

# Public Private Partnerships from budget constraints: Looking for Debt Hiding?

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## Abstract

In this paper, we first examine whether or not public authorities that experience periods of budget constraints are more tempted to choose Public Private Partnerships (PPPs) instead of traditional public procurement mechanisms (TP). Second, we study which possible channel can explain this effect. The analysis is developed within the French context where we investigate the totality of 101 Private Finance Initiative (PFI/CP) contracts signed since 2005. The empirical test is made of two stages. First, we find a positive impact of budget constraints on the use of PFI/CP. As this impact can be both for debt hiding or alternative reasons, we then study the change of our result when the possibility to underwrite the debt of PPPs has gone in 2011. We find that, even if debt hiding motivations are relevant, they are not sufficient for explaining the budget constrained governments' aptitude towards PPPs.

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The authors are grateful to Marco Bertoni, Michael Klien, Scott Masten, Stéphane Saussier, Stéphane Straub, Luciano Greco, Paola Valbonesi, Luigi Moretti, Enrico Rettore and participants at the IRSPM 2013, RSSIA 2013, IIPF 2013 conferences and “The economics of Public Procurement workshop 2013, Stockholm” for their valuable comments and suggestions on different versions of this paper. The authors would also like to thank the Mission d'appui aux partenariats public privé (MaPPP) for providing data and useful information. Any remaining errors are the authors' responsibility

# Introduction

Looking back at the past few years, we can observe how governments' behaviors and policies have been significantly affected by public finance constraints coming from either domestic policies, financial markets or regulatory measures, such as the deficit and debt limits of the European Union following the Maastricht Treaty in 1992. As a consequence, available resources to pursue public investment strategies have been definitely rationed. In such a situation, the choice of the optimal organizational structure for the realization and management of a public investment becomes crucial.

An alternative to the conventional provision of public infrastructures (Traditional Procurement) are the fixed-price risk-transfer contracts, such as the "Private Finance Initiative" in the United Kingdom or the "Contrat de Partenariat" in France (thereafter PFI/CP)<sup>1</sup>. These contracts fall within the definition of Public Private Partnerships (PPPs), i.e., contractual agreements allowing the involvement of the private sector's capital and expertise for the realization and management of an asset that will be returned to the public sector after an adequate period of time (the "bundling" mechanism after Hart (2003))<sup>2</sup>.

In the theoretical literature, PFI/CP contracts are considered to be able to release public funds for alternative uses thanks to the introduction of private knowledge or financing and due to the stronger agents' involvement in the project (Auriol & Picard 2013, Buso 2013). Nevertheless, since their creation, PFI/CP have been continuously considered too costly in comparison to Traditional Procurements (TP) because of the higher financing costs and the need of realizing private profits. The increasing number of PFI/CP in many countries are therefore considered as political. Indeed, with the Eurostat rule in 2004 allowing public investments under PPPs to be accounted as off the balance sheet<sup>3</sup>, these contractual organizations are often accused to be used for debt hiding motivations (OECD 2009, NAO 2011, PwC 2010). However, few empirical studies address the topic whether determinants for PPPs use are only to ease the public budget constraints (Russo & Zampino 2010, Krumm & Mause 2012).

Filling this gap, our analysis aims at improving the understanding about the public finance implications of PPPs by answering the following questions: Are governments more tempted to use PPPs under budget constraints conditions? If it's the case, what can explain this behavior? Hence, we first investigate the effect of governments budget constraints on the use of PPPs. We then study whether the higher/lower propensity of investment in PPPs from financial distressed institutions derives from a real saving/waste of public resources

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<sup>1</sup>The "Private Finance Initiative" was created in the UK in 1992, followed by the "Contrat de partenariat" in France in 2004, under the Ordonnance n°2004-559 of 17th June 2004, then improved by the French PPP Law of the 28th July 2008.

<sup>2</sup>All PPPs require an adequate transfer of risk from the public to the private partners. PFI/CP are different compared to other kinds of PPPs, i.e. concessions, because of the risks transferred during the operational phase: availability risk under a PFI/CP, demand risk under a concession.

<sup>3</sup>From a legal perspective, PPPs (therefore PFI/CP) are classified off-balance sheet for governments, as the private partner bears both the construction risk and at least one of either availability or demand risk.

or from a virtual withdrawal of costs from governments budgets (debt hiding)<sup>4</sup>.

We answer to these research questions through an empirical analysis applied to French municipalities. The French context is an appealing case study for three reasons. First, we can investigate the totality of PFI/CP contracts thanks to the collaboration with the French PPP taskforce sieged at the Ministry of Finances and Economy (thereafter MaPPP)<sup>5</sup>. Second, financial information of municipalities are made available by the French Ministry of Finances and Economy<sup>6</sup>. Third, the municipality level has the majority of PFI/CP contracts among local public authorities (101/138)<sup>7</sup>.

We compare our sample of municipalities having at least one PFI/CP with an adequate control group in order to analyse how budget constraints impacts the government's choice of PFI/CP procedures. We then investigate the effect of a new Decree classifying PFI/CP as on balance sheet since January 1st 2011<sup>8</sup>. This new accounting rule allows us to study the heterogeneity of the previous effect looking at the change in sign and size of the impact when the debt hiding motivations are ruled out. Finally, we find that a strict budget constraint is associated with higher use of PFI/CP, both in terms of frequency of application and amount of investment. The new rule negatively impacts the use of PFI/CP and the level of investment, nevertheless, the effect of budget constraint still persists after 2011. We then conclude that the use of PFI/CP is driven by the restriction of financial resource, but not only for the debt hiding motivations.

The paper is organized as follows. Section 1 describes the related literature and derives testable hypotheses. Section 2 discusses the French institutional context and the legal environment regulating PFI/CP contracts. Section 3 presents the data description. Section 4 explains our empirical strategy. Section 5 presents and discusses the results of the paper. Finally, Section 6 concludes.

## 1 Related literature and Hypotheses testing

The majority of existing theoretical papers study the welfare effects of the bundling mechanism of PPPs, i.e., the assignment of the different phases of the project to a single private consortium (Martimort and Pouyet 2008, Iossa and Martimort 2008, Hart 2003). Nevertheless, the financial implications and determinants of PPPs have been less investigated. The related contributions come from Engel et al. (2010, 2013), Auriol &

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<sup>4</sup>Public investment decisions are taken at the local level, while the public control of budget data is made at national or European levels. As a consequence of this distribution of roles, local authorities are tempted to use PPPs to hide their financial condition thanks to their stronger possibility to be accounted as off the balance sheet. In such a way, municipalities can elude external controls releasing fictitious resources for further investments

<sup>5</sup>The Mission d'appui aux Partenariats public-privé (MaPPP) is the French Taskforce for PPPs. Its role consists on: assessing PPPs projects, supporting the preparation and negotiation of procurement and contract documents, promoting the PPPs market in France

<sup>6</sup>Financial information of all levels of administration is available at <http://www.collectivites-locales.gouv.fr/>

<sup>7</sup>It's particular interesting to focus at municipalities inasmuch as budget constraint concerns is known to increase in importance at the municipality level (Bel & Fageda 2009, JORF 2012)

<sup>8</sup>With the Decree on December 16th 2010, all PFI/CP have to be accounted on the balance sheet at the date of the infrastructure delivery. This new Decree is applied since January 1st 2011 to both the existing PFI/CP and the new ones.

Picard (2013) and Buso (2013). They study the public finance implications of PPPs, focusing on analysing how the distortionary taxation<sup>9</sup> can affect the choice between PPPs and TP. According to Engel et al. (2013), a higher shadow cost of public funds ( $\lambda$ )<sup>10</sup> isn't a sufficient argument to prefer the private provision of services in a multiperiod context, as the resources saved by a government during the early period of the investment are offset by giving up future revenue flows to the concessionaire. On the other hand, Auriol & Picard (2013) find out as this shadow cost  $\lambda$  comes to be relevant in comparing the public regime and the "Build Operate Transfer" contracts (BOT)<sup>11</sup> for the realization and operation of a public facility. Their paper is developed in a different context with respect to Engel et al. (2013); the model assumes that the concession holder is allowed to operate under laissez-faire regime. Furthermore it faces a much weaker information asymmetry with their own manager compared to the government. Following a different approach, a similar result is reached by Buso (2013). His theoretical model is built under a context of asymmetric information; nevertheless, the level of public service provision is set by the government both under TP and PPPs. Within this framework, the saving of distortionary costs, under PPPs, comes from the long term involvement of the private agent that benefits the government in terms of lower need of investment's incentives.

On the other side, most of the empirical papers aim at detecting the economic and non economic factors able to explain the private involvement in the public services delivery (Bel and Fageda 2009, 2010, McGuire et al. 1987, Miralles 2009, Dubin and Navarro 1988 and Picazo-Tadeo et al. 2012). Starting from this strand of literature, there are few works that focus on PPPs and their determinants (Hammami et al. 2006, Albalade et al. 2012, Russo & Zampino 2010, Krumm & Mause 2012). Hammami et al. (2006) provides a cross country analyses showing that PPPs are more frequent in countries characterized by large markets, high demands and good institutions. Furthermore past experience in PPPs as well as high government debts are important factors able to explain the selection of this investment option. Differently from the previous study, Albalade et al. (2012) create an index that captures the degree of private participation in each contractual forms with the purpose of testing the drivers of contract choices in agreements that correspond to different levels of private involvement. They examine several political and economic variables finding that the probability of having large private involvement in single projects is much larger than in network projects. Further elements that explain the degree of private participation are the fiscal variables and the jurisdiction's level of debt-stress or tax burden. However, political variables do not appear significant in explaining the contractual choice.

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Costs imposed to taxpayers to collect funds for financing the investment.

<sup>10</sup>Opportunity cost from investing in this project instead of financing alternative public goods, it can be higher when the government spending capacity are lower (budget constraints)

<sup>11</sup>

BOT contracts are PPPs where the private partner is in charge of the building, operational and financial tasks.

Russo & Zampino (2010) and Krumm & Mause (2012) try to find evidences about correlations between PPPs investment and municipal budget data. Their paper are developed respectively in the contexts of Italy and the UK. Both of them show a strong positive relationship between number of PPPs and negative local budgetary outcomes. An explanation for this result stays in the opportunistic behavior of the public buyer. Nevertheless there is the possibility (mentioned by Russo & Zampino 2010) that PPPs can be used as useful adjuvant treatment in order to overcome the deficit trouble.

The mentioned empirical studies highlight a connection between the government financial constraints and the organizational structure of public investments, but they don't provide a motivated explanation for their results. Our paper adds to this literature in that we examine alternative channels that motivate French municipalities to use PFI/CP instead of TP where resources are scarce. Indeed, using data about PFI/CP in French municipalities context, we aim at testing the following hypotheses.

At first, we expect budget constrained governments to choose those structures that are able to release public funds.

- *H1: The use of PFI/CP is positively associated with public budget constraints;*

Second, we expect debt hiding as a possible, but not unique motivation able to explain the budget constraint effect.

- *H2: Without debt hiding reasons, the impact of budget constraints on the use of PFI/CP should decrease remaining positive.*

## 2 Institutional details

In this Section, we first focus on the description of French municipalities' budget elaboration and control processes. Then, we analyze how the accounting rule of PFI/CP contracts can lead to debt hiding behaviors. Finally, we present the new accounting rule since 2011 which could limit this opportunistic motivation of using PFI/CP.

### 2.1 French municipalities and the budget constraint

French municipalities count 36 thousands and are called "communes". They represent the fifth administrative level of France. Each one has a mayor and a municipal council who jointly manage the administration

with exactly the same powers (no matter the size of the commune). In terms of investment, they are in charge of: pre-primary and primary schools, libraries, cultural and sport centers, urban equipments. With the principle of municipal self-government, much freedom is left to the municipality for the investment organization and financing. However, their budget is constrained as they have to achieve a balanced public account, both for the investment and the operation sections.

Following the General Code for Local Authorities<sup>12</sup>, annually, municipalities are obliged to specify a balanced budget for the coming year, which should contain a plan for the balancing of the investment and the operating budgets. The operating revenue is mainly composed by local taxes and government grants. The operating expenses are those related to the on-going operation of the municipality: staff salaries, maintenance costs of infrastructures, expenses related to the municipality's missions, financial cost of existing debt. The investment revenue is composed by several sources. The surplus of the operating budget is the main revenue of the investment budget (42% in 2012). Government transfers and grants represent 24%, duties 10%, and finally local taxes and loan represent the remaining 24%<sup>13</sup>. The investment expenses cover the payment of the annual debt services, as well as new investment in infrastructures. It is important to emphasize that municipalities are only allowed to take loans for new investment. Once the infrastructure is built, another loan can not be taken to cover debt services.

As enacted in the Consitution in 2008, the balancing of public accounts is also required as a multiannual objective. This objective is controlled by two levels: the Administrative Courts and the Regional Court of Accounts (Chambre régional des Comptes). The first control includes the Prefect supervision on the effective balance of municipalities' accounts, as well as the possibility for administrative courts to take actions against a misuse of power of the Mayor. The second instrument aims at checking both the ex ante achievement of the budget balanced requirements and the ex post excessive deficits with respect to the budget balanced targets (5 to 10%<sup>14</sup>). Nevertheless, the control procedure normally takes the form of support rather than sanctions.

In such a context, heavily indebted municipalities have higher levels of budget constraint to achieve their infrastructures investment strategies<sup>15</sup> (JORF 2012). Indeed, the existing debt is a burden for both the operating and the investment budget of municipalities: high existing debts drive higher levels of financial costs (which are part of the operating expenses) and higher levels of annual debt services (which are part of the investment expenses). As consequence, the only way for these municipalities to achieve the same level of investment as other municipalities would be taking larger and more costly loans from commercial banks.

## 2.2 Public Private Partnership and Debt Hiding possibility

Within this context, PFI/CP (and PPPs in general), since accounted as off balance-sheet following the

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<sup>12</sup>The General Code for Local Authorities (Code général des collectivités territoriales - CGCT) in France includes laws and regulations applied to the three main levels of local authorities: municipality, department and region.

<sup>13</sup>Data come from the Ministry of the Interior: [http://www.collectivites-locales.gouv.fr/files/files/OFL\\_2013%282%29.pdf](http://www.collectivites-locales.gouv.fr/files/files/OFL_2013%282%29.pdf)

<sup>14</sup>10% for municipalities with a population that is less than 20 thousand citizens, 5% otherwise

<sup>15</sup>The Report of the Journal Officiel de la République Française stated that the level of public investment in France had slowed down in the 90s due to a hard budget constraint and a high level of public debt (JORF 2012)

Eurostat decision in 2004, seem to be a possible solution to release budget constraints. The Eurostat rule classifies infrastructures realized through PPPs as non-governmental if the construction risk and at least one of either availability or demand risk are transferred to the private operator. Thereby, PFI/CP was accounted based on the logic of accrual accounting: the annual payment related to the investment, financial and operating costs was reflected in the public account; the remaining part was accounted as a multiannual plan of payment in an appendix to the balance-sheet. As a consequence, the debt corresponding to PFI/CP did not appear on the public account. This accounting rule increases incentives in favor of PFI/CP procedures, as stated by the House of Commons (2011): “given the salience of the public debt statistics in the current political climate, the attractiveness of the PFI method for any government has been evident whether it provides value for money or not”.

Since January 1st 2011, the new Decree requires that PFI/CP commitments are no longer recognized off the balance sheet, both for existing and new projects. Based on the logic of control introduced by the International Financial Reporting Standards (thereafter IFRS), this new rule leads to the recognition of the asset and of the corresponding debt as soon as the infrastructure is delivered. In other word, on the balance-sheet, the capital value of the investment is recorded within the assets, while the already-paid investment and the remaining debt are recorded within the liabilities. The implementation of the new regulation ensures a greater transparency on the real financial situation of the governmental body and might significantly reduce the temptations to choose PPPs for hiding the debt (Dupas et al. 2012).

## 3 Data description

### 3.1 Initial database

Our data are collected in collaboration with the French Ministry of Finances and Economy. Data for PFI/CP contracts are collected with the MaPPP department. Information as the investment amount, year of signature and the contract sector have been coded. Among the totality of 138 local PFI/CP that have been signed since its creation in 2004 to August 2013, 101 are at the municipal level. These are very small and very big municipalities; the smallest counts 2500 habitants, while the biggest counts 847 thousand habitants. They invest in average 25 million of euros each year and are heavily indebted. Their debt represents on average 89,7% of the budget, while the national average is 77%. Their annual debt payment represents in average 12% of the budget. The mayor of these municipalities can be both from right-wing (52%) and left-wing (38%).

Figure 1: Number of PFI/CP per year by sector

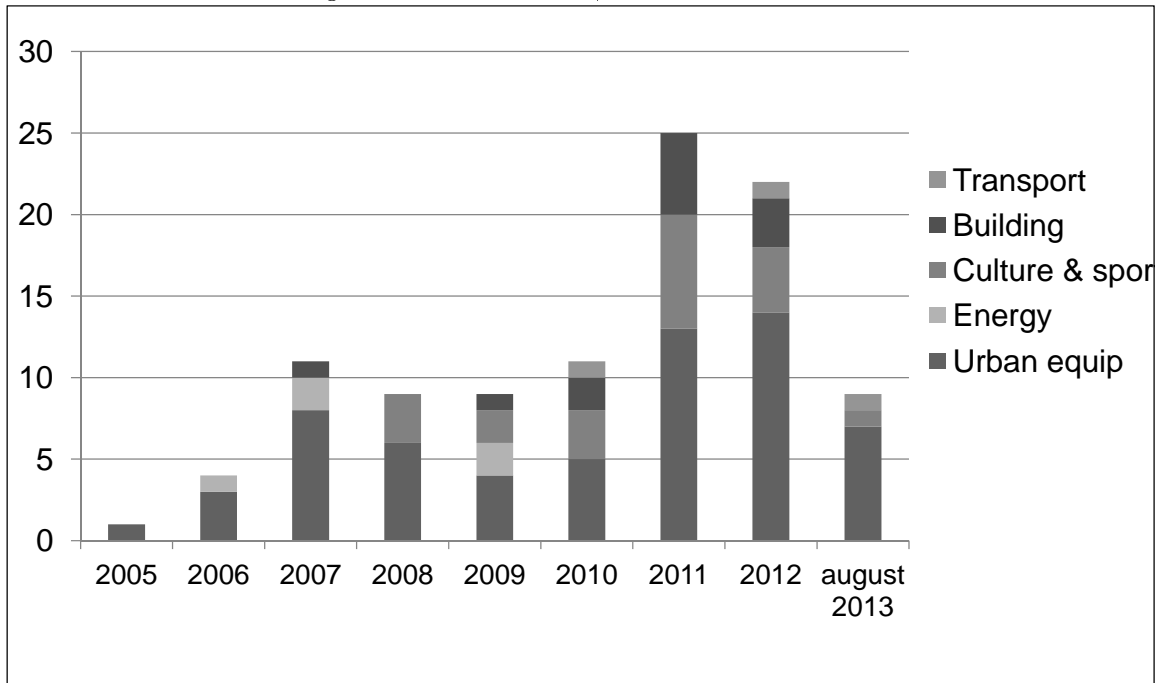


Figure 2: PFI/CP investment per year at the municipal level (millions of euros)

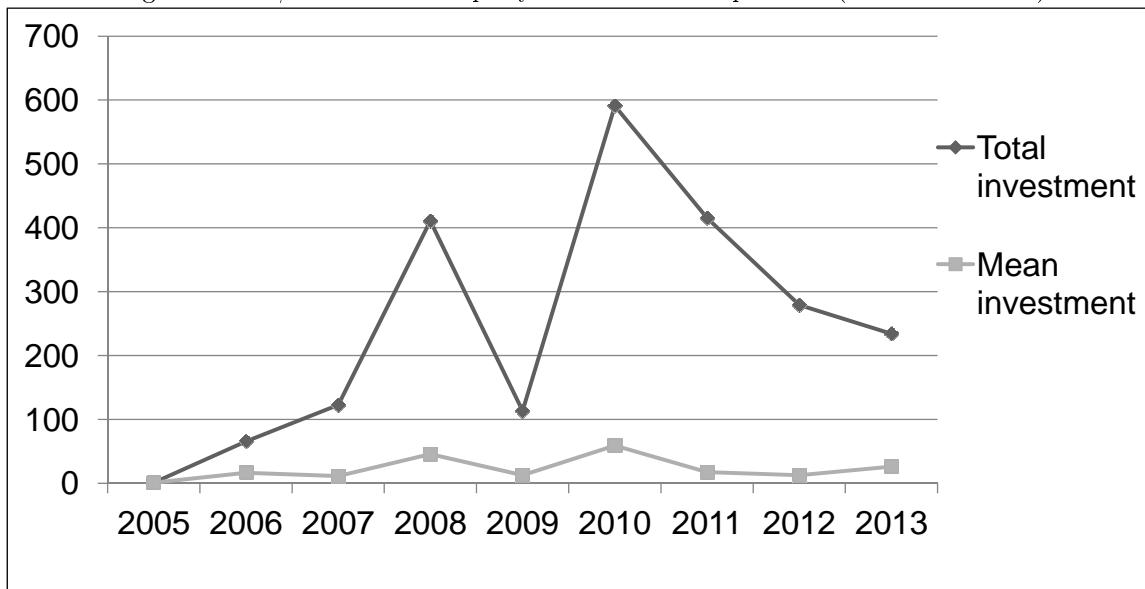


Figure 2 and 3 describe the investment in PFI/CP of these municipalities. The main sectors where municipalities use PFI/CP are public equipments and culture & sport equipments<sup>16</sup>. Other sectors are waste

<sup>16</sup>Public equipments under PFI/CP are almost public lighting projects. Culture and sport equipments are mainly composed by stadiums and theatres



treatment/energy and buildings<sup>17</sup> (Figure 1). In terms of number of concluded PFI/CP, we observe a slow adoption by French municipalities of this new kind of contracts. Created in 2004, it's only in 2007 that PFI/CP became popular with 13 signed contracts at the municipal level. This trend can be explained by a multi-step procedure before the conclusion of a PFI/CP (Saussier & Tran 2012). Since then, we observe an increasing number of PFI/CP per year till 2011; thereafter, the number of total contracts is still significant, but the trend is negative (Figure 1). Our sample includes 55 contracts before 2011 and 56 after 2011 (Figure 1). In terms of investment amount in PFI/CP, even if the total investment amount per year has decreased after 2010, the average per contract stays fairly stable (Figure 2). It is also worth mentioning that six municipalities have more than one PFI/CP.

### 3.2 Control group

The first dataset we built doesn't permit the distinction between municipalities that have chosen different investment options. To overcome this limit, we need to create a control group within the French municipalities (about 36000 observations) that have selected alternative investment options, e.g. Traditional Procurements.

With the aim of performing a suitable comparison, we choose a matching strategy that allows us to create a control group as similar as possible to our treatment group in terms of observable characteristics. The use of the matching strategy as choice-based sampling designs is already discussed in the literature (Rosenbaum & Rubin 1985, Rubin & Thomas 2000, Abadie et al. 2007, Heckman & Todd 2009) and is frequently chosen in evaluation studies to reduce costs of data collection in situations where the potential population of control is much larger than the treatment sample.

The matching variables for our treatment group of municipalities having at least one PFI/CP are furnished by the National Institute of Statistics and Economic Studies (INSEE). We matched municipalities in terms of their need of public investments (population features), while the institutional side has not been taken into account for the sample selection. This strategy is coherent with our research analysis inasmuch as we would like to test what is the impact of the local government features (supply side) in selecting PFI/CP among municipalities with the same potential demand for these types of investments. We captured the potential local request through several variables regarding years 2009, 2010, 2011 that reflect: population size, area, number of accommodations, number of households, total income, total tax revenues, number of workers, number of unemployed people, the distribution for age of the population, the number of firms for different sectors and the number of SMEs (Small and Medium Enterprises).

The procedure we implemented requires several steps. First, we estimated the propensity score using a logistic regression and a nearest neighbours estimation; our dependent variable is a dummy describing if a

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<sup>17</sup>The building sector includes schools and administration buildings

municipality has undertaken or not a PFI/CP investment, while the covariates are the selected matching variables<sup>18</sup>. Second, we chose the two nearest neighbour observations in terms of propensity score for each municipality of our PFI/CP group.

At the end, we obtain a sample of 303 municipalities where 101 come from our initial database, while the remaining is our control group. As final step, we gathered the same financial information as the initial dataset for each municipality of our control group.

### 3.3 Our final dataset

The final dataset allows us to compute the effect of budget variables on the use of PFI/CP instead of other contractual types<sup>19</sup>. Our strategy is based on the assumption that any observable and unobservable differences in terms of investment demand between the two groups are ruled out by performing the empirical strategy only over effectively comparable observations<sup>20</sup>. As a second step, we gathered a set of control data describing the supply side (municipalities' features) on the website of the French Ministry of Finances and Economy<sup>21</sup>. For each municipality, three sets of information are collected: financial budget dimensions (debt, investment, budget), political and geographical details, and institutional features.

Table 1 gives the main budget characteristics of the two groups in our dataset: Group "PFI/CP with 101 observations and group "No PFI/CP" with 202 observations. The level of investment in PFI/CP is on average 22.3 million of euros for the first group, and 0 for the other one. Municipalities in the first group are more indebted than the ones in the second group. The total debt in million of euros is about 66 for the first group, but only 46 for the second. The share of debt over budget is also higher for the group "PFI/CP" (90% versus 75%). On the other hand, we observe a higher level of investment in all kinds of contractual agreements for the second group (29 million of euros versus 25 for the group "PFI/CP"). We conclude that municipalities in the group "No PFI/CP" have their own investment strategy, but they didn't choose PFI/CP as contractual agreements.

## 4 Empirical Strategy

In this section we describe the strategy we follow to investigate the effect of budget constraints on PFI/CP

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<sup>18</sup>We report the ptest that controls for the correct achievement of the matching strategy in Table 6 (Appendix)

<sup>19</sup>Our control group, that has been selected with a propensity score matching strategy, contains only municipalities that are comparable with the ones having at least one PFI/CP in terms of their investment demand

<sup>20</sup>This assumption can seem too strong for a very heterogenous sample, but it is plausible for the French system that is characterized by a quite homogenous market and institutional framework

<sup>21</sup><http://www.collectivites-locales.gouv.fr>

Table 1: Dataset description

	Group « PFI/CP » 101 obs	Group « No PFI/CP » 202 obs
PFI/CP investment (€ mil)	22,3	0
PFI/CP choice	1	0
Debt (€ mil) <sup>22</sup>	66	46
Debt over budget	90%	75%
Annual debt payment over budget	12%	10%
Investment (€ mil)	25	29

investment and how this impact changes after the introduction of the new rule in 2011. The variables descriptions with the expected signs are reported in Table 6 in the Appendix.

#### 4.1 Dependent variables

As previously discussed, we are interested in explaining the use of PFI/CP by French municipalities. We first introduce  $pfi - choice$ , a dummy variable equalling to 1 for municipalities which have at least one PFI/CP, and 0 otherwise. As a development of the analysis, we furtherly use  $pfi - invest_i$ , which is the log of the amount of investment in PFI/CP in thousand of euros by municipality  $i$ .

#### 4.2 Explanatory variables

The level of budget constraint of each municipality is measured by its level of debt. Data are collected for the two years preceding the contract signature. This choice is consistent with the idea of capturing ex ante budget constraints and permits to avoid problems of simultaneity. The t-1 information is the most close figure available before the conclusion of the agreement, while the t-2 data reflects the municipality financial condition when it started the investment procedure that takes, on average, two years from its beginning to its conclusion (Saussier & Tran 2012). The level of debt of each municipality is collected under several forms:

- $debt_i$ : the log of debt in euros;
- $debt - capite_i$ : the log of the debt per capite;
- $debt - income_i$ : the log of the debt over income;
- $debt - budget_i$ : the level of debt in percentage of the budget;
- $strate_i$ : the comparative debt over budget <sup>23</sup>;
- $annuity_i$ : the annual debt services;

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<sup>23</sup>the level of debt in percentage of the budget as difference with similar municipalities

- $CAF_i$ : the financing capacity<sup>24</sup>.

The first four measures are stock variables that capture the ex ante exogenous situation of the municipality, while the last two measures are flow variables that describe how the municipality condition changes during the period preceding the investment start.

Debt hiding reasons for doing PFI/CP in France are ruled out in 2011. We take into account this legal discontinuity by introducing the variable *rule* that is equals to 1 when the contract signature was after January 1st 2011, and 0 for those investments previously signed.

### 4.3 Control variables

Knowing that we are comparing similar municipalities in terms of population features, we select the remaining covariates that could influence both the dependent variable and the budget constraint proxy. Indeed, we collect all those information able to reflect the institutional aspect of the municipality, i.e.: financial, political and geographical features.

At first, we consider financial variables that reflect municipalities' capacity to deal with the investment's demand. Then, we include:  $budget_i$  which is the log of the investment budget of municipality  $i$ , and  $invest_i$  which is the log of investment amount of municipality  $i$ . For avoiding problem of simultaneity and for capturing the ex ante financial conditions, we collect information at t-1 and t-2 with respect to the investment year (both for the treated municipalities and for the corresponding matched observations). We don't expect municipalities that invest in PFI/CP contracts to invest more, on average, compared to control municipalities.

Then, we collect data capturing political and institutional features of the municipality. We first include the majority political party: *Left* for the left-wing party, *right* for the right-wing party, *center* for the center party. As stated by Krumm and Mause (2012), we expect the right-wing party to be more prone to invest through PFI/CP. Second, we introduce the variable *mandate* for considering the mayor term in office up to the investigated year. Third, we include *EQI*, which is the European Quality of Government Index at the regional level (Charron, Lapuente et al. 2012)<sup>25</sup>.

Finally, we take into consideration the geographical position of each municipality, *geo*, in order to investigate whether there is a trend toward PFI/CP choices among neighbour municipalities (Costa et al. 2013).

<sup>24</sup>A higher level of self-financing reflects a lower level of budget constraint

<sup>25</sup>This index is the combination of the level of corruption, protection of the rule of law, government effectiveness and accountability at regional levels in the 27 EU Member States. The measures are collected in 172 EU regions, based on a survey of 34 000 residents across 18 countries (Charron, Lapuente et al. 2012).

According to the French telephone numbering plan, we divide France into 6 zones: Île-de-France, Northwest France, Northeast France, Southeast France, Southwest France, islands and overseas departments.

#### 4.4 Regression model

We use the described variables to test, through the following regression, the effect of the budget constraint of municipality  $i$  on the implementation of the PFI/CP project  $j$ :

$$Y_{ij} = \beta_0 + \beta_1 debt_{ij} + \beta_2 rule + \beta_3 rule * debt_{ij} + BX_{ij} + \epsilon_{ij}$$

$Y_{ij}$  is the relevant outcome variable, either the the dummy variable equal to 1 for municipalities in the group “PFI/CP” and 0 otherwise or the log of the amount of PFI/CP investment;  $X_{ij}$  is the vector of covariates;  $debt_i$  reflects our budget constraint proxy<sup>26</sup>.

We study both the general impact of the budget constraint on the dependent variable ( $\beta_1$ ) and the change of this effect after the introduction of the 2011 rule ( $\beta_3$ ). As already discussed, we expect that the budget constraint positively influences the PFI/CP adoption ( $\beta_1$ ), while we expect the coefficient  $\beta_3$  to be negative<sup>27</sup>.

Using the whole dataset of 303 observations, we first perform a PROBIT regression to investigate the budget constraint effect on the decision between doing or not a PFI/CP. As a robustness check, we test our research question on the amount of PFI/CP investment. In such a case, having a censored dependent variable (because of the 202 observations at 0 in our control group) we run a TOBIT regression.

In the analysis, it is assumed that municipalities first decide their desired level of investment; second, they choose the optimal organizational and financing mechanism. Both choices are endogenous; the first is supposed as driven by population’s needs (demand side), while the method of investment is set at an institutional level (supply side). Because of the applied matching strategy, we don’t expect that municipalities in our final dataset differ in terms of investment level (first choice), while they are different with respect to the chosen investment method (second choice). We use both the PROBIT and the TOBIT regressions to study the nature of this heterogeneity that we expect to be mainly driven by their financial conditions and budget constraints.

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<sup>26</sup>We run a regression for each measure of the budget constraint

<sup>27</sup> Indeed, the introduction of the Decree 2011 should rule out the debt hiding reasons for choosing PFI/CP

## 5 Empirical results and economic interpretation

We first resume the PROBIT regression applied to the whole dataset in Table 2.

Table 2: PROBIT estimation for the impact of budget constraint on PFI/CP choice

	(1)	(2)	(3)	(4)
	treatment	treatment	treatment	treatment
<i>left</i>	-0.499*** (-2.87)	-0.499*** (-2.87)	-0.528*** (-2.99)	-0.528*** (-2.99)
<i>rule</i>	-0.237 (-0.22)	-0.239 (-0.22)	-0.209 (-0.19)	-0.205 (-0.19)
<i>budget1</i>	0.113 (0.42)	0.111 (0.40)		
<i>investment1</i>	-0.353* (-1.85)	-0.353* (-1.85)		
<i>debt – per – capite1</i>	0.424*** (3.21)	0.415** (2.03)		
<i>rule * debt – per – capite1</i>		0.0135 (0.06)		
<i>budget2</i>			0.131 (0.49)	0.140 (0.52)
<i>investment2</i>			-0.581*** (-2.87)	-0.583*** (-2.88)
<i>debt – per – capite2</i>			0.532*** (3.69)	0.559** (2.52)
<i>rule * debt – per – capite2</i>				-0.0389 (-0.16)
<i>–cons</i>	0.832 (0.54)	0.832 (0.54)	0.839 (0.54)	0.832 (0.53)
N	303	303	303	303
<i>debt – post2011</i>		0.428*** (2.80)		0.520*** (3.20)

*t* statistics in parentheses.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

In the regression the following variables are included: trend, the interaction between trend and rule, geographical dummies, mayor duration, population, income

The analysis consists on four parts. The first two regressions aim at testing what is the impact of the budget constraint at t-1 on the level of PFI/CP investment. The last two regressions replicate the analysis using as proxy for the budget constraint data at t-2. The effect is firstly studied for the entire period of interest (columns 1 and 2). Subsequently, the interaction variable between the *rule* and the budget constraint index is introduced to compute the differential impact of the budget constraint after the introduction of the 2011 rule (columns 3 and 4). The post2011 statistic assesses whether or not the budget constraint effect is relevant after 2011 by testing the significance of the sum between coefficients  $\beta_1$  and  $\beta_3$ . The explicative variables (*debt\_capite1* and *debt\_capite2*) represent the debt per capite of each municipality. This index is one of the most important figures that banks take into account for deciding the level and the cost of debt

granted to municipalities. The regressions with other budget constraint proxies as explanatory variables are reported in Tables 5 and 6 in the Appendix. Apart from the described control variables, we run the four regressions taking furtherly into account: the trend of the *pfi – choice* and its change after 2011, as well as the level of population at the investment time and the total municipality income in 2009<sup>28</sup>.

The coefficient of the debt stress variable is positive and significant both when the budget data are considered at t-1 (regressions 1 and 2) and t-2 (regressions 3 and 4). Thereby, the level of PFI/CP investment increases when the municipality is constrained in its ability to collect funds. We are not perfectly able to identify which channels drive this effect, nevertheless we can use the Decree in 2011 for testing the absence or not of debt hiding motivations. The coefficient of the interaction term *rule \* debt – per – capite* is negative in most of the analysed specifications, but it is never significant (regression 2 - 4 and tables 5 - 6). The *post2011* coefficient is positive and significant both considering the regressions in t-1 and t-2. We conclude that the impact of the budget constraint remains positive even after the introduction of the rule. Furthermore, the size of the impact doesn't really change considering the entire period of interest or just the post 2011 effect: from 0.424 to 0.428 in t-1; from 0.532 to 0.520 in t-2. This result confirms the presence of alternative reasons compared to debt hiding motivations for choosing PFI/CP investment in contexts of hard budget constraints.

Covariates that come out to be significant are: the level of budget, the political party and the level of total investment. The first variable reflects the economical size of the municipality and it highlights as, more the budget of the city is high, more the PFI/CP investment increases. The political party covariate confirms, instead, the conventional wisdom according to which PFI/CP investment are more incentivized by the right party (Krumm & Mause 2012). Finally, it's important to highlight the negative and significant impact of the investment variables that capture the total long term investments ("total des emplois d'investissement" in the French municipality balance sheet) set up by municipalities. Controlling for the investment size, it's possible to observe how municipalities in the control group tend to invest more or at the same level of collectivities that have chosen PFI/CP. These result seem to confirm that we are comparing municipalities with equal demand for long term projects that have only selected different methods of investment.

The outcomes regarding the TOBIT regressions are described in Tables 7-8-9 in the appendix. The results substantially confirm the conclusion of the PROBIT analysis.

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<sup>28</sup>We use previous income years when the 2009 information was not available.

## 5.1 Interpretation and limits

The initial goal of this paper was the test of our hypotheses about the impact of public budget constraints on investment organizational choices. Thanks to the empirical analysis, we can finally state that the government's choice of doing or not a PFI/CP is affected by the level of financial stress; furthermore this impact cannot be exclusively explained by the accounting advantages that normally characterize PFI/CP projects. What is left to our interpretation is the discussion regarding the reasons that make budget constrained governments more inclined towards PFI/CP contracts. Apart from the debt hiding motivations, there are alternative channels that come from the literature or are discussed at a practical level; i.e.:

- First, governments can face temporary liquidity constraints (Engel et al. 2013). In such a case, the upfront spending required by TP can become more expensive than future transfers required by PPPs (distortionary cost of taxation is higher now than in the future). This benefit holds unless the planner can decide to optimally postpone the project (Engel et al. 2013) or TP repayment systems can be delayed by mimicking the timing allowed under PPPs<sup>29</sup>.
- Second, the introduction of asymmetric information can affect the choice between PPPs and TP by giving relevance to the shadow cost of public funds. Indeed, governments, through PPPs, can entrust the investment decision to better informed agents (Auriol & Picard 2013) or save incentive rents thanks to the long term involvement of the private agent (Buso 2013).
- Finally, even after the introduction of the 2011 rule, debt hiding motivations could persist. This explanation should not be so relevant given the effectiveness of the French ordonnance in ruling out accounting advantages (see institutional paragraph).

On the other hand, what we capture with our results rests on the goodness of our empirical strategy. In order to validate the analysis, we perform several robustness checks<sup>30</sup>.

At first, we ask ourselves if we really answer our initial research questions. Indeed, it's not so clear whether our dependent variable captures different methods of investment or just different propensity to invest. In order to control for this possible objection, we perform the matching strategy, furthermore we collect data from municipalities' balance sheets as the size of the budget and the level of investment. As additional check, we run several regressions using as dependent variable our treatment dummy and as control variables

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<sup>29</sup>It is also important to highlight how high levels of public debt don't directly imply government liquidity constraints

<sup>30</sup>The analyses we perform as robustness checks are available under explicit request to the authors



covariates that reflect the same information we use for the matching strategy (population, income, area, nb of firm, nb. of workers etc.) in different periods of time (2010-2011, 2009, 2006-2008, 1999-2005)<sup>31</sup>. Our main results are not affected by the included variables that come out not statistically significant. This control represents a test for our matching strategy and confirms that we compare similar municipalities in terms of propensity to invest (both in 1999 and 2011).

A second source of uncertainty stays in the interpretation of the interaction term between the accounting rule and the debt. In fact, the impact of the policy can be anticipated or posticipated by public buyers. We control, using different thresholds<sup>32</sup>, if the rule has its effects in previous or following years, but it's not the case. Furthermore, there could exist external factors influencing the trend of the budget constraint proxy that are also correlated with the PFI/CP dependent variables. An example would be the financial crisis that can make PFI/CP investment more costly for the public buyer, especially when the last is constrained in the total available resources (Marty and Tran 2013). This effect should overemphasize the potential impact of the rule, therefore we are potentially overestimating the size of the debt hiding motivations and underestimating the relevance of alternative channels.

Third, we check whether our PROBIT results are credible. We run as alternatives specifications regressions using LOGIT and linear probability models. Moreover we control whether the marginal effects comes out to be statistically significant. Both checks confirm the reliability of our results, showing how they don't depend on the chosen specification method.

Finally, we perform, as robustness check, another propensity score matching strategy including in the analysis all the local administration levels: municipalities, departments and regions. We use a smaller set of matching variables still furnished by the National Institute of Statistics and Economic Studies (INSEE) to derive a different control group. With this analysis, final outcomes don't substantially change<sup>33</sup>. As consequence, our results don't depend on the chosen matching variables and on the resulting control group.

## 6 Conclusion

In this paper we studied whether a public authority burdened by a hard budget constraint is more tempted from choosing PFI/CP, thereafter we examine the nature of this effect; i.e, is it just for debt hiding? We find that a budget constraint is associated with higher use of PFI/CP. However, while the new accounting

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<sup>31</sup>Data in 2009, 2010 and 2011 are the same that we use for the matching strategy

<sup>32</sup>We control for every year and we always find not significative impacts

<sup>33</sup>The analysis with the database that includes regions, departments and municipalities is developed in a precedent version of the paper, which can be made available under explicit request to the authors. The results we found are not qualitatively different from the ones presented in the current version of the paper

rule in 2011 might significantly changes the temptation for municipalities to hide debt and consequentially decreases the impact of financial pressure on PFI/CP investment, the budget constraint effect continues to be positive and significant. We therefore conclude that debt hiding is not the only motivation when financial stressed municipalities choose PFI/CP investment.

Our empirical result contributes to the literature inasmuch us it doesn't just detect the effect of budget constraints, but it looks at the possible motivations that induce constrained public authorities to choose PPPs; we finally discover that debt hiding reasons are not the only relevant. This paper is, at the best of our knowledge, the first direct empirical analysis on this topic.

From a practical point of view, the paper can partially explain why countries have stepped up their use of PPPs in recent years. Indeed, the OECD report in 2009 stated that PPPs had grown to comprise a portion, although not the majority, of capital budgets in several countries<sup>34</sup>. This evolution has experienced a temporary decline during the current crisis (EPEC 2011), nevertheless the long term trend is expected as positive (Wagenvoort et al., 2010). Our research faces with a very relevant problem in the current situation, where resources are scarce and much creativity is needed to incentivize the economic growth. Several extension are possible and further research are welcomed on the topic.

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<sup>34</sup>The United Kingdom has had the longest experience, with PPPs currently comprising from 10% to 15% of the capital budget in recent years. France and Korea have had similar experience, with PPPs comprising 20% and 15% of those countries' capital budgets respectively. Portugal reported the highest payments for PPPs, representing nearly 28% of the national budget or 9.4% of GDP; projects could add up to nearly 20% of GDP eventually (OECD 2009).

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## Appendix

Table 3: PS-TEST

Variable	Treated	Control	%bias	t	p>t
population_2009	35367	25448	12.5	1.35	0.181
population_1999	33663	24598	12.1	1.28	0.202
area	28626	31886	-3.1	-0.47	0.638
population_2009_men	16976	11728	14.2	1.38	0.169
accomodations_2009	19662	14281	12.9	1.25	0.213
main_residences_2009	16976	11728	14.2	1.38	0.169
second_residences_2009	1240.9	1517.9	-7.2	-0.43	0.667
vacant_accomodations_2009	1444.6	1034.6	11.8	1.24	0.217
owned_residences_2009	6965.3	5266.6	10.9	1.24	0.216
income_2009	4.7e+08	3.3e+08	13.0	1.32	0.189
taxpayers_2009	20678	14983	12.2	1.32	0.190
workers_2009	20195	14291	15.8	1.25	0.215
long_term_workers_2009	18327	13000	15.9	1.23	0.222
workers_1999	17857	12670	15.6	1.22	0.223
population_15-64_2009	23938	16610	14.0	1.41	0.159
unemployed_15-64_2009	2419	1658.1	13.3	1.43	0.155
employed_15-64_2009	16637	11732	14.0	1.38	0.169
total_firms_2010	3471.8	2432.9	12.8	1.34	0.181
agriculture_firms_2010	46.94	37.58	15.8	0.93	0.354
industry_firms_2010	155.95	118.12	11.6	1.25	0.214
construction_firms_2010	241.12	194.08	6.6	0.94	0.346
services_firms_2010	2466	1717.9	13.1	1.31	0.192
trade_firms_2010	702.65	536.27	10.7	1.09	0.279
public_firms	561.76	365.2	14.3	1.52	0.131
SMEs	998.84	706.87	13.7	1.34	0.183
No_SMEs	268.11	196.87	14.4	1.19	0.235

Table 4: Definition of variables and expected results

DIMENSION	VARIABLE	DEFINITION	EXPECTED RESULT
DEPENDANT VARIABLES			
Use of PFI/CP	<i>pfi_invest</i>	Equals to the log of the investment amount for the sample “PFI/CP”; equals to 0 for the sample “No PFI/CP”	+
	<i>pfi_choice</i>	Equals to 1 for the sample “PFI/CP”; 0 otherwise	+
INDEPENDANT VARIABLES			
Budget constraint	<i>debt</i>	Log of the debt amount of each municipality	+
	<i>debt_budget</i>	% of debt on budget of each municipality	+
	<i>debt_income</i>	% of debt over income of each municipality	+
	<i>strate</i>	% of debt on budget of each municipality minus mean of the % of debt on budget of similar municipalities	+
	<i>annuity</i>	Log of debt annuity of each municipality	+
	<i>CAF</i>	Log of annuity capability of self financing	-
Legal change	<i>rule</i>	Equals to 1 since 2011; 0 otherwise	-
	<i>rule*debt</i>	Interaction between the variable rule and debt	-
	<i>rule*debt_budget</i>	Interaction between the variable rule and debt_budget	-
	<i>rule*debt_income</i>	Interaction between the variable rule and debt_income	-
	<i>rule*strate</i>	Interaction between the variable rule and strate	-
	<i>rule*annuity</i>	Interaction between the variable rule and debt_annuity	-
	<i>rule*CAF</i>	Interaction between the variable rule and CAF	+
	<i>rule*debt_capite</i>	Interaction between the variable rule and debt_capite	-
Demand side	<i>population</i>	Equals to the log of the population of each municipality	
	<i>income_capite</i>	Equals to the log of oncome per capite of each municipality	
Supply side	<i>budget</i>	Equals to the log of the budget of each municipality	
	<i>investment</i>	Equals to the log of the investment of each municipality	-
Others	<i>geo</i>	Dummy variable: geo1, geo2, geo3, geo4, geo5, geo6	
	<i>firm</i>	n. of firms in the municipality	
	<i>employment</i>	n. of workers in the municipality	
	<i>sect</i>	Dummy variables: sect1 (building), sect2 (transport), sect3 (culture sport) sect4 (ICT), sect6 (urban equipment), sect7 (energy, waste treatment)	
	<i>politic</i>	Dummy variable: left wing, right wing, centre	
	<i>mayor_duration</i>	n. of years the mayor stayed in power	
	<i>eqi</i>	Equals to the European Quality of Region Government Index	

Table 5: PROBIT estimation for the impact of the budget constraint on PFI/CP choice (one year before)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment
budget1	0.113 (0.42)	0.110 (0.41)	0.537** (2.07)	0.532** (2.04)	0.525** (2.03)	0.520** (2.00)	0.113 (0.42)	0.149 (0.55)	0.352 (1.43)	0.349 (1.42)	0.139 (0.52)	0.138 (0.52)
investment1	-0.353* (-1.85)	-0.356* (-1.86)	-0.353* (-1.85)	-0.356* (-1.86)	-0.346* (-1.82)	-0.349* (-1.84)	-0.353* (-1.85)	-0.351* (-1.84)	-0.184 (-1.02)	-0.176 (-0.97)	-0.461** (-2.29)	-0.465** (-2.30)
EQI	0.0323 (0.07)	0.0204 (0.05)	0.0323 (0.07)	0.0281 (0.06)	0.0270 (0.06)	0.0207 (0.05)	0.0323 (0.07)	0.0740 (0.17)	-0.119 (-0.28)	-0.101 (-0.24)	-0.0637 (-0.15)	-0.0841 (-0.19)
left	-0.499*** (-2.87)	-0.501*** (-2.88)	-0.499*** (-2.87)	-0.501*** (-2.88)	-0.494*** (-2.84)	-0.496*** (-2.85)	-0.499*** (-2.87)	-0.504*** (-2.88)	-0.502*** (-2.94)	-0.495*** (-2.89)	-0.508*** (-2.90)	-0.511*** (-2.91)
mayor_duration	-0.00181 (-0.17)	-0.00198 (-0.19)	-0.00181 (-0.17)	-0.00130 (-0.12)	-0.00200 (-0.19)	-0.00148 (-0.14)	-0.00181 (-0.17)	-0.00221 (-0.21)	-0.00388 (-0.38)	-0.00319 (-0.31)	0.00000736 (0.00)	-0.000414 (-0.04)
trend_year	0.0140 (0.16)	0.0139 (0.16)	0.0140 (0.16)	0.00874 (0.10)	0.0125 (0.14)	0.00679 (0.08)	0.0140 (0.16)	0.0162 (0.18)	0.0117 (0.14)	0.00902 (0.10)	0.0270 (0.31)	0.0263 (0.30)
trend_rule	0.0288 (0.16)	0.0308 (0.17)	0.0288 (0.16)	0.0321 (0.18)	0.0330 (0.19)	0.0367 (0.21)	0.0288 (0.16)	0.0280 (0.16)	0.0304 (0.18)	0.0178 (0.10)	-0.0167 (-0.09)	-0.0145 (-0.08)
rule	-0.237 (-0.22)	-0.490 (-0.35)	-0.237 (-0.22)	-0.197 (-0.18)	-0.274 (-0.25)	-0.269 (-0.25)	-0.237 (-0.22)	-2.455 (-1.09)	-0.245 (-0.23)	-0.0554 (-0.05)	0.0967 (0.09)	-0.260 (-0.19)
debt1	0.424*** (3.21)	0.409*** (2.88)	0.424*** (3.21)	0.331 (1.58)	0.401*** (3.10)	0.298 (1.46)	0.424*** (3.21)	0.583*** (2.97)	-0.00000699 (-0.93)	-0.00000470 (-0.93)	0.594*** (3.86)	0.567*** (3.44)
rule_debt1	0.0249 (0.28)	0.0249 (0.28)	0.0249 (0.28)	0.147 (0.56)	0.163 (0.63)	0.163 (0.63)	0.147 (0.56)	-0.236 (-1.13)	0.0449 (0.47)	0.0449 (0.47)	0.0449 (0.47)	0.0449 (0.47)
debt_budget1												
rule_debt_budget1												
stratel												
rule_stratel												
debt_income1												
rule_debt_income1												
CAF1												
rule_CAF1												
annuity1												
rule_annuity1												
_cons	0.832 (0.54)	0.950 (0.60)	0.832 (0.54)	0.827 (0.54)	0.617 (0.41)	0.617 (0.41)	0.832 (0.54)	2.617 (1.14)	-0.817 (-0.55)	-1.031 (-0.70)	2.001 (1.24)	2.168 (1.32)
N	303	303	303	303	303	303	303	303	303	303	303	303
post2011(debt)		0.434*** (3.15)		0.478*** (2.85)		0.347*** (2.40)		-0.0000170 (-1.44)		0.612*** (3.82)		0.461*** (2.81)
t												

t statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ 

In the regression the following variables are included: geographical dummies, population, income.

Table 6: PROBIT estimation for the impact of the budget constraint on PFI/CP choice (two year before)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment	treatment
budget2	0.131 (0.49)	0.129 (0.49)	0.663*** (2.63)	0.647** (2.54)	0.643** (2.57)	0.625** (2.48)	0.131 (0.49)	0.201 (0.75)	0.471** (2.04)	0.467** (2.02)	0.251 (1.05)	0.249 (1.05)
investment2	-0.581*** (-2.87)	-0.581*** (-2.87)	-0.581*** (-2.87)	-0.577*** (-2.84)	-0.561*** (-2.81)	-0.555*** (-2.77)	-0.581*** (-2.87)	-0.605*** (-3.00)	-0.326* (-1.83)	-0.317* (-1.77)	-0.689*** (-3.33)	-0.691*** (-3.34)
EQI	0.0300 (0.07)	0.0247 (0.06)	0.0300 (0.07)	0.0266 (0.06)	0.0314 (0.07)	0.0254 (0.06)	0.0300 (0.07)	0.0869 (0.20)	-0.184 (-0.43)	-0.158 (-0.37)	-0.0893 (-0.20)	-0.107 (-0.24)
left	-0.528*** (-2.99)	-0.528*** (-2.99)	-0.528*** (-2.99)	-0.527*** (-2.98)	-0.523*** (-2.97)	-0.520*** (-2.95)	-0.528*** (-2.99)	-0.538*** (-3.03)	-0.505*** (-2.92)	-0.501*** (-2.90)	-0.533*** (-2.99)	-0.535*** (-3.00)
mayor_duration	-0.00364 (-0.34)	-0.00371 (-0.35)	-0.00364 (-0.34)	-0.00324 (-0.30)	-0.00365 (-0.34)	-0.00330 (-0.31)	-0.00364 (-0.34)	-0.00364 (-0.34)	-0.00613 (-0.59)	-0.00547 (-0.52)	-0.00413 (-0.39)	-0.00440 (-0.41)
trend_year	-0.00122 (-0.01)	-0.00139 (-0.02)	-0.00122 (-0.01)	-0.00811 (-0.09)	-0.00487 (-0.06)	-0.0118 (-0.13)	-0.00122 (-0.01)	0.0000517 (0.00)	-0.00131 (-0.02)	-0.00252 (-0.03)	0.0168 (0.19)	0.0154 (0.18)
trend_rule	0.0305 (0.17)	0.0313 (0.17)	0.0305 (0.17)	0.0346 (0.19)	0.0308 (0.17)	0.0343 (0.19)	0.0305 (0.17)	0.0325 (0.18)	0.0435 (0.25)	0.0389 (0.22)	-0.0215 (-0.12)	-0.0190 (-0.10)
rule	-0.209 (-0.19)	-0.323 (-0.22)	-0.209 (-0.19)	-0.166 (-0.15)	-0.204 (-0.19)	-0.193 (-0.17)	-0.209 (-0.19)	-2.984 (-1.31)	-0.279 (-0.26)	-0.185 (-0.17)	0.152 (0.14)	-0.0813 (-0.06)
debt2	0.532*** (3.69)	0.525*** (3.41)	0.532*** (3.69)	0.429* (1.92)	0.497*** (3.57)	0.383* (1.76)	0.532*** (3.69)	0.734*** (3.55)	-0.0000222* (-1.92)	-0.0000174 (-1.18)	0.610*** (3.78)	0.592*** (3.45)
rule_debt2	0.0113 (0.12)	0.0113 (0.12)	0.0113 (0.12)	0.165 (0.59)	0.180 (0.66)	0.180 (0.66)	0.180 (0.66)	-0.293 (-1.39)	-0.00000916 (-0.54)	-0.00000916 (-0.54)	0.0290 (0.31)	0.0290 (0.31)
strate2												
rule_strate2												
debt_income2												
rule_debt_income2												
CAF2												
rule_CAF2												
annuity2												
rule_annuity2												
_cons	0.839 (0.54)	0.895 (0.55)	0.839 (0.54)	0.860 (0.55)	0.578 (0.37)	0.603 (0.39)	0.839 (0.54)	2.940 (1.28)	-1.667 (-1.09)	-1.626 (-1.06)	2.755 (1.53)	2.865 (1.56)
N	303	303	303	303	303	303	303	303	303	303	303	303
post2011 (debt)	0.537	0.537	0.537	0.594	0.594	0.564	0.440	0.440	-0.0000265	-0.0000265	0.621	0.621
t	3.588	3.588	3.588	3.243	3.243	3.193	2.914	2.914	-1.854	-1.854	3.753	3.753

t statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ 

In the regression the following variables are included: geographical dummies, population, income.



Table 7: TOBIT estimation for the impact of debt per capite on PFI/CP investment

	(1)	(2)	(3)	(4)
	pfi_invest	pfi_invest	pfi_invest	pfi_invest
budget1	0.579 (0.25)	0.560 (0.23)		
investment1	-2.827* (-1.73)	-2.825* (-1.73)		
EQI	0.415 (0.11)	0.401 (0.11)	0.331 (0.09)	0.380 (0.10)
left	-4.370*** (-2.95)	-4.372*** (-2.95)	-4.441*** (-3.03)	-4.443*** (-3.03)
mayor_duration	-0.00409 (-0.05)	-0.00372 (-0.04)	-0.0195 (-0.22)	-0.0204 (-0.23)
trend_year	0.117 (0.16)	0.113 (0.15)	0.00811 (0.01)	0.0217 (0.03)
trend_rule	0.479 (0.32)	0.484 (0.32)	0.550 (0.37)	0.530 (0.36)
rule	-3.152 (-0.34)	-3.175 (-0.35)	-3.461 (-0.38)	-3.381 (-0.37)
debt_per_capite1	3.654*** (3.16)	3.582** (2.02)		
rule_debt_per_capite1		0.106 (0.05)		
budget2			0.814 (0.36)	0.894 (0.39)
investment2			-4.525*** (-2.71)	-4.552*** (-2.72)
debt_per_capite2			4.350*** (3.62)	4.606** (2.49)
rule_debt_per_capite2				-0.370 (-0.18)
_cons	-9.809 (-0.91)	-9.809 (-0.91)	-9.701 (-0.90)	-9.710 (-0.90)
_cons	9.282*** (11.85)	9.283*** (11.85)	9.132*** (11.88)	9.131*** (11.88)
N	301	301	301	301
post2011 (debt)		3.688***		4.237***
t		(2.77)		(3.15)

*t* statistics in parentheses

\*  $p < 0.10$  , \*\*  $p < 0.05$  , \*\*\*  $p < 0.01$

In the regression the following variables are included: geographical dummies, population, income

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	pf_invest	pf_invest	pf_invest	pf_invest	pf_invest	pf_invest	pf_invest	pf_invest	pf_invest	pf_invest	pf_invest	pf_invest
budget1	0.579 (0.25)	0.556 (0.24)	4.253* (1.88)	4.204* (1.86)	4.109* (1.83)	4.072* (1.80)	0.579 (0.25)	0.721 (0.31)	2.731 (1.23)	2.714 (1.23)	0.578 (0.25)	0.567 (0.25)
investment1	-2.827* (-1.73)	-2.835* (-1.74)	-2.827* (-1.73)	-2.839* (-1.74)	-2.747* (-1.69)	-2.758* (-1.69)	-2.827* (-1.73)	-2.789* (-1.71)	-1.337 (-0.84)	-1.296 (-0.81)	-3.695** (-2.20)	-3.711** (-2.20)
EQI	0.415 (0.11)	0.326 (0.09)	0.415 (0.11)	0.363 (0.10)	0.325 (0.09)	0.252 (0.07)	0.415 (0.11)	0.541 (0.15)	-1.110 (-0.30)	-0.937 (-0.25)	-0.295 (-0.08)	-0.420 (-0.12)
left	-4.370*** (-2.95)	-4.377*** (-2.95)	-4.370*** (-2.95)	-4.379*** (-2.95)	-4.321*** (-2.91)	-4.331*** (-2.92)	-4.370*** (-2.95)	-4.358*** (-2.94)	-4.500*** (-2.99)	-4.442*** (-2.95)	-4.388*** (-2.99)	-4.397*** (-2.99)
mayor_duration	-0.00409 (-0.05)	-0.00508 (-0.06)	-0.00409 (-0.05)	-0.000789 (-0.01)	-0.00657 (-0.07)	-0.00267 (-0.03)	-0.00409 (-0.05)	-0.00515 (-0.06)	-0.0196 (-0.22)	-0.0149 (-0.17)	0.0147 (0.17)	0.0126 (0.14)
trend_year	0.117 (0.16)	0.115 (0.16)	0.117 (0.16)	0.0840 (0.11)	0.106 (0.14)	0.0649 (0.09)	0.117 (0.16)	0.138 (0.19)	0.0607 (0.08)	0.0368 (0.05)	0.191 (0.27)	0.189 (0.26)
trend_rule	0.479 (0.32)	0.492 (0.33)	0.479 (0.32)	0.505 (0.34)	0.512 (0.34)	0.547 (0.37)	0.479 (0.32)	0.478 (0.32)	0.486 (0.33)	0.369 (0.25)	0.147 (0.10)	0.161 (0.11)
rule	-3.152 (-0.34)	-4.784 (-0.40)	-3.152 (-0.34)	-2.982 (-0.32)	-3.476 (-0.38)	-3.529 (-0.38)	-3.152 (-0.34)	-10.97 (-0.74)	-3.165 (-0.34)	-1.451 (-0.16)	-0.604 (-0.07)	-2.584 (-0.23)
debt1	3.654*** (3.16)	3.559*** (2.87)	3.654*** (3.16)	3.115* (1.69)	3.429*** (3.04)	2.762 (1.54)	3.654*** (3.16)	4.178*** (2.98)	-0.0000498 (-1.08)	-0.0000392 (-1.03)	5.312*** (3.92)	5.163*** (3.58)
rule_debt1	0.159 (0.21)	0.159 (0.21)	0.838 (0.37)	0.838 (0.37)	1.042 (0.47)	1.042 (0.47)	0.838 (0.37)	-0.838 (-0.67)	-0.000101 (-1.04)	-0.000101 (-1.04)	0.245 (0.30)	0.245 (0.30)
strat1												
rule_strat1												
debt_incomel												
rule_debt_incomel												
CAFI												
rule_CAFI												
annuity1												
rule_annuity1												
_cons	-9.809 (-0.91)	-9.005 (-0.79)	-9.809 (-0.91)	-9.831 (-0.91)	-11.46 (-1.06)	-11.42 (-1.06)	-9.809 (-0.91)	-4.938 (-0.38)	-19.95* (-1.73)	-22.77* (-1.92)	0.812 (0.07)	1.724 (0.15)
sigma_cons	9.282*** (11.85)	9.283*** (11.85)	9.282*** (11.85)	9.281*** (11.85)	9.301*** (11.85)	9.298*** (11.85)	9.282*** (11.85)	9.268*** (11.85)	9.506*** (11.82)	9.484*** (11.82)	9.131*** (11.88)	9.132*** (11.88)
N	301	301	301	301	301	301	301	301	301	301	301	301
post2011(debt)		3.718*** (3.09)		3.954*** (2.75)		3.804*** (2.70)		3.341*** (2.72)		-0.000141 (-1.43)		5.408*** (3.85)
t												

t statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
budget2	0.814 (0.36)	0.806 (0.36)	5.164** (2.44)	5.093** (2.39)	4.985** (2.38)	4.879** (2.31)	0.814 (0.36)	1.256 (0.56)	3.863* (1.90)	3.775* (1.86)	1.815 (0.91)	1.811 (0.90)
investment2	-4.525*** (-2.71)	-4.525*** (-2.71)	-4.525*** (-2.71)	-4.502*** (-2.69)	-4.345*** (-2.63)	-4.301** (-2.59)	-4.525*** (-2.71)	-4.738*** (-2.83)	-2.614* (-1.69)	-2.502 (-1.61)	-5.388*** (-3.17)	-5.395*** (-3.17)
EQI	0.331 (0.09)	0.306 (0.08)	0.331 (0.09)	0.294 (0.08)	0.272 (0.07)	0.214 (0.06)	0.331 (0.09)	0.539 (0.15)	-1.649 (-0.44)	-1.300 (-0.35)	-0.673 (-0.19)	-0.768 (-0.21)
left	-4.441*** (-3.03)	-4.441*** (-3.03)	-4.441*** (-3.03)	-4.432*** (-3.02)	-4.403*** (-3.00)	-4.385*** (-2.99)	-4.441*** (-3.03)	-4.469*** (-3.05)	-4.447*** (-2.98)	-4.403*** (-2.95)	-4.398*** (-3.01)	-4.404*** (-3.01)
mayor_duration	-0.0195 (-0.22)	-0.0198 (-0.23)	-0.0195 (-0.22)	-0.0172 (-0.20)	-0.0207 (-0.24)	-0.0179 (-0.21)	-0.0195 (-0.22)	-0.0200 (-0.23)	-0.0391 (-0.44)	-0.0322 (-0.36)	-0.0150 (-0.18)	-0.0164 (-0.19)
trend_year	0.00811 (0.01)	0.00753 (0.01)	0.00811 (0.01)	-0.0254 (-0.04)	-0.0193 (-0.03)	-0.0636 (-0.09)	0.00811 (0.01)	0.0371 (0.05)	-0.0248 (-0.03)	-0.0491 (-0.07)	0.154 (0.22)	0.148 (0.21)
trend_rule	0.550 (0.37)	0.554 (0.38)	0.550 (0.37)	0.580 (0.39)	0.552 (0.37)	0.587 (0.40)	0.550 (0.37)	0.560 (0.38)	0.571 (0.38)	0.519 (0.35)	0.157 (0.11)	0.170 (0.12)
rule	-3.461 (-0.38)	-3.921 (-0.33)	-3.461 (-0.38)	-3.335 (-0.37)	-3.438 (-0.38)	-3.480 (-0.38)	-3.461 (-0.38)	-16.29 (-1.10)	-3.427 (-0.38)	-2.293 (-0.25)	-0.782 (-0.09)	-2.007 (-0.18)
debt2	4.350*** (3.62)	4.323*** (3.36)										
rule_debt2		0.0448 (0.06)										
debt_budget2			4.350*** (3.62)	3.864** (2.02)								
rule_debt_budget2				0.753 (0.32)	4.022*** (3.47)	3.344* (1.80)						
strate2												
rule_strate2				1.042 (0.46)								
debt_income2							4.350*** (3.62)	5.264*** (3.58)				
rule_debt_income2								-1.366 (-1.10)				
CAF2									-0.000157 (-1.63)	-0.000106 (-1.07)		
rule_CAF2										-0.000103 (-0.81)		
annuity2											4.982*** (3.74)	4.886*** (3.45)
rule_annuity2												0.150 (0.20)
_cons	-9.701 (-0.90)	-9.478 (-0.83)	-9.701 (-0.90)	-9.670 (-0.90)	-11.56 (-1.08)	-11.45 (-1.07)	-9.701 (-0.90)	-1.872 (-0.15)	-26.25** (-2.13)	-26.14** (-2.16)	2.308 (0.21)	2.887 (0.25)
sigma_cons	9.132*** (11.88)	9.133*** (11.88)	9.132*** (11.88)	9.131*** (11.88)	9.165*** (11.87)	9.162*** (11.87)	9.132*** (11.88)	9.101*** (11.88)	9.400*** (11.83)	9.380*** (11.84)	9.033*** (11.89)	9.033*** (11.88)
N	301	301	301	301	301	301	301	301	301	301	301	301
post2011(debt)		4.368*** (3.51)		4.617*** (3.12)		4.386*** (3.05)		3.898*** (3.16)		-0.000209* (-1.79)		5.036*** (3.69)
t												

t statistics in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$