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DOCTORAL THESIS

Essays on the Unintended Effects of Local Government Spending

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Declaration of Authorship

I, Immacolata MARINO, declare that this thesis titled, 'Essays on the Unintended Effects of Local Government Spending' and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.

- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.

- Where I have consulted the published work of others, this is always clearly attributed.

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- I have acknowledged all main sources of help.

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"An examination of the situation over the past several years reveals that the Internal Stability Pact has the effect of freezing a considerable amount of funds held in the coffers of Italian municipalities, provinces and regions. Several billion euros for public works are bound by the Internal Stability Pact. This has resulted in a standstill both in new projects and those already underway. The unavailability of these funds has also meant that public bodies are prevented from making payments on time, which in turn has impeded economic recovery. The situation is made worse, particularly in southern Italy, by the state of these coffers, which have been tested by significant expenditure requirements and lower earnings. Even though the Internal Stability Pact establishes planning parameters within which the Member States can move autonomously, the prevailing opinion in Italy is that an exemption to this must be found at European level. Can the Commission answer the following: Can exemptions be introduced in the Internal Stability Pact to allow the aforementioned funds to be used to boost the economy and promote economic growth?"

European Parlamentary Questions,

20 February 2013

University FEDERICO II

Napoli

Abstract

Essays on the Unintended Effects of Local Government Spending

by Immacolata MARINO

With the introduction of the European Stability and Growth Pact most European members introduced domestic fiscal rules to make all different levels of government responsible for the control of central public accounts. There is a broad debate on the suitability of the fiscal rules set in the Treaty of Maastricht and in the Stability and Growth Pact. The present PhD's thesis review the evolution of Domestic Stability Pact in Italy (*Chapter 1*) and empirically investigate two research questions. In *Chapter 2* we explore the impact of capital expenditure constraints on investments in public works. After 2008, the Italian central government strongly changed financial rules aimed at imposing fiscal discipline on local governments. Municipalities subject to the Domestic Stability Pact (DSP) collided with new stronger expenditure restrictions and tougher punishments for non-compliers. This institutional change allows us to identify a causal relationship between the DSP and investment in public works implementing a "Difference-in-Differences" (D-i-D) design. Being exposed to the Pact reduces investment in public works by 47% and number of auctions by 44%, while increases winning rebate by 5.5% and number of bidders by 16%. In *Chapter 3* we evaluate the effect of a reduction in investment for public works on new firm formation. The results show that the amount invested in public works by local governments is a very important determinant of new firm formation. A one standard deviation decrease in total starting value decreases the entry rate for all firms by 21% and the entry rate for construction firms only by 29%.

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My first and sincere thanks goes to my advisor and mentor, Tullio Jappelli who has provided me with invaluable guidance and constant support throughout these years. I have learned from him and for his continuous help and support in all stages of my PhD studies. I would also like to thank him for being an ever-present person and for encouraging and helping me to take on this new challenge.

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Thanks to many friends and colleagues. In particular, thanks to Milena, Sara and Alessia for making my days at department enjoyable and even fun. Thanks to Valerio, Giuseppe Da, Giuseppe Ma, Rossella and Hùlia who rendered my *graduate program* at Eief special and impossible to forget.

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This thesis would not have been possible without the constant sustenance, understanding and support of my parents. They were always there bearing my ups and downs during these PhD years.

Finally, and most importantly, I would like to thank my husband Mimmo and my little son Antonio for their immeasurable love. Among many other things, they were my stronghold in the discouraging moments and my energy to go beyond.

Naples, November 2013

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Abbreviations

DSP   Domestic Stability Pact

ECB   European Central Bank

EDP   Excessive Deficit Procedure

EMU   European and Monetary Union

EU   European Union

FC   Fiscal Compact

MSP   Mutual Surveillance Procedures

OECD   Organisation for Economic Co-operation and Development

SGP   Stability and Growth Pact

To my loves,
Antonio e Mimmo

Chapter 1

The Italian Domestic Stability Pact and its Shortcomings

1.1 Introduction

The European Economic and Monetary Union (EMU) experienced two crucial periods during its evolution. On 7 February 1992 the Maastricht Treaty prepared the ground for the Europe's monetary union. Its main tasks were the creation of a European Central Bank (ECB), the definition of rules for restructuring the member's fiscal polity[1] and the "no-bailout rule" prohibiting the ECB from acquiring public debt directly from the issuer[2] (Eichengreen and Wyplosz, 2000).

At the European Amsterdam Summit in June 1997 a new instrument was introduced to reaffirm the constraint on public finances, already defined with the Excessive Deficit Procedure (EDP) with the Maastricht Treaty. The new element is the so called *Stability and Growth Pact* (SGP)[3]. Despite the progressive changes in the SGP regulation during its living period, the basic rules to define an "excessive deficit procedure" for States remain unchanged. The European constraints fix the reference value for the central government Deficit-over-GDP ratio at 3% and the central government Debt-over-GDP ratio at 60%. The motivation for imposing these reference value is the need of putting under surveillance the medium-term fiscal position of each European Member, in order to maintain it "close to balance or in surplus".

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[1]Art. 103, 104 and 109 provides two fiscal policy instruments: the Excessive Deficit and Mutual Surveillance Procedures

[2]Art. 104 of the Treaty and Art. 21 of the Protocol on the European System of Central Banks

[3]The Stability and Growth Pact was originally based on three legal acts: *Council Regulation (EC) No.1466/97* on the question of the "surveillance" both of the control of budgetary positions and the surveillance and coordination of economic policy, *Council Regulation (EC) No.1467/97* on the issue of "speeding up" and clarifying the implementation of the excessive deficit procedure and finally *Resolution of the European Council on the Stability and Growth Pact (97/C 231/01)*.

The SGP defines also specific conditions under which Member States will be dispensed with the rigid rules and be allowed to break the constraints without incurring in the "excessive deficit procedure". Despite this relative flexibility, the SGP introduced more restrictive constraints than those originally provided by the Maastricht Treaty. Rather than the SGP, the Treaty didn't bind the central government to follow any specific strategy to fulfill its reference value (Deficit-over-GDP ratio less than 3%) and in particular it didn't monitor any temporary output decline over the period under surveillance.

These binding rules led to several doubts concerning their definition as well as their benefits. Furthermore, several studies have addressed the issue of enforcement in practice and have tried to evaluate the effectiveness of super-national rules. For instance, Eichengreen and Wyplosz (2000) not only state their pessimistic view about the benefits of the SGP in terms of fiscal discipline, but also consider the Pact as a significant cause in "diverting political effort from more fundamental problems". Blanchard and Giavazzi (2004) argue that the SGP is the main responsible for the immobility of the Euro area and they clearly propose to re-write the Pact and pick up the question about the effect of the Pact for public investments. This issue is at the core of Balassone and Franco (2000) which stress the problem of the public investments together evaluating "the pros and cons of introducing a golden rule in EMU's fiscal framework".

The enter into force of the Stability and Growth Pact in 1997 pushed EMU countries to define own regulation in term of sub-national rules. Because central governments are the only responsible for their results at European level, the surveillance imposed at supra-national level induced EMU central governments to exert pressure over local entities through new fiscal regulations (Gastaldi and Giurato, 2009). Since 1999, Italy has adopted a set of rules defining fiscal constraints for

local entities (regions, provinces and municipalities), known as *Domestic Stability Pact*[4]. The decision on the budget constraints are taken by Italian Parliament and the main feature of the Italian DSP is that its rules change potentially every year.

Originally the Pact had a pure programmatic nature and it didn't provide for any indication about how to reach the fixed objectives. It was considered as a set of rules aimed to realize targets shared by central government and local entities, without any regulation regarding penalties. In this framework it is reasonable that the DSP rules have been studied deeply and from different prospectives but with contrasting results. Beyond the assessment of the effectiveness of fiscal rules introduced with the DSP and the question of compliance, many other aspects related to the DSP constraints have attracted attention, particularly the fiscal rules have been criticized because of its "excessively binding constraints for appropriate counter-cyclical action" (Balassone and Franco, 2000). The link between public investments and economic growth is generally accepted to be positive as well as the link between fiscal consolidation and cut in capital expenditures is confirmed by the venture of EU countries over the last decade. However there are no evidence of the indirect effect of fiscal rules on microeconomic outcomes. The thesis supported in our study is that the spending constraints imposed at local level not only have repercussion in terms of local budgets but they also indirectly impact local spending in public works and local firm dynamics.

The goal of this PhD's thesis is then twofold. Firstly it aims at presenting an accurate picture of the evolution of both supranational and subnational fiscal rules in Europe, with particularly attention to the constraints set at the municipality level in Italy.

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[4]The Pact was introduced with the Financial Law 23 December 1998, n. 488/1998, art. 28.

Secondly, it addresses two empirical questions:

- what is the effect of the reduction in investment for public works on auctions outcomes?

- what is the impact of the drop in capital spending on firm dynamics?

We concentrate our attention on the Italian experience and specifically our analyses are conducted at municipality level. The first version of the DSP in Italy has many features differing from the recent rules. Over the period 1999-2006 the main target of the Pact was the financial coordination and the contribution of local entities to reach the central government fiscal objective. To prevent problems of compliance in 2007 were introduced stronger supervisions and penalties.

This work evaluate the impact of DSP on local outcomes providing an analysis of the effect of the new fiscal discipline introduced in 2009-2011. The new version of the Pact turns attention to spending constraint without separate current expenditures from capital expenditures. Our hypothesis is that this new "accounting rule" induce exogenous variation in investment by local governments because "it is easier to cut back or postpone investment spending than it is to cut current expenditure" (Oxley and Martin, 1991:p. 161). Figure 1.1 shows the pattern of the municipality spending for public works and for procurement of goods and services.

The evidence suggests that up to 2008 total value for investment in public works is almost flat. However over the period 2009-2011 emerges a significant drop in capital investment while total value of auction for current spending remain unchanged. Starting from this evidence our goal is to assess the role of the DSP in affecting municipalities' spending decision.

FIGURE 1.1: **Local Government Expenditures**
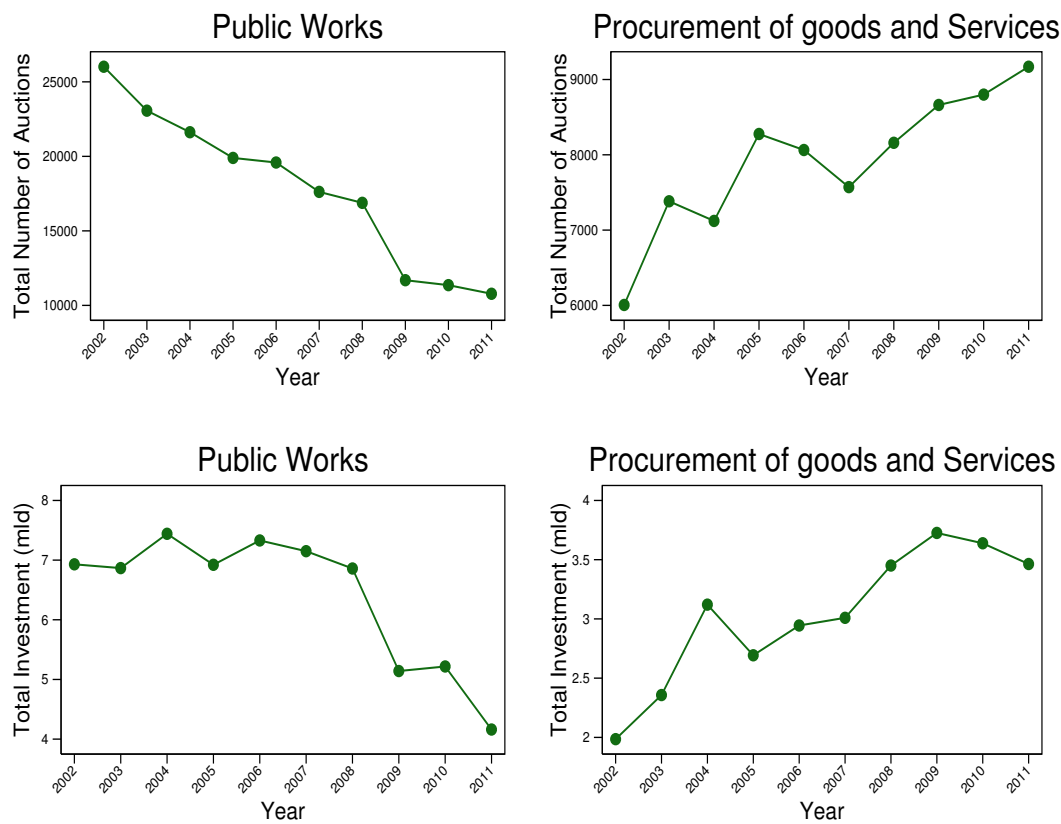
In order to carry out this grasping objective, our research is divided into three parts, containing each several sections. Chapter I provides the description of the European framework and the evolution of the DSP in Italy, providing a detailed review of the existing literature. Chapter II and III empirically investigate the two main questions previously exposed.

1.2 Existing Literature

In the literature it is generally assumed that public infrastructure investment often plays a strategic role in countercyclical fiscal policy. How the development of infrastructures impact productivity and how its effect is related to the business cycle are very discussed issues. There exist several contributions sustaining that "government spending yields few economic benefits with large cost overruns and a wasteful use of resources" (Leduc and Wilson, 2013: pag.1). On the opposite there are also contributions standing for short -term effectiveness of public spending.

Leduc and Wilson (2013) evaluate the macroeconomic effects of investment in infrastructure (they select highway spending) both empirically and theoretically, using a rich and novel data set at the state level on highway funding, highway spending, and numerous economic outcomes. They find that highway spending impacts positively GDP both in the contemporaneous horizon then in a longer horizon. The estimated multiplier of the contemporaneous effect is around 1.5 to 2.0 and this is a particularly notable result given the widespread opinion by many that the stimulus of investment in infrastructure is effective exclusively in the long-run.

They also find a long-run effect about the same size, around six to eight years after the spending. An additional interesting finding of this paper is the result showing that contemporaneous impact of highway spending takes place only for shocks in period of recession, while long-run effects persist both during recessions and expansions. This result is in line with Auerbach and Gorodnichenko (2011) which have studied the effect of fiscal policies both in recession and in expansion. Several

recent papers evaluate the effects of fiscal policy using variations in government spending using cross-state comparison[5].

From the European prospective, there is a large branch of literature that deal with the question of taking public investment expenditures away from the definition of the budget relevant for the SGP for its macroeconomic implications. In this contest the introduction of a "Golden Rule", excluding public investment spending from the definition of the caps, has been proposed. According to this "Golden Rule" investment spending would not enter in the computation for the definition of the *Excessive Deficit Procedure* (EDP)[6] for the central government.

Balassone and Franco (2001) suggest that the rules set in the SGP may negatively impact public investment expenditure but they also express their doubt on the optimality of a "Golden Rule" for public investments. The view in favor of the adoption of such a rule sustains the ability of investment to affect long-run growth. With no constraints on investment EMU countries would be allowed to better manipulate counter-cyclical budgetary actions and to use investment as instrument to contribute to capital accumulation in a long term prospective. In the original version of the SGP, for the definition of an "Excessive Deficit" there were any difference between current and capital expenditures [7].

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[5]Studies that analyze the effect of federal spending in the states on consumption, personal income, employment: Fishback and Kachanovskaya (2010), Shoag (2010), Chodorow-Reich et al. (2011), Feyrer and Sacerdote (2010), Conley and Dupor (2011), Suarez Serrato and Wingender (2011), Wilson (2012).

[6]An EDP is triggered whenever a country's planned or actual deficit-to-GDP ratio exceeds the reference value of 3%. In addition, an EDP can be launched in the case of a debt-to-GDP ratio that is above 60% unless the ratio is sufficiently diminishing and approaching the reference value at a satisfactory pace.

[7]Opinions on the adoption of a *Golden Rule* for investment spending are different. There is a dated literature on the positive impact of excluding capital expenditures from the operating budget: starting with Musgrave (1939), more recent Poterba and Robinson (1998 and 1999). Points of view in favor of such a rule are expressed in Modigliani et. al (1998).

Blanchard and Giavazzi (2003) claim that the SGP could be re-written to take into account important questions actually omitted from the regulation. The Pact doesn't provide any constraint on *current government spending* and from the viewpoint of the Pact it doesn't matter whether a Member State respect the budget balance by incrementing or by reducing spending (given the level of taxes). This is what happens also with the DSP at sub-national level, when the constraint on local public spending is expressed with the *principle of mixed competence*. Local entities have the possibility to autonomously decide whether to manipulate current or capital expenditures in order to respect the DSP. We provide quasi-experimentally that this method to calculate spending caps induce local entities (municipalities) to cut investment in public works.

1.3   Sub-national Fiscal Rules

The central issue related to the adoption of fiscal rules both at supra-national and sub-national level is their effectiveness in lowering budget imbalances. Although a number of empirical studies have addressed the question of how fiscal rules are associated with stable budget outcomes, the mixed conclusions they have reached don't allow to have a clear result on the effectiveness of fiscal rules. The common element of this literature is the evidence of serious commitment problems.

Balassone, Franco and Zotteri (2004) provide a detailed review of the literature on subnational fiscal rules in the European Union. The description of the evolution of the application of sub-national fiscal rules in Europe is strictly related to the change in structure of the budgetary rules adopted with the introduction of the Treaty of Maastricht. Supra-national fiscal rules strongly reflect the new European

context and triggered glowing debate on the effectiveness of fiscal rules. The new rules reveal the interaction between EMU countries and their economics and the need for a central authority in term of fiscal policy.

The new planning of the EMU fiscal policy in the direction of higher decentralization implicates the threat of moral hazard problems. To address this issue there were introduced both surveillance and budget procedures. Firstly, the definition of a constraint to annual deficit with the final goal of taking under control central government budgets. Secondly, these budget rules were subjected to surveillance procedures and sanctions in the case of not compliance.

There exist several works describing and evaluating fiscal rules in the European context. Kopits (2001) provides a detailed description of the evolution of fiscal rules and in particular he focus on the novel rules introduced during the 1990s. The idea underlying his study is that the final goal of fiscal rules is to make both monetary and fiscal policies credible on policy interventions by limiting to the full discretionary intervention. Therefore he outlines the evolution of fiscal rules and notes that the last generation of rules, those introduced in the 1990s, points out the urgency of *transparency standards*. Opposite to the negative evaluations of fiscal rules, Kopits claims the need and the positive impact of fiscal rules on fiscal policy using a political economy argument. He sustains, for example, that in election time fiscal rules may play a key role in restraining policymakers interests and guaranteeing that they take into account also future implications of their decisions. He analyzes the effectiveness of fiscal rules at national and subnational levels and draws interesting conclusions about the relation between countries' features and effectiveness of fiscal rules. Indeed the impact of constraining governments' behavior is different if we apply them in countries with strong or fragile fiscal policy reputation.

Our study is on the effect of constraints on public spending at local level and it is related to the discussion of Atkinson and Van den Noord (2001) on local public expenditures. They review public expenditure patterns and provide description of public expenditure policies of OECD countries discussing them from three prospectives: macroeconomic sustainability, allocative and technical efficiency. They point to the role of transparency in improving effectiveness of fiscal rules and in particular of those rules directly involving expenditures. Among these studies analyzing the role of fiscal rules in controlling budget imbalances, our novel contribute is to go beyond the only effect on balances. We also evaluate the "unintended" effect of those rules on auctions for public works and firm dynamics.

With the application of the SGP to EMU countries, rules for regulating different levels of government were introduced in developed countries to make local entities as responsible as the central government in containing budget imbalances. The objective of these rules is twofold: i) they are intended to guarantee macroeconomic stability at national level; ii) they tend to promote and intensify decentralization at local level (Joumard et al., 2005, p.5). The efficiency of fiscal rules at sub-national levels is strictly related to the level of decentralization in a country. Particularly crucial for the effectiveness of fiscal constraints is the structure of financial relationships existing between different level of governments. Rodden (2002) identifies, among the most decisive factors, the existence of broad fiscal gap or the presence of fiscal imbalances at local level. This is linked to the lack of coordination between transfers from the central government and local expenditures. The incompatibility between local and central behavior on public funds planning directly depend on the presence of fiscal imbalances at local level. The existence of fiscal imbalances induces local entities to distort central transfers allocation toward excessive local spending. Therefore it is necessary for central government to control sub-national

balances and to create an efficient mechanism to avoid financial collapses.

Giurato and Gastaldi (2009) provide a detailed classification of the existing fiscal rules. They classify fiscal rules applicable at sub-national level in the following groups:

- *Rules on budget balances* defined on different types of budget, predicted or approved, and they are very elementary but they can be ineffective if they provide many exception to considerfrom time to time.

- *Expenditure constraints* applicable in the form of upper limits on expenditure or on the growth rate of expenditure. The negative side of this type of rules is that they often consider some items as administrated "off-budget" and this make impossible to perfectly control the accumulation of debt positions. This may produce allocative inefficiencies if local entities are allowed to choose which component of spending to cut. It is reasonable that sub-national entities reduce the expenditure that is most flexible in the short term, like investment expenditure. This point is particularly related to our view in this paper and it is in line with our finding. We show that the introduction of the "mixed accrual" principle to calculate expenditure caps induce a decrease in capital spending. Local entities are not motivated to cut current expenditures (education, personal services, health care, etc.) if they can easily manipulate capital spending.

- *Ceilings on the own revenue of sub-national entities* used as an instrument to punish entities not complying with the sub-national rules.

- *Limits on the stock of debt or on the issuance of new debt.* These are especially supra-national rules. They fix a certain cup to the debt or to the

debt over GDP ratio. If these rules are applied to local entities they can be deceived by transferring debt to other local government entities that are not subject to the constraints.

- *Restrictions on the type of expenditure that can be financed with debt.* These are usually implemented for investment spending. Establishing that only investment expenditure can be financed with debt is equivalent to state a differentiated rule between current and capital expenditures. There is a deep debate on the optimality of a "golden rule" for public investment spending, however there are many doubts on the efficiency of such rule. Its effectiveness is indeed strictly associated to the definition of *investment spending* and the possibility to redefine as "investment" very heterogeneous items. Moreover, they do not appear to be able to guarantee the macroeconomic sustainability of the debt (Dafflon, 2002). The debate on how to subtract productive investment from the fiscal rules is an open issue.

- *Limits on the debt linked to the cost of debt service or indicators of the ability to service the debt.*

Beyond the adoption of one or the other rule, the necessary condition to be effective is the possibility of constituting a credible commitment between local entities and central government. Several elements cooperate to reach this goal, especially ex-ante and ex-post monitoring of budget data and ex-post punishment in terms of transfers from central authority. Among these constraints it is not uniquely defined the optimality of one rule or the efficiency of a combination of them.

The need of fiscal rules at local level is less necessary for high decentralized entities because they are less exposed to the moral hazard issue. Central governments may choose between many fiscal rules to regulate local entities' budget. These rules are

not fully effective in monitoring local public finances if they are not combined with credible commitments on the central governments' side. In order to reach the final target, the central government has to define fiscal rules taking into account many factors that contribute to make them effective. Central governments may decide if simply impose to local entities its rules or if discuss with local governments the structure of fiscal rules to adopt, they may define final targets or constrain sub-national entities to ex-ante monitoring of the budgetary position. The propensity to adopt one or more constraints should be dictated by the peculiarity of the framework in which the rules will work. Particularly, it should be the case that the choice of sub-national fiscal rules will be made taking into account the supra-national objectives. In the presence of an *external target*, such as the SGP, it is recommended to define domestic rule in the same form of those applied to the central government. Specifically, if the external target is the *budget balance* it is reasonable to define also domestic objective in terms of budget balance.

1.3.1 The International Setting

The approach to the possibility of adopting a "Golden Rule" for investment spending differs between European countries and more in general in the international contest. The rules constraining local entities were differing in several ways to those promoted under SGP (Mintz and Smart, 2006).

The different EMU countries have adopted many different approaches to engage the fiscal policies introduced with the SGP. In some cases the central governments have introduced completely novel regulation on local entities' fiscal rules, while in other countries they have just modified already existing rules governing local

entities. Before the introduction of the SGP indeed the level of fiscal decentralization was very different among EU countries. Some countries, such as Austria, Belgium, Germany and Spain already had fiscal rules at local governments level, contributing to central government in reaching the Maastricht objectives. In other countries, such as Italy, Finland and Netherlands, the need to put under control local entities' budget rise after the creation of the EMU.

All the EMU countries have adopted an annual budget constraint[8] both at federal states level and at local governments level. The experiences of Austria, Belgium, Germany and Spain represent example of failed approach to fiscal rules in the period before the SGP. During that period the rules followed to control local entities in those countries don't achieve their expected results in term of local governments' balance budgets. However a common element of the European experience is that the achievement of the fiscal constraints target mainly depends on the degree of decentralization in the country.

Among EMU countries it is possible to distinguish two different approaches to the adoption of fiscal rules: some countries have adopted a *cooperative approach*, such as Belgium and Germany, other countries have followed the *imposed approach*, such as Austria, Italy and Spain. Originally, in the most of these countries the constraints were not on expenditures but on the balance and ofter combined with an higher cap to local debt.

The results from the *cooperative* approach are mixed. In Belgium the process of coordinating budgetary objectives at different levels of government lead to a

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[8]See Giurato and Gastaldi (2009) for a detailed description of the EMU countries fiscal rules.

sustainable budget situation both for regions and municipalities. This fiscal restraints contributed to a considerable reduction in public local debt. The *cooperative* approach didn't deliver expected results in Germany. The high degree of decentralization of local entities required a supervision to coordinate budget planning between different levels of governments. With the introduction of European constraints the *Planning Council* fulfill the role of supervisor to monitor fiscal behavior of local entities and to correct their fiscal behavior.

Even though Austria and Spain are countries in which *imposed* budget rules works, cooperation is an important feature to make these rules effective. Spain is an example of coordination between increasing decentralization and budget stability during the 1990s. The target of constraints was mainly in terms of local debt. However this experience was not successfully in obtaining expected objectives and, with the introduction of the SGP, in 1999 Spain introduced a revised set of fiscal rules aimed to face supranational regulation. The budget target was rewritten on a three years basis. The peculiarity of the Spanish case is the introduction, with the revision of 2005, of a "Golden Rule" on spending for investment projects. A special case is represented by the experience of France. Here there was not introduced any formal *Domestic Stability Regulation* but central government issued a set of laws aimed to reinforce fiscal autonomy of local entities and at the same time imposed fiscal discipline without negotiations among different levels of governments.

The European goal to ensure the sustainability of state budgets has resulted in the introduction of the *Fiscal Compact* in 2012. The purpose of the new *Fiscal Compact* is to strengthen budgetary discipline in the member states of the Eurozone. The main feature of this revised regulation is the introduction of a "golden rule" requiring that *annual* budget of member governments be balanced. This rule is a crucial novelty of the European integration process because it expresses a clear

interest to directly affect the states' behavior. While with the SGP regulation member states were requested to maintain their public deficit below the yearly ratio of 3% of the GDP and the total public debt below 60% of the GDP, with the *Fiscal Compact* introduces specific rules that central governments have to follow in fulfilling their final goals. The process of fiscal decentralization and fiscal monitoring at sub-national level is strictly related to the external constraints imposed at central governments from EU.

1.4 The Process of Fiscal Consolidation in Italy

The Italian public debt has its origin in the mid-1960s when public debt increased rapidly from less than 30 percent of GDP in the mid-1960s to 80 percent in the mid-1980s and to over 120 percent of GDP by the mid-1990s (Balassone et al., 2008).

FIGURE 1.2: **General Government Net Borrowing and Debt**
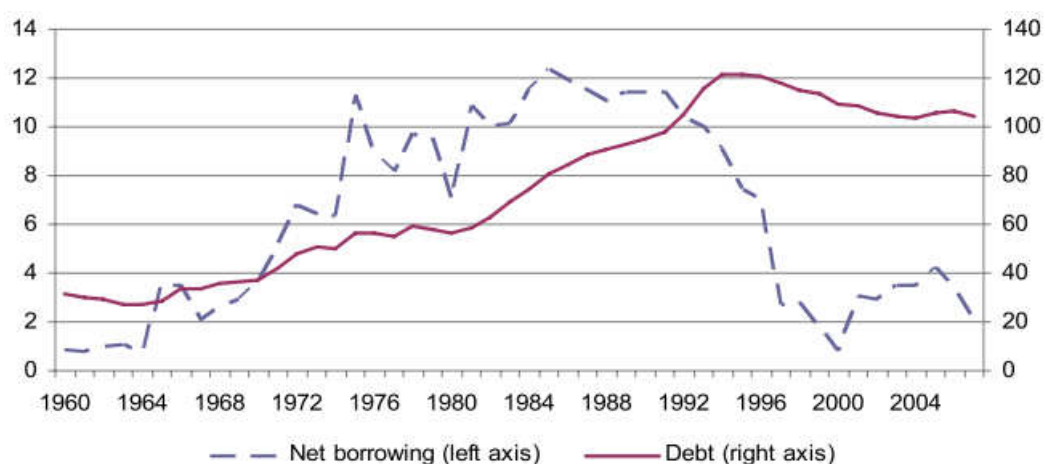
Source. Balassone et al. (2008).

Figure 1.2 from Balassone et al. (2008) well describes the dramatic evolution of the Italian gross debt after the 1960. This unsustainable pattern of public finances induced policymakers to undertake an adjustment process of the public accounts starting in the mid-1980s and still in progress. The figure also shows how the way of fiscal consolidation in Italy was launched before the introduction of the DSP. The process of public accounts adjustment started in the mid 1980s and the fiscal rules adopted in 1999 with the DSP only represents the recent phase of this process.

The process of fiscal decentralization in Italy started in the early 1990s when the central transfers to local entities decreased dramatically and by 1997 they dropped to around 60% (as the share of transfers that central government reserves to local governments). Figure 1.3 represents the pattern of "State transfers as a share of local government revenue" and clearly shows how the fiscal autonomy of local entities measured by the transfers from the central government grew gradually over the 1990s. However it remains rather unchanged after the introduction of the DSP.

FIGURE 1.3: **Central Government Transfers to Local Entities**
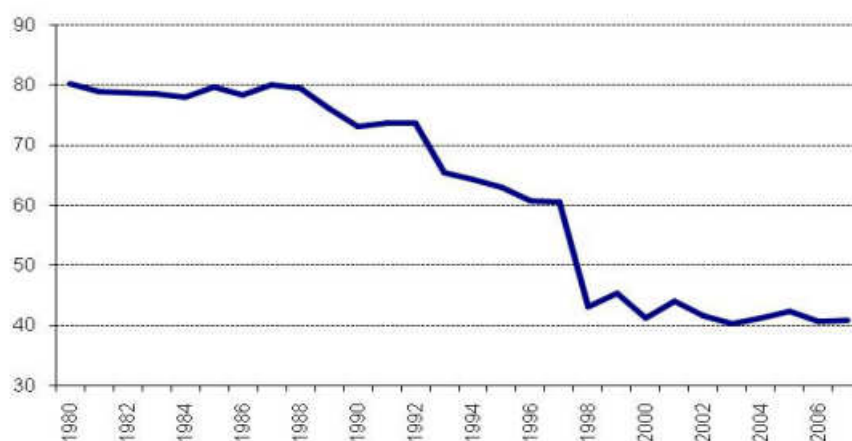
Source. Balassone et al. (2008).

The need to combine this country specific process of fiscal consolidation with a large-scale project at European level results in the introduction of the DSP. The Pact is a set of fiscal rules adopted by Italian Parliament since 1999[9] with the objective of involving all local governments in reaching the EU public finances target. In Italy DSP regulation is always defined together the yearly Financial Law. Still it represents the crucial instrument to coordinate the public finance between central government and local entities. That of *coordination* remains the main problem that single states face in applying fiscal rules and in guaranteeing the success of the domestic budget balances. Indeed the non centralized contest in which public finances are defined suggests the need of coordination between different level of governments. The DSP rules are ever defined within the financial measures setting (except for the 2002) and their identification is revised year after year in order to adapt them to the new economic and financial setting.

Domestic Stability Pact: the Italian evolution

Originally the DSP was imposed to all subnational entities (regions, provinces and municipalities) and its main target was the reduction of aggregate deficit with respect of a given target. Since 2002 some municipalities (those below 5,000 inhabitants) and other local entities were excluded from the commitment to respect the DSP rules. Figure 1.4 shows municipalities subject to the DSP in the period between 2002 and 2012 (on the left) and in the period starting from 2013 (on the right).

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[9]Law n. 488/1998, art. 28

FIGURE 1.4: **Municipalities affected by Domestic Stability Pact**
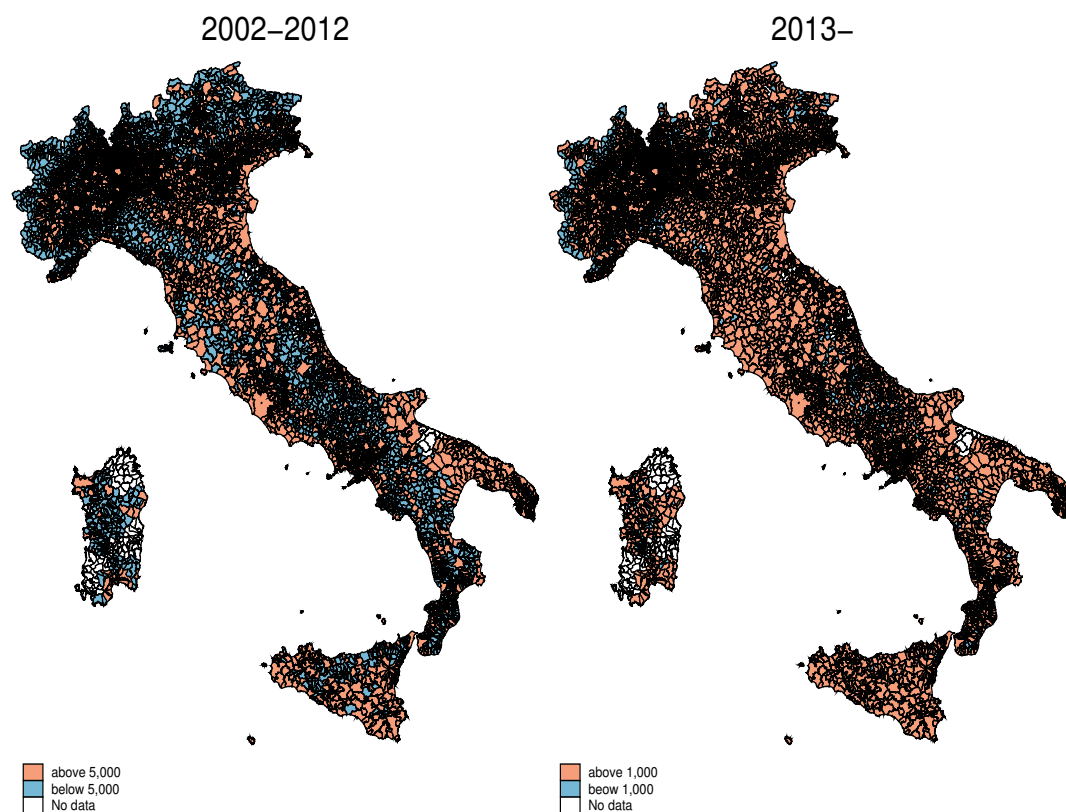
The extension of the DSP rules to municipalities between 1,000 and 5,000 inhabitants represents a significant change in the evolution of the DSP because of its increase in entities involved in the constraints. While up to 2012 only 30% of Italian municipalities were interested to DSP rules (2,320 with respect a total number of 7,712 municipalities), with the new regulation[10] about the 77% of the Italian municipalities is subjected to the DSP regulation (5,974 municipalities). In this situation of increasing restraints in terms of both objectives and size of interested entities, it is crucial to quantify the real effect of DSP in order to evaluate its

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[10]Law 24 December 2012, n. 228

impact not only in term of fiscal target effectiveness.

FIGURE 1.5: **Distribution of the Population Size**
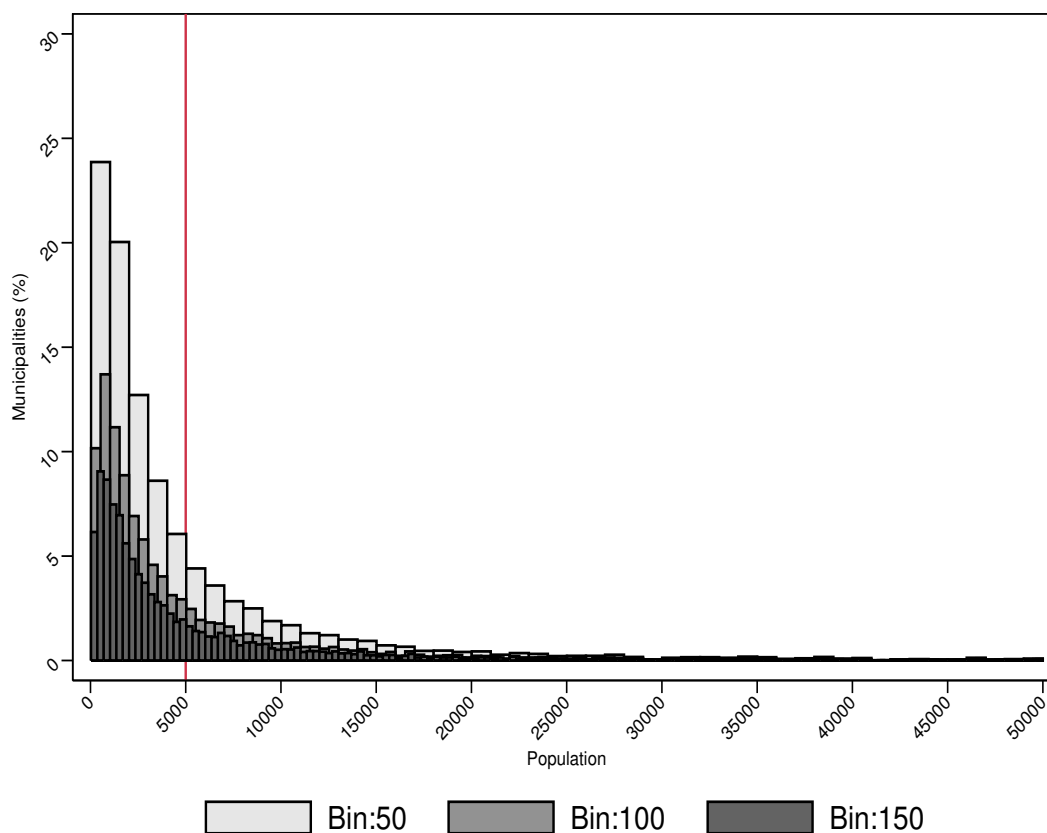
In particular, since 2002 DSP municipalities were not only involved in reaching a final target in term of fiscal sustainability, but also subjected to specific current expenditure constraints. The spending constraint was intended to correct budget imbalances at local level. In 2005 the new DSP rules were reviewed to constrain the growth of local entities' spending and also capital expenditures were included. Starting from 2006 the regulation was rewritten and, with the goal of improving

efficiency of local government spending, a differentiation between current and capital expenditure constraints was introduced. The new regulation required current expenditure to be reduced while recommending to improve capital expenditures, always in the limit of budget balance. This differentiation between current and capital expenditures vanished since 2009, when local entity-specific balance target started to be calculated in terms of "mixed competence". With the principle of *mixed competence* each local authority may decide which instrument manipulate to respect the final target (current or capital expenditures). The monitoring feature also withstand to important innovations. First, introducing the obligation for local governments to inform the Ministry of the Economy about the fulfillment of the target in terms of mixed competence; second, in term of sanctions which specifically tend to make different the spending behavior of local authorities[11].

We have underlined that the exact DSP rules constraining the expenditure caps changed from one year to another, but over our sample period it changed drastically in 2005, that is the first time it was introduced, and from 2008 and 2009 when the principle of mixed competence was adopted. Table A.1 summarizes the evolution of the DSP between 1999 and 2011. The expenditure cap was introduced in 2002 only for current expenditures then extended also to capital spending in 2005. The principle of mixed competence, already existed in the period 2007-2008 with a target period reference, however since 2009 the spending cap benchmark is calculated with respect a specific year 2007. Constrained municipalities are not allowed to spend more than a fixed amount for capital expenditures and they are subjected to mechanisms of both rewarding and punishment respectively in the cases of good or bad behavior.

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[11]See Giurato and Gastaldi (2009) for a detailed description of the evolution of the Domestic Stability Pact in Italy.

In the next two chapter, using the change in DSP regulation of the 2009, we identify some of the potential *unintended* effect of constraining capital expenditures. In Chapter 2 we explore the impact of this capital expenditure constraints on investments in public works. Municipalities subject to the Domestic Stability Pact (DSP) indeed collided with new stronger expenditure restrictions and tougher punishments for non-compliers. This institutional change allows us to identify a causal relationship between the DSP and investment in public works implementing a "Difference-in-Differences" (D-i-D) design. Being exposed to the Pact reduces investment in public works by 47% and number of auctions by 44%, while increases winning rebate by 5.5% and number of bidders by 16%. In Chapter 3 we evaluate the effect of a reduction in investment for public works on new firm formation. The results show that the amount invested in public works by local governments is a very important determinant of new firm formation. A one standard deviation decrease in total starting value decreases the entry rate for all firms by 21% and the entry rate for construction firms only by 29%.

Chapter 2

Local Government Spending and Public Procurement

2.1   Introduction

Can financial constraints imposed at local governments level have impact on procurement auctions for public works? The introduction of a European multilateral supervision of public finances of EU members states, with the Maastricht Treaty and the Stability and Growth Pact (SGP) in the early and mid-1990s, induced most Member States to extend constraints on deficit and debts to all local public administrations. Despite extensive debate on the impact of fiscal and financial restraints on debt accumulation and their effectiveness in reducing budget deficits, very little is known about their role in reducing public spending, and specifically capital expenditures. Oxley and Martin (1991) point to "the political reality that it is easier to cut back or postpone investment spending than it is to cut current expenditure" and De Hann, Strurm and Sikken (1996) argue that investment "is the least rigid component of expenditure" (see Balassone and Franco, 2000).

Starting from the recent debate, this paper investigates two issues: (i) the implication of the DSP for local investment in public works and (ii) the effect of decreasing investments on procurement auctions' outcomes. We first show quasi-experimentally that capital expenditure constraints do matter for restraining investments in public works. Then we present the empirical evidence suggesting that the reduction in the total reserve price put up for auctions contributes to lower the average number of bidders per auction and to decrease final price of the contract.

Since 1999, Italy has adopted the so-called Domestic Stability Pact (DSP) aimed at ensuring that the Local Government sector pursues an overall balance of public finances. In 2001 the central government relaxed it for municipalities below 5,000

inhabitants, from then on only municipalities above 5,000 inhabitants are subject to the DSP regulation. After 2008, the Italian Central Government strengthen the rules of the Domestic Stability Pact (DSP) and municipalities subject to the policy collided with new stronger expenditure restrictions and tougher punishments for non-compliers. This policy change allows us to combine two sources of variation, before/after 2008 and below/above 5,000 inhabitants and implement a *Difference-in-Differences* (D-i-D) design. This *natural experiment strategy* is implemented by comparing the difference in average behavior before and after the reform for the eligible group with the before and after contrast for a comparison group. The D-i-D design is a powerful tool in measuring the average effect of the DSP on the reduction in investments by municipalities exposed to the DSP. It does this by removing unobservable individual effects and common macro effects by relying on two critically important identifying assumptions of (i) common time effects across groups, and (ii) no systematic composition changes within each group.

The empirical analysis can be divided into three parts. First we implement a standard D-i-D design, assuring the validity of its identification assumption, in order to analyze the *average* impact of the change in DSP rules on investment in public works (both value and volume of contracts) and auctions' outcome variables. We consider as reference sample all municipalities and all contracts for public works, without any distinction between different adjudication methods and different contracts' types (Roads, Buildings, etc.). The results show that the DSP significantly reduces the amount of local resources dedicated to investment in public works, by around 1 million Euros per municipality over the course of the three years after the reform. Results survive a large number of robustness checks. Among those, we use only municipalities above 1,500 inhabitants in order to balance the number of observations in the treatment and in the control group and to exclude very small

cities that need fewer intervention in terms of public infrastructure.

In the second part of the empirical analysis we investigate the heterogeneity of the responses to the DSP, focusing on the effect of the DSP on auctions' outcome: winning rebate, number of bidders and chance to win the auction. The Public Procurement System in Italy contemplates two main possibilities for the adjudication of an auction for public works. The first is a *price* method, the second is a *price & quality* criterion, known as "beauty contest"The difficulty of specifying and evaluating criteria for a beauty contest makes this a nontransparent mechanism and pushes us to exclude this type of auctions from our analysis. Indeed, some contracting authorities acknowledge that they prefer beauty contests precisely because of the possibilities for supporting their "favorite participants" over other firms. But such behavior is unlikely both to safeguard competition and to benefit consumers (see Binmore and Kempler, 2002).

Among the *price* auctions two different selection mechanisms may be performed: the First Price Method (FPA) or the Average Bid Method (ABA). FPAs are believed to induce lower procurement costs through competition and lower corruption through transparency. Numerous theoretical studies have shown that the poor ex post performance of FPAs could derive from either adverse selection, when bidders differ along their unobservable cost of reneging their bid (Spulber, 1990), or moral hazard, when the contract is incomplete (McAfee and McMillan, 1986), or the winner's curse (Kagel and Levin, 1986). Conley and Decarolis (2013) shed light on the collusive feature of the Average Bid Method. In order to take into account this structural difference between FP and AB adjudication methods, we investigate separately the effects of the DSP both on FPAs and ABAs. The main result is that the effect of the DSP on the winning rebate is statistical significant only for

FPAs, in line with the theoretic competitive feature of this type of adjudication method.

Finally, we exploit the heterogeneous effects of the Pact among treated municipalities. Grembi, Nannicini and Troiano (2013) explain that a standard cross-sectional Regression Discontinuity (RD) design would not allow to identify the effect of DSP in this setting because the presence of another policy, started in the 1960s and still in place, according to which mayors of cities above 5,000 residents receive a higher salary. The presence of this confounding policy implies that analyzing the discontinuity at 5,000 inhabitants in any given year would not identify the effect of the DSP. In their analysis the authors propose a different cross-sectional approach, that they call "difference-in-discontinuity" (diff-in-disc) design. This strategy allows them to identify the effect of the DSP for municipalities in the neighborhood of 5,000. Similar to their strategy, the D-i-D estimates in the neighborhood of 5,000 inhabitants would identify the effect of the DSP on the *small DSP municipalities*. This suggests that there are heterogeneous responses to the DSP among the treated municipalities, in particular the effect on *small treated* it is not statistically significant. An explanation for this result is given in terms of compliance and we discuss how delays in payments represent an alternative to investments cut.

The paper proceeds as follows. Section 2 presents related literature and anticipate the contribution of the analysis. Section 3 illustrate the institutional frameworks: a detailed picture of the Italian Public Procurement System and a description of the evolution of the Domestic Stability Pact regulation in Italy. Then in Section 4 there is a sketch of the database used for the empirical analysis and preliminary descriptive statistics. Section 5 describe the empirical strategy and its assumptions validity. In section 6 we present and discuss empirical results. Section 7 assesses

the robustness of the results and extend the analysis taking into account of the differences between FP and AB auctions. Finally, in Section 8 we conclude that DSP reduces the overall level of investments in public works and for FPAs increases the level of competition lowering final price.

2.2 Related Literature

This paper contributes to two strands of literature. First it is related to the literature that analyze the effectiveness of fiscal rules. In particular there is a large number of empirical studies that have addressed the question of the effectiveness of sub-national fiscal rules in reducing budget imbalance (see Balassone, Franco and Zotteri, 2004 for survey) and in restraining fiscal policy (see Alesina and Perotti, 1996 and Wyplosz, 2012). One of the principal reason why fiscal rules might not work is the lack of enforcement. This problem, however, is more relevant at national level because more or less all local governments are under tight control and subjected to cutting founds for future transfers. In this paper we focus on the effects of financial rules on public spending, particularly in public spending for investment. There is also an important branch of existing literature that has discussed the possibility of introducing a *Golden Rule* to contrast the impact of the DSP on public investment spending (see Balassone and Franco, 2002). Starting from the recent debate, this paper empirically analyze the causal relationship between the DSP and the drop in investment for public works.

Second this paper contributes to the literature that has analyzed the role of competition on final price of contracts in public procurement auctions. Coviello and Mariniello (2013) find that an exogenous variation in publicity plays an important

role in increasing both entry and winning rebate. We find that an exogenous increase in the number of bidders is associated to an increase in the winning rebate only in FPAs which stands in line with the competitive feature attached to FP mechanism. As regard the difference in outcomes between FP and AB methods, Cameron (2000) and Decarolis (2012) focus on the trade-off between price and quality induced by First Price auctions. Ashenfelter et al. (1997) study the effect of competition on quality in FPAs. They evaluate the effect of a policy favoring competition in 378 construction contracts and find evidence of worsening performance. Compared to these study the contribution of this paper is to take into account the role of the investments' level in determining competition and price.

2.3 Institutional Framework

2.3.1 The Italian Public Procurement System

The main steps of the Italian Public Procurement System for public works are as follows. First, the public administration announces a call for tender following the principles of publicity and transparency in force and illustrates the contract characteristics. Sealed bids are submitted in the form of a discount over an announced reserve price (rebate). The key rules on the contractors' selection concern the specification of the type of procedure and the criterion for determining the winner. Procedures might be "open" or "restricted" according to the method adopted

for the presentation of the offers[1]. In an opened procedure all interested parties are allowed to present an offer, while in the restricted procedure only invited parties may submit their offers. Both open and restricted procedures can use "lowest price" or "economically most advantageous offer" criteria.

In the selection of the winner only the price is considered in a lowest price design, not only price but a sample of other parameters is contemplated when the economically most advantageous offer criterion is adopted[2]. Contracts for public works are typically procured through auctions based only on price but in the last ten years the economically most advantageous offer method is strongly increasing.

As regard the awarding criterion two distinct mechanisms exist: first price auctions (FPAs) and average bid auctions (ABAs). In a FPA the winner is the highest "reliable" rebate. An offer is considered "reliable" if the PA judges that the bidder can fulfill the contract at the condition promised. When the starting price of an auction is below the European threshold, the PA is not obliged to evaluate the "reliability" of rebates. If there is no evaluation of any offer the highest rebate always win the auction. If the automatic exclusion is performed the entrepreneur offering the lowest price always loses the auction. This is the crucial feature of an

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[1]There are four main types of contract award procedure: the open procedure (or public auction): all firms that wish to may participate provided they fit the criteria for the type of work and the price. The restricted procedure (or private treaty): all firms invited by the relevant public administration may take part in the tendering procedure. The negotiated procedure: can be used for contracts of less than 500,000 Euros (except for urgent works for which the limit can be exceeded); the competing companies (at least 5) are selected and invited to submit a tender by the contracting authority. The competitive tender: applicable for operations with a significant architectural element. In this procedure, a candidate draws up a project related to the services requested, based on the requirements of the administration, proposing the conditions and prices he is prepared to offer for the contract.

[2]According to EU's procurement directives, Directives 2004/17/EC and 2004/18/EC, articles 55 and 53, respectively, the winning bidder in a public procurement auction can be nominated on the basis of price only, subject to the bidder meeting minimum quality requirements, or, alternatively, to the economically most advantageous bid. The economically most advantageous bid can be the bid with the highest quality for a given price, in so-called beauty contests. It can also be the bid that achieves the highest combined price and quality score.

ABA mechanism. The exact rules for automatic elimination of bids differ between countries[3] but this design is rather common around the world.

In Italy if the AB mechanism is adopted the winning offer is selected in the following way. First, rebates are ordered from the lowest to the highest. Then the 10% of the highest and lowest discounts are eliminated. The arithmetic mean (R^{avg}) is calculated with these remaining offers. Then the average difference between R^{avg} and rebates greater than R^{avg} is computed and added to this R^{avg}. The resulting point is the "anomaly threshold": T. The winner is the highest bid below the "anomaly threshold": R^{win}. The PA also decides and declares in the announcement if it will exercise automatic exclusion of those offers above the anomaly threshold (AB mechanism). Figure 1 shows an example with thirteen bids.

Contractual conditions are expressed in the call for tender (value of the contract, type of procedure, awarding criteria, deadline and possibility of subcontracts), however there is the possibility of partially renegotiating some terms of the contract (the time of delivery and the cost of the project). In this paper we don't consider renegotiations that represent the crucial object of studies focusing on the trade-off between price and quality induced by FPAs for public works (both theoretical and empirical) because we are focusing only on the final price of the contract.

The Italian regulation governing the award of public works is ever-changing with many local exceptions. Two systematic reforms affected the national regulation over the last fifteen years, first in 1994 and then in 2006[4]. During this time span the FP method was ever compulsory for all contracts for public works with a

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[3]See Conley and Decarolis (2012) for a discussion.

[4]First with *The Legge 109/94* (known as *Legge Merloni*) and its several amendments (*Merloni-bis* in 1995, *Merloni-ter* in 1998), than with *The Decreto Legislativo (DL)163/2006* (known as *The Code of Public Contracts*) and its several amendments (*The DL 152/2008*) and (*The DL 201/2011*).

reserve price above the EU threshold (approximately 5 million). In the period between January 2000 and June 2006 the regulation mandated the use of ABAs for all contracts with reserve price below the European threshold. In 2006 with the new regulation, the recourse to ABAs became elective as long as the PA had point it clear in the announcement. Then, in 2008, the FPAs became compulsory for all contracts above 1 million, leaving the possibility of using the AB method only for contracts below this threshold. Starting from the May of 2011 the rules reverted into the regulation originally introduced in 2006 and it is still in force up to December 2013. The living matter in literature of public procurement debates about the optimality of one of the two designs. Decarolis (2012) use the different timing in introduction of FPAs after the 2006 reform to compare costs and benefits of FPAs and ABAs. It's study finds that FPAs lower the winning price but also worsen ex-post performance. This paper is about the effect of the DSP on investment in public works and it contributes to previous empirical studies taking into account the volume of auctions as determinant of winning price, in addition to the peculiarity of the auction's procedure. Using the information about the auction adjudication method, in the second part of the analysis we investigate the effects of the DSP on winning rebate in the two different awarding settings. Results show that less auctions do not induce lower winning price in ABAs, while winning rebate increase with the decreasing in the value of auctions in FPAs. Taken togheter, the theory and the evidence suggest that the winner's curse effect is large enough in ABAs, more than compensate for the increase in competition.

2.3.2 The Italian Domestic Stability Pact

In Europe, after the introduction of the Stability and Growth Pact in 1997, several countries have tried to implement the so called "Internal Stability Pact", between the central and sub-national governments[5]. In 1999[6], a "Domestic Stability Pact"(hereafter DSP), an euphemism for a central government law, was enacted in Italy, which imposes ceilings for the annual increase in sub-national government deficits (Balassone et al, 2002). However, the deficit referred to in the Pact did not include health, capital, and interest spending, and overruns could be compensated in subsequent years. Amendments of the 1999 act have retroactively permitted larger deficits than originally foreseen.

Municipal governments were constrained to keep the growth of their fiscal gap (defined as deficit, net of transfers and debt service) under tight control. The punishment established for not complying with the DSP included the following penalties: (i) 5 percent cut in the annual transfers from the central government; (ii) ban on municipal hires; (iii) 30 percent cut on reimbursement and non-absenteeism bonuses for the employees of the municipal administration. Cities complying with the DSP, instead, took advantage from a reduction of the expenses on interests for loans from the central government.

Gastaldi and Giurato (2009) procure a detailed review of the DSP regulation. Table 1 summarizes the evolution of the Internal Pact over our sample period. In 2001 this commitment was relaxed for municipalities below 5,000 inhabitants. Till 2005 the only target of this policy was to put under tight control the growth of municipal governments' fiscal gap. The exact rule constraining the fiscal gap changed from one year to another, but a structural turnaround went in 2005 when

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[5]See Von Hagen for a discussion.

[6]See the Financial Law for 1999, art. 28 Law 448/1998.

the target moved from the fiscal gap to the financial gap binding the expenditures growth control[7]. For 2006, in addition, differentiation between current and capital expenditure was required, the former to be contained and the latter augmented, so as to improve the quality of local government spending. Through 2007 publication of the list of non-compliant entities was never envisaged, and the sanctions were never applied. The main changes in 2007 involved a constraint on the final budget balance and the definition of virtuous and non-virtuous administrations. During this period there were a contradiction between the excessive rigidity in the calculation of the budget objectives and the lack of punishment in the case of non-compliance.

The awareness of this limit for 2009-2011 induced a sweeping change in the way of determining the balance, described as mixed accrual basis, because it is defined as the sum of the balance on an accrual basis for the current account and on a cash basis for the capital account (net of the proceeds of credit collections and of outlays for loans granted). Starting from 2009 also the monitoring system became more severe. Particularly, the monitoring system became a constant presence; municipalities were obliged to inform the Ministry of the Economy every six months about the results achieved in terms of mixed competence and about the determination of the target. This rule is still in force. If this information is not provided, the local government is considered non-compliant; in the case of delay, municipalities are not allowed to hire workers. Not compliers are subjected to binding punishment also in terms of spending behavior and reduction of transfer from the Ministry of the Economy. In this paper we use the 2009 change in the DSP regulation as natural experiment in order to capture the backlashes of strengthening the municipalities' expenditure capability on local public procurement outcomes.

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[7]See the Financial Law for 2005, art. 22 Law 311/2004, and Law 31 May 2005, n. 88, art. 1-ter.

2.4 Data and Descriptive Statistics

The empirical analysis is based on a unique data-set of public procurement auctions in Italy between 2002 and 2011, which was provided by *Telemat Spa*, an information-provider leader in the Italian market for reselling information on public contracts. Telemat collects data on all contracts procured by all Public Administrations, on average 85,000 auctions by year.

The data-set contains auctions' information on the following variables: contracting authority and its location (city, province, region), type of the contract (works, services, procurement of goods and healthcare procurement), date of publication on Telemat website, date of the contract adjudication, reserve price of the auction (the estimated value/reserve price set by the public administration), winning rebate (the winning bid, expressed as a percentage reduction from the of the starting value), information about the winner. It also contains information about the announcement's referential legislature, including the regulation's article, cited in the tender notice, from which we construct the variable on the adjudication method. This database doesn't offer information about the number of bidders. To recover this missing information, we use an additional database collected by another Italian information-provider *Infoplus Srl*, that is a Telemat's competitor. Finally, we also have yearly information at the municipality level about the size of the resident population (information merged by the 2001 ISTAT census).

Table 1 presents summary statistics for the original cross-sectional database of auctions for public works. The original database amounts to 371,522 auctions for public works tendered by different Italian contracting authorities between 2002 and 2011. We have information about the contracting authorities and its location.

The public administrations managing the auctions are mostly municipalities (62% of the sample), then there is a 10% of provinces and only a 2.3% of regions. Other public bodies or corporations (Universities, Hospitals, etc.) cover the residual 25%. Public administrations are mostly located in the northern Italy (41%) splitted between North East and North West, while 15.3% are in the Centre Italy, 28.8% in the Southern Italy and 14.9% in the Islands. The average reserve price per auction is 591,170 Euros, and the mean winning rebate is 19.5%.

Then we have informations about the type of public work object of the auction. The majority of the public works concern the construction of roads (21.3%), followed by the construction of public buildings, like schools and educational buildings (16.4%), Hydrics works (9.6%), art-related constructions (3%), for a large number of auctions it is not well-defined the prevalent categhory (55.8%). This is because many auctions are classified with more than one category and it is not possible to trace the prevalent category of the work.

The average starting value per auction is 500,000 Euros. The average number of bidders per auction is 36.6 and the mean winning rebate is 18.78%. The majority of auctions for public works use the *price* method to adjudicate the auction (76.8%), only 4.8% of the auctions in Telemat database are *beauty contest* contracts. We have also retraced the application of authomatic exclusion method matching the national regulation of public procurement system and information about the *Law's article* cited into the documentation included in Telemat database.

This paper is about the effect of the DSP on investment in public works and on public procurement outcomes at municipality level. This motivation lead me to

focus on a subsample of 178,187 auctions which have municipalities as contracting authorities.[8]. From the original database we construct a balanced panel of 7,712 municipalities and ten years. The restructured database contains yearly information at municipality level on the following variables: total reserve price put up for auctions of public works (it is the sum of single auctions reserve price for that municipality in that year), total number of auctions, average winning rebate, average reserve price per auction, resident population (fixed at census 2001 level) and the average number of bidders. Table 2 presents descriptive statistics for the final balanced panel of municipalities. On average italian municipalities have done 2.7 million of euros investments in public works per year during the period 2002-2011. The average total number of auctions is around 6 auctions per year, so each auction is about 400,000 Euros, in line with the information acquired from the analysis of cross-sectional database.

The main variables of interest at municipality level are auction related outcomes. To measure participation we evaluate the following measures: the probability of winning an auction (Chance to Win), the probability of winning an auction for the dominant firm in that municipality (Chance to Win - Dominant Firm) and Average number of auctions won by each winner (Avg # Auctions per Winner). *Chance to Win* at time t is calculated as the ratio between the number of auctions and the number of bidders per municipality at time t. For each year the *Chance to Win for the Dominant Firm* is the highest percentage of auctions assigned to the same firm for each of the years in the sample and for each of municipality. Finally, the *Avg # Auctions per Winner* represents the total number of auctions adjudicated on average by each winner in each municipality. As regard auctions'

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[8]The descriptive statistics in the subsample are similar to the full sample.

outcomes: in mean winning rebates are around 17% and on average 39 bids are received for each auction.

As regard the investment side, municipalities' balance is mainly divided in current expenditures and capital expenditures. Municipality have room for deciding whether adjust current or capital spending. If there are no separate constraints on the two types of expenditures, most municipalities have offset increase in public spending by winding back public investment, reflecting the political reality that it is easier to cut-back or postpone investment spending than it is to cut current expenditures (see Oxley and Martin, 2001). Using total value and the number of auctions to evaluate investments in public works, it is possible to investigate how a combined constraint on current and capital expenditures impact decision of public investment by local governments.

Table 3 shows that there are some systematic differences between municipalities in the two groups. We observe that on average larger municipalities release more calls for tenders than municipalities below 5,000 inhabitants. Smaller municipalities put up for auctions on average 890,000 Euros per year against municipalities with above 5,0000 inhabitants that invest in public works on average 3.7 million of Euros per year. The average amount of total reserve price put up for public works auctions becomes less heterogeneous if we restrict the treatment sample to those municipalities with inhabitants above 1,500 (in order to balance the number of municipalities below and above the threshold). Auctions in municipalities below 5,000 inhabitants on average announce four auctions less than bigger municipalities. However, variables related to auctions' outcomes seem to be not so different between the two groups. Municipalities in control group exhibit smaller winning rebate (16.7% vs 17.9%), fewer bidders per auction (35 vs 41.6), similar probability that a firm wins the auction (79.2% vs 76.5%) and average number of auctions

per winner (1.62 vs 1.75). An interesting evidence is that in smaller municipalities the dominant firm has an higher probability to win the auction (54% vs 35.1%). This fact migth be due to: i) less firms participate to the auction because auctions are smaller in value and this is linked to less advertisement (see Coviello and Mariniello, 2011); ii) The next session explains how we explore the Italian municipalities spending to identify the effect of DSP on investment in public works and its consequences on final price of the contract.

2.5 Difference-in-Differences Strategy

2.5.1 Setup and Identification

This section describes the empirical strategy used to identify the effect of being subject to capital expenditure constraints on public procurement outcomes. In Section 3.1, we discussed that the DSP is assigned to municipalities if an observed covariate, the population, crosses a known threshold. Let Y_{it}^1 be the outcome for municipality i in period t if municipality i is subjected to the DSP (the *treatment*). The outcome for the same municipality if not exposed to the treatment is Y_{it}^0.

Ideally one would employ random assignment to the DSP, assuring that treatment is independent of Y_{it}^0 and Y_{it}^1 and the factors influencing them. Indicating the dummy for treated municipalities by dsp_i, it is not independent of factors influencing Y_{it}. Municipalities in the treatment may differ from municipalities out-of the treatment in many ways, including the effect of the DSP, so the simple difference in outcomes between treated and control municipalities need not identify DSP impact for any definable group.

As discussed in the previous session, the identification strategy compares municipalities below 5,000 inhabitants with municipalities above 5,000 inhabitants and these groups are very different in term of investment behavior. Implementing a simple Difference-in-Differences (D-i-D) analysis with *fixed effects* at municipality level is optimal in this framework. Indeed, this strategy allows to exploit the DSP impact by comparing the average change in the outcomes within municipalities above 5,000 inhabitants with the average change within municipalities below 5,000 inhabitants. This identification method thus differences out business cycle effects which are common to both small and large municipalities. Any systematic difference in the small municipalities and large municipalities averages is attributed to the only known difference between the local governments, different in matter of DSP regulation. One thus needs to ensure that there are no other differences between the two set of municipalities that could account for the different investment patterns. Aside from the other policy regarding the mayors' salary, discussed in the Introduction, there are no other administrative reasons of which we are mindful.

Let $post_t$ be a dummy for the period after the change in DSP regulation (2009-2011). The impact of the policy for municipality i is $(Y_{it}^1 - Y_{it}^0)$. The average treatment effect for those municipalities undergoing the DSP regulation is $E(Y_{it}^1 - Y_{it}^0 | dsp_i = 1)$. It is clear that these are potential outcomes, in practice we only observe one or the other. For example, we see Y_{it}^1 in municipalities above 5,000 inhabitants in period $t = 1$, but we don't observe Y_{it}^0. Therefore, the outcome for a generic municipality i is:

$$Y_{it} = (1 - dsp_{it})Y_{it}^0 + dsp_{it}Y_{it}^1 \tag{2.1}$$

The first assumption of the D-i-D methodology is an additive structure for potential outcomes in the no-treatment state, specifically we assume that investment in public works depends on the sum of a time-invariant municipality effect and a temporal effect that is common between municipalities

$$E(Y_{it}^0|i,t) = \mu_i + \lambda_t \tag{2.2}$$

where i denotes municipality and t denotes period (before or after the *treatment*). Assuming that $E(Y_{it}^1 - E(Y_{it}^0|i,t)$ is a constant, denoted β_0, I estimate D-i-D (or, more generally fixed effects) models of the form:

$$Y_{it} = \alpha + \beta_0 dsp_i + \beta_1 post_t + \beta_2 dsp * post_{it} + + \mu_i + \lambda_t + \xi_i t \tag{2.3}$$

with $E(\xi_{it}|i,t) = 0$. Then $post_t = 0$ if the period is before of equal to 2008 and $post_t = 1$ if the year is post 2008; the dummy for treatment $dsp_i = 0$ if the municipality i is below 5,000 inhabitants and $dsp_i = 1$ if the municipality i is above 5,000 inhabitants; β_2 is the causal effect of interest. This model includes two main effects for municipalities and year: μ_i is the municipality-specific term and λ_t is the yearly fixed-effect. The causal effect is caught by the coefficient of the interaction term that indicates DSP municipalities after the policy implementation.

Because empirical analysis demonstrate that pervasive serial correlation in D-i-D models at municipality level may produce severely downward biased standard errors (see Bertrand,Duflo and Mullainathan, 2001; Donald and Lang, 2001), we use Huber-White standard errors clustered at the municipality level throughout. These SEs are robust to arbitrary forms of error correlation within a municipality. Of course, the model include μ_i as the municipality-specific term from the mean δ_0 and λ_t is the yearly fixed-effect. From here we get the causal effect of interest

β_2 that is the population double difference

$$\beta_2 = \{E(Y_{it}|dsp_i = 0, post_t = 1) - E(Y_{it}|dsp_i = 0, post_t = 0)\}+$$

$$- \{E(Y_{it}|dsp_i = 1, post_t = 1) - E(Y_{it}|dsp_i = 1, post_t = 0)\}$$

Table 4 shows the average total starting value put up for auctions in public works at municipalities below and above 5,000 inhabitants, before and after the change in DSP regulation. The causal effect of interest, estimated using the sample analogue of the population mean, is negative and around 566,000 Euros.

The key identification assumption of the DD strategy is that, nevertheless differences in level, *trends* in outcomes would be the same in both groups in the absence of treatment that is the well known *common trend assumption*. In the following sub-sessions we provide both graphical and parametric tests for this assumption and evidences support the reliability of the common trend assumption.

2.5.2 Testing for D-i-D assumptions

Common trend assumption. First we investigate graphically the validity of the common trend assumption. An interesting starting point for the empirical evaluation is to look at the relation in trends between outcomes in municipalities below 5,000 inhabitants and municipalities above 5,000 inhabitants. Figures 2, 3, 4 and 5 show the path of four variables in the two groups of municipalities. Figure 1 shows the trend in average total starting value put up for auctions in municipalities exposed to DSP discipline (red line) and municipalities without DSP constraints (blue line). Not surprisingly, the total spending for public work is very different in

level between the two groups of municipalities. The figure shows that before 2008, even though very different in levels, the average total value of yearly investment in public works is rather stable for both groups (around 2 millions for spending constrained municipalities and around 300,000 euros in municipalities below 5,000 inhabitants). The change in DSP regulation in 2009 in associated to a strong reduction in the value of investments in the affected municipalities. At the same time, figure 3 shows that over the same period also the number of auctions for public works in municipalities with DSP constraints decreased more than in unaffected municipalities. This evidence suggest that on average the size of public works contract remained unchanged.

Over the same period figures 4 and 5 show the evolution of average winning rebates and number of bidders in the two types of municipalities. a stronger increase in winning rebates and number of bidders in DSP municipalities. The figure demonstrates two interesting points: the parallel and increasing path of winning rebates in both groups is associated to the same path in the number of bidders; it is not clear whether or not there is a significant difference in the rise after 2008 between spending constrained municipalities and no spending constraint municipalities. The mean impact of the change in DSP regulation turns out to be negative on investments in procurement auctions (less auctions in value and volume) but positive on competition (increase in the number of bidders) and public spending (higher winning rebate that means lower price for the municipality). Finally, the graphical inspection suggests the validity of the common trend assumption.

Exogeneity of the Treatment. In applying the D-i-D framework to the data, it is important to consider carefully the exogenous nature of the "experiment" created by the change in DSP regulation. In the ideal case, the rules would be

independent, random events that varied in timing and had no spillover effects to non-adopting municipalities. If so, equation (3), if correctly specied, will provide an unbiased estimate of the average "treatment" effect, β_2. The present analysis does not differ from the ideal case. The DSP rules are fixed by the central government level because a super-national objective, relative to the European Stability Pact. Therefore, the constraints imposed with the DSP can be viewed as independent and random events. Specifically we graphically inspect the hypothesis of the treatment exogeneity, to exclude self-selection in the treatment. Borrowing a graphical method from the RDD environment (see McCrary, 2008), we exclude the manipulation of the "running variable" from municipalities above but very near to 5,000. The top panel of figure 6 shows that the overall distribution of the municipalities' population is right skewed and has no significant mass probability around the threshold. The bottom figure implements the graphical version of the McCrary (2008) density test in the subsample of municipalities around the discontinuity threshold.[9] This figure suggests that there are no graphical differences (jump) between the two separate estimates of the density around the threshold. Finally we find no statistical evidence of jumps in the density around the threshold of 5,000 inhabitants.

These graphical and parametric tests show that the D-i-D assumptions are satisfied. Therefore, we can assume parallel trends in outcome variables before the change in the DSP that is quasi-experimentally assigned around the threshold.

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[9]This test is constructed in two steps. First, we obtain a very under-smoothed histogram of the population distribution, where the bins of the histogram are defined so that no one histogram bin includes both points to the left and right of the discontinuity point. Second, we run a local linear smoothing of the histogram, where we treat the midpoints of the histogram bins as a regressor, and the normalized counts of the number of observations of the bins are the outcome variable.

2.6 Empirical Results

2.6.1 The Effect of DSP on Local Investment in Public Works

Table 5 contains the main D-i-D point estimates of equation (3) and standard errors of the DSP effect on investment in public works by Italian municipalities. Each column presents the results of seven regressions. For each outcome variable, column 1 contains the standard D-i-D coefficients; column 2 presents D-i-D with fixed-effects at municipalities level, in column 3 I add also temporal fixed-effects.

Although the central objective of this analysis is to test coefficient signs, their magnitude has relevant policy implications. The baseline estimates are an average treatment on the treated (ATT), which is of interest given the economic relevance of the municipalities above 5,000 inhabitants. This ATT might differ from the average treatment effect (ATE) because treated municipalities might differ from smaller municipalities in terms of the outcomes in the absence of the DSP. By restricting the set of treated municipalities to those in the neighborhood of 5,000 inhabitants, it would be possible to evaluate the estimates as an ATE for these PAs and to compare this ATE with the previously found ATT. Section 6.3 addresses this issue and presents the D-i-D results for three different restricted sample of municipalities.

The impact of the change in DSP rules on investment in public works is significant both in statistical and in economic terms. The results are similar across the three model specifications. The estimates indicate that municipalities subjected to the DSP, after the change in the regulation, on average lower total investment in public

works (both in value and in volume). The full set of D-i-D estimates also show that all municipalities over this period dedicate less resources to investment in public works[10].

The coefficient of -12.4 in column 3 indicates that after removing municipalities fixed effects and common year effects, investment in public works decreased by approximately 1.2 millions of Euro in municipalities affected by the DSP exception than in non-affected municipalities. The coefficient of -2.673 in column 3 indicates that investment in public works not only decrease in value, but also in volume (this excludes the possibility that the size of auctions is changed). Municipalities subject to the DSP reduced the average number of auctions by approximately three after the change in regulation. These correspond to a decrease in the total starting value by 47% and a reduction in the number of auctions by 44%.

2.6.2 The effects of the DSP on Participation and Winning Rebate

As expected, estimates in Table 5 indicate that the DSP regulation leads to an average increase in the number of bidders per auction by 16% (+6 bidders with respect to the sample average of 39 bidders) and a lower final price, with an increase in the winning rebate by 5.5% (+0.959 relative to a sample average of 17.45%). This suggests that an increase in the number of bidders, caused by the DSP and related to a decrease in investment for public works, should encourage

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[10]Complete set of estimates for each outcome is available upon request.

more aggressive bidding, suggesting a potential saving at time of the auction of about 290 thousands euros per year, almost 41 thousands euros per auction[11].

Groups from 3 to 5 in table 5 report the D-i-D estimates of the effect of DSP respectively on the probability to win an auction for a generic firm, the probability of winning an auction for the dominant firm in the municipalities (the firm that have won the highest number of auctions in that year) and the average number of auctions won by each winner. The estimates indicate that a decrease in investment for public works from municipalities subject to DSP leads to an average decrease of 2.9% in the probability of winning an auction, and an average increase in the probability of winning an auction for the dominant firm of 4.8%. These correspond to a decrease in the chance to win an auction by 3.8% and the same probability for the stronger firm by 11%. Both effects are statistically different from zero respectively at a 1% and a 5% significance level. Instead, the effect on the average number of auctions won by each winner is not statistically significant.

To sum up, these results show that DSP really impact the decision of local government to undertake new projects for public works. Indeed, the previous results show that municipalities affected by the DSP lower total starting value and total number of auctions. At the same time those municipalities experience higher winning rebates as well as higher number of bidders per auction; those bidders have lower chance to win the auction but the dominant firm has higher chance to adjudicate the auction.

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[11]Table 5 shows that on average municipalities under DSP constraints announce auctions for 2.6 million of euros per year distributed over 7 auctions, this means that the mean value of each auction is around 371,428 euros. On average the adjudication price is the starting value put up for auctions net of the percentage rebate offered by the winner. The average winning rebate per auction is 17.5%, this means that on average the final price for the PA is 371,428*(1-0.175)=306,428 euros. The potential saving induced to the reduction in price (increase in winning rebate) is the difference between 306,428 euros and the final price calculated taking into account the lower winning rebate (16.6%): 371,428*(1-0.166)=264,735. On average the saving is about 41 thousands euros.

2.7 Extensions

2.7.1 The effects of the DSP on FPAs and ABAs

As discussed in section 3, PAs may announce auctions for public works choosing among several types of adjudication procedures. When an open procedure is launched, the auction's announcement informs potential participants about the format of the auction. In Italy contracts for public works can typically be procured through auctions based only on price. Table 1 shows that between 2002 and 2011 these auctions accounted for 76% of auctions of all procedures used in Telemat database. In this paper we only consider these type of auctions, disregarding other methods like *beauty contest* ("offerta economicamente piú vantaggiosa").

In general, auctions for public works are common-value auctions in which an increase in the number of bidders has two counteracting effects on equilibrium bidding behavior: i) the competitive effect; ii) the winner's curse effect. The first effect predicts that increasing competition leads to more aggressive bidding, as each potential bidder tries to maximize her chances of winning against more rivals. The second effect forecast that rational bidders will bid less aggressively in response to an increase in competition. These predictions have strong implications in terms of policy because when the winner's curse is large enough to compensate the competitive effect, governments should restrict entry, or favor negotiations over auctions (Bulow and Klemperer, 1996; Hong and Shum, 2002). However, these effects stand under the classical assumption that bidders are able to commit to bidding promises, that is the not the case of concession contracts (Guasch et al., 2003). Procurement contracts for public works with *price* adjudication method

also allow renegotiations. Indeed renegotiations are partially subject to the discretion of the public administrators and can be used without particularly strong restrictions.

When the adjudication of the auction is based only on price, following the regulation in force, PAs choose between two different mechanism to select the winner: first price (FP) or average bid (AB). These mechanism are described in detail in section 3. Here is useful for the analysis to restate that they differ in the way the winner is determined. In a FPA the highest "responsible" rebate always wins the auction. In an ABA the highest rebate will never win the auction because it is automatically excluded from the selection (see figure 1). Decarolis (2012) shows: i) that FPAs induce lower adjudication price than ABAs but also lower quality and higher cost in the future (high probability of renegotiation); ii) that the specific features of the AB mechanism deliver the theoretical possibility that increasing the number of bidders in the auction not necessarily results in greater competition. If so an increase in the number of bidders will not be associated to an increase in the winning discount. We test empirically these theoretical predictions, implementing a D-i-D both for FPAs and ABAs, separately.

Table 9 and 10 present distinct D-i-D estimates for FPAs and ABAs[12]. The estimates show different results for the two types of adjudication methods. They indicate that DSP causes a decrease in investments for public works whether with FP or with AB procedure, respectively by around 721,000 euros and 2.2 millions euros. Panels 6 and 7 in both tables report the effect of the DSP (and the lower

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[12]From the original cross-section of auctions we build two separate datasets: one with only FPAs and the other with only ABAs. With these two new set of auctions, we proceed with the construction of two balanced panel databases of municipalities. We run separately all the regressions using these two datasets.

level of investments) on the winning rebate and the number of bidders, respectively. They provide different economic evidences about the effect of increasing competition in the two types of procedures. The results suggest sure enough a negative and statistically signicant relation between the level of investments in auctions for public works and the winning rebate only in FPAs (+1.274 percentage points, with a standard error of 0.646) but estimates are not economically and statistically significant when we consider ABAs (the coefficient for the winning rebate is negative and not statistically significant).

These results show that the winners curse effect is particularly strong in ABAs. More precisely, the winners curse effect prevails on the competitive effect so that bidders bid less aggressively when they expect more competition in ABAs. This is somehow related to the specific "collusive" feature of the ABAs (see Conley and Decarolis, 2012). In line with Athias and Nuñez (2008) we also observe that the effect of the winners curse is weaker for FPAs, where the likelihood of renegotiation is higher, so that bidders will bid more strategically in weaker institutional frameworks. We conclude that more competition induced by a reduction in demand for public work by local governments induce "really high competition" in the form of higher rebates only in FPAs.

Table 6, 7, 8 report several regression results to test the *common trend assumption*. Following Autor (2003), Table 6 provides estimates of a subset of the model in table 5, augmented with leads and lags of the implied DSP regulation. Specifically I add indicator variables for four years before adoption and three years after adoption. These indicator variables are equal to 1 in the corresponding years if the municipality is eligible for the DSP. There is no evidence of an anticipatory response within municipalities as regard variables in column (3)-(6). The evidence of no anticipatory effect is unclear for the first two column. To further investigate

the validity of common trend assumption We run a so-called placebo experiment only using the pre-reform perios of the data and moving the DSP shock from 2009 to 2005. Table 7 report the result of the "placebo" regression. The coefficients are all close to zero and all not statistically significant, except the variable "number of auctions". These estimates makes it particularly unlikely that differential time trends explain my results. Again a simple test for "parallel linear trends"suggest that differential trend are not a threat to validity of our findings.

2.7.2 Robustness Check

In this section we present several robustness checks for the D-i-D estimates. First we restrict sample of municipalities around the threshold of 5,000. One concern with the D-i-D approach is that the relationship between the DSP eligibility and the level of investments may be due to the model specification, sample selection, or the omission of the relevant characteristics of public procurement auctions. The primary estimates are obtained by considering a model that includes the municipalities fixed effects and the year effects over the entire sample of Italian municipalities. This specification may not be sufficiently flexible to absorb all the auctions characteristics. In the previous section we investigated heterogeneous effects of DSP on FPAs and ABAs with this motivation. Now we present additional checks based on the definition of different treatment and control groups. Table 11, 12 and 13 report different sets of estimates of the effect of DSP on auctions' outcomes using three restricted sample of municipalities.

Table 11 shows D-i-D estimates using as control group only municipalities above 1,500 inhabitants. This choice is motivated by the decision to balance the number of municipalities below and above the threshold of 5,000 inhabitants. This is

also useful to avoid possible overlapping with other potential policy changes. The estimation window is reduced to 14,254 observations but the signs of the estimates remain unchanged with respect to the basic model. The effect of the DSP is economic and statistically significant on the level of investment (both in value and in volume) with the negative sign.

Table 12 and 13 report results for two different additional intervals. The first set of regressions (table 12) is run on a restricted sample of municipalities, those in [2,517-32,154] inhabitants. These extremes of this interval are respectively the population mean value in the two original control an treatment groups. Again estimates show significant effect of the reduction on investments due to the DSP, with a coefficient negative but lower that the correspondent coefficient resulting from the basic D-i-D model. Also within this bracket the effect on winning rebate and number of bidders is positive and statistically significant (winning rebate +0.97% and +6.3 bidders on average).

The second group of regressions (table 13) report results for a still restricted sub-sample of municipalities, those in [2,444-13,620] inhabitants. This bracket is chosen using as lower bound the median of the population in the control group and as upper bound the median of the population in the treatment group. For this group of municipalities the results suggest that the DSP doesn't play a significant role in reducing investment in public works. The interesting evidence is that as the effect on the level of spending in public works vanish also the effect on the winning rebate disappear. The signs of the coefficients are all those expected but the estimates are not statistically significant. The lack of evidence for municipalities very close to the threshold is not in contrast with previous result. It is reasonable that *small DSP municipalities*, those above the threshold but very close to 5,000 inhabitants, don't take into account the constraints imposed by the DSP in planning public works ,

and decide to incur in late payments as long as they provide auctions to firms (more likely local firms). A second explanation is simply that smaller municipalities: i) are also those identified as the less compliant with domestic stability pact rules; ii) are more efficient in reducing current spending and they don't resort to capital expenditure cutting. We conclude that it is extremely important to talk out the heterogeneous behavior between municipalities relative to the rules imposed by the DSP, in light to the new regulation in force from January 2013 that expend the pact also to municipalities below 5,000 but above 1,000 inhabitants. At present the lack of data on the late in payments at municipality level make this exercise not possible. Therefore results presented in this section are twofold important: i) they confirm the negative effect of DSP on investment in public works and the positive effect of the DSP on final price of the contract; ii) they shine a light on the potential trade-off between reduction in investment in public works and delays in payment.

2.8   Concluding Remarks

This paper focus on the identification of the underlying causes of the drop in capital spending in Italy over the last ten years and investigate the effect of the reduction in level of investments for public works on auctions' outcomes. It can be summarized that from the empirical research conducted, it was found that the change in DSP regulation after 2008 significantly reduced level of investment in public works by italian municipalities. Municipalities eligible for the DSP were allowed to autonomously decide how manipulate current and capital spending in order to respect the expenditure constraint in term of "mixed competence". The

results suggest that between 2009 and 2011 on average municipalities affected by the DSP reduced investment in public works by 1.2 millions of Euro.

We also identify the effects of reduction in investments for public works on auctions' outcomes by comparing municipalities below 5,000 inhabitants with municipalities above 5,000 inhabitants and taking into account the auction format (FP vs AB). Consistently with Athias and Nuñez we provide evidence that the competition induced by a lower level of investments affects rebates only in FPAs. In terms of policy implication this result suggest that government should induce firms to participate FPAs, in order to increase entry.

Reduction in capital expenditures is not associated with reduction in current expenditures by Italian municipalities. Particularly, when local governments have the possibility of choice it is more likely that they restraint capital expenditure. This is crucial for the debate on the containment of public spending. In this sense, our findings shed light on the negative effect of a mix competence method to define spending cap on capital expenditure side.

Chapter 3

Capital Expenditure and New Firm Formation

3.1   Introduction

There is little doubt that the process of new firm formation is a crucial factor for economic growth. This is an embedded question in economics, first identified by Shumpeter (1911, 1942) and formalized by Aghion and Howitt (1992)[1]. However, while a large body of literature has explored the key determinants of new firm formation, the heterogeneous results they have produced have contributed to not achieving a coherent explanation of this process. What does appear clear is that new firm formation dynamics are very complex and in large part difficult to measure because a lack of comparable data.

In this paper we focus on the effect of local investment in public works on new firm formation. Particularly we look at the entry dynamics for construction firms, who are those participating in auctions for public works, exploiting aggregate data on firms entry and exit at municipality level. Analysis is based on data on registrations, de-registrations and the stock of firms taken from the *Chamber of Commerce Firms Register*, monitored by *Unioncamere*. After further developing this database by adding measures of investment in public works, we use the variation in the so called "Domestic Stability Pact" (DSP) regulation as instrument for capital expenditures by local entities.

The positive relationship between investment in public works measured by the average total starting value and new firm entry rate is documented in Figure 3. The right panel shows the relationship between the average value of auctions for public works and the average entry rate of construction firms by year. For

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[1]A large body of literature has addressed this issue, see, for example, Wennekers and Thurik (1999), Bertrand and Kramarz (2002), OECD (2003), Nicoletti and Scarpetta (2003), Commission of the European Communities (2003, 2010), Alesina et al. (2005), Reynolds et al. (2005), and the contributions in Audretsch, Grilo, and Thurik (2007), Griffith et al. (2007), Aghion et al. (2009) and Leitao and Baptista (2009).

comparison the left panel shows the same relationship existing for all firms. We would like to investigate also the de-registration process and make it comparable to the registration data, however figure 3 shows that the relationship between average total starting value and exit rate is much less clear than those existing between average total starting value and entry rate.

Figure 3 suggests that total starting value is a strong predictor of entry rate. It is not certain, however, whether this correlation corresponds to a causal relationship. Obtaining evidence on the causal effect of investment in public works is difficult because several reasons. First of all, biases are caused by omitted variables which are correlated with both auction starting value and entry rate. One potential omitted factor is the quality of municipality's administration which is difficult to measure. "Better" administrators are able to better manage local entity's balance and expenditures. "Better" administrators are also more efficient in having confrontation with firms and make them easier to participate to the auction. It is reasonable that bigger and better structured companies have the possibility to choose unconditionally were to bid, without geographic and qualification restrictions. The selection problem also arises and biases OLS estimates of the local capital investment. Conventional OLS estimates will therefore lead to bias estimates of the effect of capital expenditure on firm dynamics.

To address these problems, we propose the change in DSP rules as a source of exogenous variation in investment for public works. Our framework is Italy, where in 2009 fiscal and balance rules for local entities experienced substantial changes with respect to the previous period. In 1999 central government introduced a set of fiscal rules as response to the European Stability and Growth Pact. The DSP is aimed at ensuring that Local Government sector contribute to pursue an overall balance of public finance. The main feature of the Italian DSP is its yearly

revision which creates no few problems for the local planning. Since 2002 the budget constraint was diversified between regions and municipalities, in particular municipalities below 5,000 inhabitants were excluded from compliance[2].

The 2009-2011 version of the DSP represents a crucial experience for local entities because of its several news. This shock regarded only municipalities affected by the DSP, those above 5,000 inhabitants. Using this change in regulation as instrument for the level of public capital spending , we investigate how the sharp (and we claim exogenous) drop in auctions for public works affected new firm formation and other aggregate firm dynamics. Figure 1 shows the trend in total starting value of auctions for public works between 2002 and 2011. Our empirical strategy tends to investigate the impact of this drop in the total value of investment after 2008 to the formation of new firms in Italy. The paper is organized as follows. Section 2 provides an overview of our research setting giving a brief description of the the relationship between investment in public works (as a proxy for infrastructures) and dynamic of firms. Section 3 summarizes the relevant literature. Section 4 describes the data sources in more detail. Key identification assumptions and empirical strategy are discussed in Section 5. Section 6 presents and interprets the empirical results and validity tests. Finally, in Section 7 we conclude offering policy implications of our findings and suggestions for future research.

3.2   Infrastructures and Construction Firms

The macroeconomic relationship between public infrastructures investment and local GDP is at the core of discussion in literature.

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[2]According to the Law n. 228/2012, since January 2013 also municipalities below 5,000 but above 1,000 inhabitants are eligible for the DSP.

The first question linked to the "local infrastructure endowment" is related to the correlation between infrastructures creation and short/long term productivity. The seminal paper in this research line is the one of Fernald (1999) exploring the interpretation of the existing correlation between infrastructures and productivity in U.S. industries from 1953 to 1989. In his work the author asked for a causal interpretation of this association, focusing on the impact of changes in roads on the relative productivity performance of U.S industries. The main result of his investigation is that "changes in road growth are associated with larger changes in productivity growth in industries that are more vehicle intensive". The important conclusion of these findings is that there exist a causal effect of the change in the roads stock on the change in productivity.

The second crucial point is the one related to the strategic role played by entrepreneurship for the local economies' development. This issue is enhanced by both policy measures and academic research (García, A. B., 2013). The need for more competitive and dynamic firms was supported by the *Lisbon Agenda* (Lisbon Council, 2000) and more recently by the *Small Business Act*, drafted in 2008 from the European Commission. The Act stands for the extensive interest of policy-makers in throwing light on entrepreneurship processes. It consists in ten principles seeking to "improve the overall policy approach to entrepreneurship and to promote small and medium enterprise (SME) growth"(European Commission, 2008). At the same time recent research is focusing on the factors that may stimulate entrepreneurial activity with particular attention on the geographical dimension.

From figure 2 is clear the sharp decrease in the average entry rate after 2008 and the motivation for our research question. Our goal is to investigate the specific

role of local government spending in public works on the dramatic reduction in new firm formation in the Italian context.

3.3   Literature Review

This paper relates to the literature that has analyzed the determinants of new firm formation. While a number of empirical studies have attended to explain which factors are crucial for new firm creation, they have reached mixed conclusions. One of the main difficulty in approaching the question of new firm formation is the heterogeneous of available data that lead to contradictory results. In the literature we can distinguish purely cross-country studies[3] (Da Rin et al., 2011 and Kneller and McGowan, 2011) from analyses at regional (Reynolds et al., 1995 and Audretch and Fritsch, 2002) and city level (Rosenthal and Ross (2010), Doms et al. (2010), Belitski and Korosteleva 2010). These studies support the idea that new firm formation decision is not an isolated event but it is supported by the environment in which entrepreneur will operate.

Previous literature has analyzed the effect of many factors as determinants of new firm creation. Guesnier (1994), Reynolds (1994), Armington and Acs (2002), Audretch and Fritsch (1994) and Garofoli (1994) has analyzed the effect of population change on new firm entry, founding either positive or zero effect. As regard the role of mean establishment size (MES), while Audretch and Fritsch (1994) found no significant effect on new firm formation, Armington and Acs (2002) indicated a

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[3]There is a large body of recent literature of purely cross-country studies that study the effect of policy measures and country characteristics on the incorporation decision and on the characteristics of entrants, particularly the study by Djankov et al. (2010) analyzes a cross-section of 85 countries using survey-based information. See also Ciccone and Papaioannou (2007), Demirgüç-Kuntetal et al. (2006), Desai et al. (2003), Djankov et al. (2002), Klapper et al. (2006), Perotti and Volpin(2007).

negative effect. Again there is uncertainty about the *net* effect of unemployment on the rate of new firm formation (Reynolds et al., 1994).

Because of our focus on local capital spending, our paper is more in line with several recent papers that have used variations in government spending to identify the effects of fiscal policy (Acconcia et al, 2013, Fishback and Kachanovskaya, 2010 or Wilson, 2012) in particular on firms dynamics.

Local government spending may have opposite influences on new firm creation. Hick and Sutaria, 2004 find no significant effect at regional level of the change in local spending on new entry rate. In their paper they argue that an increase in local spending may have a positive *demand-pull effect*, when local governments design spending for local physical and infrastructure improvements, and a negative *tax-push effect*, as higher spending is associated to higher income. Our empirical investigation shed lights on the impact of total local capital expenditures on new firm formation. Therefore, we contribute to the empirical literature by looking at a policy tool that has affected total government spending and its composition. We directly focus on the effect of capital spending reduction in public works on new firm formation at municipality level.

To our knowledge this paper is the first to investigate the *causal* effect of local investment in public works on new firm creation at municipality level. The existing literature on new firm formation has indeed mostly focused upon endogenous issues analyzing the determinants of business creation as a measure of entrepreneurship.

3.4   Data

We use two sources of data to construct a balanced panel dataset of municipalities between 2002 and 2011. The main source of data is the *Unioncamere*[4] database which contains aggregate information at municipality level about the number of firms yearly registered, active, new born and canceled from the "Official Firms' Register" [5].

The data were originally an unbalanced panel of 8,069 Italian municipalities between 2000 and 2012 and also procured disaggregated informations by firm sector and size[6]. We define four outcome variables for firm dynamics. According to the *ecological* approach, we define the variable *entry_rate* as the fraction of new firms to the number of firms previously in existence and active in the market[7]. Following the same approach we define the variable *exit_rate* as the fraction of canceled firms to to the number of firms previously in existence and active in the market.

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[4]*Unioncamere* is an association of public Chambers of Commerce, Industry, Agriculture and Crafts present in Italy at regional level. Its objective is to consolidate policies and best actions that support the development of companies that operate in the region, so as to intensify specific regions' economic leadership in Italy and in Europe. The Chambers of Commerce, Industry, Crafts and Agriculture are independent institutions that, in their province of competence, support and promote activities for the general interest of enterprises. They support the development of local economies, especially with regard to the system of small and medium-sized firms.

[5]There is a distinction between "registered firm" and "active firm". We refer to a firm as "registered" if it is in the *Firm Archive* and it is not liquidated, irrespective of its *activity position* (active, inactive, suspended, in liquidation or failed). According to the *Unioncamere* database definition, a firm is defined as "active" if it operative and it has no any ongoing insolvency procedures.

[6]Firms are classified according to the ATECO 2007 code. This is an automatic coding tool which makes possible to assign an ATECO 2007 code according to a brief description of the economic activity supplied by the firm. We have fifteen activity's sectors in our database: Agriculture, Mineral Processing, Manufacturing, Electricity, Construction, Trade, Room and Board Services, Transport and Storage Services, Finance and Insurance, Public Administration and Social Insurance, Education, Health-Care and Social Services, Family activities, Other Organizations, Not Classified.

[7]See Hicks and Sutaria (2004) for a detailed illustration of the two different approaches widespread in literature to measure new firm formation.

We also construct two measures of firm turnover. The first is the difference between *exit_rate* and *entry_rate* indicating the number of firms yearly deleted from the *Register* with respect to the number of new firms, standardized to the number of enterprises previously in existence and active in the municipality. To explore the relationship between exit and entry we introduce the second outcome that is the ratio between *exit_rate* and *entry_rate*. This is something new in the literature to measure firms' turnover. This indicator is one if there is perfect equilibrium between new firms and canceled firms, it is positive if the number of canceled firms exceeds the number of new firms.

We combine the data on aggregate firm dynamics with information on investment in public works measured by the total starting value of auctions announced by municipalities. The combination of this two databases produces a balanced panel of 7,712 municipalities between 2002 and 2011. The natural feature of our empirical methodology induce us to rearrange the data in order to exclude missing values for variables included in the regression. This leaves us with a final sample of 18,092 observations.

Table 1 shows descriptive statistics for our sample of municipalities. The main variable of interest are the *Total Starting Value* and the *Entry Rate*. From the descriptives we see that the average total value of investment in public works by Italian municipalities is about 2.5 million of Euros, but with a high dispersion. In our sample about 50% of the municipalities invest on average only about 1 million. These amount put up for auctions is on average distributed among 6 auctions,therefore the average value of each auction is around 430 thousands Euros. The ratio *Exit/Entry* represents a proxy for the *turnover rate* of firms. It is on average 1 for the whole of firms, a little higher for construction firms. This indicates an "equilibrium" between entry rate and exit rate in the long-run. Again the second

turnover indicator is worse for the construction sector than for all the remaining industries (-1.69 vs -0.52). These variables signal that on average for construction firms the frequency of de-registered firms is higher than the frequency of new firm registration. Our analysis is aimed to understand if public spending austerity may shrink new entry formation and the findings regarding construction firms display a negative impact compared with an already critical sector situation. *Exit Rate* is higher for construction firms than for all other sectors (7.33% vs 7.09%) meaning that on average 7.3% of the registered firms die during the later year. Also average *Entry Rate* is higher for construction firms than for all other sectors (9.02% vs 7.61%). We also report descriptive statistics relative to the auctions' features.

Since our goal is to individuate the role of local public spending in pushing the formation of new firms and its responsibility in causing the cancellation from the *Firms' Register*, we don't need to exclude from our analysis any auction based on its size. The main analysis is conducted on the entire sample of municipalities. Thanks to our empirical strategy we are able to control for *fixed* structural differences, no matter how big they are, among municipalities. The next section presents our identification strategy and empirical model.

3.5 Identification

Using this dataset we investigate the effect of investment in public works on firm dynamics outcomes at municipality level with the following regression model:

$$Outcome_{it} = \beta_1 + \beta_2(TotalStartingValue)_{it} + \beta_3(AnomalyExclusion)_{it} +$$

$$\beta_4(Avg\#AuctionsPerWinner)_{it} + \beta_5(ProbLocalWinner)_{it} +$$

$$\beta_6 MunicipalityFE_i + \beta_7 YearFE_t + \epsilon_i t$$

$$(3.1)$$

We are primarily interested in evaluating the relation between the level of investment in public works and new firm formation at municipality level. We regress the outcome of municipality i in term of aggregate firm dynamics in year t on a measure of investment level, total starting value of auctions for public works announced by municipality and other controls. The main controls are auction-based variables. *Anomaly Exclusion* is a continuous variable between zero and one and it is and indicator for contracting authorities "preferences" between adjudication methods available to select the winner. This variable indicates the percentage of auctions adjudicated with the AB method in municipality i at time t. We also control for the average number of auctions won by the same winner (in a sense this is an index of winners' turnover in the municipality) and for the probability of winning for a local firm (defined as a firm located in the same city of the contracting authority). To control for temporal factors common between municipalities we include year dummies. We also control for municipality level factors which affect firm dynamics outcomes and are constant over time by including a full set of municipality fixed effects.

The main coefficient of interest is β_2 indicating how level of investment in public works affects firm dynamics outcomes at municipality level. However, estimating this equation using OLS will go into biased results, as the amount put up for public works auction is endogenous. Three cases may deliver biased estimates: measurement errors, omitted variables and selection of interested firms into municipalities that announce more auctions. Measurement errors occurs because total starting value of the auction is reported by hand from the announcement and also because the effective price payed by the contracting authority is affected by ex-post event as renegotiations.

In order to take into account these concerns we propose the DSP regulation after the change in rules to limit local public spending as an exogenous source of variation in investments in public works. As discussed before, the DSP contraints interest only municipalities above 5,000 inhabitants while municipalities below 5,000 inhabitants were not affected. After 2008, municipalities under DSP regulation experienced a substantial change in the procedure to calculate the cap for local expenditures. For each local government the specific balance target is calculated using the criterion of *mixed accrual basis* (without any differentiation between current and capital expenditure caps).

Figure 3 shows how the DSP affected investment in public works by italian municipalities. The red line shows municipalities above 5,000 inhabitants, subject to the DSP regulation. The blue line shows municipalities without DSP constraints. We note that the change in DSP rules caused a strong reduction in the level of total investment in public works in affected municipalities. It is important to stress that the fact that DSP affect bigger and systematically different municipalities does not invalidate the identification strategy because we will take into account level effects introducing municipalities fixed effects. The crucial assumption for the validity of

the Difference-in-Differences approach is that the trends in control and treatment groups were the same in the period before the shock occurs. We will show that this assumption is convincing in this set-up both graphically than parametrically.

The implementation of the DSP rules in term of *mixed accrual basis* allows municipalities to autonomously decide what kind of expenditure manipulate in order to achieve the target imposed by the central government. According to Oxley and Martin (1991, p.161) "it is easier to cut-back or postpone investment spending than it is to cut current expenditures" and from figure 3 we can see that DSP on average had a significant effect on total starting value for public works. It is reasonable to use it as an instrument for the endogenous total starting value variable. The first stage regression is the following:

$$TotalStartingValue_{it} = \gamma_1 + \gamma_2(DSP * Post)_{it} + \gamma_3(AnomalyExclusion)_{it} +$$

$$\gamma_4(Avg\#AuctionsPerWinner)_{it} + \gamma_5(ProbLocalWinner)_{it} +$$

$$\gamma_6MunicipalityFE_i + \gamma_7YearFE_t + \epsilon_i t$$

$$(3.2)$$

This is the first-stage regression for total starting value. The instrument for the total starting value in the IV analysis is the dummy *DSP*Post* that is equal to one if the municipality is above 5,000 in period after the change in DSP rules of 2008. It measures how much total amount invested in public works reduced because of the change in DSP regulation after 2008. The variable is zero before 2009 for all municipalities. Starting from 2009 it is equal to one for municipalities affected by DSP but it is equal to zero in municipalities below 5,000 inhabitants. Using the DSP as instrumental variable for total starting value we are assuming

that the DSP had no other effect on firm dynamics outcomes than through its effect on local investments. It is crucial to highlight that any factor affecting all Italian municipalities in the same way, such as the economic crises of 2008 or the reduction in national funds, will be captured by the yearly fixed effects and they don't invalidate the identification strategy.

As municipalities below 5,000 inhabitants are considered as control group, only factors changing at the same time as the DSP and exclusively interesting municipalities above 5,000 inhabitants may be potential trouble the validity of the identification strategy. There are no other policies changing during the period in analysis exclusively involving municipalities in the treatment group. The main worry is that with the change in spending constraints also cutting to national funds are contemplated in the DSP. However these reduction in financing local entities is not the novelty of the 2009-2011 regulation and already before this period municipalities were affected by decreasing funds.

To test the *common trend assumption* we estimate a so-called falsification exercise only using the pre-treatment period observations and moving the DSP shock from 2009 to 2005. Table 2 presents results of this experiment and shows that all coefficients are not statistical significant, except for the variable *exit rate for all firms*. The results support the assumption that differential trends are not a threat for our findings.

3.6 The Effect of Investment in Public Works on Firm Outcomes

An interesting starting point for the empirical analysis is the comparison between firms' outcomes in municipalities subject to DSP regulation and outcomes of firms in municipalities without financial spending constraints. Figure 4 shows the evolution of entry rate in the two group of municipalities (red line for municipalities subject to the DSP regulation, blue line for unconstrained municipalities). The left panel of the figure shows that the path for the two set of municipalities is very similar between 2002 and 2011. On average both line are decreasing over the entire period, however different in levels. Municipalities below 5,000 inhabitants exhibit lower entry rates than municipalities above 5,000 inhabitants. The right panel shows the trend in entry rate for construction firms in different groups of municipalities. Before 2008 the ratio of new and existing firms is always higher in municipalities under DSP rules than in municipalities not affected by the DSP, also the drop between 2007 and 2008 is almost the same in the two groups of municipalities. However after 2008 the two trends converge and in 2011 entry rate is higher in municipalities above the threshold of eligibility for the DSP than in big cities.

Figure 5 presents the evolution of exit rate for all firms (on the left) and for construction firms only (on the right). It is clear from the data that the path for this variable is much more regular in trends than in levels. One explanation for this evidence is that the variable "exit rate" is representative of firms' mortality in the long-run more that in the short-term because it is defined as the percentage of firms "definitively dead" over the existing firms in the previous period. Indeed

the procedure of "cessazione d'impresa" is more an administrative feature than an economic issue because of its hybrid definition and the delays proper to the bankruptcy process. In other words it is reasonable than a firm is effective dead but it is already present in the "Firms' Register". This is the main reason because we are not able to draw a conclusive result about the *exit side* of the firm dynamics. However our data fully grab what happens from the *entry side* and also give important signals about the complete firms turnover.

Figure 6 and 7 show the pattern for two indicators of the firms' turnover. From the first figure we note that the evolution of the difference between exit and entry rate is increasing both for all firms and for construction firms only. However the right panel highlights the increasing divergence in the evolution after 2008 between municipalities under DSP regulation and municipalities not affected by the DSP. This tendency is more clear from the second figure that represents the trend in the ratio between exit and entry rate. After 2008 municipalities under DSP regulation broaden their gap in the *turnover index* with respect to non DSP municipalities. Indeed in municipalities with DSP constraints the ratio between exit and entry rate grows from 1.2 in 2008 to almost 1.5 in 2011 while in municipalities without DSP rules the same ratio is stable aroud 1.1. From this feature is also of interest the evidence that emerges comparing the pattern of the index between all firms and construction firms: while for all firms the ratio between exit rate and entry rate is always higher in municipalities below 5,000 inhabitants than in municipalities above 5,000 inhabitants, the opposite is true for construction firms. This indicates that in the sector of constructions the rate of turnover is higher in bigger cities than in little municipalities, and the difference in between them increase after 2008.

The graphical analysis suggests that new firm formation in DSP municipalities

worsen after the change in DSP regulation but there are no clear patterns on the effect of a reduction in investment in public works on aggregate firms' mortality. It is important to stress that the figures understate the variation we are using in the regression analysis. Table 3 reports regression results of this reduced form[8]. The DSP constraints have a strong and negative impact on the total value invested by Italian municipalities in public works. The impact of the change in DSP rules to calculate spending limits of local entities is always economic significant and somewhere statistically significant at 1 percent level. The variable we are interested in is strongly affected with the expected sign: the new entry rate for all firms decrease by 0.343 (with respect a mean of 7.606) and the new entry rate for construction firms decreases by 0.563 percent points (with respect a mean of 9.016).

Table 2 shows the estimates from the falsification test where we estimate the effect of a *false* shock in DSP regulation in 2005 using only pre-2009 years and investigate whether municipalities which later experienced the change in DSP regulation were already on a descending trend before 2009 in term of investment in public works and other variables. The results suggest that none coefficient is statistically significant, the only troubling variable is the exit rate. This is a strong signal that the change in DSP regulation is a valid sourse of variation in the total starting value of investments in public works.

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[8]The reduced form is the simple D-i-D model:

$$Outcome_{it} = \theta_1 + \theta_2(DSP * Post)_{it} + \theta_3(DSP)_i + \theta_4(Post)_t +$$
$$\theta_5(AnomalyExclusion)_{it} + \theta_6(Avg\#AuctionsPerWinner)_{it} + \theta_7(ProbLocalWinner)_{it} +$$
$$\theta_8 MunicipalityFE_i + \theta_9 YearFE_t + \epsilon_i t$$

$$(3.3)$$

where DSP_i is a dummy indicating whether the municipality i is DSP constrained; $Post_t$ is a dummy equal to one if the period is after the 2008 treatment and zero otherwise. This is the simple D-i-D methodology with some control variables (Anomaly Exclusion, Number of Auctions Per Winners and Probability to have a local winner) and both municipalities and time fixed effects.

Following the strategy adopted by Waldinger (2010) we evaluate the effect of DSP capital expenditure constraints on firm dynamics using an IV approach. To overcome the endogeneity issue we use the DSP after 2008 as an instrument for total starting value. Column (1) of table 4 presents first stage regression equivalent to equation (2) introduced in the previous section. As expected the change in DSP regulation has a strong and really significant effect on average level of total investment in public works (on average -1 million of euros).

Tha main challange of our strategy relates to the possibility that some firms may have reacted to the decreasing of demand for public works by municipalities subject to DSP by bidding for auctions in municipalities not affected by DSP. This is the main weakness of our data because we only have informations on the aggregate firm dynamics by municipality. Because of this peculiarity of the data structure, we consider appropriate to focus our analysis on the "entry side". Indeed we are unable to draw any conclusion regarding the"exit side" of the firm dynamics. In order to address this issue we claim that further attention need to be posed on the exit side, from a micro prospective. Column (1) also reports that the first-stage F statistics is 21.33, which suggests that the IV-LATE estimates are not affected by the weak instruments problem.

Columns (2)-(5) report the IV results for the following outcome: ratio between exit and entry rate, difference between exit and entry rate, exit rate and entry rate. For each variable of interest we present results for all firms and coefficients concerning only construction firms. As suggested in Imbens and Lemieux (2008) we compute standard errors that are robust for the presence of an unknown form of heteroskedasticity, clustered at municipality level.

Column (2) reports results for the effect of the DSP on the ratio between exit and

entry rate. The reduction in investment for public works seems to not influence the general relationship between exit and entry for all firms in the market. However the construction sector experiences a significant change in its firms composition. The coefficient of -0.008 indicates that a one standard deviation decrease in total starting value increase the ratio between exit and entry rate for construction firms by about 0.42 percentage points. This is a strong and very sizeable effect (39%) because the average municipality shows about a *turnover index* about 1. As regard the difference between exit and entry rate, both coefficients relative to all firms and construction firms show the expected sign but they are not statistically significant.

Column (4) gives us a puzzling evidence about the effect of DSP on average firm's exit rate in Italian municipalities. The results show that the the decrease in investment for public works impacts all firms in local entities with an unexpected sign. A one standard deviation decrease in total starting value for public works also decrease the exit rate by about 1 percentage point (relative to an average of around 7%, corresponds to an increase by 14%). From column (3) we note that DSP has no effect on the exit rate of construction firms. However, these results don't prove that DSP is not affecting firms' structure and their mortality. The main problem with the variable "exit rate" is that it includes only firm completely deleted from the "Italian Firms' Register" and this is not a signal of the firm mortality[9]

Column (5) shows the effect of total investment in public works on entry rate. Total investment in public works has a positive and statistically significant effect on the entry rate both for all firms and for construction firms only. The standard deviation in total starting value is about 5.2 (million Euros). A one standard deviation decrease in total starting value therefore decreases the entry rate by 1.6

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percentage points and this corresponds to an average decrease in entry rate for all firms by 21%. The result for construction sector firms is again significant. A one standard deviation in total starting value cause an opposite variation in entry rate by 2.6 percentage points and this corresponds to an average variation in entry rate by 29%.

3.7 Conclusions

In this paper we try to explain variation in rates of new construction firm formation across both municipalities (small municipalities vs large municipalities) and time (before and after change in DSP regulation) using a unique panel dataset. We combine D-i-D and IV strategies to produce to identify the effect of investment in public works on firm dynamics.

After 2008 the DSP rules, imposed by Italian central governments to local entities, took a turn to grasping spending constraints. We first show that DSP rules have negative impact on investment in public works. Then we use the exogenous variation in the value of auctions for public works to estimate its effect on new firm formation. We also keep an eye on the relationship between new firm formation and firm mortality from an aggregate prospective. Consisting with our hypothesis, we find that new firm formation is affected by reduction in investment in public works, and construction firms are more influenced than other sectors.

Our results contribute to explain the role of public spending austerity on firm opportunities. The existing literature argue that the direction of the relationship between local government spending and new firm formation is not determined

(Reynolds, 1994). With our data and our empirical analysis we find that there is a "causal" relationship between local government spending and new firm creation. We claim that more attention should be posed on the effect of the central government austerity on firm dynamics. We believe that central government austerity together with the "relative discretion"left to local governments is not effective in controlling public spending waste. Future research should explore: (1) the effect of local government expenditures on firms bankruptcy, using micro-data at firm level. (2) the indirect effect of DSP on public spending composition.

Appendix A

Appendix - Chapter 2

Tables

TABLE A.1: **Domestic Stability Pact Evolution**

Year	1999-2001	2002	2003-2004	2005-2006	2007-2008	2009-2011
Covered Municipalities	all 100%	> 5,000 29%	> 5,000 29%	> 5,000 29%	> 5,000 29%	> 5,000 29%
The main Target						
Budget Balance	X	X	X			
Expenditure cap						
-Current expenditures		X	X	X	X	X
-Capital expenditures				X	X	X
Mixed Competence Method						
Target period					2003-2005	2007
Specific balance target						X
Enforcement						
Monitoring					X	X
Monetary Punishment					X	X
Public list of non compliants						X

Notes. The *Domestic Stability Pact* (DSP) is the regulation introduced in Italy in 1999 as response to the *European Stability and Growth Pact*. Almost all local goverments (regions, provinces and municipalities) were interested by the new fiscal discipline. Till 2005 the main target of this regulation was the growth of *Fiscal gap*. In years 2005-2006 central government arouse its interest also in expenditures cap. A turning point in favor of the tight control of local spending both in term of rules and monitoring is the period 2009-2011. In this period, in spite of the persuasive monitoring, local goverments were allowed to decide how to reach their objectives. They autonomously decided which type of local spending manipulate in order to respect the DSP.

TABLE A.2: **Data**

Variable	Mean	Std. Dev.	N
Type of contracting authority			
Municipality	0.621	0.485	371522
Province	0.105	0.307	371522
Region	0.023	0.149	371522
Other	0.251	0.433	371522
Location			
North East	0.164	0.37	371522
North West	0.246	0.43	371522
Centre	0.153	0.36	371522
South	0.288	0.453	371522
Islands	0.149	0.356	371522
Type of contracts			
Roads_Rails	0.213	0.41	371522
Buildings	0.164	0.37	371522
Hydrics	0.096	0.295	371522
Culture	0.03	0.171	371522
Energy_Tech	0.045	0.208	371522
Green	0.01	0.099	371522
Other	0.558	0.497	371522
Outcomes			
Total Starting Value (in 100thousand euros)	5.272	14.966	371522
Winning bid	18.779	10.342	193692
# Bidders	36.638	57.658	10701
Adjudication Method			
Price	0.768	0.422	371522
BeautyContest	0.048	0.213	371522
Other	0.184	0.387	371522
Authomatic Exclusion			
FirstPrice	0.296	0.456	371522
AverageBid	0.704	0.456	371522
NotSpecified	0	0.016	371522
Population			
# Inhabitants	209,401	518,137	371522
Inhabitants>5,000	0.748	0.434	371522

Notes. All the auctions for public works tendered in Italy between the years of 2002-2011 with public participation. *Municipality* is a dummy for whether the public administration is a municipality. *Province* is a dummy for whether the public administration is a province. *Region* is a dummy for whether the public administration is a region. *Type of contracts* are the technical and financial characteristics required by the contracting authority to the bidders (OGs). In this table I report the sum of the most frequent OG1-OG13. Among outcomes I report: *Total Auction Starting Value* that is the value/reserve price set by the public administration (in 100,000 Euros), *Winning Rebate* is the winning bid and is expressed as a percentage reduction form the starting value. The winning rebate is the highest rebate in First Price Auctions, it is the maximum rebate below the anomaly threshold *T* in Average Bid Auctions, textit # Bidders is the number of bids presented in the auction. *Population* is the number of resident inhabitants (year 2001) in the city of the public administration if the contracting authority is a municipality. *Inhabitants¿5,000* is a dummy for whether the municipality is eligible for the DSP.

TABLE A.3: **Descriptive Statistics**

	mean	sd	p10	p25	p50	p75	p90	n
Total Starting Value	26.6	97.2	2.05	4.45	9.95	22.6	50.8	15956
Total # Auctions	6.09	12	1	2	3	7	12	15956
Chance to Win	.775	.268	.333	.556	.889	1	1	15956
Chance to Win (Dominant Firm)	.424	.312	.111	.182	.333	.5	1	15956
Avg # Auctions per Winner	1.7	1.84	1	1	1.13	1.8	3	15956
Winning Rebate	17.4	8.07	7.32	11.8	16.6	23.1	29	15956
# Bidders	39	41.8	5	12	26.1	50	88	15956
Population	20681	86545	1433	3122	7267	16900	38598	15956
North-West	.25	.43	0	0	0	0	1	15956
North-East	.095	.29	0	0	0	0	0	15956
Centre	.12	.32	0	0	0	0	1	15956
South	.26	.44	0	0	0	1	1	15956
Islands	.16	.37	0	0	0	0	1	15956

Notes. All municipalities between 2002 and 2011. *Total Starting Value* is the total amount yearly put up for public works auctions; *Total # Auctions* is the total number of contracts for public works announced by year. *Chance to win* is the average probability of winning an auction for a whichever bidder. *Chance to win for the dominant bidder* is the average probability of winning the auction for the winner dominating the market, that is the firm that wins more often in a given city. *Avg # Auctions per Winner* is the average number of auctions adjudicated by each winner in the municipalities. *Winning Rebate* is the average level of winning bid and is expressed as a percentage reduction form the starting value. textit # Bidders is the average number of bids presented in the auction at municipality level. *Population* is the number of resident inhabitants (year 2001) in the city and its location .

Table A.4: **DSP Municipalities Vs No-DSP Municipalities**

		Municipalities below 5,000	Municipalities above 5,000
Total Starting Value	Mean	8.9	37.8
	p50	5.8	14.8
	Std Dev	10.3	123
Total # Auctions	Mean	3.11	7.98
	p50	2	5
	Std Dev	2.4	14.9
Chance to Win	Mean	.792	.765
	p50	1	.833
	Std Dev	.272	.264
Chance to Win (Dominant Firm)	Mean	.54	.351
	p50	.5	.25
	Std Dev	.319	.285
Avg # Auctions per Winner	Mean	1.62	1.75
	p50	1	1.2
	Std Dev	1.3	2.11
Winning Rebate	Mean	16.7	17.9
	p50	16.2	16.8
	Std Dev	8.13	7.99
# Bidders	Mean	35	41.6
	p50	21	29.5
	Std Dev	41.2	42
Population	Mean	2,517	32,154
	p50	2,444	13,620
	Std Dev	1,321	108,998

Notes. All municipalities. Municipalities below 5,000 inhabitants are not interested by the DSP regulation. Municipalities above 5,000 inhabitants are subject to the fiscal and financial restraints imposed by the DSP.

Table A.5: **Average investment per municipality before and after the DSP twist**

	Variable	noDSP (i)	DSP (ii)	Difference, DSP-noDSP (iii)
1.	Total starting value - before	9.12	39.39	30.27
	Observations	(4,245)	(7,262)	
2.	Total starting value - after	8.43	33.04	24.61
	Observations	(1,932)	(2,517)	
3.	Change in mean	-.69	-6.35	-5.66

Notes. The table reports average total reserve price (in 100,000 Euros) puts up for auctions in public works by municipalities below and above 5,000 inhabitants before and after the DSP regulation in 2009. The sample consists of all italian municipalities. Number of observations are reported in parentheses.

TABLE A.6: **D-i-D Estimation Results**

Outcomes		(1) ols	(2) fe	(3) fe
Total Auction Starting Value		-5.659***	-12.269***	-12.400***
		(1.783)	(3.497)	(3.490)
	Mean	26.58	26.58	26.58
	St. Dev.	97.20	97.20	97.20
Total #Auction		-1.742***	-2.755***	-2.673***
		(0.298)	(0.510)	(0.513)
	Mean	6.090	6.090	6.090
	St. Dev.	12.00	12.00	12.00
Chance to win		-0.001	-0.023*	-0.029**
		(0.009)	(0.013)	(0.013)
	Mean	0.775	0.775	0.775
	St. Dev.	0.268	0.268	0.268
Chance to win for the Dominant Firm		0.070***	0.053***	0.048***
		(0.011)	(0.016)	(0.016)
	Mean	0.424	0.424	0.424
	St. Dev.	0.312	0.312	0.312
Avg # Auctions per Winner		-0.007	0.060	0.082
		(0.044)	(0.080)	(0.081)
	Mean	1.697	1.697	1.697
	St. Dev.	1.843	1.843	1.843
Winning Rebate		0.599*	0.975**	0.959**
		(0.306)	(0.411)	(0.408)
	Mean	17.45	17.45	17.45
	St. Dev.	8.066	8.066	8.066
# Bidders		9.837***	7.023***	6.133**
		(1.789)	(2.478)	(2.486)
	Mean	39.05	39.05	39.05
	St. Dev.	41.80	41.80	41.80
Year dummies		no	no	yes
Observations		15,956	15,956	15,956

Robust standard errors in parentheses, clustered at municipality level
*** p<0.01, ** p<0.05, * p<0.1

TABLE A.7: **D-i-D with *Leads & Lags***

	(1) Total Value	(2) Total # Auctions	(3) Chance to Win	(4) Chance to Win for the Dominant Firm	(5) Avg # Auctions per Winner	(6) Winning Rebate	(7) # Bidders
leads							
dsp_5	10.586*	1.812***	-0.007	-0.036*	-0.116	-0.375	-4.563*
	(5.762)	(0.633)	(0.019)	(0.022)	(0.125)	(0.505)	(2.682)
dsp_6	6.497**	1.307***	-0.022	-0.072***	0.118	-0.493	1.206
	(2.942)	(0.452)	(0.019)	(0.022)	(0.108)	(0.500)	(2.900)
dsp_7	7.207***	0.840**	0.005	-0.024	-0.048	0.230	-1.181
	(2.579)	(0.422)	(0.019)	(0.021)	(0.117)	(0.465)	(2.781)
dsp_8	8.783**	0.625	-0.018	-0.024	0.051	0.406	-0.717
	(3.763)	(0.423)	(0.019)	(0.022)	(0.106)	(0.482)	(2.786)
lags							
dsp_9	5.115**	0.595*	-0.022	-0.048**	0.202	0.373	-5.882**
	(2.156)	(0.335)	(0.019)	(0.023)	(0.165)	(0.491)	(2.979)
dsp_10	0.963	-0.716**	-0.055***	-0.025	0.212*	0.836	0.158
	(3.177)	(0.357)	(0.021)	(0.024)	(0.110)	(0.630)	(3.618)
dsp_11	-6.038**	-1.519***	-0.055***	0.017	0.181	1.550**	6.726
	(2.575)	(0.420)	(0.020)	(0.025)	(0.115)	(0.645)	(4.292)
Constant	23.001***	5.524***	0.818***	0.451***	1.480***	17.014***	46.299***
	(1.213)	(0.198)	(0.014)	(0.018)	(0.066)	(0.364)	(2.199)
Observations	15,956	15,956	15,956	15,956	15,956	15,956	15,956
Mean	26.58	6.090	0.775	0.424	1.697	17.45	39.05
St. Dev.	97.20	12.00	0.268	0.312	1.843	8.066	41.80

Robust standard errors in parentheses, clustered at municipalities level
*** p<0.01, ** p<0.05, * p<0.1

TABLE A.8: **Placebo test in 2005**

	(1) Total Value	(2) Total # Auctions	(3) Chance to Win	(4) Chance to Win for the Dominant Firm	(5) Avg # Auctions per Winner	(6) Winning Rebate	(7) # Bidders
dsp_post1	-1.205	-0.939***	-0.013	-0.006	0.106	0.609*	2.700
	(3.001)	(0.290)	(0.016)	(0.017)	(0.111)	(0.366)	(1.894)
Constant	25.818***	6.262***	0.827***	0.434***	1.484***	16.536***	41.286***
	(2.013)	(0.186)	(0.013)	(0.014)	(0.082)	(0.291)	(1.605)
Observations	11,507	11,507	11,507	11,507	11,507	11,507	11,507
Mean	39.05	39.05	39.05	39.05	39.05	39.05	39.05
St. Dev.	41.80	41.80	41.80	41.80	41.80	41.80	41.80

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

TABLE A.9: **Parametric Test Pre-Period *Parallel Trends***

	(1) Total Value	(2) Total # Auctions	(3) Chance to Win	(4) Chance to Win for the Dominant Firm	(5) Avg # Auctions per Winner	(6) Winning Rebate	(7) # Bidders
$F(6, 4092)$	0.70	3.48	1.02	1.58	1.74	1.61	3.21
Prob> F	0.6510	0.0020	0.4071	0.1487	0.1067	0.1393	0.0038

TABLE A.10: **Heterogenous Effects: FP Auctions**

Outcomes		(1) ols	(2) fe	(3) fe
Total Auction Starting Value		-5.375*	-6.011	-7.214**
		(3.255)	(4.558)	(3.626)
	Mean	25.06	25.06	25.06
	St. Dev.	99.78	99.78	99.78
Total #Auction		-0.256	-0.578	-1.203***
		(0.312)	(0.465)	(0.452)
	Mean	4.499	4.499	4.499
	St. Dev.	9.169	9.169	9.169
Chance to win		-0.013	-0.032*	-0.025
		(0.010)	(0.018)	(0.018)
	Mean	0.848	0.848	0.848
	St. Dev.	0.230	0.230	0.230
Chance to win for the Dominant Firm		0.015	0.010	0.038
		(0.015)	(0.026)	(0.025)
	Mean	0.527	0.527	0.527
	St. Dev.	0.332	0.332	0.332
Avg # Auctions per Winner		0.000	0.023	-0.012
		(0.058)	(0.117)	(0.137)
	Mean	1.408	1.408	1.408
	St. Dev.	1.626	1.626	1.626
Winning Rebate		1.218***	1.256*	1.274**
		(0.392)	(0.652)	(0.646)
	Mean	18.05	18.05	18.05
	St. Dev.	8.768	8.768	8.768
# Bidders		8.106***	3.690	3.132
		(2.123)	(3.550)	(3.517)
	Mean	41.22	41.22	41.22
	St. Dev.	45.60	45.60	45.60
Year dummies		no	no	yes
Observations		8,251	8,251	8,251

Robust standard errors in parentheses, clustered at municipality level
*** p<0.01, ** p<0.05, * p<0.1

TABLE A.11: **Heterogenous Effects: AB Auctions**

Outcomes		(1) ols	(2) fe	(3) fe
Total Auction Starting Value		-13.637***	-21.257***	-22.126***
		(1.778)	(3.869)	(3.962)
	Mean	18.35	18.35	18.35
	St. Dev.	56.67	56.67	56.67
Total #Auction		-3.134***	-4.597***	-4.811***
		(0.325)	(0.674)	(0.695)
	Mean	5.153	5.153	5.153
	St. Dev.	10.76	10.76	10.76
Chance to win		0.000	-0.015	-0.008
		(0.012)	(0.021)	(0.021)
	Mean	0.789	0.789	0.789
	St. Dev.	0.274	0.274	0.274
Chance to win for the Dominant Firm		0.071***	0.057**	0.069***
		(0.015)	(0.024)	(0.023)
	Mean	0.497	0.497	0.497
	St. Dev.	0.343	0.343	0.343
Avg # Auctions per Winner		0.028	0.075	0.044
		(0.052)	(0.121)	(0.120)
	Mean	1.680	1.680	1.680
	St. Dev.	1.585	1.585	1.585
Winning Rebate		-0.221	-0.167	-0.096
		(0.370)	(0.535)	(0.527)
	Mean	17.61	17.61	17.61
	St. Dev.	8.089	8.089	8.089
# Bidders		12.638***	9.258**	10.315***
		(2.276)	(3.815)	(3.826)
	Mean	39.57	39.57	39.57
	St. Dev.	40.22	40.22	40.22
Year dummies		no	no	yes
Observations		11,223	11,223	11,223

Robust standard errors in parentheses, clustered at municipality level
*** p<0.01, ** p<0.05, * p<0.1

Outcomes		(1) ols	(2) fe	(3) fe
Total Auction Starting Value		-5.924***	-12.398***	-12.558***
	Mean	28.90	28.90	28.90
	St. Dev.	102.6	102.6	102.6
Total #Auction		1.799***	-2.845***	-2.768***
		(0.303)	(0.505)	(0.508)
	Mean	6.494	6.494	6.494
	St. Dev.	12.61	12.61	12.61
Chance to win		-0.006	-0.021	-0.027*
		(0.010)	(0.014)	(0.014)
	Mean	0.771	0.771	0.771
	St. Dev.	0.267	0.267	0.267
Chance to win for the Dominant Firm		0.074***	0.066***	0.061***
		(0.013)	(0.017)	(0.017)
	Mean	0.405	0.405	0.405
	St. Dev.	0.306	0.306	0.306
Avg # Auctions per Winner		0.012	0.043	0.063
		(0.049)	(0.085)	(0.086)
	Mean	1.714	1.714	1.714
	St. Dev.	1.907	1.907	1.907
Winning Rebate		0.411	1.202***	1.189***
		(0.341)	(0.441)	(0.438)
	Mean	17.53	17.53	17.53
	St. Dev.	8.040	8.040	8.040
# Bidders		8.637***	6.889**	5.954**
		(2.031)	(2.690)	(2.698)
	Mean	39.91	39.91	39.91
	St. Dev.	42.07	42.07	42.07
Year dummies		no	no	yes
Observations		14,254	14,254	14,254

Robust standard errors in parentheses, clustered at municipality level
*** p<0.01, ** p<0.05, * p<0.1

TABLE A.13: **Robustness: Municipalities in [2,517-32,154]**

Outcomes		(1) ols	(2) fe	(3) fe
Total Auction Starting Value		-1.745**	-2.383**	-2.577**
		(0.742)	(1.070)	(1.074)
	Mean	15.72	15.72	15.72
	St. Dev.	19.10	19.10	19.10
Total # Auction		-0.981***	-1.246***	-1.242***
		(0.152)	(0.212)	(0.213)
	Mean	4.489	4.489	4.489
	St. Dev.	3.805	3.805	3.805
Chance to win		-0.006	-0.008	-0.008
		(0.012)	(0.017)	(0.017)
	Mean	0.778	0.778	0.778
	St. Dev.	0.268	0.268	0.268
Chance to win for the Dominant Firm		0.059***	0.061***	0.058***
		(0.016)	(0.021)	(0.021)
	Mean	0.428	0.428	0.428
	St. Dev.	0.303	0.303	0.303
Avg # Auctions per Winner		0.001	0.023	0.022
		(0.055)	(0.095)	(0.095)
	Mean	1.662	1.662	1.662
	St. Dev.	1.381	1.381	1.381
Winning Rebate		0.530	0.884	0.972*
		(0.419)	(0.550)	(0.545)
	Mean	17.07	17.07	17.07
	St. Dev.	7.911	7.911	7.911
# Bidders		7.019***	7.266**	6.325*
		(2.604)	(3.371)	(3.382)
	Mean	39.97	39.97	39.97
	St. Dev.	42.74	42.74	42.74
Year dummies		no	no	yes
Observations		10,707	10,707	10,707

Robust standard errors in parentheses, clustered at municipality level
*** p<0.01, ** p<0.05, * p<0.1

TABLE A.14: **Robustness: Municipalities in [2,444-13,620]**

Outcomes		(1) ols	(2) fe	(3) fe
Total Auction Starting Value		0.220	-0.164	-0.385
		(0.730)	(1.067)	(1.058)
	Mean	12.34	12.34	12.34
	St. Dev.	14.35	14.35	14.35
Total # Auction		-0.611***	-0.754***	-0.756***
		(0.139)	(0.202)	(0.204)
	Mean	3.730	3.730	3.730
	St. Dev.	2.880	2.880	2.880
Chance to win		-0.004	-0.001	-0.001
		(0.013)	(0.019)	(0.019)
	Mean	0.780	0.780	0.780
	St. Dev.	0.270	0.270	0.270
Chance to win for the Dominant Firm		0.054***	0.059***	0.056**
		(0.017)	(0.023)	(0.023)
	Mean	0.473	0.473	0.473
	St. Dev.	0.309	0.309	0.309
Avg # Auctions per Winner		0.022	0.008	0.005
		(0.057)	(0.101)	(0.100)
	Mean	1.644	1.644	1.644
	St. Dev.	1.298	1.298	1.298
Winning Rebate		0.461	0.734	0.861
		(0.447)	(0.603)	(0.598)
	Mean	16.66	16.66	16.66
	St. Dev.	7.903	7.903	7.903
# Bidders		8.021***	8.375**	7.633**
		(2.814)	(3.721)	(3.745)
	Mean	38.99	38.99	38.99
	St. Dev.	43.29	43.29	43.29
Year dummies		no	no	yes
Observations		7,980	7,980	7,980

Robust standard errors in parentheses, clustered at municipality level
*** p<0.01, ** p<0.05, * p<0.1
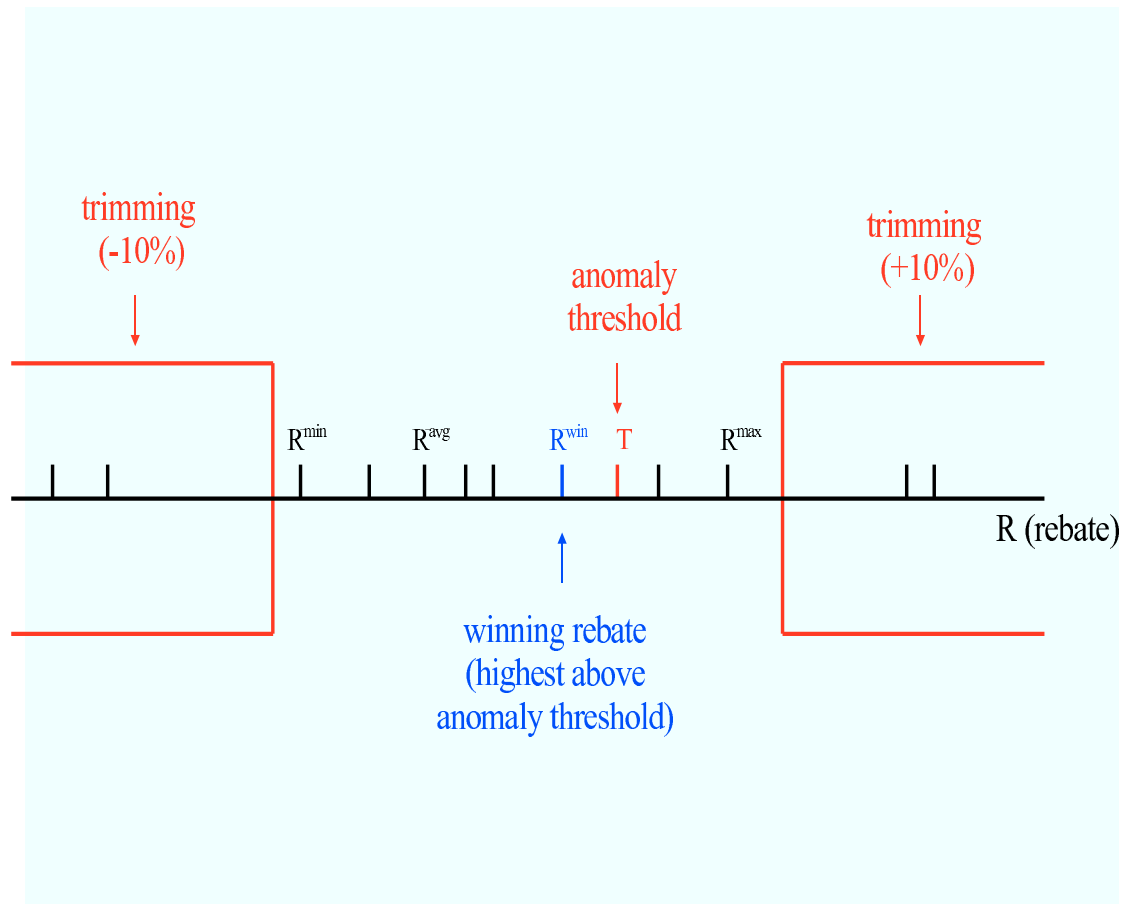
Figures

FIGURE A.1: **Average Bid Mechanism**
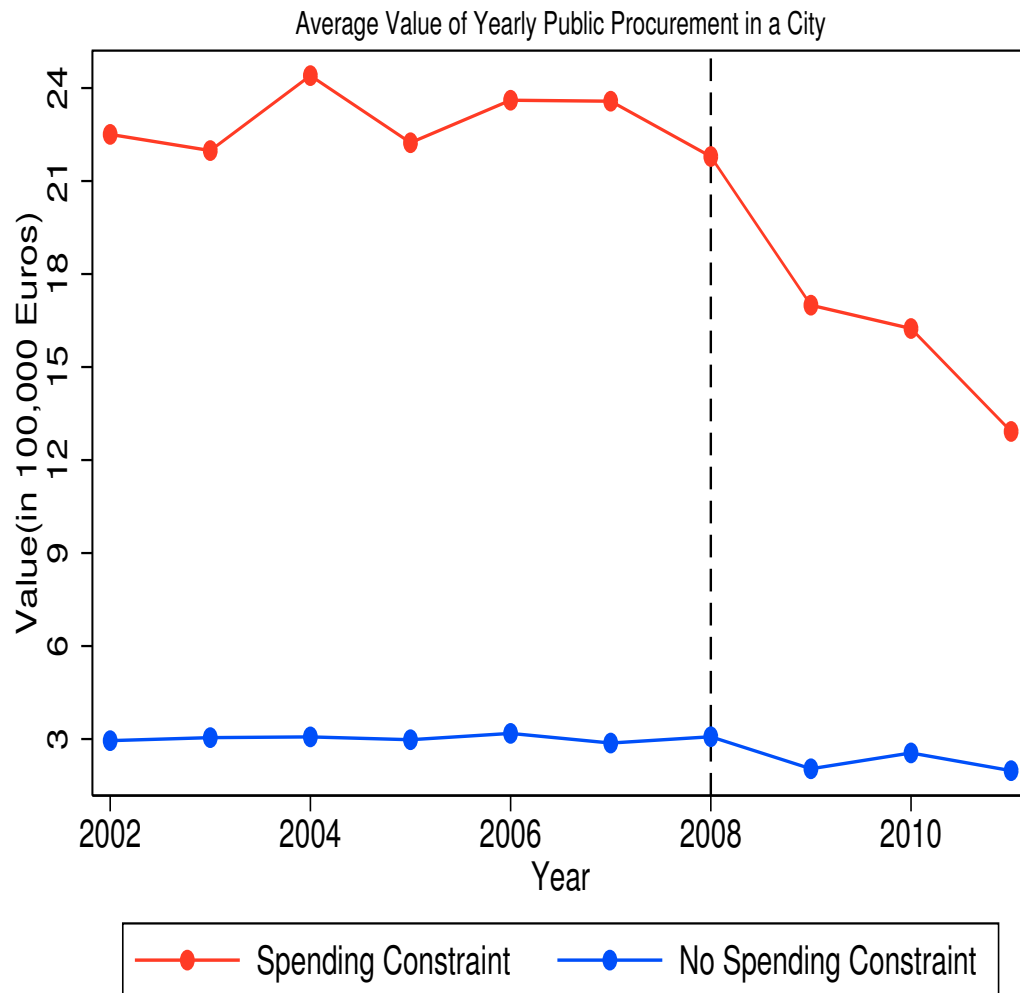
Average Value of Yearly Public Procurement in a City
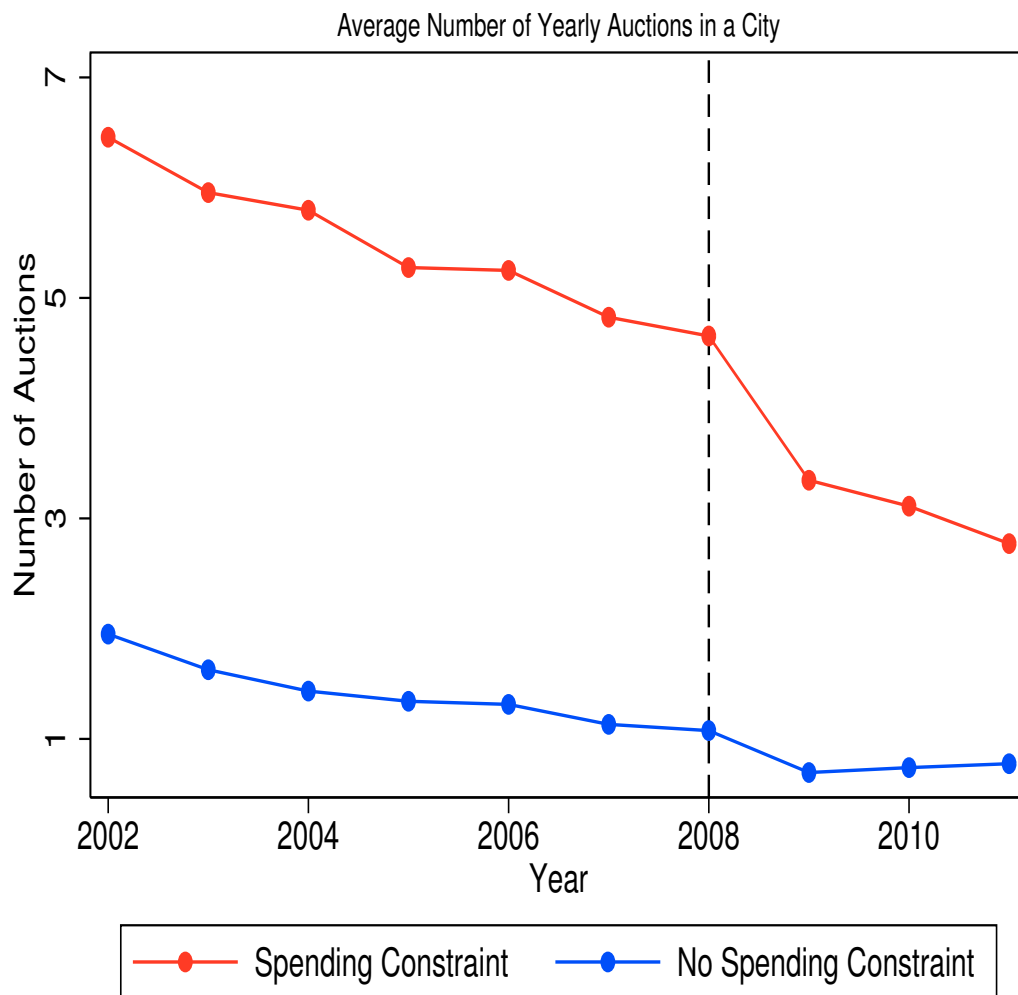
FIGURE A.3: **Total Number of Auctions for Public Works**

FIGURE A.4: **Winning Rebate**
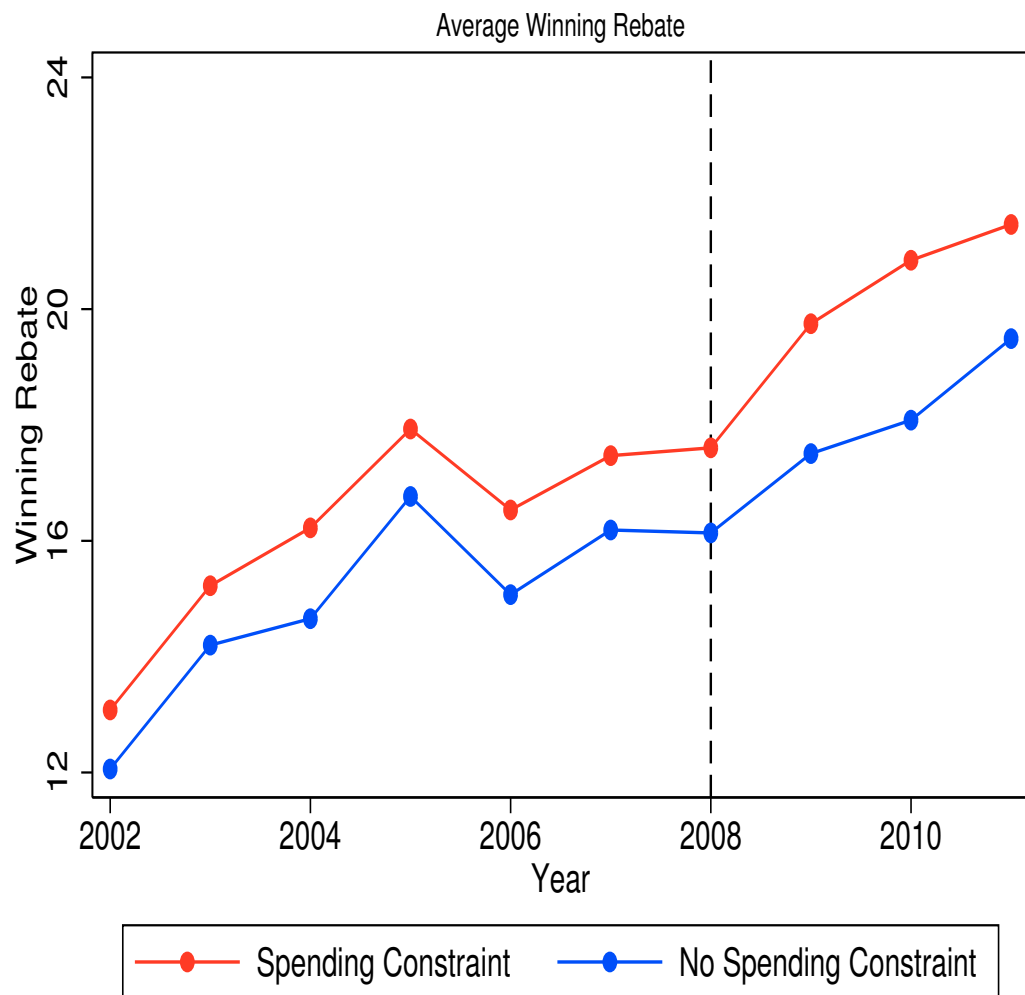
FIGURE A.5: **Number of Bidders**
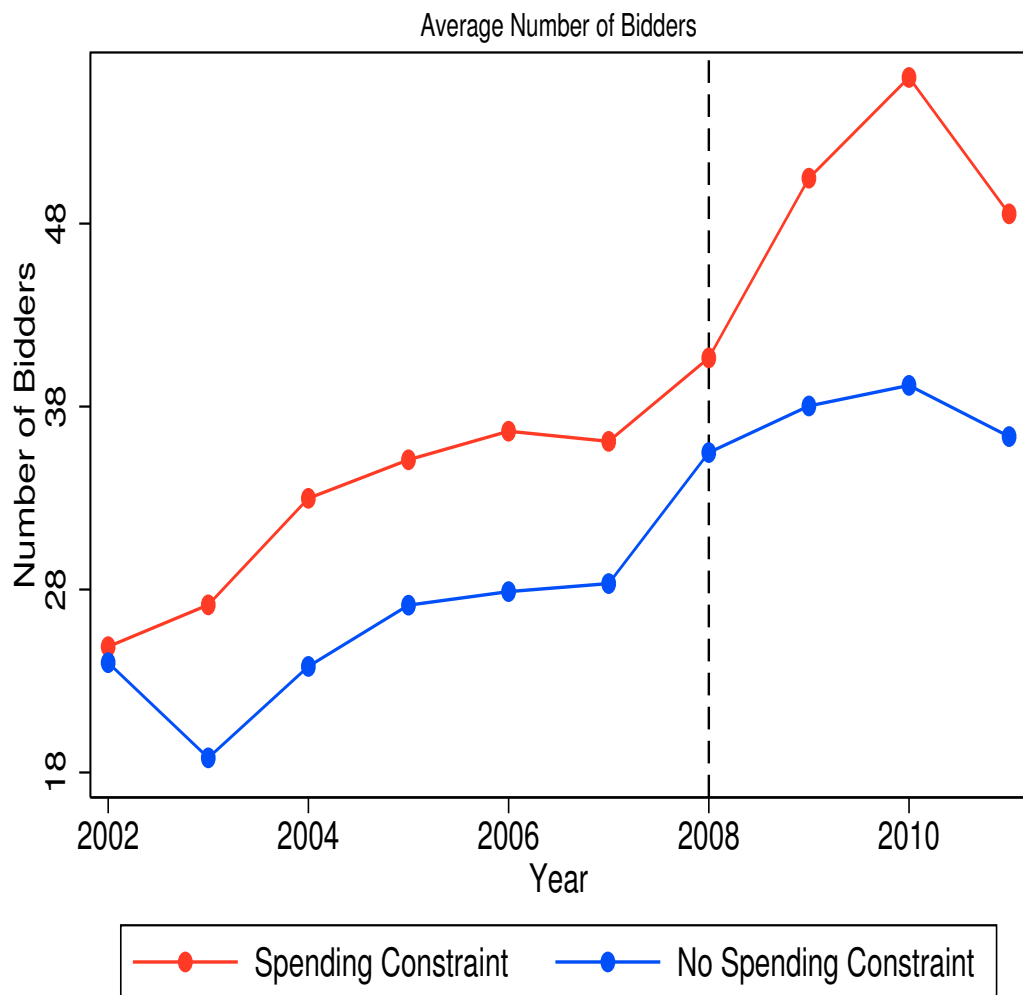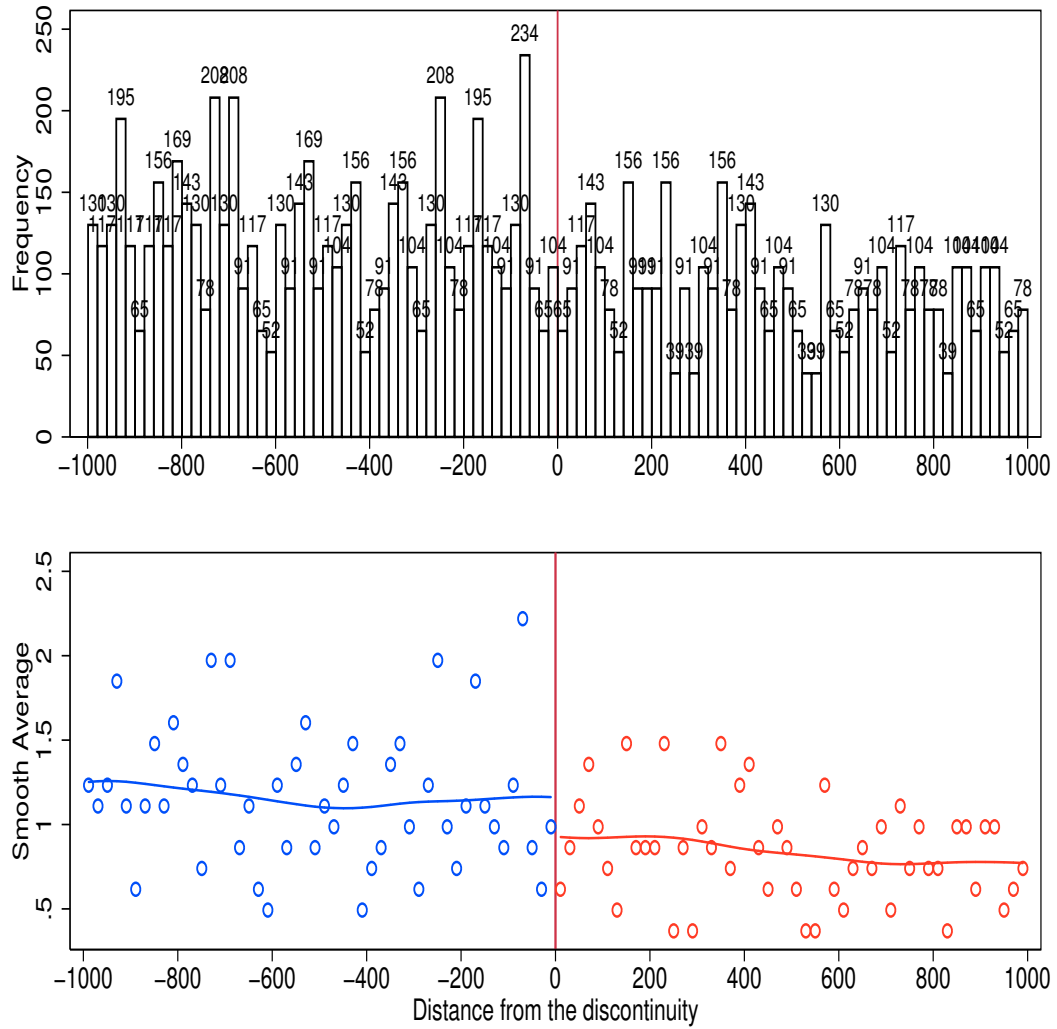

Average Number of Bidders

FIGURE A.6: **Density of the Population Around the Threshold**

Appendix B

Appendix - Chapter 3

Tables

TABLE B.1: **Descriptive Statistics**

	mean	sd	p10	p25	p50	p75	p90	n
Total Starting Value	25.6	92.6	1.95	4.22	9.8	22.2	49.1	18092
Total # Auctions	6	11.5	1	2	3	7	12	18092
Exit/Entry								
all	1.01	.438	.621	.762	.931	1.14	1.45	18092
construction	1.07	.941	.3	.545	.882	1.29	2	18092
Exit-Entry								
all	-.52	2.63	-3.5	-1.99	-.503	.931	2.5	18092
construction	-1.69	6.48	-8.33	-4.44	-.971	1.8	4.62	18092
Exit Rate								
all	7.09	2.02	4.76	5.85	6.97	8.16	9.43	18092
construction	7.33	4.13	2.68	4.96	7.07	9.3	11.9	18092
Entry Rate								
all	7.61	2.31	4.81	6.12	7.54	8.97	10.3	18092
construction	9.02	5.59	3.77	5.61	8.08	11.2	14.7	18092
Anomaly Exclusion	.593	.436	0	0	.75	1	1	18092
Avg # Auctions per Winner	1.71	1.6	1	1	1.13	2	3	18092
P(Local Winner)	.11	.257	0	0	0	0	.5	18092

Notes. I consider informations about the number of firms yearly registered, active, new entry and expired in Italian Municipalities between 2000 and 2012. *Total Starting Value* is the value/reserve price set by the public administration (in 100,000 Euros). *Total Number of Auctions* is the average total number of auctions tendered by each municipality by year. *Entry Rate* at year t is defined as the percentage ratio between the number of new firms at time t and the number of firms active at time $t-1$. *Exit Rate* at year t is defined as the percentage ratio between the number of expired firms at time t and the number of firms active at time $t-1$.

Table B.2: **Placebo test in 2005**

	(1) Tot value	(2) Exit rate/Entry rate		(3) Exit rate-Entry rate		(4) Exit rate		(5) Entry rate	
		all	*construction*	*all*	*construction*	*all*	*construction*	*all*	*construction*
Dsp_Post2004	-0.408	-0.034	-0.069	0.092	-0.381	0.228**	0.058	0.136	0.439
	(2.048)	(0.026)	(0.049)	(0.147)	(0.375)	(0.110)	(0.263)	(0.108)	(0.294)
Anomaly Exclusion	-11.319	-0.027	0.016	-0.312**	0.118	-0.130	-0.243	0.182*	-0.361
	(7.152)	(0.024)	(0.063)	(0.137)	(0.351)	(0.104)	(0.235)	(0.100)	(0.283)
Avg # Auctions per Winner	0.512	0.002	0.002	0.024	0.036	0.001	0.010	-0.022**	-0.026
	(0.373)	(0.002)	(0.005)	(0.015)	(0.034)	(0.012)	(0.024)	(0.010)	(0.027)
P (Local Winner)	-1.887	-0.016	-0.010	-0.143	-0.016	-0.185*	-0.179	-0.041	-0.162
	(2.949)	(0.026)	(0.046)	(0.144)	(0.347)	(0.110)	(0.235)	(0.107)	(0.265)
Constant	27.763***	1.171***	1.276***	0.556***	-0.045	7.798***	8.586***	7.242***	8.632***
	(3.020)	(0.022)	(0.052)	(0.134)	(0.345)	(0.103)	(0.234)	(0.095)	(0.270)
Observations	13,499	13,499	13,499	13,499	13,499	13,499	13,499	13,499	13,499
Mean	0.184	0.184	0.184	0.184	0.184	0.184	0.184	0.184	0.184
St. Dev.	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114	0.114

Table B.3: **Reduced Form**

Outcomes Sample 2		(1) ols	(2) fe	(3) fe
Total Auction Starting Value		-5.823***	-11.333***	-11.523***
		(1.552)	(2.903)	(2.934)
	Mean	25.60	25.60	25.60
	St. Dev.	92.61	92.61	92.61
Exit rate/Entry rate		-0.012	-0.032	-0.039
all firms		(0.019)	(0.026)	(0.026)
	Mean	1.007	1.007	1.007
	St. Dev.	0.438	0.438	0.438
construction firms		0.182***	0.093	0.089
	(0.040)	(0.057)	(0.057)	
	Mean	1.066	1.066	1.066
	St. Dev.	0.941	0.941	0.941
Difference between Exit and Entry rates		0.238**	0.159	0.109
all firms		(0.105)	(0.132)	(0.130)
	Mean	-0.520	-0.520	-0.520
	St. Dev.	2.627	2.627	2.627
construction firms		0.771***	0.473	0.439
		(0.259)	(0.305)	(0.304)
	Mean	-1.690	-1.690	-1.690
	St. Dev.	6.478	6.478	6.478
Death rate		-0.009	-0.192*	-0.234**
all firms		(0.084)	(0.115)	(0.114)
	Mean	7.086	7.086	7.086
	St. Dev.	2.020	2.020	2.020
construction firms		0.249	-0.049	-0.124
		(0.175)	(0.229)	(0.228)
	Mean	7.326	7.326	7.326
	St. Dev.	4.131	4.131	4.131
New entry rate		-0.247***	-0.351***	-0.343***
all firms		(0.085)	(0.096)	(0.096)
	Mean	7.606	7.606	7.606
	St. Dev.	2.315	2.315	2.315
construction firms		-0.522**	-0.522**	-0.563**
		(0.213)	(0.226)	(0.226)
	Mean	9.016	9.016	9.016
	St. Dev.	5.585	5.585	5.585
Year Effects		no	no	yes
Observations		18,092	18,092	18,092

TABLE B.4: **Instrumental Variables**

	First Stage	Instrumental Variables							
	(1)	(2)		(3)		(4)		(5)	
	Total Starting Value	Exit/Entry		Exit-Entry		Exit Rate		Entry Rate	
		all	*construction*	*all*	*construction*	*all*	*construction*	*all*	*construction*
Dsp*Post	-11.523***								
	(2.495)								
Total Starting Value		0.003	-0.008*	-0.009	-0.038	0.020**	0.011	0.030***	0.049**
		(0.002)	(0.005)	(0.010)	(0.024)	(0.009)	(0.017)	(0.009)	(0.020)
Anomaly Exclusion	-10.342***	0.006	-0.127**	-0.337***	-0.415	0.130	-0.061	0.467***	0.354
	(3.702)	(0.026)	(0.058)	(0.129)	(0.312)	(0.122)	(0.211)	(0.129)	(0.271)
Avg # Auctions per Winner	0.459	-0.000	0.007	0.020	0.049	-0.012	-0.010	-0.032**	-0.060**
	(0.330)	(0.002)	(0.005)	(0.013)	(0.033)	(0.011)	(0.020)	(0.014)	(0.029)
P (Local Winner)	0.889	-0.012	0.009	-0.028	0.123	-0.085	0.115	-0.057	-0.008
	(2.230)	(0.018)	(0.038)	(0.090)	(0.214)	(0.081)	(0.148)	(0.089)	(0.186)
F-first stage	21.33								
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes	yes
Municipalities FE	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	18,092	18,092	18,092	18,092	18,092	18,092	18,092	18,092	18,092
Number of groupcity	3,597	3,597	3,597	3,597	3,597	3,597	3,597	3,597	3,597
Mean	9.777	1.043	1.066	-0.520	-1.690	7.086	7.326	7.606	9.016
St. Dev.	52.278	0.553	0.941	2.627	6.478	2.020	4.131	2.315	5.585

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figures

FIGURE B.1: **Total Starting Value of Auctions for Public Works**
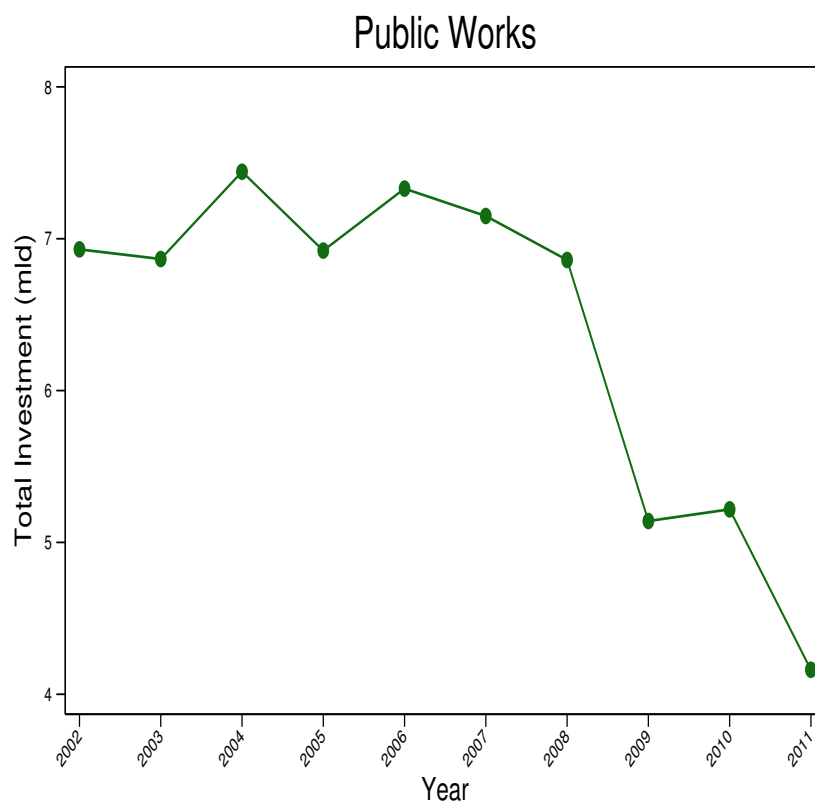
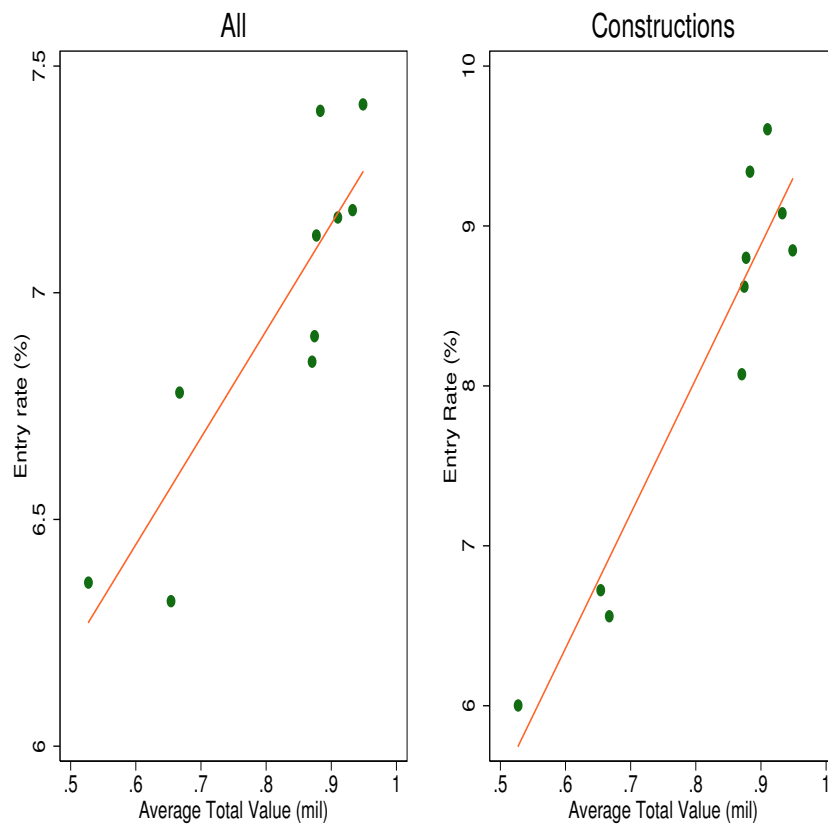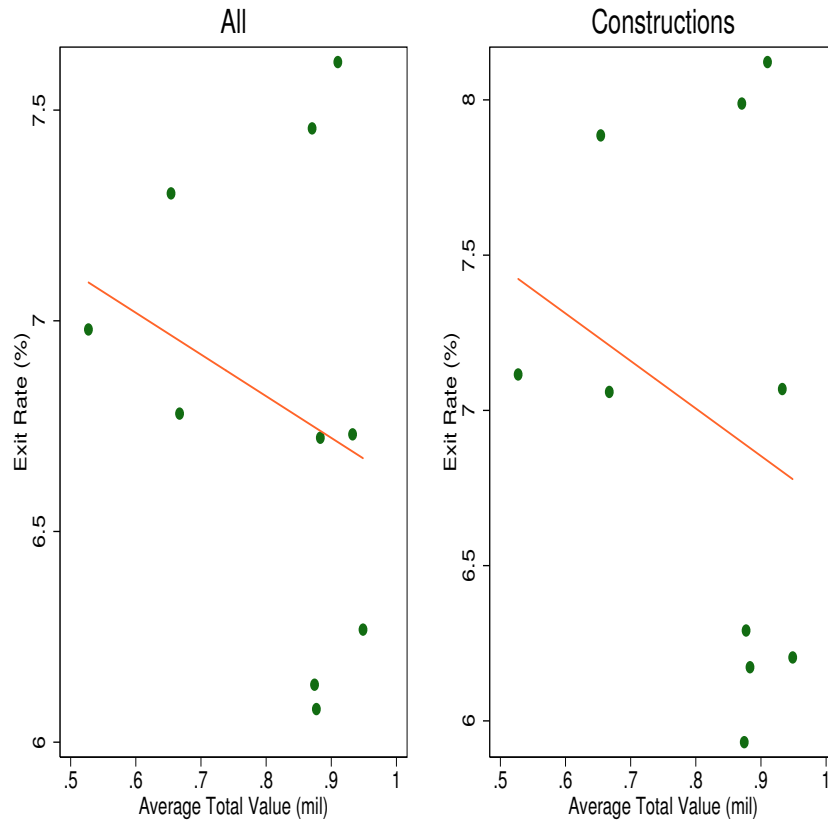FIGURE B.2: **Public Investment and New Entry Firms**

FIGURE B.3: **Public Investment and Exit Rate**

FIGURE B.4: **Total Starting Value**

Average Value of Yearly Public Procurement in a City
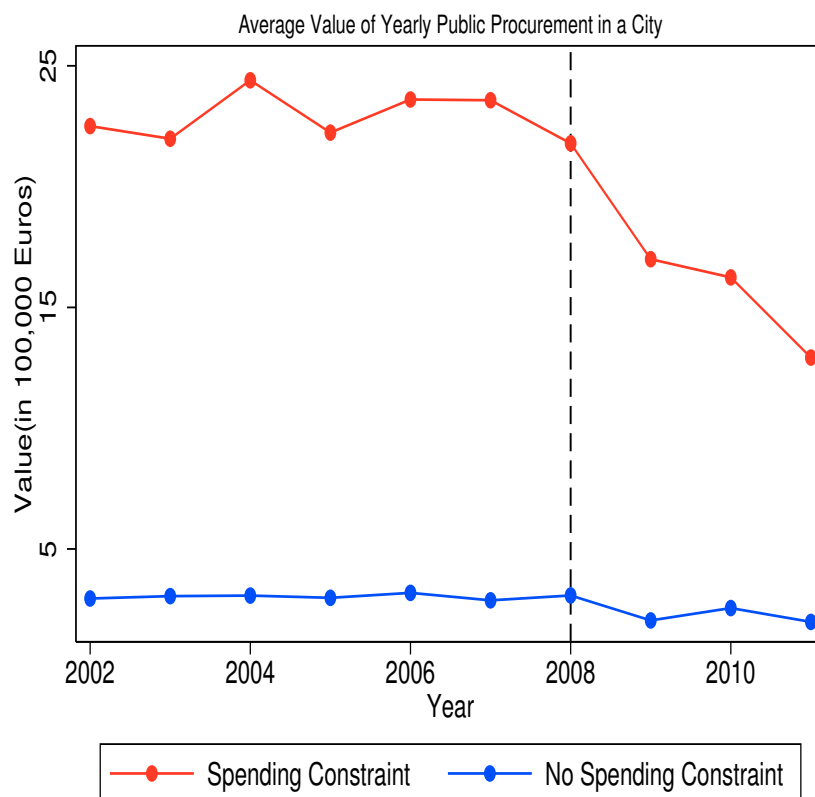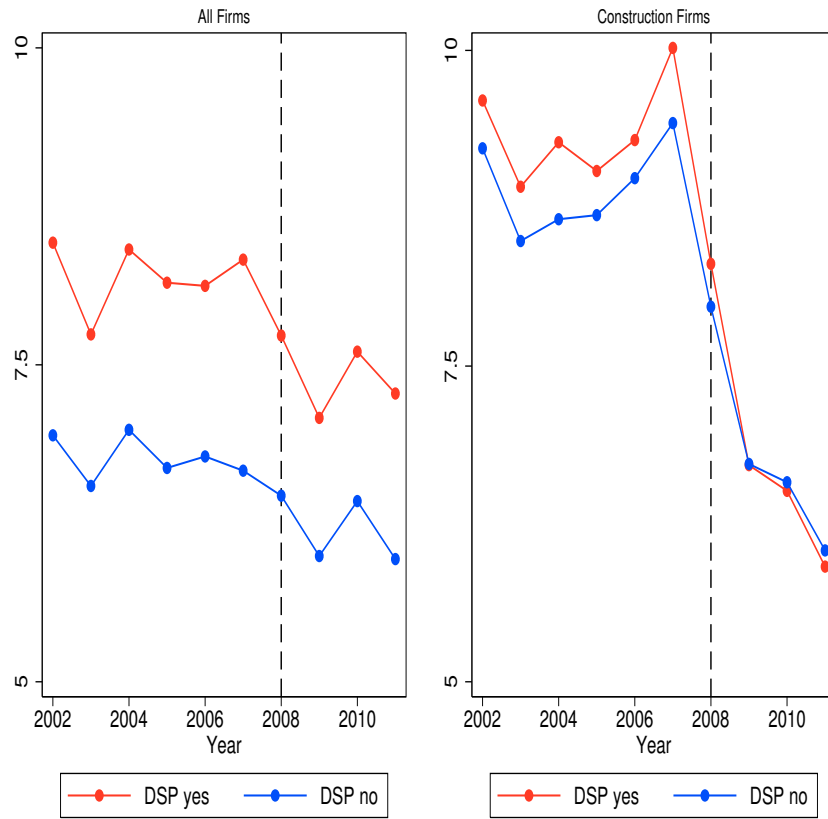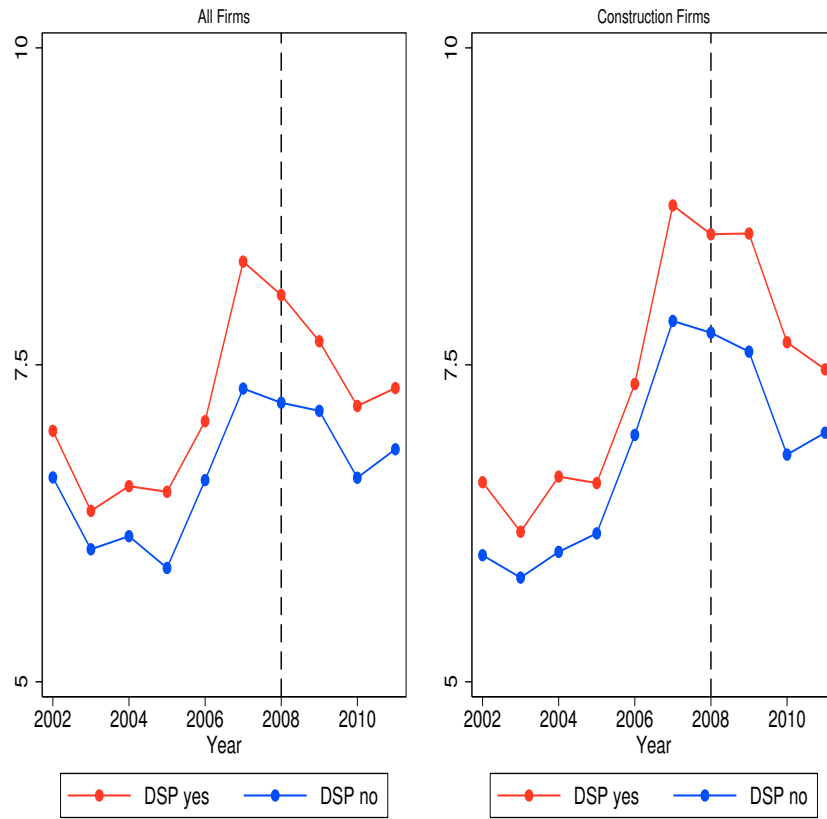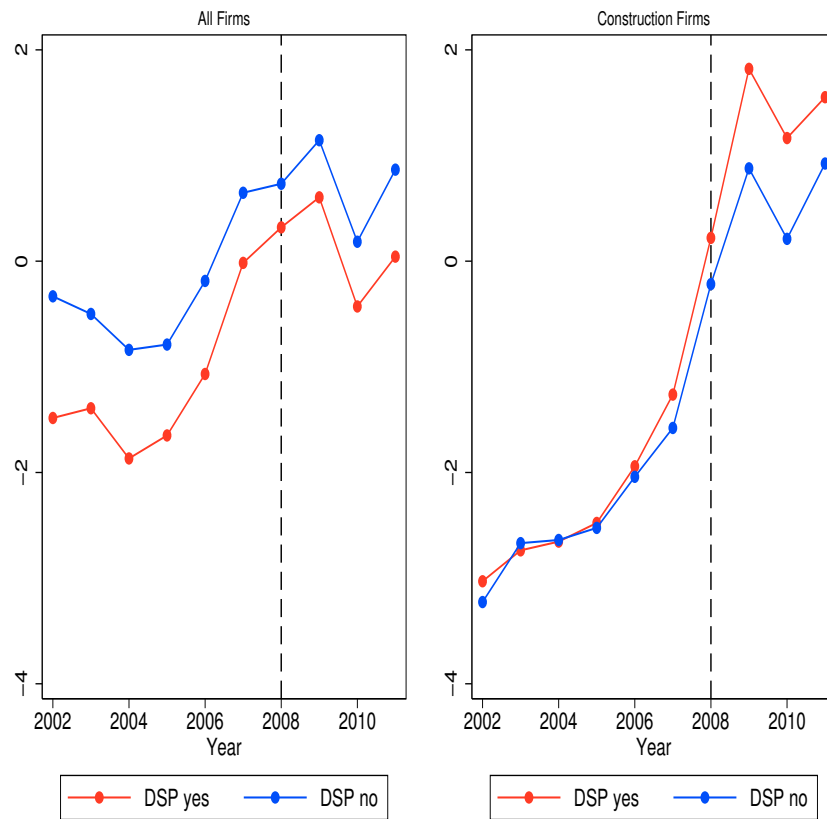
FIGURE B.5: **Entry Rate**
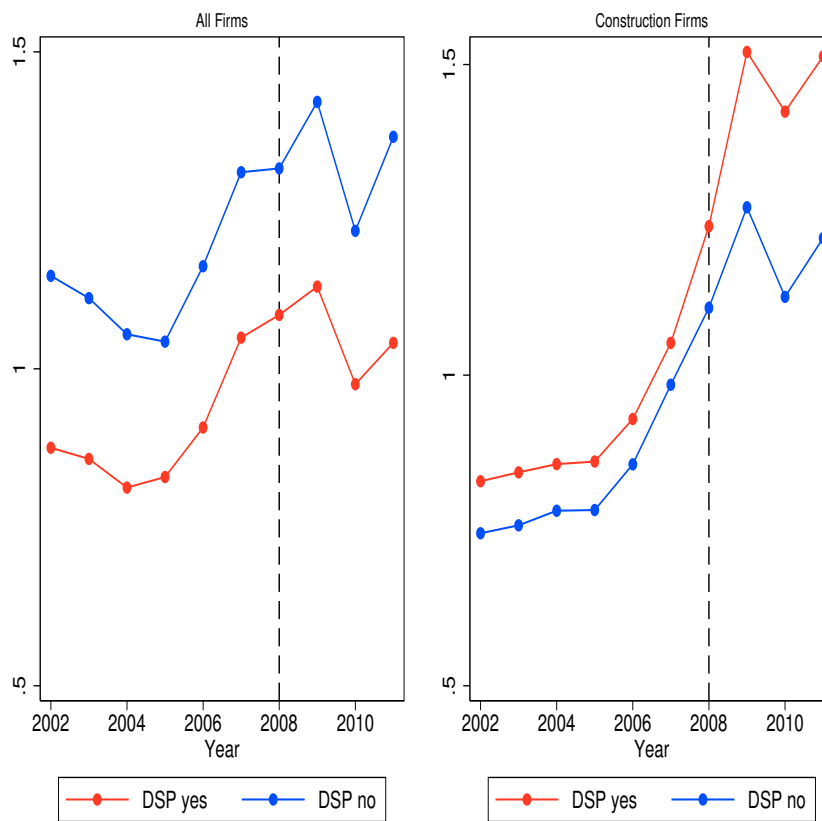
FIGURE B.6: **Exit Rate**

FIGURE B.7: **Difference between Exit and Entry Rate**

FIGURE B.8: **Index of Turnover**

Bibliography

[1] Acconcia, A., Corsetti, G. and S. Simonelli (2013). "Mafia and Public Spending: Evidence on the Fiscal Multiplier from a Quasi-Experiment". forthcoming in *American Economic Review*.

[2] Alesina, A. and R. Perotti (1996)."Fiscal Discipline and the Budget Process". *American Economic Review Papers and Proceedings*, vol. 86, pp 401407.

[3] Armington, C. and Z.J. Acs (2002)."The Determinants of Regional Variation in New Firm Formation". *Regional Studies*, vol.36, pp. 3345.

[4] Ashenfelter, O., Ashmore, R. and R. Filter (1997)."Contract Form and Procurement Costs: The Impact of Compulsory Multiple Contractor Laws in Construction". *The Rand Journal of Economics*, Special Issue, 28, S5-S16.

[5] Athias, L. and A. Nuñez (2008). "Winner's Curse in Toll Road Concessions". *Economic Letters*, vol. 101, pp. 172174.

[6] Atkinson, P. and P. van den Noord (2001). "Managing Public Expenditure: Some Emerging Policy Issues and A Framework for ". OECD Economics Department Working Papers 285, OECD Publishing.

[7] Audretsch, D.B. and M. Fritsch (1994). "The Geography of Firm Births in Germany". *Regional Studies*, vol. 28, pp. 359366.

[8] Balassone F. and Franco D. (2000). "Public Investment, the Stability Pact and the Golden Rule". *Fiscal Studies*, vol.21, pp 207229.

[9] Balassone F., Franco D. and S. Zotteri (2004). "Fiscal Rules for Subnational Governments: Lessons from EMU Countries"in G. Kopits (ed.), *Rules-Based Fiscal Policy in Emerging Markets: Background, Analysis and Prospects*, Palgrave Macmillan.

[10] Belitski, M. and J. Korosteleva (2010). "Entrepreneurial Activity Across European Cities". *Frontiers of Entrepreneurship Research*, vol. 30(4). Article 12.

[11] Bertrand, M., Duflo, E. and S. Mullainathan (2004). "How Much Should We Trust Difference-in-Differences Estimates?". *Quarterly Journal of Economics*. MIT Press, vol. 119 (1), pp 249275.

[12] Binmore, K. and P. Kempler (2002). "The Biggest Auction Ever: The Sale of the British 3G Telecom Licences". *The Economic Journal*, vol.112, pp 7496.

[13] Blanchard, O. and F. Giavazzi (2004). "Improving the SGP Through a Proper Accounting of Public Investment". CEPR Discussion Paper No 4220.

[14] Bulow,J. and P. Klemperer (1996). "Auctions versus negotiations". *American Economic Review*, vol. 86, pp. 180194.

[15] Cameron, L. (2000). "Limiting Buyer Discretion: Effects of Performance and Price in Long-Term Contracting". *American Economic Review*, vol. 90, pp. 265281.

[16] Chodorow-Reich, G. et al. (2011). "Does state fiscal relief during recessions increase employment? Evidence from the American Recovery and Reinvestment Act". *American Economic Journal: Economic Policy* Forthcoming.

[17] Conley, T. G. and F. Decarolis (2012). "Detecting Bidders' Groups in Collusive Auctions". *Mimeo.*

[18] Conley, T. and B. Dupor (2011). "The American Recovery and Reinvestment Act: Public sector jobs saved, private sector jobs forestalled". University of Western Ontario and Ohio State University.

[19] Coviello, D. and M. Mariniello (2013). "The Role of Publicity Requirement on Entry and Auctions Outcomes". Forthcoming on the *Journal of Public Economics*.

[20] Da Rin, M. , Di Giacomo, M. and A. Sembenelli (2011). "Entrepreneurship, firm entry, and the taxation of corporate income: Evidence from Europe". *Journal of Public Economics*, pp. 10481066.

[21] Decarolis, F. (2012). "Awarding Price, Contract Performance and Bids Screening: Evidence from Procurement Auctions" Working Paper, U Wisconsin.

[22] De Hann J., Sturm J.E. and B.J. Sikken (1996). "Government Capital Formation: Explaining the Decline". *Review of World Economics*, vol.132, pp 5574.

[23] Djankov,S., Ganser, T., McLiesh, C. Ramalho,R. and A. Shleifer (2010). "The Effect of Corporate Taxes on Investment and Entrepreneurship". *American Economic Journal*, vol. 2, pp. 3164.

[24] Doms, M., Lewis, E. and A. Robb (2010). "Local Labor Force Education, New Business Characteristics, and Firm Performance". *Journal of Urban Economics*, vol. 67, pp. 6177.

[25] Donald, S. and K. Lang (2007). "Inference with Difference in Differences and Other Panel Data". *Review of Economics and Statistics*, vol. 89, pp. 221233.

[26] Eichengreen, B. and C. Wyplosz (1998). "Stability Pact: more than a Minor Nuisance?". *Economic Policy*, vol. 26, pp. 67104.

[27] Feyrer, J. and B. Sacerdote (2011). "Did the stimulus stimulate? Real time estimates of the effects of the American Recovery and Reinvestment Act". National Bureau of Economic Research, No. w 16759.

[28] Fernald, J.G. (1999). "Roads to Prosperity? Assessing the Link between Public Capital and Productivity". *American Economic Review, American Economic Association*, vol. 89(3), pp. 619-638.

[29] Fishback, P. and V. Kachanovskaya (2010). "In Search of the Multiplier for Federal Spending in the States During the New Deal". NBER Working Paper No.16561.

[30] García, A. B. (2013)."Analyzing the Determinants of Entrepreneurship in European Cities".*Small Business Economics*, vol. 7, pp. 389407.

[31] Garofoli, G. (1994)."New Firm Formation and Regional Development: the Italian Case". *Regional Studies*, vol. 28, pp 381393.

[32] Grembi, V., Nannicini, T. and U. Troiano (2012). "Policy Responses to Fiscal Restraints: A Difference-in-Discontinuities Design". *IZA Discussion Papers*, 6952.

[33] Guasch, J. L., J.J. Laffont and S. Straub (2003). "Renegotiation of Concession Contracts in Latin America". World Bank Policy Research Working Paper 3011.

[34] Guesnier, B. (1994)."Regional Variation in New Firm Formation". *Regional Studies*, vol. 28(4), pp. 347358.

[35] Hong, H. and M. Shum (2002). "Increasing Competition and the Winners Curse: Evidence from Procurement". *Review of Economic Studies*, vol. 69 (4), pp. 871898.

[36] Kagel, J.H. and D. Levin (1986). "The Winner's Curse and Public Information in Common Value Auctions". *American Economic Review*, vol. 76, pp. 894920.

[37] Kneller, R. and D. McGowan (2011).

[38] Kopits, G. (2001)."Fiscal rules: useful policy framework or unnecessary ornament?". International Monetary Fund, 2001.

[39] Leduc, S. and D. Wilson (2013). "Roads to prosperity or bridges to nowhere? theory and evidence on the impact of public infrastructure investment". *NBER Macroeconomics Annual* University of Chicago Press, vol. 27(1), pp. 89 - 142.

[40] McAfee, R. P. and J. McMillan (1986). "Bidding for Contracts: a Principal-Agent Analysis". *Rand Journal of Economics*, vol. 17, pp. 326338.

[41] McCrary (2008). "Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test". *Journal of Econometrics*, vol. 142.

[42] Oxley, H. and J.P. Martin (1991). "Controlling Government Spending and Deficits: Trends in the 80s and Prospects for the 90s". *OECD Economic Studies*, vol. 17, pp. 14589.

[43] Reynolds, P. (1994)."Autonomous firm Dynamics and Economic Growth in the United States, 1986-1990". *Regional Studies*, 122.

[44] Reynolds, P., Story, D.J. and P. Westhead (1994). "Cross-National Comparisons of the Variation in New Firm Formation Rates". *Regional Studies*, vol. 28, pp. 443556.

[45] Reynolds, P., Miller, B. and W.R. Maki (1995)."Explaining Regional Variation in Business Births and Deaths: U.S. 19761988".*Small Business Economics*, vol. 7, pp. 389407.

[46] Rodden, J. (2002). "The dilemma of fiscal federalism: grants and fiscal performance around the world". *American Journal of Political Science*, vol. 46.

[47] Rosenthal, S.S. and A. Ross (2010). "Violent Crime, Entrepreneurship, and Cities". *Journal of Urban Economics*, vol. 67, pp. 135149.

[48] Serrato, J.C.S. and P. Wingender (2011). "Estimating the incidence of government spending". Mimeo.

[49] Shoag, D. (2010). "The Impact of Government Spending Shocks: Evidence on the Multiplier from State Pension Plan Returns". Working Paper, Harvard University.

[50] Spulber, D. F. (1990). "Auctions and Contract Enforcement". *Journal of Law, Economics and Organization*, vol. 6, pp. 325344.

[51] Wilson, D. J. (2012). "Fiscal Spending Jobs Multipliers: Evidence from the 2009 American Recovery and Reinvestment Act". *American Economic Journal: Economic Policy* 4(3): 251-82.

[52] Wyplosz, C. (2012). "Fiscal Rules: Theoretical Issues and Historical Experiences". NBER Working Paper 17884.