Government Consumption Per Capita	618.7027	1305.138	1854.091
Exports Per Capita	506.883	614.4739	2628.839
Imports Per Capita	912.5002	909.3655	3129.607
Exchange Rate	0.0352388	0.0351745	0.3525189
Real Effective Exchange Rate	0.9513424	0.9224208	0.9967622

c) Capital-labour ratio

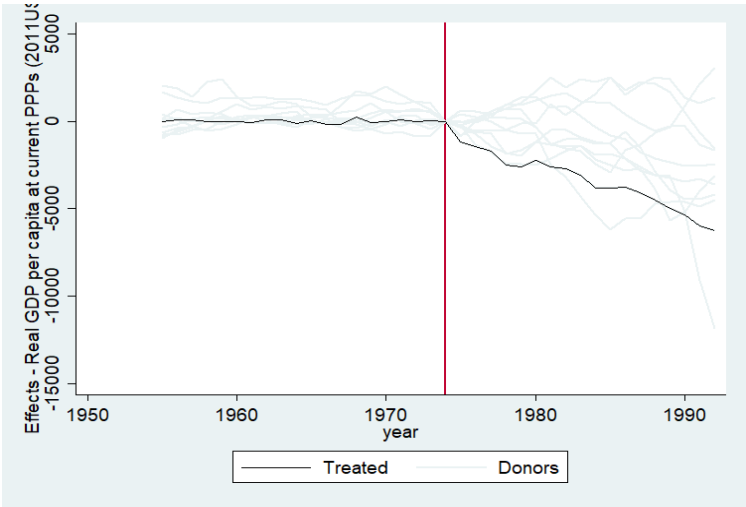
	Portugal	Synthetic Portugal	OECD pool
Internal rate of return	0.135	0.113	0.089
Capital share in national income	0.357	0.360	0.354
GFCF share in GDP	0.217	0.232	0.292
Capital depreciation	0.026	0.034	0.035
Exchange rate	0.142	1.462	29.218

Table III
P-values for in-space placebo effects

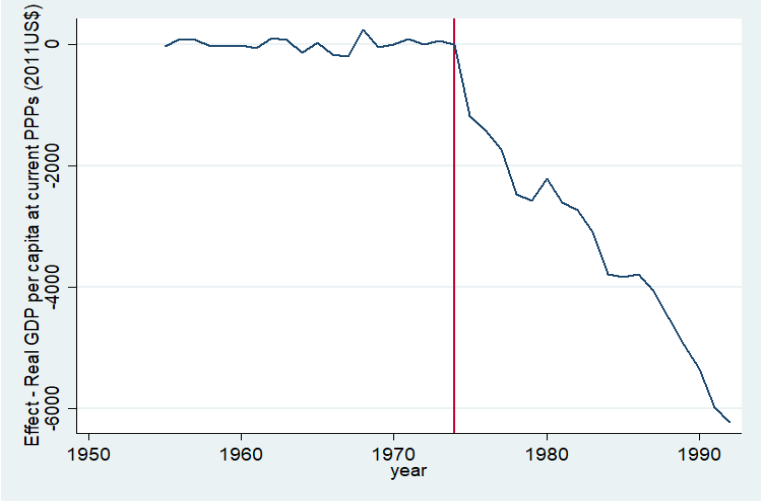
Year	(1) GDP per capita	(2) Current account	(3) K-L ratio
1975	0	0.143	0
1976	0	0.071	0
1977	0	0.071	0.053
1978	0	0.071	0.053
1979	0	0.5	0.053
1980	0	0.357	0.053
1981	0	0	0.053
1982	0	0	0.053
1983	0	0	0.053
1984	0	0	0.053
1985	0	0.5	0.053
1986	0	0.929	0.053
1987	0	0.571	0.053
1988	0	0.143	0.158
1989	0	0.923	0.210
1990	0	1	0.210
1991	0	0.5	0.158
1992	0.1	0.714	0.158
Overall	0	0.07	0.05

Figure 6
Placebo tests synthetic control method GDP per capita Portugal (1955-1992), treatment: 1974

a) Portugal vs. donors



b) Gap post-1974 Portugal vs synthetic



c) Treatment relocation 1964

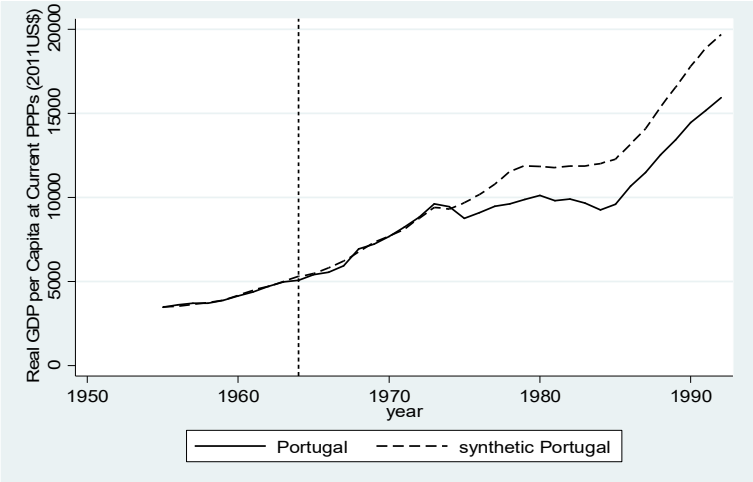
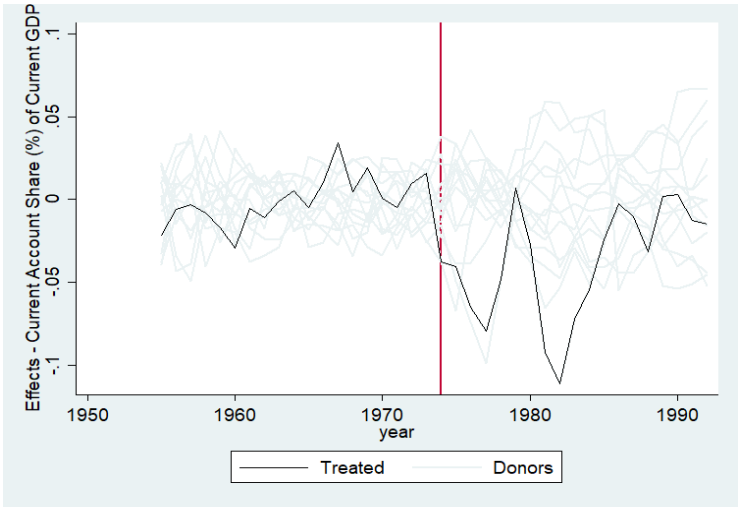
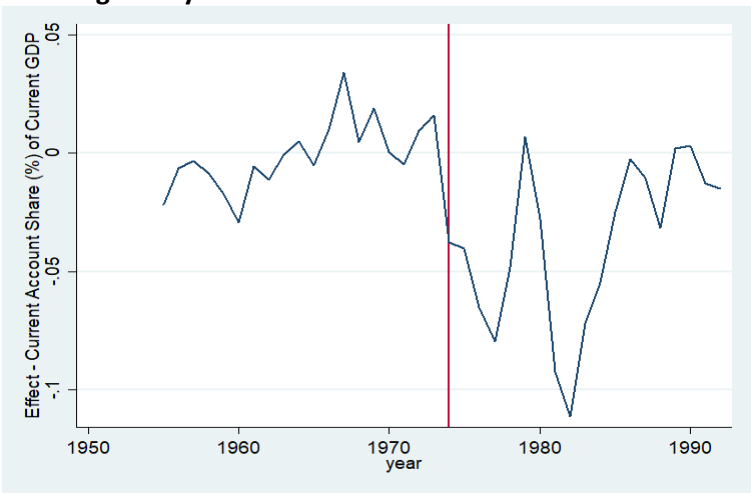


Figure 7
Placebo tests synthetic control method current account Portugal (1955-1992), treatment: 1974

a) Portugal vs. donors



b) Gap post-1974 Portugal vs synthetic



c) Treatment relocation 1964

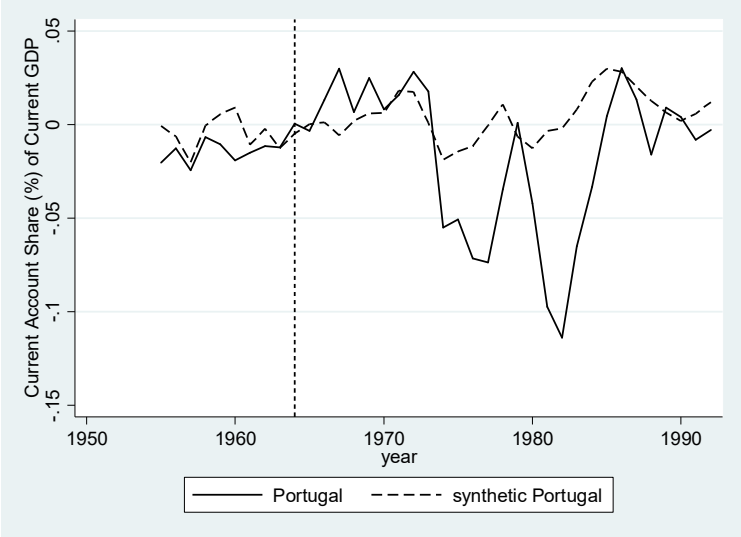
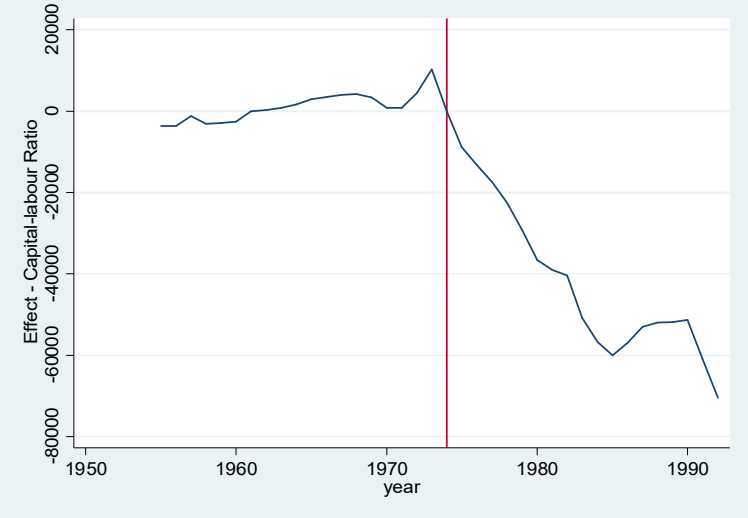


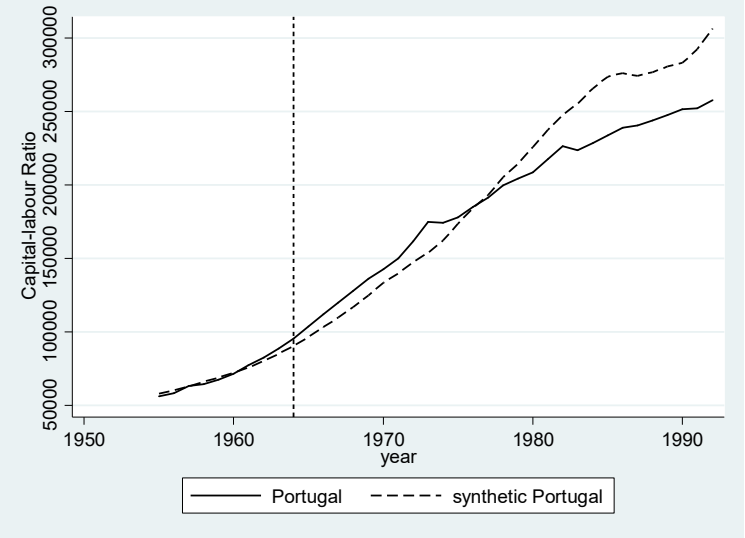
Figure 8
Placebo tests synthetic control method capital-labour ratio Portugal (1955-1992), treatment: 1974

a) Portugal vs. donors

b) Gap post-1974 Portugal vs synthetic



c) Treatment relocation 1964



Appendix 1

A synthetic control test for Portugal's GDP per capita after the Carnation Revolution excluding Greece and Spain from the sample

To address the issue of the possible confounding factor of the presence of Greece and Spain in the pre-treatment period sample of countries, we provide in this appendix a synthetic control test for the impact of the Carnation Revolution on Portuguese GDP per capita leaving the two countries out of the sample. The results are shown in the figure and table below. The figure shows an impact of the revolution that is almost exactly the same as the one reported in the main text, in which Greece and Spain are included in the sample. The table shows how the country weights are also essentially identical: South Korea is still the largest donor, its weight now being 45% (it was 36% in the test that included Greece and Spain) and the remaining donors have similar weights: Japan now has a weight of 30%, versus 25% in the sample with Greece and Spain, and Ireland 32%, when it was 22% in the sample with Greece and Spain. Greece, which contributed with 7% in the original test, of course now disappears. Instead, Switzerland becomes a donor, although with a negligible contribution of only 3%. As we can see, none of this fundamentally alters the results reported in the main text, allowing us to conclude that the presence of Greece and Spain in the sample is not a confounding factor that jeopardizes the validity of our test.

Figure A.1
GDP per capita Portugal vs. Synthetic Portugal, 1955-1992, treatment 1974 (without Greece and Spain in the sample)

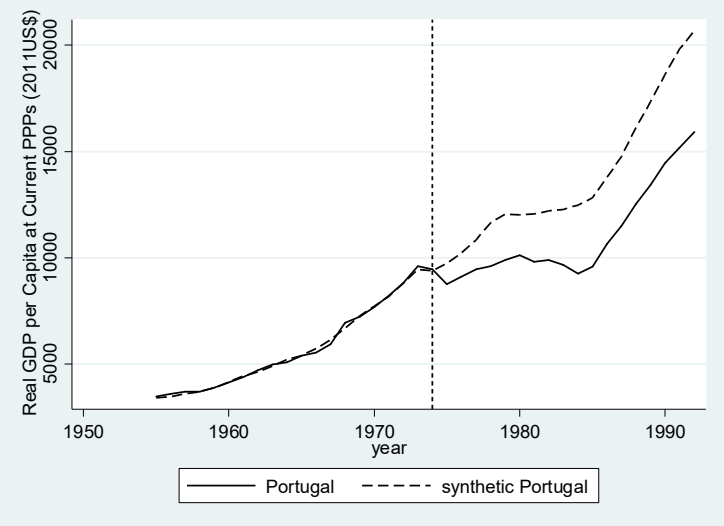


Table I
Country Weights for Synthetic Portugal, GDP per capita (without Greece and Spain in the sample)

Australia	0
Austria	0
Belgium	0
Canada	0
Denmark	0
Finland	0
France	0
Germany	0
Ireland	0.222
Israel	0
Japan	0.298
Netherlands	0
New Zealand	0
Norway	0
South Korea	0.450
Sweden	0
Switzerland	0.029
United States	0

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