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## Quantifying the costs of sovereign defaults using odious debt cases as a quasi-natural experiment

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**Quantifying the costs of sovereign defaults using odious debt cases as a quasi-natural experiment**

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# **Quantifying the costs of sovereign defaults using odious debt cases as a quasi-natural experiment**

## **Abstract**

Sovereign defaults enable the defaulting countries to eliminate its debt, which raises the question why sovereign debt can exist, given that lenders fear losing their money. Thus, a cost burden must exist for a country in order to achieve the government paying its debt. Historically, sovereign defaults mostly occur in times of low GDP growth rates. This makes it impossible to isolate the defaults' impact on macroeconomic fundamentals since the vice-versa causality cannot be ruled out when a traditional regression analysis is applied. With this, it is not conceivable to quantify the defaults' idiosyncratic costs. An instrument variable for a sovereign default has not been found and it is likely that such an instrument does not exist at all. This paper applies a quasi-natural experiment approach to circumvent the above mentioned causality problem. Odious debt cases, as well as scenarios where the government leaders have argued that the government debt is illegitimate, are applied to quantify the sovereign default's impact on macroeconomic fundamentals. Since only few of these cases are available, a panel analysis is conducted, using the Abadie and Gardeazabal (2003) and Abadie et al. (2010) synthetic control method for comparative case studies, in order to generate synthetic counterfactual countries that have the same macroeconomic fundamentals in the pre-default period. In addition to that, the creditors' behavior towards the defaulting country is analyzed, giving hints that the GDP, FDI's, private lending as well as development aid may decline after the non-necessary default is announced.

JEL-Codes: C82, E01, F21, F34, F35, F51, N20, N26, N27, O54, O55

## **1. Introduction**

“What happens when a country goes bust”<sup>1</sup> has been the headline of the Economist on November 24<sup>th</sup>, 2014, showing that investors as well as residents of the defaulting country are concerned about what may happen once a sovereign default is declared. The country that defaults will be burdened by costs that might be either directly imposed to the country (such as trade sanctions) or indirectly (such as a decline in trade loans due to the loss in the country’s credibility by foreign investors), see Borenzstein and Panizza (2009) for further examples to deter other countries from defaulting.

Previous empirical investigations that have been performed to quantify the costs of sovereign defaults suffer from a two-way causality since defaults usually occur in bad economic times, as noted by Levy Yeyati and Panizza (2009). To overcome this problem, a quasi-natural experiment is conducted in this paper, employing defaults that were non-necessary, such as odious debt defaults. Due to the small number of countries that defaulted due to their unwillingness to pay, the synthetic control method for comparative case studies which was suggested by Abadie and Gardeazabal (2003) and Abadie et al. (2010) is applied in this paper. The remainder of the paper is structured as followed: Chapter 2 will give a literature overview and it will discuss the causality problem of the previous studies undertaken. Chapter 3 will introduce the concept of odious debt, explain the quasi-natural experiment, and discuss which defaults can be attributed as odious debt defaults. Chapter 4 will introduce the methodology and discuss the results. Finally, chapter 5 concludes.

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<sup>1</sup> Economist, the (2014b).

## **2. The costs of sovereign default**

### **2.1. Literature overview**

Costs imposed to the defaulter are a necessary condition to be fulfilled in order to allow the existence of sovereign debt, given that countries cannot leave the market, as it is the case for companies, once they become unable to pay their debt. The companies' assets can be sold if the company exits the market, to fulfill the lenders demands, while this is not the case for countries.<sup>2</sup> Coherently, there must be other actions the creditor has to enforce the legal demands that follow out of a government debt contract to deter the country from defaulting. Direct costs imposed to the defaulting country by the lender might be one channel to assure the debt payments from the sovereign debtor, such as a halt in lending further money to both, the government and the non-government investors in the country, or trade sanctions, which worsen other macroeconomic fundamentals such as the GDP per capita indirectly.

Research in the field of the costs of sovereign default has been conducted in diverse fields. The main point of concern is the exclusion from international capital markets as it has been shown in the theoretical model proposed by Eaton and Gersowitz in 1981. Empirical research with reference to this field has been made by Borenzstein and Panizza (2009), who have estimated a negative impact of sovereign defaults on sovereign credit ratings, as well as on bond spreads after the end of the default episode. According to them, these effects are not long-lasting.

Another focus of research is the possibility of a GDP decline following the sovereign default. A significant negative correlation of GDP growth and sovereign default has been identified by Schaltegger and Weder (2013). Sturzenegger (2004), Fuceri and Zdzienicka (2012), Borenzstein and Panizza (2009), de Paoli et al. (2009), Sandleris (2012), and Jorra (2011). On the other hand, Levy Yeyati and Panizza (2009), using quarterly data, have argued that a sovereign default occurs in the trough of the recession, accompanied with an increase in growth, following the default event. Panizza et al. (2009) also found lower growth rates during and after the default's

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<sup>2</sup> The seizure of an Argentine naval vessel in 2012, the ARA Libertad, in Ghana by an American hedge fund might a rare exemption, see Financial Times (2012).

announcement, but they have also noted that growth tends to recover quickly in the periods following the default, denying a long-lasting negative effect on economic growth.

According to Rose (2005) and Martinez and Sandleris (2011) a sovereign default can be accompanied by a decline in trade. This can be achieved by direct trade sanctions but it can also be a consequence of the GDP decline. On the contrary, Borenzstein and Panizza (2009) have concluded that the trade loss is short lived, but they were not able to determine that the reduction in international trade is given due to the reduction in the volume of official trade credit. This rejects the idea that trade loans are an indirect channel of declining trade. A default induced currency devaluation (see De Paoli et al. 2009), which caused lack of imported intermediate goods that are needed to produce final exported goods, is a further transmission mechanism for the decline in exports. The currency crisis mentioned above may attribute to an improvement of exports due to their relative price decline. Although it is likely that “easy to produce” exports, like agricultural products, may increase, the more sophisticated products, for whose production imported intermediate goods are required, might decline as Mendoza and Yue (2012) have expounded.

De Paoli et al. (2006), de Paoli et al. (2009) and Borenzstein and Panizza (2009) have argued that a sovereign default can be the source of a banking crisis or a currency crisis. The banking crisis can be directly caused by the sovereign default decision. The domestic banks are holding government bonds, which lose their value due to the default, leading to an unsustainable decline of the banks’ assets. This effect is even stronger if the government tries to circumvent the sovereign default by forcing its domestic banks to buy government bonds. Borenzstein and Panizza (2009) have estimated that the relationship is not vice-versa. On the contrary, the possibility that the causality is the other way around - such that a default occurs because banks have to be bailed-out might also be the cause of a sovereign default, as the anecdotic evidence on the nearby default of Iceland in 2008 has shown. Schaltegger and Weder (2013) have calculated a significant positive correlation, predicting that sovereign defaults and banking crisis occur at the same time.

An FDI decline has been estimated in the aftermath of sovereign default, since investors are deterred due to the governments’ expropriation of private capital as noted by Arteta and Hale (2008), who, using micro data, found a foreign credit decline to domestic firms by over 20

percent, and by Fuentes and Saravia (2010). Furthermore, private capital inflows are reduced following a sovereign default. On the other hand, Jorra (2011) does not find a significant impact of a default on the FDI inflows. Supporting Jorra (2011), Borenzstein and Panizza (2009) have estimated that a sovereign default does not lead to an external financing problem for domestic industries, leaving them unharmed.

Another point of interest might be the re-election probability of the government leaders that decide whether their country should default or not. Borenzstein and Panizza (2008) have estimated a lower re-election probability after a default is announced. Thus, career interested government leaders should not default if they are interested in continuing their career which is, conferring to Panizza et al. (2009), the main reason why countries pay their debt. Foley-Fisher (2012) has found out the contrary, assuming that a default being declared at the beginning of the electoral term signals a strong government.

It can be assumed that countries that declare their sovereign default will suffer from official development aid decline, although the opposite has been found. Among the limited literature in this field, Brandt and Jorra (2012) have estimated a development aid increase of 6.4 percent, following a sovereign default. According to them, this instrument cannot serve as an enforcement mechanism against defaulting countries.

## **2.2. The causality problem - why and when do defaults occur**

As figure A1 in the appendix shows, defaults have occurred in clusters over history, with the peak located in the 1980's. This is due to the Reagonomics policy in the USA, where President Ronald Reagan cut taxes and increased defense spending,<sup>3</sup> while central bank president Paul Volcker ran a restrictive monetary policy. This policy mix initiated a revaluation of the US-Dollar, leaving several developing countries unable to serve their US-Dollar denominated government debt. Still today several emerging market economies still hold their debt in foreign currencies, making them prone to exchange rate volatility, therefore lowering the credit worthiness of the countries, causing higher risk premiums, which leads to a higher debt service

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<sup>3</sup> Expansionary fiscal policy.

burden and a lower sustainable debt level (see Eichengreen et al. 2003). Other sovereign defaults, such as Russia in 1998, Argentina in 2001, Uruguay 2003 and Greece 2012 were provoked by weak economic performance in those countries or by contagion,<sup>4</sup> leading to unsustainable high debt levels. War is another reason why countries become unable to pay their debt, since the war costs have the power to bear a burden too high for the country. An example is the default of Croatia in 1993.<sup>5</sup>

Thus, once the impact of a sovereign default on the macroeconomic performance of a country is investigated empirically, the vice-versa causality issue will appear, given that it is still not known whether the default was caused by poor macroeconomic fundamentals, or the default has created the bad fundamentals. As mentioned above, Levy Yeyati and Panizza (2009) have argued that the default occurs in the trough of the recession, following an improvement of the economy. Thereafter, Tomz and Wright (2007) also found a negative correlation of GDP growth and the defaults' announcement, while investigating defaults between 1820 and 2003, although the correlation found was weak. Panizza et al. (2009) argue that the default itself might lead to a deepening of the output loss during the crisis in which it occurs, but they do not find long lasting effects.

From a theoretical perspective, it is doubtless that a default worsens the country's macroeconomic environment because the defaulting government denies property rights, which signals bad institutions to possible investors. Nonetheless, the isolated impact of a sovereign default on macroeconomic fundamentals has not been quantified yet. The forthcoming analysis applies three case studies in which the sovereign default decision has been isolated from any previous economic crisis. Thereby odious debt, odious debt alike examples, and "sovereign theft"<sup>6</sup> cases are analyzed. The latter tends to be the more appropriate quasi-natural experiment, since the before mentioned quasi-natural experiment example can suffer from international sanctions from the time the regime was odious, the results could be biased.

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<sup>4</sup> The case of Uruguay is an example of a default caused by contagion. Due to the default and the economic crisis in Argentina, the most important trading partner failed and Uruguay had to declare its default.

<sup>5</sup> The default data is taken from Borenzstein and Panizza (2009).

<sup>6</sup> Tomz and Wright (2008), p.2.



### **3. Odious Debt as a Quasi-Natural Experiment to isolate the impact of a sovereign default on macroeconomic fundamentals**

A suitable quasi-natural experiment that allows quantifying the costs following a sovereign default must exclude those defaults that were induced by economic crisis, wars, or natural disasters. Accordingly, all defaults that appeared in history must be analyzed and it has to be decided, whether a default has been induced by the inability to pay or by the unwillingness to pay. This study only investigates those defaults that are caused by the country's unwillingness. By doing so, default decisions that have to be carried out by policy leaders, which are faced with economic crisis, are not taken into account. This is because the aim of the quasi-natural experiment is to isolate the default costs from economic crisis costs.

The literature in this field is rare and the only exceptions are Grossman and van Huyeck (1985) that differentiate whether the default was excusable or not, and Alfaro and Kanczuk (2005) who set up a theoretical model and argue that a government may be either bad or good. Anyhow, both papers do not analyze the differences empirically.

#### **3.1. What is odious debt? - The ex-ante versus the ex-post approach**

Odious debt is defined as a government acquiring loans and instead of spending them on consumption smoothing, government investments, or the provision of public goods, loans are used on the personal convenience of the domestic leaders being in charge of negotiating and signing the respective government debt contracts. Other definitions of odious debt concern the effectiveness of government expenditure as well as expenses on suppression of the population. This is also called dictator debts or regime debts (see Nehru and Thomas 2008). According to them, other fields of odious debts include war debts and subjugation debts. Given this theory, odious debt is always aligned with a deep policy change.

The traditional literature on odious debt concerns the avoidance of odious debt, which is, the obligation of the lender. Thus, traditional creditor-borrower relationships, screening and

monitoring are to be conducted to avoid default on the ground of odious debt (see Nehru and Thomas 2008).

The odious debt literature has developed two different odious debt approaches, the ex-ante odious debt and the ex-post odious debt. Their main difference is the timing and the decider of the declaration of the sovereign debt being odious.

Debt is declared illegitimate ex-ante by an international body, e.g. the UN-security council. Due to their declaration as being odious, investors know that a new government will repudiate the country's debt. To avoid losses, an investor will stop providing the odious labeled country with long term loans.<sup>7</sup> On the other hand, interest rates may rise in countries that are declared odious leading to a more severe suffering of the domestic population, enabling the government leaders to attract foreign capital (see Jayachandran and Kremer 2006). This ex-ante approach can be criticized since high return on investments, which overcompensates the riskiness of the investment, paid by odious states may encourage lenders to continue investing into odious regimes. Historically, sovereign debt has never been declared as being odious ex-ante.

In the ex-post odious debt approach, an international body or the country itself, declares the sovereign debt as illegitimate after the odious government has been removed from power (see Jayachandran and Kremer 2006). This can be a multilateral agreement as in the case of South Africa in the transition from the Apartheid regime towards a democracy (see Nehru and Thomas 2009), or unilateral, as in the instance of Ecuador in 2008 (see Kueffner 2008).<sup>8</sup> These defaults are usually high selective, since even odious regimes not only invest into items, which are used to suppress the population, but they also invest in public goods from which the population benefits, such as hospitals, streets or schools. In the remainder of this chapter, the countries selected for the odious debt approach are introduced. In the following, odious debt events will be used to quantify the costs of sovereign defaults. Thereby, odious – or non-necessary - debt cases are discussed to serve as a quasi-natural experiment to tackle the causality problem explained in chapter 2.2.

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<sup>7</sup> This assumption holds at least for long term loans. Since the investor would assume the ex-ante odious government will remain in power, at least in the short run, he would continue to supply the country with short term loans. Being avoided by institutional and risk-averse investors, the odious country would pay a higher prime on its loans.

<sup>8</sup> Both cases will be explained more detailed in the following subchapters.

## **3.2. The quasi-natural experiment**

### *3.2.1. Costa Rica 1923*

The first example of a country that has repudiated its debt on odious reasons was Costa Rica in 1923, when the US Supreme Court declared the government debt being the one of the previous dictator, Frederico Tinoco, who has overthrown the former government in 1917 and left the country 2 years later. Before he left the country he received a loan from the Royal Bank of Canada and he took the money with him, while leaving the country (see Buchheit, Gulati and Thompson 2007 and Nehru and Thomas 2009). Given that this case is the textbook example of odious debt, it is included in the following analysis, although some difficulties in obtaining data appear. Consistently, the results obtained for Costa Rica are only comparable to the other results to a limited extend.

### *3.2.2. South Africa 1993*

In the transition period from the Apartheid towards a full democracy, the South African government has declared South Africa's debt, which was raised by the predecessor apartheid government<sup>9</sup> in the 1970's and 1980's, as being odious in the year 1993. To avoid harsh punishment and to reduce the costs of the default, the restructuring of the South African bonds was negotiated with the bondholders shortly after the default was announced (see Nehru and Thomas 2009, p. 210). This allowed for the South African debt,<sup>10</sup> which was defaulted in September 1993, to be restructured in the same month. With this the country regained access to the capital markets in 1994 (see Cruces and Trebesch 2011, p. 43).

The ANC government itself has not further repudiated the countries' debt, which originated during the Apartheid regime (see Howse 2008, p. 13 and Kremer and Jayachandran 2006, p. 86).

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<sup>9</sup> The Apartheid debt amounted to 86.7 billion rand (14 billion US-Dollars) in 1993, see Economist, the (1999).

<sup>10</sup> According to Cruces and Trebesch (2011), p. 78.5 billion US-Dollars were affected by the sovereign default, which included short term debt, previously restructured debt and the old debt already fallen due at the time of the restructuring.

This was due to the governments wish to retain the good economic ties to western creditors. The full repudiation of the Apartheid debt is still a matter of public debate in South Africa today (see Economist, the, 1999) and - indeed, not the entire debt inherited from the Apartheid regime has been repudiated by the transitory government in 1993, since a significant share of the debt taken in the 1970's and 1980's went into schooling, medical care and infrastructure, which can be accounted as a legitimate debt although conducted under an odious regime.

Arguments that support the classification of the default of 1993 as being odious are laid on the grounds of the odiousness of the debt on which South Africa has declared its default in 1993. Furthermore, the default was announced outside of any default cluster (see Borenzstein and Panizza 2009) while the country was not suffering from economic problems, as it can be seen in figure A1 in the appendix. According to the South African Reserve Bank (1997), the total foreign debt stood in the range of 25-30 billion US-Dollars between 1990 and 1994 with a foreign debt share as a percentage of GDP being between 20 and 25 percent, with 1990 showing the largest debt share as a percentage term of GDP.<sup>1112</sup> On the other hand, South Africa's total loan debt of national government as a percentage of its GDP stood at 28.1 percent in the first quarter of 1991. It increased to 34.5 percent in the fourth quarter of 1992, reaching a value of 37.2 percent in the third quarter of 1993, when the default was announced (see South African Reserve Bank 2015b). The Government debt, as a percentage of GDP, rose further after the announcement of the default, reaching its peak of 47.6 percent of GDP in the second quarter of 1997. South Africa had a deficit of more than 6 percent of its GDP the year the default was announced (see South African Reserve Bank 2015a). Contrary to that, the South African Institutional Credit Rating received a score of 38.2 (a ranking between 0 and 100 with the higher score being more creditworthy), this being higher than the scores of other defaulters (see Cruces and Trebesch 2011, p.7 and Reinhard and Rogoff 2009, p. 285f).<sup>1314</sup> This leads to the conclusion that the selected default of 1993 was

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<sup>11</sup> Further proxies are applied to derive the assumption that South Africa has not been into economic trouble by the time the default was announced in 1993. Hence, according to (Worldbank 2015) the Central Government final consumption has not changed systematically around the time the default has been announced, the inflation rate has declined and the currency devaluation vis a vis the US-Dollar has declined by less than 15 percent, which is in line with other countries, that did not declare their default.

<sup>12</sup> By the time the default was announced, most countries have abolished the economic sanctions on South Africa.

<sup>13</sup> In terms of speculation, one might assume that the creditors negotiated the default with the transitory regime, due to the fear that any negotiation with the post-Apartheid government might have led to a higher haircut. After the restructuring of the debt in 1993, the creditors were able to argue that the Apartheid debt has already been restructured, which laid grounds for the Mandela government in order to not further repudiate the countries' debt.

due to the odiousness of the sovereign debt and not due to its unsustainability.<sup>15</sup> This explains why South Africa is included as a case study in the following analysis. Anyhow, a huge policy change was made at the end of Apartheid. In the following analysis, all changes in South Africa are attributed to the default event and not to the further policy change. The supporting argument for this assumption is that all policy measures that were taken at the end of Apartheid should have a positive impact on South Africa's macroeconomic outcome. Once trade embargos were lifted and the entire population was allowed to participate in the economy and move freely around the country, an improvement of all variables should have been observed. On the other hand, the fear of government theft or a marginalization of minority groups might have deterred investment in some circumstances.

### 3.2.3. *Ecuador 2008*

The "populist government of Ecuador"<sup>16</sup>, leaded by Rafael Correa, declared its default on its 2012 and 2030 government bonds on the 12<sup>th</sup> of December 2008 (see Kueffner 2008), declaring its debt "immoral and illegitimate".<sup>17</sup> While defaulting in 2008, Ecuador neither suffered from an economic nor a financial hardship. The country had no reason to default. Its debt-GDP ratio, as well as its debt-government revenue ratio have never been lower as in more than 3 decades. Additionally, the Ecuadorian Central Bank held 6.5 billion US-Dollars in freely disposable international reserves, which was more than it has ever accumulated before. The bond on which the country defaulted required an interest payment of 331 million US-Dollars, (see Porzecanski 2010). It was even noted by the financial minister, 15 months after the default, that the default

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<sup>14</sup> In September, 1993 it was already known that free elections would take place in 1994 with the ANC being most likely to win the elections. Thus, the possibility of a further repudiation of the Apartheid debt was already included in the Institutional Credit Rating, leading to a lower value. If political circumstance would not have been part of the rating, it would have been valueless.

<sup>15</sup> The Data allows to assume that the debt of South Africa in 1993 was sustainable, especially because of the economic conditions, as well as the debt level after the default was announced became more severe, while no further default has followed.

<sup>16</sup> Porzecanski (2010), p. 5.

<sup>17</sup> Porzecanski (2010), p. 6.

was not determined by the government's inability to pay, but by the sovereign's unwillingness to pay the debt, declaring it as being odious.<sup>18</sup>

In contrast to that, Ecuador is a serial defaulter, accounting for 9 sovereign defaults prior to the one announced in 2008 (see Borenzstein and Panizza 2009). Asonuma (2012) has highlighted the stylized fact that countries, which have not fulfilled their debt service, have a higher likelihood to default again. While it is observed that Ecuador was under healthy macroeconomic circumstances by the time the default has been announced, the risk prime to be paid was affordable.

In 2009 the country announced a buyback offer for its defaulted bonds, where 3 billion US-Dollars in bonds were exchanged for 900 US-Dollars in Cash. This amounted to 91 percent of the debt being due until May, 15<sup>th</sup>, 2009. Holdouts then received an offer with the same haircut and by the end of 2009, 95 percent of the debt was rescheduled. (see Porzecanski 2010, p. 16).

A problem arises when analyzing Ecuador, given that the default was announced during the sharp contraction of the late 2000's. Due to other countries suffering from the same world-wide output contraction, Ecuador can still be compared to other countries, since a better economic policy and the absence of a sovereign theft alike default tends to lead to worse macroeconomic outcomes. Since a strong policy cut does not underlie in the event of the Ecuadorian default of 2008, it is the best example of an unnecessary default. Here further political impacts or endogenous shocks that might have led to a stronger deterioration of macroeconomic fundamentals than in the counterfactual, did not take place. Plausibly, a case study on Ecuador can be performed in this study.

### *3.2.3. Other countries*

There are also other countries available, which have suffered from an odious debt default, most notably the case of Iraq in 2003, whose debt has been declared odious ex-post by an international bod (see Nehru and Thomas 2009). 80 percent of its 125 billion US-Dollars debt was forgiven on

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<sup>18</sup> The Ecuadorian debt level stood at 20 percent of the country's GDP at the time of the default, while interest payments only reached about 1 percent of government revenues, which is manageable by the country, see Porzecanski (2010), p. 6f.

odious grounds (see Buchheit, Gulati and Thompson 2007). Due to international sanctions, a lack of data and an ongoing war before, after and during the default, Iraq is not analyzed in this study.<sup>19</sup>

A further event of interest is the sovereign default of Nicaragua, which followed the revolution of 1979. This example is problematic since there was an ongoing civil war, in which different guerilla groups fought against the “odious” Somoza regime, leading to an accumulation of government debt. The war continued after the revolution took place with the Contras, which were mainly formed by the former elite, starting a guerilla war, which was sponsored by the CIA, against the new Sandinista regime.<sup>20</sup> The Contra war makes it impossible to attribute the changes in the macroeconomic outcome variables only to the default decision itself. The CIA support of the Contra guerilla cannot be traced back only to the Sandinista government repudiating the country’s debt as a tit for tat game. The fear in the context of the cold war, that a communist regime might be established in Central America, which has the capacity to become a hub for USSR tactical missiles can be another reason for the CIA - Contra support.<sup>21</sup> The reason for leaving out this nation is the war in Nicaragua, following the default.

Another example is Burkina Faso. The Burkinabe leader, Thomas Sankura, hold a speech at the UN in 1987, in which he stated that his country will not pay its debt and that all other African countries should follow his steps. He was later overthrown and killed in a bloody coup d’état (see Dembele 2009). Anyhow, the default already occurred in 1983,<sup>22</sup> which makes a distinction of a Reagonomics provoked default and an odious default difficult. Since the French Franc on which the Burkinabe currency, the CFA Franc, is bounded, has devaluated by almost 50 percent in the respective time as obtained from fxtop.com (2014), shown in figure A3 in the appendix. On the other hand, Sankuras speech at the UN in 1987 might have been seen as a signal that the Burkinabe Government refuses to renegotiate its debt with its lenders.

Given the database on sovereign defaults provided by Borenzstein and Panizza (2009), several former socialist countries went bankrupt, which might have been due to odious reasons.

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<sup>19</sup> The Worldbank data available on Iraq is very limited.

<sup>20</sup> The Iran-Contra affair has proved the CIA involvement in the Nicaraguan Contra war (see Congressional Committees 1987).

<sup>21</sup> As in the case of Cuba.

<sup>22</sup> The Borenzstein and Panizza (2009) database gives insight concerning the dates mentioned.

Examples are Russia after the October Revolution in 1917, Czechoslovakia in 1959, Cuba in 1960 and in 1982, Poland in 1981, Romania in 1986, and Bulgaria in 1990, after the fall of the iron curtain. These countries are excluded from the analysis since the macroeconomic fundamentals, taken from planned economies were calculated in prices which are set by the economic planning administration. This price setting by the planning administration did not account for relative scarcities, as it would be the issue in decentralized market economies (see Paqué 2010, p.54f). Taking those countries into account would lead to a bias in the results, although the defaults' odiousness after the fall of the iron curtain is doubtless.<sup>23</sup>

An alternative scenario to be investigated is the Venezuelan default of 2005, which lasted one month and occurred after Standard & Poor's have changed the country's long term foreign currency debt rating to selected default (see Standards & Poors 2012). This default was provoked by the government, by failing to pay on its oil-indexed obligations. This was after the state-owned Petrol es de Venezuela SA missed to publish the official price of oil for calculating the bond payment. The missed payment on the Venezuelan Brady-Bonds amounted to only 35 million US-Dollars, a small share compared to the total debt of 23.6 billion US- Dollars by that time. The Venezuelan government had promised to catch up on the debt payment (see Bloomberg 2005). Due to the small amount of debt being due, Venezuela is not taken into account for further analysis.<sup>24</sup>

An additional case of an "unwillingness to pay" default is the Argentinian default in 2014. An investigation on the recent Argentinian incident has to be postponed until data is available.

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<sup>23</sup> Note that all former communist countries suffered an economic crisis after the fall of the iron curtain, which was not only due to sovereign defaults being declared in those countries, but mainly caused by evaluating the worth of the countries' output by fair values and not by government administrated prices. The government fixed prices have contributed to a GDP illusion in those countries before the markets were opened with the GDP decline starting in 1990 being the result of economic mismanagement of the communist regimes (see Paqué 2009).

<sup>24</sup> The results for Venezuela can be obtained from the author.



## 4. Empirical investigation

### 4.1. Methodology

The applied methodology is based on Abadie and Gardeazabal (2003), Abadie et al. (2010), Cavallo et al. (2010) and Jorra (2011) and adapted to the different changes in macroeconomic fundamentals, as realized by the latter.  $J + 1$  countries are observed with one country being the treated country, declaring an unnecessary default as mentioned in the quasi-natural experiment case above, and  $J$  control group countries in the donor pool that do not have the treatment. The synthetic control group methodology aims to build up a synthetic twin country based on the  $J$  donor pool countries to the country that is investigated. The synthetic twin country has not suffered from the respective shock from  $T_0$ , the beginning of the observed time span to the time of the unnecessary default. Therewith, the outcome variable change that is given due to the unnecessary sovereign default can be measured in the following way:

$$y_{i,t} = y_{i,t}^{noudef} + (y_{i,t}^{undef} - y_{i,t}^{noudef})udef_{i,t}$$

With

$$udef = \begin{cases} 1 & \text{if } i = 1 \text{ and } t \geq T_0 \\ 0 & \text{else} \end{cases} \quad (1)$$

where  $udef$  denotes the unnecessary default and  $noudef$  that no unnecessary default occurred. The economic loss induced by a sovereign default is expressed as:

$$\widehat{\alpha}_{i,t} = \widehat{y}_{i,t}^{undef} - \widehat{y}_{i,t}^{noudef} = y_{1t} - \widehat{y}_{i,t}^{noudef} \quad \text{for } t \geq T_0 \quad (2)$$

which is a typical difference in difference approach. To calculate the effect, the macroeconomic outcome of interest in a non-default scenario has to be estimated. Here the difference of this method, compared to traditional models comes into place. While only averages of the control group countries are used in FE regression analyses or in traditional comparative case study

models, the synthetic control group method is able to generate a synthetic twin country from the donor pool. As a result, it can be avoided choosing a random, non-matching country into the control group, which has nothing in common with the country of interest and is thus, a bad fit. The aim is to find a country, where the same macroeconomic conditions as in the defaulting country can be observed; but which does not have a default on its own. This may lead to further problems, since no country, as well as no simple average of countries matches the defaulting country in terms of all relevant variables.

This problem is solved by the synthetic control estimator which creates a synthetic control country without a history of an unnecessary default via using weighted averages from the donor pool countries. The weights are collected in the vector  $W = (w_2, \dots, w_{j+1})'$  with  $\sum_{j=2}^{J+1} w_j = 1$  and  $w_j \geq 0 \forall j = 2, \dots, n$ , aiming to clone the defaulting country as narrowly as possible. While Jorra (2011) only recreates the country before the event of the crises, a further point of interest lies in the time after the crises has started in terms of the control variables. Accordingly, it is assumed that a control variable worsening has been caused by the default, and it is searched for a synthetic country that observed the same control variable worsening to measure the isolated default effect as the driving force on the variable of interest. To clarify this statement, one might think about the terms-of-trade being an important variable to measure the defaults impact on exports, as a share of GDP. Subsequently, it has to be controlled that the terms-of-trade of the synthetic counterfactual have approximately the same value as the terms-of-trade of the treated country. It would be blasphemous to not control for the post-default terms-of-trade co-movement, since a terms-of-trade increase in either the treated- or in the synthetic unit might have led to the exports increase or decline in the treated country, compared to its counterfactual. The degree of similarity is measured as the pre-crisis outcome variable of interest and the above mentioned variables over the entire time horizon. The counterfactual outcome is therefore estimated as

$$y_{1,t}^{nodef} = \sum_{j=2}^{J+1} w_j^* \cdot y_{j,t} \quad \text{for } t \geq T_0 \quad (3)$$

with  $(w_2^*, \dots, w_{j+1}^*)'$  being the optimal weights.

For obtaining the optimal weights, let  $Z_1$  be a  $(K \times 1)$  vector that consists of outcome variable predictors, denoted by the vector  $X = (r \times 1)$ , and which includes  $M$  linear combinations of the pre-default macroeconomic outcome variable of interest<sup>25</sup> of the treated country. Thereby,  $K = r + M$ .

The  $(K \times J)$  matrix  $Z_0$  includes exactly the same variables including the pre-default macroeconomic outcome of interest of the counterfactual countries that are selected into the donor pool. Given the optimal country weights  $W^*$  one minimizes the root mean prediction error (RMSPE):

$$\|Z_1 - Z_0W\|_v = \sqrt{(Z_1 - Z_0W)'V(Z_1 - Z_0W)}$$

$$s. t. \quad w_j \geq 0 \quad \forall j = 2, \dots, n$$

$$and \quad \sum_{j=2}^{J+1} w_j = 1$$
(4)

where the optimal vector  $W^*$  depends on the weighting of the exogenous variables defined in the positive definite diagonal  $(K \times K)$  matrix  $V$ .

Matrix  $V$  is a vector of weights concerning the importance of the individual outcome predicting variables as mentioned above. Thereby, the weights of the  $V$ -matrix are determined by the following nested optimization problem:

$$V^* = \operatorname{argmin} \sum_{i=1}^N (Z_{i,1} - Z_0W_i^*(V))'(Z_{i,1} - Z_0W_i^*(V))$$
(5)

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<sup>25</sup> In this analysis, only the simple average will be used as a linear combination, because of its good fit. According to Abadie et al. (2010), the consideration of only a few linear combinations of pre-intervention outcomes can be applied for simplification, if it is accounted for a good fit.

for which the optimal results  $W^*(V^*)$  are obtained, see Abadie et al. (2010) for details.<sup>26</sup> Matrix  $V$  is allowed to change among each individual study since a different impact of a control variable change on the outcome variable of interest in each treated country is assumed. In the result tables, some synthetic values can diverge from the treated outcome. This might be due to a weight  $V$  of 0, or a value close to 0, denoted to the respective control variable.

Trivially spoken, the defaulting country, or its macroeconomic fundamentals, is duplicated with the usage of non-defaulting countries that are a simple combination of countries taken from the donor pool. This is done by relating the synthetic country as closely as possible to the defaulting country, given the weighting vector being the tool of adaption.

#### 4.2. Testing for significance of the results

To test the results for interference, the same procedure that has been applied for the defaulting country has to be conducted for all other countries in the donor pool, simulating a bankruptcy at occurring at the respective point in time as well. If those non-defaulting countries show a better macroeconomic outcome than the treated country the p-value can be estimated for every individual post-crisis scenario  $l$  as:

$$p - value = \Pr(\hat{a}_{1,l}^{PL} > \hat{a}_{1,l}) = \frac{\sum_{j=2}^{J+1} I(\hat{a}_{1,l}^{PL(j)} > \hat{a}_{1,j})}{J} \quad (6)$$

Thus, it is simply counts how many placebo studies lead to a higher  $\hat{a}$  compared to the treated country. The p-value is then calculated by dividing the cases of a higher placebo value by the number of placebo countries.

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<sup>26</sup> The standard STATA approach was applied in this field. Thereby, the nested allop option was used which solves the minimization problem 4 and 5, using a search mechanism. The allop option uses 3 different starting points to reduce the likelihood of obtaining a local minimum.

### 4.3. Data

The data for the underlying analysis is taken from Worldbank (2015), and from the Polity IV Project (2014), while the default data is taken out of Borenzstein and Panizza (2009), this paper uses the Standards and Poors definition of a sovereign default. Since the default data by Borenzstein and Panizza ends in 2004, Standard and Poors (2014) data has been applied to enhance the list. The identification of odious and non-necessary defaults are taken out from the analysis performed in chapter 3. Countries that are selected in the donor pool include all non-OECD countries, all non-LDC countries and all non-Gulf countries. In addition to that, all former communist-bloc countries, where China is accounted for, are omitted. This is done because the country groups mentioned above tend to have a different macroeconomic structure that is unobserved and leads to a bias in the results, or, as in the case of the former communist-bloc countries to the issues mentioned in chapter 3.2.3. In addition to that, countries that do not report data are excluded from the donor pool. This includes countries such as Iraq, Myanmar, North Korea and the small islands states in the Caribbean area as well as in the Indian- or Pacific Ocean. Furthermore, all countries in the donor pool must have at least 1,000,000 inhabitants.<sup>27</sup> According to Abadie et al (2014), only countries that share “similar characteristics to the treated unit”<sup>28</sup> should be included in the donor pool. One may argue that some countries, such as Algeria, should be omitted when comparing to Ecuador, although, these two countries might be relatively similar. According to them, the donor pool should not be too big to avoid over fitting.

For the case of Costa Rica, this investigation refers to MOxLAD (2012) data, which is probably the only available historical data source available for all Latin American countries. There is indeed a drawback in variables that can be used as controls, consequently, the GDP data is only given in PPP terms. Furthermore, the exports have to be expressed in per capita terms, given that the GDP is in PPP terms and the total exports are not, leaving the exports per capita as the only available measurement of exports, relative to the country size.

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<sup>27</sup> This may include the island states of Mauritius and Trinidad and Tobago for analysis where data is available.

<sup>28</sup> Abadie et al (2014), p. 11.

#### 4.4. Specification

For the different macroeconomic fundamentals, different specifications are applied. The first macroeconomic variable of interest is the GDP per capita change, which might be lower because of the default. Further macroeconomic outcome variables of interest are the FDOI net inflow, the Exports/GDP ratio, lending to non-government agents per capita, and development aid per capita. The GDP per capita, Exports/GDP, the quasi-natural resource share of GDP, net FDI inflows, the terms of trade, the inflation rate, the savings rate, the population growth rate, and the polity2iv might serve as control variables for any specification as it can be seen in the respective result tables. The polity2iv is defined between -10 and 10, where -10 denotes an autocracy and 10 a full democracy.

It has to be mentioned that unobserved heterogeneity and unobserved shocks, which might have an impact on the macroeconomic outcome variable of interest, cannot be accounted for. This is due to the limited amount of cases in history in which countries did not pay their debt, although they were able to. Hence, for South Africa, this paper cannot account for measures and law changes at the end of the Apartheid regime that might have an impact on the country's per capita GDP<sup>29</sup> and denotes the entire change of the outcome variable on the default which is indeed a strong assumption.

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<sup>29</sup> One may think about “race-quotas” for jobs in the government or in private companies that might prevent the recruitment of the first-best suiting worker for the job concerned, or about the “fear of nationalization” in Ecuador. In the Ecuadorian case, the fear of expropriation can be neglected because with Nicaragua, Bolivia and Venezuela other ALBA countries, where investors might face the same kind of fear, are selected into the synthetic country.

## 4.5. Results

### 4.5.1. Odious debts and GDP growth

To estimate the impact of the odious debt default on GDP per capita<sup>30</sup>  $GDP_{pc}$ , the following control variables, that are part of vector  $X$ , are implemented. The exports as a share of GDP, denoted as  $x$ , are taken to control for trade openness, while the terms of trade where the index year 2000=100,  $tot$ , are applied to control for sudden relative price changes of the domestically produced goods. The quasi-natural resources rent as a share of GDP is another control variable, since a country may observe a sudden discovery of new resources which is beneficial to a higher  $GDP_{pc}$  growth. The FDI inflows as a percentage of GDP,  $fdi$ , is another important control variable. Although, they might be fostered by the discovery of new resources, they still tend to aliment the domestic savings rate  $s$ , on which data is only available for 2005. In addition to that, the population growth rate,  $n$ , is taken into account. This variable is as well as the savings rate  $s$  are derived from the Solow Growth Model. The inflation rate, measured by the consumer price index,  $Pi$  is also taken into account. The polity2 iv that has a value of 10 for full democracies and a value of -10 for full autocracies is taken into account as well. In general, democracies tend to have a higher GDP per capita. The polity2 IV is taken from the Polity IV Project (2014). Since Namibia has been under South African mandate until 1990, the polity2 iv of South Africa is taken for the pre 1990 polity2 outcomes. In the case of Ecuador, the inflation rate  $Pi$  is used as an additional control variable.

### **Costa Rica 1923**

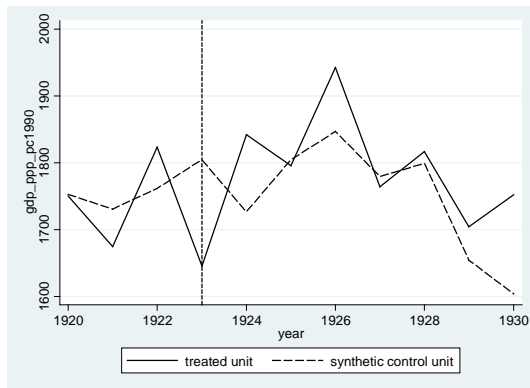
Given the weakness of the data sources of the Costa Rican case, only the GDP per capita in PPP's is used in the analysis. The pre-default synchronization time only traces back for 3 years before the odiousness of the default has been announced. The exports per capita and the unit value of exports are the only available control variables. The synthetic Costa Rica consists out of

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<sup>30</sup> The GDP per capita is measured in current US-Dollars. Thereby, the nominal GDP is taken in domestic currency and exchanged to US-Dollars using the official exchange rate. Exchange rate shocks thus have an impact on the domestic GDP. This procedure is more appropriate than using the GDP in PPP which has a strong bias towards non-traded goods. The nominal GDP in current US-Dollars is further more comparable at each point in time but not over time.

77.3 percent Mexico, 16.6 percent Honduras, and 6.1 percent Cuba, as it is shown in table 1.<sup>31</sup> Figure 1 displays the gap between the synthetic Costa Rica and Costa Rica. In 1923, the nadir of the Costa Rican GDP per capita in PPP terms is reached, giving hints that costs have been burdened on the country; anyhow, given the high volatility of the Costa Rican GDP per capita, it cannot be concluded whether this impact is caused by chance or by the odious default at a first glance. Figure 1 suggests that the default itself does not seem to have any impacts in the long run.

**Figure 1: Costa Rica compared to its synthetic counterfactual**



**Table 1: GDP per capita in Costa Rica and its synthetic counterfactual**

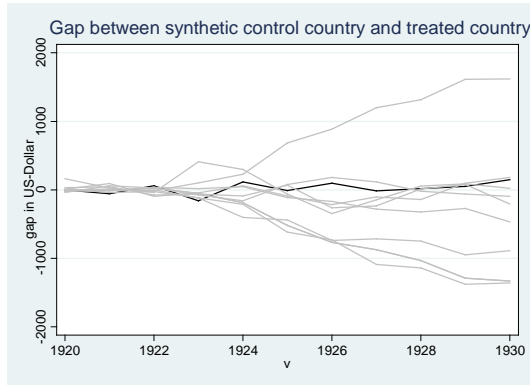
	Costa Rica GDP per capita		
	Treat	Synth	Avg
gdp_pc ppp (1920-1922)	1749.225	1748.36	1422.28
X_pc (1920-1922)	0.0305	0.0305	0.0305
X_pc (1923-1930)	0.0364	0.0246	0.0292
Tot (1920-1922)	0.581	1.175	0.849
Tot (1923-1930)	0.834	1.626	1.014
RMSPE	48.184		
Control Group	Mexico (0.773) Honduras (0.166) Cuba (0.061)		

<sup>31</sup> The donor pool countries are: Colombia, Cuba, Venezuela, Peru, El Salvador, Guatemala, Honduras, Mexico and Nicaragua.



After running the pseudo studies, Costa Rica shows the strongest GDP PPP per capita decline in the year of the odious default. This is displayed in figure 2. A p-value of 0.01 can be obtained in the defaulting year, predicting that also an odious default burdens costs on the defaulting country.

**Figure 2: Pseudo studies testing for the significance of the results obtained for Costa Rica.**



### South Africa 1993

For the South African case, the inflation rate is not taken into account. This is done because some of the donor pool countries reach inflation rates in the range of -20.81 to 13,611 percent, making comparisons among them impossible. A disadvantage of this procedure is that Ecuador and South Africa are not directly comparable. A long pre-default time horizon, dating back to 1980, is applied regardless that some of the donor pool countries, as well as South Africa were in default in the 1980's.<sup>32</sup> Anyhow, no country has defaulted in 1993, the year of interest. As noted in chapter 2.1, the impact of a sovereign default on GDP growth is contradicting. To analyze the impact of the declaration of sovereign default in Ecuador, 39 countries are taken in the donor pool of countries to estimate a synthetic counterfactual.<sup>33</sup> The results from the baseline-scenario are shown in table 2 column 3. The synthetic counterfactual for South Africa consists of 28.1 percent Brazil, 24.1 percent Jordan, 15.7 percent Venezuela, 10.1 percent Singapore, 9.9 percent Uruguay, and 2.1 percent Costa Rica. As it can be seen in table 2 column 3, the synthetic counterfactual always has a better fit than the overall average of countries that would be used

<sup>32</sup> Figure 3(1) shows a small downward shift around 1985, the year South Africa has announced its default.

<sup>33</sup> These countries are: Argentina, Bolivia, Botswana., Brazil, Côte d'Ivoire, Cameroon, Colombia., Congo (Rep), Costa Rica., Dominican Republic, Egypt., Ecuador, Gabon, Ghana., Gambia, Guatemala., Honduras, Indonesia., India., Jordan, Kenya, Morocco, Nicaragua, Nigeria, Malaysia., Namibia., Pakistan., Panama, Paraguay, Peru, Philippines, El Salvador., Singapore., Sri Lanka., Swaziland., Thailand., Tunisia., Uruguay and Venezuela.

in a regular regression analysis, or a randomly chosen country that would have been selected to run a traditional difference in difference analysis, as shown in table 2 column 7. The average GDP per capita in the 2 pre-default periods is only 172.78 US-\$ lower in South Africa, compared to the synthetic counterfactual, while the overall average differs by more than 1,000 US-\$. The South African GDP per capita is 1,218 US-\$ lower in 1993, 1,705 US-\$ lower in 1994 and 1,942 US-\$ lower in 1995, compared to the synthetic counterfactual. In 1996 the counterfactual GDP per capita is 2666 US-\$ higher than the South African GDP per capita. This difference increases to 2954 US-\$ in 1997, to decline to 2,671 US-\$ in 1998.

To run robustness tests, Argentina, Bolivia, Brazil, Côte d'Ivoire, Cameroon, Congo (Rep), the Dominican Republic, Ecuador, Gabon, Gambia, Honduras, Jordan, Kenya, Morocco, Nicaragua, Nigeria, Panama, Paraguay, Peru, Philippines, Uruguay, and Venezuela that were in default between 1980 and 1998, the time investigated, are omitted. The baseline specification, as shown in table 2 column 3 has been executed for South Africa where those countries are omitted. The results are shown in figure 2(2) and in table 2 column 4. Omitting countries that have observed a similar treatment as the treated country is also in line with the arguments made by Abadie et al. (2014) since otherwise a treated country would be compared to a treated counterfactual. After omitting other defaulters the results remain robust. Given that Singapore is a city state and might have different growth patterns than South Africa and the other countries, Singapore<sup>34</sup> is omitted from the donor pool. The results are displayed in figure 3(3) and in table 2, column 5. The RMSPE compared to model 2 increases by a factor of more than 2. The qualitative statement remains, while in quantitative terms, the GDP loss is smaller when Singapore is omitted. Although, Singapore tends to be a bad counterfactual country at the first glance, the RMSPE is always lower once Singapore is included in the donor pool. This is justified by the fact that Singapore used to be the only comparative country to South Africa in the 1980's.

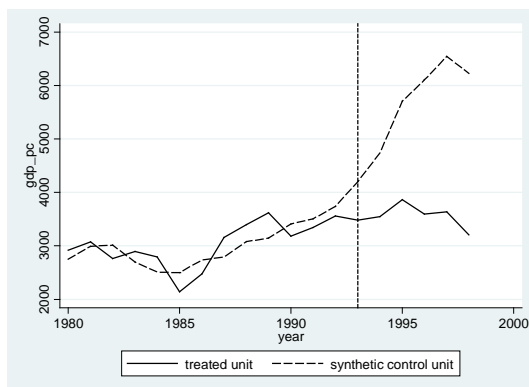
An additional robustness test is done with the relatively wealthy neighboring countries Namibia and Botswana being the only countries in the donor pool. The pre-default fit is weak (the RMSPE increases to 1,388.83), because both countries are poorer than South Africa. The results are displayed in table 2, column 6 and in figure 3(4).

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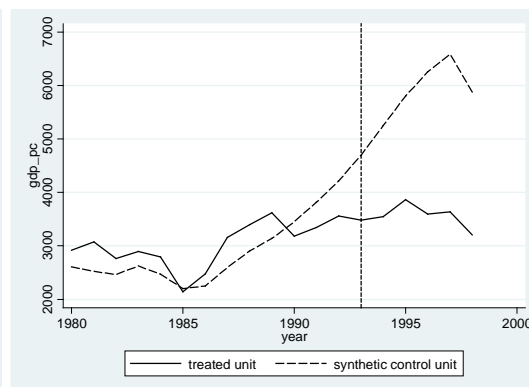
<sup>34</sup> According to the Worldbank (2015), Singapore is a high income country, while the other countries in the sample are not.

Given that figure 3(3) and 3(4) predict a weak fit of the South African GDP per capita, its GDP per capita in 1980 and that of the donor pool countries has been normalized to 100. This methodology has the advantage that the different GDP-levels balanced. The foible of this application is that economic growth might be dependent on the initial income level of the countries. This information gets lost when the outcome variable is normalized to 100. The results are presented in figure 3(5) and 3(6) for the instance where only Botswana and Namibia are in the donor pool. Both figures show a better pre-treatment fit of the outcome variable. The corresponding table 2, columns 7 and 8, illustrate a lower RMSPE. This is because the pre-treatment fit of the endogenous variable is better but also measured in other terms. Hence the minimization problem, revealed in formula (4) leads to lower RMSPE results. Both models show that the South African GDP declined after the default, relative to the synthetic counterfactual.

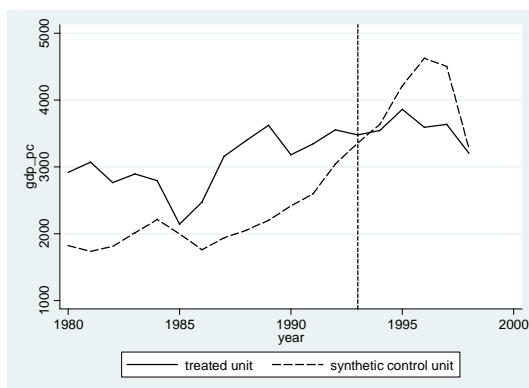
**Figure 3: GDP per capita in South Africa compared to its synthetic counterfactual.**



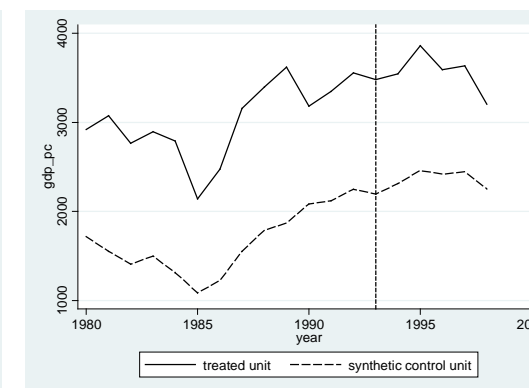
(1) Baseline.



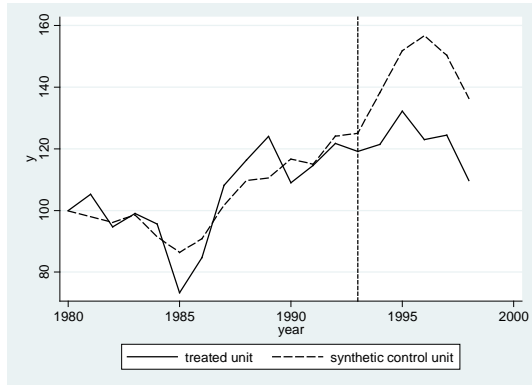
(2) All Countries that were in default between 1990 and 1998 are omitted.



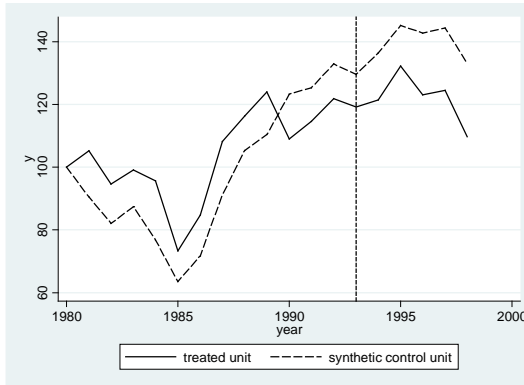
(3) All other defaulters and Singapore are excluded.



(4) Only Botswana and Namibia are in the donor pool.



(5) All other defaulters and Singapore are excluded, the GDP of 1980 is normalized to 100.



(6) Only Botswana and Namibia are in the donor pool, the GDP of 1980 is normalized to 100.

Although, Singapore tends to be a bad counterfactual country at the first glance, the RMSPE is always lower once Singapore is included in the donor pool. This is justified by the fact that Singapore used to be the only comparative country to South Africa in the 1980's.

**Table 2: GDP per capita in current US-Dollars in South Africa compared to its synthetic counterfactual**

	South Africa GDP per capita							Avg (9)
	Treat (2)	Synth (3)	Synth* (4)	Synth*(S) (5)	Synth(SoA) (6)	Synt*(S)=100 (7)	Synth(SoA)=100 (8)	
gdp_pc (1980-1985)	2764.35 (94.64)	2744.01	2482.07	1932.17	1429.12	95.09	83.38	1025,51
gdp_pc (1986-1990)	3167.20 (108.43)	3032.78	2868.27	2073.50	1703.34	105.90	100.36	1544.76
gdp_pc (1991-1992)	3451.46 (118.17)	3624.24	4017.41	2820.85	2184.90	119.56	129.12	1984.50
n (1980-1985)	2.50	2.58	2.43	2.60	2.87	2.49	2.72	2.58
n (1986-1990)	2.34	2.34	3.76	2.87	3.75	3.14	3.90	2.52
n (1991-1992)	2.07	3.38	3.25	2.64	3.16	2.60	3.23	2.42
n (1993-1998)	2.21	2.20	3.00	2.53	2.75	2.36	2.83	2.12
S (1990-1992)	17.98	21.32	30.07	29.06	33.25	26.08	31.09	19.30
x (1980-1985)	28.63	38.19	81.90	51.15	60.74	33.19	61.42	30.83
x (1986-1990)	28.17	38.62	76.72	63.05	60.71	32.19	59.58	34.02
x (1991-1992)	21.55	40.73	71.95	73.42	51.85	31.87	52.13	35.12
x (1993-1998)	23.72	39.47	69.99	89.33	50.03	31.40	49.66	36.86
Tot (1980-1985)	107.11	93.85	103.11	73.01	87.77	97.51	91.09	123.75
Tot (1986-1990)	108.31	89.66	100.63	89.87	96.14	102.95	96.47	105.13
tot (1991-1992)	103.95	91.05	82.04	106.90	80.38	90.49	78.63	97.29
tot (1993-1998)	105.84	101.19	91.14	108.67	89.85	102.62	89.19	100.57
fdi (1986-1990)	-0.068	1.646	2.51	2.83	1.49	0.41	1.09	1.34
fdi (1991-1992)	0.107	1.459	5.03	7.97	2.68	2.28	3.33	1.61
fdi (1993-1998)	0.775	2.66	4.39	5.03	1.84	1.88	2.27	2.38
Resources (1980-1985)	9.06	7.51	3.94	18.16	3.79	4.84	4.09	8.45
Resources (1986-1990)	4.56	5.60	16.36	15.27	13.55	11.08	15.91	7.66
Resources (1990-1992)	2.88	6.39	1.70	13.14	1.55	3.04	1.68	6.86
Resources (1993-1999)	2.15	5.21	0.98	8.79	0.93	2.41	0.99	6.36
Polity2 (1980-1985)	4	-1.97	2.99	4.49	4.79	3.34	4.51	-1.49
Polity2 (1986-1990)	4.2	3.56	3.31	4.49	5.34	5.13	5.01	1.51
Polity2 (1991-1992)	5.5	4.66	4.61	4.49	6.39	6.74	6.25	2.70
Polity2 (1993-1998)	8.83	4.82	4.58	3.88	6.52	7.36	6.34	2.96
RMSPE		275.15	415.05	971.63	1388.83	6.8407	12.92°	
Control Group		Brazil (0.381) Jordan (0.241) Venezuela (0.157)	Namibia (0.800) Singapore (0.177)	Malaysia (0.918) Costa Rica (0.082)	Namibia (0.607) Botswana (0.393)	Namibia (0.438) India (0.306) Pakistan (0.161)	Namibia (0.746) Botswana (0.254)	
		Singapore (0.101) Uruguay (0.099) Costa Rica (0.021)	Colombia (0.02) Egypt (0.003)			Thailand (0.094)		

\* Denotes the results obtained if the countries that were in default between 1980 and 1998 are omitted from the donor pool.

(S) Denotes the specification where Singapore is omitted from the donor pool.

(SoA) Denotes the specification where only Botswana and Namibia are in the donor pool.

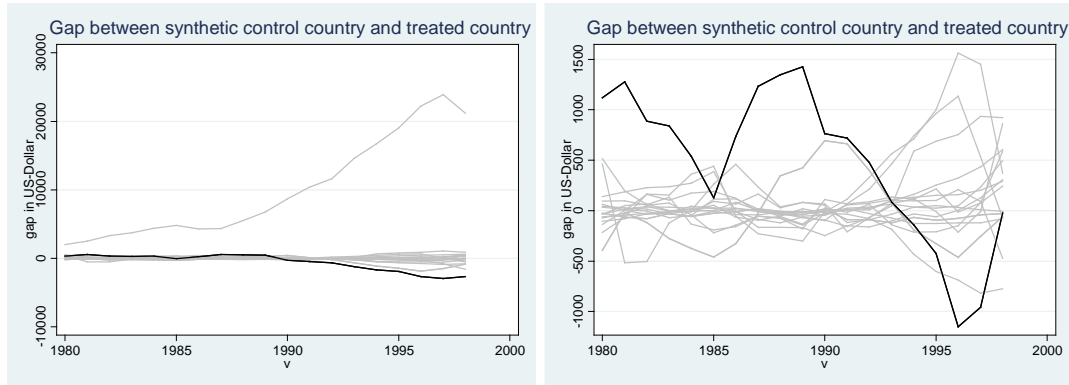
=100 the GDP of 1980 is normalized to 100 for all countries.

To test the significance of the results, the above mentioned method, proposed by Cavallo et al. (2012), is applied. Figure 4a(2) represents the results obtained in specification 2. Figure 4a(3) displays the pseudo study results once Singapore is omitted (specification 3). After obtaining the output in figure 4a(2) the outlier Singapore is omitted.<sup>35</sup> This is because the pseudo studies have a

<sup>35</sup> Singapore is omitted from the placebo studies but not from the donor pool as in Scenario 3.

high RMSPE, which predicts a very bad fit in the pre-default time. This has been proposed by Abadie et al. (2010).

**Figure 4a: Pseudo studies testing for the significance of the results obtained for South Africa.**

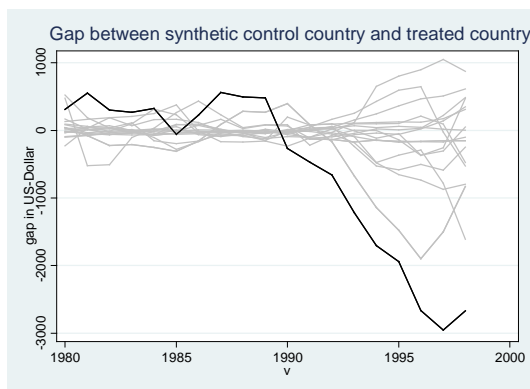


(2) All Countries that were in default between 1990 and 1998 are omitted.

(3) All other defaulters and Singapore are excluded.

Dropping Singapore from figure 3(2) leads to figure 4b, where the p-values can be derived from:

**Figure 4b: Pseudo studies testing for the significance of the results obtained for South Africa with outliers being omitted.**



The p- values are shown in the following table:

**Table 3: p-values concerning the GDP per Capita of South Africa:**

year	1993	1994	1995	1996	1997	1998
2(2)	0.01	0.01	0.01	0.01	0.01	0.01
2(3)	>0.2	0.177	0.59	0.01	0.01	>0.2

## Ecuador

To analyze the impact of the declaration of sovereign default in Ecuador, 44 countries are taken in the donor pool to estimate a synthetic counterfactual.<sup>36</sup> In addition to the South African case study, the savings rate,  $s$ , in 2005 is included. The results are shown in table 3 column 3. The synthetic Ecuador consists of 20.6 percent Nigeria, 20.6 percent Guatemala, 18.8 percent Mauritius, 18.2 percent Gabon, 11.5 percent Nicaragua and 10.3 percent Sri Lanka. In terms of the average pre-default GDP per capita, the average quasi-natural resources share of GDP, the average population growth rate in the pre-default scenario  $n$ , the savings rate in 2005  $s$ , the average FDI net inflows, the average post-default terms of trade, the average inflation rate  $P_i$  and the average pre-default polity2 iv the synthetic counterfactual, leads to a much better fit. This is in contrast to the overall average of countries that would be used in a regular regression analysis, or a randomly chosen country that would have been selected to run a traditional difference in difference analysis, as shown in table 3, column 6. On the other hand, the average exports share of GDP, as well as the average post-default population growth rate and the pre-default average terms-of-trade are worse than the overall average of countries in the donor pool. This occurs if the weighting vector  $V$  denotes a relatively low weight, or even a zero weight, to the control variable. In the example of Ecuador, the results are ambiguous, as shown in figure 5(1). First of all, the results are partly driven by the sharp contraction of the financial crisis that began in 2008, leading to an overall decline of GDP. Anyhow, one can still distinguish between countries, given that some of them did better through the crisis while others did worse. In the instance of Ecuador, one can at least see a higher output covariance with the synthetic counterfactual following the default. If one takes the baseline model, shown in figure 5(1), it estimates that in 2008, the Ecuadorian output was 347 US-\$ lower than the counterfactual. This increased to a level that is 337 US-\$ higher than the counterfactual outcome. In 2010,  $\widehat{\alpha}_{1,t}$  declines to a small plus of 71 US-\$, to decline further to a minus of 207 US-\$ in 2011.

A similar robustness analysis as in the case of South Africa has to be conducted in the scenario of Ecuador, once the GDP per capita is the concern. The benchmark analysis has shown that

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<sup>36</sup> These countries are: Algeria, Argentina, Bolivia, Botswana, Brazil, Côte d'Ivoire, Cameroon, Colombia, Congo (Rep), Costa Rica, Dominican Republic, Egypt, Fiji, Gabon, Gambia, Ghana, Guatemala, Honduras, Indonesia, India, Jamaica, Jordan, Kenya, Lebanon, Malaysia, Mauritius, Morocco, Nicaragua, Nigeria, Namibia, Pakistan, Panama, Paraguay, Peru, Philippines, El Salvador, Singapore, South Africa Sri Lanka, Swaziland, Thailand, Tunisia, Uruguay and Venezuela.

Nicaragua is one of the synthetic countries, although this country was in default at the same time as Ecuador. Once it is excluded, the output shown in figure 5(2) is obtained. This shows that Ecuador has a higher GDP per capita compared to its counterfactual after the non-necessary default has been announced.<sup>37</sup>

Since some of the donor-pool countries were in default during the pre-treatment period in the case of Ecuador, robustness tests were conducted in these scenarios as well. It is justified to omit those countries, since they can bias the synthetic GDP growth path, given that the countries' exit of the default state might lead to an increased investor confidence and domestic spending behavior in one of the countries that form the synthetic counterfactual (e.g. Argentina). Once the countries that have defaulted prior to Ecuador, but were not in default at the same time as Ecuador, are excluded, the output shown in figure 5(3) is obtained. This shows that Ecuador grew faster compared to its synthetic counterfactual. The synthetic counterfactual is shown in table 3 column 5.

An additional specification is applied in figure 5(4) where post-treatment control variables are omitted. Given the baseline scenario shown in figure 5(1), no significant differences to figure 5(4) underlie. The results obtained in this model, that also show a lower RMSPE, are also displayed in table 4 column 6.

Figure 5(5) and table 4 column 7 shows the results obtained once only Latin American non-defaulting countries are selected for the donor pool, in order to test for the robustness of the results. The RMSPE increases in this robustness test and the synthetic counterfactual outcome is lower compared to the treated, predicting that defaulting Ecuador has a higher GDP per capita compared to the synthetic counterfactual outcome. One reason explaining this result might be the increase in terms-of-trade by 28.5 percent in Ecuador, while the terms-of trade of the synthetic counterfactual declined.

El Salvador's share of the synthetic counterfactual is 49.5 percent, which may drive the entire synthetic counterfactual outcome. To test for this effect, El Salvador is excluded in the estimates shown in figure 5(6) and in table 4 column 8, resulting in a small RMSPE decline. In this specification, the synthetic counterfactual has a similar terms-of-trade growth as the treated

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<sup>37</sup> The results are shown in table 3 column 4.



outcome, while the results do not change systematically. All in all, the unilaterally declared default does not have an impact on GDP growth in Ecuador. Anyhow, it is not accounted for other reasons why this result is observed. An example might be the sharp contraction of 2008/2009 and the question whether new resources were found in Ecuador. By excluding all non-Latin American countries from the donor pool, the remaining countries tend to be more similar to the treated country. They share the same colonial history, the same language,<sup>38</sup> a similar climate, and the production of similar goods.

**Table 4: GDP per capita in current US-Dollars in Ecuador compared to its synthetic counterfactual**

	Ecuador GDP Growth							Avg
	Treat	Synth	Synth*	Synth**	Synth***	Synth*#	Synth**#	
gdp_pc (2001-2007)	2739.63	2727.31	2736.88	2734.58	2741.39	2740.11	2734.70	2640.20
resource (2001-2007)	18.18	17.94	16.78	11.98	14.96	2.66	13.29	9.94
resource (2008-2012)	20.83	16.38	15.64	10.80		3.23	14.45	10.20
n (2001-2007)	1.85	1.86	1.60	1.81	1.82	1.13	1.88	1.63
n (2008-2012)	1.65	1.87	1.65	1.90		1.27	1.77	1.56
s (2005)	22.81	22.91	22.87	27.08	22.81	14.17	19.54	22.11
x (2001-2007)	26.42	41.26	34.57	42.25	41.70	24.20	29.76	40.31
x (2008-2012)	30.30	41.09	33.46	37.91		23.66	33.85	38.37
tot (2001-2007)	96.85	106.14	108.19	106.06	100.69	96.42	107.33	104.04
tot (2008-2012)	124.43	128.05	130.14	122.19		96.12	132.71	120.41
fdi (2001-2007)	1.72	2.19	2.18	1.74	2.45	2.45	2.97	3.57
fdi (2008-2012)	0.79	3.55	2.57	2.37		2.21	3.50	4.05
Pi (2001-2007)	11.11	8.45	5.31	6.38	6.33	4.59	5.56	7.57
Pi (2008-2012)	5.80	6.85	6.05	6.22		4.47	5.89	7.22
polity2 (2001-2007)	6.00	5.13	2.76	4.59	4.04	7.51	8.32	4.24
polity2 (2008-2012)	5	6.17	5.04	5.30		7.9	8.00	4.6
RMSPE	84.8418		85.165	73.0858	80.34	148.67	152.52	
Control Group	Nigeria (0.206)		El Salvador (0.344)	Guatemala (0.408)	Guatemala (0.327)	El Salvador (0.495)	Bolivia (0.387)	
	Guatemala (0.206)		Gabon (0.188)	Algeria (0.284)	Sri Lanke (0.191)	Guatemala (0.341)	Guatemala (0.342)	
	Mauritius (0.188)		Gabon (0.182)	Mauritius (0.115)	Mauritius (0.165)	Brazil (0.164)	Chile (0.115)	
	Nicaragua (0.115)		Nicaragua (0.115)	Guatemala (0.117)	Mauritius (0.161)	Brazil (0.164)	Chile (0.115)	
	Sri Lanka (0.103)		Sri Lanka (0.103)	Indonesia (0.108)	Swaziland (0.058)	Gabon (0.161)	Mexico (0.09)	
				Indonesia (0.108)	Swaziland (0.058)	Congo (Rep)(0.081)	Peru (0.065)	
				Cameroon (0.087)	Gambia (0.025)	Pakistan (0.075)		
				Pakistan (0.062)	Malaysia (0.03)			
				Nigeria (0.047)	South Africa (0.022)			
					Ghana (0.014)			

\*denotes the model where Nicaragua, which was in default at the same time as Ecuador is omitted.

\*\* denotes the model where all countries that have been in default prior to Ecuador are omitted, although, they were not in default at the same time as Ecuador.

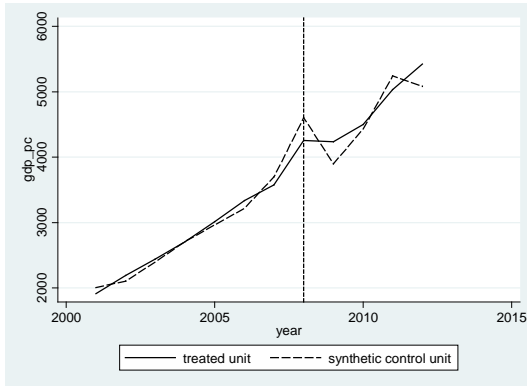
\*\*\* Denotes the specification where all post-default control variables are omitted.

\*# denotes the specification where only Latin American countries are in the donor pool.

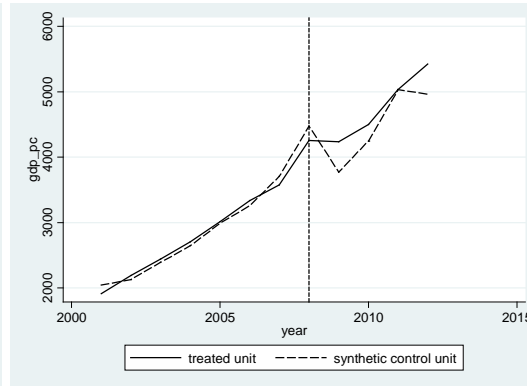
\*\*# denotes the specification where only Latin American countries are in the donor pool, omitting El Salvador.

<sup>38</sup> Brazil is the exception here.

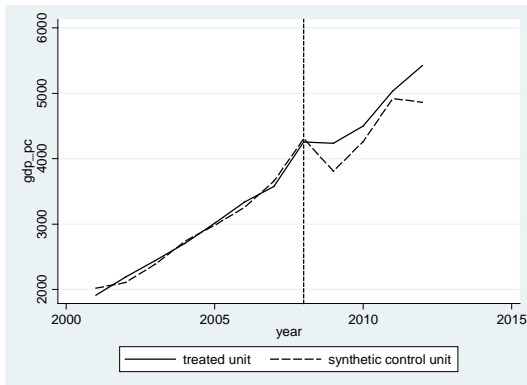
**Figure 5: GDP per capita in Ecuador compared to its synthetic counterfactual.**



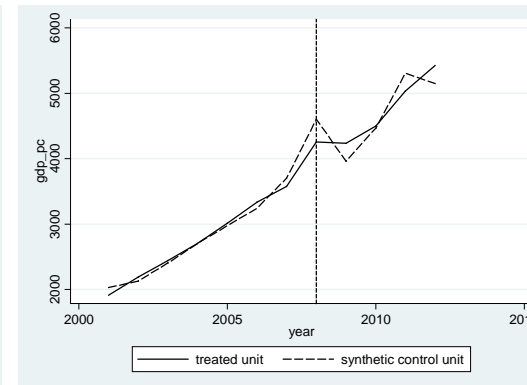
(1) Baseline.



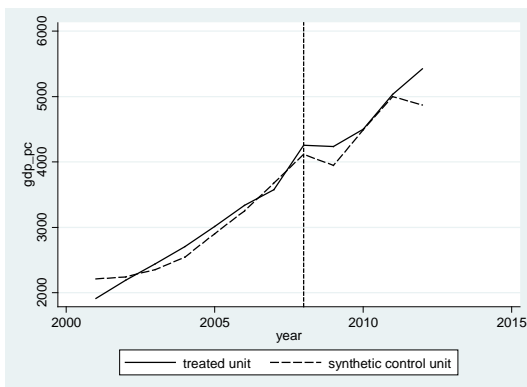
(2) Nicaragua excluded.



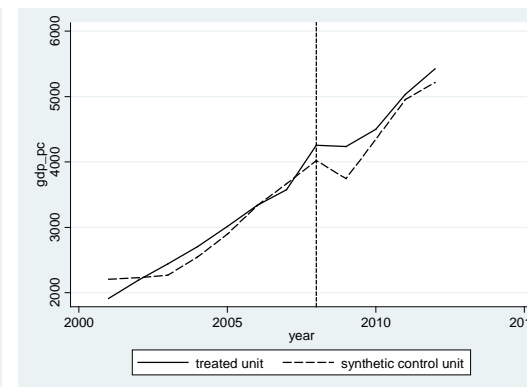
(3) All other pre-defaulters are excluded.



(4) Baseline scenario, no post-treatment control variables.



(5) Only Latin American countries that have not suffered a default are included in the donor pool.

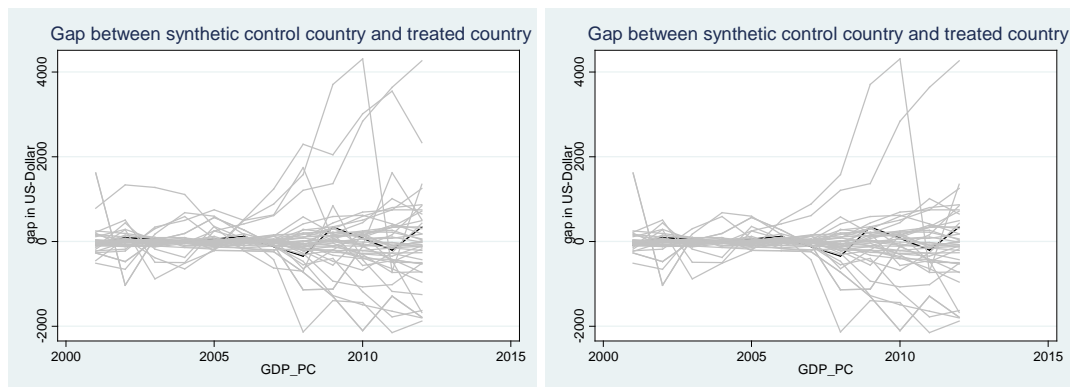


(6) Only Latin American countries that have not suffered a default are included in the donor pool. El Salvador is omitted as well.

To test for the significance of the results, the above mentioned method, used by Cavallo et al. (2012) is applied. After obtaining the first output (figure 6 left), pseudo studies that exceed an RMSPE of 900 (more than 10 times the RMSPE of Ecuador are omitted (figure 6, right). These

countries are Brazil, Gabon and Lebanon. In figure 6 right, a p-value of 0.147 can be obtained for 2008, while the p-value of the 2011 is 0.41. The point-estimators of 2009 and 2010 are positive which is counterintuitive. Consequently a test whether the results might be positive does not have to be undertaken.

**Figure 6: Pseudo studies testing for the significance of the results obtained for Ecuador (baseline scenario).**



The significance tests lead to figure 6, where a p-value of 0.147 can be obtained for 2008, while the p-value for 2011 is 0.41.

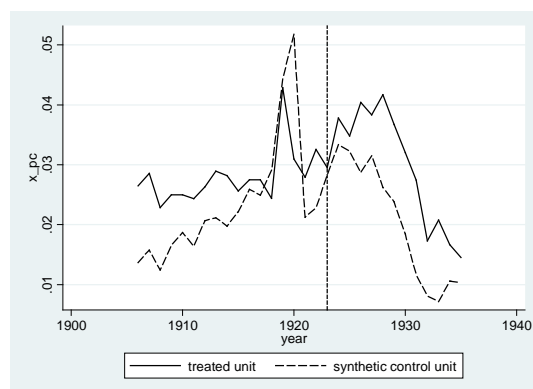
For the specifications where only Latin American countries are selected into the donor pool, a significance test with the null-hypothesis of a higher GDP does not have to be conducted since the point estimators are already greater than 0.

#### 4.5.2. *Odious debt and trade*

### **Costa Rica**

Figure 7 shows the impact of the odious default on the Costa Rican exports per capita. The synthetic Costa Rica consists out of 89.8 percent Honduras and 10.2 percent Cuba. A odious default caused decline in exports cannot be observed. Anyhow, the trade decline following the Great Depression can be seen. Due to the counterintuitive results, placebo studies do not have to be conducted.

**Figure 7: Costa Rica compared to its synthetic counterfactual**



**Table 5: Costa Rican trade compared to its synthetic counterfactual.**

	Costa Rica		Avg
	Exports per capita		
	Treat	Synth	
X_pc (1906-1916)	0.0263	0.0185	0.0167
X_pc (1917-1920)	0.0314	0.0375	0.0341
X_pc (1921-1922)	0.0302	0.022	0.0232
Tot (1920-1922)	0.581	0.639	0.849
Tot (1923-1935)	0.834	0.957	0.972
GDP_pc_PPP (1920-1922)	1749.23	1649.18	1422.28
GDP_pc_PPP (1923-1935)	1728.58	1611.34	1597.29
RMSPE	0.00904		
Control Group	Guatemala (0.85) Cuba (0.15)		

### South Africa

Figure 8 shows that South Africa has suffered a moderate decline of the exports share of GDP which amounts to a level that is about 2 percentage points lower than the synthetic counterfactual in 1994 and in 1995.<sup>39</sup> The gap declines in the following years, with the trend being inverted from 1998 onwards. The results concerning the South African example are represented in table 4. Since Guatemala makes up 52.6 percent of the synthetic counterfactual, a robustness test was executed, omitting the country from the donor pool. As a result, the RMSPE which is subject to

<sup>39</sup> The donor pool countries are: Argentina, Bolivia, Botswana, Brazil, Côte d'Ivoire, Cameroon, Colombia, Congo (Rep), Costa Rica, Dominican Republic, Egypt, Ecuador, Gabon, Ghana, Gambia, Guatemala, Honduras, Indonesia, India, Jordan, Kenya, Morocco, Nicaragua, Nigeria, Mauritius, Malaysia, Namibia, Pakistan, Panama, Peru, Philippines, El Salvador, Singapore, Sri Lanka, Swaziland, Thailand, Tunisia, Uruguay and Venezuela.

be minimized, increases from 0.01022 to 0.618765 – a more than 60 fold increase. This is shown in table 6 column 2 and figure 8(2). It is shown in figure 8(2) and in table 6 column 4 that, once Guatemala is omitted the pre-default co-movement weakens and the RMSPE increases to 0.618765, from the 0.01022, obtained in the baseline specification. The gap between the treated South Africa and the synthetic counterfactual widens starkly in this specification.

The South African export case study has also been analyzed, excluding those countries from the donor pool that suffered a default as well. The output shown in table 6 column 5 and in figure 8(3) can be obtained in this robustness test, showing that the results obtained for South Africa are not robust. The entire export decline for South Africa is driven by other defaulters that did not default at the same time as South Africa, but neither were in default while South Africa has declared its default, or declared their default after 1993. Coherently, the case study on South Africa concerning the countries' exports is not appropriate for further policy consulting.

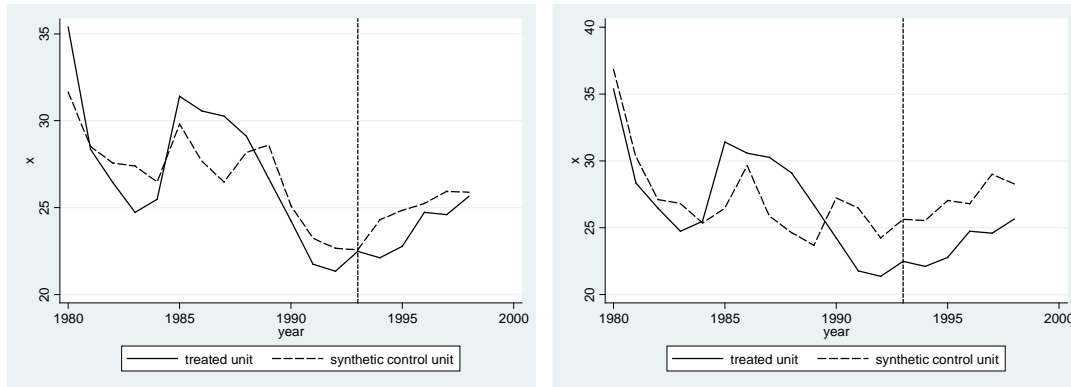
**Table 6: South African trade compared to its synthetic counterfactual.**

	South Africa Trade			
	Treat	Synth	Synth*	Avg
x (1980-1985)	28.63	28.57	28.82	30.83
x (1986-1990)	28.17	27.21	26.21	34.02
x (1991-1992)	21.55	22.95	25.34	35.12
gdp_pc (1980-1985)	2764.35	1645.82	1194.86	1025.51
Gdp_pc (1986-1990)	3167.20	1779.93	1311.91	1544.76
Gdp_pc (1991-1992)	3451.46	2885.57	1713.50	1984.50
gdp_pc (1993-1999)	3554.00	3559.98	2816.51	2606.69
tot (1980-1985)	107.11	134.69	85.87	123.75
tot (1986-1990)	108.31	107.94	96.39	105.13
tot (1991-1992)	103.95	102.52	80.96	97.29
tot (1993-1998)	105.84	104.82	98.30	100.57
Resources (1980-1985)	9.06	8.96	3.62	8.45
Ressources (1986-1990)	4.56	8.08	4.55	7.66
Resources (1991-1992)	2.88	2.82	3.38	6.86
ressources (1993-1998)	2.15	2.35	2.26	6.36
RMSPE	2.11		3.09	
Control Group	Peru (0.311)		El Salvador	
	Argentina (0.300)		(0.570)	
	Swasiland (0.138)		Colombia	
	Namibia (0.096)		(0.345)	
	Côte d'Ivoire (0.081)		Namibia	
	El Salvador (0.070)		(0.044)	
	Venezuela (0.003)		Singapore	
	Gabon (0.001)		(0.041)	

\* Denotes the results obtained, once Bolivia, Peru, Cameroon, Congo (Rep), Ecuador, Kenya, Venezuela, Nicaragua, Honduras, Gabon, and Côte d'Ivoire are omitted from the donor pool, given that in default between 1993 and 1999, although the default has not been announced at the same time.

(G) denotes the model with Guatemala, which accounts for 52.6 percent of the synthetic counterfactual in the baseline scenario, being omitted.

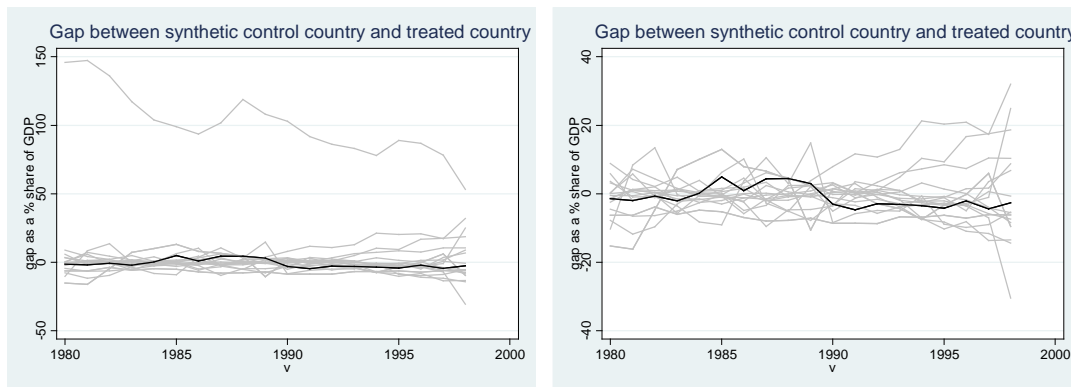
**Figure 8: Exports from South Africa compared to its synthetic counterfactual.**



(1) Baseline.

(2) All defaulters are omitted.

**Figure 9: Pseudo studies testing for the significance of the results obtained for South Africa (baseline scenario).**



The robustness test conducted on the baseline model is represented in figure 9, and shows that the export decline driven by the default is insignificant. P-values that are larger than 0.23 are calculated in any year, following the default. For the model shown in figure 8(3) no further robustness test has to be made since the exports of South Africa are higher than those of the synthetic counterfactual, which is counterintuitive. Other idiosyncratic shocks in South Africa might have produced this result. The lifting of the trade sanctions is an example of a policy change in South Africa that has stimulated trade.

## Ecuador

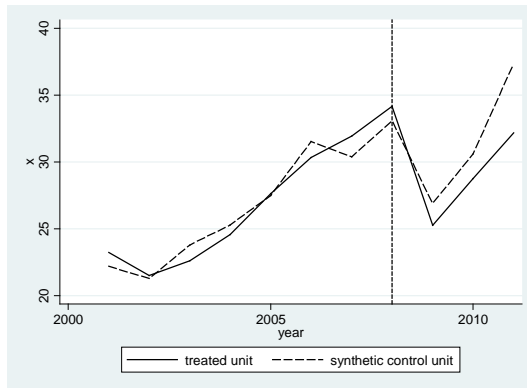
In the Ecuadorian scenario, the export share of GDP declines by only 1.65 – 1.84 percentage points in 2009 and 2010 compared to its synthetic counterfactual shown in table 7 column 3, but the gap increases to a level that is 4.43 percentage points lower than the counterfactual outcome in 2011.<sup>40</sup> This is shown in figure 10(1) and in table 7 column 3. Once the same countries are omitted in Ecuador, the following output is obtained, which shows that the synthetic Ecuador only has lower exports, as a share of its GDP, in the year following the default, as shown in figure 10(2). Furthermore, the quantitative statement is weaker than in the baseline scenario, where the pre-treatment defaulters are excluded. Nevertheless, the RMSPE worsens in the underlying specification, as shown in table 7 column 4. Figure 10(3) and table 5 column 5 shows the specification where all post-default control variables are omitted with the exception of the terms-of-trade. This model suggests a stronger export decline compared to the baseline model.

As a further robustness test, the analysis has also been applied using only southern American countries that have not suffered a sovereign default in the donor pool. Chile and Mexico, two OECD countries which were not included in the donor pool in the previous estimates, are now incorporated in the donor pool. The results represented in figure 10(4) and in table 5 column 7 are similar to those found in the models shown in figure 10 (1) and (3). While the resource rents are lower in the synthetic counterfactual, the terms-of-trade are higher, predicting that parts of the higher trade of the synthetic counterfactual might be determined by its terms-of-trade increase.

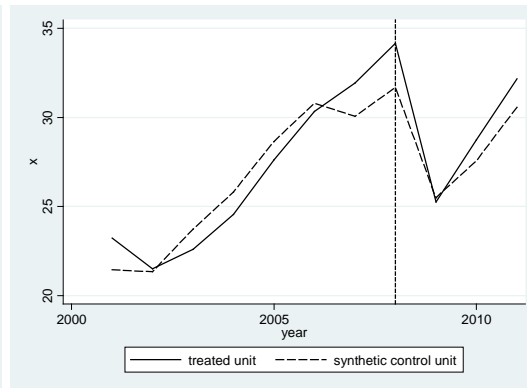
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<sup>40</sup> The donor pool countries are: Algeria, Argentina, Bolivia, Botswana, Brazil, Cameroon, Colombia, Congo (Rep), Costa Rica, Dominican Republic, Egypt, Fiji, Gabon, Gambia, Ghana, Guatemala, Honduras, Indonesia, India, Jordan, Kenya, Lebanon, Malaysia, Mauritius, Morocco, Nicaragua, Nigeria, Namibia, Pakistan, Panama, Paraguay, Peru, Philippines, El Salvador, Singapore, South Africa Sri Lanka, Swaziland, Thailand, Tunisia, Uruguay and Venezuela.

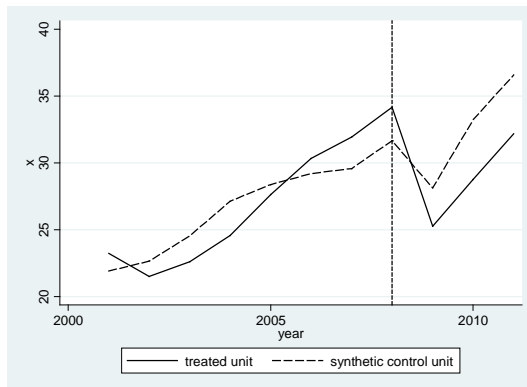
**Figure 10: Exports from Ecuador compared to its synthetic counterfactual.**



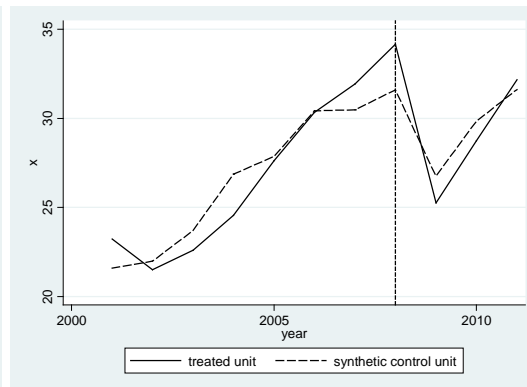
(1) Baseline.



(2) All pre-defaulters are excluded.



(3) Baseline with the terms of trade being the only post-default control variable.



(4) Only Latin American countries that have not suffered a default are included in the donor pool.



**Table 7: Ecuadorian trade compared to its synthetic counterfactual.**

	Ecuador						
	Trade						
	Treat	Synth	Synth**	Synth***	Avg	Synth*#	Avg
x (2001-2007)	25.96	25.99	25.98	26.19	40.19	26.13	40.19
gdp_pc (2001-2007)	2739.63	2739.62	2735.12	2610.69	2649.50	2022.09	2649.50
gdp_pc (2008-2011)	4507.12	4507.67	4919.08		4561.55	3832.08	4561.55
resource (2001-2007)	18.18	16.42	17.13	12.14	10.22	13.23	10.22
resource (2008-2011)	21.04	16.16	17.41		10.55	14.00	10.55
tot (2001-2007)	96.85	109.66	112.61	96.96	103.50	102.91	103.50
tot (2008-2011)	121.85	139.39	149.84	117.69	119.32	124.13	119.32
RMSPE		0.9905	1.24333	1.7211		1.28594	
Control Group	Bolivia (0.348)		Colombia (0.444)	Nicaragua (0.606)		Bolivia (0.442)	
	Lebanon (0.304)		Algeria (0.234)	Brazil (0.175)		Guatemala (0.372)	
	Colombia (0.17)		Bolivia (0.229)	Venezuela (0.131)		Brazil (0.187)	
	Nigeria (0.158)		Lebanon (0.093)	Gabon (0.089)			
	Pakistan (0.011)						
	Gabon (0.009)						

\*\* denotes the model where all countries that have been in default prior to Ecuador are omitted, although, they were not in default at the same time as Ecuador.

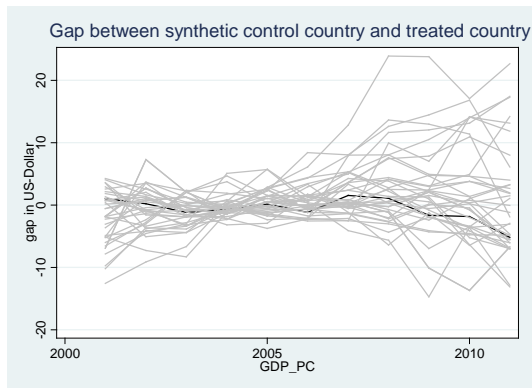
\*\*\* denotes the specification where the terms-of-trade are the only post-default control variables.

\*# denotes the specification where only Latin American countries are in the donor pool.

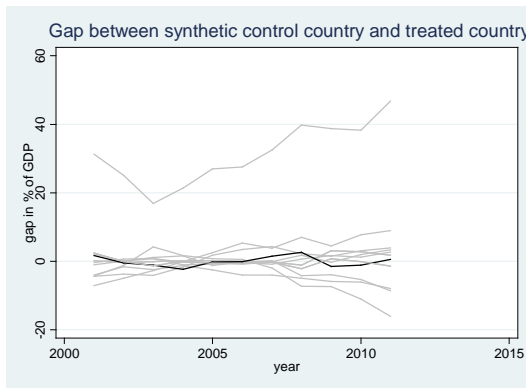
The results obtained for exports in the instance of Ecuador are not statistically significant. P-values above 0.2 are obtained in any year following the default. This is also represented in figure 11(1) after Congo (Rep), Ghana, Malaysia, Mauritius, Pakistan and Venezuela are omitted from the significance test for having more than 3 times the RMSPE of Ecuador as it is shown in figure 11. It can be obtained from figure 11 that the reduction in exports is not statistically significant.

Once only the Latin American countries are selected into the donor pool, the p-values remain above 0.2 as shown in figure 11(2). Consequently, no statistical significant impact of an export decline is due to the governments' decision to do not meet its obligations.

**Figure 11: Pseudo studies testing for the significance of the results obtained for Ecuador (baseline scenario).**



(1) Baseline.

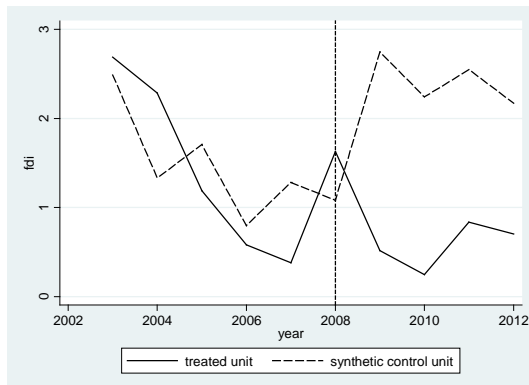


(2) Only Latin American countries that have not suffered a default are included in the donor pool.

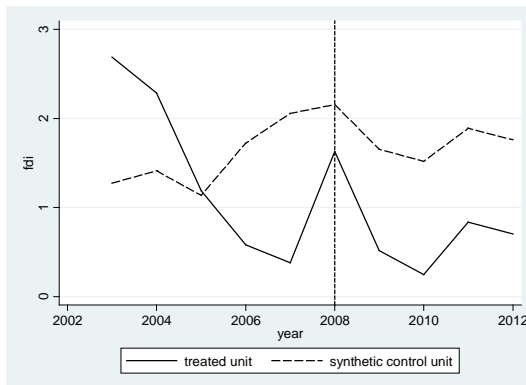
#### 4.5.3. Odious debt and FDI's

### Ecuador

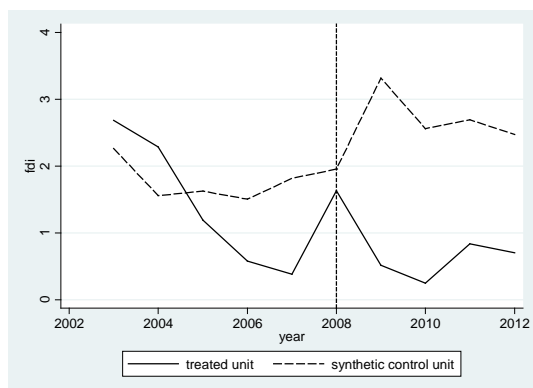
**Figure 12: FDI's in Ecuador compared to its synthetic counterfactual.**



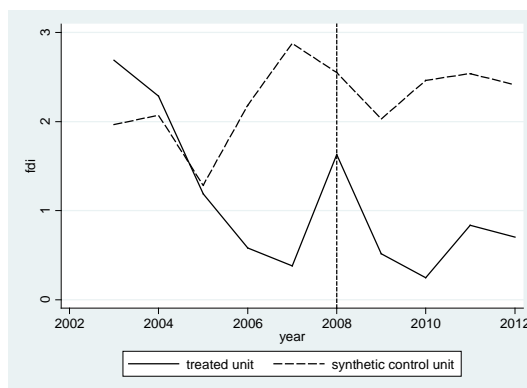
(1) Baseline.



(2) All pre-defaulters are excluded.



(3) Baseline with the polity2 iv being excluded and the exports ranging from 2008-2012.



(4) Only Latin American countries that have not suffered a default are included in the donor pool. The exports are controlled for from 2008-2012.

Figure 12(1) shows the FDI net inflow as a percentage term of the GDP. It is shown that the FDI inflow has declined sharply compared to the synthetic counterfactual, shown in table 8 column 3, after the defaults' announcement.<sup>41</sup> In addition to previous estimations, the agricultural share of income is included denoted as *agr*.

It might be the case that the countries that were in default prior to Ecuador but not in default at the same time as Ecuador bias the results once these countries are part of the donor pool. An example of this is that international investors gain confidence with the country that has exited the default state and start investing again, which would lead to an upward bias of the synthetic country. In the following, it has to be noted, that Nigeria had a default in 2002 (see Borenzstein and Panizza 2009), but the synchronization starts in 2003. The output obtained in figure 12(2) shows a gap between Ecuador and the synthetic counterfactual, shown in table 8 column 4, which is slightly shorter compared to the baseline scenario.

In figure 12(3) a robustness test is shown with the post-treatment exports synchronization being extended from 2008 to the period 2008-2012. A widening of the gap between the treated and the synthetic unit can be observed in this robustness test. As shown in table 8 column 5 the RMSPE increases compared to the baseline scenario shown in table 8 column 3. As in the case of the Ecuadorian exports, the analysis has been conducted with Latin American non-defaulters being

<sup>41</sup> The donor pool countries are: Algeria, Argentina, Bolivia, Botswana, Brazil, Côte d'Ivoire, Cameroon, Colombia, Congo (Rep), Costa Rica, Dominican Republic, Egypt, Fiji, Gabon, Gambia, Ghana, Guatemala, Honduras, Indonesia, India, Jamaica, Jordan, Kenya, Lebanon, Malaysia, Mauritius, Morocco, Nicaragua, Nigeria, Namibia, Pakistan, Panama, Paraguay, Peru, Philippines, El Salvador, Singapore, South Africa Sri Lanka, Swaziland, Thailand, Tunisia, Uruguay and Venezuela.

the only countries designated into the donor pool to test for robustness of the results. The results are shown in table 8 column 6 and in figure 12(4). As in cases 12(2) and 12(3), the pre-treatment synchronization is weak, while the gap increases compared to model 12(3) and is lower than in model 12(2). The RMSPE is higher than in the previous models, predicting a worse fit.

**Table 8: Ecuadorian FDI's compared to its synthetic counterfactual.**

	Ecuador FDI					Avg
	Treat	Synth	Synth**	Synth(a)	Synth*#	
fdi (2003-2007)	1.42	1.52	1.52	1.75	2.08	4.33
gdp_pc (2003-2007)	3014.39	2668.57	2477.90	2150.80	4515.63	3939.04
gdp_pc (2008-2012)	4690.62	4694.97	4688.24	3357.61	5922.85	6151.52
resource (2003-2007)	20.75	24.27	13.30	22.42	11.74	10.50
resource (2008-2012)	20.83	20.82	10.63	20.24	10.77	9.87
x(2003-2007)	27.41	34.15	31.28	34.08	27.49	45.36
x(2008)	34.16	37.05	29.43			45.93
X (2008-2012)	30.08			34.08	30.26	
agr (2004-2007)	10.04	14.23	10.04		8.68	11.64
Pi (2003-2007)	7.45	7.77	9.48	4.84	6.67	7.85
Pi (2008-2012)	5.80	7.84	8.58	5.79	5.73	7.04
polity 2 (2003-2007)	6.00	-1.57	5.00		8	4.48
polity 2 (2008-2012)	5.00	-2.03	5.00		7.81	4.79
tot (2003-2007)	101.31	133.09	107.82	122.95	103.21	106.00
tot (2008-2012)	124.43	176.34	124.46	152.52	114.26	119.62
RMSPE	0.6448626		1.172958	0.8742	1.3703	
Control Group	Cameroon (0.599) Venezuela (0.189) Gabon (0.161) Bolivia (0.052)	Sri Lanka (0.426) Algeria (0.278) Brazil (0.212) Bolivia (0.029) India (0.054) South Africa (0.001)	Cameroon (0.524) Gabon (0.234) Pakistan (0.128) Bolivia (0.113)	Mexico (0.423) Guatemala (0.27) Bolivia (0.234) Brazil (0.073)		

\*\* denotes the model where all countries that have been in default prior to Ecuador are omitted, although, they were not in default at the same time as Ecuador.

(a) denotes the model where the polity2 iv is excluded and the exports are calculated from 2008 until 2012.

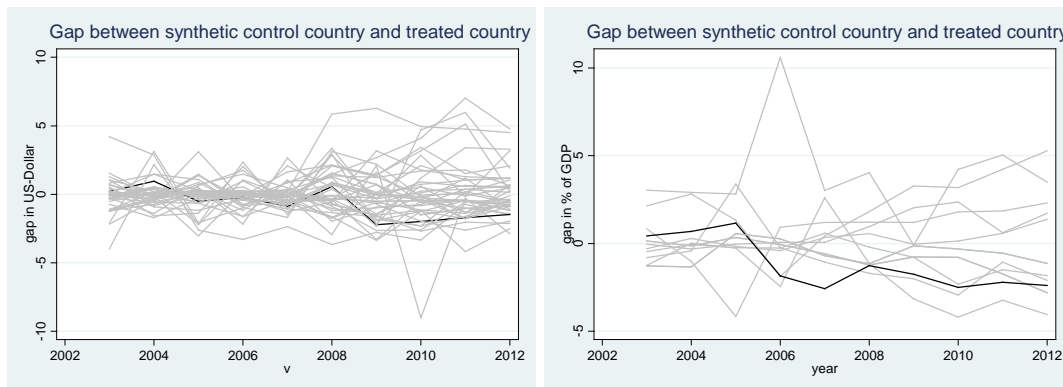
\*# denotes the specification where only Latin American countries are in the donor pool.

To test for the statistical significance of the results, shown in figure 13(1), Congo (Rep), Jordan, Lebanon and Singapore are excluded, given that the respective RMSPE is 3 times higher than the RMSPE in Ecuador. In this estimation, the FDI decline is significant on a 15 percent level,<sup>42</sup> sufficient to give a hint that the default announcement might have had an impact on the FDI

<sup>42</sup> In 2009 and in 2012 the p-value has reached levels of 0.125.

decline in Ecuador. The same holds if only Latin American countries are taken into the donor pool, as shown in figure 13(2) where for 2008 and for 2011 p-values below 0.1 are calculated, while p-values below 0.2 are derived for the other years. As a consequence of the default, investors have lost trust in their investment decision in Ecuador after the president has announced that property rights are not guaranteed, facing the risk of their property being confiscated.

**Figure 13: Pseudo studies testing for the significance of the results obtained for Ecuador.**



(1) Baseline.

(2) Only Latin American countries that have not suffered a default are included in the donor pool. The exports are controlled for from 2008-2012.

#### 4.5.4. *Odious debt and lending*

### **Ecuador**

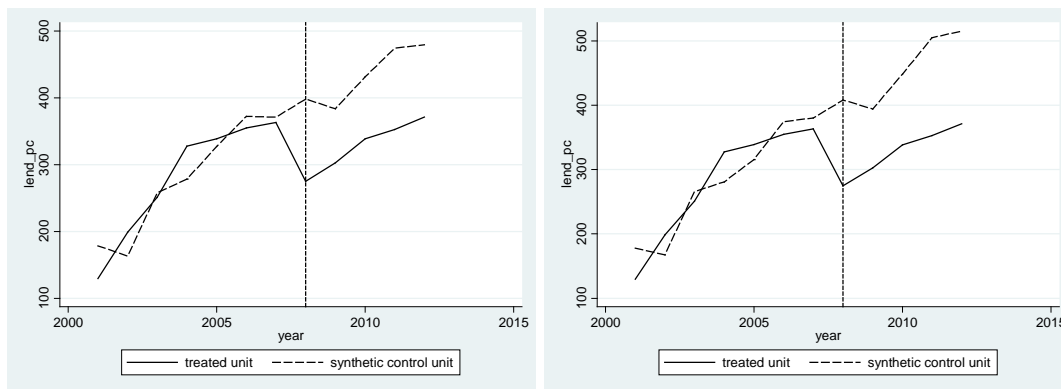
In the standard literature starting from Eaton and Gersowitz in 1981, it is said that a default might cut the governments access to the bond market and make government lending impossible, at least for some time. It would be interesting to know whether or not there might be an impact on domestic lending to non-government entities in the defaulting countries, since the literature analysis, shown in chapter 2.1, has antithetic results on this issue. Therefore, the private non-government lending to banks and other creditors is taken and divided by the total population to generate a private lending per capita variable, which serves as the variable of interest in the forthcoming analysis. Here, a sharp decline in lending per capita can be observed in Ecuador after

the default is announced.<sup>43</sup> The per capita lending is 129.63 US-\$ lower in 2008, 86.78 US-\$ lower in 2009, 92.37 US-\$ lower in 2010, 120.14 US-\$ lower in 2011 and 146.37 US-\$ lower in 2012 compared to the counterfactual outcome which is shown in table 9 column 3 and in figure 14(1). Nonetheless, due to data limitations, only 27 countries are part of the donor pool when the impact of private lending is concerned.<sup>44</sup>

Those nations that were in default prior to the Ecuadorian default announcement are excluded from the donor pool, as done in the previous robustness test concerning the GDP and the FDI growth in Ecuador following the default. Once the countries that have defaulted prior to Ecuador, but were not in default at the same time as Ecuador, are excluded, the gap between Ecuador and the synthetic counterfactual grows further, as shown in the following figure, which denies the above mentioned concern in this scenario. Once those countries are omitted, the RMSPE increases to 26.27, as shown in table 7 column 4.

In table 9 column 5 and figure 14(3) the results that are obtained once only Latin American countries are selected into the donor pool are displayed.<sup>45</sup> The results remain robust.

**Figure 14: Private lending in Ecuador compared to its synthetic counterfactual.**



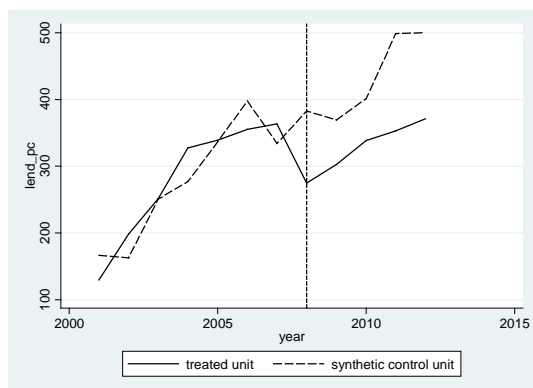
(1) Baseline.

(2) All pre-defaulters are excluded.

<sup>43</sup> Data from South Africa is not available.

<sup>44</sup> The donor pool countries are: Algeria, Argentina, Bolivia, Botswana, Côte d'Ivoire, Colombia, Dominican Republic, Egypt, Fiji, Guatemala, Honduras, Indonesia, India, Jamaica, Jordan, Morocco, Mauritius, Malaysia, Nicaragua, Pakistan, Panama, Peru, Philippines, El Salvador, South Africa, Sri Lanka, Thailand and Tunisia.

<sup>45</sup> Mexico and Chile are not part of the donor pool in this specification.



(3) Only Latin American countries that have not suffered a default are included in the donor pool.

**Table 9: Private lending in Ecuador compared to its synthetic counterfactual.**

	Ecuador Lending				Avg
	Treat	Synth	Synth**	Synth*#	
lend_pc (2001-2007)	280.63	278.38	280.47	275.10	139.04
gdp_pc (2001-2007)	2739.63	2732.18	2738.42	3300.51	2450.26
gdp_pc (2008-2012)	4690.62	4399.03	4624.21	5683.51	6151.52
n (2001-2007)	1.85	1.14	1.01	1.25	1.44
s (2005)	22.81	18.82	19.88	15.56	21.95
x (2001-2007)	25.96	31.95	40.07	34.56	38.95
agr (2001-2007)	11.11	10.65	10.45	9.20	12.09
fdi (2001-2007)	1.72	2	3.3	3.91	0.032
Pi (2001-2007)	11.11	6.02	4.14	4.14	6.08
Pi (2008-2012)	5.80	5.96	3.93	4.24	7.04
polity2 (2001-2007)	6.00	7.69	5.99	7.74	4.49
RMSPE	30.8574		31.44	33.57	
Control Group	El Salvador (0.401)		El	El	
	Philippines (0.281)		Salvador	Salvador	
	Argentina (0.165)		(0.341)	(0.395)	
	South Africa (0.097)		Thailand	Panama	
	Guatemala (0.042)		(0.302)	(0.24)	
	Ghana (0.015)		Colombia	Brazil	
			(0.226)	(0.134)	
			Guatemala	Guatemala	
			(0.049)	(0.123)	
			Pakistan	Colombia	
			(0.041)	(0.108)	
			Malaysia		
			(0.041)		

\* denotes the model where all countries that have been in default prior to Ecuador are omitted, although, they were not in default at the same time as Ecuador.

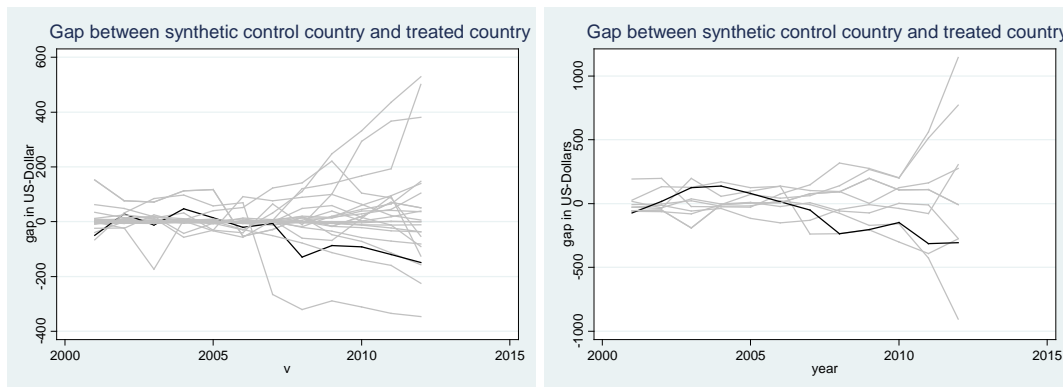
\*# denotes the specification where only Latin American countries are in the donor pool.

These results are statistically significant on the 5 percent level in 2008 and on the 10 percent level in 2009-2010, as shown in figure 15(1). If only Latin American countries are chosen for the

donor pool, the decline in lending is significant on the 1 percent level in 2008, on the 15 percent level in 2009, on the 25 percent level in 2010 and 2011, and on the 15 percent level in 2012. These results are shown in figure 15(2).

Thus, Ecuador is harmed by the default decision taken in 2008 in terms of a lower private loan level that might have negative consequences on growth in the long run and refinancing problems for private companies in the short run.

**Figure 15: Pseudo studies testing for the significance of the results obtained for Ecuador (baseline scenario).**



(1) Baseline.

(2) Only Latin American countries that have not suffered a default are included in the donor pool. The exports are controlled for from 2008-2012.

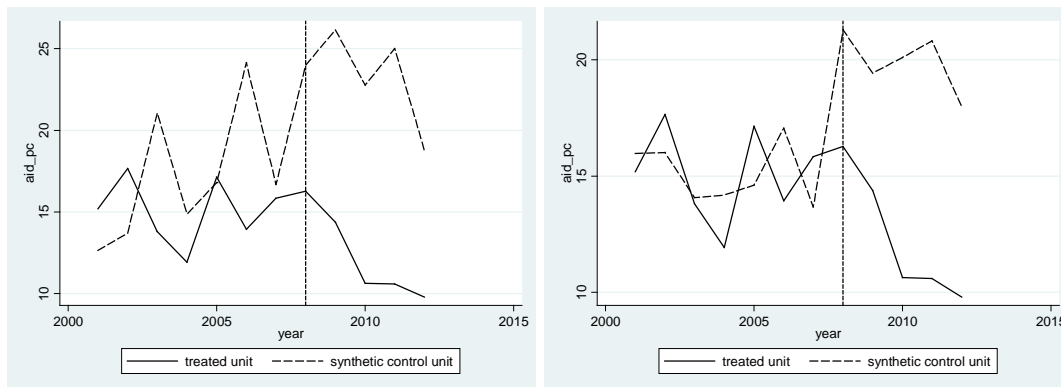
#### 4.5.5. *Odious debts and development aid*

As mentioned in chapter 2.1, the literature overview denies an impact of a sovereign default on development aid. In the South African case study, official development aid was not paid during the Apartheid time until 1993, while for the Ecuadorian default even some anecdotic evidence is available, concerning the Yasuni-National park project where oil was discovered. The Ecuadorian executive asked the international community to donate money to desist drilling for oil in the National Park but the international community, especially Germany, refused to pay. The default in 2008 might have caused a loss in confidence, regarding the Ecuadorian government and the drilling in the national park, leading to a failure of the project.



In table 10 column 3 and figure 16(1) the results that are obtained once only Latin American countries are selected into the donor pool are displayed.<sup>46</sup> The results remain robust once Colombia, which share of the synthetic counterfactual equals 90.5 percent is omitted, as shown in figure 16(2) and table 10 column 4. The development aid dedicated to Ecuador declines remarkable after the default's announcement, although the synthetic counterfactual country has a higher GDP per capita. Another focus has to be set on the point that the RMSPE declines once Colombia is omitted. It might be the case that in the instance of Colombia a local minima has been estimated, showing the importance of robustness tests while running the synthetic control method, although other control variables are now in further distance towards the treated country.

**Figure 16: Development aid in Ecuador compared to its synthetic counterfactual.**



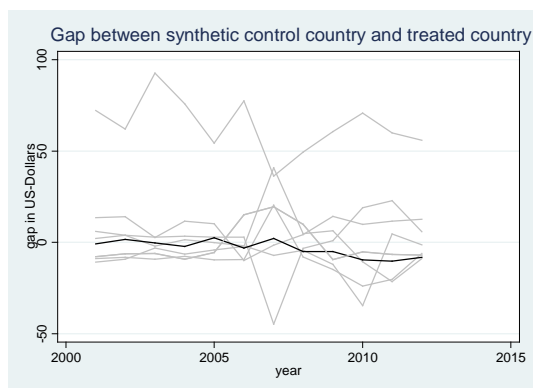
(1) Only Latin American countries that have not suffered a default are included in the donor pool.

(2) Only Latin American countries that have not suffered a default are included in the donor pool. Colombia is omitted.

Figure 17(1) shows that there is no statistical significance observable after the default was announced. P-values above 0.2 are observed in any case. Although the decline in aid looks dramatically in figure 16(1) and 16(2), the drop is not systematically larger than in countries where a sovereign default has not been announced.

<sup>46</sup> Mexico and Chile are not part of the donor pool in this estimation. This is due to the fact that data on private lending is not published by the two countries.

**Figure 17: Pseudo studies testing for the significance of the results obtained for Ecuador (baseline scenario).**



(1) Only Latin American countries that have not suffered a default are included in the donor pool. Colombia is omitted.

**Table 10: Development aid in Ecuador compared to its synthetic counterfactual.**

	Treat	Synth*#	Synth*##	Avg
Gdp_pc (2001-2007)	2739.63	3047.09	3324.22	3079.08
Gdp_pc(2008-2012)	4690.62	6056.62	6759.32	5569.36
Resource (2001-2007)	18.18	7.09	4.07	7.67
Resource (2008-2012)	20.83	9.67	4.62	8.84
Polity2 (2001-2007)	6	7	7.75	8.16
polity 2 (2008-2012)	5.00	7.08	7.95	8
Aid_pc (2001-2007)	15.07	17.13	15.08	22.60
RMSPE	5.1869	2.0477		
Control Group		Colombia (0.905)	Brazil (0.491)	
		El Salvador (0.095)	Guatemala (0.263)	
			El Salvador (0.246)	

\*# denotes the specification where only Latin American countries are in the donor pool.

\*## denotes the specification \*# but omitting Colombia.

#### 4.5.6. Odious debt and reelections

According to the reelection probability, no clear results can be derived. The fact that the Correa government in Ecuador, is still in power at the time this paper is written, supports Foley-Fisher

(2008) who argues that a strong government leader may repudiate its debt in the beginning of his term “as a signal of strong leadership”.<sup>47</sup> To the contrary, the government that ruled South Africa in 1993 did not get reelected in 1994 when it was replaced by the ANC government supporting the findings by Borenstein and Panizza (2009).<sup>48</sup> The lower reelection probability shown by Borenstein and Panizza (2009) can furthermore be explained by the bad macroeconomic fundamentals and the bad policy or the economic shock that has led to the inevitable default in the examples mentioned by them has led to the lower reelection probability.

## **5. Conclusion**

Previous research suggested that defaults may be costly for the country as well as for the government leaders, but all investigations suffer from a two-way causality. This paper isolates the impact of the sovereign default and can thus, state that an additional economic downturn might occur due to the defaults’ announcement.

It can be concluded that there are hints stating that an avoidable sovereign default is expensive for the defaulting country, and that domestic leaders are well advised to decide against the default, even if they consider that the previous regime was illegitimate. This holds especially if the government leaders are interested in their private domestic agents receiving loans from abroad. Furthermore, there are hints predicting the FDI net inflows to be lower after the default is announced, although this result is not statistically significant with the p-value being only below 0.2.

In the case of Ecuador, exports were lower, but not statistically significant after the unilateral default was announced, while the results for South Africa are not robust. A unilaterally declared default tends not to have a negative impact on GDP growth in the instance of Ecuador, while in South Africa, GDP per capita tends to be lower, although this might be attributed to other effects at the end of Apartheid.

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<sup>47</sup> Foley-Fisher (2008), p. 2.

<sup>48</sup> Note here that the ANC, the party that fought against Apartheid, was allowed to participate in the elections for the first time and thus had the support of those that were not allowed to vote before, which was the majority of the population.

Nonetheless, the scenario of Ecuador, evaluated in this paper, may suggest that an avoidable sovereign default, announced at the beginning of the head of state's electoral term, might improve the likelihood to be reelected. On the contrary, if Burkina Faso and Nicaragua's defaults are accounted as odious the costs imposed to the government leaders are extremely high.

If a country is faced by an economic downturn, diminishing the country's ability to meet its obligations, policy makers should take the analysis conducted in this paper with care, given that only the defaults induced by an unwillingness to pay are investigated in here. Furthermore, countries may always face idiosyncratic shocks and unobservable heterogeneity, such as a different law system, underlies in almost any case when a country based empirical study is executed.

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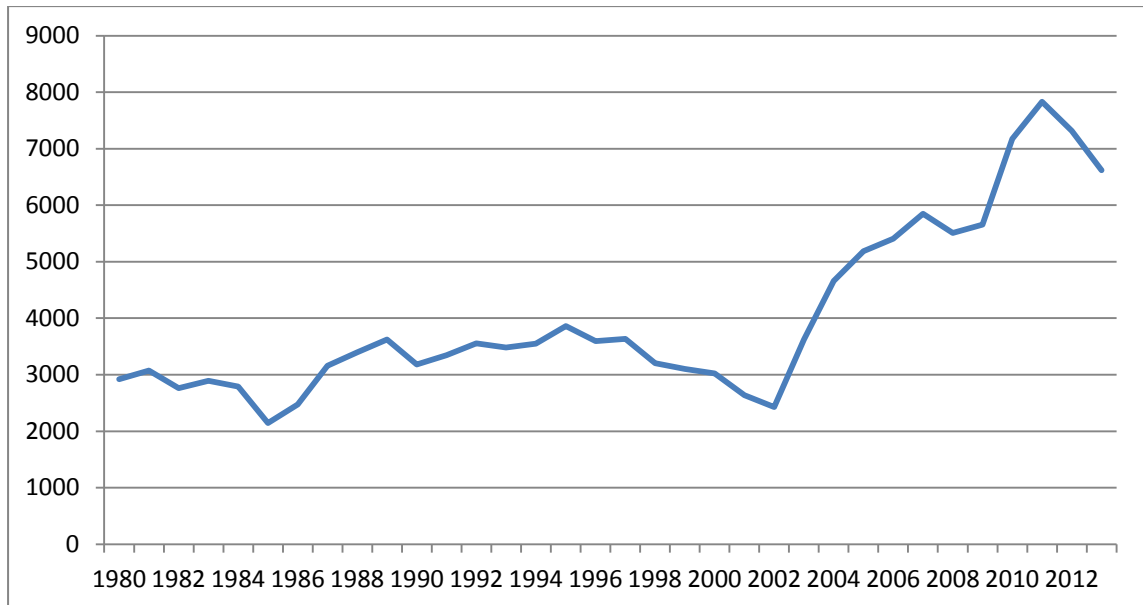
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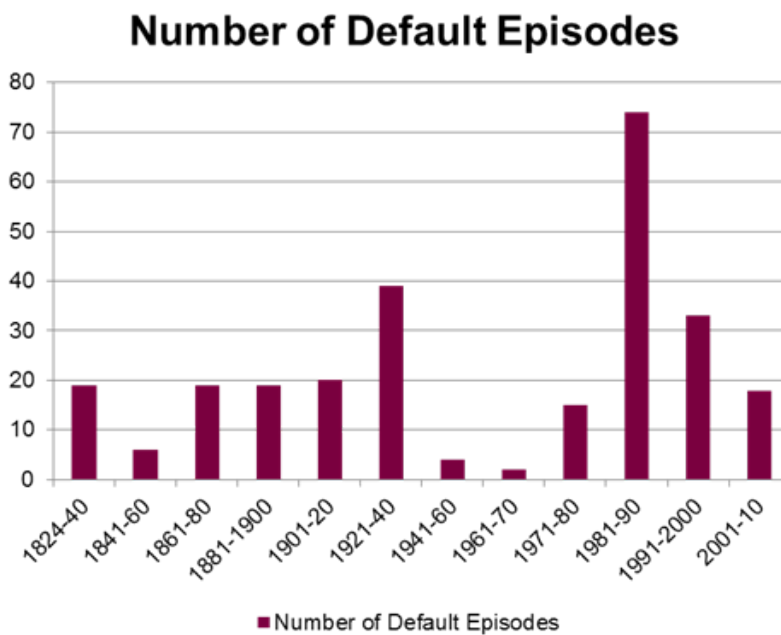
## Appendix

**Figure A1: GDP per capita in current US-Dollars of South Africa:**



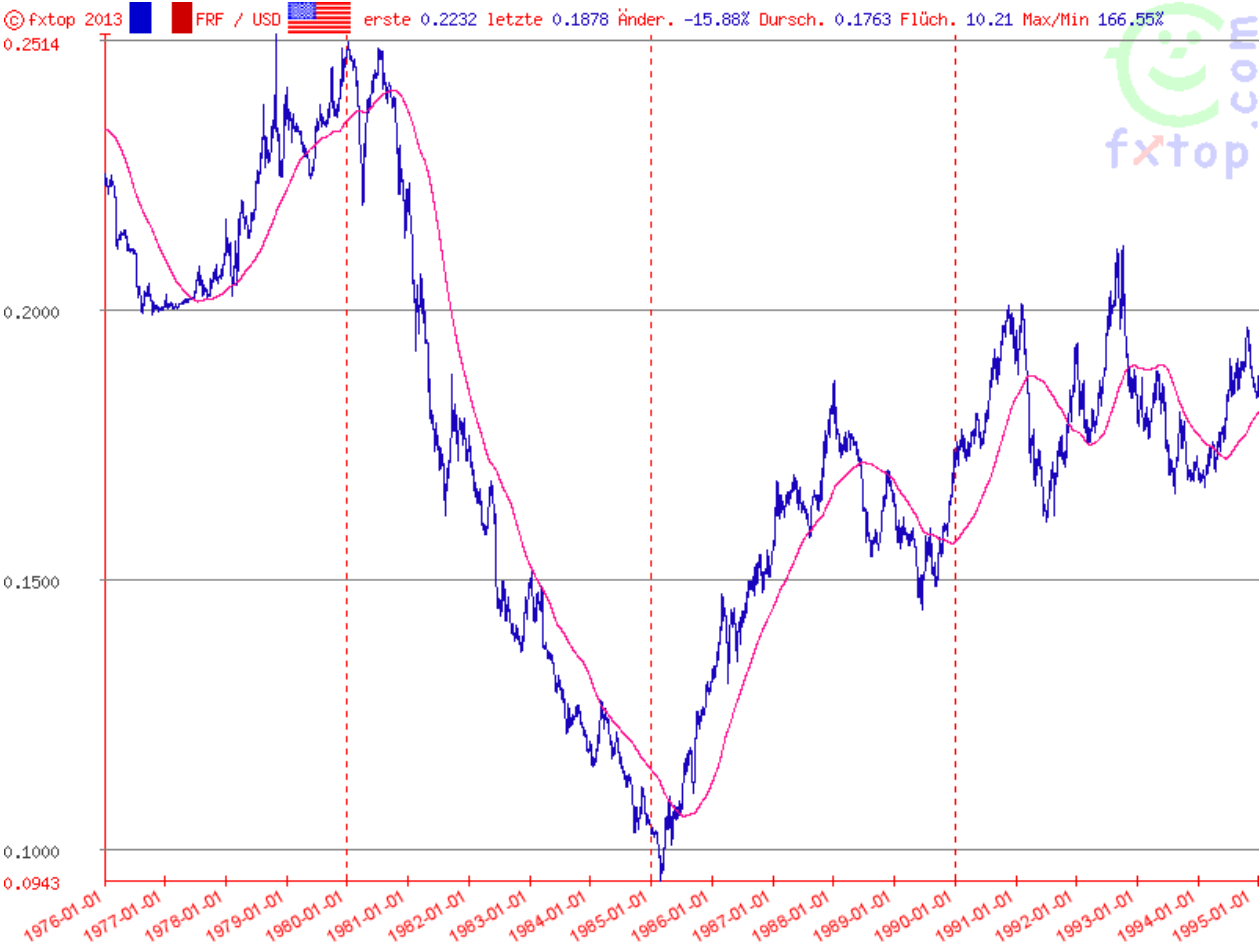
Source: Worldbank (2015).

**Figure A2: Sovereign defaults 1824-2010:**



Source: Borenzstein and Panizza (2008) and Standard and Poors (2011).

**Figure A3: Exchange rate French Franc/UD-Dollar:**



Source: Fxtop (2014).