

The impact of Fiscal Rules on Government Debt:

Evidence from the CFA Zone

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Abstract. This paper uses the synthetic control method (SCM) to estimate the effect of adopting numerical fiscal rules on the debt-to-GDP ratio of CFA zone countries. Using the SCM, allows to address the self-selection bias issue that has plagued previous studies on the impact of fiscal rules. The SCM compares the post treatment trajectory of the treated CFA zone countries to that of a counterfactual constructed using similar but untreated donor countries. Our results show that overall, adopting a stringent numerical debt rule leads to a statistically significant decrease in the level of debt for CFA zone countries. The effect is stronger for West African CFA zone countries, suggesting that enforcement mechanisms and strong institutions are the key determinants of the effectiveness of fiscal rules.

Keywords: Fiscal rules, Currency Union, Government debt, CFA zone.

JEL Codes: C01, E02, E62, H63, O11.

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China has become one of Africa's largest creditors in recent years, lending hundreds of billions of dollars to governments to build roads, railways and ports. Now it's promising to write off a small part of that debt as countries on the continent battle the Covid-19 pandemic.

(CNN, June 19, 2020)

In a virtual summit with African leaders on Wednesday, Chinese President Xi Jinping pledged to "cancel debt for relevant African countries in the form of interest-free government loans that are due to mature at the end of 2020."

(Brookings Institution, June 20, 2020)

1. Introduction

From 2000 to 2018, Chinese banks gave \$152 billions in loans to African countries¹ to help with economic development, but since the covid-19 pandemic, African countries have struggled to repay their debt, leading China to develop a debt relief plan, which includes, for instance, the suspension of both interest and principal payments as well as a \$2 billion fund to help these countries fight the pandemic, which has had devastating consequences on the global economy and on heavily indebted countries in particular. In 2018, the ratio of public debt to GDP was 51 percent for low-income countries, up 5 % from 2013; whereas the 2018 global ratio of debt to GDP reached 230%, with some emerging countries reaching an all-time high debt ratio of 170% of GDP.²

In Africa, for instance, Mozambique's debt to GDP ratio went from 100% in 2018 to 130% in 2020, other African countries such as Angola, Cabo Verde, or Congo have also had higher than 100% debt to GDP ratio, making it difficult to provide an appropriate economic response to the covid-19 pandemic. Other future economic consequences are that African countries will be forced to rely more heavily on external borrowing which might hurt their process of economic development. In addition to that, African countries 'current levels of debt burden will most likely translate into higher fiscal deficits, since interest payments are often the largest expenditure item for these countries.

¹ Source: China Africa Research Initiative)

² Source: The World Bank

Thus, the covid-19 pandemic, if anything, should force these countries to finally deal with their debt issues and design long-term sustainable solutions. This would mean improving the fiscal framework under which African countries have been operating as well as increasing fiscal discipline. For many countries, one of the key ways to achieve these goals has been to implement stringent numerical targets or fiscal rules. Fiscal rules take four main forms: debt rule, budget balance rule, revenue rule and expenditure rule; and when accompanied with enforcement mechanisms, fiscal rules can improve fiscal discipline and also sustain it in the long term.

Studies on the effectiveness of fiscal rules have shown that the implementation of numerical constraints can improve fiscal outcomes. For instance, a study of US states confirms that fiscal constraints have significant effects on the distribution of per capita debt and debt to income ratios (See Von Hagen, 1991; Bohn and Inman, 1996; Canova and Pappa, 2006). Moreover, numerical fiscal rules can also help to prevent the manipulation of government spending during elections or political business cycles (Fatas and Mihos, 2003a). In this paper, we assess the effect of debt rules on debt to GDP ratio in African countries, i.e., CFA zone countries.³ Following Kopits and Symansky (1998), we define a debt rule as an explicit limit that acts as a ceiling on the ratio of public debt to GDP; in the case of CFA zone countries, that ceiling is set at 70 percent of GDP.

Fiscal sustainability is even more important in a currency union, where fiscal policy is often the primary tool used to respond to asymmetric shocks. The implementation and enforcement of fiscal constraints ensure that other member countries do not have to carry weaker and less disciplined countries' debt burden, leading to a free-rider problem. Studies on the success of fiscal rules show that countries with more stringent numerical rules together with enforcement mechanisms have lower deficits (Filc and Scartascini, 2005 and Von Hagen, 2006). On the other hand, studies on the

³ The CFA zone is the second-largest currency union in the world, it is in reality comprised of two different zones: The West African zone (WAEMU) and the Central African zone (CAEMC). We provide more details about the zone in section 3 of the paper.

impact of fiscal rules in the United States have described a similar effect (Bayoumi and Eichengreen, 1994 and Canova and Pappa, 2006)

As for the CFA zone, fiscal deficits have been the primary driver of public debt. Before the adoption of fiscal rules in 2000 for WAEMU and 2002 for CAEMC⁴, many member countries saw their debt-to-GDP ratio increase substantially in the 1980s and 1990s. This was due to a 40% deterioration in the terms of trade, procyclical fiscal policies, and weak GDP growth (Hadjimichael and Galy, 1997). But despite strong institutional features such as a limit on credit advances to member countries of 20%, fiscal discipline remained difficult to achieve for these countries. To improve fiscal outcomes and reduce their level of indebtedness, CFA zone countries embarked on a series of structural and institutional reforms in 1994. For instance, to ensure the integration of fiscal policies that are consistent with the monetary policy pursued in each zone, a regional surveillance framework was created and supplemented by a Growth, Stability, Convergence, and Solidarity Pact; in addition to that, in the 2000s, fiscal rules were adopted to achieve the long-term goal of fiscal discipline.

In this paper, we use the CFA zone as a case study to test the effectiveness of numerical debt targets on debt-to-GDP ratios. From an econometric point of view, however, this is no easy feat since the adoption of numerical restraints is endogenous and can lead to a self-selection bias. Many studies have opted for the use of a differences-in-differences (DID) approach to estimate the effect of policy choices on economic outcomes, but the use of the DID method in understanding the effect of numerical constraints, creates potential issues.

First, the validity of DID requires that the common trend assumption holds, but this might not necessarily be the case in our study of the CFA zone, because as mentioned earlier, our treatment, i.e., adopting a numerical debt rule is not randomly assigned and is determined by geographical (for

⁴ WAEMU stands for West African Economic and Monetary Union. CAEMC stands for Central African Economic and Monetary Union.

instance WAEMU vs CAEMC) and socio-economic factors. Second, the number of treated units is relatively small, in the case of the CFA zone, we can only estimate the average treatment effect for 13 countries and in addition to that, there is considerable heterogeneity among CFA zone countries, implying that the impact of a numerical debt rule is not uniform across countries. Finally, other panel data methods such as fixed effects models might not capture the fact that government debts can trigger the need for reforms, leading to endogeneity problems caused by reverse causation and only account for time-invariant unobservables.

In this paper, we provide a bridge between a case-study approach and the potential issues with cross-sectional estimators by using the synthetic control method (SCM) to analyze the impact of adopting a numerical debt rule on the debt to GDP ratio for CFA zone countries. The SCM has many attractive features; first, instead of estimating average treatment effects, our analysis can focus on *individual* countries as potential case studies. Second, the use of the SCM requires the selection of an appropriate group of donor countries (control units) that will provide a good counterfactual for each treated country, constructed using a weighted average of control units (Abadie et al., 2014)). In addition to that, the selection process of these donor countries is transparent and can safeguard researchers against the risk of far-fetched parametric extrapolation (Abadie, 2019). Third, the SCM can address endogeneity concerns since this approach accounts for time-varying unobservables. Finally, it is important to recognize that using the SCM, does not come without challenges. One problem with the SCM is that the use of standard inference techniques can be difficult; first because samples of data tend to be small and the treatment is not random (Bove et al., 2014). But as discussed later on section 6, statistical testing can be done using permutation tests or placebo tests (Abadie et al., 2010).

Using the SCM, our results show that the adoption of a debt rule led to a statistically significant decrease in the debt-to-GDP ratios of CFA zone countries. The impact of these numerical

constraints is stronger for WAEMU countries than CAEMC countries, and the timing of the estimated effects vary widely across countries, while some countries saw an immediate impact on their debt to GDP ratio, other countries only started to reap benefits years after the rule was implemented.

This study contributes to two different literature strands on fiscal rules. First, this paper adds to the literature on the impact of fiscal rules in currency unions. To our knowledge, this paper is the first to look at the impact of fiscal rules in the CFA zone, as most studies have assessed the impact of numerical constraints in the European Monetary Union (EMU). Some studies have found that fiscal rules have reduced deficits in small countries, but the impact was smaller in large countries or countries with strong institutions (Von Hagen and Harden, 1995 and Von Hagen, 2006). Other researchers have found that fiscal rules are more effective immediately after their adoption (Fatas and Mihov, 2003 and Von Hagen, 2006). Overall, fiscal rules adopted by the EMU, have helped to stabilize government debt in the euro area; though this impact has varied widely across European countries (Leiner-Killinger and Nerlich, 2019).

Second, this study also contributes to the literature on the effectiveness of fiscal rules using a case study approach, namely the SCM, to address endogeneity problems driven mainly by self-selection bias and reverse causality. To be sure, using propensity score matching (PSM), Mandon (2014) has attempted to correct for these issues; his results show that the adoption of fiscal rules improves the procyclicality of fiscal rules. There are, however, two main issues with using PSM. First, such studies can only match on observables and do not account for possible unmatching in unobservables, leading to potential issues of hidden bias; whereas the SCM accounts for the presence of unobservable covariates. Moreover, compared to the SCM, where the construction of the counterfactual relies on the matching of the donor countries' covariates with the treated units' covariates; using PSM implies that the treated units and control units are matched using propensity

scores, which does not necessarily imply an exact match in terms of covariates. Finally, PSM requires large samples with a high level of dimensionality, whereas the SCM does not.

The rest of the paper is organized as follows. In section 2, we discuss the political economy of government debts, section 3 describes the CFA zone. Section 4 briefly discusses the data used in our analysis. Section 5 presents the preliminary results obtained from a simple DID regression model. Section 6 explains the SCM and the statistical inference technique used in this paper. Section 7 presents and discusses the results. Section 8 concludes.

2. The political economy of government debt

In this paper, we analyze the effect of adopting a debt rule on government debt, in the CFA zone. In a currency union, fiscal discipline is essential to maintain economic stability, ensure fiscal sustainability and improve the coordination of national fiscal policies across member countries. One way to achieve fiscal discipline is to implement rules that can effectively *tie policymakers' hands* in their conduct of fiscal policy. Examples of such rules are fiscal rules which are numerical constraints on budgetary aggregates such as debt, expenditure, or budget balance (Schaechter et al. 2012) and can help to anchor expectations and promote macroeconomic stability. The arguments in favor of fiscal rules stem from two important problems: political budget cycles and the common pool problem.

Political business cycles refer to the manipulation of government budgets by opportunistic governments during the electoral cycle. For instance, an incumbent president might increase government spending before elections to remain in power (Nordhaus, 1975). The assumption being that voters value the short-term economic gains provided by expansionary fiscal policy and do not necessarily internalize its macroeconomic costs (such as higher price level in the future). Thus, an opportunistic politician might behave irresponsibly to maximize his/her chance of re-election. This

is known in the literature as the “fiscal illusion hypothesis” which in essence assumes that voters are irrational. In the case of rational voters, however, political business cycles might still arise because voters can sometimes view public spending as a signal of competence (Rogoff, 1990).

Despite the recent embarkment of African countries in the democratization process, the lack of strong institutions, coupled with the lack of independence of African central banks, have made these countries particularly vulnerable to political business cycles, since few mechanisms exist that can hold incumbents accountable for their actions. For example, Brender and Drazen (2005) argue that political budget cycles are more likely to occur in newly established democracies and Block (2002) using a sample of 44 Sub-Saharan African countries, find that African politicians manipulate fiscal instruments during electoral cycles. Finally, Alt and Lassen (2006) show that countries with less budget transparency tend to run higher levels of fiscal deficits and government debt.

Moreover, according to the “common pool problem”, society can be divided into several interest groups who can influence fiscal authorities and directly benefit from government spending. Greater fragmentation leads to distributional conflicts, which in turn can result in higher fiscal deficits or debts. Thus, in an environment where fiscal discipline is weak, i.e., not enforced via numerical constraints or mechanisms that enforce government accountability or transparency, as is often the case in developing countries, the common pool problem can lead to a deficit bias (Velasco, 1999). There is ample empirical evidence of the common pool problem; for instance, many studies have found that there is a positive relationship between political cohesion and fiscal discipline (Volkerink and De Haan, 2001, Eslava, 2011).

While rules can help to mitigate the dual problems aforementioned, it is important to recognize that rules can also be disadvantageous when too strict or too restrictive. Sometimes, unforeseen economic shocks such as the covid-19 pandemic can force governments to run unusually high

deficits to maintain economic stability. Oftentimes, when rules are implemented, escape clauses are included that give governments the flexibility needed to break the rules in case of extraordinary circumstances. In our dataset, we find that while WAEMU countries have well-specified escape clauses, CAEMC countries do not.

In addition to that, although rules and institutions are often seen as substitutes (Wyplosz, 2012), institutions can play a key role in the implementation of numerical rules, as countries with stronger institutions are more likely to comply with the rules. In the case of the CFA zone, institutions ensure that enforcement mechanisms can be implemented *de facto* both at the currency union level and the national level. Institutions can, for instance, ensure not only compliance with the rule but enforcement of sanctions or penalties in case of non-compliance. This could be achieved for instance, via the establishment of an independent (from the said government) monitoring body whose *de jure* or *de facto* authority is officially recognized.

3. The CFA zone

a. An overview of the zone

The CFA zone is the largest currency union in Africa and the second-largest in the world after the Eurozone. In reality, the CFA zone is a misnomer as it is made of two distinct zones, each with its own regulating body. First, there is the Central African Economic and Monetary Community (CAEMC) whose members are mainly central African countries (Cameroon, Central African Republic, Chad, Equatorial Guinea, Gabon, and Congo) and whose currency is the XAF, issued by their common central bank, BEAC⁵. Second, there is the West African Economic and Monetary Union (WAEMU) whose members are mainly west African countries (Benin, Burkina-Faso, Guinea-

⁵ BEAC stands for *Banque des Etats de l'Afrique Centrale* in French.

Bissau, Ivory Coast, Mali, Niger, Senegal, and Togo) and whose currency is the XOF, issued by BCEAO⁶, the zone's shared central bank.

Moreover, unlike the eurozone, the CFA zone is a remnant of colonialism, as the CFA was originally the official currency of French colonies. However, after independence, most French colonies (except for Mali and Mauritania) opted to remain within the currency union and maintain the CFA peg to the French franc before 1999, and the euro thereafter. For that reason, the zone has some notable features. For instance, the board of directors of BEAC includes 2 French representatives.⁷ Additionally, there is free capital mobility between the two zones and France but very little de facto capital mobility between CAEMC and WAEMU; the CFA currencies are only legal tenders within their zone, and finally, the most noteworthy and controversial features of the zone is the *operations account system*, which acts as a limited overdraft by insuring that BEAC and BCEAO have unlimited access to foreign reserves (via the Bank of France) to maintain the peg with the euro. CFA zone countries are, however, required to put part of their external assets or earnings (50% for CAEMC and 60% for WAEMU) in their operations account with the French treasury.

b. The evolution of debt in the zone

Debt problems have plagued the African continent since independence and have been a key component of many African countries' struggle to grow. Indeed, Africa's level of total debt as a percentage of GNP grew from an average of 75.9 % in the 1980s to 107.6 % in the 1990s.⁸ This rise in debt was due to many factors such as mismanagement of public revenues, overreliance on commodities, negative oil shocks, or excessive borrowing and led to the introduction of structural

⁶ BCEAO stands for *Banque Centrale des Etats de l'Afrique de l'Ouest* in French.

⁷ This is used to be the case for BCEAO as well, but since 2020, there are no longer any French representatives on its board of directors.

⁸ Source: The World Bank

adjustment programs (SAPs) to help these countries attain a sustainable fiscal balance. As for the CFA zone, one of the main effects of this debt crisis was the devaluation of the CFA by 50% in 1994.⁹ In addition to that, convergence criteria were adopted in 1999, which require that fiscal balance as a percentage of nominal GDP be in balance or surplus and outstanding domestic and foreign debt to nominal GDP must not exceed 70 percent.

Table 1 shows the number of countries complying with the convergence criteria over the period 1994-2006 and reveals that WAEMU countries violate the criteria more than CAEMC countries. For example, in 1994, there was only 5 CAEMC countries violating the debt criteria compared to 7 WAEMU countries. This is unsurprising, however, given that many CAEMC countries are oil exporters and on average only Chad and Central African Republic, the only non-oil producers in the region have had a hard time complying. Moreover, 2000 and 2002 are the implementation year of the debt rule for WAEMU and CAEMC, respectively and by 2006, no CAEMC was violating the fiscal balance criteria while 7 WAEMU countries were still in violation.

INSERT TABLE 1

More recently, there have been concerns across the continent that another debt crisis is looming as countries have been borrowing too much and too fast. For instance, in 2014, Ghana, a country whose level of debt as a percentage of GDP has almost doubled from 2009 to 2016 (26.96% to 51.16%) issued \$1 billion euro-denominated bonds, other countries such as Nigeria, Namibia have followed suit and issued similar bonds. Many of these countries have now surpassed the 50% ceiling recommended by the IMF.¹⁰ This has been the case especially, for many non-CFA countries such as Kenya or Ghana, whose debt as a percentage of GDP reached 62%; whereas many CFA countries

⁹ Prior to the devaluation, 1 French franc = 50 francs CFA but after the devaluation, 1 French franc = 100 francs CFA.

¹⁰ Source: IMF

were able to keep their level of debt relatively below 50%. This raises the question of whether or not, CFA zone countries have had an easier time maintaining a certain level of fiscal discipline due to their adoption of stringent fiscal rules. In other words, are the debt rule implemented by CAEMC or WAEMU effective in curbing these countries' level of debt as a percentage of GDP compared to non-CFA countries?

4. Data

The data used in this analysis consists of 49 countries over the period 1980-2013, out of which 13 are CFA zone countries (the treated units) and 36 are non-CFA zone countries (see Tables 2 and 3). Out of the 36 non-CFA zone countries, there are 9 non-African countries: Bangladesh, Bolivia, Brazil, Costa Rica, Ecuador, El Salvador, Honduras, Jamaica, and Nepal. (see Table 3, list of donor countries). Our outcome variable is central government debt as a percentage of GDP and is from the IMF Global Debt Database and is defined as the total stock of debt liabilities issued by the central government as a share of GDP.

INSERT TABLES 2 AND 3

Moreover, we refer to the treatment or intervention in this case, as the implementation of a debt rule, which is defined as an explicit target for public debt as a percentage of GDP (Kopits and Symansky, 1998), in our 13 CFA zone countries. The data on debt rules is from the IMF Fiscal rules database. In the case, of the 2 CFA zones, the CAEMC countries adopted a debt rule in 2002, which requires that the stock of external plus domestic public debt should be kept below 70 percent of GDP. As for WAEMU countries, they adopted a debt rule in 2000, and the rule states that nominal debt-to-GDP ratio should be kept at 70 percent of GDP. While in CAEMC countries, the adoption of a debt rule was accompanied by an outside monitoring of compliance, the WAEMU countries' debt rule includes monitoring as well as a formal enforcement procedure.

Finally, we include a set of important predictors of a country's level of debt: GDP per capita, inflation, trade as a percentage of GDP, democracy, civil war, and coup d'état. The first three variables are from the World Bank Development Indicators database and the last two variables are from the Center for Systemic Peace Polity IV database. In Table 4, we provide some descriptive statistics for the CFA zone countries and the non-CFA zone countries for in the 1980s (pre-intervention period) and the 2000s (post-intervention period). First, our outcome variable, the level of government debt as a percentage of GDP for non-CFA countries is lower than the CFA countries in the 1980s, but in the 2000s, both have a similar level of debt (55.4% vs. 56.2%).

Second, we compare other economic characteristics such as GDP per capita, inflation and trade openness. In the 1980s, non-CFA countries and CFA countries have similar income per capita but in the 2000s, income in the CFA zone exceeds that of the non-CFA countries. As expected, inflation in the CFA zone is lower than inflation for the non-CFA countries both in the 1980s and 2000s; trade openness is also higher for CFA countries relative to non-CFA countries in the 1980s and 2000s. This is unsurprising, given that both lower inflation and higher trade openness variables reflect the gains of belonging to a currency union (Debrun et al., 2005).

Finally, we include measures of political instability as predictors given the African context. The democracy variable goes from -10 (autocracy) to 10 (democracy), we can see that non-CFA countries are less autocratic than CFA countries, this is true in the 1980s and 2000s as well. Moreover, when it comes to civil war, non-CFA countries are more prone to civil war than CFA zone countries but both countries have on average the same number of coup d'état.

INSERT TABLE 4

5. Fiscal rules and debt: a preliminary analysis

In this section, we test the effect of implementing a fiscal rule on government debt as a percentage of GDP using a DID framework, i.e. I estimate the following DID model using OLS:

$$Y_{it} = \beta_i + \gamma_t + \alpha D_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} is government debt as a percentage of GDP in country i at time t , β_i is country fixed effects, γ_t is a time effect, ε_{it} is the error term and D_{it} is a dummy variable taking the value of one for CFA zone countries in and after the treatment and zero otherwise. The results are obtained by setting one CFA zone country as the treated country and excluding the other CFA zone countries each time the analysis is performed. The results are shown in Tables 5, and 6. As expected, our DID analysis shows that there is an inverse relationship between debt rule and government debt. In addition to that, out of the WAEMU countries, Benin, Mali and Ivory Coast saw the larger impact of adopting a debt rule in 2000; while Guinea-Bissau, Niger, Senegal and Togo saw no effect on the ratio of debt to GDP. As for CAEMC countries, Equatorial Guinea and Congo have the largest DID estimates, while the rule has no effect for Cameroon and Gabon.

Although the results of the DID estimates provide useful insights on the effect of adopting a debt rule on government debt, we cannot claim that these estimates are reliable, or causal given the limitations of the DID method. First, the DID framework depends on the common trend assumption, which is key for internal validity. As the time trend graphs show in Figure 1 for CAEMC countries and Figure 2 for WAEMU countries, we can clearly see that for most of our treated units, the common trend assumption does not hold; given that the treated unit and the comparison countries do not follow the same trend. Moreover, this assumption is also unlikely to hold when the treatment is not random. In our case, the adoption of debt rules might be endogenously driven by the socio-economic characteristics of the CFA zone countries; thus, any differences in the outcome variable can be driven by these characteristics rather than the treatment.

Second, the DID framework can account for time-invariant unobservables but not time-varying unobservables that must be controlled for. Finally, the DID method assumes that changes in the outcome variable; in our case, government debt, will remain the same for both treated units and control units in the absence of treatment. Even if we observe a parallel trend in the pre-treatment period between the treated countries and the control group, there is no guarantee that this trend will hold over time.

INSERT TABLES 5, AND 6

6. The synthetic control method

6.1 the estimation

In this paper, rather than relying on the DID method to estimate the effect of adopting a debt rule for CFA zone countries, we rely on the synthetic control method (SCM), developed by Abadie and Gardeazabal (2003) and extended by Abadie et al (2010). SCM is a statistical method that consists of comparing the effect of the treatment on an outcome variable, in our case, government debt as a percentage of GDP, between the treated unit and a counterfactual. Using SCM, the counterfactual is constructed, using a weighted combination of possible “donor” countries, such that the weighted average of the outcome variable and other key characteristics matches that of the treated country in the pre-intervention period. Thus, our identification strategy is based on the comparison of the trends in government debt of the country exposed to our treatment with that of the counterfactual.

Moreover, one of the advantages of SCM is the use of several donor countries rather than one country to build a more precise counterfactual, this also removes the difficulty of finding just one donor country. In addition to that, the flexibility of SCM makes it easier to appropriately choose units that are closely matched to the treated country and thanks to post-estimation estimates of key characteristics, a better comparison of the counterfactual and the treated unit can be made and

sources of heterogeneity can be easily identified. Finally, the transparent estimation of the counterfactual can help to dampen the risk to draw causal inference from an unknown extrapolation process.

More formally, the SCM uses a sample of $j + 1$ countries indexed by j where country $j = 1$ is the treated country; in this paper, our treated sample consists of 13 CFA zone countries, 5 from the CAEMC zone and 8 from the WAEMU zone. Our overall sample consists of 45 countries including our treated countries observed over a period $t = 1, \dots, T$; where T_0 represents the number of years, our treated unit did not adopt a debt rule (pre-intervention period) and $T - T_0$ represents the number of years the debt rule was adopted (post-intervention period). Let Y_{jt} be the outcome of the treated unit at time t and $Y_{jt}(0)$ and $Y_{jt}(1)$ be the potential outcome of country j pre- and post- intervention period, respectively. Thus, the observed effect can be captured by $\gamma_{jt} = Y_{jt}(1) - Y_{jt}(0)$ and $Y_{jt} = Y_{jt}(0)$ in pre-intervention period or $Y_{jt}(1) = Y_{jt}(0) + \gamma_{jt}$ in post-intervention period. This relationship can be estimated using the following factor model:

$$Y_{jt}(0) = \delta_t + X_{jt} \quad (2)$$

$$Y_{jt}(1) = \gamma_{jt} + \delta_t + X_{jt} \quad (3)$$

where $X_{jt} = \theta_t Z_j + \beta_t \mu_j + \varepsilon_{jt}$, Z_j is a vector of observed explanatory variables, θ_t is a vector of unknown parameters, β_t consists of unobserved common factors, μ_j is a vector of country-specific unobservables and ε_{jt} is a zero-mean error term. Suppose Z_1 is a vector of pre-treatment characteristics of a treated unit while Z_0 is a vector of the same characteristics for the donor

countries¹¹. Then, the SCM minimizes the difference between Z_1 and Z_0 which is given by $Z_1 - Z_0W$, where W is a vector of weights on the donor countries such that $w_j \geq 0$ and $\sum w_j = 1$:

$$\min_w \sqrt{(Z_1 - Z_0W)'V(Z_1 - Z_0W)} \quad (4)$$

where V is some symmetric positive semidefinite matrix. The SCM selects w^* such that the estimator of γ_{jt} is given by comparing the outcome for the treated country to the outcome of the counterfactual during the pre-intervention period¹²:

$$\widehat{\gamma}_{jt} = Y_{jt} (1) - \sum_{j=2}^{j+1} w_j^* Y_{jt} \quad (5)$$

The weights on the donor countries are chosen so that the weighted averages match Mali as closely as possible.

6.2 Placebo tests

One of the disadvantages of the SCM is that determining the statistical significance of the results can be tricky given that the traditional statistical inferential techniques are not available; especially given that the sample period and the number of observations in the analysis are often small. Thus, as Abadie et al. (2010) initially suggested, placebo tests can provide an alternative method to provide statistical inference based on the results. In our case, we conduct “in-place placebo tests” or tests in which the treatment is reassigned to control units that did not, in reality, experience it. The results of these placebo tests should not show control units that have similar or larger trends in the outcome variable, than actually treated countries, in the post-intervention period. Otherwise, this could imply that effect of the intervention was observed by chance, which threatens the credibility of the SCM.

¹¹ Note that these characteristics may include the pre-intervention values of the outcome variable as well.

¹² See Abadie et al. (2010).

Moreover, the distribution of in-place placebos can be captured by p-values, which have the interpretation of being the probability of obtaining an estimated effect at least as large as that of the treated country¹³. These p-values are calculated in the following way:

$$\text{P-value} = \text{Pr.} (|\hat{\alpha}_{1t}^{\text{PL}}| \geq |\hat{\alpha}_{1t}|) = \sum_{j \neq 1} \frac{\mathbf{1}(|\hat{\alpha}_{1t}^{\text{PL}}| \geq |\hat{\alpha}_{1t}|)}{I} \quad (6)$$

where $\hat{\alpha}_{1t}^{\text{PL}} = \hat{\alpha}_{jt}$; ($j \neq 1$) is the distribution of in-place placebos effects.

6.3 Case study selection

We implement the SCM to estimate the effect of adopting a debt rule on government debt. To do so, an appropriate donor pool of suitable countries must be constructed, and the countries selected must meet two key criteria: 1) they cannot have received the treatment themselves and 2) they must be comparable to the treated unit. To account for these similarities, we use the following predictors: GDP per capita, inflation, trade as a percentage of GDP, democracy, civil war, and coup d'état, as shown in Table 7.

INSERT TABLE 7

Moreover, besides CFA zone countries, other African countries such as Botswana, Kenya, Liberia, Namibia have also adopted debt rules¹⁴. We choose to exclude these 4 countries from the treatment group since the debt rules adopted were not accompanied by explicit enforcement mechanisms such as a formal enforcement procedure or an independent monitoring body and this might imply a de

¹³ See Galiani and Quistorff (2017).

¹⁴ Except for Kenya, which adopted a debt rule in 1997, all of these countries are included in our donor pool since they implemented a debt rule well after our treated countries did.

jure adoption of a debt rule but necessarily a de facto adoption, making it difficult to assess the actual impact of a debt rule on government debt. In addition to that, in 2013, the East African Monetary Union whose members are Burundi, Kenya, Rwanda, South Sudan, Tanzania, and Uganda, adopted a debt rule, which included an outside monitoring option but no formal enforcement procedure. Nevertheless, we exclude this currency union because the data, for our outcome, is only available until 2013. Thus, we limit our treated units to CFA zone countries because they meet the following conditions: i) as shown in Table 2, allows us to cover a longer post-treatment period which can capture both short-term and long-term effects and ii) there is at least a mechanism (such as monitoring of compliance or a formal enforcement procedure) put in place to ensure a de facto implementation of the debt rule.

Finally, as shown in Table 3, our donor pool consists of 27 non-CFA African countries and 9 non-African countries. While, ideally, we would like to restrict the sample of donor countries to African countries, we include non-African countries to increase the pre-intervention fit between the treated and control unit.

7. The impact of fiscal rules on government debt

7.1 Results

In this section, we discuss the results of our synthetic control experiments numerically (Tables 9 and 10) and graphically (Figures 5 and 6). These tables compare the predictor variables of each treated country with its synthetic. Following Abadie et al. (2010), to improve the pre-treatment fit between the counterfactual and the treated unit, we randomly pick annual observation of the outcome variable and include it as a predictor. In Table 9, we provide a comparison of CAEMC country with its synthetic. Overall, except for GDP per capita and inflation, the values of the predictors of the treated country are close in value to those of the synthetic. This is also the case for WAEMU

countries as shown in Table 10. For instance, in the case of Ivory Coast and Mali, the predictors are nearly identical. For most of the countries in our sample, except Cameroon, Equatorial Guinea and Chad, the predictor balances tables suggest that the treated unit and the counterfactual are pretty comparable in the post-treatment period.

Next, Figures 5 and 6 provide a graphical analysis of the pre-treatment fit between the counterfactual and the treated units. In Figure 5, we present the results for the CAEMC countries, the dashed lines represent the synthetic units while the solid lines represent the treated units. Figure 5 confirms that for Cameroon, Chad, and Equatorial Guinea, the pre-treatment fit between these countries and their synthetic is poor, whereas, for Congo and Gabon, their synthetic units are pretty comparable. For Congo, the synthetic unit or counterfactual consists of Mauritania (63.3%) and Sudan (36.7%)¹⁵ and the trajectory of government debt is nearly identical to that of the synthetic. After the adoption of the debt rule in 2002, their trajectory remains identical, before eventually diverging, i.e., Congo's level of government debt continues to decrease. In addition to that, the p-values which represent the probability to observe this effect by chance, values are close to zero in the last five years of our post-treatment period. They reveal that adopting a debt rule will lead, on average, to a statistically significant decrease in government debt for Congo and suggest that Congo did not immediately feel the effect of a debt rule.

For Gabon, the synthetic unit consists of Burundi (16.7%), DRC (17.9%), Madagascar (5.8%), Namibia (38.5%), Nigeria (10.4%), and Tanzania (10.7%). The level of government debt for Gabon and synthetic Gabon follow the same trajectory in the pre-treatment and most of the post-treatment period but slightly diverge toward the end of the post-treatment period and the effect of adopting a debt rule remains statistically insignificant at any conventional levels (see p-values).

¹⁵ Weights tables are provided for all countries in the appendix.

Moreover, Figure 6 presents the results of the placebo tests for CAEMC countries, in which the treatment, i.e., adopting a debt rule, is assigned to all the other countries in the sample. For Congo, the estimated effect is slightly larger than the placebo effects, this is also the case for Gabon, confirming that the estimated divergence between Gabon and Synthetic Gabon is not statistically significant.

Finally, Figure 7 presents the results of the synthetic experiments for WAEMU countries. Overall, the trajectory followed by government debt for the treated unit is nearly identical to that of the synthetic units for all eight countries. However, the effect of implementing a debt rule is only statistically significant for four countries: Ivory Coast, Mali, Niger, and Senegal. In the case of Mali, synthetic Mali which consists of Comoros (19.9%), Ghana (1.1%), Madagascar (6.1%), Malawi (52.3%), Mauritania (6%), Rwanda (3.7%) and Sierra Leone (10.9%), does not experience the same sharp decrease in government debt as Mali does after adopting a debt rule and the p-values suggest that the probability of observing such an effect by chance is close to zero for the first seven years of the post-treatment period. Thus, adopting a debt rule leads to a statistically significant decrease in government debt for Mali, and the effect of this rule was felt immediately upon adoption. In the case of Niger, adopting a debt rule has a similar effect on government debt to Mali but this effect was not felt immediately.

Moreover, in Figure 8, the placebo tests for WAEMU countries are shown. As stated earlier, for all 8 WAEMU countries, the counterfactual does a good job of replicating government debt in the pre-treatment period; but for four of them (Benin, Burkina Faso, Guinea-Bissau, and Togo), the effect of the 2000 debt rule on government debt is not statistically significant. This is also confirmed by their placebo tests, in which the placebo effects are larger than the bold line which represents the treated unit, suggesting that our results might be driven by chance. For the other four countries, i.e.,

Ivory Coast, Mali, Niger and Senegal, the bold line is larger than the other permutations, lending credence to our conclusion that the estimated effects are not driven by chance and represent the real effect of adopting a debt.

In conclusion, for five of our treated countries, implementing a debt rule, on average led to a decrease in government debt. While some countries such as Ivory Coast or Mali saw the intended benefits of following a debt rule right after implementation; for other countries such as Congo or Niger, the effect of this fiscal rule is slower to emerge.

7.2 Discussion

In the previous section, the results show that adopting a debt rule leads to a statistically significant decrease in government debt. But out of the 5 CAEMC countries, only one country, Congo, benefited from adopting the debt rule in 2002; whereas for WAEMU countries, four out of 8 countries benefited. What drives this difference? Moreover, among the benefiting countries, some countries were slow to see an impact whereas other countries saw an immediate effect, what explains this?

We argue that differences between the two zones could be the result of the correction mechanisms that were put in place once the rule was adopted to ensure countries' compliance, as countries with stricter fiscal rules and correction mechanisms see a larger impact on their level of debts (Fisc and Scartascini, 2005). Correction mechanisms are especially key in a currency union, since adopting a supranational debt rule does not necessarily translate into the implementation of the rules at the national level unless strict automatic correction mechanisms are put in place (Schaechter et al. 2012). Such mechanisms could, for instance, include the establishment of an independent monitoring agency or a formal enforcement procedure, whose role is to monitor or assess the adoption and effect of the rules. In the case of CAEMC countries, the adopting of a debt rule was only

accompanied by the former but not the latter, whereas, for WAEMU, a formal enforcement procedure was put in place and administered by the WAEMU commission whose responsibilities, include, for example, ensuring that the regional fiscal rules are implemented at the national level via the establishment of fiscal councils. In addition to that to ensure that countries comply with the debt rule and achieve fiscal discipline, the WAEMU commission also provides an institutional surveillance framework. The commission is also equipped to administer sanctions in case a country fails to comply, this includes for instance publishing a statement on the country's economic situation or withdrawing access to the currency union's resources to the guilty member state (Hitaj and Onder, 2013).

Moreover, a second explanation could reside in institutional differences that exist at the national level. As argued by Acemoglu et al. (2001), to achieve economic growth or other comparable economic outcomes, good institutions are key and a similar argument can be made for achieving fiscal discipline (Halleberg et al., 2009). Adopting a de jure supranational fiscal rule such as a debt rule is not enough to achieve fiscal discipline. In the case of currency unions, strong institutions must exist not only at the regional level but also at the national level. One measure of institutional quality often used in the literature is *political regime*; thus, using Polity data from the Center for Systemic Peace, we calculate the average polity score for CAEMC and WAEMU countries over the period 1980-2013. A polity score is a single political regime score that ranges from -10 (full autocracy) to 10 (full democracy) and based on their polity score, all 6 CAEMC countries can be classified as dictatorships compared to only four out of 8 WAEMU countries.

Moreover, differences in institutional quality can also explain why we observe a lag in the impact of the debt rule for Congo and within WAEMU countries. As mentioned earlier, Congo is the only CAEMC country to see a statistically significant effect of the 2002 debt rule, but this impact was

slow to appear. Congo is also a dictatorship with an average polity score of -4. In contrast, for WAEMU countries, Mali and Senegal which are among the strongest democracies in the region, saw an immediate impact on government debt. Consequently, it appears that countries with high-quality institutions are more likely to enforce the debt rule at the national level, immediately upon adoption given that they already possess the institutions necessary to do so.

8. Conclusion

This paper has explored how the adoption of fiscal rules impacts the debt-to-GDP ratio of CFA zone countries. To answer this question, we rely on the synthetic control method (SCM) and data on 13 CFA zone countries, which adopted the rule in 2000 (WAEMU countries) and 2002 (CAEMC countries). By comparing the post-treatment trajectory of individual CFA zone countries to their counterfactual consisting of a linear combination of similar untreated donor countries, we find that overall, adopting a numerical debt rule lowers the debt-to-GDP ratio of CFA zone countries.

However, out of 5 CAEMC countries, only Congo saw a statistically significant decrease in its debt-to-GDP ratio, whereas for WAEMU countries, 5 out of 8 countries experience a similar effect.

These results are driven by the fact that WAEMU countries have stricter enforcement mechanisms and on average stronger institutions than CAEMC countries. In addition to that, we also find that within WAEMU countries, Benin, Ivory Coast, and Mali experience the impact of the rule, immediately upon adoption whereas, for Niger and Senegal, the effect was slow to appear.

If anything, our paper shows that adopting fiscal rules is not enough to improve fiscal discipline.

Supranational rules must be enforced at the national level and therefore, dependent on the level of institutions that exist at the country level. Such institutions can be complemented by monitoring agencies or commissions that can monitor countries' adherence to the rules and deliver appropriate

penalties when necessary. The impact of debt rules on CFA zone countries provide a potential solution for African countries, trying to achieve fiscal discipline.

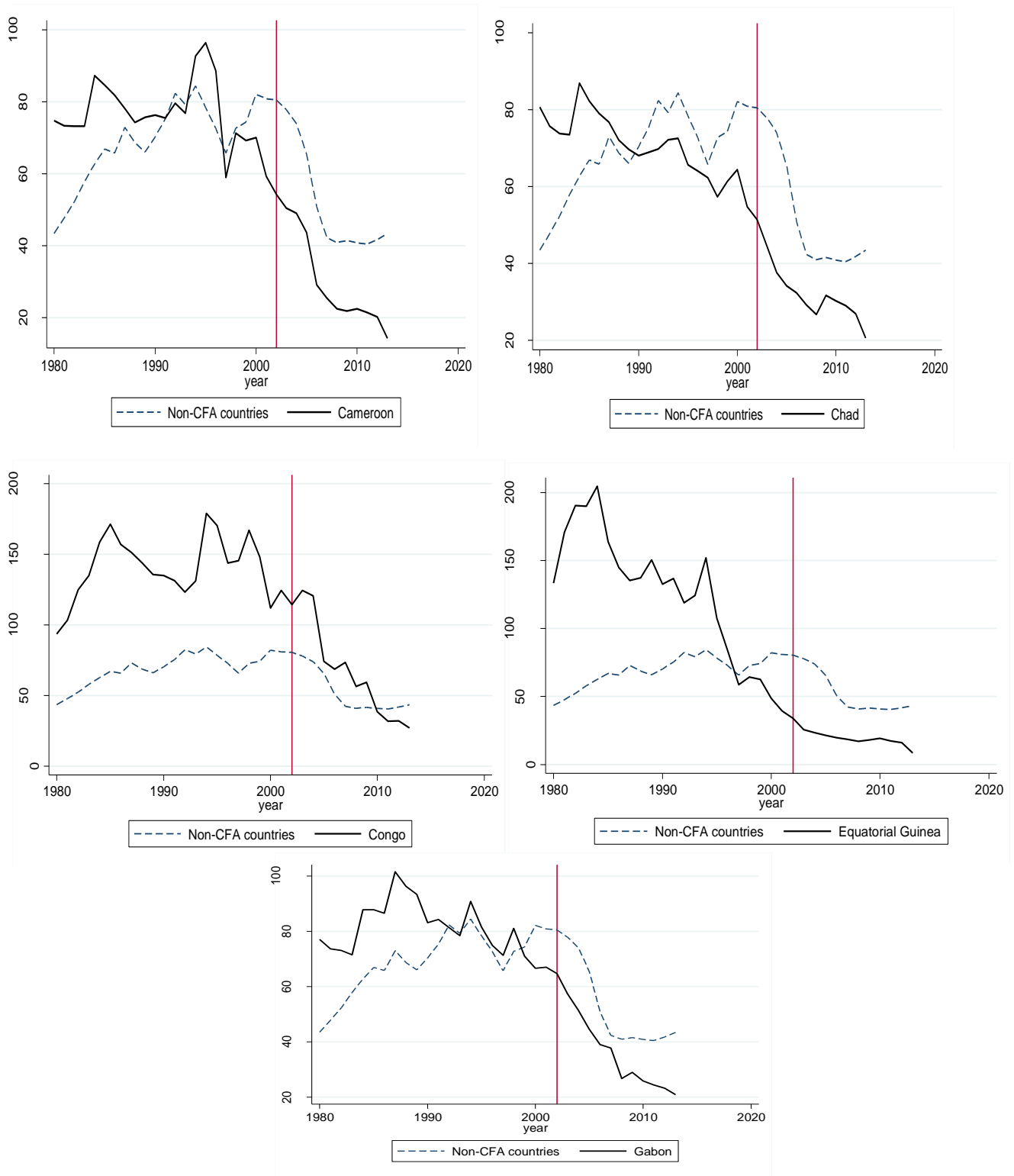
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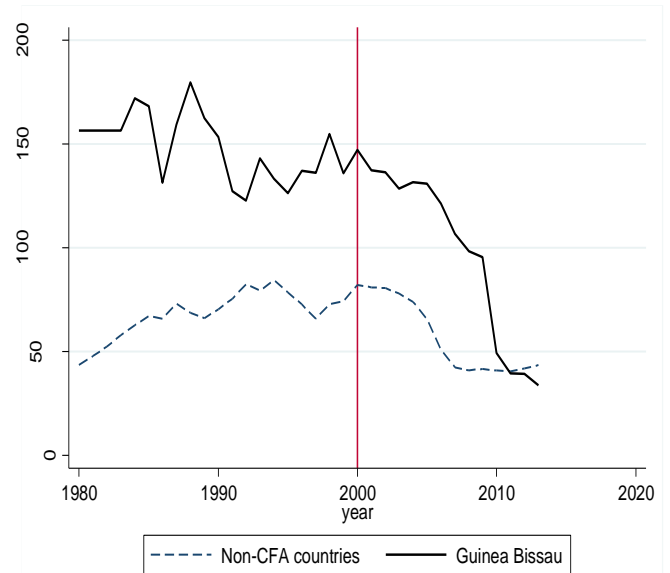
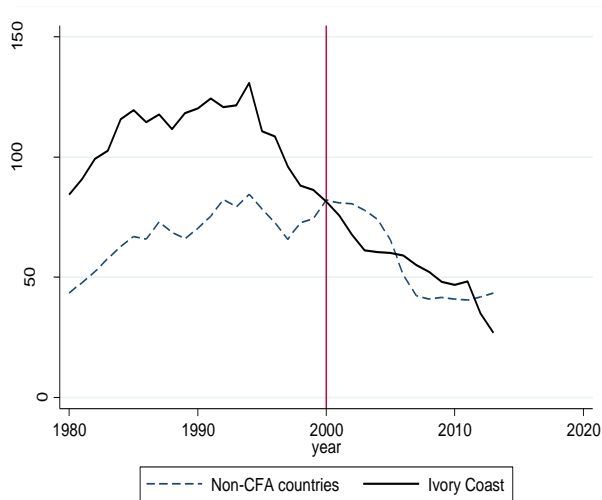
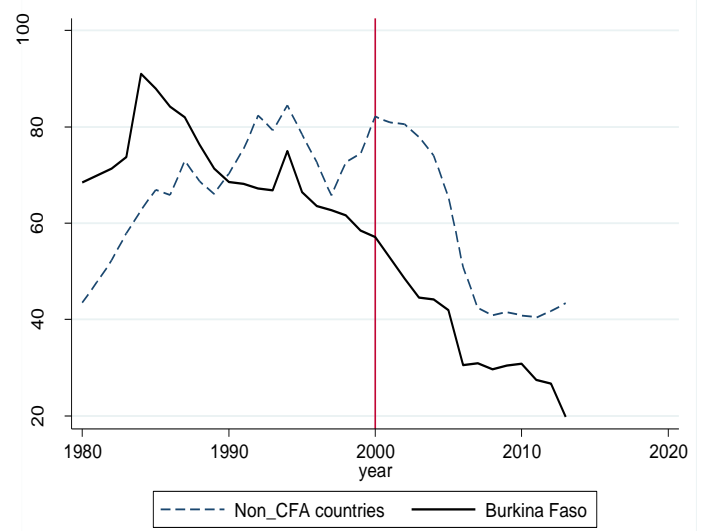
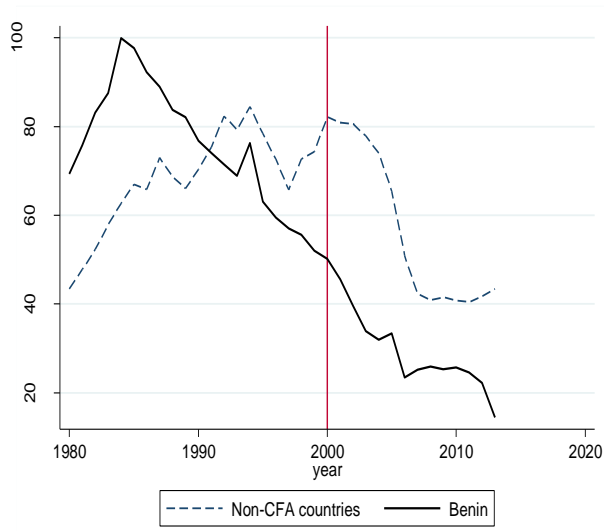
FIGURES

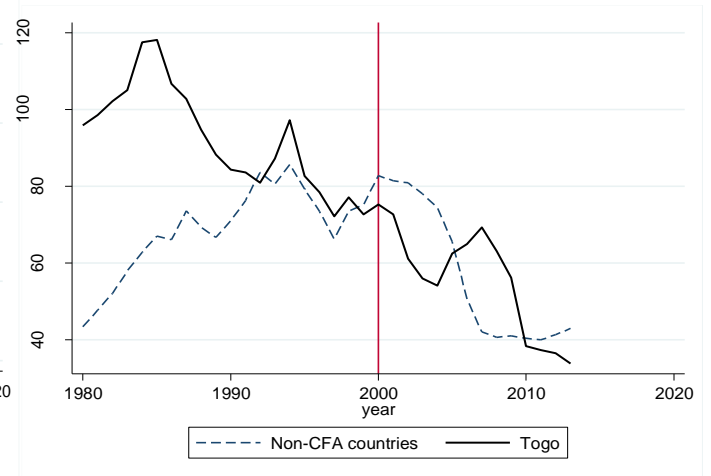
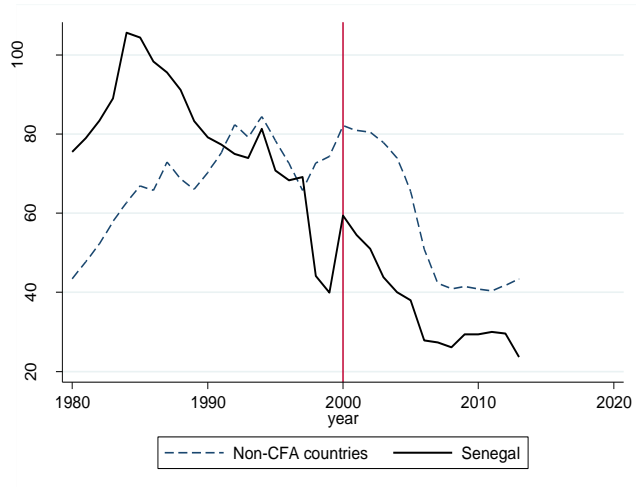
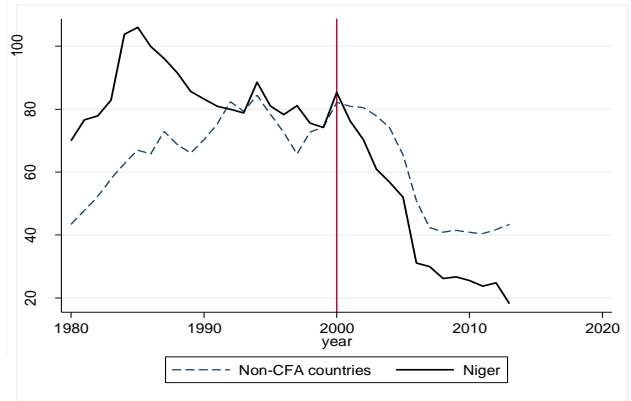
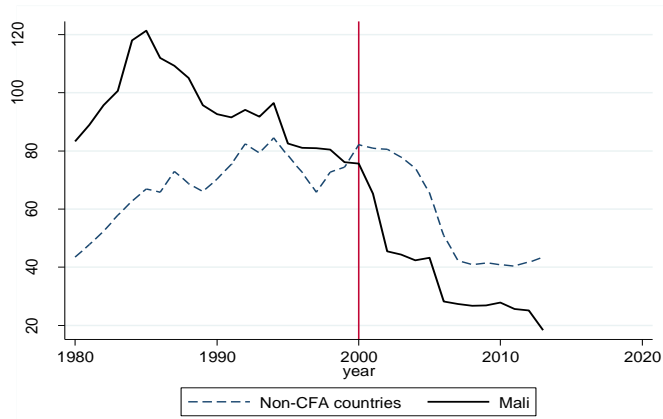
Figure 1: Time trend graph: government debt (as a percentage of GDP) for CEMAC countries



Notes: Solid lines are government debt for central African CFA zone countries. The dashed lines represent average government debt for the control units. The vertical line is the intervention year.

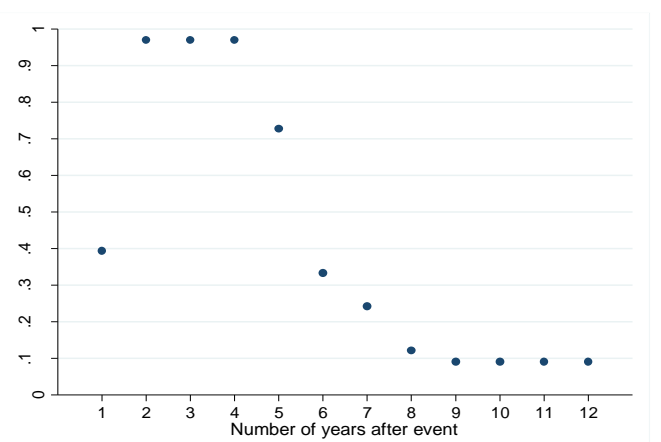
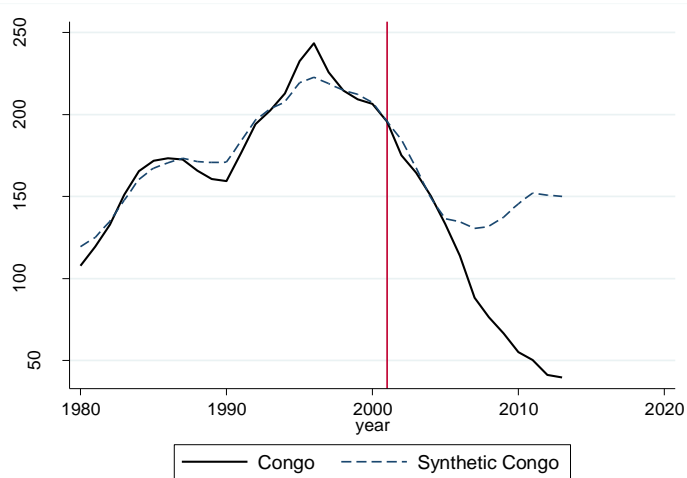
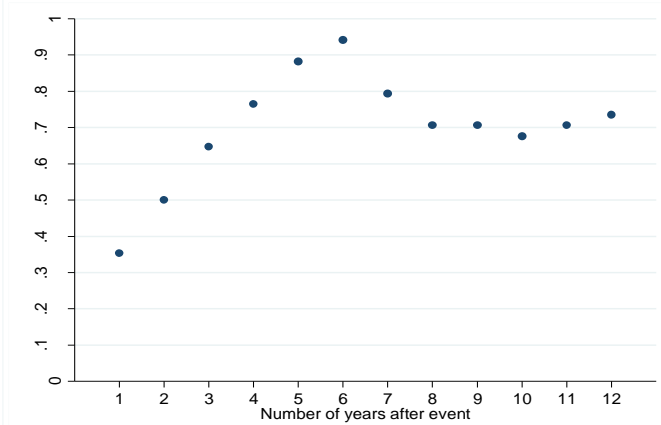
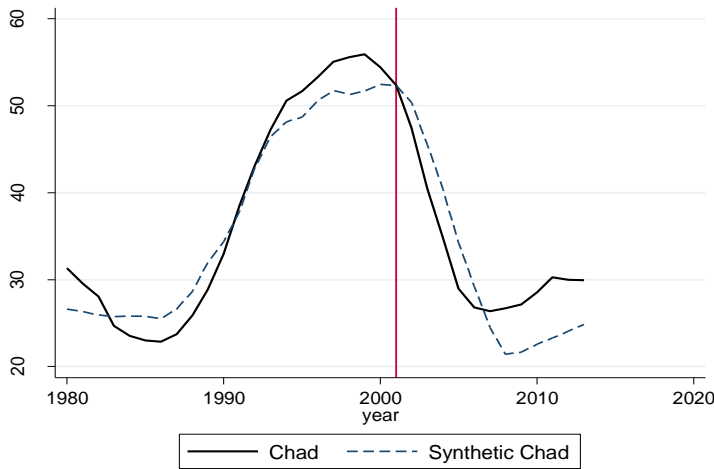
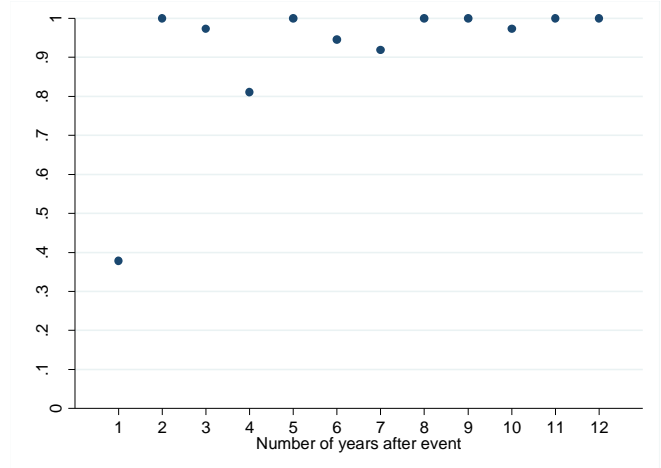
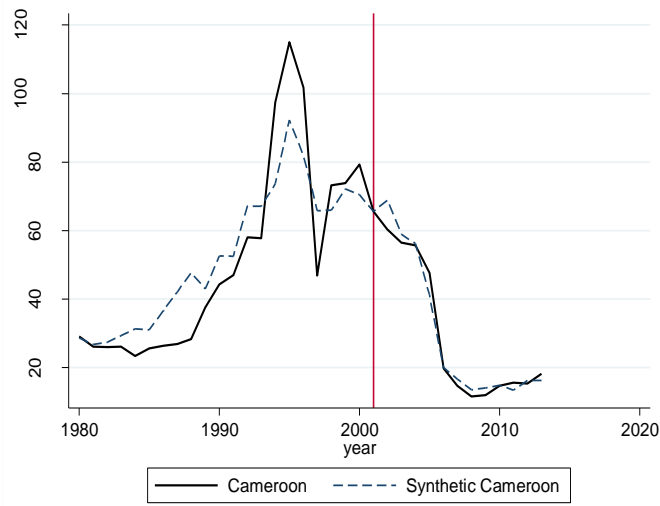
Figure 2: Time trend graph: government debt (as a percentage of GDP) for WAEMU countries

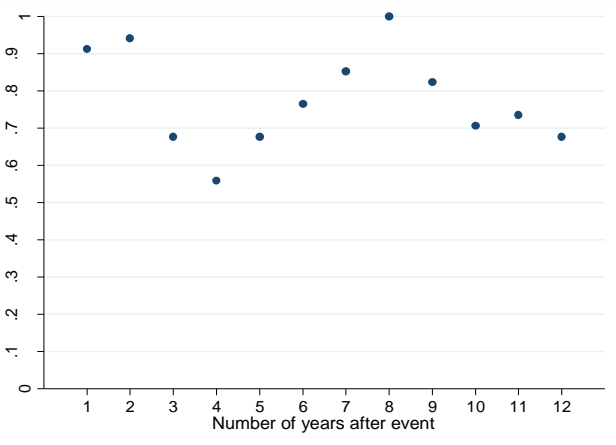
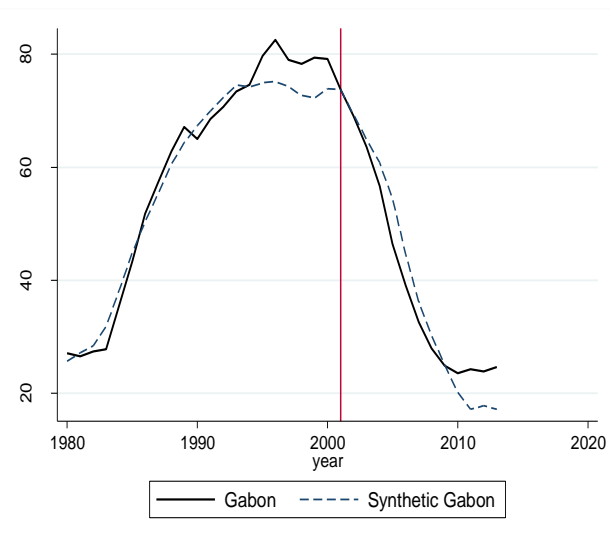
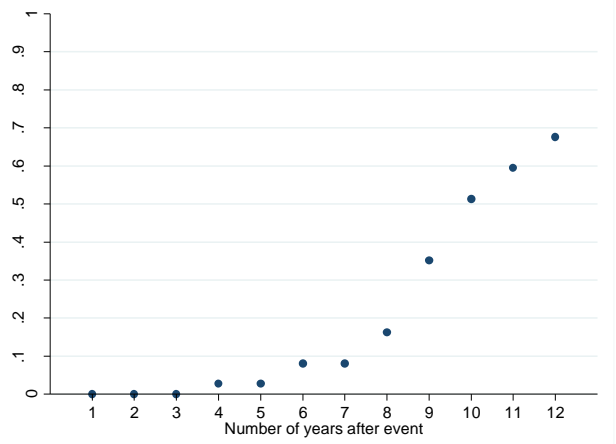
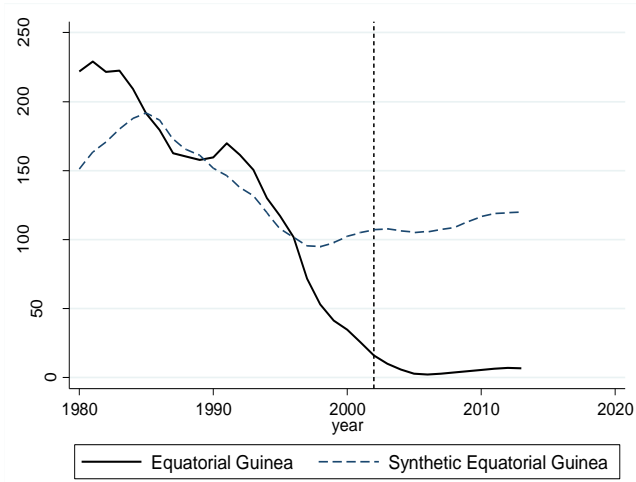




Notes: Solid lines are government debt for west African CFA zone countries. The dashed lines represent average government debt for the control units. The vertical line is the intervention year.

Figure 5: Government debt (as a percentage of GDP) for CEMAC countries: treated and control units





Notes: Solid lines are government debt for Central African CFA zone countries. The dashed lines represent average government debt for the counterfactual. The vertical line is the intervention year.

Figure 6: Government debt (as a percentage of GDP) for CAEMC countries: placebo tests

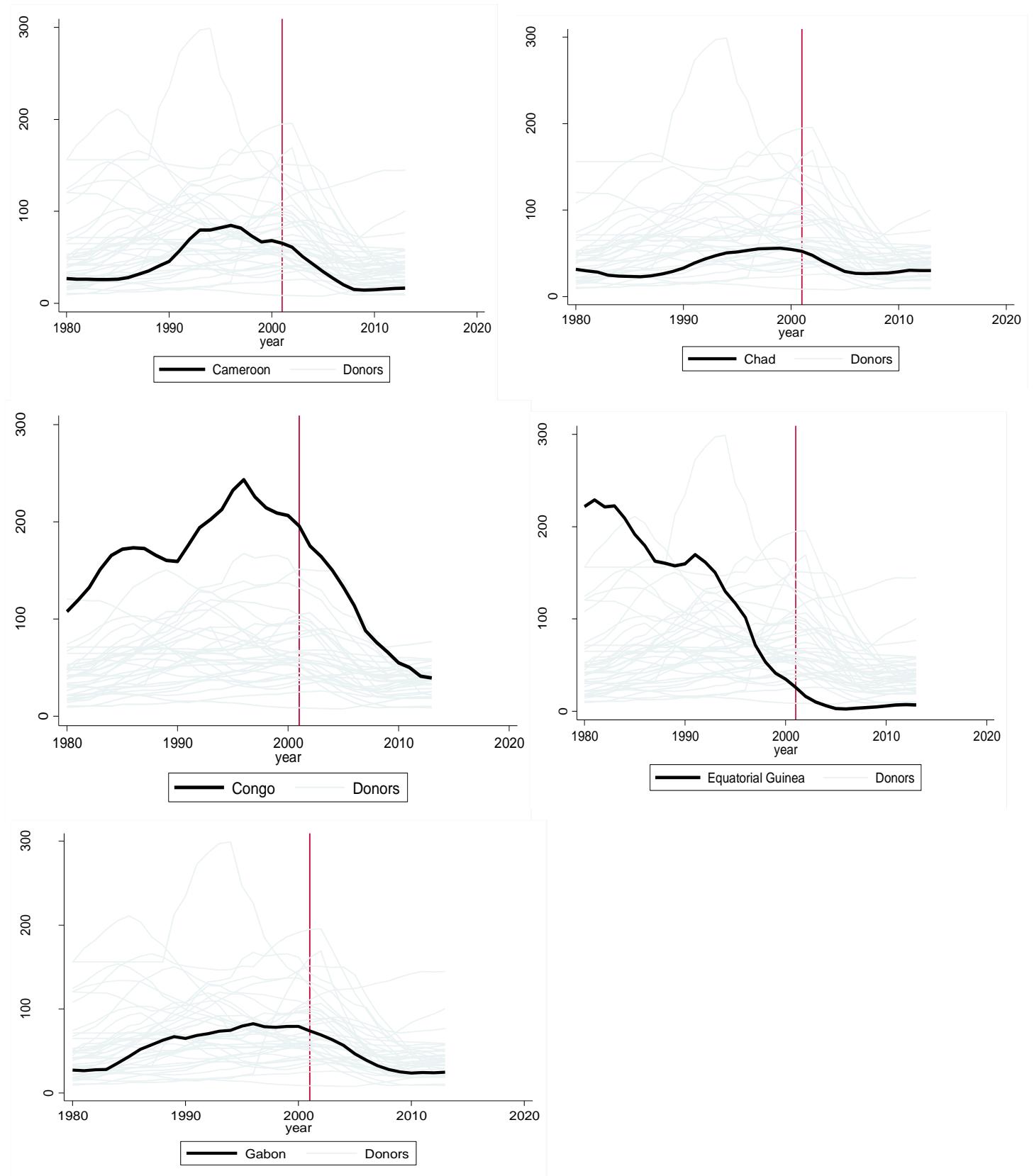
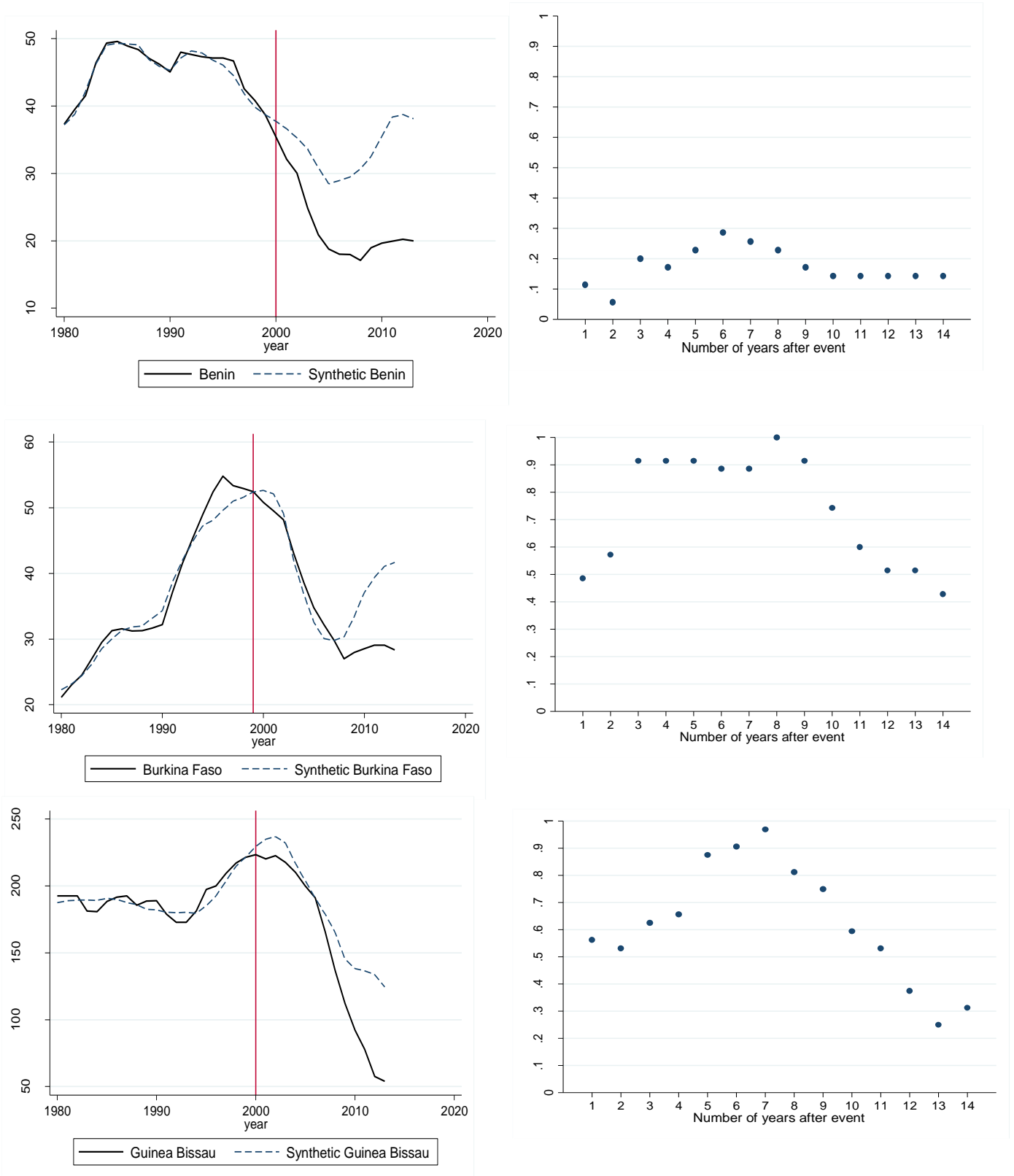
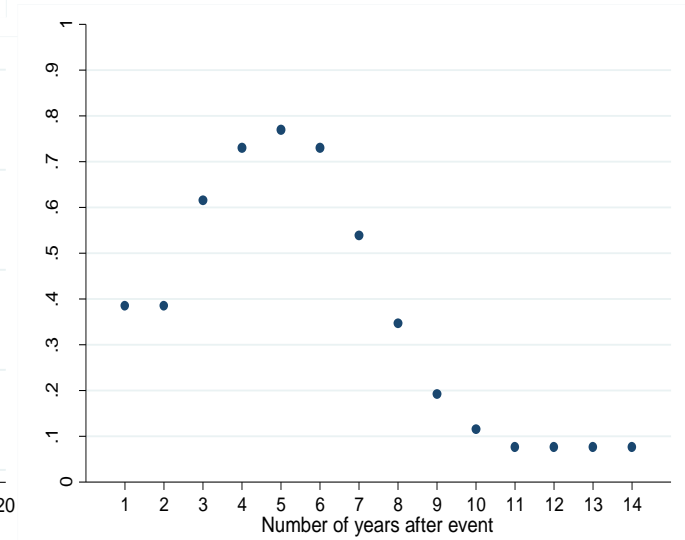
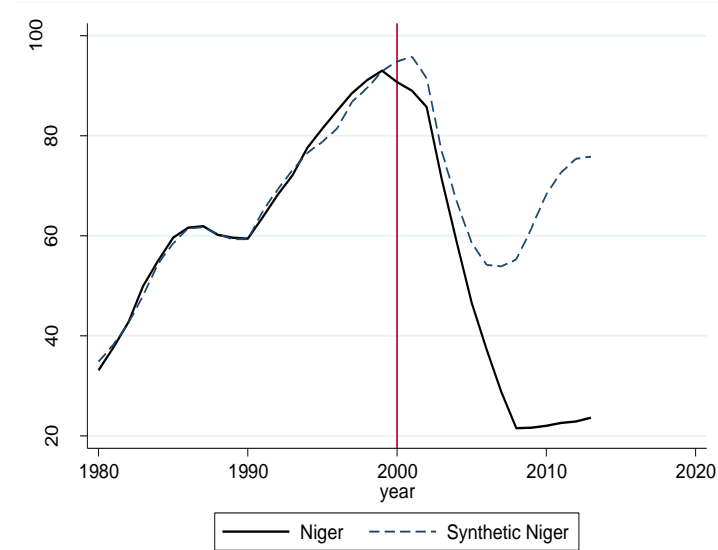
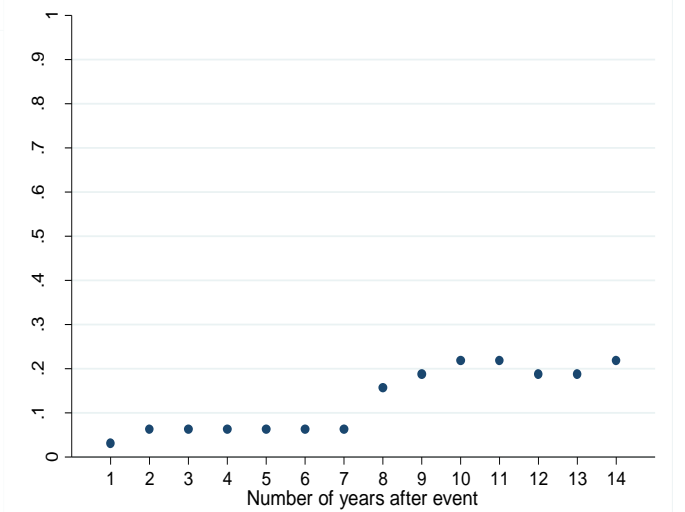
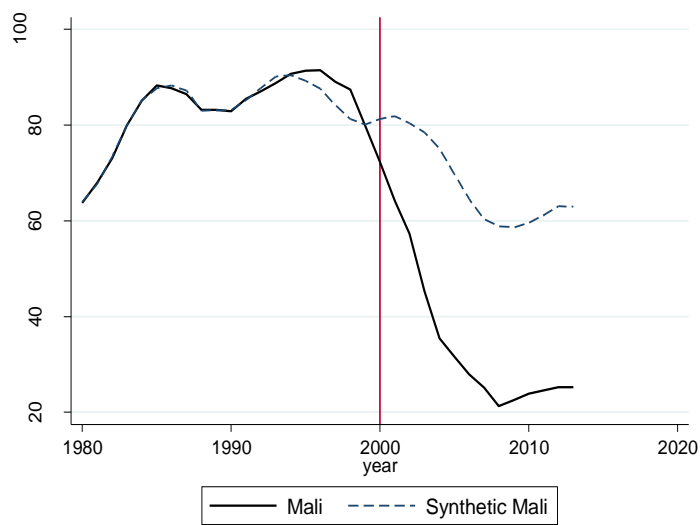
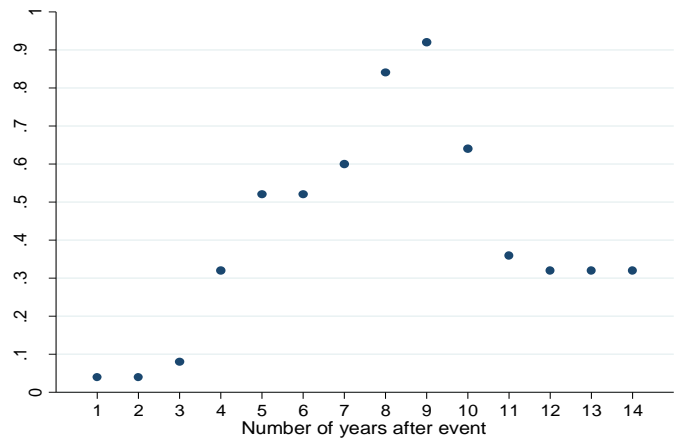
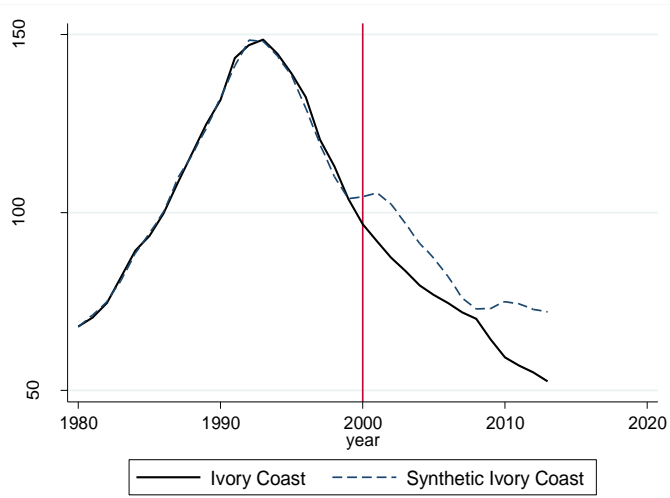
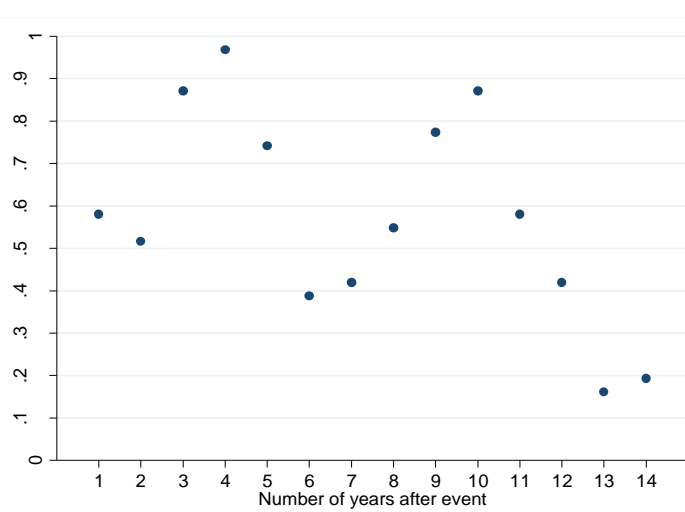
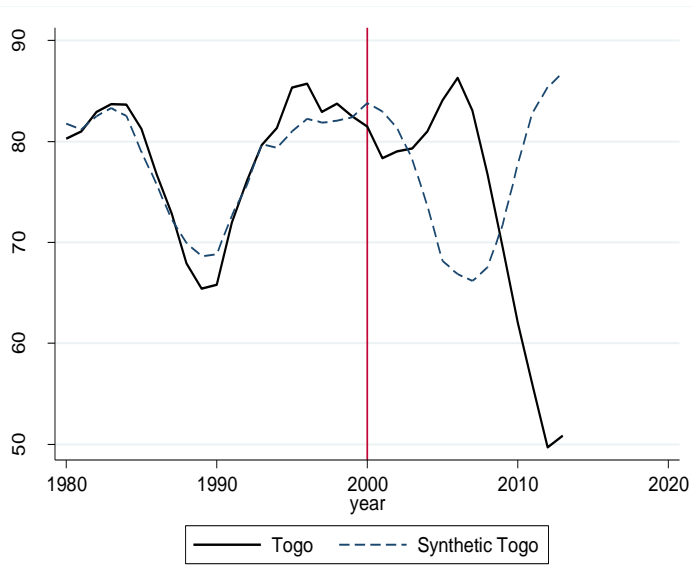
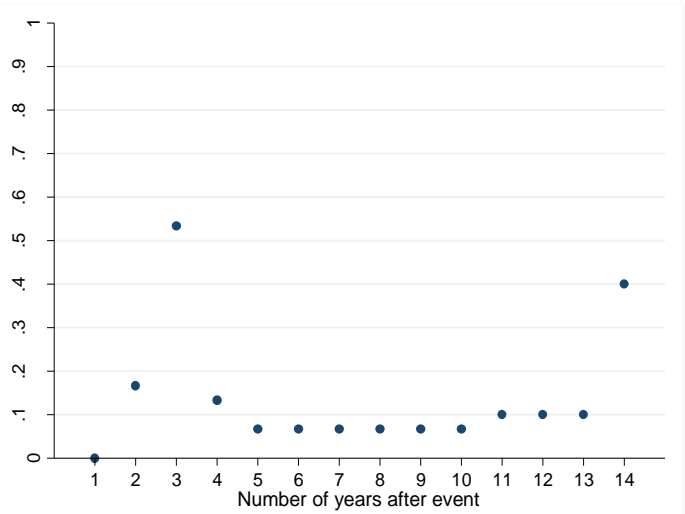
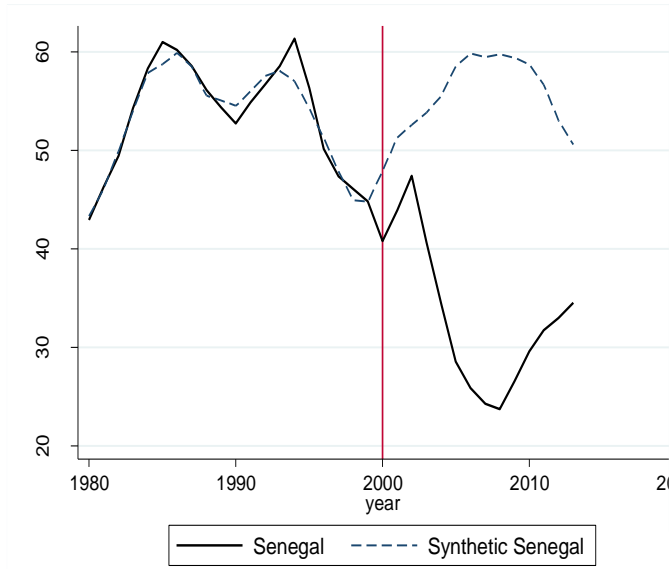


Figure 7: Government debt (as a percentage of GDP) for WAEMU countries: treated and control units

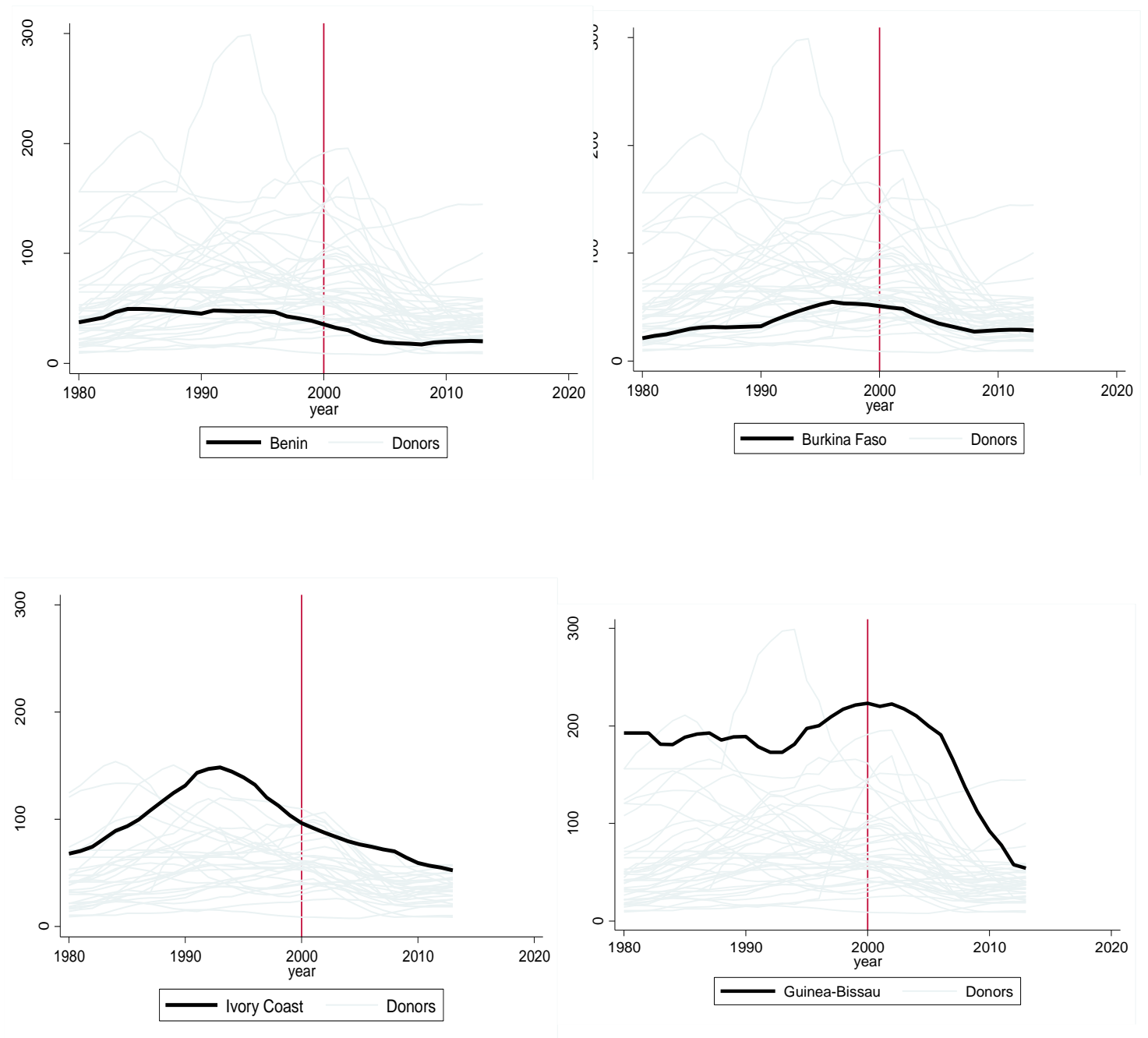


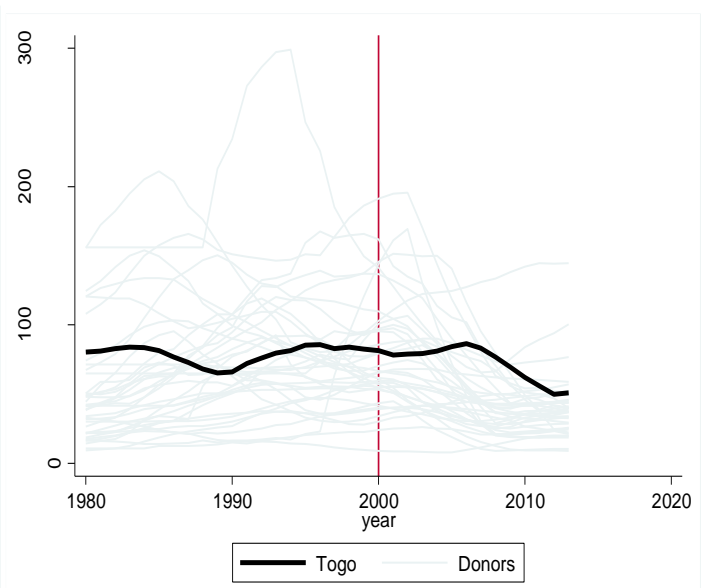
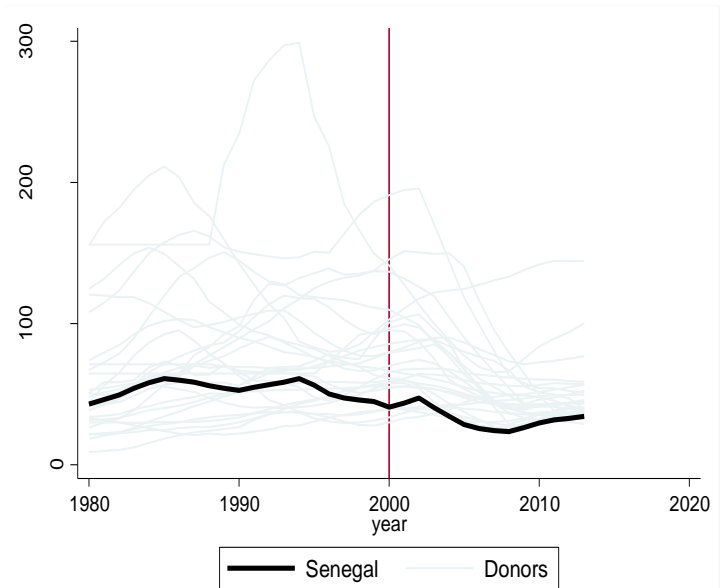
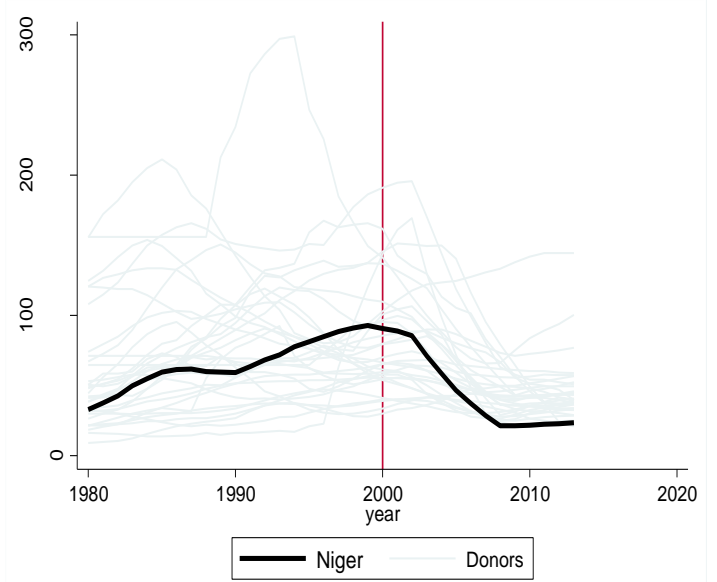
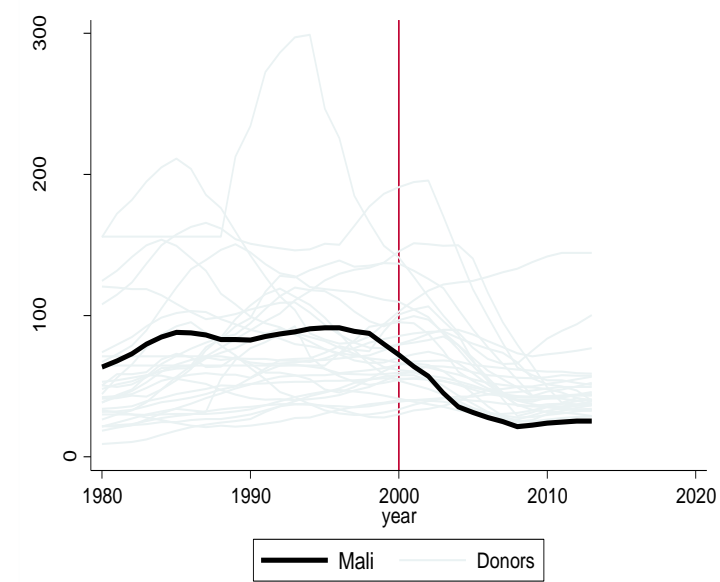




Notes: Solid lines are government debt for West African CFA zone countries. The dashed lines represent average government debt for the counterfactual. The vertical line is the intervention year.

Figure 8: Government debt (as a percentage of GDP) for WAEMU countries: placebo tests





Notes: Bold lines are government debt for treated West African CFA zone countries. The other lines represent average government debt for the control units. The vertical line is the intervention year.

Table 1: CEMAC AND WAEMU history							
Fiscal balance criteria: nonnegative	1994	1996	1998	2000	2002	2004	2006
CAEMC							
Cameroon	-7.5	-3.8	-2.4	2	0.8	0	3.2
Central African Republic	-5.8	-3.1	-0.7	-1.9	-0.5	-3.9	0.4
Chad	-5.3	-1.4	-0.4	-3.1	-3.2	-0.2	2.5
Congo	-12.4	-6.9	-15.9	7.1	-0.8	9.2	32.6
Equatorial Guinea	-2.7	2.9	-0.5	9.5	11.5	9.9	15.7
Gabon	1.8	11	-1.3	13.9	6.8	11	15.1
Number of countries violating	5	5	6	2	3	2	0
WAEMU							
Benin	-0.9	1.3	3.3	1.9	0.1	-0.4	0.1
Burkina Faso	-2.7	0.6	-0.5	-1.4	-3.7	-3.1	-4.3
Ivory Coast	-3	-0.4	-0.8	-0.3	-0.4	-1.3	-2
Guinea-Bissau	-7.9	-4.3	-16.4	-16.8	-9	-13.7	-15.9
Mali	-3.1	0.8	0.2	-0.6	-1.3	-0.7	-0.6
Niger	-7	-1.7	-3.3	-3	-1.8	-2.2	-1.8
Senegal	-2.3	1.5	0.9	1.2	1.8	-0.7	-3.5
Togo	-8.3	-3.6	-3	-2.7	0.3	1.4	-2.7
Number of countries violating	8	4	5	6	5	7	7
Total debt/GDP (less or equal 70%)							
CAEMC							
Cameroon	145.6	85.4	81.1	80.4	50.1	44.2	3.1
Central African Republic	94.8	89.9	83.9	80.3	91.4	93.6	82.3
Chad	62.3	54.3	54.2	72.3	57.2	35	23.7
Congo	270.2	212.2	264.4	164.9	200.9	229.6	82.5
Equatorial Guinea	218.1	92.9	59.7	36.3	10.2	6.2	2.7
Gabon	86.4	71.1	84.9	57	65.6	40.1	34.2
Number of countries violating	5	5	4	4	2	2	2
WAEMU							
Benin	82	65.7	65.8	71.8	66.6	49.8	22.1
Burkina Faso	51.6	44.6	46.4	63	51.4	34.8	8.9
Ivory Coast	176.1	133.2	84.9	108	88.9	88.7	177.4
Guinea-Bissau	378.2	326.1	449	353.8	419.4	379.4	326.2
Mali	116.4	101.3	100.3	99.5	90.2	66.9	27.7
Niger	101.9	76.6	77.9	94.5	81	55.6	14.6
Senegal	84.1	80.4	85.2	76.2	82.2	67.3	44.9
Togo	121.1	85.6	79.7	98.2	93.9	79.6	67.6
Number of countries violating	7	6	6	7	6	3	2

Source: Gulde and Tsangarides, (2008).

Table 2: CFA Zone countries used in studies

Countries	Region	Intervention year	Type of Fiscal Rule
Cameroon	CAEMC	2002	Debt rule
Chad	CAEMC	2002	Debt rule
Congo	CAEMC	2002	Debt rule
Equatorial Guinea	CAEMC	2002	Debt rule
Gabon	CAEMC	2002	Debt rule
Benin	WAEMU	2000	Debt rule
Burkina Faso	WAEMU	2000	Debt rule
Ivory Coast	WAEMU	2000	Debt rule
Guinea Bissau	WAEMU	2000	Debt rule
Mali	WAEMU	2000	Debt rule
Niger	WAEMU	2000	Debt rule
Senegal	WAEMU	2000	Debt rule
Togo	WAEMU	2000	Debt rule

Notes: CAEMC = Central African Economic and Monetary Community, WAEMU = West African Economic and Monetary Union. Debt rule states that the stock of external and domestic public debt should be kept below 70 percent of GDP.

Table 3: List of donor countries

African countries	African countries	Non-African countries
Algeria	Mozambique	Bangladesh
Burundi	Namibia	Brazil
Botswana	Niger	Bolivia
DRC	Nigeria	Costa Rica
Egypt	Rwanda	Ecuador
Ethiopia	Sierra Leone	El Salvador
Gambia	South Africa	Honduras
Ghana	Sudan	Jamaica
Guinea	Tanzania	Nepal
Madagascar	Uganda	
Malawi	Zambia	
Mauritania	Zimbabwe	
Mauritius	Tunisia	
Morocco		

Table 4: Descriptive statistics in the 1980s and 2000s

Variables	Non-CFA countries						CFA countries					
	1980s			2000s			1980s			2000s		
	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.	Mean	Std. Dev.
GDP per Capita	680	1814	1887.724	476	2367.3	2553.563	260	1800.495	2890.355	182	2723.396	4427.024
Inflation	679	88.736	1055.631	476	15.901	120.761	259	9.499	18.07	182	5.237	11.417
Trade openness (% of GDP)	680	55.064	26.912	476	63.012	25.51	240	61.869	24.694	177	71.245	30.003
Government Debt (percent of GDP)	680	64.666	46.276	476	55.434	37.806	260	87.701	60.16	182	56.244	50.618
Democracy	670	-4.8	18.042	476	-0.399	17.426	260	-9.423	19.584	182	-3.725	19.14
Civil war	680	0.894	1.883	476	0.366	1.204	260	0.281	0.991	182	0.11	0.419
Coup d'état	670	0.158	0.45	476	0.116	0.351	260	0.2	0.503	182	0.198	0.487

Notes: Based on author's calculations

Table 5: DID estimates of the effect of fiscal rule on government debt (WAEMU)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated Countries	Benin	Burkina Faso	Ivory Coast	Guinea-Bissau	Mali	Niger	Senegal	Togo
DID estimates	-9.63*	11.84*	-25.412**	-15.852	-33.379***	-0.653	-3.952	8.595
	(3.85)	(4.76)	(8.65)	(19.75)	(6.89)	(10.12)	(5.49)	(6.07)
Observations	1292	1292	1292	1292	1292	1292	1292	1292
R ²	0.03	0.03	0.03	0.16	0.02	0.02	0.03	0.02
No. of countries	37	37	37	37	37	37	37	37
No. of treated countries	1	1	1	1	1	1	1	1
Sample period	1980-2013	1980-2013	1980-2013	1980-2013	1980-2013	1980-2013	1980-2013	1980-2013

Notes: Robust Standard errors are in parentheses. The outcome variable is government debt (as a percentage of GDP).

*** 1%, **5%, *1%.

Table 6: DID estimates of the effect of fiscal rule on government debt (CEMAC)

	(1)	(2)	(3)	(4)	(5)
Treated Countries	Gabon	Cameroon	Chad	Congo	Equatorial Guinea
DID estimates	-2.235 (7.96)	-5.757 (8.40)	10.118** (4.70)	-58.326*** (20.32)	-24.778*** (15.17)
Observations	1292	1292	1292	1292	1292
R ²	0.036	0.04	0.044	0.131	0.099
No. of countries	37	37	37	37	37
No. of treated countries	1	1	1	1	1
Sample period	1980-2013	1980-2013	1980-2013	1980-2013	1980-2013

Notes: Robust Standard errors are in parentheses. The outcome variable is government debt (as a percentage of GDP).
*** 1%, **5%, *1%.

Table 7: DID estimates of the effect of fiscal rule on government debt (per CFA zone)

	(1)	(2)
Treated Countries	WAEMU	CAEMC
DID estimates	10.35* (6.03)	2.124 (7.97)
Observations	1530	1428
R ²	0.02	0.02
No. of countries	44	41
No. of treated countries	8	5
Sample period	1980-2013	1980-2013

Notes: Robust Standard errors are in parentheses. The outcome variable is government debt (as a percentage of GDP).
*** 1%, **5%, *1%.

Table 8: Summary Table

Outcome variable	Government debt (percent of GDP)
Treated countries	13 CFA zone countries
Intervention year	see Table 1
Predictors	GDP per Capita Inflation Trade (percent of GDP) Government Debt (percent of GDP) Democracy Civil war Coup d'état

Table 9: Predictors and Outcome variable for CAEMC

	Cameroon	Synthetic Cameroon	Chad	Synthetic Chad
GDP per capita	1352.03	1258.10	492.67	4956.77
Inflation	6.58	11.95	5.26	14.58
Fraction of total population aged 15-64	50.74	51.16	49.35	55.85
Trade openness	46.04	46.37	45.15	46.33
Democracy	-6.09	-5.73	-31.77	-3.03
Civil war	0	1.05	2.73	1.75
Government debt (1980)	26.84	23.52	31.31	27.49
Government debt (1989)	40.33	45.46	28.88	33.15
Government debt (1996)	84.71	73.96	53.27	51.70
	Congo	Synthetic Congo	Gabon	Synthetic Gabon
GDP per capita	2751.19	1321.24	11319.98	1961.27
Inflation	7.37	24.42	7.44	336.89
Fraction of total population aged 15-64	52.77	52.02	53.17	51.96
Trade openness	108.09	53.36	93.54	64.13
Democracy	-8.18	-5.78	-9.86	-9.88
Civil war	0.41	1.90	0	0.58
Government debt (1980)	107.80	125.72	27.07	27.11
Government debt (1989)	160.58	175.68	67.13	64.36
Government debt (1996)	243.54	177.95	82.51	79.78
	Equatorial Guinea	Synthetic Equatorial Guinea		
GDP per capita	1731.63	3320.64		
Inflation	11.20	23.87		
Fraction of total population aged 15-64	54.30	55.87		
Democracy	-6.45	5.35		
Civil war	0	0.79		
Government debt (1980)	221.81	151.01		
Government debt (1989)	157.70	161.15		
Government debt (1996)	101.67	101.74		

Notes: based on author's calculations. The outcome variable is government debt. The value of the predictors is averaged over the pre-treatment period (1980-2002).

Table 10: Predictors and Outcome variable for WAEMU

	Benin	Synthetic Benin	Burkina Faso	Synthetic Burkina Faso
GDP per capita	853.71	1144.20	401.64	714.91
Inflation	7.96	7.99	4.62	28.20
Fraction of total population aged 15-64	50.76	50.81	49.94	52.90
Trade openness	53.67	53.72	37.29	41.68
Democracy	-5.2	-4.07	-6	-2.75
Civil war	0	0	0	0.26
Government debt (1980)	46.70	46.73	54.81	50.29
Government debt (1989)	46.20	46.22	31.68	33.76
Government debt (1996)	37.29	37.30	21.11	20.16
	Ivory Coast	Synthetic Ivory Coast	Guinea Bissau	Synthetic Guinea Bissau
GDP per capita	1582.57	1559.74	608.88	1645.38
Inflation	6.53	55.77	45.24	28.01
Fraction of total population aged 15-64	52.43	52.48	50.81	52.53
Trade openness	69.62	38.41	51.86	56.90
Democracy	-7.4	-7.42	-13.2	-3.75
Civil war	0	1.58	0.2	1.89
Government debt (1980)	67.96	68.65	200.14	169.41
Government debt (1989)	124.82	124.76	188.78	176.47
Government debt (1996)	132.44	131.70	192.60	131.75
	Mali	Synthetic Mali	Niger	Synthetic Niger
GDP per capita	493.23	653.22	527.75	534.62
Inflation	6.33	20.58	6.19	44.19
Fraction of total population aged 15-64	50.36	51.48	49.40	51.65
Trade openness	50.40	51.43	41.20	56.47
Democracy	-5.45	-6.18	-11.65	-6.45
Civil war	0	0.04455	0	0.18
Government debt (1980)	63.75	63.70	33.09	39.27
Government debt (1989)	83.19	84.01	59.57	61.73
Government debt (1996)	91.43353	91.36	85.13	84.72

Notes: based on author's calculations. The outcome variable is government debt. The value of the predictors is averaged over the pre-treatment period (1980-2002).

Table 10 (cont.): Predictors and Outcome variable for WAEMU

	Senegal	Synthetic Senegal	Togo	Synthetic Togo
GDP per capita	1085.81	1786.10	588.86	2391.73
Inflation	5.58	8.38	6.20	327.58
Fraction of total population aged 15-64	50.55	50.85	51.04	59.39
Trade openness	63.45	68.75	86.63	84.56
Democracy	-1.05	-1.05	-5.05	-3.62
Civil war	0	0	0	0.24
Government debt (1980)	42.94	42.86	80.27	76.15
Government debt (1989)	54.39	54.29	65.40	75.18
Government debt (1996)	50.15	49.98	85.72	80.19

Notes: based on author's calculations. The outcome variable is government debt. The value of the predictors is averaged over the pre-treatment period (1980-2002).