PUBLIC-PRIVATE PARTNERSHIPS AND FISCAL RULES
DO THE ADOPTION AND STRENGTH OF NUMERICAL FISCAL RULES IN EUROPE ENCOURAGE THE USE OF PUBLIC-PRIVATE PARTNERSHIPS?

A Thesis
submitted to the Faculty of the
Graduate School of Arts and Sciences
of Georgetown University
in partial fulfillment of the requirements for the
degree of
Master of Public Policy
in Public Policy

By

Mikel Tejada-Ibanez, B.A.

Washington, DC
April 19, 2013
Copyright 2013 by Mikel Tejada-Ibanez
All Rights Reserved
PUBLIC-PRIVATE PARTNERSHIPS AND FISCAL RULES
DO THE ADOPTION AND STRENGTH OF NUMERICAL FISCAL RULES IN EUROPE ENCOURAGE THE USE OF PUBLIC-PRIVATE PARTNERSHIPS?

Mikel Tejada-Ibanez, B.A.

Thesis Advisor: Matthew H. Fleming, Ph. D.

ABSTRACT

Increasing public deficit and debt constitute a major problem in public finance. Fiscal rules attempt to constrain the incentives of politicians and policymakers to elude fiscal responsibility. However, previous research suggests that politicians and policymakers may circumvent the intent of fiscal rules by formally complying with them while maintaining high levels of public spending absent new revenue—namely through the use of public private partnerships (PPP). This is the case because PPP allow for off-budget public investment. Using panel data for countries in the European Union, this paper finds that the existence and strength of fiscal rules are significantly and positively correlated with the use of PPP, when controlling for a set of other potential determinants of the use of PPP as well as unobserved country characteristics. This suggests that when countries adopt or strengthen their fiscal rules, they rely more on PPP than otherwise, implying that governments use PPP to avoid the constraints on public investment imposed by those same fiscal rules.
# Table of Contents

Introduction .................................................................................................................. 1  
Background .................................................................................................................... 2  
Literature Review .......................................................................................................... 6  
  - Circumventing fiscal rules ......................................................................................... 6  
  - PPP as way to circumvent fiscal rules ..................................................................... 9  
Conceptual Framework ................................................................................................. 13  
  - Dependent variable ................................................................................................. 15  
  - Independent variables: fiscal rules .......................................................................... 16  
  - Independent variables: other determinants of PPP ................................................ 17  
Analysis Plan .................................................................................................................. 19  
Results ........................................................................................................................... 22  
  - Data analysis and descriptive statistics .................................................................. 22  
  - Regression Results ................................................................................................. 24  
Discussion ......................................................................................................................... 29  
Conclusion ....................................................................................................................... 32  
Bibliography .................................................................................................................... 33
LIST OF ILLUSTRATIONS

Figure 1. Funding needs under PPP and fiscal rule index……………………………………….22
LIST OF TABLES

Table 1. Variables and data sources.................................................................18
Table 2. Model specifications...........................................................................21
Table 3. Numerical variable descriptive statistics.............................................23
Table 4. Chief executive party orientation.......................................................23
Table 5. Regression results..............................................................................25
INTRODUCTION

Increasing public deficit and debt have become a major problem in policy making. Fiscal rules have been introduced in order to constrain incentives of politicians and policymakers to elude fiscal responsibility. Nonetheless, some authors have suggested that precisely the introduction of fiscal rules have encouraged the use of some fiscal or “accounting devices” (Irwin, 2012) that allow formally complying with those rules while maintaining the level of public spending without new revenue. Public Private Partnerships (PPP) have been mentioned among those fiscal or accounting devices since they may allow off-budget public investment. Building on the literature regarding both the circumvention of fiscal rules and the determinants of PPP, this paper will attempt to empirically test whether the existence and strength of fiscal rules encourage the use of PPP.

This paper is structured as follows. A background section introduces both fiscal rules and PPP. The following section reviews the literature regarding the use of fiscal gimmickry to circumvent fiscal rules and those studies suggesting a link between fiscal rules and the use of PPP, focusing on the European Union. The fourth section of this paper develops the conceptual framework and presents the variables and data sources for the empirical model used to test the research question. The fifth section presents the results of the empirical model, followed by a discussion of their policy implications in the final section.
The presence of persistent public deficits and the consequential accumulation of public debt, particularly since the 1980s, have supported the idea that governments tend to rely excessively on borrowing to finance their spending (Corsetti & Roubini, 1996). This tendency, which the specialized literature denominates “deficit bias,” refers to the existence of several incentives in the policy making process that shape the behavior of policymakers. According to Debrun et al. (2008), incumbent governments have, for instance, “a tendency to overlook the long-term consequences of budgetary imbalances” as well as an incentive to constrain the activities of future governments by running deficits during their mandate. The pro-cyclical behavior of public spending reinforce these incentives due to stronger spending pressures when the economy is going well and revenues are higher.

Moreover, public spending suffers from the classical “common pool problem” due to the specificity of benefits arising from spending against the less concentrated cost of taxation. This “common pool problem” worsens in the presence of several fiscal jurisdictions (either sovereign states in economic/monetary unions or subnational entities) that do not fully assume responsibility for their fiscal behavior. For instance, the European Monetary Union (EMU) creates moral hazard incentives for member states to over-borrow on the belief that they will be bailed-out by the Union. Thus, the EMU may face (as is currently happening) negative externalities from the fiscal irresponsibility of single members as it is forced to bail out those countries, as well as potential Union-wide financial crises (Inman, 1996).
Persistent public deficits and the consequential accumulation of public debt may have perverse effects on the economy. In the short run, the main schools of economic thought discuss the role of public spending to smooth business cycles (Abel, Bernake & Croushore, 2011). In the long run, the accumulation of public debt creates several imbalances on the economy that affect its sustainability. In terms of efficiency, excessive public borrowing may “crowd out” private savings in which investment and ultimately productivity are based. In terms of equity, increasing public debt imposes a burden on future generations, harming intergenerational equity. It also harms equity among current generations since the repayment of the public debt and its associated interest implies a transfer of resources from taxpayers as a whole to the holders of public bonds, usually part of the wealthier fraction of the population (Gruber, 2011).

Constraining the discretion of policy makers by imposing rules and institutions limiting fiscal policy may prevent these negative consequences (Corsetti & Roubini, 1996). These “fiscal frameworks” can be defined as the “set of elements of the institutional policy making setting that shape the fiscal policy making at the national level” (European Commission, 2010). The broad concept of fiscal frameworks refers to the existence of independent fiscal institutions, budgetary rules, medium-term budgetary frameworks, and numerical fiscal rules (hereinafter simply referred to as fiscal rules). Fiscal rules are defined in Kopits and Symansky (2008) as a “permanent constraint on fiscal policy, expressed in terms of a summary indicator of fiscal performance.”

A sizeable body of literature discusses the effects of a variety of fiscal rules as well as the most appropriate design for them. A specific trade-off noted in the literature is the possibility that
instead of leading to fiscal adjustment, fiscal rules may actually encourage the use of nonstructural fiscal measures (one-off budgeting, off-budget operations, creative accounting) to circumvent those same rules, spoiling their intended goals and even reducing fiscal transparency (Milesi-Ferreti 2003, Debrun et al. 2008).

A PPP can be defined as “a contractual agreement between a public agency and a private-sector entity resulting in greater private-sector participation in the delivery and/or financing of infrastructure projects” and other public services traditionally provided by the public sector (Istrate & Puentes, 2011; IMF, 2004). Several alleged benefits arise from the use of PPP: improved management, better allocation of risks, and ultimately lower cost. However, a claim made in the literature is that the original and likely still prevalent reason to use PPP is precisely to avoid or circumvent the constraints on more traditional spending created by fiscal rules (among others, Mintz and Smart, 2006).

As noted, public finance literature has widely expressed concern about fiscal rules encouraging creative accounting and other fiscal nonstructural measures. However, there is little empirical assessment of the topic, mostly focused on the United States (Milessi-Ferreti 2003). In the last decade, some studies have empirically tested this topic for Europe using different approaches, whose results are discussed below. However, to the best of my knowledge, there has been no attempt to empirically link the use of PPP and the presence and strength of fiscal rules.

With this objective, this paper empirically examines the factors that determine the use of PPP. In this sense, the analysis of the determinants of the use of PPP is itself an unexplored field of study. There are some relatively new studies addressing this issue for the United States, the
United Kingdom and developing countries. As exposed later, this paper partially relies on their findings to construct my own empirical model. However, here again, the empirical assessment of the determinants of PPP for the European Union appears to be relatively unexplored in the literature. The model used in this paper will specifically introduce, within those determinants, an indicator of the presence and strength of fiscal rules in order to test the following research question: Does the presence of fiscal rules encourage the use of PPP?
Circumventing fiscal rules

As noted, following Milesi-Ferreti and Moriyama (2006), the literature suggests that fiscal rules may incentivize the use of “nonstructural” fiscal measures or creative accounting instead of actually constraining fiscal policy. However, there is little empirical research testing this hypothesis.

Most studies focus on the United States (see Fernandez-Llera (2004), his doctoral dissertation, for an overview). Pogue (1970) is one of the first authors suggesting the possibility of this behavior, but does not consider it likely. Bunch (1991) shows through an empirical model a positive non-significant effect of debt ceilings on the number of public entities (off-balance sheet public entities). Merrifield (1994), however, finds a negative effect of debt ceilings on off-balance sheet debt, but his results are not significant.

Extending the previous concerns to a worldwide perspective, Easterly (1999) claims that constraints on conventional measures of budget deficits or public debt (usually concerning the change in government published debt figures) will induce only an illusionary fiscal adjustment since government will prevent its net worth from changing. According to anecdotal evidence and a constructed theoretical model, “governments will respond to a mandated deficit reduction by (1) cutting public investment, (2) privatization, (3) shifting revenue and expenditure over time, or (4) running implicit liabilities,” since all of these mechanisms allow the government to maintain its current spending while reducing the explicit deficit and debt. Easterly’s empirical research
confirms these findings, stating that fiscal adjustment under fiscal constraints was at least partially illusory.

Focusing on Europe and using the experience over the period surrounding the introduction of the euro, Koen and Van den Noord (2005) prove through a Logit regression analysis that “when deficit rules or, to a lesser extent, debt thresholds tend to be more binding, resource to gimmicks is more likely.” With fiscal gimmicks, Koen and Van Den Noord refer to a set of accounting measures that the government may undertake (since there is always some room for interpretation of accounting rules) to avoid the cost of implementing fiscal constraints. These actions take basically two forms according to Koen and Van Den Noord: (i) “one-off measures”, referring to “government decisions of a non-recurrent nature” (e.g., privatizations of non-fiscal assets, tax amnesties, etc.) and (ii) creative accounting, non-traditional accounting treatment of government decisions affecting the fiscal balance (including, for instance, the accounting of PPP).

Following a similar approach, Buti et al. (2007) provide new econometric evidence of a positive correlation between the recourse to stock-flow adjustment (i.e., hiding deficits or selling assets) and deficits and debt. Buti et al. claim that the adoption of the Stability and Growth Pact seems to be associated with a larger use of fiscal gimmicks.

With a broader approach, Milesi-Ferreti (2003) provides a theoretical model linking the existence and strength of fiscal rules and the appearance of creative accounting. Milesi-Ferreti concludes that rules applying to less transparent budgets encourage creative accounting instead of fiscal adjustment, ceteris paribus.
Motivated by this theoretical model, Hagen and Wolff (2006), provide empirical evidence on whether governments use creative accounting to circumvent fiscal rules. According to their findings, the introduction in 1997 of the Stability and Growth Pact in the European Union resulted in the use of creative accounting. To fulfill the requirement of its associated fiscal rules, governments may use stock-flow adjustment (annual changes in the debt level less annual budget deficits) in order to hide deficits. The positive adjustment of this stock-flow shown by Hagen’s paper implies that debt level increases more than deficits suggest. The business cycle aggravates this trend given the large cost of reducing deficits during recessions.

Finally, with a similar objective, Milesi-Ferreti and Moriyama (2006) take a different approach and analyzes whether the reduction of government debt in the EU is correlated with a reduction of government assets. Since governments may reduce financial assets and public capital, “improvements in the fiscal balance and reduction in debt need not be associated with an improvement in government finances”. The data used in the study suggest a strong correlation between debt reduction and asset sales as well as reduction in public investment in the years just before the adoption of the euro. This suggests, according to Milesi-Ferreti and Moriyama, “an exclusive focus on deficit and debt level conveys a misleading picture of the evolution on the underlying fiscal situation.”
PPP as way to circumvent fiscal rules

As noted before, no studies appear to empirically link the use of PPP and the presence and strength of fiscal rules. There is, however, literature expressing concerns regarding the use of PPP as a tool to circumvent fiscal rules and explaining the rationale behind doing so. This subsection of the paper will review that literature in detail.

IMF (2004) notes that one of the main concerns surrounding the use of PPP is that they can be used to “bypass spending controls, and to move public investment off budget and debt off the government balance sheet, while the government still bears most of the risk involved and faced potentially large fiscal cost”. While increasing efficiency through the involvement of the private sector, PPP also provide sources of private financing. It allows public investment without immediately increasing the public debt. The IMF points out several factors that encourage the use of PPP as means to circumvent fiscal rules. Special Purpose Vehicles (SPVs), extensively used to provide the financing for PPP, can become a “veil behind which government controls a PPP” without consolidating it on the public accounts. SPV in particular and PPP can be used with that objective due to a lack of a comprehensive international standard on accounting and reporting PPP. Depending on the accounting rules, the private partner is the owner of the asset and therefore it neither appears as an asset nor as a liability on the public accounts, allowing for off-balance sheet public investment. This would be the proper way of accounting if a substantial part of the risks related with the project had been effectively transferred to the private partner. Then the private sector would have the autonomy to make the decisions and properly manage those risks. However, it is difficult to assess the real transfer of the risks undertaken with a PPP.
This is particularly the case in the presence of government guarantees that limit the risk borne by the private partner.

Hemming (2006) insists on the same idea, saying that the lack of comprehensive standards on accounting for PPP “makes it difficult to close loopholes” that enable to use PPP to circumvent fiscal rules. Akitoby, Hemming and Schwartz (2007) reformulate the same concern as follows: “PPP allows government to avoid or defer spending on infrastructure without foregoing its benefits.” According to Akitoby et al., this is especially appealing for those governments with strong restriction on current spending.

Nonetheless, IMF (2004) expect some potential benefits from the use of PPP if the allocation of risk is properly done and Akitoby et al. (2007) are still confident in the ability of well-structured PPP to offer efficiency gains that justify their adoption as alternatives to traditional public investment.

Some other authors focus instead on the rationale for using PPP. Turrini (2004), points out that one reason [for the use of PPP] was usually considered prominent in the policy debate: “PPP have the desirable property of putting capital spending outside government budgets, thus easing the effect of external budgetary constraints on public investment.” Following the same idea, Sadka (2006) recognizes that PPP are not driven by the search for a proper allocation of risk for greater efficiency. Instead, “they are means to disguise conventional contracting undertakings that are subject to standard budgeting processes as some new undertakings are carried out off budget.” Sadka (2006) considers that such a claim was particularly true, when governments

---

1 Eurostat adopted in 2004 new criteria for the accounting of the PPP precisely based on the allocation of risks.
started using PPP basically as a way to obtain additional financing for public investment, providing governments with a “channel through which it can finance infrastructure investment by implicit (or hidden) budget deficits and debts.” He adds, quoting Spackman: “Early financing proposals were designed mainly to evade expenditure controls.” Finally, Maskin and Tirole (2007) consider that the desire to avoid budgetary constraints have also favored the use of PPP, “the marked increase in PPP contract worldwide is often attributed less to the intrinsic qualities of such contracts than to governments’ attempt to evade budget constraints by taking liabilities off the balance sheet.”

Notwithstanding this, Sadka (2006) also considers that over time, the use of PPP has been also supported by other arguments based on the efficiency gains from a better allocation of risk.

In specific countries within the European Union, as is the case of Spain, scholars appear to be especially concerned. Benito (2008) expressly analyzes the “private financing of infrastructure in Spain” as “an example of creative accounting in the public sector”. According to the author, in Spain, the traditional way of financing infrastructure through the public budget has been reduced in the last decades due to stronger fiscal requirements for entry in the EMU. The author believes that the main reason for the increasing use of PPP is to “defer payments and in this way control their deficits and debt without cutting investment in infrastructures and public services.” In this sense, the author provides anecdotal evidence of projects in which the main goal of PPP was to circumvent fiscal rules. Benito concludes that PPP “implementation has just been, at bottom, a financial make up. In other words, it has been a clear example of public sector ‘creative accounting’.”
Also focusing on Spain, Fernandez Llera (2008) researches the question that concerns this paper, the use of PPP to elude budgetary stability controls. The author makes reference to the arguments supporting the use of PPP as the search for additional sources of financing and the potential greater efficiency achieved through a better allocation of the risks. Fernandez Llera, however is concerned about the use of PPP as a way to circumvent fiscal rules. While the author does not offer empirical evidence of this idea regarding PPP, he uses figures regarding the growing number of public enterprises as a proxy for it (since public enterprises can be also used to hide assets from the public balance sheet). Fernandez Llera observes a clear growth in the number of public companies since the adoption in Spain of stronger policies on budgetary stability in 2001.

Interestingly enough, while not directly analyzing PPP, some of the previously mentioned empirical studies regarding fiscal rules also mention PPP. Koen and Van Den Noord (2005) consider PPP a case of creative accounting but points out that they may “have merits of their own” alluding to efficiency gains. In any case, he concludes that from the point of view of his study “their main feature is that they initially reduce the general government deficit and debt for a given level of investment and publicly-used infrastructure.” Also, Milessi-Ferreti and Moriyama (2006) recall that PPP can also be used to hide deficits but it will not appear in the form of stock-flow adjustment (that is used in his study). Finally, Irwin (2012) considers that PPP can embody several of the accounting devices he includes in his taxonomy.
In order to empirically test whether the presence and strength of fiscal rules encourage the use of PPP, I will empirically evaluate the factors that determine the use of PPP in the European Union. I will specifically introduce within those determinants an indicator of the presence and strength of fiscal rules whose significance and magnitude will be used to answer my research question.

The dependent variable is the use of PPP. The use of PPP can be observed either on the number of PPP deals reached in a period of time or on the amount of investment required (or a similar monetary quantity). While each outcome carries different and complementary information, I will focus my attention on the amount of investment. The amount of investment will be defined (as explained in more detail later) as the aggregate funding needs of PPP reaching financial close by country and year.

In order to test the research question, I will employ an indicator of the existence and strength of fiscal rules for different countries and years. Additionally, the model will contain a set of factors that may both influence the use of PPP and the existence and strength of fiscal rules. This way, the model will avoid incurring bias caused by omitted variables.

The unit of analysis will be the countries of the European Union. A first attempt to formally present the empirical model is as follows:

For instance, a large number of deals may not actually mean prevalence of PPP unless they also imply a relatively important amount of investment and, conversely, the amount of investment of one unique big deal may be misleading on the real relevance of PPP.
Use of PPP = \beta_0 + \beta_1 FISCALRULE + \beta_2 CONTROLS + u

where: the Use of PPP is the dependent variable representing the use of PPP; FISCALRULE is the measurement of the presence and/or strength of fiscal rules; and CONTROLS is a vector containing factors that may influence the use of PPP other than the presence of fiscal rules.
Dependent variable

This paper will use as measurement of the use PPP across the member states of the European Union the aggregate funding needs of PPP reaching financial close by country and year.\(^3\)

These figures are publically available in the Annex to an “ECON Note” published by the European Investment Bank in October 2011 entitled “Recent trends in the PPP market in Europe: slow recovery and increasing EIB involvement.” The figures in the Annex are part of the ECON/EPEC PPP database. According to the Kappeler (2011) they are collected from a variety of sources (Dealogic ProjecWare, IfraNews, Infrastructure Journal and Ispiratia) and cross-checked with EIB project data when appropriate. Malta and Estonia are excluded from the dataset. The dataset includes data for 21 full years (1990 to 2001) and the data for the first half of the year 2011.\(^4\)

\(^3\) Following Kappeler (2011), financial close (the moment when the data is compiled) refers to the moment when the “main project and financing agreements are signed and debt drawdowns can be made. The author of the ECON Note makes some warnings regarding the data and the finding of the publications itself. First, the data does not include any project with funding requirements lower than euro 5 million. Given the difficulties on reaching a common definition of PPP, the ECON Note adopts its own definition to include projects as PPP, which may be seen as another limitation for the data. According to this operationalization, PPP are projects “based on a long term, risk sharing contract between public and private parties. The project must include the bundling of design, construction, operation and/or asset maintenance, together with a major component of private finance.”

\(^4\) Due to problems with data availability for other control variables (especially in central and eastern European countries), this study focuses on the years 1996 to 2010, for which data is more readily available for every country. This will also allow for consistent use of real values for PPP aggregate funding needs by using the harmonized consumer price index on its 2005 base (that runs from 1996).
Independent variables: fiscal rules

Most of the empirical work on circumventing fiscal rules within the European Union reviewed above relied on the fact that while some of the member states entered into the EMU, others did not. The member states that were willing to become a part of the EMU had to fulfill the 1992 Maastricht Treaty provisions. This paper will control for EMU membership differentiating between EMU member states (subject to an exogenously imposed fiscal rule) from the rest.

Besides the adoption of the Excessive Deficit Procedure and the subsequent Stability and Growth Pact, several European countries had established before or established afterwards their own fiscal rules. In some countries, the adoption of national rules was encouraged by the mandate to fulfill the European fiscal rules. In others the rules were preexistent or were adopted independently. The European Commission has compiled a dataset of the domestic numerical fiscal rules that is available from 1990 to 2010. Moreover, based on that dataset, the Commission elaborated a fiscal rule strength index that tries to measure the enforceability of each rule. Finally, complementing the existence of the rule with its attributed strength, the Commission compiled the fiscal rule index (FRI) for each country and year determined by the fiscal strength of the rules in place and its coverage (European Commission, 2010). The effect of the European FRI on the use of PPP will be the main focus of this paper.

---

5 The Maastricht Treaty provisions established as one of the criteria to join the EMU the Excessive Deficit Procedure: European Union member countries needed to meet two fiscal convergence conditions: (i) overall deficit less than 3 percent of GDP and (ii) stock of gross public debt equal or less than 60 percent of GDP. In 1997, the Stability and Growth Pact further extended the application of the aforementioned conditions once the EMU was established in order to ensure that they were still observed.
Independent variables: other determinants of PPP

As briefly noted above, in order to control for other factors that may simultaneously influence the use of PPP and the adoption of fiscal rules in different countries across the European Union, the empirical assessment will include a set of control variables. The inclusion of the appropriate control variables ensures that the test on the effect of the European FRI is not biased due to omitted variables. There are several empirical studies regarding the determinants of PPP in other settings. This paper will follow the findings of those studies in order to determine which variables should be included as control variables for this empirical model.\(^6\)

Guided by that earlier research, this empirical model will control for the potential effect of four channels on the use of PPP with two variables for each channel: (i) market size measured by gross domestic product and population; (ii) public finance and fiscal constraints measured by public debt and public deficit; (iii) macroeconomic stability measured by inflation and interest rates; and (iv) political environment, controlling for the executive ruling party and an indicator for corruption. The following table presents the data sources for each variable:

## TABLE 1. VARIABLES AND DATA SOURCES

<table>
<thead>
<tr>
<th>Channel</th>
<th>Variable</th>
<th>Description</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of PPP</td>
<td>Use of PPP</td>
<td>Real aggregate funding needs of PPP reaching financial close in millions of euros</td>
<td>European Investment Bank</td>
</tr>
<tr>
<td>Existence and Strength of fiscal rules</td>
<td>European FRI</td>
<td>European fiscal rule index</td>
<td>European Commission</td>
</tr>
<tr>
<td>Market size</td>
<td>Real GDP</td>
<td>Gross domestic product at market prices in millions of euros ¹</td>
<td>Eurostat</td>
</tr>
<tr>
<td></td>
<td>Population</td>
<td>Population at January 1rst</td>
<td>Eurostat</td>
</tr>
<tr>
<td>Public finance and fiscal constrains</td>
<td>Deficit</td>
<td>Public deficit in millions of euros ³, as a percentage of GDP</td>
<td>Eurostat</td>
</tr>
<tr>
<td></td>
<td>Debt</td>
<td>Gross public debt in millions of euros, as a percentage of GDP</td>
<td>Eurostat</td>
</tr>
<tr>
<td>Macroeconomic stability</td>
<td>Inflation</td>
<td>Harmonized annual inflation index ⁴</td>
<td>Eurostat</td>
</tr>
<tr>
<td></td>
<td>Interest</td>
<td>Interest rates ⁵</td>
<td>Eurostat</td>
</tr>
<tr>
<td>Political environment</td>
<td>Right-wing</td>
<td>Dummy variable indicating those countries and years when the executive ruling party belonged to the political right</td>
<td>Database of Political Institutions⁶</td>
</tr>
<tr>
<td></td>
<td>Corruption</td>
<td>Corruption perception index</td>
<td>Transparency International</td>
</tr>
</tbody>
</table>

¹ Measured in millions of euros (from 1.1.1999) and millions of ECU (up to 31.12.1999). This applies to all the rest Eurostat variables.
² In the case of Germany the data used refers to the population of Germany including the former German Democratic Republic (there is only difference for the year 1990 itself). For France, the population figure used refers to the population of metropolitan France.
³ Measured according to the accounting rules established in order to determine the fulfillment of the convergence criteria to enter in the European Monetary Union, methodology further applied to any member state.
⁴ The base year for the calculation of the inflation index is 2005.
⁵ European Monetary Union convergence criterion bond yields.
⁶ Philip Keefer, Development Research Group, The World Bank, December 2010
Analysis Plan

The dependent variable of the model (real euro value of the aggregate funding needs of PPP reaching financial close by country and year) is an example of a corner solution. It “is zero for a nontrivial fraction of the population but is roughly continuously distributed over positive values” (Wooldridge, 2012). Under those conditions, while is possible to obtain a good estimation with a linear model near the means, we may get negative predicted values that undermine the consistency of the model (truncation bias). To address these conditions, the Tobit method includes in the model a latent variable that controls for the probability of having a nonnegative value. To find the determinants of PPP, Hammami et al. (2006) and Cacherita (2009) use this method, benchmarking it with linear regressions Ordinary Least Squares (OLS) and General Least Squares (GLS), the last one to address the potential heteroscedasticity of the error terms.

As another important feature, the dataset is organized as panel data. In effect we have data for aggregate funding needs under PPP by countries (individual agents, i) across time (years, t). This allows controlling for unobserved time-constant characteristics of the individuals recurring to a fixed effect model. Not controlling for such unobserved factors may result in misleading observations. Fernandez Llera (2004) benchmarked fixed effects and random effects regressions in his research of the factors determining the increasing use of public enterprises in Spain.

Given the previous considerations, the optimal alternative would be to use a fixed effects model with an estimator that controls for the potential truncation bias of the dependent variable (e.g., Tobit). However the elimination of the unobserved fixed effect is based on a linear transformation. If that is to be done in a nonlinear model (e.g., Tobit), the transformation does
not remove the unobserved fixed effect. It is possible to force a Tobit fixed effect on statistical packages by introducing dummy variables for the individuals. However, this will result in biased estimates unless the time dimension (the number of years in our case) is large. This potential source of inconsistency is known as the incidental parameters problem (Wooldridge, 2005; Söderbom, 2009). The magnitude of such bias is controversial. According to Greene (2002) “the bias is persistent, but it drops off rapidly as T increases to 3 and more,” while Hahn (2004) states “increasing T need not fully solve this problem.”

To avoid the incidental parameters problem, a random effects model may be used instead of fixed effects one. However, among other conditions, random effects models require strict independence between the control variables and the unobserved effects, which in our case is unlikely. Following Söderbom (2009) the “Mundlak-Chamberlain approach” can be used to relax this assumption. By “adding individual means of time varying x-variables to the set of regressors we allow for some correlation between the random effect and the regressors.” Wooldrige, 2005 recommends the same approach and denominates it “correlated random effect Tobit.”

In conclusion, given all the considerations above, the following table presents the specifications that may be used to test the hypothesis concerning this paper, stating for each one its virtues and potential caveats.
<table>
<thead>
<tr>
<th>Model</th>
<th>Virtue</th>
<th>Caveats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level OLS</td>
<td>Simplicity</td>
<td>Truncation bias; Heteroscedasticity; Unobserved effects</td>
</tr>
<tr>
<td>Level GLS</td>
<td>Heteroscedasticity; Simplicity</td>
<td>Truncation bias; Unobserved effects</td>
</tr>
<tr>
<td>Fixed Effect OLS</td>
<td>Unobserved effects</td>
<td>Truncation bias; Heteroscedasticity</td>
</tr>
<tr>
<td>Fixed Effects GLS</td>
<td>Unobserved effects; Heteroscedasticity</td>
<td>Truncation bias</td>
</tr>
<tr>
<td>Level Tobit</td>
<td>Truncation bias</td>
<td>Heteroscedasticity; Unobserved Effects</td>
</tr>
<tr>
<td>Fixed Effect Tobit</td>
<td>Truncation bias; Unobserved Effects</td>
<td>Incidental Parameters; Heteroscedasticity</td>
</tr>
<tr>
<td>Mudlack-Chamberlain</td>
<td>Truncation Bias; Unobserved Effects</td>
<td>Heteroscedasticity; Unobserved Effects</td>
</tr>
</tbody>
</table>
RESULTS

Data analysis and descriptive statistics

The use of PPP in Europe has been growing steadily during the last two decades. The PPP market reached its peak in 2006 and 2007, just before the financial crisis when it declined for the next two years. In 2010, the PPP market grew again. Note that until the mid-2000s, the UK accounted for around 50 percent of the whole European PPP market.

Figure 1 shows the evolution of the annual mean for the European FRI and the PPP funding needs for the target years (1996-2010).

FIGURE 1. FUNDING NEEDS UNDER PPP AND FISCAL RULE INDEX
During this period of time, fiscal rules have become stronger in most countries around Europe. The figure shows a common trend between increasing the use of PPP and stronger fiscal rules. In fact, the correlation coefficient between the European FRI and PPP funding needs is 0.32 and statistically significant at the 95 percent confidence level. This finding encourages fully developing the econometric model with additional control variables to test whether the relationship persists.

The main descriptive statistics for the variables in the model are presented in the following tables:

TABLE 3. NUMERICAL VARIABLES DESCRIPTIVE STATISTICS

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of PPP¹</td>
<td>374</td>
<td>695.37</td>
<td>2006.2</td>
<td>0</td>
<td>15511.6</td>
</tr>
<tr>
<td>European FRI</td>
<td>375</td>
<td>0.29</td>
<td>0.99</td>
<td>-1.03</td>
<td>2.32</td>
</tr>
<tr>
<td>GDP²</td>
<td>374</td>
<td>400,840.5</td>
<td>604,505.7</td>
<td>1,454.16</td>
<td>2,705,881</td>
</tr>
<tr>
<td>Population</td>
<td>375</td>
<td>19,400,000</td>
<td>22,600,000</td>
<td>411,600</td>
<td>82,500,000</td>
</tr>
<tr>
<td>Deficit³</td>
<td>369</td>
<td>-2.5</td>
<td>3.76</td>
<td>-30.9</td>
<td>7</td>
</tr>
<tr>
<td>Debt⁴</td>
<td>374</td>
<td>51.84</td>
<td>28.09</td>
<td>6.1</td>
<td>148.3</td>
</tr>
<tr>
<td>Interest</td>
<td>317</td>
<td>5.11</td>
<td>1.62</td>
<td>2.41</td>
<td>14.43</td>
</tr>
<tr>
<td>Inflation</td>
<td>374</td>
<td>94.55</td>
<td>16.67</td>
<td>5.01</td>
<td>139.62</td>
</tr>
<tr>
<td>Corruption</td>
<td>354</td>
<td>6.42</td>
<td>2.04</td>
<td>2.6</td>
<td>10</td>
</tr>
</tbody>
</table>


¹ Millions of euros in real terms of aggregate funding needs of PPP reaching financial close per country and year.
² Gross domestic product at market prices in millions of euros (real terms).
³ Public deficit in millions of euros, as a percentage of GDP
⁴ Gross public debt in millions of euros, as a percentage of GDP

TABLE 4. CHIEF EXECUTIVE PARTY ORIENTATION

<table>
<thead>
<tr>
<th>Left</th>
<th>Center</th>
<th>Right</th>
<th>NA¹</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>155</td>
<td>52</td>
<td>128</td>
<td>1</td>
<td>336</td>
</tr>
<tr>
<td>46.13 %</td>
<td>15.48 %</td>
<td>38.10 %</td>
<td>0.30 %</td>
<td>100 %</td>
</tr>
</tbody>
</table>

¹ According to the World Bank Database of Political Institutions Codebook “NA is recorded in the following cases: when a country is a colony, even if it has internal self-government within a commonwealth; for the Soviet Republics while they were part of the USSR; for countries in the midst of civil war or political crisis”.

23
Regression Results

As per the analysis plan above, several econometric specifications have been implemented and preformed with STATA. For clarity, Table 6 (next page) includes only the most relevant specifications according to the virtues and caveats of each empirical approach.

Both the Breusch-Pagan and the White’s test preformed after running a basic OLS regression showed the presence of heteroscedasticity and therefore make the use of the GLS approach more appropriate when feasible. Taking this into account, the first column of Table 6 contains the GLS regression results. The second column of Table 6 shows the regression results of the Tobit model to control for the censored characteristics of the data.

Both the GLS and the Tobit specifications include time dummies. By introducing three indicator variables it also controls which of the EU member states are members of the EMU and former members of the soviet/communist bloc. A specific indicator variable is introduced for the United Kingdom in order to control for its position as the more developed market for PPP, far ahead of the other countries. The baseline category of countries appears integrated therefore by Sweden and Denmark (members of the EU, but neither ex-soviet nor EMU countries).

---

7 While this paper has not fully address the potential bias from the presence of time correlation on the error terms, robust standard errors allow for a partial correction of this potential caveat.
### TABLE 5. REGRESSION RESULTS

<table>
<thead>
<tr>
<th></th>
<th>(1) GLS</th>
<th>(2) Tobit</th>
<th>(3) Fixed Effects GLS</th>
<th>(4) Mundlak – Chamberlain</th>
</tr>
</thead>
<tbody>
<tr>
<td>European FRI</td>
<td>324.9*</td>
<td>334.5</td>
<td>512.7*</td>
<td>714.5*</td>
</tr>
<tr>
<td></td>
<td>(163.6)</td>
<td>(216.8)</td>
<td>(208.2)</td>
<td>(303.7)</td>
</tr>
<tr>
<td>Real GDP</td>
<td>0.000821</td>
<td>-0.000396</td>
<td>0.00288</td>
<td>0.00445**</td>
</tr>
<tr>
<td></td>
<td>(0.000645)</td>
<td>(0.000840)</td>
<td>(0.00174)</td>
<td>(0.00137)</td>
</tr>
<tr>
<td>Population</td>
<td>-0.0000109</td>
<td>0.0000375</td>
<td>-0.000130</td>
<td>-0.000593*</td>
</tr>
<tr>
<td></td>
<td>(0.0000167)</td>
<td>(0.0000228)</td>
<td>(0.000325)</td>
<td>(0.000248)</td>
</tr>
<tr>
<td>Deficit</td>
<td>-36.22</td>
<td>-128.6*</td>
<td>-14.63</td>
<td>-175.6**</td>
</tr>
<tr>
<td></td>
<td>(30.22)</td>
<td>(53.71)</td>
<td>(28.55)</td>
<td>(60.43)</td>
</tr>
<tr>
<td>Debt</td>
<td>1.329</td>
<td>-0.266</td>
<td>-14.15</td>
<td>-64.82***</td>
</tr>
<tr>
<td></td>
<td>(2.778)</td>
<td>(7.137)</td>
<td>(12.90)</td>
<td>(18.37)</td>
</tr>
<tr>
<td>Interest</td>
<td>68.49</td>
<td>13.18</td>
<td>45.93</td>
<td>56.09</td>
</tr>
<tr>
<td></td>
<td>(85.24)</td>
<td>(213.2)</td>
<td>(49.37)</td>
<td>(231.3)</td>
</tr>
<tr>
<td>Inflation</td>
<td>-19.02</td>
<td>-20.71</td>
<td>-2.996</td>
<td>118.1*</td>
</tr>
<tr>
<td></td>
<td>(11.62)</td>
<td>(39.94)</td>
<td>(10.08)</td>
<td>(54.06)</td>
</tr>
<tr>
<td>Corruption</td>
<td>-115.9+</td>
<td>-80.22</td>
<td>334.0+</td>
<td>318.2</td>
</tr>
<tr>
<td></td>
<td>(67.07)</td>
<td>(127.1)</td>
<td>(165.6)</td>
<td>(221.5)</td>
</tr>
<tr>
<td>Right-wing</td>
<td>-273.0</td>
<td>74.76</td>
<td>-457.7</td>
<td>-271.3</td>
</tr>
<tr>
<td>government</td>
<td>(189.5)</td>
<td>(319.9)</td>
<td>(332.2)</td>
<td>(340.7)</td>
</tr>
<tr>
<td>Country member of the EMU</td>
<td>418.4**</td>
<td>1243.9*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(147.5)</td>
<td>(545.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Former soviet bloc country</td>
<td>-253.1</td>
<td>-601.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(275.0)</td>
<td>(883.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>7600.1***</td>
<td>8918.3***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(973.1)</td>
<td>(788.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1238.8</td>
<td>-2102.7</td>
<td>796.7</td>
<td>-43489.4*</td>
</tr>
<tr>
<td></td>
<td>(969.6)</td>
<td>(3813.0)</td>
<td>(7041.2)</td>
<td>(18697.3)</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>280</td>
<td>280</td>
<td>280</td>
<td>280</td>
</tr>
<tr>
<td><strong>adj. R-sq</strong></td>
<td>0.694</td>
<td>0.212</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All the specifications include time dummies.
Standard errors in parentheses + p<0.10 * p<0.05 ** p<0.01 *** p<0.001
The other two specifications presented in Table 6 use panel data approaches. First, column 3 contains the result of a regular fixed effect model calculated with robust standard errors to address heteroscedasticity. The last column contains the results for the Random Effects Mudlak-Chamberlain approach. As explained before, this model allows using a Tobit regression without incurring in the incidental effects problem and allowing for some correlation between the variables in the model and the error term.

All the specifications are overall significant. The GLS have a great explanatory power, explaining 72 percent of the total variation in the model. The fixed effect model with robust linear estimators has a much lower explanatory power. This is not surprising since we are losing a great part of the variation by controlling for the unobserved effects of each country. In the case of the Tobit estimators there is not a similar measurement of the explanatory power (the usual pseudo R square is only meaningful with discrete distributions). Since they have overall significance we deem their results as relevant.

The European FRI, the key variable of interest, is significant in three of the four specifications (GLS, Fixed Effects and Mudlak-Chamberlain). For these three specifications the European FRI is significant as a predictor of the use of PPP (measured, as exposed, as the aggregate funding needs reaching financial close by country and year) with more than a 95 percent level of confidence. Only in the case of the Tobit model the European FRI is not significant within the usual levels of confidence. Note however that this lack of statistical significance is marginal since it would turn out significant with an 87 percent level of confidence. In all four specifications, the positive sign of the coefficient associated with the European FRI indicates a
consistent direction of its effect on the use of PPP. It suggests that a larger European FRI is associated with a greater use of PPP.

For the purposes of this research, the magnitude of the effect is not as meaningful given the composite nature of the European FRI. Nonetheless, the variation across the different specifications seems consistent and reinforces the conclusion. In this sense, the lower magnitude appears in the GLS level model (when we do not control for the censored nature of the data or for the unobserved effects). The magnitude increases progressively in the other specifications as we begin controlling for the censored nature of the data (Tobit), the unobserved effects (fixed effect). The greater magnitude is obtained when controlling for both characteristics to the extent possible (the Mudlack-Chamberlain approach).⁸

Regarding other variables, only corruption appears to be significant for the GLS and Fixed Effects specifications (at the 90 percent level of confidence). With the Mudlack-Chamberlain approach (that theoretically is more suitable to the characteristics of the data) several other variables are significant for a level of confidence above the 95% (debt, deficit, real GDP, population and inflation). The negative sign of the coefficients associated with debt and deficit suggest that larger debt and deficits are associated with a lower use of PPP.

In those specifications that include regions (the level specifications both GLS and Tobit) both the United Kingdom and the European Monetary Union indicator are also significant. This

---

⁸In those models using the maximum likelihood estimators (Tobit and Mudlak-Chamberlain) the coefficient is only referring to those observations with nonnegative values.
outcome is not surprising. On the contrary is consistent with the previously noted observation regarding the greater use of PPP in the United Kingdom.

Finally, while the model does not control for total public expenditure, introducing this variable does not affect the significance or direction of the effect of the European FRI in the use of PPP. In conclusion, showing a clear robustness, the effect of the European FRI on the use of PPPS, the key independent variable for this paper, remains significant and with the same direction across most specifications.
DISCUSSION

As noted above, no empirical model perfectly addresses the characteristics of the research question and the available data. Nonetheless, the dataset used was the only one publically available for the countries and the topic of interest.

Theoretically, the Mudlak-Chamberlain approach provides the best alternative. It allows for partially controlling for the likely existing unobserved or fixed effects for every country while also implementing a nonlinear regression (specifically, a Tobit model) to address the corner solution feature of the data and the consequential truncation bias that may arise otherwise. Even so, the Tobit model relies on a strong assumption of normality that may not correspond with the distribution of the data. The alternative, using robust estimators on a linear fixed effect model, does not address the evident corner solution feature of the data.

In any case, the consistent results for the key variable of interest, the European FRI, across both specifications (and across several other benchmarking specifications) demonstrates the consistency of the results. The main empirical finding of the research can be stated as follows: the existence and strength of fiscal rules is, ceteris paribus, significantly and positively correlated with the use of PPP, when controlling for a set of other potential determinants of the use of PPP as well as the unobserved country characteristics. This consistent empirical result indicates that when countries adopt or strengthen their fiscal rules they rely more on PPP than otherwise (since the empirical model holds constant other potential determinants of the use of PPP and the fixed country effects). Such a finding seems to empirically support that governments use PPP, among
other reasons, precisely to avoid the constraints imposed by fiscal rules, as suggested by the reviewed literature.

The policy implication of the previous conclusion is obvious: while introducing or strengthening their fiscal rules, European countries seem to be using mechanisms that allow them to sustain the level of public investment without breaching the mentioned rules or raising new revenue. As a consequence, while formally upholding a legal framework whose goal is the sustainability of public finance, they may be endangering that same sustainability by other means. The introduction in 2004 of new public accounting rules regarding the use of PPP by the European Union can be seen precisely as a reaction to the misuse of PPP that this paper empirically accounts for.

It is out of the scope of this empirical research paper to further analyze the incentives of governments or to suggest a course of action to prevent the potential use of PPP to circumvent fiscal rules. The complexity of the topic makes it difficult to properly and coherently design fiscal rules, public accounting systems and PPP legal frameworks. The contribution of this paper is precisely to raise awareness of that complexity by showing empirically the potential presence of some unintended effects.

These unintended effects may arise when using simultaneously fiscal rules and new public management framework as PPP. The legal framework regulating both domains needs to be carefully designed to account for all the incentives affecting politicians and policymakers. Such a legal framework should ensure that PPP are used to improve public management, while fiscal rules keep contributing to public finance sustainability.
Nonetheless, even just in terms of empirical analysis there is obviously further research to carry out. In terms of data, a better, more complete and updated data set regarding the use of PPP in Europe may be used or other settings may be chosen. Besides, instead of the funding needs, the number of PPP deals can be used dependent variable. In terms of the empirical approach, additional methods may be employed (for example two stage regressions). Additionally new empirical models may address potential problems of endogeneity and serial correlation on the use of PPP and fully control for the level of public expenditure or investment. All these issues constitute potential fields for future research.
CONCLUSION

This goal of this paper was to empirically test whether there is a correlation between the presence and strength of fiscal rules and the use of PPP. Such a correlation would suggest that when countries adopt or strengthen their fiscal rules, they rely more on PPP than otherwise, implying that governments use PPP to avoid the constraints on public investment imposed by those same fiscal rules.

With that objective in mind the paper has reviewed the most relevant scholarly works regarding the circumvention of fiscal rules and specifically the use PPP for that purpose. Relaying on panel data for the members of the European Union, the paper presents an empirical model that concludes that the existence and strength of fiscal rules are significantly and positively correlated with the use of PPP, when controlling for a set of other potential determinants of the use of PPP as well as unobserved country characteristics.

The complexity of the topic makes it unfeasible to address in this paper the motivations undelaying this behavior. However, the contribution of this paper is precisely to raise awareness of that complexity by showing empirically the potential presence of some unintended effects. These unintended effects may arise when using simultaneously fiscal rules and new public management framework as PPP. The legal framework regulating both domains needs to be carefully designed to account for all the incentives affecting politicians and policymakers. Such a legal framework should ensure that PPP are used to improve public management while fiscal rules keep contributing to public finance sustainability.
BIBLIOGRAPHY


Fernandez Llera, Roberto. 2004. "El Endeudamiento De Las Comunidades Autonomas: Disciplina De Mercado, Estabilidad Economica y Canales De Elusion Normativa." PhD,


