European Journal of Political Economy xxx (xxxx) xxx

Contents lists available at ScienceDirect

European Journal of Political Economy

journal homepage: www.elsevier.com/locate/ejpe

Fiscal rules to the test: The impact of the Spanish expenditure rule

Ana Herrero-Alcalde [a,*], Javier Martín-Román [a], José Manuel Tránchez-Martín [a], Ignacio Moral-Arce [b]

[a] UNED, Spain
[b] Instituto de Estudios Fiscales, Spain

ARTICLE INFO

JEL classification:
H50
H63
H72

Keywords:
Fiscal rules
Government expenditure
Public debt
Impact evaluation
Synthetic control methods

ABSTRACT

Despite the large spread of fiscal rules around the world, there is still not enough evidence of their effectiveness in ensuring fiscal sustainability. Furthermore, there is little evidence of the impact of expenditure rules in countries' fiscal performance. This paper evaluates the effectiveness of the Spanish expenditure rule that has been in force since 2012 in controlling the growth of public expenditure. We use a synthetic control methodology to analyze the impact of the rule on the evolution of current and primary expenditure within Spanish public administrations (2001–2018), avoiding the potential endogeneity problems of traditional econometric approaches. Overall, we find that the expenditure rule has largely improved budget sustainability by limiting both current and primary expenditure. These results are robust to different levels of government.

1. Introduction

Limits to the level and evolution of budget variables have existed for long now, but a true expansion of fiscal rules took place around the globe by the end of the 20th century and during the first years of the 21st century. First-generation fiscal rules were designed to foster long-term fiscal sustainability, although they proved to have strong pro-cyclical effects. Second-generation fiscal rules, passed in many countries after the Great Recession, also tried to improve fiscal sustainability, while at the same time protecting long-term economic growth.

Despite the implementation of those rules, after the outbreak of the Great Recession in 2008, the level and evolution of public debt in some developed countries raised concerns about their effectiveness in guaranteeing long-term sustainability of public budgets. To address this issue, the European Union passed the so-called "Six-pack" (2011), the "Fiscal Compact" (2012), and the "Two-pack" (2013) reforms of the Stability and Growth Pact (SGP). These agreements modified the European fiscal governance framework by strengthening the macroeconomic surveillance of member countries (preventive arm) and by fostering the penalty process for those failing to adjust their debt and deficit levels (corrective arm). These reforms included the introduction of the expenditure benchmark, complementary to the medium-term budgetary objective of each country, which works as an instrumental guidance of the evolution of public expenditure. It essentially links the evolution of general governments' expenditure to the growth rate of each national economy.

Under this new framework, and to adapt their national legislations, many country members passed new laws of different nature and relevance, including some constitutional amendments. Only some of them included, within their national legislation, expenditure rules that mirror the European expenditure benchmark (Spain, Austria, Italy, Romania, Bulgaria, Latvia, and Croatia).

* Corresponding author.
E-mail address: aherrero@cee.uned.es (A. Herrero-Alcalde).

https://doi.org/10.1016/j.ejpoleco.2024.102501
Received 2 August 2023; Received in revised form 10 January 2024; Accepted 12 January 2024

A large body of literature has shown the positive effects of fiscal rules on the sustainability of public finances. The effectiveness of the rules seems to be contingent on their specific design, the existence of monitorization and enforcement tools and independent fiscal councils, their legal status, and the institutional and social characteristics of each country (Eichengreen and Bayoumi, 1994; Ayuso-i-Casals, 2012; Heinemann et al., 2018; Marneffe et al., 2011; Debrun et al., 2009; Alesina and Bayoumi, 1996; Foremny, 2014; etc.).

However, this evidence has been somewhat called into question more recently due to potential endogeneity problems (Eliason and Lutz, 2018; Heinemann et al., 2018; Salvi et al., 2020; Strong, 2023). Basically, this research points to the fact that the passing of a fiscal rule could be an indicator of an already more-concerned society or political class regarding fiscal discipline. In that context, more sustainable fiscal policies could have taken place even without the passing of the fiscal rule.

Considering this potential endogeneity bias of part of the empirical literature, it seems critical to look for new evidence about the effectiveness of fiscal rules, that will allow to optimize their design. This could be particularly important within the EU, currently amid a new reform of the SGP. As Hansen (2020) argues, understanding the true effect of fiscal rules is extremely important not only for sustainability reasons, but also because they are one of the main tools used by financial markets to price the riskiness of debt. Caselli et al. (2022) also point out the activation of escape clauses during the pandemic as an opportunity to rethink supranational and national fiscal rules.

Moreover, the evidence of the specific impact of expenditure rules on the evolution of fiscal outcomes is particularly scarce, as compared to the abundant analyses of budget balance and debt rules. This paper tries to fill this gap by analyzing the impact of the Spanish expenditure rule passed in 2012 on the evolution of public expenditure. The analysis of the Spanish expenditure rule is of unquestionable interest, since Spain, which has displayed intense budget imbalances after the Great Recession, is also one of the countries that has most faithfully replicated the expenditure benchmark designed by the European Union. In a nutshell, this rule limits public expenditure growth to the medium-term GDP growth rate.

In our empirical analysis, we use the synthetic control method (SCM) proposed by Abadie and Gardeazabal (2003) and Abadie et al. (2010) to analyze the evolution of current and primary expenditure during the period 2001–2018. This approach allows us to construct a counterfactual unit for the Spanish public sector under a scenario in which no expenditure rule had been applied whatsoever. With this methodology, we avoid the endogeneity problems of the conventional econometric approaches outlined by Eliason and Lutz (2018), and we manage to discount the influence that other potential external elements —both observed and unobserved— could be exerting simultaneously while implementing the policy, such as changes in public preferences or other institutional reforms. One of the main advantages of the SCM is that it allows to create the artificial unit (the counterfactual scenario) by capturing unobservable underneath general trends. If the impact we are observing was due to other unobservable trends, such as changes in citizens' preferences, then the placebo tests would suggest that what we are capturing is not the impact of the fiscal rule, but of other general trends present in both the treated and untreated units. In our specific case, the idea of a collective (European) preference for increased fiscal discipline would be more an advantage than a shortcoming, since it would mean that all countries included in the donor pool are more homogeneous in terms of public preferences, and therefore, more comparable to the treated unit. This advantage has been highlighted by Abadie and Gardeazabal (2003), Abadie et al. (2010), Abadie (2021) and Eliason and Lutz (2018).

Our results reveal that the synthetic unit —the counterfactual scenario of the study— displays systematically higher levels of public expenditure than the real Spain. Therefore, the Spanish expenditure rule has fostered budget sustainability by largely containing public expenditure. These results are robust to different public expenditure definitions such as current and primary expenditure, and to different levels of government. Furthermore, by replicating our analysis for the Austrian and Italian expenditure rules, we find further empirical evidence of their effectiveness in constraining the dynamics of public expenditure. This empirical evidence is extremely relevant for those countries that are considering including an expenditure rule within their national fiscal framework and even for the EU, currently amid a reform of the SGP.

The paper is organized as follows. Section two reviews the most relevant literature on the design and effectiveness of expenditure rules. Section three offers some highlights on the design of the European expenditure benchmark and the Spanish fiscal rules framework. In section four, an explanation of the methodology to be used in the empirical part of this research will be done. Section five presents the results and section six concludes.

2. The design and effectiveness of expenditure rules: what does the literature say?

According to Kopits and Symansky (1998) a fiscal rule consists of imposing a permanent constraint on fiscal policy, expressed either in terms of numerical limits on budgetary aggregates or on the budget procedure. Most common fiscal rules are numerical, constructed as limits on the level or growth rate of one budget indicator, such as budget balance, public debt, expenditure, or revenue. However, "procedural rules" have become increasingly important in the last few years, setting targets and conditions regarding the budgetary process (Sutherland et al., 2005; Wyplosz, 2013).[1]

The main purpose of a fiscal rule is to foster fiscal discipline, and to prevent unsustainable budgetary behavior, by trying to address the so-called "deficit-bias" (Ardanaz et al., 2019; AIReF, 2018; Alesina and Passalacqua, 2016; Wyplosz, 2013; Calmfors and

[1] Two comprehensive comparative analyses of them can be found in Fall et al. (2015) and Schaechter et al. (2012).

Wren-Lewis, 2011).[2] More specifically, fiscal rules can help to erode political budget cycles (Benito et al., 2013; Bonfatti and Forni, 2019; Burret and Feld, 2018; Gamalerio, 2020; Gootjes et al., 2021; Gupta et al., 2016) and to diminish the optimist bias of governments' fiscal forecasts (Giuriato et al., 2016). Other complementary purposes of fiscal rules are reducing macroeconomic volatility (Fatás and Mihov, 2003, 2006; Sacchi and Salotti, 2015; Lim, 2020), fostering monetary and financial stability (Alesina and Passalacqua, 2016), signaling financial markets the government's commitment to implement sound fiscal policies (Kumar et al., 2009) and enhancing governments' efficiency levels (Bergman et al., 2016; Christl et al., 2020).

Most economies concerned with fiscal responsibility and the sustainability of public finances, including the Euro area and Spain, have developed fiscal frameworks that combine several types of rules, based on the consensus that this mix can enhance their individual positive effects (Bergman et al., 2016; Caselli and Reynaud, 2019; Eyraud et al., 2018a; Heinemann et al., 2018; Asatryan et al., 2018). Particularly, some countries have included in these rule-packages different types of expenditure rules which are aimed to limit either the level or the growth of public expenditure.

Several advantages have been highlighted regarding the implementation of expenditure rules. First, they constrain the evolution of a variable that is under the direct control of the government. By limiting expenditure, they address the main source of the "deficit bias" (Ayuso-i-Casals, 2012). Second, they seem to be generally more effective in reducing the procyclicality of fiscal policy and in promoting a better balance between budgetary discipline and macroeconomic stabilization (Turrini, 2008; Wierts, 2008; Holm-Hadulla et al., 2012; Larch et al., 2021).[3] Quite usually, these rules tend to exclude "automatic stabilizers", allowing them to counteract the effects of the cycle on the economy (Fall et al., 2015; European Commission, 2019). Third, expenditure rules are more transparent and easier to monitor, and this contributes to greater compliance. Cordes et al. (2015) find that countries comply more often with expenditure rules than with other fiscal requirements. Fourth, although they are not created to trigger expenditure reforms, expenditure rules can incentivize them as they force spending prioritization (Bedogni and Meaney, 2017).

However, the use of expenditure rules can also have some drawbacks, especially if they are not properly designed. They alone cannot address economic shocks on their own since no constraint on the revenue side is applied. They usually need complementary resources, balance, or debt rules to avoid pro-cyclical effects and to achieve debt sustainability (Hauptmeier and Kamps, 2022). On the other hand, many papers have pointed out the potential inconsistency problems that can take place with the mix of rules (Eyraud et al., 2018b; Ayuso-i-Casals, 2012; Darvas et al., 2018).

Furthermore, expenditure rules could lead to an undesirable composition of spending, by prioritizing items that are politically harder to cut (wages and public consumption), and reducing public investment, damaging long-term economic growth as a result (Venturini, 2020; Dahan and Strawczynski, 2013; Bedogni and Meaney, 2017; Ardanaz et al., 2019).

Expenditure rules can also induce an undesirable substitution of direct expenditure (limited by the rule) by tax expenditures to achieve policy objectives. Another important flaw of expenditure rules is that, albeit being easily communicated and controlled, they require estimating several unobservable macro-indicators (i.e., potential output, GDP deflator), which are usually subject to periodical revisions and might be susceptible of weak estimations (Fall et al., 2015).

The empirical evidence regarding the effectiveness of fiscal rules is very extensive, generally pointing to a positive impact in the level and evolution of targeted fiscal variables.[4] The effectiveness of the rules seems to be contingent on their specific design regarding the ambition of numerical targets, the comprehensiveness of the indicators and the compliance time horizon (Eichengreen and Bayoumi, 1994; Alesina and Bayoumi, 1996; Bohn and Inman, 1996; Ayuso-i-Casals et al., 2009; Ayuso-i-Casals, 2012; Debrun et al., 2008; Deroose et al., 2006; Marneffe et al., 2011; Fall et al., 2015; Eyraud et al., 2018a; Heinemann et al., 2018). Another relevant factor is the existence of monitorization and enforcement tools, as shown by Alesina and Bayoumi (1996), Ayuso-i-Casals et al. (2009), Von Hagen (2002), and Clemens and Miran (2012). A third factor that determines the effectiveness of the rule is its legal status. Those announced in the constitution or statutory laws tend to be more effective, as noticed in Asatryan et al. (2018) and Nerlich and Reuter (2013). Other important institutional elements such as independent fiscal councils are also critical in the impact of fiscal rules (Debrun, et al., 2009, 2013; Nerlich and Reuter, 2013; Calmfors and Wren Lewis, 2011; Von Hagen and Harden, 1994; Gupta and Yläoutinen, 2014; Blondal, 2005; Chrysanthakopoulos and Tagkalakis, 2023).[5] Transparency also seems to be relevant in the effectiveness of fiscal rules, according to Gootjes and de Haan (2022b). Furthermore, Aaskoven and Rasmus (2022) find that expenditure and revenue fiscal rules can be more effective due to their larger credibility. Finally, the empirical literature has shown that all those characteristics interact with each other, and with the political and social characteristics of each country, leading to different results even when the design of the fiscal rule is similar (Alesina and Passalacqua, 2016; Grembi et al., 2016; Foremny, 2014; Wierts, 2007).

Despite all the evidence mentioned above, some authors claim that the positive impact found in previous research could be due to a problem of endogeneity (Krogstrup and Wälti, 2008; Strong, 2023): societies that pass fiscal rules are already more concerned with budget sustainability; therefore, they would apply sound fiscal policies even without the approval of fiscal rules. Specifically, Debrun and Kumar (2007) and Eliason and Lutz (2018) show that fiscal rules seem to actually reflect a greater societal commitment to fiscal

[2] This deficit bias is rooted in different factors: the problem of policy time-inconsistency (Kydland and Prescott, 1977; Persson and Svensson, 1989); the so-called "common pool problem" within public budgets (Debrun and Kumar, 2007); electoral competition (Alesina and Tabellini, 1990); pro-cyclicality during good times (Manasse, 2006; Tornell and Lane, 1999); and lack of intergenerational equity (Guerguil et al., 2016).

[3] On the contrary, Carnazza et al. (2023) and Gootjes and de Haan (2022a) find that fiscal rules are no objection for public budgets still having pro-cyclical effects.

[4] Extensive reviews on this issue can be found in Fall et al. (2015), Maltritz and Wüste (2015), and Schaechter et al. (2012).

[5] On the contrary, Dorn et al. (2021) find no evidence of more sound fiscal policies after specific procedural fiscal rules —which implied changes in accounting methods— were applied within German municipalities.

discipline rather than the effectiveness of fiscal limits. Following the same line of argument, Wierts (2007) highlights that he cannot disentangle whether the improved fiscal position observed in some UE countries is due to the rules per se or to the higher political concern in fiscal sustainability. In an analysis of the EU, Heinemann et al. (2018) find that fiscal rules are more effective in countries with a lower reputation of financial stability, whereas in countries with a history of financial stability they are seen as a further commitment to fiscal discipline. With the same purpose, Caselli and Reynaud (2019) use instrumental variables with a panel data set of 142 countries, finding that when endogeneity problems are properly addressed, only well-designed fiscal rules improve fiscal sustainability.

Regarding the specific effectiveness of expenditure rules, the evidence of their impact is scarce. There are some empirical contributions focusing on their compliance, their effects on the procyclicality of fiscal policy (Turrini, 2008; Wierts, 2008; Holm-Hadulla et al., 2012; Belu and Bova, 2020), or their effects on the composition of spending (Dahan and Strawczynski, 2013; Bedogni and Meaney, 2017). However, to the best of our knowledge, only Manescu and Bova (2020) focus on the impact of expenditure rules on the evolution of public expenditure, finding that their effectiveness is strongly dependent on their particular design.

Considering the methodology of interest in this paper, Eliason and Lutz (2018) analyze the most stringent fiscal rule within the USA: the one that was active in Colorado from 1977 to 2012. Applying the same methodology used in Abadie et al. (2010), they find no evidence that the rule was effective in reducing the State's expenditure or revenue. Their conclusions suggest that all previous empirical evidence of the effectiveness of fiscal rules might be due to endogeneity problems. On the other hand, Kraemer and Lehtimäki (2023) analyze the impact of the Stability and Growth Pact at the EU level using the same methodology, finding a debt-reduction effect in member countries. Asatryan et al. (2018), Pfeil and Feld (2016) and Salvi et al. (2020) use the same empirical strategy to measure the impact of including a budget balance rule in Switzerland's Constitution in 2001 (effective from 2003), finding that both public spending and debt would have been larger had not the constitutional reform been in place. Focusing on CFA African countries, Strong (2023) uses a difference-in-difference and a SCM approach to find a positive impact of debt rules which is higher in those nations with stronger institutions.

Ardanaz et al. (2019) also use Abadie et al.'s methodology in order to analyze the effectiveness of fiscal rules within Latin America. More specifically, they study the effects of those rules in Colombia, Peru and Panama. They find that budget and financial stability was enhanced by fiscal rules in Panama and Peru, while in Colombia this improvement only took place immediately after the rule was applied.

3. The European expenditure benchmark and the Spanish expenditure rule

3.1. The institutional framework

As we have already mentioned above, the reform of the Stability and Growth Pact in 2011 introduced several new elements both in the preventive and the corrective arm of the European fiscal governance framework. One of them was the expenditure benchmark, that works as a complement of the medium-term budget framework (MTBF) of each country, by linking the evolution of public expenditure to the potential economic growth. It is not a fiscal rule per se, but an operational guidance that leads each country to achieve its own MTBF.

Most European countries reinforced their fiscal frameworks during or after the Great Recession. Specifically, some of them passed expenditure rules in line with the European expenditure benchmark: Spain (2012), Latvia (2014), Italy (2014), Romania (2015), Bulgaria (2014), Austria (2015) and Croatia (2019) have fiscal rules that prevent public spending from growing faster than GDP. Poland and Lithuania also have expenditure rules that link the evolution of public spending to economic growth, but with a distinct design from that of the European benchmark.

Spain was one of the first countries to incorporate the European economic governance package into its internal legal system. The current Spanish legal framework is based on article 135 of the Constitution —reformed in 2011— and the Statutory Law of Budget Stability and Financial Sustainability (*Ley Orgánica de Estabilidad Presupuestaria y Sostenibilidad Financiera*, LOEPSF hereafter) passed in 2012. To foster budgetary discipline and financial sustainability, the latter established a new expenditure rule, designed in line with the European expenditure benchmark, that limits the growth of public expenditure to the medium-term GDP growth rate of the Spanish economy.[6] According to the law, all primary public expenditure is bound by the rule, with the following exceptions:

- Payments of debt interests.
- Non-discretional unemployment benefits.
- Spending financed with earmarked funds from the EU or other public administrations.
- Transfers linked to subnational governments' financing systems.
- Financially sustainable investments implemented by local governments, financed with surpluses generated in previous years.

Additionally, the level of expenditure subject to the rule may vary when regulatory changes involve permanent increases or decreases in tax collections.

The Spanish Ministry of Economy and Competitiveness uses the European Commission's methodology in determining the

[6] Similarities and differences between the Spanish expenditure rule and the European expenditure benchmark are summarized in Table A.1 of Appendix I.

Table 1
Potential GDP and public expenditure growth rates.

	Potential GDP growth rate	Public expenditure growth rates		
		Central Government	Regional Government	Local Government
2013	1.7	−8.1	−5.3	−3.0
2014	1.5	1.9	0.1	0.2
2015	1.3	6.4	5.2	2.3
2016	1.8	0.3	0.4	−1.2
2017	2.1	−3.6	3.1	1.1
2018	2.4	10.1	2.7	2.1

Source: own elaboration using Ministry of Finance's statistics.

"medium-term GDP reference growth rate" that will apply for all expenditure categories bound by the rule.[7] This growth rate applies for the three subsectors of public administrations —central, regional, and local— and for each territorial unit that belongs to them.[8] During the elaboration of the budget, the Spanish Fiscal Council (*Autoridad Independiente de Responsabilidad Fiscal, AIReF*) is in charge of monitoring the fulfillment of the expenditure rule for all public administrations. An early warning system detects any deviations from the rule. After that, the Ministry of Treasury has the power to demand defaulters to present and execute an economic and financial plan, and to eventually execute any disciplinary actions, including the intervention of the budget.

3.2. The compliance of the Spanish expenditure rule

Table 1 shows which subsectors of the Spanish public administration have followed the expenditure rule (in white) and which have not (in shadows) since the Law was passed. For a better interpretation of the information displayed in Table 1, it is important to consider the relative weight of each level of government. While the central government has absorbed an average of 57.1 per cent of total public expenditure according to OECD figures (with a peak of 59.9 in 2012 and a lower value of 55.8 in 2017), regional governments have managed an average of 31.7 per cent of public spending and local authorities an average of 11 per cent respectively. With this vertical distribution of powers, the larger compliance of the expenditure rule at the local level has obviously had a lower impact on overall public budget sustainability.

Only in 2016 did all levels of government comply with the rule. Local administrations have been the most successful ones, with only two years of non-compliance, as opposed to the central and regional governments. Nevertheless, it is important to highlight that non full compliance with a fiscal rule does not necessarily mean that it does not refrain expenditure, budget imbalance or debt from excessively growing (Alesina and Passalacqua, 2016; Reuter, 2015).

3.3. Expenditure rules within the EU

Several EU's member countries have implemented expenditure rules with a design that follows the basic lines of the European expenditure benchmark, limiting expenditure growth to the evolution of GDP: Austria, Bulgaria, Croatia, Italy, Latvia, Spain, and Romania. Lithuania and Poland have also applied rules that link to the economic growth, but their design is not in line with the European benchmark. Others have created different expenditure rules that impose ceilings to primary expenditure: Bulgaria, Denmark, Finland, Italy, Netherlands, Sweden, the United Kingdom, and Slovakia (until 2015). This ceilings are designed as limits in absolute terms or in a percentage of GDP, and can be annual or multiannual.

On the contrary, Cyprus, the Czech Republic, Germany, Estonia, France, Greece, Hungary, Ireland, Luxembourg, Malta, Portugal, and Slovenia do not apply any kind of expenditure rule. Table A2 in Appendix I displays a compact comparison of all the mentioned rules.

4. The synthetic control methodology (SCM)

4.1. Introduction

Within the general framework of public policy evaluation, this paper will use the SCM proposed in Abadie and Gardeazabal (2003), Abadie et al. (2010) and Abadie (2021) to evaluate the effectiveness of the Spanish expenditure rule, in line with Eliason and Lutz (2018), Asatryan et al. (2018), and Salvi et al. (2020). Our goal will be to test whether an intervention such as the approval of a specific fiscal rule is effective in controlling the growth dynamics of public expenditure, despite the frequent non-compliance of numerous Spanish public administrations.

[7] The reference rate is estimated based on two factors: real potential GDP growth and the GDP deflator. Regarding the former, it is obtained by averaging the previous 5 years, the current year, and the forecast of the 4 subsequent years. Regarding the latter, the lower of the following two values will be chosen: either 2 per cent or the growth rate or the GDP deflator.

[8] If structural imbalances or public debt figures are above the legal limit, public spending growth has to adjust according to the path established in the economic and financial plans previously approved.

This approach allows us to construct a counterfactual unit for the Spanish public sector under a scenario in which no expenditure rule had been applied whatsoever. Specifically, SCM consists of the construction of a synthetic control unit that is comparable to the real treated territory that is under study. The counterfactual scenario —the artificial unit created— works as a comparison group that allows predicting the behavior of the treated territory, had it not been affected by the treatment. In this case, since the methodology specifically constructs a homogenous control unit, discretional decisions by the researcher are minimized and conclusions apply for the treated unit (Abadie and Gardeazabal, 2003; Ayala et al., 2023).

With this methodology, we can avoid the endogeneity problems of the conventional econometric approaches used in most of the previous literature, that is, we can control for unobservable factors with a common trend (Eliason and Lutz, 2018). By operating this way, we manage to discount the influence that other potential external effects (both observed and unobserved) could be exerting simultaneously while implementing the policy. In our case of analysis, the SCM allows us to isolate the impact of the expenditure rule from the effects of the adverse financial and economic circumstances taking place in Spain during the same period, and also from the potential changes in citizens' preferences.

It is important to highlight that other important institutional changes performed at the supranational level at the same time —such as the renewed SGP— affected all countries used to construct the counterfactual (the so-called *donor pool*); this is very helpful for us, since it makes it easier to have a homogeneous control group.

This method shares some characteristics with the diff-in-diff technique, as they both require information from different periods and allow for correcting selection bias in unobserved variables. However, the synthetic control methodology has a notable advantage over the former one: it enables the implementation of impact evaluation in cases where there is only one (or a few) treatment(s), which is quite common in macroeconomic analyses. Therefore, it fits perfectly in the kind of research we are trying to address here. Moreover, by using information from different periods, it allows to correct the selection bias in unobserved variables (Eliason and Lutz, 2018). This takes place in a similar manner to the diff-in-diff technique, because achieving a good fit in the pre-treatment period —when using SCM— is equivalent to satisfying the "parallel trends assumption" —when applying a diff-in-diff approach. In brief, when this happens, it can be ensured that the predictions in the post-treatment period are valid and reliable. Consequently, the influence of other external factors that could be disturbing the correct measurement of the impact is isolated. Thus, it is guaranteed that the estimations obtained are exclusively attributable to the analyzed policy, which is precisely the central goal of any impact evaluation exercise.

The synthetic control unit consists of a weighted combination of countries (in our case, European countries unaffected by the intervention under examination) and predictors (variables highly correlated with the dependent variable of interest) that best resembles the evolution of the outcome in the unit of treatment. To achieve high-quality estimates of the policy's impact being analyzed, it is essential that, during the pre-treatment period, the trajectory of the outcome variable in the treated unit is replicated as accurately as possible by the generated control group —the synthetic control unit. This optimization process occurs during the period prior to the pass of the policy. Thus, if the path described by the synthetic unit does not fit well with the treated one during the pre-treatment period, it will not provide useful conclusions about the effectiveness of the policy.

An important advantage of the SCM is that it allows to run placebo tests that replicate the estimations for non-treated territories as if they had actually been treated. Should the results for the treated unit be obtained by chance, the placebo tests would display positive results for those non-treated units. Furthermore, the SCM allows to run temporal placebo tests that capture potential anticipation effects of the analyzed policy.

As a caveat, it is important to highlight that the results obtained when using SCM might be valid for the period immediately after the intervention, but the longer the post-treatment period is, the less reliable the conclusions obtained with the counterfactual are. The basic characteristics of the SCM model and its inference rules are displayed in Appendix II.

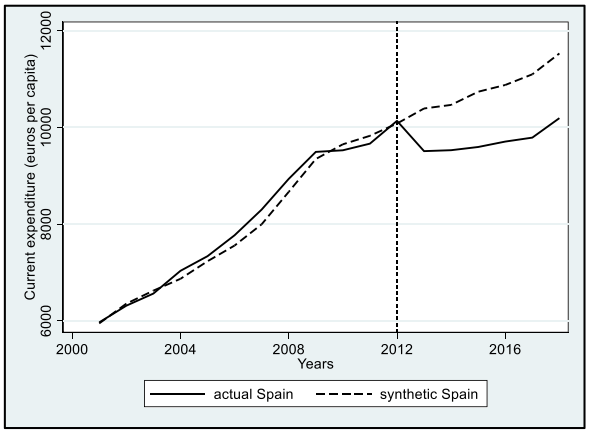
5. Assessing the effects of the Spanish expenditure rule

As we have previously highlighted, the goal of this paper is to analyze the effectiveness of the Spanish expenditure rule in containing the growth of public expenditure. To do so, we use the SCM approach, that allows us to isolate the impact of the rule per se from those due to other relevant facts (e.g., the financial crisis) and institutions (e.g., changes of the supra-national framework) happening at the same time.

Regarding the dependent or objective variables of our analysis, the impact of the rule is measured with two different outcomes that are under the direct control of public administrations: (a) *public current expenditure*, which contains wages and salaries, payment of interests, purchase of goods and services, and current transfers; and (b) *public primary expenditure*, that subtracts financial expenditure from total expenditure. We focus on those expense items for two reasons. In the first case, we argue that capital expenditure tends to be much more volatile and discretional, while current expenditure has a strong inertia that is supposed to be refrained by the rule. Therefore, we are interested in analyzing how governments were able to limit this inertia by containing current expenditure. In the second case, it seems obvious that we need to isolate the impact of the rule from the huge pressure that high interest rates during and after the financial crises were putting on Spanish public budgets. Both outcomes are measured in nominal per capita terms.[9]

[9] Using real, instead of nominal figures should not change the results, since we would be deflating figures at both sides of the equation. Moreover, when passing budget laws, all public administrations have to express their level of expenditure in nominal terms. Another alternative would have been to use the share of public expenditure over national GDP. However, it is important to recall that the Spanish expenditure rule imposes no limit on that ratio. By analyzing the impact of the rule on the evolution of nominal expenditure we are focusing on the specific variable that the rule is trying to constrain.

a. *Spain vs synthetic Spain*



b. *Public current expenditure gap: estimated impact*

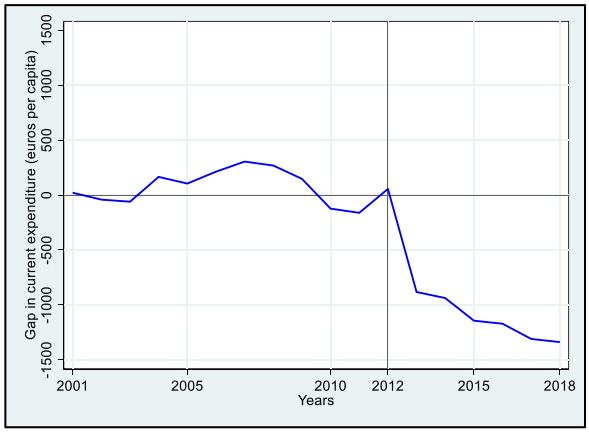


Fig. 1. Trends of public current expenditure in Spain.
a. Spain vs synthetic Spain. b. Public current expenditure gap: estimated impact.
Source: own elaboration.

The analysis has been performed for the Spanish General Government. Considering the public sector as a whole, we can avoid the potential problem of the central administration spinning their deficit to subnational governments. We also analyze the behavior of local governments, which have been the best compliers of the rule according to Table 1 above. A regional-level analysis was not possible due to the scarcity of regional data at the European level: Eurostat only offers the needed regional information for Austria, Belgium, Germany, and Spain, leaving us without enough donor countries to construct the artificial unit that works as a counterfactual in our analysis.

During our period of analysis (2001–2018), expenditure rules were implemented both in Spain and other EU member countries. This allows us to perform several robustness checks running the SMC not only for Spain, but also for those other countries. It is important to highlight that since all these rules were suspended in 2020 due to the pandemic, our period of analysis could not have been extended much longer.

The construction of the artificial unit that will work as our counterfactual is based on a *donor pool* of EU member countries. Since they all share the same supra-national fiscal framework, we can rule out the possibility of our results reflecting the impact of those changes of European rules taking place during the same period. However, several countries had to be discarded precisely because they have also been "treated" with an expenditure rule linked to the evolution of GDP: Austria, Italy, Bulgaria, Romania, Latvia, Lithuania, and Poland. Croatia was included in the *donor pool* since the passing of the expenditure limit did not take place until 2019 and our period of analysis ends in 2018. Estonia and the United Kingdom were also dropped from the *donor pool* for not having data on some of

Table 2
Impact results. Estimated gap in euros per capita.

Year	Actual Spain	Synthetic Spain	Estimated impact
2013	9509.80	10,392.36	**−882.56** ***
2014	9529.16	10,466.20	**−937.04** ***
2015	9595.74	10,738.88	**−1143.14** ***
2016	9707.82	10,878.55	**−1170.73** ***
2017	9789.50	11,098.85	**−1309.35** ***
2018	10,192.47	11,530.47	**−1338.00** ***

Notes: (1) Asterisks indicate level of significance: ***standardized p-value <0.01, **standardized p-value <0.05, **standardized p-value* <0.1.
Source: own elaboration. Source: own elaboration.Source: own elaboration.

the variables used in the analysis.

In order to obtain the synthetic unit, a set of predictors was included that tries to address the socio-economic, financial and institutional characteristics of the countries included in the *donor pool*, in line with previous literature on the topic: budget balance as a percentage of GDP, nominal GDP, percentage of population above 65, unemployment rate, interest payments as a share of GDP, and two dummy variables that reflect whether a country was part of the Eurozone or not, and whether the country was bailed out during the financial crises or not.[10]

Regarding our period of analysis, we used data from 2001 to 2018. The pre-treatment period comprises 2001–2011, and the treatment year coincides with the approval and first implementation of the expenditure rule in 2012.

Four independent exercises were developed: *Exercise I*, showing results for current expenditure at the General Government level; *Exercise II*, displaying estimations for the same variable, but at the Local level of Government; *Exercise III*, presenting evidence for primary expenditure related to General Government; and *Exercise IV*, analyzing the same variable, but now considering the Local level of Government.

5.1. Current expenditure

5.1.1. General government (exercise I)

Direct public investment and capital transfers are one of the most volatile parts of the budget. Therefore, by analyzing current expenditure, we focus on those items that have a stronger inertia.

In line with the literature on the topic, predictor variables used to construct the artificial unit have been the following: budget balance as a share of GDP, nominal GDP, percentage of population over 65, unemployment rate and payments of interests as a share of GDP.[11] Section AIII.3 in Appendix III includes comparative values of the treated, artificial and control units. Besides, several lags of the dependent variable (current expenditure per capita) were included to get a better fit in the pre-treatment period (Abadie et al., 2010). The latter is consistent with the strong inertia displayed by budget variables.

Fig. 1a shows the evolution of actual and synthetic Spain, before and after the treatment, the start of which is indicated with a vertical dashed line. As it can be easily seen, the fit of both units before the treatment is rather good. It is important to recall at this point that estimating the impact of any treatment with this technique requires obtaining a synthetic unit as similar to the treated one as possible. As long as both units follow a similar path before the treatment, their predicted and actual evolution after the passing of the expenditure rule can be reliably compared (synthetic Spain vs actual Spain) to assess the impact on the outcome under analysis.

An intense impact of the expenditure rule is found, with real Spain devoting to public current expenditure consistently fewer resources than its synthetic counterpart. Therefore, preliminary signals point to the effectiveness of the expenditure rule in constraining total expenditure growth (Fig. 1b).

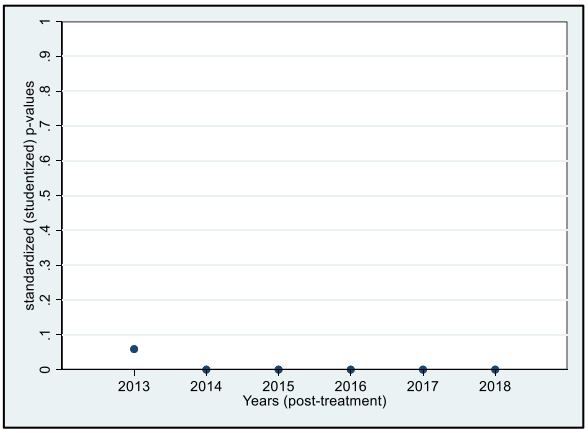
Figure AIII.2.1 in Appendix III illustrates the composition of the synthetic unit, that is, it shows the weights assigned to each of the potential control units that were part of the initial *donor pool*. The result in this first exercise returns an artificial Spain formed by the following combination of countries: Slovakia (57.3 %), Germany (20.7 %), Luxembourg (6.8 %), Croatia (4.5 %), Sweden (3.3 %), Finland (2.5 %) and Greece (0.5 %).

Finally, Table 2 exhibits the impact results for each year after the treatment. What we can see in this table is the comparison between the treated and the synthetic unit for each year. The estimated model informs us of a growing impact —in terms of savings— with an average saving (2013–2018) close to 1000 euros per capita per year.

[10] The SCM does not aim to explain the outcome variable, but to construct a synthetic unit as similar as possible to the real unit. Therefore, it is the iterative process that creates the artificial (synthetic) unit that chooses which variables will be used for its construction. As a result, some of the potential predictors might be chosen for the construction of one artificial unit and some not. In Abadie's (2021, p.393) words, "*the synthetic control methodology formalizes the selection of the comparison units using a data driven procedure*".

[11] We use annual country-level data from Eurostat for all EU countries considered in the study.

a. *Standardized p-values*



b. *Ratio post-RMSPE/pre-RMSPE*

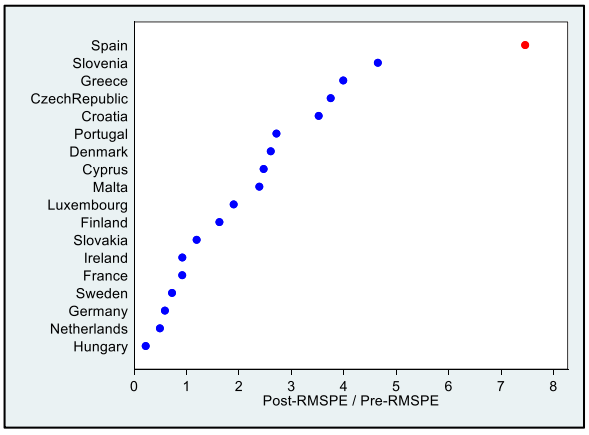


Fig. 2. Inference analysis.
90487526924000a. Standardized *p*-values. b. Ratio post-RMSPE/pre-RMSPE.
Source: own elaboration.

As far as the statistical inference is concerned, Fig. 2a rules out the possibility of having obtained the previous results by chance, with standardized p-values[12] of 0.5 in the first year, and zero in the rest of the period. This is an analysis of individual significance, year by year. Fig. 2b, on the other hand, represents a test of "global" significance, for the entire period considered.

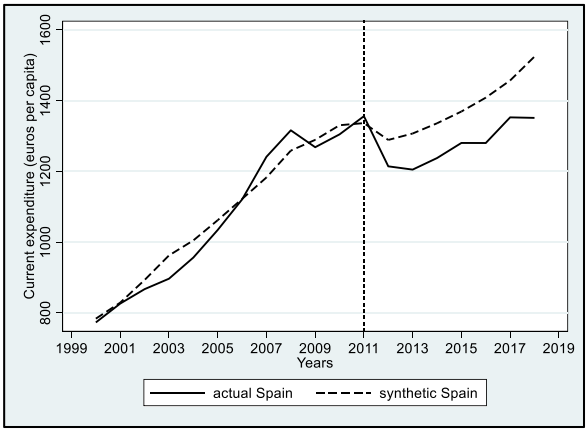
What is interesting to analyze in this last graph is precisely what we have represented: a post-RMSPE/pre-RMSPE ratio as large as possible for the treated unit as compared to the different controls.[13] The numerator of this ratio measures the impact in the post-treatment period (we want it to be as large as possible), while the denominator measures the goodness of fit in the pre-treatment stage (we want it to be as small as possible). Section AIII.4 in Appendix III includes further results of our spatial placebo tests, which clearly confirm the absence of false positives, since Spain largely displays higher impacts than any of the *donor pool* countries.

5.1.2. Local government (exercise II)

Moving on to the analysis of local current expenditure, new evidence on the effectiveness of the Spanish expenditure rule is found. Although the fit of real and synthetic Spain is not as good as for the General Government estimations, Fig. 3a shows clear divergent trends of real and synthetic Spain after the treatment, pointing to a large constraining impact of the fiscal rule. Fig. 3b represents the gap between the actual current expenditure and that estimated for the synthetic Spain during the pre-treatment period (*goodness of fit*) and during the post-treatment period (*treatment effect* or estimated impact), respectively. The smaller impact of the expenditure rule at the local level is undoubtedly related to the small size of local governments within the Spanish public sector (an average 11 per cent

[12] A *standardized* or *studentized* p-value is a vector showing the percentage of placebo standardized effects that are at least as large as the main standardized effect for each post-treatment period. The standardized effect for a specific unit is understood as the impact estimated (the difference between the actual and the synthetic unit) divided by the RMSPE in the pre-treatment period.
[13] Check "Inference analysis with SCM" in Appendix II.

a. *Spain vs synthetic Spain*



b. *Public current expenditure gap: estimated impact*

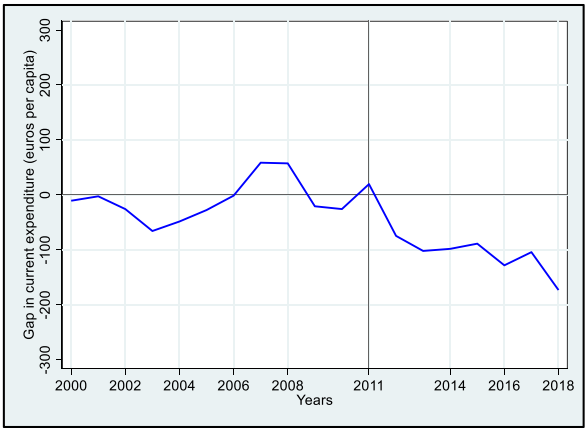


Fig. 3. Trends of public current expenditure in Spain.
a. Spain vs synthetic Spain. b. Public current expenditure gap: estimated impact.
Source: own elaboration

Table 3
Impact results. Estimated gap in euros per capita.

Year	Actual Spain	Synthetic Spain	Estimated impact
2012	1214.33	1289.02	**−74.69** ***
2013	1205.08	1307.17	**−102.09** ***
2014	1237.78	1336.06	**−98.28** ***
2015	1280.46	1369.35	**−88.89** ***
2016	1280.29	1408.57	**−128.28** ***
2017	1352.86	1457.18	**−104.32** ***
2018	1351.38	1524.65	**−173.27** ***

Notes: (1) Asterisks indicate level of significance: ***standardized p-value <0.01, **stand*ardized p-value* < 0.05, **standardized p-value* <0.1.
Source: own elaboration. Source: own elaboration.

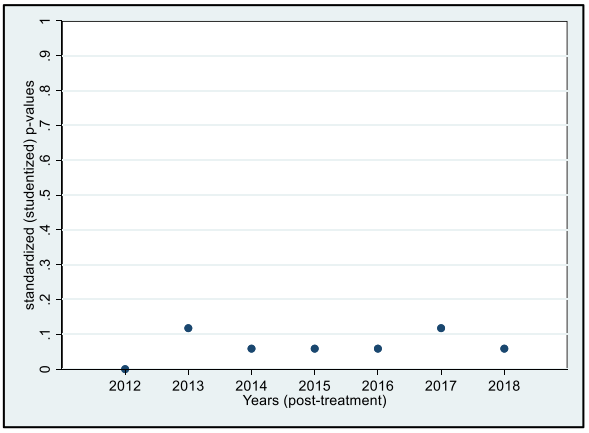
during the period of study) as compared to the central and regional levels of administration (57.1 and 31.7. respectively).

Table AIII.3.2 in Appendix III shows that the synthetic Spain here would be formed by the following combination: Portugal (31.9 %), Germany (30.3 %), Hungary (22.3 %), Slovakia (13.7 %) and the Czech Republic (1.8 %).

Bearing in mind the impact results (Table 3), it is necessary to underline that five out of seven estimated impacts are significant. Now we observe, on average, a saving close to 150 euros per capita per year.

The weaker fit of the synthetic unit in this case is reflected on the probability of results having been obtained by chance (*standardized p-values*), since they have a lower level of statistical significance (Fig. 4a). Specifically, years 2013 and 2017 are not

a. *Standardized p-values*



b. *Ratio post- RMSPE/pre-RMSPE*

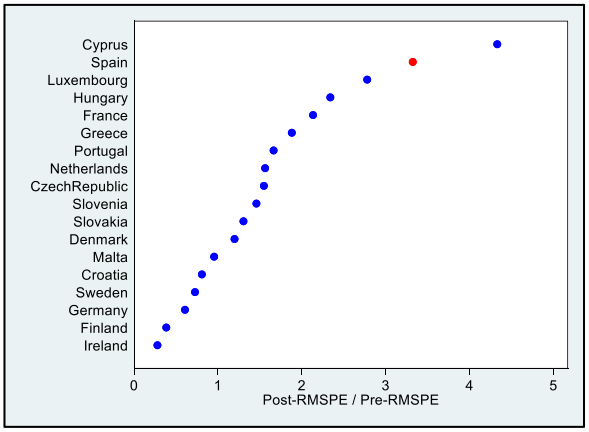


Fig. 4. Inference analysis.
a. Standardized *p*-values. b. Ratio post-RMSPE/pre-RMSPE.
Source: own elaboration

significant. Likewise, results of Fig. 4b, although desirable, are not as conclusive as those checked in Exercise 1.

5.2. Primary expenditure

5.2.1. General government (exercise III)

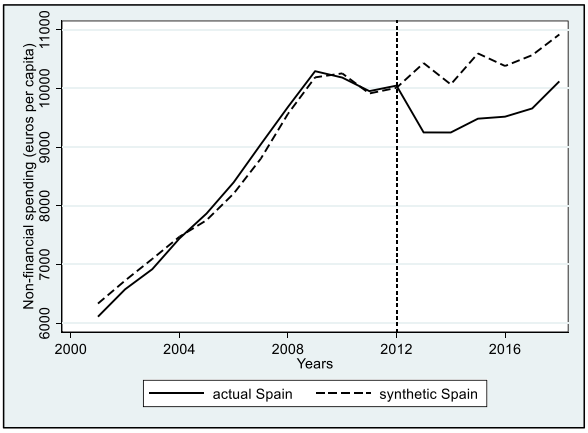
After the outbreak of the Great Recession in 2008, some EU countries —including Spain— experienced an intense rise in financial costs, due to their credibility loss in capital markets. This whole situation led to a deep deterioration of budget balances and public debt figures that had a strong inertia in the following decade.

In order to isolate the analysis of this research from the adverse effects of the financial crisis of 2010–2012, it seems reasonable to run one additional exercise with primary expenditure, hence excluding payments of interests and debt repayment from our outcome variable. In this case, the construction of artificial Spain included the following predictors: budget balance as a share of GDP, nominal GDP, unemployment rate, population over 65, payment of interests over GDP and two dummy variables that reflect whether a country was a part of the Eurozone in one year or not, and whether it was bailed-out by the EU during the 2010–2012 financial crisis. Section AIII.3 in Appendix III includes comparative values of the treated, artificial and control units. In search of a better fit of the synthetic unit, several "lags" of the analyzed outcome allowed to capture the strong inertia of the outcome variable.

With this approach, new evidence on the effectiveness of the Spanish expenditure rule is found. Fig. 5a shows an excellent fit between the real and the synthetic Spain regarding General Government's primary expenditure. The divergent trends of both units after 2012 denote a large constraining effect of the fiscal rule all over the post-treatment period. Fig. 5b offers a visual approach of the calibration of the model during the pre-treatment period, as well as a graphical representation of the impacts throughout all the post-treatment periods.

Considering the synthetic Spain, in this third case the contributions achieved give rise to a control unit made up of the five following

a. *Spain vs synthetic Spain*



b. *Primary expenditure gap: estimated impact*

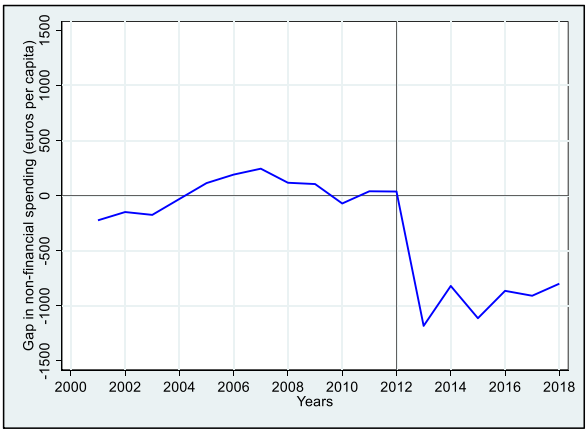


Fig. 5. Trends of public primary expenditure in Spain,
a. Spain vs synthetic Spain. b. Primary expenditure gap: estimated impact.
Source: own elaboration.

Table 4
Impact results. Estimated gap in euros per capita.

Year	Actual Spain	Synthetic Spain	Estimated impact
2013	9250.24	10,432.06	**−1181.82** ***
2014	9249.36	10,069.01	**−819.65** ***
2015	9484.72	10,597.08	**−1112.36** ***
2016	9519.27	10,383.17	**−863.90** ***
2017	9659.08	10,567.54	**−908.46** ***
2018	10,120.57	10,919.76	**−799.19** ***

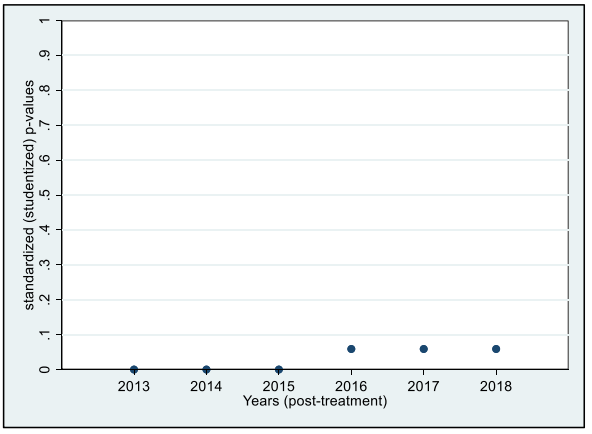
Notes: (1) Asterisks indicate level of significance: ***standardized p-value <0.01, **standardized p-value <0.05, *stan*dardized p-value* <0.1.
Source: own elaboration.

countries: Slovakia (37.9 %), Greece (27.6 %), France (19.7 %), Germany (11.7 %) and Ireland (3.1 %) (see section AIII.2 in Appendix III).

As far as the estimated impacts are concerned (Table 4), while the lowest per capita savings took place in 2018 —about 800 euros—, in 2013 those savings amounted 1181 euros. On average, the savings displayed in this exercise are close to 1000 euros per capita.

The statistical inference associated to Exercise 3 shows a very high significance from an individual point of view (Fig. 6a). Also, an alternative way to study the Spanish gap relative to the gaps obtained from the placebo runs —*falsification tests* implemented for each of the control units— is to analyze the distribution of the ratios of post-RMSPE/pre-RMSPE (Fig. 6b). The ratio for Spain clearly stands out

a. *Standardized p-values*



b. *Ratio post RMSPE/pre-RMSPE*

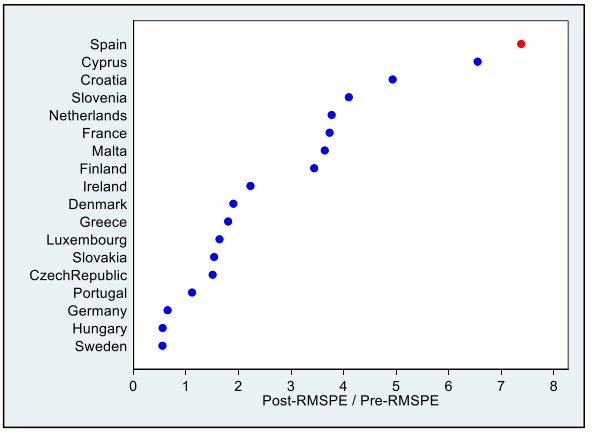


Fig. 6. Inference analysis.
a. Standardized p-values. b. Ratio post RMSPE/pre-RMSPE.
Source: own elaboration.

in the graph: post-RMSPE is more than 7 times the RMSPE for the pre-expenditure rule passing period. No control country achieves such a large ratio.

5.2.2. Local government (exercise IV)

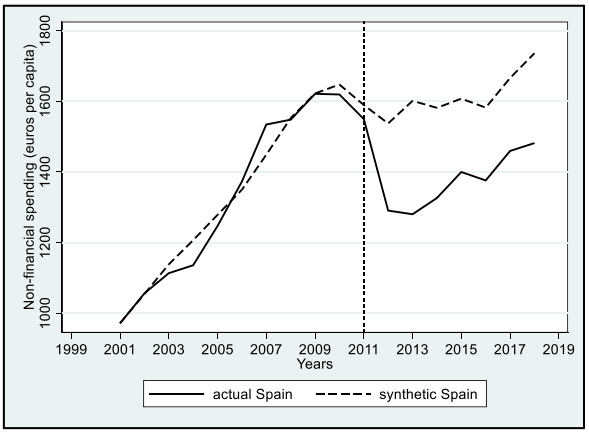
Regarding Local Governments' primary expenditure, new evidence on the effectiveness of the expenditure rule is found (see Fig. 7a and b). In a similar way to what happened with the specification analyzing local current expenditure, the fit between the real and the synthetic unit is not as good as the one obtained when focusing on the General Government budget. Nevertheless, Fig. 7a suggests that the rule was also effective.

Bearing in mind the weights in the control unit here, section AIII.2 in Appendix III shows that the synthetic Spain in this case is formed by the following countries: Portugal (46.9 %), Slovakia (21.0 %), France (20.4 %), Croatia (7.4 %), Slovenia (2.5 %) and Greece (1.9 %).

As for the impact results (Fig. 8), it is important to underscore that some non-significant results appear (Fig. 8a) for years 2015–2018. However, for the first three post-treatment years, the estimated impacts are highly significant, with a *standardized* p-value of less than a 0.01 (see Fig.8b). Table 5 shows the estimated impacts for each of the years under study.[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16]

The robustness of the results is more than evident when testing the graph referring to the post-RMSPE/pre-RMSPE ratio for all the countries of interest (see Fig. 8b). Spain is in second position, with a ratio that only appears behind Hungary. Once again, it would be ruled out that the results observed for the treated country are due to chance.

a. *Spain vs synthetic Spain*



b. *Primary expenditure gap: estimated impact*

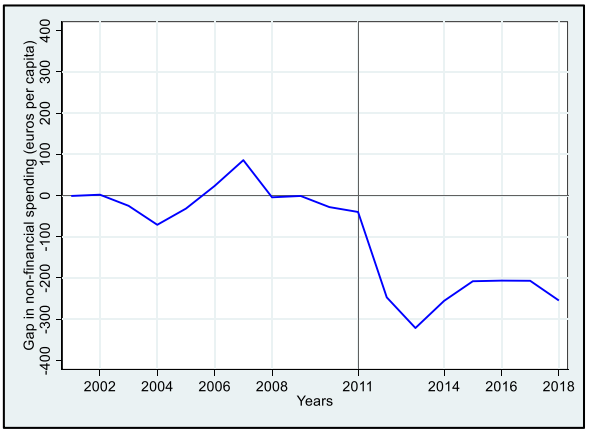


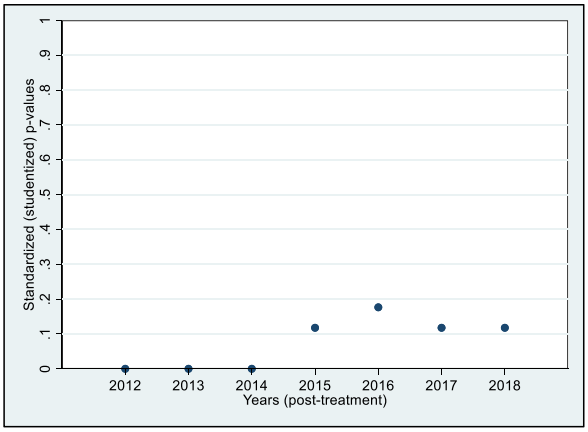
Fig. 7. Trends of public primary expenditure in Spain.
a. Spain vs synthetic Spain. b. Primary expenditure gap: estimated impact.
Source: own elaboration.

5.3. Robustness checks

With the aim of checking the robustness of our analysis, we replicated our four exercises with the following different specifications (the results can be found in Appendix IV):

- Excluding from the donor pool those countries which were explaining the largest part of the artificial unit: Germany and Slovakia in exercise 1, Germany and Portugal in exercise 2, Slovakia and Greece in exercise 3 and France and Greece in exercise 4. All the new estimations pointed to the same conclusions, suggesting that the Spanish rule has been very effective in containing current and primary expenditure growth.
- Excluding predictors to check the sensitivity of our results, we found a confirmation of our initial conclusions. In no case were the artificial units largely sensitive to changes in the specifications.
- Excluding from the donor pool those countries that had suffered from an idiosyncratic shock (a bailout) during the Great Recession. After excluding Portugal, Ireland, Greece and Cyprus, our results remain basically the same, pointing to the effectiveness of the expenditure rule.
- With the purpose of capturing potential anticipation effects, we performed some placebo tests regarding the temporal sequence of the implementation of the rule. Section AIII.5 of Appendix III includes the results of those placebo tests. We found no anticipation effects whatsoever in the case of current expenditure, both for General Government and Local authorities, and in the case of primary expenditure at the local level. However, some anticipation can be seen in the case of primary expenditure at the General Government level, in which expenditure growth starts to depart from the artificial unit one year before the rule was passed. This is consistent with the fact that the rule was already announced during the previous year.

a. *Standardized p-values*



b. *Ratio post RMSPE/pre-RMSPE*

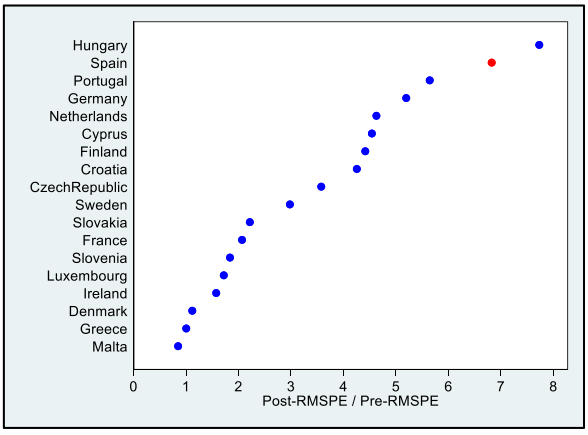


Fig. 8. Inference analysis.
a. Standardized p-values. b. Ratio post RMSPE/pre-RMSPE.
Source: own elaboration.

Table 5
Impact results. Estimated gap in euros per capita.

Year	Actual Spain	Synthetic Spain	Estimated impact
2012	1290.65	1537.58	**−246.94** ***
2013	1280.35	1601.59	**−321.24** ***
2014	1326.38	1581.77	**−255.39** ***
2015	1399.97	1607.82	**−207.85** ***
2016	1376.09	1582.39	**−206.29** ***
2017	1459.61	1666.38	**−206.77** ***
2018	1481.99	1736.49	**−254.50*****

Notes: (1) Asterisks indicate level of significance: ***standardized p-value <0.01, **standardized p-value <0.05, *standardized p-value <0.1.
Source: own elaboration.

In order to be able to extrapolate our results for the Spanish case to other countries, with different political, institutional and socio-economic characteristics, we have run the same analysis for the rest of the EU countries which had expenditure rules similar to the Spanish one during our period of study. Appendix V includes the basic results for Austria, Italy, Latvia, Bulgaria, and Romania.[14] Those

[14] Croatia was not analyzed, since the expenditure rule was passed in 2019, right before the scape clause of all fiscal rules was activated due to the pandemic.

results show that the rules were effective in containing the growth of current and primary expenditure in Austria and Italy.[15] Although the fit of their respective artificial units is in not as good as in our estimations for the Spanish rule, the figures clearly show a divergent trend in the evolution of the treated and the synthetic units. This effectiveness takes place in Italy both at the General Government and the Local Governments levels. The Austrian rule, on the contrary, only seems to have been able to contain expenditure at the aggregated level. The reason behind the smaller impact at the local level in Austria could be, as in the Spanish case, due to the smaller size of local authorities (15.4 per cent of general government expenditure) as compared to the Italian case (27.5).

Regarding the cases of Latvia, Bulgaria and Romania, implementing the SCM analysis was not successful, since it was not possible to create an artificial unit that replicated the evolution of the treated units (see Appendix V). Following Abadie (2021), this could be because the treated units display extreme values in either the analyzed outcome or the predictor variables used to construct the artificial unit, or that the analyzed territories are very heterogeneous as compared to the donor pool countries. It is important to recall here that Latvia joined the EU in 2004 and the Eurozone in 2014, while Bulgaria and Romania did not become members of the Union until 2007 and they have not joined the Eurozone yet.

6. Conclusions

Fiscal rules have been used around the globe to enforce fiscal discipline for several decades now. First-generation fiscal rules were primarily designed to improve long-term fiscal sustainability but turned out to be strongly pro-cyclical. Second-generation fiscal rules were passed in many countries and in the EU after the outbreak of the Great Recession to improve public finances solvency and, at the same time, protect long-term economic growth. Within this context, both the EU institutions and the Spanish National Government passed several new fiscal limits, including the expenditure benchmark and the expenditure rule respectively.

After the suspension of fiscal rules due to the acute economic crisis triggered by the pandemic, European institutions are now discussing the design of a new institutional framework that better ensures fiscal sustainability, while at the same time avoids pro-cyclical budgets and promotes strategic areas such as the energetic and digital transitions within the Union. Although there is plenty of empirical evidence on the effectiveness of fiscal rules in achieving fiscal sustainability, it is also known that their specific design is critical in reaching that goal. Not all rules have the same impact.

Moreover, the impact of expenditure rules has not been analyzed as much as those limiting public deficit and debt. This paper contributes to the literature by trying to fill this gap, offering evidence that expenditure rules that link the evolution of expenditure to the economic growth can be a useful tool to curb the incremental inertia of public budgets. Specifically, we focus on the impact of the Spanish expenditure rule that was passed and firstly implemented in 2012, in the midst of a financial crisis that strongly hit the southern economies of the Eurozone.

From a methodological point of view, the technique we propose to isolate the effect of the fiscal rule from the influence of other external factors happening at the same time is based on the original proposal of Abadie and Gardeazabal (2003). The SCM, a powerful tool to assess the impact of fiscal rules (Eliason and Lutz, 2018; Ardanaz et al., 2019; Salvi et al., 2020), consists of constructing a counterfactual scenario that shows the evolution of the analyzed outcome — public expenditure, in our case— had the rule not been in force. As one of the main advantages of the method, it should be noted that it eludes the potential endogeneity problem that has been claimed by a part of the literature on the effectiveness of fiscal rules (Eliason and Lutz, 2018; Heinemann et al., 2018; Caselli and Reynaud, 2019). Furthermore, and even more importantly, it allows to control for unobserved variables, coming pretty close to the impacts that could be derived from a randomized controlled trial.

We focus on the evolution of two different budget outcomes that are directly related to the aim of the rule: current and primary expenditure. In the first case, we analyze the evolution of the part of expenditure with a higher level of inertia, leaving aside the usually more volatile behavior of investment. In the second, we study to what extent the actual evolution of public expenditure was due to the rule once financial costs were deducted. In both cases, our findings show that the Spanish expenditure rule has been greatly successful in constraining the growth of public expenditure. More specifically, the results reveal that the evolution of the synthetic Spain, the unit that works as a group of control in our study, displays systematically higher levels of public expenditure than real Spain. Results are robust for both the General Government and the local level, and also to different specifications of the artificial units.

When applying the same methodology to the other EU member states that passed similar expenditure rules, we find that Italy and Austria were also successful in containing public expenditure growth.

Despite the evidence that the interaction of fiscal rules with socio-economic and other institutional characteristics can lead to different results in terms of fiscal sustainability (Alesina and Passalacqua, 2016), we believe that this empirical evidence is extremely relevant for those developed and developing countries that are considering including an expenditure rule within their national fiscal framework. Moreover, there is presently an intense debate regarding the fiscal background that will be applied within the European Union once the escape clause activated during the pandemic is de-activated. One of the proposals currently on the table is the combined use of a debt and an expenditure rule. Our results offer some evidence on the effectiveness of the latter in containing public expenditure growth.

Further work on this topic is still needed to see to what extent this expenditure limitation affects programs that have effects on long term economic growth. Tentative explorations on this have revealed us that, while the Spanish expenditure rule has been successful in limiting the growth of public expenditure, it has also strongly affected public investment.

[15] This results were not sensitive to changes in the donor pool and the predictor variables shown in the original specifications.

Funding

This research has been funded by the Spanish Institute of Fiscal Studies.

CRediT authorship contribution statement

Ana Herrero-Alcalde: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Javier Martín-Román:** Writing – original draft, Visualization, Methodology, Formal analysis, Data curation. **José Manuel Tránchez-Martín:** Writing – original draft, Validation, Investigation, Conceptualization. **Ignacio Moral-Arce:** Validation, Methodology, Formal analysis, Data curation.

Declaration of competing interest

We do not have any conflict of interest regarding the preparation or publication of this paper.

Data availability

Data will be made available on request.

Appendix I

Table A.1
Comparison of the Spanish expenditure rule and the European expenditure benchmark

	LOEPSF	UE
Who is bound by the rule?	All public administrations, individually, except Social Security.	All public administrations (aggregated).
When does the rule apply?	Always, except: - Activation of escape clause. - Public administrations with problems as structural imbalance or public debt higher than objective.	Always, except: - Activation of escape clause. - States under the Excessive Deficit Protocol.
What kind of expenditure is bound by the rule?	Primary expenditure in terms of ESA.	Primary expenditure in terms of ESA.
Exceptions	- Interest payments. - Non-discretional unemployment benefits. - Spending co-financed with earmarked funds from EU or other administrations. - Intergovernmental transfers linked to subnational governments' financing systems. - Financially sustainable local investment (funded with previous surpluses).	- Interest payments. - Expenditure co-financed with European earmarked funds. - Non-discretional unemployment benefits. - Public investment derived from to structural reforms.
Adjustments	- No exclusion of "one off" measures. - Adjustment of the growth rate according to increases or decreases of resources due to discretional changes in legislation.	- Exclusion of "one off" measures. - Adjustment of the growth rate according to increases or decreases of resources due to discretional changes in legislation.
Growth rate	- European Commission's methodology, but GDP deflator cannot exceed 2 %. - Identical growth rate for all public administrations, except for units under a consolidation plan.	- European Commission's methodology, but GDP deflator cannot exceed 2 %. - If the member State has not reached its MTBF, the growth rate is adjusted to be compatible with the structural deficit target.
Monitorization	- Ex ante: Spanish fiscal council (AIReF). - Ex post: Ministry of Finance.	Ex ante and ex post: European Commission.
Consequences	Under its fiscal rule status, non-compliance triggers the same consequences as in the case of budget balance and debt rules.	It is not a fiscal rule per se; therefore, non-compliance does not trigger any sanctions.

Source: own elaboration.

Table A.2
Expenditure rules within the European Union

	Expenditure rule	Definition	Level of Government	In force since
Austria	Nominal expenditure growth rate limit.	The expenditure growth by Federal Government, provinces and municipalities must be in line with European legislation (Council Regulation (CE) n. 1466/97).	All public administrations	2015
Belgium	Real expenditure growth rate limit.	Federal health care spending in real terms has to grow equal or below 1,5 %.	Social Security	2016
Bulgaria	Nominal expenditure growth rate limit.	The annual expenditure growth cannot exceed the potential GDP reference growth rate estimated using European Commission's methodology (Council Regulation (CE) n. 1466/97).	General Government	2014
	Nominal expenditure ceiling as % of GDP	Expenditure under the consolidated fiscal program may not exceed 40 % of GDP	General Government	2012
Croatia	Nominal expenditure growth rate limit.	Expenditure growth cannot exceed potential GDP reference growth rate, augmented by forecasted inflation.	General Government	2019
Denmark	Nominal expenditure ceiling in absolute terms.	Nominal expenditure ceilings for Central, Regional, and Local Government according to rule no. 7013, legally binding for 4 rolling years.	All public administrations	2014
Spain	Nominal expenditure growth rate limit.	Annual expenditure growth cannot exceed the average medium-term growth rate of GDP (over a period of 10 years), in nominal terms.	All public administrations	2012
Finland	Real expenditure ceiling in absolute terms.	4-year ceilings set at the beginning of each legislature and adjusted annually to inflation.	Central Government	2007
Italy	Real expenditure growth limit.	The annual target rate of growth in General Government expenditure may not exceed the reference growth rate calculated in accordance with EU Law (Council Regulation (CE) n. 1466/97).	General Government	2014
	Nominal expenditure ceiling.	Expenditure ceilings for pharmaceutical products expressed as a percentage of the financing level for the national health service financed by the State.	Regional Government	2008
Lithuania	Nominal expenditure growth rate limit.	If General Government budget balances show average deficits for the past five years, the annual growth rate of expenditures of the State, Social Insurance Fund and Health insurance should not exceed one half of the average multiannual growth rate in percentage of potential GDP.	General Government Social Security	2015
Latvia	Real expenditure growth rate limit.	Public expenditure, excluding GDP deflator, cannot grow faster than potential GDP.	General Government	2014
Netherlands	Real expenditure ceiling in absolute terms.	Any setbacks against the expenditure ceiling must be compensated within the sector; windfalls can only be used to compensate for setbacks within that sector; windfalls cannot be used to finance new expenditures or are automatically used to reduce debt.	General Government	2012
Poland	Nominal expenditure growth rate limit.	The dynamics of the expenditure are limited to the medium-term real GDP growth multiplied by the inflation target, with the inclusion of the discretionary measures and the correction mechanism.	General Government	2016
Romania	Nominal expenditure growth rate limit.	The annual expenditure growth of public administration must comply with the provisions of EC Council Regulations no. 1466/97,	General Government	2014
Sweden	Nominal expenditure ceiling in absolute terms.	All expenditure in the Central Government budget is subject to the expenditure ceiling, except debt interest. Off-budget expenditure in the old-age pensions system also bound by the limit.	Central Government and Social Security	2010
Slovakia	Nominal expenditure ceiling.	The rule sets a limit of 15 %. Expenditure not considered in the State budget law can only be executed if its total amount does not exceed 1 % of total expenditure approved in the budget law and the deficit is not increased.	Central Government	2012–2015
United Kingdom	Nominal expenditure ceiling.	The welfare cap limits overall welfare spending, excluding the state pension and automatic stabilizers.	General Government	2015–2019

Source: own elaboration using European Commission's Fiscal Governance Database (2021).

APPENDIX II

The synthetic control method

The model

The specific methodological process goes as follows. Let us suppose that there are $J+1$ countries where $j=1$ denotes Spain (the treated unit) and $j=2,\ldots,J+1$ designate the *donor pool*, a set of potential control countries defining the synthetic control unit. Let us also assume that Y_{it}^{N} represents the outcome (public current expenditure and public primary expenditure) for country i at time t without an expenditure rule linked to GDP, for units $i=1,\ldots,J+1$, and time periods $t=1,\ldots,T$. We also suppose that T_0 is the number of pre-

intervention periods, with $1 \leq T_0 < T$, and Y_{it}^I, the outcome that would be checked for unit i at time t if unit i is exposed to the policy under study in periods T_{0+1} to T.[16]

Let us consider as well that $\alpha_{it} = Y_{it}^I - Y_{it}^N$ stands for the effect of the expenditure rule for unit i at time t, being Y_{it}^I the real data of the outcome of interest, and Y_{it}^N the potential response without policy. Then, the observed outcome for country i at time t could be described as follows:

$$Y_{it} = Y_{it}^N + \alpha_{it} D_{it} \tag{1}$$

where D_{it} is a dichotomous variable, taking value one when country i is under the effects of the expenditure rule, and value zero otherwise. Considering that only the first country is affected by the policy analyzed, and only when $t > T_0$, we can state that:

$$D_{it} = \begin{cases} 1 & \text{if } i = 1 \quad \text{and } t > T_0 \\ 0 & \text{otherwise} \end{cases} \tag{2}$$

Ultimately, we intend to estimate α_{1t} for $t > T_0$. Thus, reordering terms in [1] we get:

$$\alpha_{1t} = Y_{1t}^I - Y_{1t}^N = Y_{1t} - Y_{1t}^N \tag{3}$$

For Spain, the treated unit, that is, the country affected by the expenditure rule, Y_{1t}^N cannot be observed in the post-treatment periods. Data are available for the actual path of the outcome (Y_{1t}^I), but it is unknown what would have happened with that trajectory if it had not been under the effects of the policy investigated. Therefore, we search an estimate of Y_{1t}^N that, following Abadie et al. (2010), is given by a linear factor model. This is necessary to quantify the effect of the event by calculating the difference detailed in [3].

To find optimal weights, Abadie and Gardeazabal (2003) defined a $(K \times 1)$ vector X_1 of the pre-event values of K predictors of the outcome variable and a $(K \times J)$ matrix X_0, which measures the values of the same variables for the *donor pool*.

The vector of optimal weights referring to the control countries, W^*, is the one that minimizes the following problem:

$$\| X_1 - X_0 W \|_v = (X_1 - X_0 W)' V (X_1 - X_0 W) \tag{4}$$

where $W^* = (w_1^*, w_2^*, \ldots, w_{J+1}^*)'$ is a $(J \times 1)$ vector of non-negative weights that sums to one, and V is a diagonal matrix with non-negative components. The values of the diagonal elements of V show the relative importance of the different growth predictors. Considering that W^* depends on V, it seems appropriate to clarify that the choice of V could be subjective, reflecting the previous knowledge of the researchers about the relative importance of each particular growth predictor. Nevertheless, the most common practice, and the one applied here, consists of applying a more functioning method, choosing V such that the public current expenditure (public primary expenditure) path for Spain during the pre-treatment period is best reproduced by the resulting synthetic Spain.

After getting the matrix $W^*(V^*)$, made up of the estimated optimal weights that each country of the control group receives for the design of the synthetic unit, it is enough to apply these weights in [3] to find the estimated effect derived from the passing of the expenditure rule:

$$\widehat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt} \tag{5}$$

Inference analysis with SCM

By applying the SCM technique, neither confidence intervals nor statistical significance parameters are calculated, which are typical procedures in an inference analysis. Instead, the SCM offers complementary options also identified as *falsification* or *permutation* tests. With "in-space" or "in-place" placebos, each country integrating the original *donor pool* is separately conceived as a treated unit and the SCM is then applied as if each one of these countries, originally taking part in the synthetic unit, were now affected by the expenditure rule (Abadie et al., 2010).

By applying this iterative mechanism, we obtain a distribution of estimated placebo treatment effects for all units (countries) in which no event occurred. Bearing in mind that none of these control countries has been influenced by the expenditure rule analyzed, we should only observe great disparities between these *placebo* countries and their corresponding synthetic control randomly and in irregular cases.

A more accurate mechanism for identifying the significance of the results is based on the Root Mean Squared Prediction Error (RMSPE), which is the index typically used to assess the goodness of fit when applying the SCM. It measures, for a given unit of analysis, the fit —or lack thereof— between the actual outcome variable and its synthetic counterpart. In other words, it represents the distance or discrepancy between the path drawn by each variable.

Formally, it can be expressed as follows:

[16] We assume there is no effect of the expenditure rule on the outcome of interest before its occurrence, that is, $Y_{it}^I = Y_{it}^N$ when $t \leq T_0$.

$$RMSPE = \sqrt{\frac{1}{T_0}\sum_{t=1}^{T_0}\left(Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}\right)^2} \quad (6)$$

Ultimately, we calculate the ratio between the post-intervention RMSPE and pre-intervention RMSPE and determine how many control countries present an effect as large as the one observed in Spain (the treated country). Within this ratio, the numerator quantifies the magnitude of the impact (the higher the post-intervention RMSPE, the greater the impact) and the denominator represents the goodness of fit (the lower the pre-intervention RMSPE, the better the fit).

APPENDIX III

AIII.1. Descriptive statistics

	Obs	Mean	Std.Dev.	Min	Max
Current Expenditure (GG)	342	11,244.49	7250.29	1520.909	37,924.6
Current expenditure (LG)	342	2757.365	3542.252	49.505	16,434.27
Primary Expenditure (GG)	342	11,753.29	7808.884	1742.849	41,489.52
Primary Expenditure (LG)	342	3134.631	3733.605	72.409	17,226.22
Deficit/GPD	342	−2.492	3.925	−32.1	5.9
Nominal GDP	342	424,305.8	705,731	4541.1	334,470
Population>65	342	16.387	2.587	10.8	21.8
Unemployment	342	8.859	4.578	1.9	27.5
Interests/GDP	342	2.2	1.274	0	7.7
Net Local Debt0	342	−16.123	108.835	−431.131	434.216

AIII.2. Country weights

Exercise 1: current expenditure (general government)

Table AIII.2.1
Country weights in synthetic Spain

Country	Weight	Country	Weight	Country	Weight
Austria	–	**Germany**	**0.207**	Poland	–
Belgium	–	**Greece**	**0.005**	Portugal	0.000
Bulgaria	–	Hungary	0.000	Romania	–
Croatia	**0.045**	Ireland	0.000	**Slovakia**	**0.573**
Cyprus	0.000	Italy	–	Slovenia	0.000
Czech Rep.	0.000	Latvia	–	**Sweden**	**0.033**
Denmark	0.000	Lithuania	–	United Kingdom	–
Estonia	–	**Luxembourg**	**0.068**		
Finland	**0.025**	Malta	0.000		
France	0.000	Netherlands	0.000		

Notes: (a) Austria, Belgium, Bulgaria, Latvia, Lithuania, Italy, Poland, and Romania have been excluded for also having approved an expenditure rule linked to GDP during the period under examination; (b) Estonia and the United Kingdom have also been dropped from the *donor pool* for not having data on some of the variables used in the analysis.
Source: own elaboration.

Exercise 2: current expenditure (local governments)

Table AIII.2.2
Country weights in synthetic Spain

Country	Weight	Country	Weight	Country	Weight
Austria	–	**Germany**	**0.303**	Poland	–
Belgium	–	Greece	0.000	**Portugal**	**0.319**
Bulgaria	–	**Hungary**	**0.223**	Romania	–
Croatia	0.000	Ireland	0.000	**Slovakia**	**0.137**
Cyprus	0.000	Italy	–	Slovenia	0.000
Czech Rep.	**0.018**	Latvia	–	Sweden	0.000
Denmark	0.000	Lithuania	–	United Kingdom	–
Estonia	–	Luxembourg	0.000		

(*continued on next page*)

Table AIII.2.2 (*continued*)

Country	Weight	Country	Weight	Country	Weight
Finland	0.000	Malta	0.000		
France	0.000	Netherlands	0.000		

Notes: (a) Austria, Belgium, Bulgaria, Latvia, Lithuania, Italy, Poland, and Romania have been excluded for also having approved an expenditure rule linked to GDP during the period under examination; (b) Estonia and the United Kingdom have also been dropped from the *donor pool* for not having data on some of the variables used in the analysis.
Source: own elaboration.

Exercise 3: primary expenditure (general government)

Table AIII.2.3
Country weights in synthetic Spain

Country	Weight	Country	Weight	Country	Weight
Austria	–	**Germany**	**0.117**	Poland	–
Belgium	–	**Greece**	**0.276**	Portugal	0.000
Bulgaria	–	Hungary	0.000	Romania	–
Croatia	0.000	**Ireland**	**0.031**	**Slovakia**	**0.379**
Cyprus	0.000	Italy	–	Slovenia	0.000
Czech Rep.	0.000	Latvia	–	Sweden	0.000
Denmark	0.000	Lithuania	–	United Kingdom	–
Estonia	–	Luxembourg	0.000		
Finland	0.000	Malta	0.000		
France	**0.197**	Netherlands	0.000		

Notes: (a) Austria, Belgium, Bulgaria, Latvia, Lithuania, Italy, Poland, and Romania have been excluded for also having approved an expenditure rule linked to GDP during the period under examination; (b) Estonia and the United Kingdom have also been dropped from the *donor pool* for not having data on some of the variables used in the analysis.
Source: own elaboration.

Exercise 4: primary expenditure (local governments)

Table AIII.2.4
Country weights in synthetic Spain

Country	Weight	Country	Weight	Country	Weight
Austria	–	Germany	0.000	Poland	–
Belgium	–	**Greece**	**0.019**	**Portugal**	**0.469**
Bulgaria	–	Hungary	0.000	Romania	–
Croatia	**0.074**	Ireland	0.000	**Slovakia**	**0.210**
Cyprus	0.000	Italy	–	**Slovenia**	**0.025**
Czech Rep.	0.000	Latvia	–	Sweden	0.000
Denmark	0.000	Lithuania	–	United Kingdom	–
Estonia	–	Luxembourg	0.000		
Finland	0.000	Malta	0.000		
France	**0.204**	Netherlands	0.000		

Notes: (a) Austria, Belgium, Bulgaria, Latvia, Lithuania, Italy, Poland, and Romania have been excluded for also having approved an expenditure rule linked to GDP during the period under examination; (b) Estonia and the United Kingdom have also been dropped from the *donor pool* for not having data on some of the variables used in the analysis.
Source: own elaboration.

AIII.3. Treated, synthetic and control units' values

Exercise 1: current expenditure (general government)

	Treated	Synthetic	Average Control
Deficit/GDP	−3.491	−3.443	−2.896
Nominal GDP	955,500	538,000	361,700
Population>65	16.800	15.050	15.495
Unemployment rate	13.816	11.656	8.194
Current Exp (2002)	6312.617	6363.525	8589.788
Current Exp (2010)	9527.581	9673.230	12,547.751
Current Exp (2012)	10,135.797	10,082.188	12,619.098

Exercise 2: current expenditure (local governments)

	Treated	Synthetic	Average Control
Local Deficit	−0.290	−0.248	−0.161
Nominal GDP	948,600	810,300	357,200
Population>65	16.745	16.606	15.387
Unemployment rate	12.818	9.470	7.979
Bailout	0	0.026	0.025
Eurozone	1	0.642	0.530
Interests	18,919.363	22,400.197	9275.019
Current Exp (2002)	867.023	887.193	2275.707
Current Exp (2008)	1316.171	1257.161	2823.126
Current Exp (2011)	1356.149	1338.959	3067.838
Current Exp (2012)	1214.333	1293.5356	3122.773

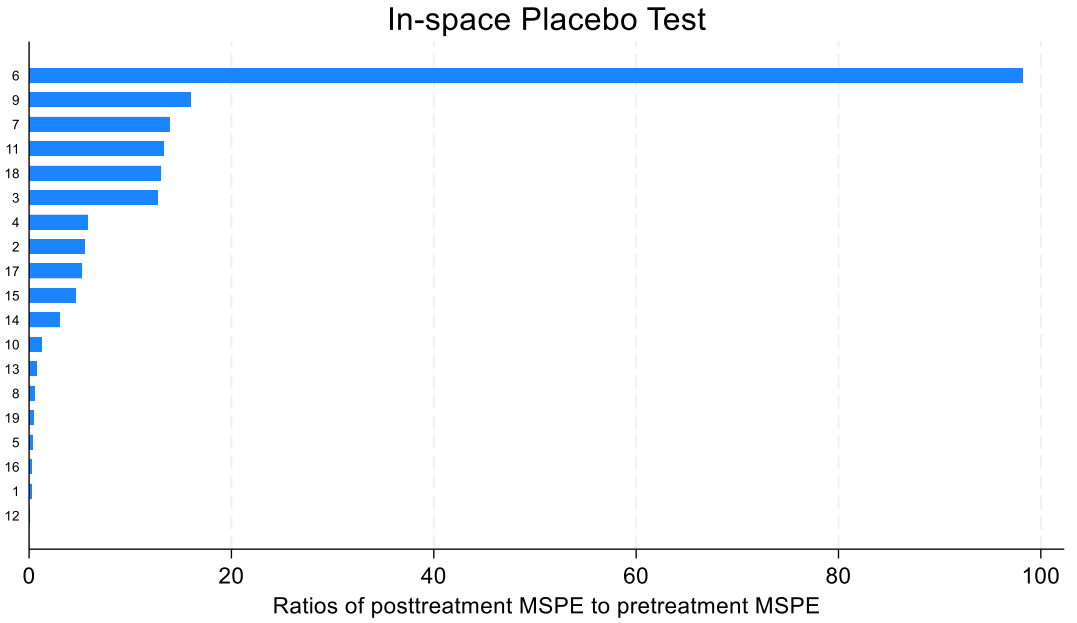
Exercise 3: primary expenditure (general government)

	Treated	Synthetic	Average Control
Deficit/GDP	−3.491	−4.515	−2.896
Nominal GDP	955,500	654,100	361,700
Unemployment rate	13.816	10.990	8.194
Population>65	16.8	16.097	15.495
Bailout	0.083	0.080	0.037
Eurozone	1	0.711	0.546
Interests/GDP	2.125	2.745	2.272
Current Exp (2002)	6919.124	7037.656	9491.492
Current Exp (2010)	9047.627	8912.543	11,234.135
Current Exp (2012)	10,185.812	10,161.160	13,121.945

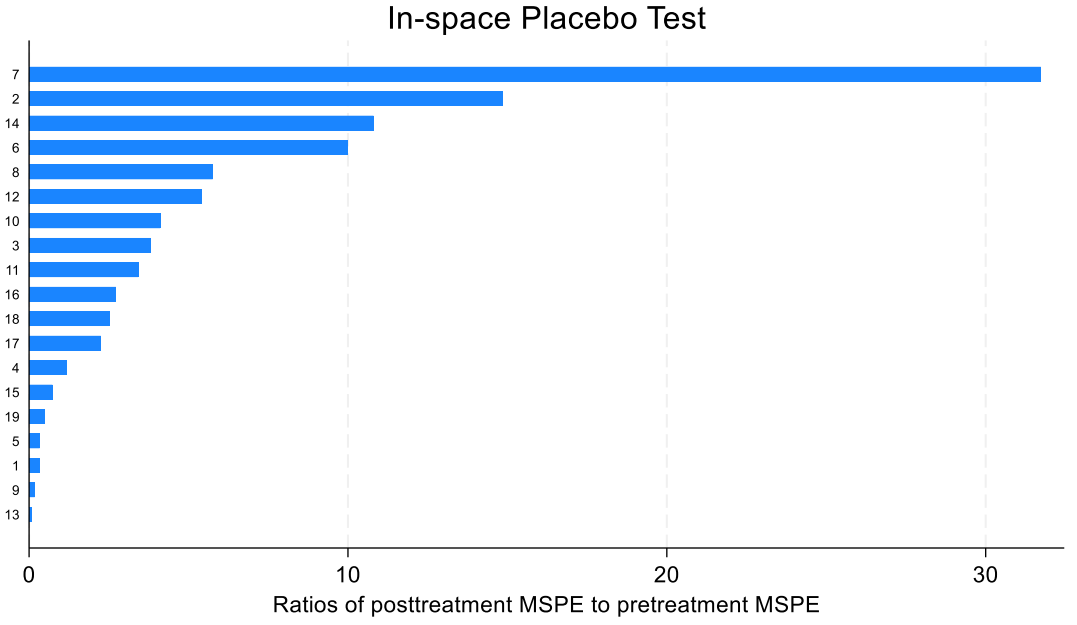
Exercise 4: primary expenditure (local governments)

	Treated	Synthetic	Average Control
Net Local Debt	−65.410	−48.459	−37.409
Nominal GDP	948,600	411,100	357,200
Population>65	16.745	16.870	15.387
Unemployment rate	12.818	9.283	7.979
Bailout	0	0.039	0.025
Eurozone	1	0.642	0.530
Interests/GDP	2.045	1.829	2.252
Current Exp (2003)	1113.318	1114.843	2742.726
Current Exp (2005)	1246.966	1257.809	2799.674
Current Exp (2007)	1534.521	1504.462	3061.649
Current Exp (2009)	1550.054	1578.920	3459.208

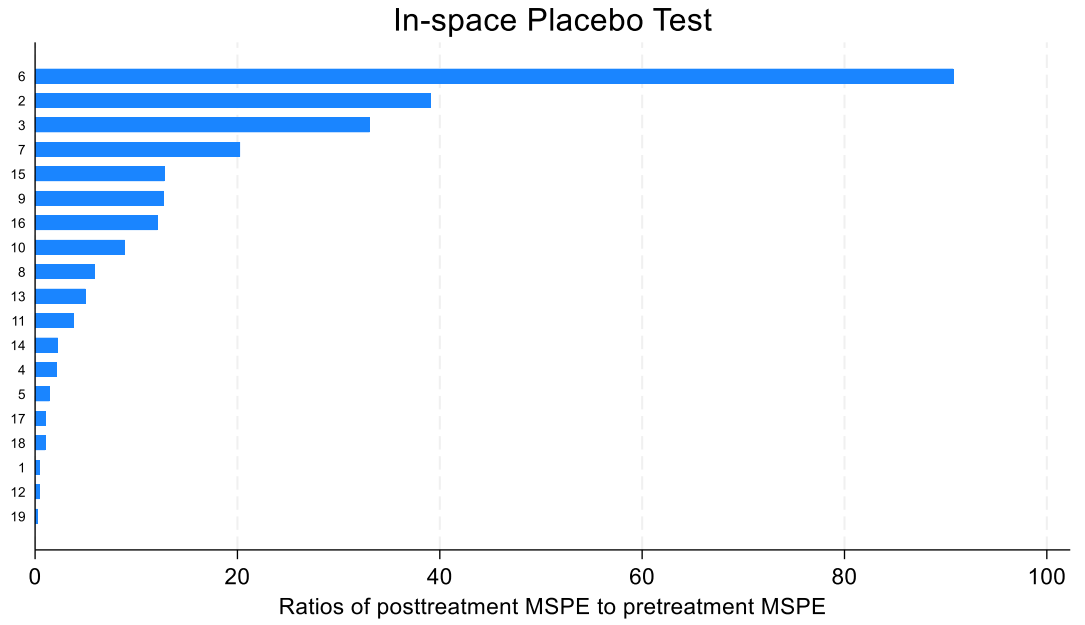
AIII.4. Spatial placebo tests



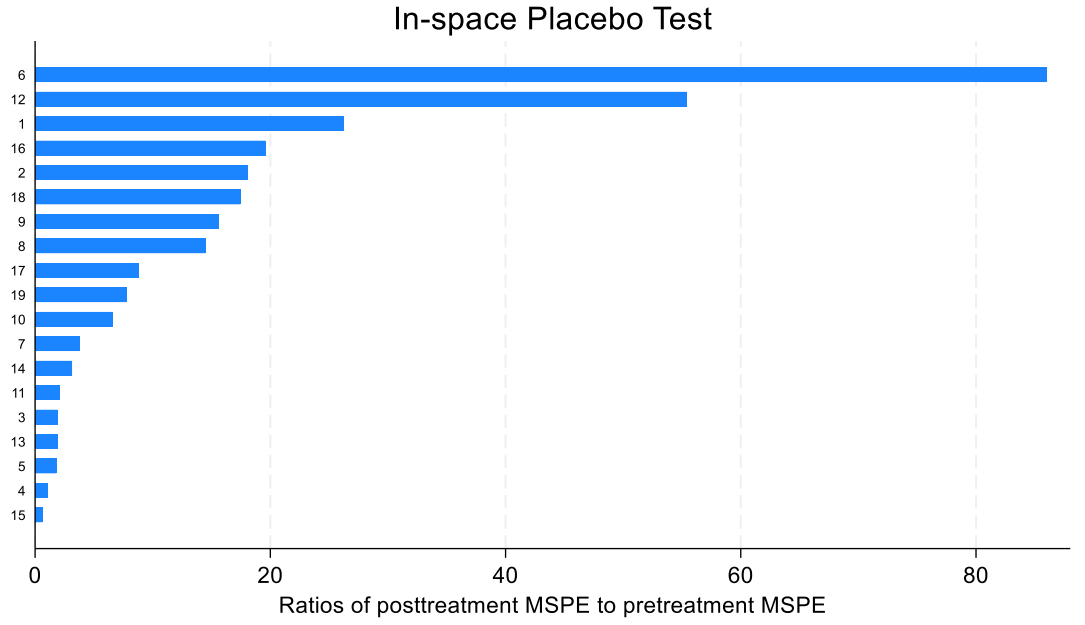
Exercise 1: current expenditure (General Government).
Unit names: 1. Germany, 2. Cyprus, 3. Croatia, 4. Denmark, 5. Slovakia, 6. Spain, 7. Slovenia, 8. Estonia, 9. Finland, 10. France, 11. Greece, 12. Hungary, 13. Ireland, 14. Luxembourg, 15. Malta, 16. Netherlands, 17. Portugal, 18. Czech Republic, 19. Sweden.



Exercise 2: current expenditure (Local Governments).
Unit names: 1. Germany, 2. Cyprus, 3. Croatia, 4. Denmark, 5. Slovakia, 6. Spain, 7. Slovenia, 8. Estonia, 9. Finland, 10. France, 11. Greece, 12. Hungary, 13. Ireland, 14. Luxembourg, 15. Malta, 16. Netherlands, 17. Portugal, 18. Czech Republic, 19. Sweden.

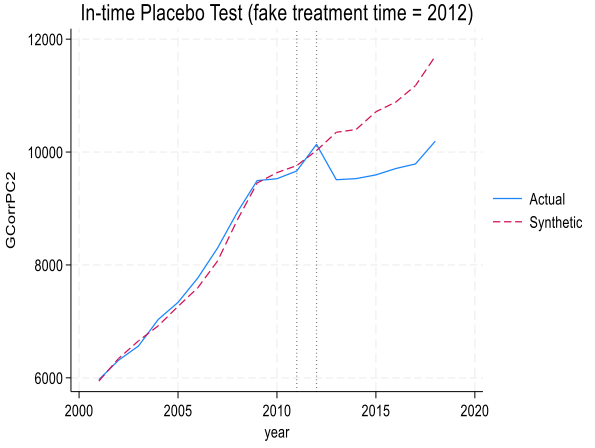


Exercise 3: primary expenditure (General Government).
Unit names: 1. Germany, 2. Cyprus, 3. Croatia, 4. Denmark, 5. Slovakia, 6. Spain, 7. Slovenia, 8. Estonia, 9. Finland, 10. France, 11. Greece, 12. Hungary, 13. Ireland, 14. Luxembourg, 15. Malta, 16. Netherlands, 17. Portugal, 18. Czech Republic, 19. Sweden.

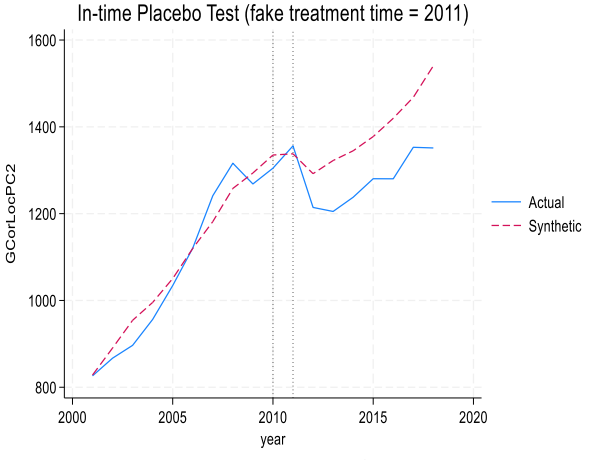


Exercise 4: primary expenditure (Local Governments).
Unit names: 1. Germany, 2. Cyprus, 3. Croatia, 4. Denmark, 5. Slovakia, 6. Spain, 7. Slovenia, 8. Estonia, 9. Finland, 10. France, 11. Greece, 12. Hungary, 13. Ireland, 14. Luxembourg, 15. Malta, 16. Netherlands, 17. Portugal, 18. Czech Republic, 19. Sweden.

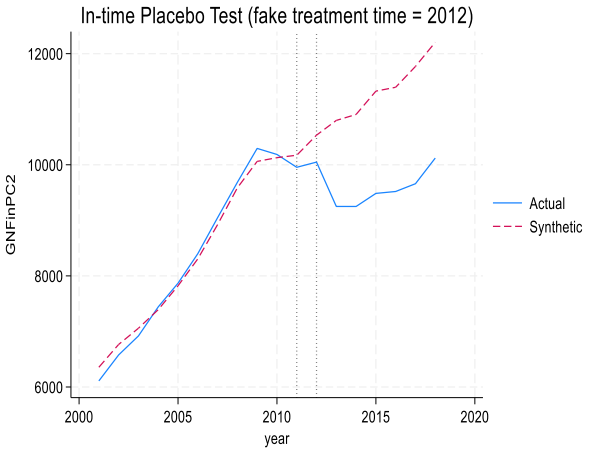
AIII.5. Temporal placebo tests



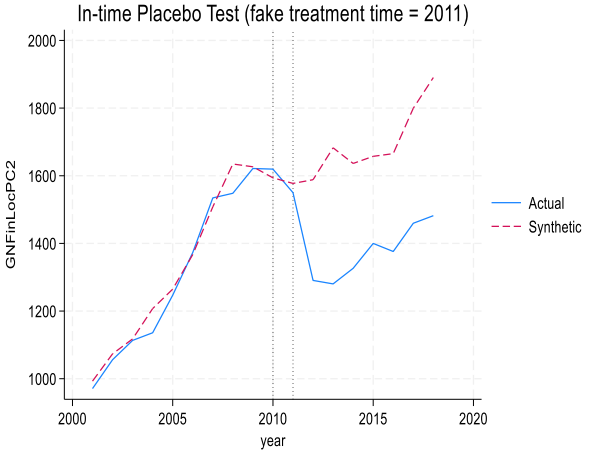
Exercise 1: Current expenditure (GG).



Exercise 2: Current expenditure (LG).



Exercise 3: Primary expenditure (GG).

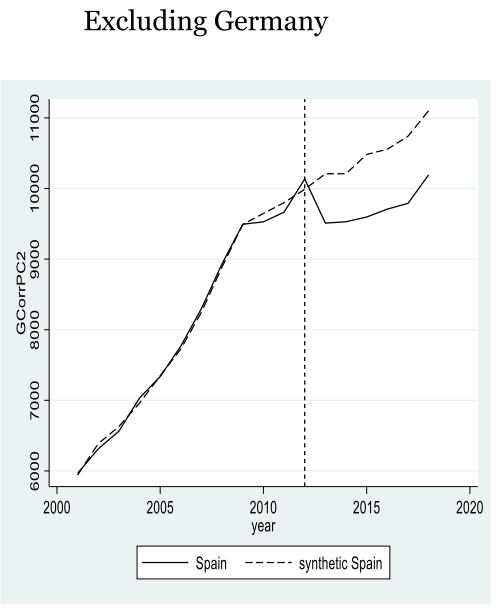


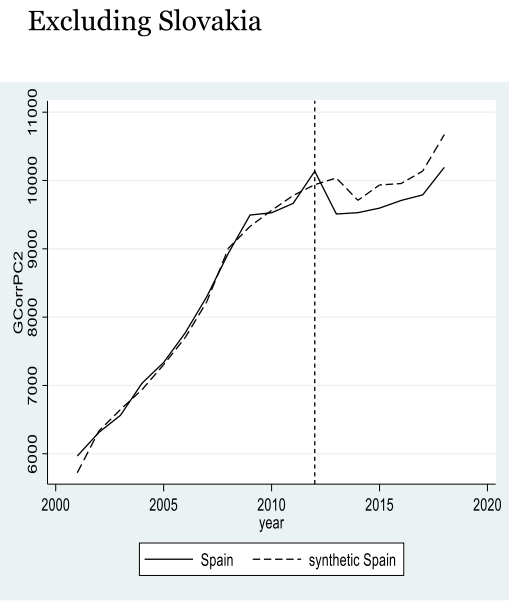
Exercise 4: Primary expenditure (LG).

APPENDIX IV

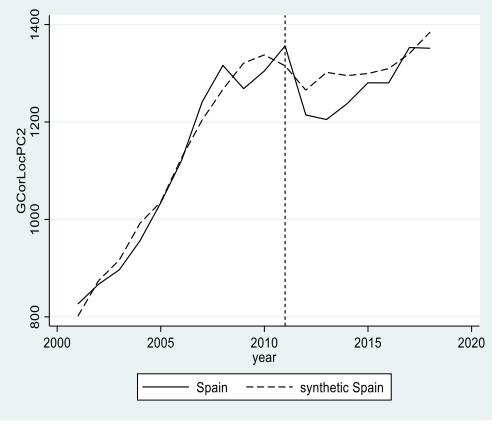
Robustness checks

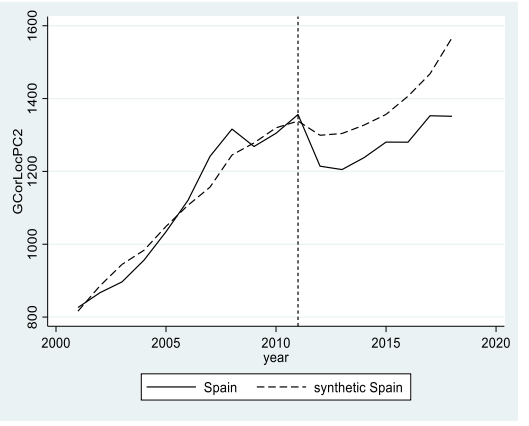
1. Excluding those countries with the highest weights in the artificial units



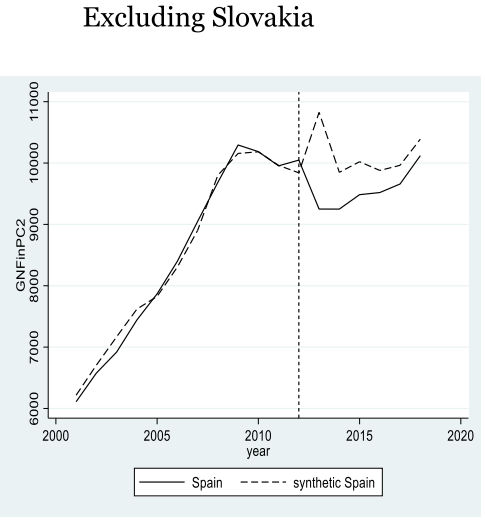


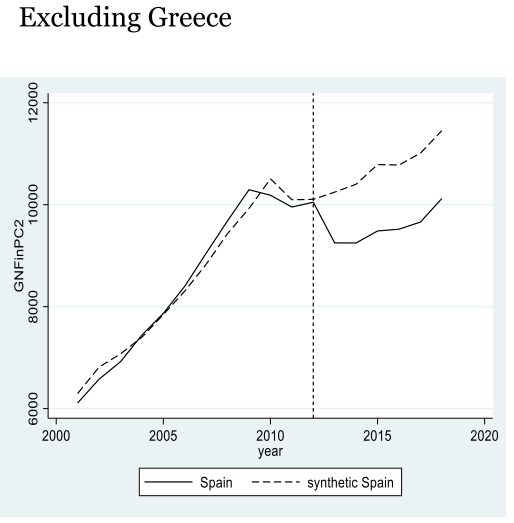
Exercise 1: Current expenditure (General Government).



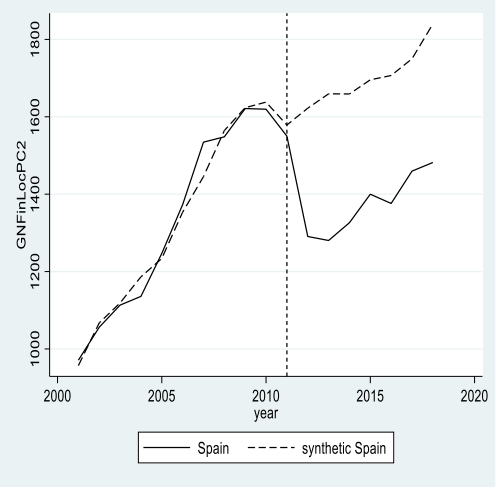


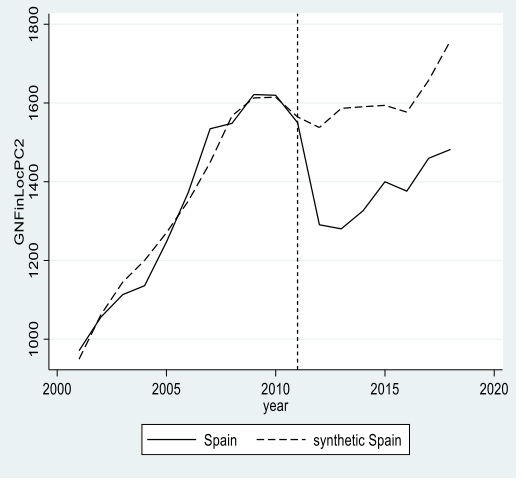
Exercise 2: Current expenditure (Local Governments).





Exercise 3: Primary expenditure (General Government).

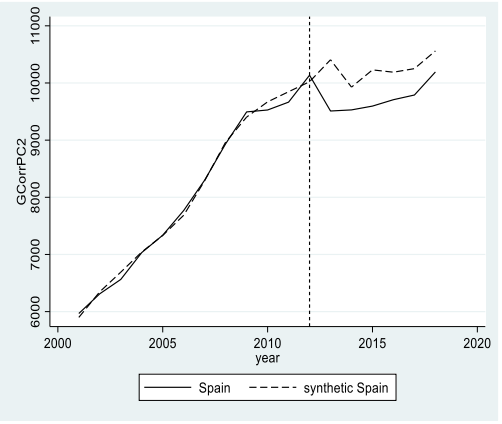




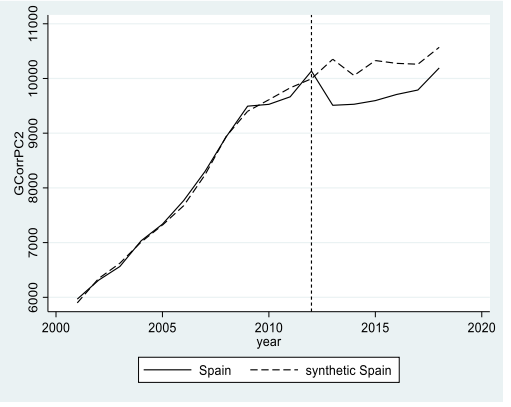
Exercise 4: Primary expenditure (Local Governments).

Æ-
xcluding predictors

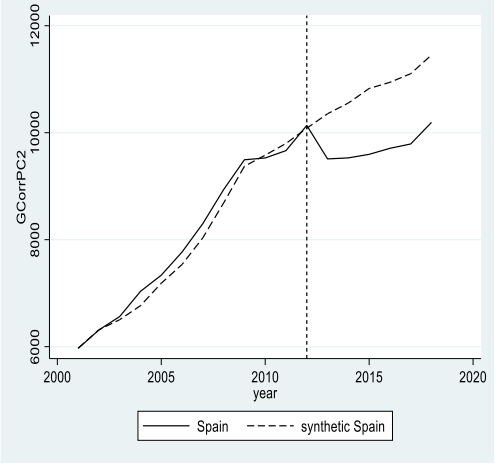
Excluding Deficit/GDP



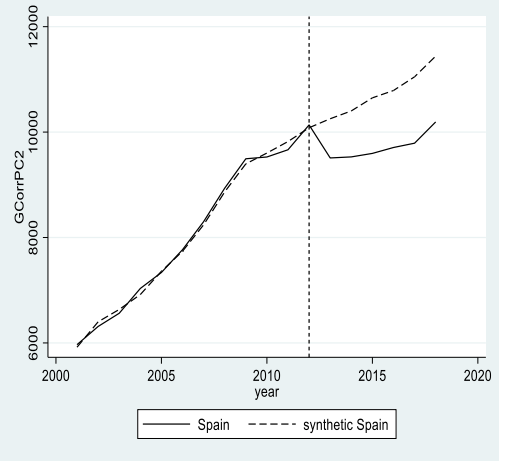
Excluding nominal GDP per capita



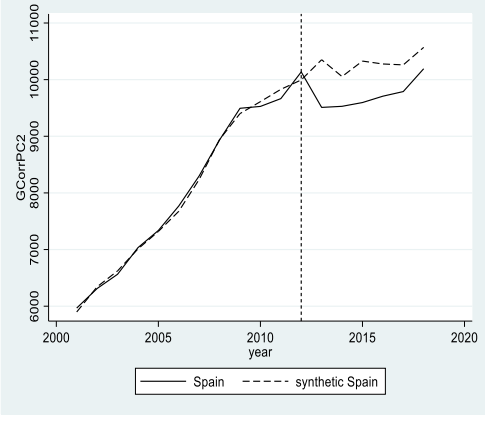
Excluding population over 65



Excluding the unemployment rate

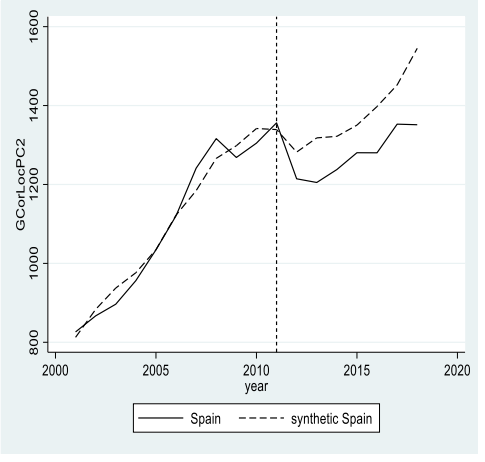


Excluding interests/GDP

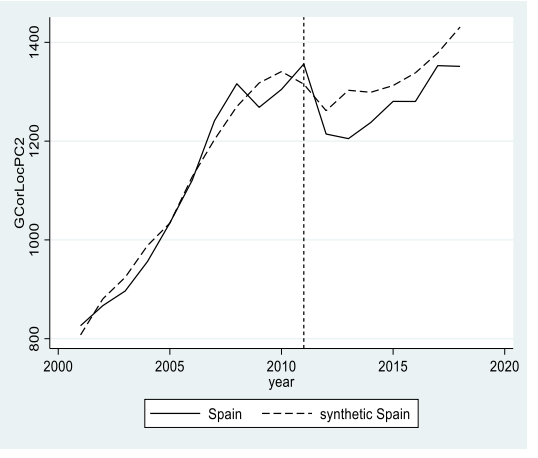


Exercise 1: Current expenditure (General Government).

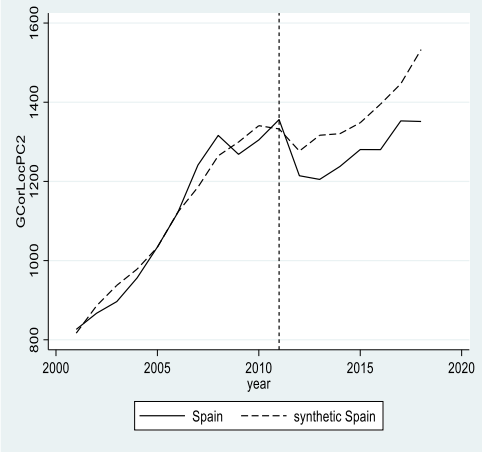
Excluding Local Deficit/GDP



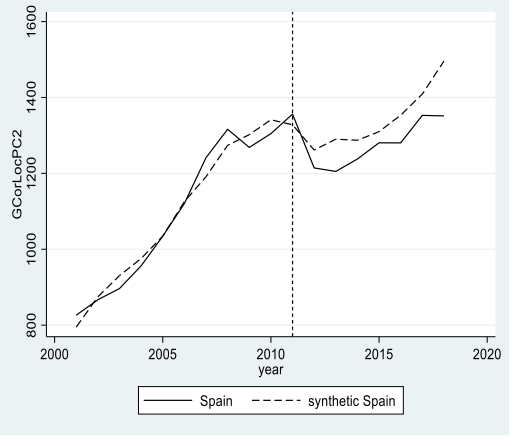
Excluding nominal GDP per capita



Excluding population over 65

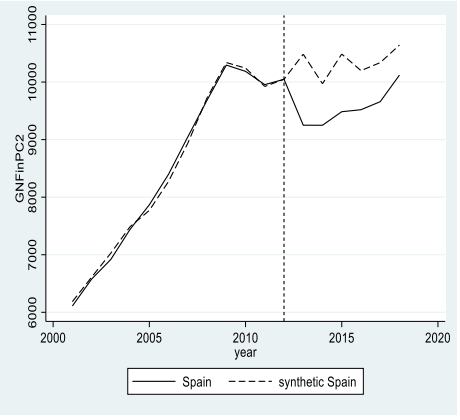


Excluding the unemployment rate

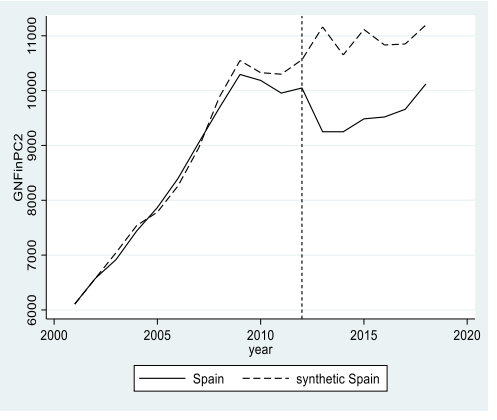


Exercise 2: Current expenditure (Local Governments).

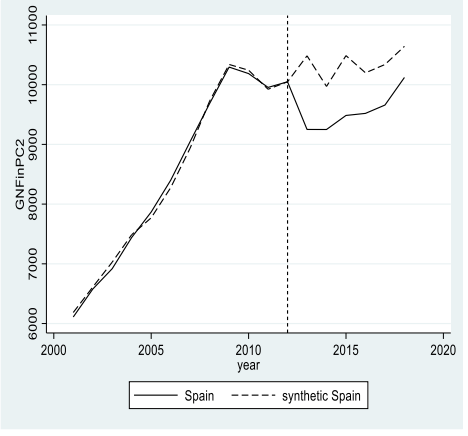
Excluding Deficit/GDP



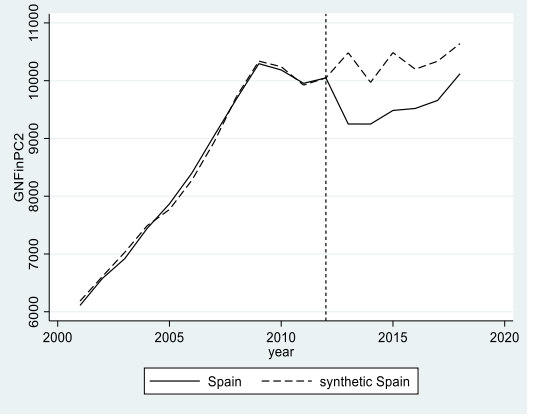
Excluding nominal GDP per capita



Excluding population over 65

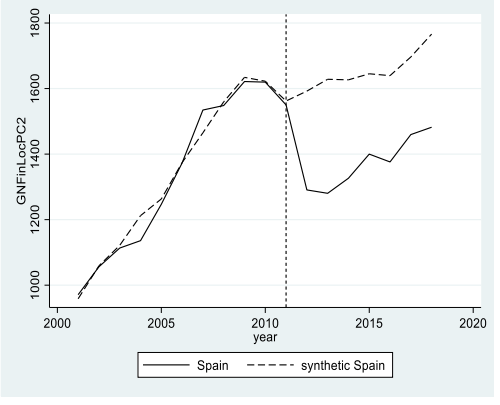


Excluding the unemployment rate

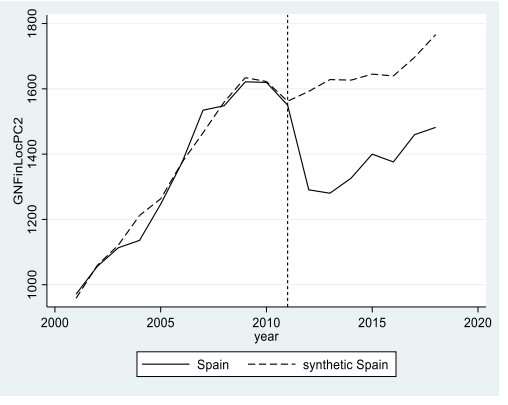


Exercise 3: Primary expenditure (General Government).

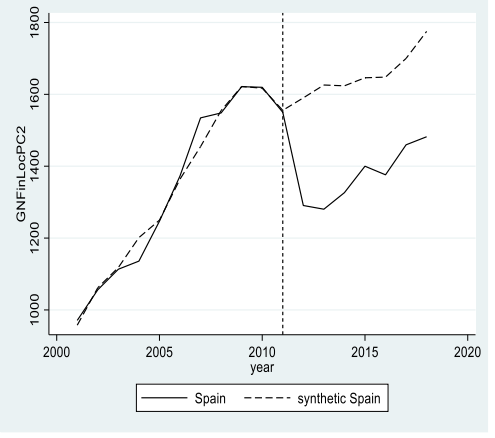
Excluding Local Debt per capita



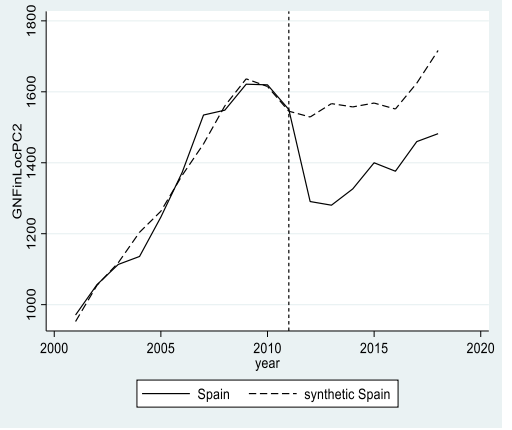
Excluding nominal GDP per capita



Excluding population over 65

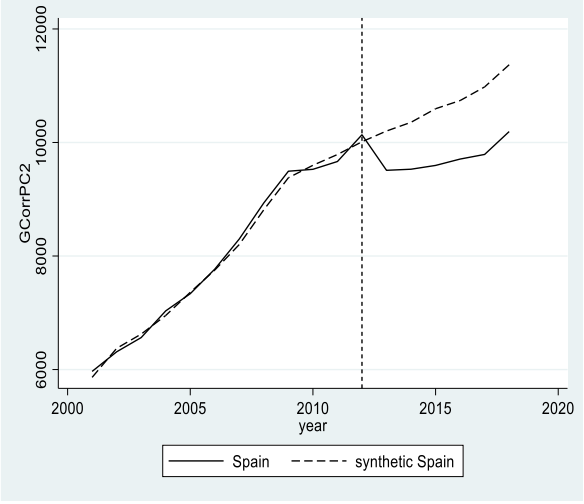


Excluding the unemployment rate

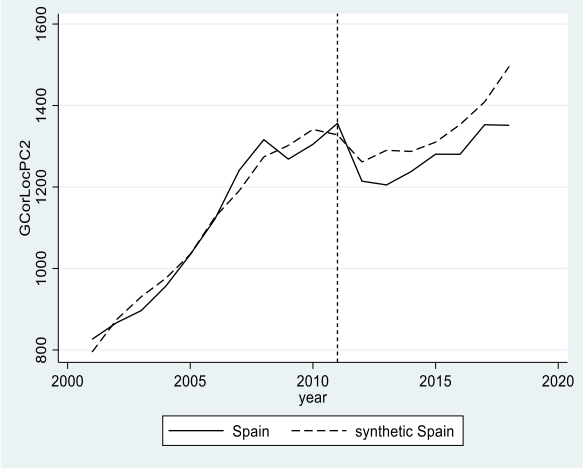


Exercise 4: Primary expenditure (Local Governments).

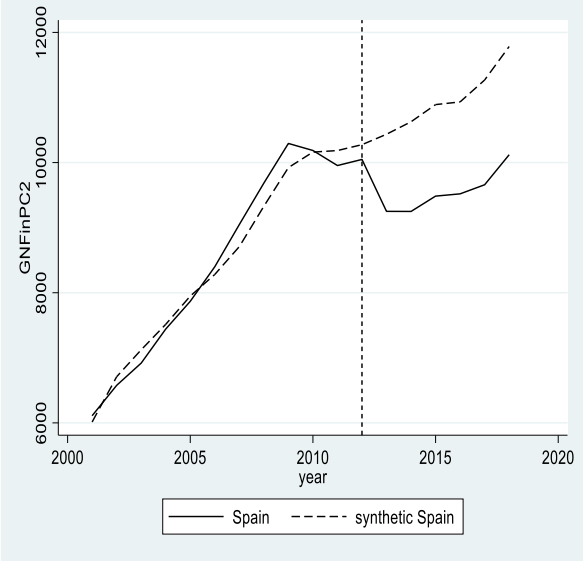
3. Excluding countries that experienced a large idiosyncratic shock (EU's bailout) during the Great Recession (Portugal, Ireland, Greece and Cyprus)



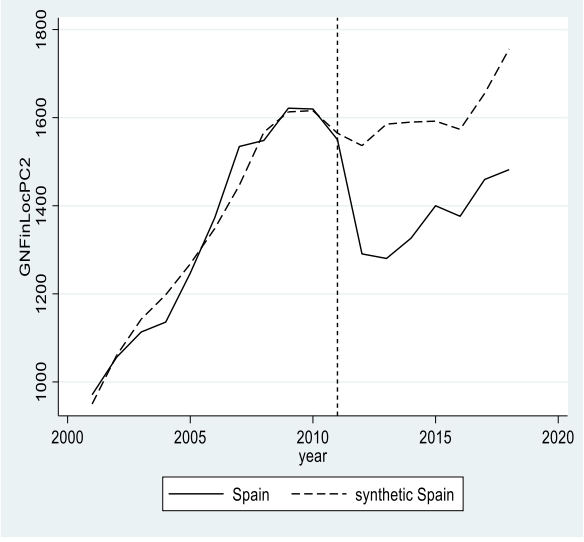
Exercise 1: Current expenditure (GG).



Exercise 2: Current expenditure (LG).



Exercise 3: Primary expenditure (GG).

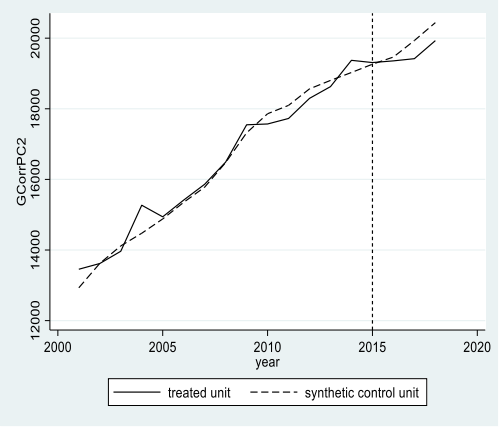


Exercise 4: Primary expenditure (LG).

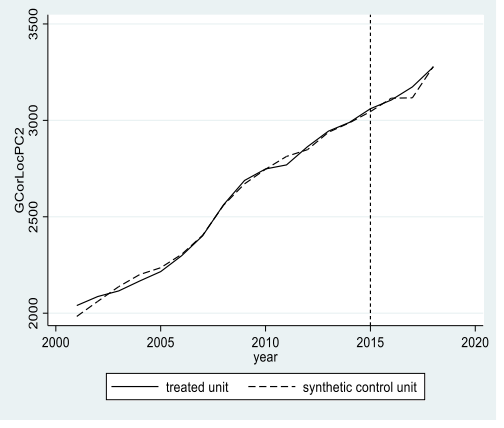
APPENDIX V

The effectiveness of expenditure rules in other European countries

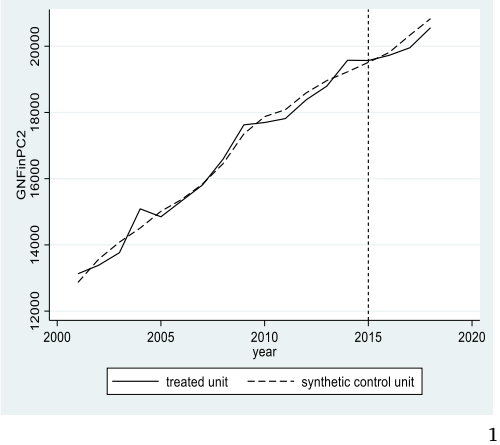
Current expenditure: GG



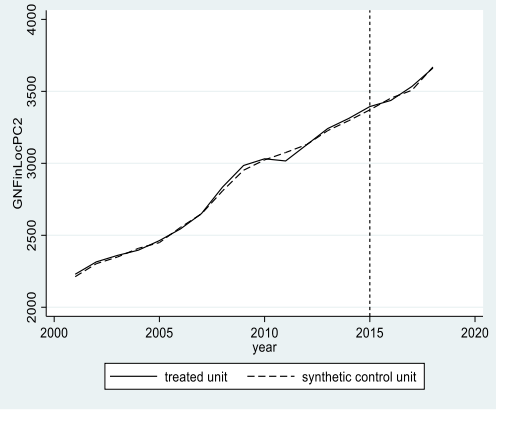
Current expenditure: LG



Primary expenditure: GG

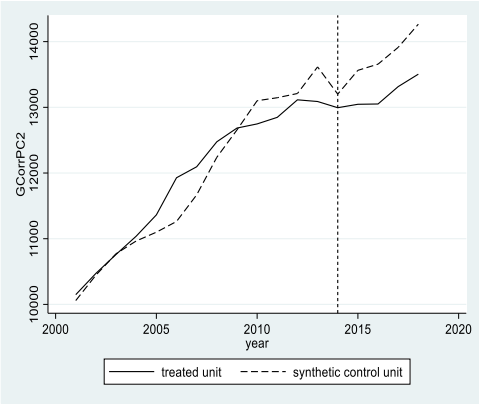


Primary expenditure: LG

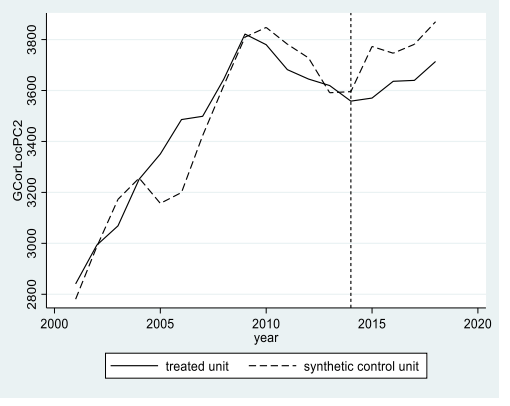


1. Austria

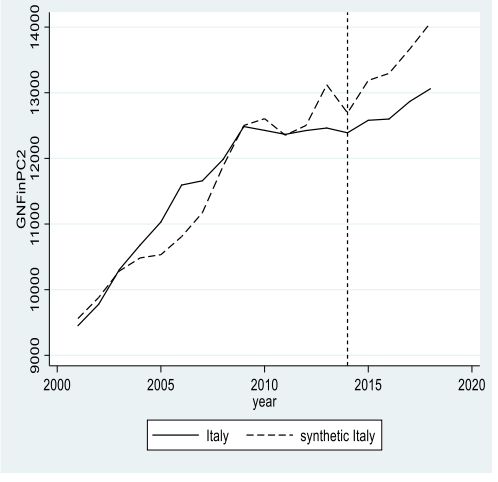
Current expenditure: GG



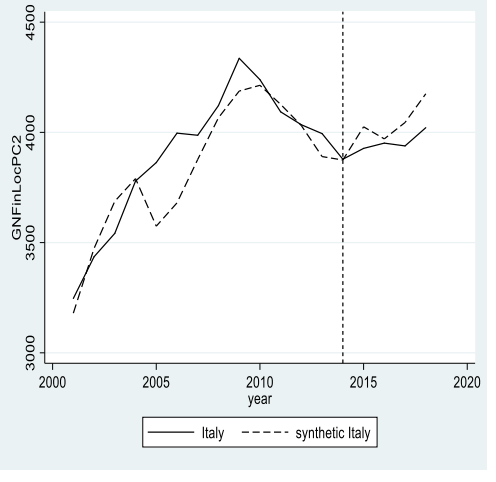
Current expenditure: LG



Primary expenditure: GG

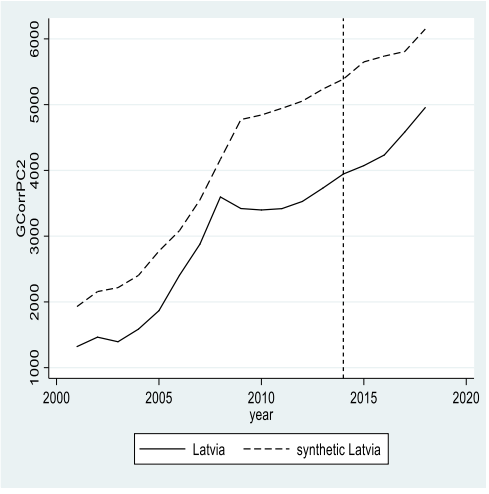


Primary expenditure: LG

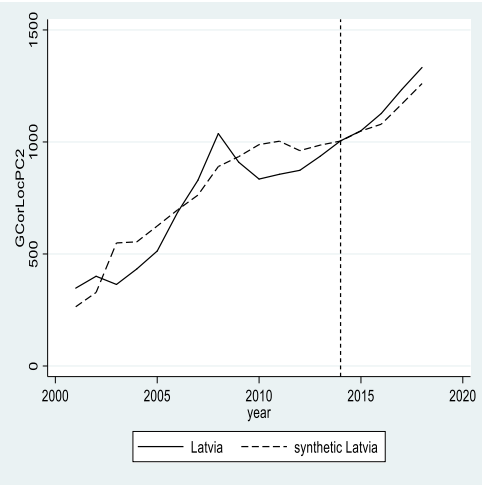


2. Italy

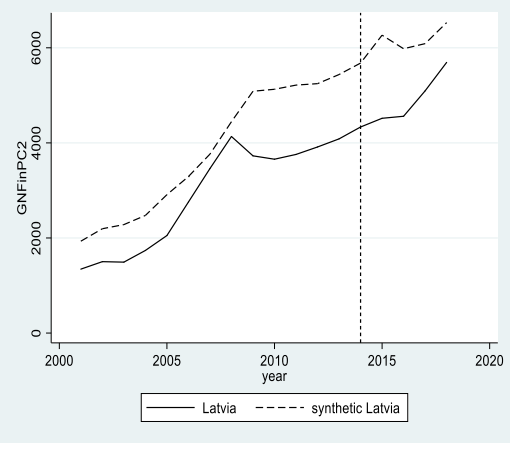
Current expenditure: GG



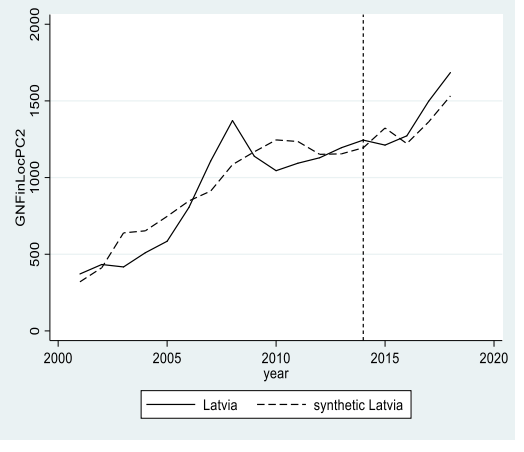
Current expenditure: LG



Primary expenditure: GG

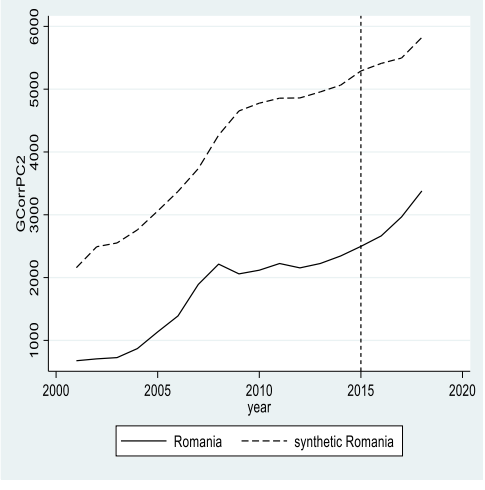


Primary expenditure: LG

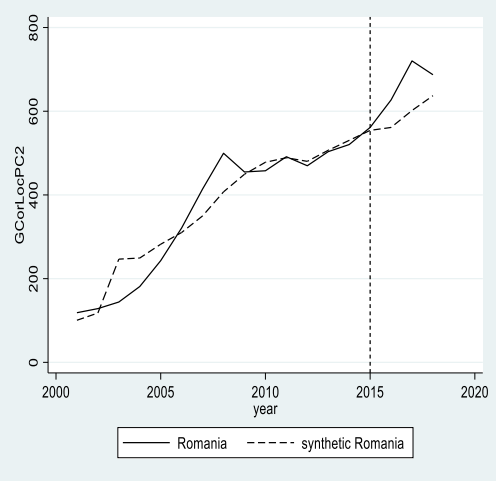


3. Latvia

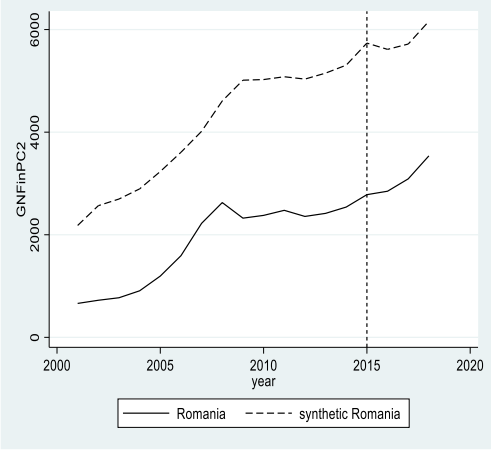
Current expenditure: GG



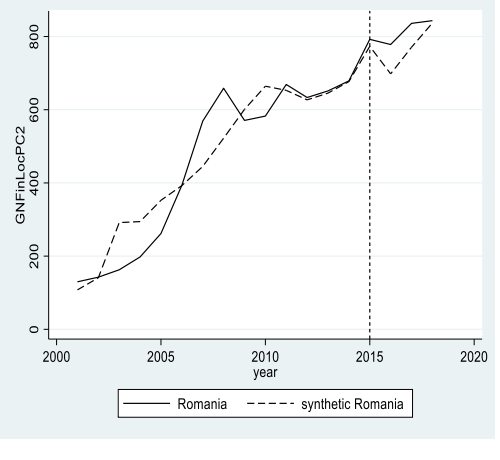
Current expenditure: LG



Primary expenditure: GG

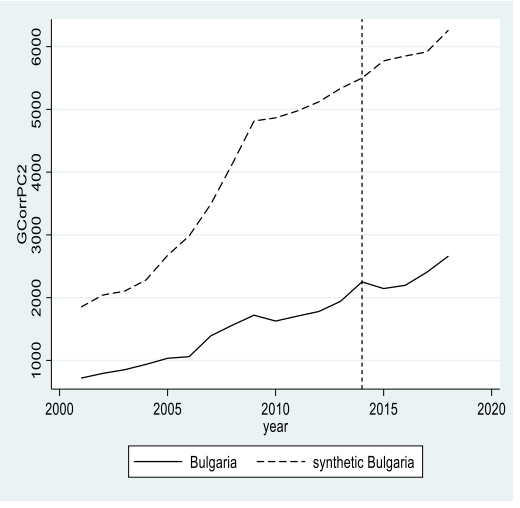


Primary expenditure: LG

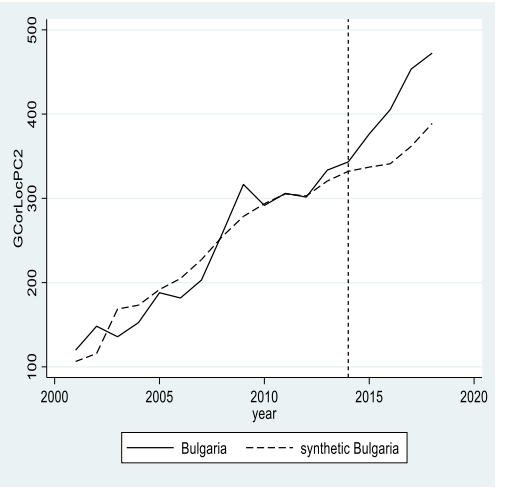


4. Romania

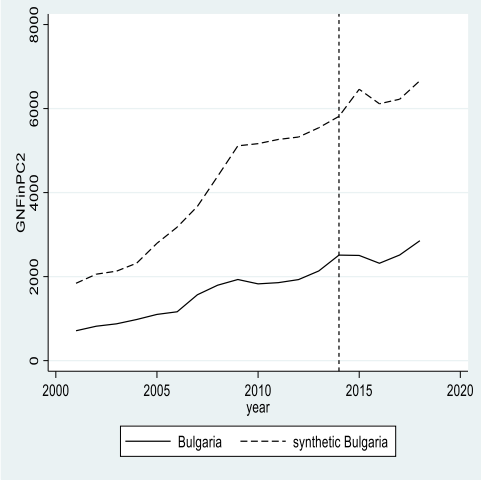
Current expenditure: GG



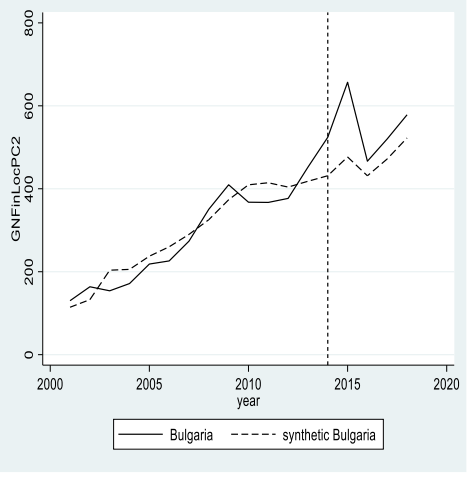
Current expenditure: LG



Primary expenditure: GG



Primary expenditure: LG



5. Bulgaria

References

Aaskoven, L., Rasmus, W., 2022. How fiscal rules matter for successful fiscal consolidations: new evidence. CESifo Econ. Stud. 68 (4), 414–433.
Abadie, A., 2021. Using synthetic controls: feasibility, data requirements, and methodological aspects. J. Econ. Lit. 59 (2), 391–425.
Abadie, A., Gardeazabal, J., 2003. The economic costs of conflict: a case study of the Basque country. Am. Econ. Rev. 93 (1), 113–132.
Abadie, A., Diamond, A., Hainmueller, J., 2010. Synthetic control methods for comparative case Studies: estimating the effect of California's tobacco control program. J. Am. Stat. Assoc. 105 (490), 493–505.
AIReF, 2018. Some Elements for a Revamped Fiscal Framework for Spain. Autoridad Independiente de Responsabilidad Fiscal, Working Papers, n.2018/3.
Alesina, A., Passalacqua, A., 2016. The political economy of government debt. In: Taylor, J., Uhlig, H. (Eds.), Handbook of Macroeconomics, vol. 2. Elsevier, pp. 2599–2651.
Alesina, A., Tabellini, G., 1990. A positive theory of fiscal deficits and government debt. Rev. Econ. Stud. 7 (3), 403–414.
Alesina, A., Bayoumi, T., 1996. The Costs and Benefits of Fiscal Rules: Evid U.S. States. National Bureau of Economic Research (NBER) Work.
Ardanaz, M., Barreix, A., Corrales, L., 2019. Las Reglas Fiscales en América Latina. In: Barreix, A., Corrales, L. (Eds.), Reglas Fiscales Resilientes en América Latina. Banco Interamericano de Desarrollo, pp. 1–40.
Asatryan, Z., Castellón, C., Stratmann, T., 2018. Balanced budget rules and fiscal outcomes: evidence from historical constitutions. J. Publ. Econ. 167, 105–119.
Ayala, L., Martín-Román, J., Navarro-Ruiz, C., 2023. Unemployment shocks and material deprivation in the European union: a synthetic control approach. Econ. Syst. 47 (1), 101053.

Ayuso-i-Casals, J., 2012. National Expenditure Rules: Why, How and When? European Commission, Economic Papers, N. 473.
Ayuso-i-Casals, J., González Hernández, D., Moulin, L., Turrini, A., 2009. Beyond the SGP: features and effects of EU national-level fiscal rules. In: Ayuso-i-Casals, Deroose, Flores, Moulin (Eds.), Policy Instruments for Sound Fiscal Policies. Fiscal Rules and Institutions. Palgrave MacMillan, Basingstoke, pp. 204–240.
Bedogni, J., Meaney, K., 2017. EU Fiscal Rules and International Expenditure Rules. Irish Government Economic & Evaluation Service. Staff Papers, February.
Belu, C., Bova, E., 2020. National Expenditure Rules in the EU: An Analysis of Effectiveness and Compliance. European Commission. Discussion Papers, n. 124.
Benito, B., Bastida, F., Vicente, C., 2013. Creating room for manoeuvre: a strategy to generate political budget cycles under fiscal stress. Kyklos 66 (4), 467–496.
Bergman, U.M., Hutchison, M.M., Hougaard Jensen, S.E., 2016. Promoting sustainable public finances in the European union: the role of fiscal rules and government efficiency. Eur. J. Polit. Econ. 44, 1–19.
Blondal, J., 2005. The reform of public expenditure management systems in OECD countries. In: d'Italia, Banca (Ed.), Fiscal Policy: Public Expenditures, Acts of the 7th Public Finance Workshop Held in Perugia, 31 March – 2 April.
Bohn, H., Inman, R.P., 1996. Balanced-budget rules and public deficits: evidence from the US states. In: Carnegie-Rochester Conference Series on Public Policy (Vol. 45. North-Holland, pp. 13–76.
Bonfatti, A., Forni, L., 2019. Fiscal rules to tame the political budget cycle: evidence from Italian municipalities. Eur. J. Polit. Econ. 60, 101800 https://doi.org/10.1016/j.ejpoleco.2019.06.001.
Burret, H.T., Feld, L.P., 2018. "(Un-)intended effects of fiscal rules.". Eur. J. Polit. Econ. 52, 166–191.
Calmfors, L., Wren-Lewis, S., 2011. "What should fiscal councils do?". Econ. Pol. 26 (68), 649–695.
Carnazza, G., Liberati, P., P, Sacchi, A., 2023. Does politics matter? A comparative assessment of discretionary fiscal policies in the euro area. Eur. J. Polit. Econ., 102435 https://doi.org/10.1016/j.ejpoleco.2023.102435.
Caselli, F., Reynaud, J., 2019. Do Fiscal Rules Cause Better Fiscal Balances? A New Instrumental Variable Strategy. IMF Working Papers, n.19/49.
Caselli, F., Davoodi, H., H, Goncalves, C., Hee Hong, G., Lagerborg, A., Medas, P., Nguyen, A., J, Yoo, J., 2022. The Return to Fiscal Rules. IMF Staff Discussion Notes, n.002.
Christl, M., Köppl-Turyna, M., Kucsera, D., 2020. Determinants of public-sector efficiency: decentralization and fiscal rules. Kyklos 73 (2), 253–290.
Chrysanthakopoulos, C., Tagkalakis, A., 2023. The effects of fiscal institutions on fiscal adjustment. J. Int. Money Finance 134, 102853. https://doi.org/10.1016/j.jimonfin.2023.102853.
Clemens, J.P., Miran, S.I., 2012. Fiscal policy multipliers on sub-national government spending. Am. Econ. J. Econ. Pol. 4, 46–68.
Cordes, T., Kinda, T., Muthoora, P., Weber, A., 2015. Expenditure Rules: Effective Tolls for Sound Fiscal Policy? IMF Working Papers, n. 15/29.
Dahan, M., Strawczynski, M., 2013. Fiscal rules and the composition of government expenditures in OECD countries. J. Pol. Anal. Manag. 32 (3), 484–504.
Darvas, Z., Martin, P., Ragot, X., 2018. The Economic Case for an Expenditure Rule in Europe. CEPR Policy Papers.
Debrun, X., Kumar, M.S., 2007. Fiscal rules, fiscal councils and all that: commitment devices, signaling tools or smokescreens? In: d'Italia, Banca (Ed.), Fiscal Policy: Current Issues and Challenges, Papers Presented at the Banca d'Italia Workshop Held in Perugia, 29–31 March 2007, pp. 479–512.
Debrun, X., Hauner, D., Kumar, M., 2009. Independent fiscal agencies. J. Econ. Surv. 23, 44–81.
Debrun, X., Kinda, T., Curristine, T., Eyraud, L., Harris, J., Seiwald, J., 2013. The Functions and Impact of Fiscal Councils. IMF Policy Papers.
Debrun, X., Moulin, L., Turrini, A., Ayuso-i-Casals, J., Kumar, M.S., 2008. Tied to the mast? National fiscal rules in the European Union. Econ. Pol. 23 (54), 298–362.
Deroose, S., Moulin, L., Wierts, P., 2006. National expenditure rules and expenditure outcomes: evidence for EU member states. Wirtsch. Blatter 1 (2006), 27–41.
Dorn, F., Gaebler, S., Roesel, F., 2021. Ineffective fiscal rules? The effect of public sector accounting standards on budgets, efficiency, and accountability. Publ. Choice 186 (3), 387–412.
Eichengreen, B., Bayoumi, T., 1994. The political economy of fiscal restrictions: implications for Europe from the United States. Eur. Econ. Rev. 38 (3–4), 783–791.
Eliason, P., Lutz, B., 2018. Can fiscal rules constrain the size of government? An analysis of the "crown jewel" of tax and expenditure limitations. J. Publ. Econ. 166, 115–144.
European Commission, 2019. Report on Public Finances in EMU, 2018. European Commission, Institutional Papers, n. 095.
Eyraud, L., Debrun, X., Hodge, A., Lledó, V., Pattillo, C., 2018a. Second-Generation Fiscal Ru les: Balancing Simplicity, Flexibility, and Enforceability. IMF Staff Discussion Notes, n 18/04.
Eyraud, L., Lledó, V., Dudine, P., Peralta Alva, A., 2018b. How to Select Fiscal Rules. A Primer. International Monetary Fund, How to Notes, 2018/01.
Fall, F., Bloch, D., Fournier, J.M., Hoeller, P., 2015. Prudent Debt Targets and Fiscal Frameworks. OECD Economic Policy Papers, n. 15.
Fatás, A., Mihov, I., 2003. The case for restricting fiscal policy discretion. Q. J. Econ. 118 (4), 1419–1447.
Fatás, A., Mihov, I., 2006. The macroeconomic effects of fiscal rules in the US states. J. Publ. Econ. 90 (1–2), 101–117.
Foremny, D., 2014. Subnational deficits in European countries: the impact of fiscal rules and tax autonomy. Eur. J. Polit. Econ. 34, 86–110.
Gamalerio, M., 2020. Do national political parties matter? Evidence from Italian municipalities. Eur. J. Polit. Econ. 63, 101862 https://doi.org/10.1016/j.ejpoleco.2020.101862.
Giuriato, L., Cepparulo, A., Barberi, M., 2016. Fiscal forecasts and political systems: a legislative budgeting perspective. Publ. Choice 168, 1–22.
Gootjes, B., de Haan, J., Jong-A-Pin, R., 2021. Do fiscal rules constrain political budget cycles? Publ. Choice 188, 1–30.
Gootjes, B., de Haan, J., 2022a. Procyclicality of fiscal policy in European Union countries. J. Int. Money Finance 102276. https://doi.org/10.1016/j.jimonfin.2020.102276.
Gootjes, B., de Haan, J., 2022b. Do fiscal rules need budget transparency to be effective? Eur. J. Polit. Econ. 75, 102210 https://doi.org/10.1016/j.ejpoleco.2022.102210.
Grembi, V., Nannicini, T., Troiano, U., 2016. Do fiscal rules matter? Am. Econ. J. Appl. Econ. 8 (3), 1–30.
Guerguil, M., Mandon, P., Tapsoba, R., 2016. Flexible fiscal rules and countercyclical fiscal policy. IMF Working Papers.
Gupta, S., Yläoutinen, S., 2014. Budget Institutions in Low-Income Countries: Lessons from G-20. IMF Working Paper, No. 14/164.
Gupta, S., Liu, E., Mulas-Granados, C., 2016. Now or later? The political economy of public investment in democracies. Eur. J. Polit. Econ. 101, 101–114.
Hansen, D., 2020. The effectiveness of fiscal institutions: international financial flogging or domestic constraint? Eur. J. Polit. Econ. 63, 101879 https://doi.org/10.1016/j.ejpoleco.2020.101879.
Hauptmeier, S., Kamps, C., 2022. Debt policies in the aftermath of COVID-19. The SGP's debt benchmark revisited. Eur. J. Polit. Econ. 75, 102187 https://doi.org/10.1016/j.ejpoleco.2022.102187.
Heinemann, F., Moessinger, M., Yeter, M., 2018. Do fiscal rules constrain fiscal policy? A meta-regression analysis. Eur. J. Polit. Econ. 51, 69–92.
Holm-Hadulla, F., Hauptmeier, S., Rother, P., 2012. The impact of expenditure rules on budgetary discipline over the cycle. Appl. Econ. 44, 3287–3296.
Kopits, M.G., Symansky, M.S.A., 1998. Fiscal Policy Rules. International Monetary Fund.
Kraemer, R., Lehtimäki, J., 2023. Government debt, European Institutions and fiscal rules: a synthetic control approach. Int. Tax Pub. Finan. https://doi.org/10.1007/s10797-023-09791-z.
Krogstrup, S., Wälti, S., 2008. Do fiscal rules cause budgetary outcomes? Publ. Choice 136, 123–138.
Kumar, M., Baldacci, E., Schaechter, A., Caceres, C., Kim, D., Debrun, X., Escolano, J., Jonas, J., Karam, P., Yakadina, I., Zymek, R., 2009. Fiscal Rules-Anchoring Expectations for Sustainable Public Finances. International Monetary Fund.
Kydland, F., Prescott, E., 1977. Rules rather than discretion: the inconsistency of optimal plans. J. Polit. Econ. 85 (3), 473–491.
Larch, M., Orseau, E., Van Der Wielen, W., 2021. Do EU fiscal rules support or hinder counter-cyclical fiscal policy? J. Int. Money Finance 112, 102328. https://doi.org/10.1016/j.jimonfin.2020.102328.
Lim, J.J., 2020. The political economy of fiscal procyclicality. Eur. J. Polit. Econ. 65, 101930.
Maltritz, D., Wüste, S., 2015. Determinants of budget deficits in Europe: the role and relations of fiscal rules, fiscal councils, creative accounting and the Euro. Econ. Modell. 48, 222–236. https://doi.org/10.1016/j.econmod.2014.12.001.
Manasse, P., 2006. Pro-cyclical Fiscal Policy: Shocks, Rules, and Institutions: A View from MARS. IMF Working Paper, n. 06/27.

Manescu, C., Bova, E., 2020. National expenditure rules in the EU. An analysis of effectiveness and compliance. In: European Economy Discussion Papers 124. Directorate General Economic and Financial Affairs (DG ECFIN), European Commission.
Marneffe, B., Van Aarle, B., Van Der Wielen, W., Vereeck, L., 2011. The impact of fiscal rules on public finances in the euro area. CESifo DICE Rep. 9 (3), 18–26.
Nerlich, C., Reuter, W.H., 2013. The Design of National Fiscal Frameworks and Their Budgetary Impact. European Central Bank Working Paper Series, n 1588.
Persson, T., Svensson, L.E., 1989. Why a stubborn conservative would run a deficit: policy with time-inconsistent preferences. Q. J. Econ. 104, 325–345.
Pfeil, C., Feld, L., 2016. Does the Swiss Debt Break Induce Sound Federal Finances? A Synthetic Control Analysis. CESifo Working Paper Series, n.6044.
Reuter, W., 2015. National numerical fiscal rules: not complied with, but Still Effective? Eur. J. Polit. Econ. 39, 67–81.
Sacchi, A., Salotti, S., 2015. The impact of national fiscal rules on the stabilisation function of fiscal policy. Eur. J. Polit. Econ. 37, 1–20.
Salvi, M., Schaltegger, C., Schmid, L., 2020. Fiscal rules cause lower debt: evidence from Switzerland's federal debt containment rule. Kyklos 73 (4), 605–642.
Schaechter, M.A., Kinda, M.T., Budina, M.N., Weber, A., 2012. Fiscal Rules In Response To the Crisis: Toward The "Next-Generation" Rules: A New Dataset. International Monetary Fund.
Strong, C., 2023. The impact of fiscal rules on government debt: evidence from the CFA zone. Empiric. Econom. https://doi.org/10.1007/s00181-023-02430-w.
Sutherland, D., Price, R., Joumard, I., 2005. Fiscal Rules for Sub-central Governments: Design and Impact. OECD. Economic Department Working Paper, n. 465.
Tornell, A., Lane, P., 1999. The voracity effect. Am. Econ. Rev. 89, 22–46.
Turrini, A., 2008. Fiscal Policy and the Cycle in the Euro Area: the Role of Government Revenue and Expenditure. European Commission. European Economy, Economic Papers, n. 323.
Venturini, F., 2020. The unintended composition effect of the subnational government fiscal rules: the case of Italian municipalities. Eur. J. Polit. Econ. 63, 101874 https://doi.org/10.1016/j.ejpoleco.2020.101874.
Von Hagen, J., 2002. Fiscal rules, fiscal institutions, and fiscal performance. Econ. Soc. Rev. 33 (3), 263–284.
Von Hagen, J., Harden, I., 1994. National budget processes and fiscal performance. European Economy. Reports and Studies 3, 315–418.
Wierts, P., 2007. Can expenditure rules counter expenditure pressures from revenue windfalls?. In: Public Finance Workshop in Challenges for Government Spending in the EU. European Central Bank, Frankfurt. December 7th, 2007.
Wierts, P., 2008. How do expenditure rules affect fiscal behaviour? DNB Working Papers 166.
Wyplosz, C., 2013. Fiscal rules, theoretical issues and historical experiences. In: Alesina, A., Giavazzi, F. (Eds.), *Fiscal Policy After the Financial Crisis*, NBER. The University of Chicago Press, Chicago.