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Using Public Procurement for Policy Objectives: Opportunities and Pitfalls

An Empirical Analysis

Thèse

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Foreword

This Ph.D. dissertation is made up of four chapters. The links between them and the underlying logic of the whole dissertation is explained in the General Introduction. Nevertheless, since each chapter corresponds to an independent study, they can be read separately. This implies the presence of redundant information.

Abstract

Using Public Procurement for Policy Objectives: Opportunities and Pitfalls - *An Empirical Analysis*

For some time now, political bodies promote a use of public procurement driven by the pursuit of other objectives rather than merely cost-minimization. In particular, the European Commission seeks to reshape its regulatory framework towards this aim. This PhD dissertation empirically investigates the effectiveness of such a change (i.e. the attainment of the given objectives in practice). A special focus is made on the pursuit of Small and Medium Enterprises (SMEs)' growth by facilitating their access to the related contracts and environmental goals by allowing the use of Green Public Procurement (GPP). To this end, in chapter 1, we start by introducing our work through a literature review. We first analyze existing studies: these call into question the current effectiveness of this reform and investigate the potential to go further. Related insights notably show i) a large gap between the political aspirations and the practice, ii) related barriers / conditions for effectiveness. Second, we emphasize their limits and derive the needs for additional research. It especially regards the need for robust empirical analyses. Our three remaining chapters precisely aim at filling this gap. In each of them, based on two large French public procurement databases, we perform an econometrical analysis

on this effectiveness issue. Chapters 2 and 3 are interested in the expected impact of two "perceived" barriers to participation on SMEs' access. In this respect, we find formalism and the delay of payment to effectively impact the presence of SMEs at the bidding stage. However, this result does not remain when looking at their probability of winning. Chapter 4 focuses on GPP implementation. We found it to be positively influenced by the European practical guidelines, a municipality's size and financial situation, mayor's characteristics and mimetic behaviors. Our results show a particularly strong impact of internal learning through our "past experience" variable. Besides, we believe our findings are also contributing to a more traditional research. First, the one on the determinants of firms' participation in auction by adding formalism and the delay of payment. Second, the one on the determinants of innovative practices within organizations by supporting the importance of internal learning. From a public policy point of view, in a first place, our results call into question the effectiveness of the European measures towards SMEs' growth. Indeed, we did not find the link on which they are based between barriers to participation and SMEs' access to the related contracts. In a second place, they call for the deployment of tools towards the acquisition of GPP knowledge by public buyers as a way to increase their implementation.

Keywords: Public Procurement, SME, Environment, Effectiveness, Policy Evaluation, Econometrics.

Résumé

Les Marchés Publics comme Instruments de Politiques Publiques: Opportunités et Obstacles - *Une Analyse Empirique*

Depuis un certain temps maintenant, les instances politiques poussent à une utilisation des marchés publics guidée par la poursuite d'autres objectifs que la seule minimisation des coûts. Dans cette optique, depuis une Directive de 2004, la Commission Européenne cherche à redessiner le cadre de régulation relatif à ces marchés. Cette thèse étudie empiriquement l'efficacité d'un tel changement au regard de l'atteinte en pratique des objectifs poursuivis. Nous portons une attention particulière à la poursuite de deux de ces objectives: la croissance des Petites et Moyennes Entreprises (PME) en leur facilitant l'accès à ces contrats et l'atteinte d'objectifs environnementaux en permettant l'utilisation de Marchés Publics Verts (MPV). Le chapitre 1 commence par introduire notre travail à travers une revue de littérature. Dans un premier temps, nous analysons les études existantes sur le sujet: celles-ci remettent en cause l'efficacité actuelle de ces réformes et en analysent l'efficacité potentielle. Leurs résultats montrent notamment: i) un décalage important entre les aspirations politiques et la pratique, ii) l'existence de barrières et conditions d'efficacité relatives. Dans un second temps, nous mettons en avant les limites de ces études pour en dériver les besoins en termes de recherche ad-

ditionnelle. Ces besoins sont liés tout particulièrement au manque de résultats empiriques suffisamment robustes. Nos trois chapitres restant ont précisément pour objectif de combler ce manque. A l'aide de deux larges bases de données sur les marchés publics français, dans chacun d'entre eux, nous menons une analyse économétrique relative à cette efficacité. Les chapitres 2 et 3 portent sur l'impact attendu de deux barrières à la participation "perçues" sur l'accès des PME aux marchés publics. Nos résultats montrent ainsi que le formalisme de procédure et les délais de paiement ont effectivement un impact sur la présence des PME au stade compétitif. Cependant, ce résultat ne se retrouve pas quand on s'intéresse à leur probabilité de gagner. Le chapitre 4 porte sur les MPV. Nous trouvons que leur utilisation est positivement influencée par: les recommandations pratiques de la Commission Européenne, la taille et situation financière des municipalités, les caractéristiques du maire et les comportements mimétiques. Nos résultats soulignent l'influence particulièrement forte de l'apprentissage en interne à travers notre variable "expérience passée". Au delà de cette récente littérature, nous pensons que nos résultats contribuent également à une recherche plus traditionnelle. Tout d'abord, celle qui porte sur les déterminants de la participation des entreprises aux marché publics en y ajoutant le formalisme de procédure et les délais de paiement. Ensuite, à celle s'intéressant aux déterminants des pratiques innovantes dans les organisations en soulignant l'important de l'apprentissage en interne. Concernant nos implications en termes de politiques publiques, dans un premier temps, nos résultats remettent en question l'efficacité des mesures Européennes en faveur de la croissance PME. En effet, nous n'avons pas retrouvé le lien sur lequel celles-ci sont pensées entre barrières à la participation et accès des PME aux contrats relatifs. Dans un second temps, ils encouragent les pratiques visant à développer les connaissances des acheteur publics sur les MPV afin d'en accroître l'utilisation.

Mots clés: Marchés Publics, PME, Environnement, Efficacité, Evaluation de Politiques, Econométrie.

Contents

General Introduction

Public sector activity and notably public procurement has long been under high scrutiny. Hence, related deviant behaviors are being followed closely within the media. As a representative example, Transparency International (a well-known non-profit organization) is regularly publishing articles, reports or indexes on corruption in public procurement.[1] Cases of such behaviors are also widely reported within the press (e.g. the French "Affaire des Lycées d'Ile-de-France" combining collusion and corruption which has been the headline of the main newspapers).[2] Besides, we can notice the same interest devoted to public procurement (in) efficiency. For instance, a very recent French report on the subject has been largely picked up by the press (Saussier and Tirole [2015]). In parallel, those concerns have also been major ones for the scientific research. This can notably be seen through a number of journals or conferences with great focus on the topic.[3].

Why is there this interest for public procurement ? The primary reason regards the large amount of public money it involves (i.e. from 10 to 25% GDP in Euro-

[1]See Transparency International website: https://www.transparency.org/.

[2]See for instance: Libération, 21 Mars 2005 "Lycées d'Ile-de-France: la sale affaire de tous les partis" and Le Monde, 21 Mars 2005 "Le procès des marchés publics d'Ile-de-France s'ouvre à Paris".

[3]See for instance: *Journal of Public Administration and Theory, Public Administration Review, Public Management Research Conference, International Research Society for Public Management Conference.*

pean countries).[4] In this respect, it appears necessary to control and evaluate its efficient spending. This issue becomes even more important when considering the current economic environment. Indeed, for the last years, governments are facing a major fiscal crisis and related high budget constraints. A central preoccupation has thus been turning around the rationalization of their spending.

Under such a context, academic research has mainly been governed by a neoliberal ideology with the dominant objective of cost-minimization. A particularly abundant literature can be found within the economic and management fields. To begin with, as regards economic science, a first strand has been developing analytical frameworks to describe and understand this public-private relationship. These are meant to underline the main issues tainting procurement efficiency and derive theoretical hypotheses. They are notably drawn from the Public Choice, the Principal Agent, the Transaction Cost, the Auction and the Incomplete Contract theory. A second strand is covering empirical studies testing those hypotheses and providing related practical recommendations. For instance, on the contract form (e.g. Crocker and Reynolds [1993], Hendel and Lizzeri [2000] Corts and Singh [2004]) or the procedure to be used (e.g. Bajari et al. [2008], Chong et al. [2009], Chever et al. [2011], Chever and Moore [2013]). As for research in management science, it has been substantially rested on those economic foundations. Indeed, one of its main doctrine, the New Public Management (NPM), has been shaped around the neoliberal theories above-mentioned (Hughes [2006]). Hence, NPM prescriptions have been driven by the objective of cost-minimization with competition as the main channel to reach this aim (O'Flynn [2007]).

On the other side, the importance and related concern as regards public procurement made it a particular interesting issue within the political arena. Hence, departing from this traditional paradigm, since very recently, public procurement is promoted as a tool to pursue other policy objectives rather than merely cost-minimization. Along this line, it is now presented as a "Policy Strategy Tool" by the European Commission and the 2014 Directive is calling for a complete mod-

[4]Source: http://ec.europa.eu/trade/policy/accessing-markets/public-procurement/.

ernization of its regulation towards this use.[5] However, this political aspiration has been challenged in return by a new strand of research highlighting important questions that need to be addressed. As argued by Spagnolo in general terms: "Shall we use public procurement to stimulate innovation, protect the environment, increase social inclusion etc ? [...] what do we actually know about the costs and benefits of using public procurement as a policy tool to foster European market integration, or to stimulate innovation and green technologies ? How do we know that public procurement it is more or less costly than using other instruments ? Indeed, we don't know" (Spagnolo [2012]). Looking at the literature, we can identify a recent research that began to develop around these issues. Related studies call into question the current effectiveness of such a use (i.e. the attainment of the given objective in practice) and the potential to go further. Their insights notably highlight: i) a large gap between the political aspiration and the practice; ii) related barriers / conditions for effectiveness. Some studies are also questioning its cost-effectiveness. They draw attention to the costs it might imply making the use of other tools preferable. However, this literature is very new and so far has been very limited in terms of number and/or methodological approach. In this regard, it has been pointed out the lack of robust empirical analyses on these issues (Spagnolo [2012], Staropoli and Steiner [2015]). As expressed by Spagnolo [2012], a number of studies are biased (because ordered and supervised by the European Commission) and there is a scarcity of available data to undertake independent and unbiased research.

This dissertation intends to partially fill this gap through econometrical analyses based on two large public procurement databases. With a focus on Small and Medium Enterprises (SMEs)' growth and environmental goals, we challenge the effectiveness of using public procurement towards policy objectives. More specifically, our first two studies are interested in the European measures that aim at increasing SMEs' access by a decrease in barriers to participation. In this respect, we look at the impact of procedural rules and the delay of payment on the pres-

[5]See Directive 2014/24/EU.

ence of these firms at the bidding stage and their likelihood of winning the related contracts. Our third paper focuses on Green Public Procurement (GPP) practices. We analyze in details the related practices by public buyers and intend to identify its determinants.

In the following, we explain how we have constructed our databases and our choice of empirical method. Finally, we provide a summary of each of our chapters.

The construction of our databases

One of the most important step of this research was to get data on public procurement in a sufficient number to construct our databases and be able to perform our empirical analyses. We managed to obtain such information from two main sources. The first one was the *Tender Electronic Daily* (TED) European Commission website.[6] It contains all PdF documents as regards public contracts above a certain threshold awarded within the European countries for the last five years.[7] Those information have been used for our analyses in chapters 3 and 4. In a first place, we have contacted and obtained from the European Commission an excel document with the data contained in all award notices available. This added great value to our work: it reduced the amount of data we had to extract from the PdF documents and allowed us to considerably enlarge our dataset. In a second place, we have coded the information we needed from the tender documents. Finally, we merged all data (using the contract number) to obtain our complete TED database.

Our second source of information was Paris Habitat-OPH, the largest social housing constructor of Europe. Paris Habitat-OPH provided us with an excel document containing very detailed information on contracts it has awarded between 2004 and 2011. We had information such as the estimated and final value of the contract, the identity of participants and winners, the procedure used or the contract length. We used those information to construct our dataset and perform the empirical

[6] See http://ted.europa.eu/TED/main/HomePage.do.

[7] Currently, public works above 5,186,000 euros need to be reported, and services or supplies if the contract exceeds 414,000 euros.

analysis of chapter 2.

Besides data at the contract level, we also needed information at the firm level. Indeed, in chapter 3, one of our variable of interest is SMEs' probability of winning. From TED, we had available the name and address of the winner. Hence, we used these latter within the "Diane" website that contains numerous informations on French firms. In this way, we could extract: the turnover and the number of employees for each firm / group. Based on the European Commission definition, we could then determine if our winning firm was an SME or not.[8] Finally, our complete database has been obtained from merging those information with the above ones regarding the procurement itself.

Our choice of empirical method

Our research is conducted through a quantitative method based on deduction. For each of our studies, we proceed as follows. We first construct theoretical hypotheses on the impact of our explanatory variable on our explained variables (e.g. the variation in the delay of payment on SMEs' probability of winning). Second, we empirically test those hypotheses. Our empirical tests are all based on econometrical analyses. This choice is explained by the robustness of the results we can obtain with this approach. Indeed, simple statistics only provide correlation effects. Hence, there is a risk of biased results (due for instant to reverse causality or omitted variables). This risk can be faced by the use of econometrics. Indeed, it offers a number of strategies allowing to get rid of or minimize eventual biases (e.g. the use of control variables, difference-in-differences, instrumental variables). These allow to isolate and thus analyze the studied impact. More details on the empirical strategies we use are given in each chapter.

Summary of chapters

[8]The European Union defines an SME according to the following criteria: a firm with less than 250 employees, a turnover under 50 million euros and not part of a larger group that does not fulfill the two previous conditions (European Commission [2003]).

Chapter 1: Public Procurement as a "Policy Strategy Tool": A changing Paradigm?
Our first chapter introduces our research through a literature review. The aim is to provide a global picture of our topic of interest: the main issues at stake, existing insights and limits, to finally derive the needs for further research. In general terms, on one hand, studies are challenging the current effectiveness of using public procurement towards SMEs' growth and environmental objectives; on the other hand, they investigate the potential to go further. Their results have been pointing out the large gap between the political aspirations and the practice, the related barriers/ conditions for effectiveness and finally, have questioned the cost-effectiveness of such a change. This literature is mainly very recent, hence, we found important limits and needs for future investigations. We notably highlight the lack of robust empirical analysis.

Our following three chapters are precisely intended to fill this gap. To do this, in each of them, we undertake an econometrical analysis as regards the effectiveness of using public procurement towards SMEs' growth and environmental objectives.

Chapter 2: Procedural Rules, Efficiency and Access of SMEs: Evidence from French Public Procurement
In this paper, we look at the French "adapted procedure", that allows public buyers to reduce procedural rules. Using the Paris Habitat-OPH dataset, we empirically assess the use of such procedures on the two objectives set by the government: i) enhancing the efficiency of the process, and ii) increasing SMEs' access to public procurement. We also look at its potential side effect on price. On one hand, our results suggest that a reduction of rules enables to increase the efficiency of the process with no side effect on price. On the other hand, they question its effectiveness as regards the SMEs' objective. Indeed, while, we did find an increase in their access to the bidding stage, such impact was not find when looking at their probability of winning contracts.

Chapter 3: Ex Post Delay of Payment, Participation and SMEs' Access to Public Procurement: Evidence from France

We empirically investigate the impact of a variation in the delay of payment on participation and SMEs' access to public procurement. We perform a difference-in-differences analysis using the TED European database with a focus on contracts awarded by French ministers between 2008 and 2012. Our treatment is a policy reform that was only applied to some ministers and significantly increased their delay of payment. We find a negative impact on the number of bidders, while SMEs' probability of winning has not been affected. Our findings suggest that the delay of payment does have an impact on firms' incentive to participate. However, they question the effectiveness of the European measures towards SMEs' access. Indeed, we did not find the link on which they are based between variation in barriers to participation and their probability of winning.

Chapter 4: The use of Green Public Procurement: Evidence from France

We empirically investigate what determine the use of environmental clauses within tenders by public buyers. We perform an econometrical analysis using the TED European database with a focus on contracts awarded by French municipalities between 2009 and 2012. Our results highlight a significant effect of i) the European guidelines, ii) mayor's personal characteristics reflecting the importance of its influence and iii) municipality's size and financial situation as well as mimetic behaviour. We finally found a particularly strong impact of internal learning through our "past experience" variable.

In the following table, we summarize the research questions, the data and the methods used as well as the main results from each chapter of this dissertation.

Table 1: Summary of chapters (*Research questions, methodology and main results*)

Chapter	Method and Data	Main results
• **Chapter 1.** Public Procurement as a Policy Strategy Tool : What Effectiveness ? • **Research Questions.** What are the existing insights as regards the effectiveness of using public procurement towards SMEs' growth and environmental goals ? What are their limits and related need of further research ?	• Literature Review.	• Existing insights highlight: i) a large gap between the political aspirations and the practice, ii) related barriers / conditions for effectiveness. They also question its cost-effectiveness (as regards other tools available). • The limits and needs regard the lack of robust empirical analyses.
• **Chapter 2.** Procedural Rules, SMEs' Access and Efficiency: Evidence from France. • **Research Question.** What is the effective impact of a decrease in procedural rules that aimed at increasing SMEs' access and enhancing the process efficiency ? Does it have a side effect on price ?	• Econometric analysis (Instrumental variable). • Data from Paris Habitat-OPH. • 472 public work contracts tendered between 2004 and 2011.	• The reduction in procedural rules enhances the efficiency of the process with no side effect on price. • It enables a better access of SMEs at the bidding stage. However, it does not impact their access to the related contracts.

Chapter	Methodology (and Data)	Main results
• **Chapter 3.** Delay of Payment, Participation and SMEs' Access: Evidence from France. • **Research Question.** What is the effective impact of a variation in the delay of payment on the level of participation and SMEs' probability of winning ?	• Econometric analysis (Difference-in-Differences). • Data from the TED European Commission website. • 11.493 tenders and 29.613 award notices for auctions launched by French ministers between 2008 and 2012.	• The variation in the delay of payment does have an impact on the number of bidders. However, no such impact is found on SMEs' probability of winning.
• **Chapter 4.** The Use of Green Public Procurement: Evidence from France. • **Research Question.** What are the determinants for the use of GPP by public buyers ?	• Econometric analysis (Control Variables). • Data from the TED European Commission website. • 19.952 tenders and related award notices for auctions launched by French municipalities between 2009 and 2012.	• The use of GPP is positively influenced by: European guidelines, mayor's personal characteristics, municipality's size and financial situation as well as mimetic behaviour. • A particularly strong impact is found for "past experience".

Chapter 1

Public Procurement as a Policy Strategy Tool: A Changing Paradigm?*

1.1 Introduction

For the last 30 - 40 years, public procurement has been mainly used towards lowering and minimizing public spending. Indeed, as reported by Pollitt and Bouckaert [2011], during the 80s - 90s, appeared a general context of crisis combined with the idea of "government over-reach". This has led to the introduction of major reforms to enhance public sector efficiency, which spread and became a common experience throughout the world (OECD [2001], Kattel et al. [2010]). These reforms have been further conceptualized by Hood in 1991, followed by the subsequent literature, under the term "New Public Management" (NPM) - or "Reinventing Government" when applied to the U.S.; and presented as "the most internationally trend in public administration" (Hood [1991], Osborne [1993]). The general idea behind that term was a reshape of the "bureaucratic paradigm of public admin-

*The author would like to thank the members of the Chaire EPPP for their precious comments and criticisms on the preliminary versions of this chapter.

istration" (the Weberian bureaucracy) towards an "efficient" public management (Stoker [2006]; O'Flynn [2007]). One of the main dimensions of NPM reforms underlined by Hood has been: the "shift to greater competition in the public sector", meaning the "move to term contracts and public tender procedures", justified by the idea of "rivalry as the key to lower costs and better standards" (Hood [1991]). Hence, tendering process in particular, has become a popular instrument used by government to gain efficiency from competition (O'Flynn [2007]). This assumption of a link between competition and efficiency in the public sector is supported and can be understood in the light of neo-liberal theories (Kattel et al. [2010]). For instance, following Public Choice, public employees do not seek to maximize social welfare but rather their self-interest (Buchanan and Tullock [1962]), hence "without market discipline, civil servants have no incentive to control costs and are likely to expand production beyond socially optimal levels to maximize their own rewards in terms of state, powers and income" (Parker [1990]; Erridge and McIlroy [2002]). Besides, the literature on bidding process for the delivery of public service largely shows decreasing price with competition (Domberger and Jensen [1997]; Meyer [1998], Amaral et al. [2009]). Within this context, a growing literature has emerged looking for best practices in public procurement to reach the objective of cost-minimization (with similar or higher quality). For instance, on the contract form (e.g. Crocker and Reynolds [1993], Hendel and Lizzeri [2000] Corts and Singh [2004]) or the procedure to be used (e.g. Bajari et al. [2008], Chong et al. [2009], Chever et al. [2011], Chever and Moore [2013]).

However, for some time now, we can observe a major change within the political arena as regards the role attached to public procurement. Starting slowly with its 2004 Directive, the EC encouraged the use of public procurement towards other policy aspirations rather than merely cost-minimization. But, the major change came with the very new Directive adopted in 2014 calling for a complete modernization of public procurement rules to foster objectives such as innovation, environmental and social goals or Small and Medium Enterprises (SMEs)' economic

development.[9] Along this line, public procurement is now viewed and presented by the Commission as a "policy strategy instrument".

This political ambition has found a particular interest within the literature. Indeed, a recent research has been challenging and investigating the effectiveness of such a change (i.e. the attainment of the given objectives in practice). Related studies highlight the important gap existing between the theoretical aspirations and the practice as well as related barriers / conditions for effectiveness. Others address the cost-effectiveness of such a change (i.e. its relative costs and benefits compared to other tools available).

In this paper, our goal is to draft a clear and organized overview of this research. In this way, we aim to i) underline existing insights and ii) highlight what still need to be done to go further. This work was motivated when considering the importance of this research and related findings. Indeed, public procurement involves a large amount of taxpayers' money, hence it appears particularly important to evaluate and guide efficiently the related spendings.

Concerning our scope of research, we have chosen to delimitate and concentrate the literature review on two particular objectives assigned to public procurement: SMEs' economic development (through an increase in their access to the related contracts) and the protection of environment (through the use of Green Public Procurement (GPP)). This choice has been driven as regards the important place given to those aspects as well as the related reforms that have been undertaken for some time now. Indeed, a number of measures have been introduced by the 2004 Directive to facilitate SMEs' access (e.g. simplification of procedure, decrease in the delay of payment, dematerialization, allotment). Others have offered the possibility for public buyers to insert environmental criteria within the calls for tenders.[10] Hence, it gives to research the necessary hindsights as to already draw some conclusions on the effectiveness of such reforms.

The remaining presents our analysis as follows. Section 2 comes back to the in-

[9] See Directive 2014/24/EU.

[10] Public buyers have the possibility to insert environmental criteria within i) the technical specifications, and/or ii) the selection criteria, and/or iii) the award criteria, and/or iv) the clauses attached to contract performance.

stitutional context. It allows to understand the evolution in regulation towards public procurement as a policy strategy tool and the theoretical rationale beyond that evolution. Section 3 provides an overview of the literature challenging the effectiveness of such a change and analyzing the potential to go further. Section 4 summarizes this literature to derive its limits and the need for further research.

(Note on the general structure - If a general questioning can be made at first on the use of public procurement towards public policy objectives. The same cannot be done for drawing a detailed analysis and related conclusions. Indeed, the regulation and logic behind are very specific to each goal as well as the change it implies in practice. Along the same line, the literature is also divided as regards the objective studied. Hence, in the following, we have chosen to treat separately the GPP and SMEs issues.)

1.2 Public Procurement as a Policy Strategy Tool: Regulatory Framework and Theoretical Rationale

1.2.1 Environmental Objectives and Public Procurement

In the course of the sustainable development challenge, environmental concerns have taken a significant place within public policies. As representative examples, the protection of environment has been advanced as one of the main world leaders' objectives during the 1992 Earth Summit in Rio. Besides, since 1997, the European treaty in its article 6 states: "Environmental protection requirements must be integrated into the definition and implementation of the Community policies [...] in particular with a view to promoting sustainable development". The logic and belief behind are the following. Human activity (production and consumption) would be the main source of the planet degradation. The reason being that related decisions are only governed by economic concerns while their environmental

impacts are not taken into account (such as deforestation, pollution or water and soil depletion). Hence, government should intervene through its public policies to address this market failure and reach a "Green Growth".

Within this context, public procurement is presented as a major tool towards environmental objectives (McCrudden [2004]); and GPP promoted at all institutional levels. At the international one, in 2002, OECD countries adopted the "Recommendations on the Environmental Performance in Public Procurement" and committed to taking step to "ensure the incorporation of environmental criteria into the public procurement". At the European one, the 2004 Directive offered the possibility to use GPP defined as: "a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact though out their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured" (European Commission [2008]). Accordingly, public buyers can insert environmental criteria at different steps within call for tenders. In order to have a clear understanding of what it means in practice, Table 1.1 below lists and defines the main steps where an environmental criteria can be used and provides some related examples.[11] Finally, at the national level, this directive has been or should be transposed into the different domestic laws by Member States as to give to their public procurers a legal basis and support for the use of GPP.

The rationale behind the use of public procurement to reach environmental objectives is first related to the strong purchasing power it represents. In this way, it would have the capacity to shape production and consumption towards environmentally friendly products and services. Second, it is argued that GPP can lead to a double benefit for the public buyer: an environmental gain as well as a financial one through a decrease in the lifecycle cost (Marty [2012]). This might be the case when a green asset is relatively more expensive when only considering its cost of acquisition but become relatively less expensive when considering savings made from its further energy performance. Finally, it can have a spill over effect by

[11] Those information are extracted from the European Commission reference document "Buying Green! Handbook".

fostering the development and diffusion of green products through three channels: i) the exemplary effect of public buyer (i.e. it confers credibility to green purchase by demonstrating its technical and economic viability); ii) the benefits for private firms in case of risk-sharing (e.g. costs-sharing) and co-conception at the earlier stage of development and; iii) in terms of economies of scale and learning effects at the stage of diffusion (Marty [2012]).

Table 1.1: Environmental criteria within the call for tender

Step	**Definition**	**Examples**
Subject Matter	The determination of the good or service purchased	Purchase of PCs with low environmental impact through the lifecycle Purchase or lease of low emission vehicles
Technical specifications	The required characteristics of the product or service purchased	Office IT equipments shall meet the latest STAR standards for energy performance All plastic bags must be biodegradable
Selection criteria	The required technical qualifications of the participants	The ability to apply environmental management system with reference to EMAS, ISO14001 or equivalent certification or evidence Previous experience in designing similar building with high environmental standards
Award criteria	The criteria used to score the participants and select the winner	60 points for quality criteria (including the use of green cleaning technique, reduced packaging, etc.) Additional points given for the use of organic food above the minimum required in the technical specifications
Contract performance clauses	The requirements relative to how the work should be carried out	The employment of good environmental practices with regards to waste reduction, waste recovery, etc Reduction of CO2 or other greenhouse gas emission associated with transport

1.2.2 SMEs' growth and Public Procurement

The growth of SMEs has also been considered as a priority within European Public Policies. This can be seen through different actions undertaken by the European Union towards this objective. As representative examples, the European Commission has implemented a dedicated web portal, published the "Small Business Act for Europe" with numerous recommendations on how to foster their economic development.[12] This particular interest is built on the idea that SMEs are a major source of economic growth and employment. Two reasons justify this belief. First, the figures show the important weight SMEs have within the economic activity: they represent 99% of the total number of enterprises; 2/3 of private sector employment and contribute to more than half of the European added value.[13] Second, a widely recognized economic model, developed by David Birch in 1979, has analysed the American market and concluded that the Small High-Growth firms, the "Gazelles" are the main source of job creation.[14] Those are distinguished from the "Elephants", the large cited groups with a tendency of job destruction and the "Mices", the very small firms with no vocation to grow.

Within this context, public procurement is presented as one of the main vectors for SMEs' economic development. Hence, the above-mentioned dedicated web portal as well as the "Small Business Act for Europe" both contain recommendations on how to promote SMEs' access to public procurement. Furthermore, a "Code of Best Practice for Public Procurement" has been published by the European Commission towards the same objective (European Commission [2008]).

This role given to public procurement is explained by the significant source of growth it can be for SMEs through the benefits it can offer in terms of markets acquisition. This concern has taken even more attention when considering the difficulties SMEs have to access public procurement: indeed, while they represent

[12]For the dedicated web portal, see: http://ec.europa.eu/enterprise/policies/sme/index_en.htm.

[13]Source: http://ec.europa.eu/growth/smes/.

[14]This model has been taken as theoretical support for the introduction of the European measures towards SMEs' economic development (EC 2011: "Gazelles - High-Growth Companies" - Final report).

52% of the European added value, they only weight for 32% of the European public procurement in value (European Commission [2010]). These two figures put in relief highlight the disadvantaged access of SMEs to public procurement because not due to their relative (in) efficiency but to their small size. The contrast between the importance given to SMEs' access to public procurement and the difficulties they precisely have to access these markets has led to some evolution on the legal side.

With this concern in mind but referring to the principle of equal treatment, the direction taken by the European Union has not been to discriminate the attribution of contracts in favour of SMEs (as in the U.S, Brazil or Japan) but to reduce their difficulties in order for this access to be fairer (i.e. more based on their efficiency). Along this line, a number of measures have been introduced in the 2004 Directive and have been / should be transposed into (Member States') national law. These concern, notably allotment (i.e.: the subdivision of a contract into lots), e-procurement, the simplification of procedures or the reduction in the delay of payment. Because of the principle of equal treatment, those measures aim at increasing the participation of all types of operators. However, it has been made clear by the European Commission that this is "with the specific aim of facilitating SMEs' access to public procurement" by providing "solutions for problems faced by SMEs or mainly by SMEs" (European Commission [2008]). Therefore, their intended impact was an increase in competition translated into a better access of SMEs to public procurement.

1.3 Public Procurement as a Policy Strategy Tool: What Effectiveness?

Spagnolo [2012] underlines the need to investigate the question: "Shall we use public procurement to stimulate innovation, protect the environment, increase social inclusion etc. ?". His reflection is the following: "What do we actually know about the costs and benefits of using public procurement as a policy tool to foster

European market integration, or to stimulate innovation and green technologies ? How do we know that public procurement it is more or less costly than using other instruments ? Indeed, we don't know". Hence, it appears necessary to investigate the use of public procurement towards each given objective. Along this line, for our two topics of interest, the following reviews a recent literature that has been challenging the effectiveness of such a use.

1.3.1 Environmental Objectives and Effectiveness

The effectiveness of using public procurement towards environmental objectives has been challenged through a number of issues. First: the figures highlighting the low levels of implementation. Second: the related conditions to be met in practice. From one side, those explain the low levels of implementation and question the current effectiveness. From another side, they investigate the potential to go further. Finally, some studies put into question the cost-effectiveness of GPP by stressing the relative costs it might imply as compared to other tools available.

Starting with the figures, in general terms, European Commission [2012] underlines an overall level of implementation (26%) still below the EC target (50%).[15] As regards practices in Northern countries in particular, Parikka-Alhola et al. [2006] found almost one third of tenders with an environmental criteria. However, this result is highly contrasted when looking at the scoring rules : environmental aspects are only accounted for 3,3%. On the same line, Kippo-Edlund et al. [2005] conclude on one hand on a great percentage of tenders with green criteria, but on the other hand, only few of them to be well specified (i.e. with clear information on what is required by the public buyer). Besides, the authors found that, in many cases, environmental award criteria present in the call for tenders are not mentioned within the final decision.

Going into the detailed figures, studies show heterogeneous practices notably de-

[15]These percentages regard contracts containing at least one environmental criteria as defined by the European Commission within the related report.

pending on: the country, the sector or the stage of inclusion. They pinpoint cases with very low rates of implementation that highlight even more the limits in practice to follow and reach the political aspirations. As regards the country, European Commission [2012] highlights numerous Member States with highly restricted GPP practices.[16] Looking at the sector, **?** underlines a number of them attached to very low level of green criteria. The same observation is made in Kippo-Edlund et al. [2005] for Northern countries.[17] Finally, looking at the stage of inclusion, European Commission [2010] found a related low level in clauses related to contract performance (15% of all environmental clauses), selection criteria (14%) or award criteria (10%). On the same line, Kippo-Edlund et al. [2005] show that contract performance clauses are only accounting for 5%.

Turning to the conditions for effectiveness, the literature has first highlighted factors related to the public buyer. She must have a sufficient level of knowledge, competence and information (European Commission [2006], European Commission [2010], Michelsen and de Boer [2009], Testa et al. [2012], Lindgreen et al. [2009]). Those would be necessary, for instance, to take into account the lifecycle cost, to select the relevant good or services (i.e. as regards their potential to reach environmental benefits), to organize more complex calls for tenders, to face eventual asymmetries of information related to private firms or to detect green washing behaviours (Marty [2012]). Besides, managerial and political supports are found to be determinant for public buyer's incentive to use GPP (European Commission [2006], Lindgreen et al. [2009]). Second, there are factors related to the municipality / public agency: GPP uptake would be positively correlated with size as well as the presence of an organizational policy European Commission [2010] and the possibility to rely on external expertise (Testa et al. [2012]).[18] Their centralization and

[16] 12 countries have an implementation level of environmental criteria (as defined by the EC) below 20%. Those are: Portugal, Ireland, Poland, the Czech Republic, Finland, Slovenia, Hungary, Romania, Bulgaria, Greece, Latvia and Estonia.

[17] In European Commission [2010]: Water, Event management and wall panels. In Kippo-Edlund et al. [2005]: Postal and telecommunication services, Computer and related services, Architectural services and Cleaning services.

[18] An organizational policy refers to the existence of a procurement strategy, procurement regulation, procurement procedures or purchase conditions.

/ or coordination are also presented as important drivers for effectiveness. Indeed, those would guarantee a minimum level of demand and thus increase incentive for private firms to participate (Marty [2012]). Third, we find factors related to the sector / product purchased: the potential gains could be met when public demand represents a significant part of the market and where private demand exists as to gain from spill over effect (Marron [2004], Marty [2012]). Another important point is the difference in price between the "green" and the "brown" version as well as the price-sensitivity of consumers. Indeed, if both are significant enough, there is the risk of a substitution effect in the private market towards the "brown" version (Marron [1997]). Finally, as regards the criteria itself, effectiveness has been linked to its gradual strengthening over the successive rounds. If too restrictive from the beginning, it would attract the "green" producers, while the "brown" (targeted) ones would have disincentive to participate (Lundberg et al. [2003]).

As regards its cost-effectiveness, first the use of GPP is attached to potential side effects on procurement outcomes. Indeed, it could lead to additional purchasing costs for the public buyer, notably when the contract is not awarded on the basis of the lowest offer but on the Economically Most Advantageous Tender (EMAT) criteria or; when some markets are reserved to environmentally friendly products whatever their relative price. There is also the risk of a decreasing number of participants. This might be the case when some firms do not fulfill the new requirements and related compliance implies a cost. Finally, using EMAT as award criteria leads to more discretion for the public buyer and this is attached to a greater risk of error, capture or corruption (Marty [2012]). Second, GPP is only impacted a limited part of the market, while *ex ante* regulation has an effect on all firms and consumers (Marty [2012], Saussier and Tirole [2015]). Third, as regards CO2 emission in particular, it is argued that GPP would create a different carbon price than the one attached to tax. As a consequence, this will increase the cost to reach the given objective (Saussier and Tirole [2015]). Fourth, while taxation or subvention leaves firms with the choice on how to adjust their environmental behaviours depending on their relative costs, GPP applies the same technological

requirement or environmental objective to all firms. Hence, following the theoretical model of Lundberg et al. [2013], this would prevents firms from cost-effective adaptation.

1.3.2 SMEs' growth and Effectiveness

As for GPP, the effectiveness of using public procurement towards SMEs' growth has been first challenged by the figures showing the large gap between the political aspirations and the practice. Second: by the important barriers of access that are still faced by SMEs. Finally, some studies put into question the cost-effectiveness of measures implemented towards this aim.

Concerning the figures, as reported by European Commission [2010], SMEs are still under represented in public procurement (they weight for 52% of the European added value but only for 32% of the European public procurement in value) and there is no related improvement despite the European measures implemented towards this end (this share was 35% in 2004, 31% in 2006, 38% in 2007 and 34% in 2008). This can be linked to the remaining major barriers of access identified by the literature. A first group of studies consists of surveys sent to firms of all size or SMEs only, providing evidences on their "perceived" barriers of participation. At the European level, European Commission [2010] highlights over-emphasize on price, late payment and slow payments as the most important obstacles. Regarding studies at the national level, we can rely on Loader [2015] that provides a detailed summary of existing insights. This paper identifies two main types of barriers detected by the literature. The first type is attached to the public sector process and environment. Among them, there are the ones faced by all firms: slow payment, poorly defined specifications (MacManus [1991]), a long and expensive bidding process (Cabras [2011]), the focus on price as award criteria (Michaelis et al. [2003]), the difficulties to identify opportunities (Michaelis et al. [2003], Loader [2007]). And there are the ones faced by SMEs in particular: contract size (Bovis [1996],

Erridge et al. [1998], Morand [2003], Loader [2007]) and contract length (Loader [2011]), the need to demonstrate a track record (Loader [2005], Walker and Preuss [2008], Pickernell et al. [2011]), excessive requirements (Loader [2005], Freshminds [2008]), long, costly and complex tendering process (Loader [2007], Freshminds [2008], Glover [2008], Cabras [2011], Peck and Cabras [2011]), public buyers' competing objectives and lack of clear priorities (Zheng et al. [2006], Loader [2007], Glover [2008]), aggregation of contracts (Loader [2011], Preuss [2011]). The second type of barriers is attached to SMEs' internal characteristics: a lack of electronic resource and legal expertise (Karjalainen and Kemppainen [2008]) as well as a lack of marketing capabilities (Michaelis et al. [2003], Walker and Preuss [2008]). A second group of studies covers econometrical analyses based on objective information extracted from public tenders. This methodology complements the above-mentioned studies by testing if i) the reported "perceived" barriers of participation are "effective" ones and ii) the correlations found are causal effects. To the best of our knowledge, there are only two related studies: Estache and Iimi [2009] and Coviello and Mariniello [2014]. The first one relies on data regarding procurement auction for electricity projects in developing countries. The authors found a decreasing participation related to high technical requirements. The second with data on Italian procurement auction establishes a significant link between publicity of tender and number of bidders.

Finally, as regards the cost-effectiveness of measures implemented towards SMEs' access to public procurement, we identified two types of literature. A first one analyzed the outcomes of measures discriminating in favor of SMEs. A second, the outcomes of the European non-discriminatory measures that aim at increasing SMEs' access through a decrease in barriers to participation.

The outcomes of discriminatory measures

SMEs being generally associated with lower efficiency (compared to bigger firms), some studies have been interested in the potential side effect of measures discriminating in favor of those firms on procurement outcomes. A first group has analyzed the effect of set-asides (i.e. it reserves a number of contracts to SMEs).

The related studies, Denes [1997] with data on American federal dredging contracts, detects no increase in cost; and Nakabayashi [2013] finds the same result with data on Japanese public construction projects. A second group of studies has focused on bid-preference program (i.e. it gives an advantage in bidding to SMEs against un-favoured firms). Among them, Marion [2007] analyses auctions for road construction contracts and finds an increase in cost of 3,6%. Krasnokutskaya and Seim [2011] with the same data show a decreasing inefficiency with the size of the project (i.e. for small projects, the program produces moderate change in SMEs' access but an increase in cost by about 4%; while for large projects, the impact on participation becomes stronger and the cost is decreasing). Finally, Reis and Cabral [2015] analyze service contracts for four Brazilian federal government agencies. On one hand, they find an increase in SMEs' access and probability of winning with no increase in *ex ante* costs; but on the other hand an increase in the probability for contracts to be terminated due to poor performance.

Hence, those studies show that if discriminatory measures (by definition) enable to reach the increase in SMEs' access, their use has nevertheless to be questioned as regards the costs they might imply. Indeed, results lean towards a risk of a decrease in *ex ante* efficiency. Besides, the analysis of Reis and Cabral [2015] provides first evidence as regards the risk of lower *ex post* performance.

The outcomes of non-discriminatory measures

The only related study we know is the one of De Silva et al. [2013]. This paper analyses the effect of a bidder-training program implemented by the Texas Department of Transportation in favour of "Small and Minority firms".[19] The results show on one hand a decrease in bids of targeted firms, but on the other hand challenge the effectiveness of such measure by presenting no increase in their probability of winning.[20]

Hence, contrary to discriminatory measures, no decrease in cost efficiency is found

[19]This measure only applies to the target firms. However, it is still a non-discriminatory one as compared to the measures above-mentioned because no advantage is given to those firms at the awarding stage.

[20]This second effect is explained by the changing behaviour of non-trained firms: facing fierce competition, they have also lowered their bids.

with a non-discriminatory one. However, the effectiveness of such a measure is called into question.

The following table presents the methodology undertaken in each of the paper above-mentioned. It will enable to have a clear overview as regards the strength of existing research and results.

Table 1.2: Summary Table

	Author (Year)	**Type**	**Scope**	**Methodology**
Environmental Objectives and Effectiveness	European Commission [2006]	European Commission report	25 Member States	Tender analysis / Online questionnaire Descriptive statistics
	European Commission [2010]	European Commission report	30 European countries	Desk research / Interviews / Online questionnaire Descriptive statistics
	European Commission [2012]	European Commission report	27 Member States	Online questionnaire Descriptive statistics
	Kippo-Edlund et al. [2005]	Government report	Denmark, Finland, Norway and Sweden	Tender analysis Descriptive statistics
	Parikka-Alhola et al. [2006]	Academic paper	Denmark, Finland and Sweden	Tender analysis Descriptive statistics
	Michelsen and de Boer [2009]	Academic paper	Norway	Interviews / Online questionnaire Descriptive statistics / Statistical correlation
	Testa et al. [2012]	Academic paper	Italy	Online questionnaire Econometrics
	Lindgreen et al. [2009]	Academic paper	UK	Online questionnaire Descriptive analysis / statistics
	Marron [2004]	Academic Paper		Theoretical discussion
	Marty [2012]	Academic Paper		Theoretical discussion
	Lundberg et al. [2003]	Academic Paper		Theoretical model
	Lundberg et al. [2013]	Academic Paper		Theoretical model
	Saussier and Tirole [2015]	Government report		Theoretical discussion
SMEs' Growth and Effectiveness				
	European Commission [2010]	European Commission report	European countries	Tender analysis Descriptive statistics

	Loader [2015]	Academic paper		Literature review
	Estache and Iimi [2009]	Academic paper	Electricity projects in developing countries	Tender analysis Econometrical strategy
	Coviello and Mariniello [2014]	Academic paper	Italian procurement	Tender analysis Econometrical strategy
Discriminatory measures	Marion [2007]	Academic Paper	US road construction	Tender analysis Econometrical strategy
	Krasnokutskaya and Seim [2011]	Academic Paper	US road construction	Tender analysis Econometrical strategy
	Reis and Cabral [2015]	Academic Paper	Brazilian Federal government agencies	Tender analysis Econometrical strategy
	Denes [1997]	Academic Paper	US Federal dredging contract	Tender analysis Statistical analysis
	Nakabayashi [2013]	Academic Paper	Japanese procurement contract	Tender analysis Econometrical strategy
Non-discriminatory measures	De Silva et al. [2013]	Academic Paper	Highway procurement auctions in Texas	Tender analysis Econometrical strategy

After a summary of this overall research, next section concludes on its limits and thus the need for additional studies.

1.4 Conclusion: Limits and Needs for further research

Through this paper, our aim was to review the literature questioning the changing paradigm of public procurement as a "policy strategy tool". We were especially interested in its use towards environmental objectives and SMEs' growth.
Along this line, we have reported existing insights putting in doubt the current effectiveness of such a change and investigating the potential to go further. From the previous section, we now underline for each of our issues: i) the limits of existing research and; ii) the related needs for further investigations.

Environmental Objectives and Public Procurement
As regards the studies on the conditions for effectiveness, we have identified two main limits. First, a number of them are relying on descriptive analyses / statistics. Those provide useful insights but are not sufficient proofs. Indeed, they call for enriched empirical tests in order to get rid of eventual biases (e.g. reverse causality, omitted covariates). Along this line, Testa et al. [2012] are using an econometrical strategy allowing for more robust evidences. However, they only analyze a limited number of variables. Thus, there is a need of further studies using the same methodological approach to test the other barriers underlined by the literature. Second, most studies are based on subjective data collected from questionnaire or observed by the authors. Hence, the related findings give evidences on the "perceived" barriers of implementation and need to be further analyzed with objective data to test if those are "effective" ones.
As regards the cost-effectiveness question, related studies are only theoretical (model or discussion). Hence, we can consider their insights as theoretical propositions in need of further empirical tests to get more robust evidences.

SMEs' growth and Effectiveness

Concerning the barriers to effectiveness, we have identified the same limits as the ones related to GPP practices. First, the majority of studies rely on questionnaires. Thus, their findings concern "perceived" barriers of participation and need to be complemented with analyses based on objective data. Second, these analyses are also mostly based on descriptive analyses and have to be complemented with robust empirical strategies to get stronger results. These two limits are circumvented in Estache and Iimi [2009] as well as in Coviello and Mariniello [2014]. Indeed, they rely on objective data extracted from tender documents and use econometrical strategies minimizing eventual biases. However, those studies investigate only two variables. Hence, there is a need of further analyses applying the same methodological approach to test the other perceived barriers underlined by the literature.

Going to the cost-effectiveness of discriminatory measures, as mentioned by Reis and Cabral [2015], existing studies have all been interested in the *ex ante* outcomes (i.e. winning bid, competition), but little is known about what happens *ex post*. While, as expressed by the authors, there is a need of investigation on this subject. Indeed, SMEs might be more exposed to risks and market uncertainties (Hoffmann and Schlosser [2001]), have higher production costs (Nooteboom [1993]), have no access to financial market (Beck and Demirguc-Kunt [2006]) etc. Thus, a lower performance can be expected from favoured SMEs. Following this idea, Reis and Cabral [2015] provide the first related evidences showing a positive impact of a bid preference program on the number of contracts terminated due to poor performance. This result enforces the expectation regarding a decreasing efficiency due to favoured SMEs. As expressed by the authors, it calls for further analyses on *ex post* outcomes linked to discriminatory measures. Besides, almost all findings regard the short-term effect on SMEs' access. While, the final purpose is to enhance their growth and there is a risk of side effect on this latter. Indeed, firms might

have an incentive to choose an inefficient size to continue to be favoured (Marion [2007], Nakabayashi [2013]). Thus, empirical studies should be undertaken on the long-term effect of those measures notably on favoured firms size /growth.
Finally, regarding cost-effectiveness of non-discriminatory measures, research is extremely scarce. Indeed, we only know the study of De Silva et al. [2013]. Consequently, there is a need of additional analyses. Furthermore, this study concerns a very special measure applying only to SMEs. No investigation has been undertaken on the impact of measures such as the ones implemented by the European Commission (i.e. that aim at increasing SMEs' participation in particular but with an application to all firms). Hence, there is a particular need of empirical analyses on this type of measures - especially when considering the absence of improvement in SMEs' access (see above European Commission [2010]).

Chapter 2

Procedural Rules, Efficiency and Access of SMEs: Evidence from French Public Procurement*

2.1 Introduction

Traditionally, public sector activities were governed by a rule-based system attached to the concept of "Bureaucracy" (O'Flynn [2007]). Following the pioneer work of Weber, it was seen as the most efficient and rational system of organization (Weber [1946]). The idea behind was based on the assumption that politicians tend to use their public offices (and thus public money) not towards public welfare but rather their own interest. Hence, rules were viewed as instruments to reduce discretion and thus the possibility of deviant behaviors. This logic especially applied to the case of public procurement. Indeed, as expressed by Girth [2014]: "Contracting has raised key questions about discretion" because "discretion can lead up the implementation process to manipulation and exploitation particularly

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when resources are being allocated, as in government contracting". In consequence, the procurement process has been highly regulated through a number of rules to prevent potential abusive behaviors from public buyers (Kelman [2012]). Yet, for the last 20 years, this traditional paradigm has been put into question, notably through two changes within its institutional framework. This has resulted in a reshape of public procurement regulation.

First, during the 80s-90s, appeared a general situation of crisis combined with the idea of "government over-reach" (Pollitt and Bouckaert [2004]). In this context, the traditional bureaucratic organization has been highly criticized and accused to be source of inefficiency. Along this line, a number of reforms have been undertaken to improve public sector performance. Those have been further conceptualized under the term New Public Management (NPM) and one of its main dimensions has been the shift from strict rules to discretion (Hood [1991]). Indeed, regulation was viewed as a constraint for public officers preventing them from taking good decisions. Hence, the idea was to reduce rules and standards to rather focus on the assessment of outcomes (Hood [1991]). As regards public procurement in particular, with the same logic, the tradition of strong procedural rules was attached to the inefficiency of the process. Those were supposed to imply more difficult, long and more costly contracting, especially for small purchases (Kelman [2005]). Hence, the NPM proponents have claimed for procurement to rely on the discretion and empowerment of public buyers as a way to enhance the efficiency of the process. In terms of practice, as described by Hood, NPM has been "one of the most striking international trends in public administration" (Hood [1991] leading to significant reforms of procurement regulation across the world (Hood and Peters [2004]).[21]

The second evolution relates to the recent shift within the political arena as regards the role attached to public procurement. Indeed, public procurement is not anymore merely seen as a tool for the acquisition of goods and services. It is now presented and highly promoted as a major driver to stimulate public policy ob-

[21] A prime example is the reforms of the US procurement process initiated in 1993 as part of the "reshaping government" initiative led by the then Vice President Al Gore.

jectives such as innovation, environmental and social goals or Small and Medium Enterprises (SMEs)' economic development (Spagnolo [2012]). However, this political ambition found important limits linked to the high rigidity rules associated with the procurement process. Indeed, as above-mentioned, this rigid system aims at reducing possible abusive behaviors but on the other hand imposes important constraints for public buyers. As a consequence, it impedes the process to be used for reaching those public policy goals (Arrowsmith [2012]). For instance, rules based on the European principle of non-discrimination might prevent the insertion of environmental or social criteria within call for tenders. Hence, to counteract those limits, there has been and still is a strong political push for the modernization of public procurement regulation towards more flexibility within the process (Spagnolo [2012]). For instance, in its 2004 and 2014 Directives, the European Commission calls for a decrease in administrative requirements to facilitate SMEs' access or for the possibility to use green public procurement. Those measures have been or should be further transposed by Member States into national law.

In a nutshell, for some time, procurement regulation has been significantly rethought going from strict rules and standards towards discretion and flexibility. The aim was to reach a more efficient process and to stimulate public policy objectives.

Yet, to the best of our knowledge, no empirical studies have been undertaken to test those expected impacts. And, more generally, as noted by Potoski [2008], there is a lack of evidences on the effects of increased public buyers' discretionary powers on outcomes. This latter gap is particularly worrisome considering (i) the amounts involved in public procurement (ii) that increasing discretion may have an adverse effect in terms of deviant deviant behaviors (Kwon [2012]) and thus lead to distorted outcomes in terms of prices and/or quality as well as in terms of allocation.

This paper attempts to fill these gaps by studying the French adapted procedure called "Mapa".[22] Compared to other available procedures, the adapted procedure is a non formalised procedure that gives the public buyer discretion to adapt some

[22]Mapa stands for "Marché à Procédure Adaptée"

key steps of the process to her needs (in terms of publicity, delays, pre- and post-qualification requirements). This procedure appeared to be a great case to empirically test the rationale beyond the evolving regulation of public procurement. Indeed, as expressly mentioned by the French government, its aim was to i) enhance the efficiency of the process and ii) facilitate SMEs' access. Hence, in this paper, we study the effect of using an adapted procedure on those two goals. Besides, we also look at the winning bid with concern about the potential side effect discretion could have on price. These effects are compared with those of traditional formalised procedures.

In order to do so, we have constructed an original and comprehensive database on the 472 public work contracts awarded by Paris Habitat-OPH, the largest social housing constructor in Europe, between January 2004 and July 2011. Available information includes the type of procedures used, the engineers' estimations of the amount and duration of the contracts, the number and identity of all candidates as well as whether they were admitted to bid, the identity of the winning bidders, and the amounts of the winning bids. Using firm level information provided by Paris Habitat-OPH, we have also distinguished SMEs from large firms.

After dealing with the endogeneity issue associated with the choice of using an adapted procedure, we find generally positive results on the outcomes studied. Indeed, we show that such a procedure reduced the duration of the procurement process (i.e. a proxy for its efficiency). Moreover, while this procedure did not alter the proportion of candidate SMEs (i.e. sending a candidature), we do find that it significantly raised the share of SMEs being admitted to bid. Yet, the probability of SMEs to win contracts remained unchanged. In addition, we found no impact on the amount of the winning bid.

The rest of this paper is organized as follows. Section 4.2 provides a review of literature regarding the impact of discretion on outcomes and SMEs' access to procurement contracts as well as our contribution to this latter. Section 4.3 presents the institutional framework and our theoretical expectations as regards the use of adapted procedure. In Section 4.4, we describe the data gathered from our public

buyer. Section 4.5 our empirical methodology, our choice of instruments for the public buyer's decision to select an adapted procedure and our results. We discuss these results and their implications for public policies in Section 4.6 and conclude by underlying the main limit as regards their validity.

2.2 Related Literature and Contribution

2.2.1 Discretion and Outcomes

In this section, we review a recent body of empirical work that has attempted to understand the impact of discretion on outcomes. A significant proportion of these studies has relied on testing the impact of a particular awarding procedure that allows more discretionary power to the public buyer. Among these, previous work on restricted auctions (Coviello et al. [2011] and Chever et al. [2011]), that allow more discretion to public buyers in their selection of candidates, and negotiated procedures (Chever and Moore [2013]), which increase discretion through the possibility of negotiating the received offers, have found generally positive results on outcomes.

In the only negative result concerning the impact of discretion on outcomes, Ohashi [2009] analysed a reform of Japanese procurement that changed from an opaque and discretionary framework to a transparent and rule-based regulation of procurement. The author finds that this shift of framework has decreased prices paid by a local government by close to 8%. In contrast with this result, Amaral et al. [2009] analysed the outcomes of two models of organization of transportation tenders: an opaque and rule-based model and a model relying on both discretion of the public buyer and transparency. They find that the latter organization enabled to achieve higher outcomes. From these two studies, it is unclear whether discretion exhibits better results than a rule-based regulation in a steady and transparent framework. In this respect, the study of Bandiera et al. [2009] offers some interesting results

by analysing discretion in a homogenous environment (i.e. Italian procurement). The authors show that more autonomous procurement bodies, that enjoy more discretionary power than more centralised procurement agencies, achieved better results. Indeed, discretion is suspected to increase efficiency without raising the level of corruption. Still, while the authors control for geography, size and social capital variables affecting different procurement bodies, it remains unclear whether other institutional or organizational differences (e.g. the internal organization of the bodies) may play a role.

Our paper shares similarities with the aforementioned studies in the sense that we analyse the outcomes of a particular awarding procedure allowing more discretionary power to the public buyer. Yet we also contribute to this work by focusing on a reduction of public buyers' administrative burden in a homogenous institutional environment.

2.2.2 SMEs in Public Procurement

A large literature has been interested in the effect of measures that aims at increasing SMEs' access to public procurement. Most of it focuses on discriminatory measures. Among them, Morand [2003] theoretically studies the implications of such policies on two SMEs and one large firm. The author finds that both bid preference program and set asides are generally not optimal. This result is corroborated by a series of empirical studies on both policies. Marion [2007] analyses a program that offered a 5% discount to bids from small firms. The author finds that the program increases procurement costs, increased contract attribution to SMEs and reduced participation of large firms. Allowing for endogenous participation, Krasnokutskaya and Seim [2011] also assess the impact of bid preference program on several outcomes. They find that the discounts only raised the cost of procurement by 1% and allowed small business to take an estimated 10-18% of large firms' profits. As for set asides relative to the US' "Small Business Act", although they do not study procurement auctions per se but rather government sales of

timber, Athey et al. [2013] assess the efficiency of the 14% of auctions which used set asides for small businesses. While they increase small business participation, set asides are found to decrease efficiency by 17%. In their counterfactual analysis, they find that replacing set asides with bid subsidies would yield better results for both small businesses and governments. To conclude from those studies, on one hand discriminatory measures allow an increase in SMEs' probability of winning. But, on the other hand they lead to a risk of an increase in price.
With respect to the aforementioned studies, our paper evaluates as an alternative the effect of a non-discriminatory procedure that aims at increasing the access of small businesses by decreasing barriers to participation. Thus, in the following, we present an overview of the literature that aims at identifying these barriers.

2.2.3 Barriers to Participation and SMEs

Barriers to participation of firms in French public procurement can be divided into entry costs and pre-qualification requirements.[23] [24] Entry costs refer to the costs of "developing and evaluating private information" and of "preparing and delivering a formal offer" (Levin and Smith [1994]) or to search costs for tenders (see Coviello and Mariniello [2014] and Leslie and Zoido [2011]). On the other hand, pre-qualification requirements refer to the financial, technical, or legal references required by public buyers (see Estache and Iimi [2009]). These requirements can constitute barriers to participation as some firms might be unable to deliver the required elements (e.g. past references or financial guarantees).
Both entry costs and pre-qualification requirements may affect small businesses' participation to a greater extent than larger firms. Indeed, suppliers will bid only if their expected profits exceed their participation costs. As argued by Albano

[23] Albano et al. [2006] also discuss the existence of entry fees, which are non refundable payments from firms to the public buyer. However, in our context, entry fees are not relevant.

[24] We make a strong distinction between entry costs and pre-qualification requirements. Yet, in practice, this distinction may be weaker. For instance, firms may have to bear costs to fulfil some of the qualification requirements (e.g. acquiring some kinds of certifications is costly).

et al. [2006], less efficient firms, such as SMEs, which expect lower profits than efficient ones will be more affected by a rise in entry costs. Carpineti et al. [2006] also argue that weaker pre-qualification requirements will facilitate SMEs' participation to a greater extent than that of large firms as it is more probable for small businesses to be unable to deliver the required documents. Looking at adapted procedures, we contribute to this literature by empirically testing if and how the related variation in barriers to participation affect SMEs' access.

In the next section, we explain in details how the use of adapted procedures may affect those barriers. First, we review the different awarding procedures giving a general overview of the French institutional procurement framework.

2.3 Adapted Procedures: Description and Expected Impact

2.3.1 Thresholds and Organisation

In order to tender public work contracts, there are two main categories of procedures available to French public buyers: non formalised procedures, consisting only of adapted procedures, and formalised procedures, which regroup procedures such as the open call for tenders, the restricted call for tenders and formalised procedures with a negotiation phase (or "negotiated procedures", hereinafter).[25] [26] The choice between these procedures is not entirely left to the discretion of the public buyer. Indeed, awarding procedures have to be chosen according to thresholds defined in the French public procurement Code ("the Code", hereinafter). Since these thresholds have been changed several times during the period we study, Ta-

[25] These are the most frequently used procedures in French public procurement (Chong et al. [2009]). Under specific conditions, other procedures may also be used. Nevertheless, our public buyer only used three procedures to award contracts: the open call for tenders, adapted procedures and negotiated procedures. Thus, in the rest of this section, we focus on those three procedures.

[26] In the following subsection, we present the main differences between formalised and non formalised procedures.

ble 2.1 sums up their evolution. The use of adapted procedures and negotiated procedures is limited to contracts whose values are below (or between) the reported thresholds. As for the open call for tenders, its use is permitted under the thresholds, but it is mandatory above them. There were two important reforms regarding thresholds and procedures. First, the 2004 reform of the Code, designed to implement the latest EU reform, increased existing thresholds while enabling public buyers to use negotiated procedures for contracts with values between 230,000€ and 5,900,000€. Second, in December 2008, the possibility of using adapted procedures was substantially widened from 206,000€ to 5,150,000€.

Table 2.1: Successive thresholds between 2001 and 2010

Date of change	Possibility of using adapted procedures (non formalised)	Possibility of using negotiated procedures (formalised)	Open call for tenders (formalised)
Before March 2001	< 38,200€	-	> 38,200€
March 2001	< 90,000€	-	> 90,000€
January 2004	< 230,000€	> 230,000€ and < 5 900 000€	> 5,900,000€
January 2005	< 210,000€	> 210,000€ and < 5 270 000€	> 5,270,000€
January 2008	< 206,000€	> 206,000€ and < 5 150 000€	> 5,150,000€
December 2008	< 5,150,000€	< 5,150,000€	> 5,150,000€
January 2010	< 4,845,000€	< 4,845,000€	> 4,845,000€

Note: this table is adapted from Chever and Moore [2013].

Available procedures also differ in their organisation as well as in the possibility of negotiating offers. Leaving the degree of formalism aside, there are two main differences between these procedures. The first main difference relates to the reception of candidatures and bids from firms. When using formalised procedures with a negotiation phase, public buyers have to separate the reception of candidatures and the reception of bids into two phases. The buyer first receives the candidatures from the firms. He analyses them and sends further details on the project to firms satisfying the pre-qualification requirements. Firms then have to submit their bids for the project. In contrast, when using open auctions or

adapted procedures, firms have to simultaneously submit both their candidatures and their bids.[27] [28] The second main difference relates to the possibility to negotiate the offers received. Indeed, contrarily to the two other awarding procedures, no negotiation phase may be used in the traditional open call for tenders. As for formalised procedures with negotiation and adapted procedures, the negotiation phase has to be announced in the publicity.

2.3.2 Theoretical Hypotheses on Outcomes

This section aims at analysing the rationale beyond the implementation of mapa. To do so, in the following, we look at the different aspects of the process that can be adapted by the public buyer (compared to formalised procedures) and study how each of them might (i) increase the efficiency of the process and (ii) impact the access of SMEs to public procurement, building on the barriers to participation identified in Section 2.2.3.

First, regarding publicity requirements, adaptations can be undertaken both in terms of support and content. As for the support, formalised procedures oblige the public buyer to publish tenders both within the French national database (BOAMP) and the European one (JOUE). Using mapa, publicity can be reduced, depending on the value of the contract, to no publication or to publication on a sole support (ranging from the public buyer's own website to the BOAMP).[29] Concerning the content, formalised procedures oblige the public buyer to use an official national form. Above 5,000,000 euros, the tender must be published in an official European form: it must contain all the national requirements plus some

[27] The implications of this difference regarding the number of candidatures received by our public buyer are discussed in Section 4.4.2.

[28] Note that when bids and candidatures are submitted simultaneously, a bid is only analysed if the associated candidature is satisfactory from the public buyer's point of view.

[29] Below 15,000 euros, the public buyer can decide not to publicise the tender (for instance, he can request only 3 or 4 firms to send an offer); between 15,000 and 90,000 euros, the public buyer has to publicise the tender, however any support can be used (for instance, only his web-portal or a regional journal); above 90,000 euros (and under 5,000,000 euros), the public buyer can choose to publicise the tender within the BOAMP or within a journal of legal notices.

European ones. Using mapa, below 90,000 euros, the public buyer has no obligation regarding the content.[30] From the public buyer's side, this possibility of adaptation enables a reduction in his administrative burden concerning the support requirements (i.e. no support or reduced to one and the choice of the most suitable one), as well as the content requirements (i.e. exemptions from using official forms). From the firms' side, this adaptation might decrease the level of available information through the decreasing number of supports where the tenders can be found and the decrease in centralisation (operated via the BOAMP and JOUE). This might increase searching costs and thus, following our literature review, decrease more particularly the entry of SMEs.

Second, the public buyer is exempted from requesting a number of documents as pre-qualification requirements. For instance, the proofs of competences to be asked need not be the ones listed within the law but any other substitutes can be accepted and technical requirements can be reduced to a minimum. This adaptation enables the public buyer to reduce her administrative burden both in terms of number of documents and content to be produced, analysed, and compared before awarding the contract. From the firms' side, it might decrease the costs related to the preparation and submission of formal offer and decrease the probability of not being able to deliver all the required elements to be admitted to bid. As a consequence, this adaptation might increase both the entry of SMEs and their probability of being admitted.

Third, the public buyer does not have to respect the strict delays of 52 days for firms to submit their offers and of 16 days for firms to contest her decision.[31] This reduction in procedural delays enables the public buyer to adapt the process to the degree of urgency of her needs. From the firms' side, the decrease in the delay left to submit the offers might decrease the entry of SMEs since the preparation of an offer may be more difficult and thus more time-consuming for these firms.

Finally, concerning post-selection requirements, the public buyer is exempted from

[30]Note that sufficient information still needs to be incorporated within the tender to ensure transparency and competition, see the French Council of State decision n°290236.

[31]Note that the public buyer still has to ensure that the delay enables all interested firms to submit an offer (see for instance the decision from the Administrative tribunal of Lille n°307117).

(i) writing a report justifying the regularity of both the procedure and her choices and (ii) informing all eliminated candidates of the reason for their refusal (though she can voluntarily execute them).[32] This later adaptation enables the public buyer to decrease her administrative burden as regards the number of documents to be produced.

[32]Note that firms may still individually request from the buyer to justify their elimination when using an adapted procedure. If so, the Code obliges the public buyer to respond.

Table 2.2 summarizes the expected impacts of adapted procedure:

Table 2.2: Expected impacts of adapted procedure

Possible Adaptation	Efficiency of the process	Entry of SMEs	Qualification of SMEs
Publicity	+	−	
Pre-qualification	+	+	+
Delays	+	−	
Post-qualification	+		

From this table, we can derive our overall expectations. First, through a decrease in administrative burden, adapted procedure will likely enhance the efficiency of the process. Second, as regards SMEs, the procedure is expected to increase their probability of being admitted to bid. However, the impact on their entry is found to be ambiguous.

2.4 Data

2.4.1 Our Dataset

In order to test the impact of the decrease in procedural rules on outcomes, we have gathered information on the complete sample of 472 public work contracts awarded by Paris Habitat-OPH, an independent public buyer responsible for the construction of social housing in Paris, between January 2004 and July 2011.[33] These contracts consisted of the construction, destruction or restoration of social housings in the Parisian area.[34] Table 2.3 summarises the information we have gathered.

[33]Only purely fixed-price contracts were taken into consideration.

[34]Paris Habitat-OPH is divided between several departments, each of which being in charge of a particular type of public work.

Table 2.3: Descriptive Statistics

Variable Name	Description	Nb. Obs.	Mean	Std. Dev.	Min	Max
Mapa	Equals 1 if the contract was awarded using an adapted procedure, 0 otherwise	472	0.400	0.491	0	1
Duration	Estimated duration of the contract in months	472	8.752	6.585	1	38
Estimate	Estimated contract value in euros	472	1,509,568	3,087,829	15,000	22,600,000
Subcontracted	Amount subcontracted by the winning firm	472	539,458.2	1,555,980	0	22,107,794
Nb Candidates	Number of firms who submitted a candidature for the contract	472	7.809	5.536	1	31
Price Index	Price Index in the construction industry (French national statistics institute)	472	1417.4	109.38	1225	1638
Nb Contracts	Number of contracts currently being awarded by Paris Habitat-OPH	472	31.85	10.38	2	51
Share SMEs	Number of candidate SMEs divided by the total number of candidates	469	0.522	0.308	0	1
Share Adm SMEs	Number of SMEs admitted to bid for the contract divided by the total number of admitted firms	469	0.469	0.315	0	1
Winner SME	Equals 1 if the winner of the contract is an SME, 0 otherwise	429	0.499	0.501	0	1
Winning Bid	Amount of the winning bid	472	1,355,343	2,774,812	9,645.21	23,042,727.42
Diff Length	Duration in months between the reception of the candidatures of the firms and the notification to the selected supplier	472	5.79	3.37	1	23

Our public buyer received a total of 3868 candidatures for these contracts, i.e. a mean of 7.8 candidatures per contract (*Nb Candidates*). The average contract lasted 8.7 months (*Duration*) and was estimated at slightly more than 1.5 million euros (*Estimate*). Contract values ranged from a minimum of 15,000€ to a maximum of 22,600,000€. On average, the winning bid (*Winning Bid*) was 9% under the estimated value of the contract and around 22% of the average contract was subcontracted by the winning firm (*Subcontracted*). Formalised procedures with a negotiation phase and adapted procedures (*Mapa*) were the most frequently used procedures to award the contracts. They each account for around 40% of the procedures used.

We distinguished SMEs from large firms using information collected by Paris Habitat-OPH from the candidature documents of firms. In order to distinguish SMEs from other firms, we retained the definition of the European Union.[35] Out of the 3,686 candidatures received and the 472 winning firms in our sample, we were able to distinguish, respectively, 3,190 and 429 SMEs from large firms (for the latter, see *Winner SME*).[36] In the end, 53% of the candidatures received by Paris

[35]European Commission [2003]

[36]This difference is mainly due to some imprecisions in the data. For example, some firms only

Habitat-OPH were from SMEs. They were awarded approximatively 50% of the contracts, yet these contracts only accounted for less than one third of the total value of the contracts, this latter figure being 7 percentage points under the corresponding aggregate figure for French public work procurement (OEAP [2011]).

2.4.2 Restriction of the Data

As we have discussed in Section 4.3.1, formalised procedures with a negotiation phase are differently organized than adapted procedures and open auctions. Reception of the candidatures and of the offers are separated in two distinct phases. As a consequence, our public buyer received far more candidatures when using a formalised procedure with a negotiation phase (as illustrated in Table 2.4). This results from the fact that candidatures are made up of relatively standardised documents. The cost of preparing a candidature is thus far lower than that of preparing an offer. Traditionally, researchers use the number of candidatures either to assess entry or to control for the competitiveness of the environment. Yet, in our case, the number of candidatures received is likely to be more correlated to the procedure and the way it is organised than to entry decisions or to the competitiveness of the environment. An alternative way of controlling for the competitiveness of the environment is to use the number of bidders as a covariate. Unfortunately, we lack this information. Consequently, we are unable to directly compare the number of SMEs in adapted procedures to that in other procedures. We circumvent this caveat by focusing on the proportion of candidate SMEs (*Share SMEs*) and on the proportion of admitted SMEs (*Share Adm SMEs*) which should not be affected by this difference in organisation of the procedures.

reported the number of employees in their Parisian office(s) or the turnover of a subpart of the firm. Moreover, in some cases, the information on the firms was completely missing.

Table 2.4: Procedure Used and Candidatures

Used Procedure	Nb. Obs	Mean	Std. Dev.	Min	Max
All Procedures	472	7.81	5.54	1	31
Open Auction	93	5.23	3.11	1	14
Adapted Procedure	189	5.02	3.46	1	28
Formalised Procedure With a Negotiation Phase	190	11.85	5.69	2	31

2.5 Methodology and Results

2.5.1 Methodology

Our goal is to assess whether the use of adapted procedures enables to increase SMEs' access and to reach a more efficient process. We use three different proxies for the access of SMEs to public procurement: the share of candidate SMEs, the share of SMEs admitted to bid, and the probability that an SME wins the contract. For the efficiency of the process, we use its duration as a proxy. Indeed, it has been argued that strict rules impede the efficiency of the process, notably through an increase in its length (Potoski [2008]). As expressed by Kelman [2005] regarding the traditional bureaucratic organization of procurement: "The agglomeration of rules created so much delay that the system of rules had greater costs than benefits". The related variable we use is *Diff Length* which captures the time elapsed in months between the "Commission d'Appel d'Offres" (CAO, in charge of opening the candidature documents of firms) and the notification to the winning firm (i.e. the moment when the public buyer officially announces its selection to the supplier). If public buyers focus on specific goals, we may fear adverse effects on other outcomes notably on price. In order to control for this, we also assess whether the use of such procedures altered the amount of the winning bid. Thus, we estimate the following equation:

$$Outcome_n = \gamma_0 + Mapa_n\gamma_1 + Controls_n\Gamma_2 + C\Gamma_3 + \epsilon_n \tag{2.1}$$

Where *Outcome* is alternatively *Diff Length*, *Share SMEs*, *Share Adm SMEs*, *Winner SME* or *Winning Bid*. *Mapa* is the variable we are primarily interested in and γ_1 its associated coefficient. $Controls_n$ is a matrix that consists of variables related to contract n (*Estimate*, *Duration*, *Subcontracted*, *Price Index* or *Nb Contracts*) and Γ_2 its vector of coefficients. C is a matrix consisting of year dummies with Γ_3 its vector of coefficients. Since we use data from 2004 to 2011, year dummies are meant to capture unobserved heterogeneities in time. γ_0 is a constant and ϵ the error term.

According to our discussions with the legal department of Paris Habitat-OPH, there was a centralised decision within Paris Habitat-OPH to encourage the use of adapted procedures when possible. However, in our data, adapted procedures were only used for approximatively 78% of contracts below the associated thresholds. Evidently, the procedure used still resulted, in some cases, from a decision taken by the different departments of our buyer (or by contracting officers). As a result, when estimating the previous equations, we are likely to face an omitted variable bias. In particular, the choice of a contracting officer to use an adapted procedure may be based on her own expectations on the outcomes. For instance, since adapted procedures enable to reduce pre-qualification requirements, a procurement officer may be more prone to choose such procedures when she expects potential competition for the contract to be scarce. Thus *Mapa* is suspected to be endogenous. To solve this endogeneity problem, we use an instrumental variable approach for which we have constructed two instruments. To be valid, our instruments must be relevant (i.e. correlated to the instrumented variable) and exogenous (i.e. uncorrelated to the error term) (Murray [2006]).

Routines, our first instrument, is related to our buyer's internal routines. We suspect that newly available procedures may take time to be adopted by public buyers as these latter may resist change (de Vries and Balazs [1999]). During that time, a spillover effect may play a role: different departments of our public buyer may communicate or observe each other's practices regarding used procedures (see Fernandez and Rainey [2006] on the importance of employee communication and

feedback as a means to overcoming resistance to change). As a result, a given department may take into account past choices of other departments when making their decision of the procedure to use for a particular project. That is, if a procedure is more frequently used by other departments in the recent past, this may raise the probability, for a particular department, of choosing this procedure. Our instrument is designed to capture this spillover effect. *Routines* is defined as the ratio of contracts awarded by other departments using an adapted procedure during the last two months divided by the ratio of contracts awarded by other departments using an adapted procedure before the last two months. Basically, *Routines* captures how the use of adapted procedures has evolved in a recent period of time compared to the past in other departments of our public buyer. According to our previous discussion, we expect *Routines* to have a significant and positive effect on the use of adapted procedures. Furthermore, we believe that *past* choices of procedures by *other* departments will not impact the outcomes of the current call for tenders through another channel than the choice of the procedure, satisfying the exogeneity condition.

We have constructed a second instrument related to a new form of contract litigation introduced during the studied period. Since May 2009, the *référé contractuel* enables an evicted candidate to challenge an awarding procedure after the contract has been signed if she feels that the public buyer did not comply with the advertising and competition requirements. Prior to its introduction, such claims could only be made before the contracts were signed through the *référé pré-contractuel*. We believe that this new litigation tool will influence the choice of procedure by public buyers. After its introduction, public buyers may fear a raise in the number of litigations. To avoid being challenged (and thus being discredited) in such ways, contracting officers are likely to have used more adapted procedures after May 2009. Indeed, since adapted procedures consist of a lower number of rules and can be almost freely adapted to the buyer's needs, the probability of being challenged on a specific rule or on the overall organisation of the procedure should be lower than with traditional formalised procedures. Thus, adapted procedures

seem to be a convenient choice of procedure to avoid challenges from evicted candidates. Our instrument *Litigation* is a dummy variable that takes the value one for every contract awarded after May 2009 and 0 for contracts awarded before that date. Based on our previous discussion, we expect this instrument to have a positive and significant impact on the choice of using adapted procedures. Since the expected changes in the behaviour of contracting officers are induced by an exogenous change in the law, we believe that this instrument satisfies the exogeneity condition. Table 2.5 provides descriptive statistics on our two instruments.

Table 2.5: Descriptive statistics of the instruments

Instrument	Nb. Obs	Mean	Std. Dev.	Min	Max
Routines	472	1.02	0.89	0	7
Litigation	472	0.25	0.43	0	1

2.5.2 Results

In the following subsections, we report the regressions of several outcomes on *Mapa*, our variable of interest and other covariates. All specifications include heteroskedasticity robust standard errors as well as year dummies. All continuous variables are expressed in logarithms. Our regressions are voluntarily organised in a similar fashion: two specifications are shown for each dependent variable. First, we only include exogenous variables (*Duration*, *Estimate* and *Price Index*). In the second specification, we add other covariates (*Subcontracted* and *Nb Contracts*). *Duration*, *Subcontracted* and *Estimate* may all be viewed as measures of the complexity of the contract (Chong et al. [2009]) while *Price Index* is used to capture the evolution of prices in the construction industry.

In all of our first stage regressions, our instruments consistently have the expected signs and are statistically significant. We always reported the F-Statistic associated with these first stage regressions. These latter are consistently above the rule of thumb of 10 (Staiger and Stock [1997]). We thus need not worry about a weak instrument issue. In our second stage regressions, we always reported the

p-values associated with the Hansen J-Statistic. They are consistently above the 10% threshold, telling us that we may consider our instruments exogenous provided that at least one of them is.

Results on the Duration of the Procurement Process

Results from the 2SLS regressions of our variable *Diff Length* on our variable of interest and other covariates are shown in Table 2.6. Unsurprisingly, the expected duration of the contract has a significant and positive effect on the length of the procedure. However, it seems that all else held equal, the more valuable the contract, the quicker the awarding process. As for *Mapa*, our variable of interest, we find that once accounting for all covariates, adapted procedures allow a decrease in the duration of the procedure of close to two and a half months. Hence, we believe this result provides some evidence that the use of adapted procedures may enable public buyers to enhance the efficiency the procurement process.

Results on the Share of Candidate and Admitted SMEs

We report the results from the 2SLS regressions of the variables *Share SMEs* and *Share Adm SMEs* in Table 2.7. Results from our control variables are as one would expect. A more valuable contract attracts a lower share of SMEs. This difference persists after the admission phase. Moreover, holding equal the valuation of the contract (as well as other covariates), a longer contract attracts significantly more SMEs. Again, this difference persists after the admission phase. As for our variable of interest, we find that SMEs do not submit more candidatures when an adapted procedure is used. However, this procedure enables public buyers to qualify a significantly larger share of SMEs to the bidding stage.

Results on the Probability of Winning the Contract

Next, our focus is on the impact of adapted procedures on the probability that an SME is awarded the contract. Results from the 2SLS regressions of *Winner SME* are reported in Table 2.8. We find that more complex contracts (see the sign and significance of our variables *Estimate* and *Subcontracted*) are significantly less won by SMEs. However, the duration of the contract again seems to play in favour of SMEs as these latter are significantly more awarded longer contracts. As for *Mapa*, our variable of interest, we find a negative, yet non-significant coefficient. The use of an adapted procedure therefore seems to have no impact on the probability that an SME will win the contract.

Results on Price

Finally, we focus on the effect of using adapted procedures on the amount of the winning bid. Results from our 2SLS regressions are shown in Table 2.9. Unsurprisingly, longer and more complex contracts are awarded at a higher price. However, our variable capturing the evolution of prices in the construction industry does not impact the amount of the winning bid. We suspect that the evolution of prices are likely to be captured by the year fixed effects included in our regressions. As for our variable of interest, our regressions show a positive yet non significant effect. The use of adapted procedures therefore does not seem to have an adverse effect on the prices paid by the public body.

2.6 Discussion and Implications for Public Policies

In this paper, we analyzed the effect of increasing the discretionary power of public buyers through a decrease in procedural rules, on several outcomes. Towards this

end, we empirically assessed the impact of the adapted procedure, a French awarding procedure that allows public buyers to adapt the procedure to their needs. Its effects were analyzed on the two aims set by the government (the efficiency of the process and the access of SMEs to public procurement) as well as on the price of the purchases.

After dealing with the endogeneity issue associated with the use of an adapted procedure, we first showed that the use of such procedure enabled to decrease the duration of the procurement process. Moreover, we showed that entry was not mitigated by the use of this procedure, at least in terms of the share of SMEs competing. This result may be put in line with our discussion in Section 4.3.2 showing that several contradicting effects may influence entry decisions of SMEs when using adapted procedures. We then showed that the use of adapted procedures significantly raises the share of SMEs being admitted to bid. We interpret this finding as the result of discriminatory power given to the procurement officers to adapt and thus reduce the formalism of pre-qualification requirements. These latter being frequently underlined by SMEs as barriers to their participation in public procurement (Loader [2007]). Yet, we then have shown that in spite of the latter result, these procedures do not impact the probability that an SME is awarded the contract. We believe that this result provides clear evidence that barriers to participation are not the only obstacle standing between SMEs and the attribution of procurement contracts. Even when reaching the bidding stage, SMEs are still left facing the challenge of bidding against large firms. This finding may thus be linked to the existence of cost asymmetries between SMEs and large firms (Nooteboom [1993]). Because of these asymmetries, focusing on removing barriers to participation, and thus increasing competition from SMEs, need not have a direct impact on the probability that an SME will win the contract. Finally, we found no side effect on the price of public procurement.

Our results have some implications for public policies. First, they point to the fact that cost asymmetries may be another important barrier preventing SMEs from winning procurement contracts. As regards legislator's goal to promote fair

competition between SMEs and large firms, allowing public buyers to use tools such as the possibility to reduce the formalism of procedure will, at least partially, contribute to reaching that goal. However as to enhance SMEs' probability of winning contracts, the effectiveness of such a measure is questionable. Theoretical and empirical studies (Morand [2003]; Marion [2007]; Krasnokutskaya and Seim [2011]; Athey et al. [2013]) have shown that both bid preferences and set-asides have positive impacts on contract attribution to SMEs. Although the previously mentioned studies find that these policies have the risk to increase procurement costs (particularly for set-asides), these discriminating policies could still be considered as potential solutions. Second, there have been repeated pleas for decreasing the extent of procedural rules in public procurement The expected aims were an increase in efficiency of the process and its use to stimulate public policy objectives. The results of this paper are in line with this prediction. Indeed, the lower formalism did enable public buyers to speed up procurement and allowed broader access of SMEs to the bidding stage while not deteriorating the price paid.

Some limits to our results should be underlined here. First, the contracts analysed in this paper are for relatively complex transactions (the mean contract value is above 1.5 million euros) that are thus likely to be renegotiated (Bajari and Tadelis [2001]; Brown et al. [2010]). One might fear that decreasing pre-qualification requirements, because it enables the participation of less experienced firms, could have an adverse effect on the amounts renegotiated. Hence, though our estimates show that the *ex ante* price of procurement is unaltered by the raise in discretion, we are not able to conclude on the impact of such procedures on the total cost of the contracts. The second limit relates to the institutional framework of our analysis. As well explained by Barro [1986]: "Discretion seemed to be synonymous with flexibility, which one had no reason to deny to a smart, benevolent policymaker". In our case, Paris Habitat-OPH corresponds to this definition through a great level of competence and transparency. [37] Hence, in light of those considerations, our results need to be understood as follows: our public buyer has effectively

[37] Paris Habitat-OPH is the largest social housing constructor in Europe, characterized by important resource and high scrutiny.

used discretion towards its purpose (i.e. aligning the modalities of the process to the characteristics of the transactions). This allowed better outcomes with no side effect on price. On the other side, this reading indirectly suggests that if dealing with a public buyer not "smart" or 'benevolent" enough, discretion could be not used towards its purpose and lead to no increase or even a decrease in the overall performance of the process. First, a non-competent public buyer might not be able to organize the procedure wisely. Second, with a non-benevolent / non-transparent public buyer, there is the risk of discretion not used towards efficiency but rather her own interest. Indeed, in this case, higher discretion would facilitate deviant behaviors such as favoritism or corruption. Besides, the organization of the process can also be partly explained by the fear of third party opportunism (Moszoro and Spiller [2012]). Indeed, strong political competition and/or being close to an election could lead public officers to choose a more formalized process to avoid being discredited. Hence, in this case, the modalities of the process would be less dictated by economic efficiency considerations than by the fear of being suspected of misconducts (Chong et al. [2011]). Overall, it is important to keep in mind that with a public buyer not competent, benevolent or transparent enough and/or with high political pressure, our positive results might not remain.

Table 2.6: Adapted Procedures and Duration

	Model 1 First Stage *Mapa*	Model 2 2SLS *Diff_Length*	Model 3 First Stage Mapa	Model 4 2SLS *Diff_Length*
Mapa		-2.668*		-2.944*
		(1.485)		(1.528)
Duration	-0.044	1.697***	-0.045	1.651***
	(0.047)	(0.298)	(0.047)	(0.296)
Estimate	-0.166***	-0.577**	-0.167***	-0.665**
	(0.022)	(0.276)	(0.023)	(0.281)
Subcontracted			0.000	0.015
			(0.004)	(0.029)
Nb Contracts			-0.019	-0.942
			(0.058)	(0.614)
Litigation	0.560***		0.557***	
	(0.103)		(0.105)	
Routines	0.037**		0.037**	
	(0.019)		(0.019)	
Constant	2.378***	8.865**	2.448***	12.909***
	(0.220)	(3.723)	(0.291)	(4.687)
Nb. Obs.	472	472	472	472
Adj. R^2	0.513	0.254	0.511	0.255
F-Stat	21.14		20.03	
Hansen J Stat		0.421		0.402

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions include month and year dummies. Reported in the table are the p-values associated with the Hansen J-Statistic.

Table 2.7: Adapted Procedures and SMEs Entry / Admission to bid

	Model 5 First Stage *Mapa*	Model 6 2SLS *Share SMEs*	Model 7 2SLS *Share Adm SMEs*	Model 8 First Stage Mapa	Model 9 2SLS *Share SMEs*	Model 10 2SLS *Share Adm SMEs*
Mapa		0.141	0.206*		0.141	0.206*
		(0.113)	(0.117)		(0.114)	(0.117)
Price Index	-0.001	0.001	0.001	-0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Duration	-0.044	0.101***	0.090**	-0.044	0.100***	0.090**
	(0.047)	(0.035)	(0.036)	(0.048)	(0.035)	(0.036)
Estimate	-0.165***	-0.120***	-0.115***	-0.164***	-0.121***	-0.115***
	(0.022)	(0.024)	(0.025)	(0.023)	(0.024)	(0.025)
Subcontracted				-0.000	0.000	0.000
				(0.004)	(0.003)	(0.003)
Litigation	0.538***			0.538***		
	(0.109)			(0.109)		
Routines	0.038**			0.038**		
	(0.019)			(0.019)		
Constant	3.085**	0.896	0.925	3.084**	0.899	0.927
	(1.324)	(1.071)	(1.082)	(1.324)	(1.070)	(1.081)
Nb. Obs.	469	469	469	469	469	469
Adj. R^2	0.509	0.264	0.284	0.508	0.263	0.282
F-Stat	18.06			17.96		
Hansen J Stat		0.568	0.654		0.572	0.657

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions include month and year dummies. Reported in the table are the p-values associated with the Hansen J-Statistic.

Table 2.8: Adapted Procedures and Winner SMEs

	Model 11 First Stage *Mapa*	Model 12 2SLS *Winner SME*	Model 13 First Stage Mapa	Model 14 2SLS *Winner SME*
Mapa		-0.280		-0.297
		(0.252)		(0.251)
Price Index	-0.000	0.001	-0.000	0.001
	(0.001)	(0.002)	(0.001)	(0.002)
Duration	0.007	0.198***	0.007	0.203***
	(0.052)	(0.053)	(0.052)	(0.053)
Estimate	-0.182***	-0.234***	-0.183***	-0.202***
	(0.025)	(0.049)	(0.026)	(0.051)
Subcontracted			0.001	-0.016***
			(0.004)	(0.006)
Litigation	0.543***		0.543***	
	(0.107)		(0.108)	
Routines	0.034*		0.034*	
	(0.020)		(0.020)	
Constant	3.032**	2.250	3.037**	2.191
	(1.399)	(2.368)	(1.399)	(2.339)
Nb. Obs.	429	429	429	429
Adj. R^2	0.526	0.060	0.525	0.071
F-Stat	17.65		17.55	
Hansen J Stat		0.588		0.652

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions include month and year dummies. Reported in the table are the p-values associated with the Hansen J-Statistic.

Table 2.9: Adapted Procedures and *Ex Ante* Price

	Model 15 First Stage *Mapa*	Model 16 2SLS *Winning Bid*	Model 17 First Stage Mapa	Model 18 2SLS *Winning Bid*
Mapa		0.010		0.034
		(0.164)		(0.158)
Subcontracted			0.000	0.024***
			(0.004)	(0.005)
Price Index	-0.001	0.002	-0.001	0.002
	(0.001)	(0.002)	(0.001)	(0.002)
Duration	-0.044	0.241**	-0.044	0.226**
	(0.047)	(0.108)	(0.048)	(0.102)
Estimate	-0.166***	0.917***	-0.167***	0.871***
	(0.022)	(0.049)	(0.023)	(0.051)
Litigation	0.543***		0.543***	
	(0.108)		(0.108)	
Routines	0.037*		0.037*	
	(0.019)		(0.019)	
Constant	3.060**	-2.302	3.063**	-2.124
	(1.322)	(2.121)	(1.323)	(2.041)
Nb. Obs.	472	472	472	472
Adj. R^2	0.512	0.941	0.511	0.945
F-Stat	18.04		17.94	
Hansen J Stat		0.224		0.281

Note: Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All regressions include month and year dummies. Reported in the table are the p-values associated with the Hansen J-Statistic.

Chapter 3

Ex Post Delay of Payment, Participation and SMEs' Access to Public Procurement: Evidence from France*

3.1 Introduction

For some time now, the European Union aims at fostering SMEs' growth through their access to public contracts. The logic behind relates to the benefits they can offer in terms of market share acquisition and thus economic development. This issue has taken even more attention when considering the difficulties SMEs precisely have to access public procurement: indeed, while they represent 52% of the European added value, they only weight for 32% of the European public procurement in value (European Commission [2010]). Those two figures put in relief highlight the disadvantaged access of SMEs to public procurement for reasons not due to their relative (in) efficiency but to their small size.

With this concern in mind on one hand, but referring to the European principle

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of equal treatment on the other hand, the choice made by the European Union has not been to discriminate in favor of these firms (as in in the U.S, Japan or Brazil) but rather to reduce their difficulties in order for this access to be fairer (i.e. more based on their efficiency). Along this line, a number of measures have been introduced in the 2004 Directive towards this goal and have been / should be transposed into (Member States') national law. These concern, notably allotment (i.e.: the subdivision of a contract into lots), e-procurement, the simplification of procedures and the reduction in the delay of payment. Accordingly with the principle of equal treatment, those measures aim at increasing the participation of all types of operators. However it has been made clear by the European Commission that this is "with the specific aim of facilitating SMEs' access to public procurement" by providing "solutions for problems faced by SMEs or mainly by SMEs" (European Commission [2008]). Therefore, their intended impact is an increase in competition translated into a better access of SMEs to public procurement. However, in spite of these measures, a recent report from the European Commission emphasized that since 2004, SMEs have not gained in terms of weight within public procurement (European Commission [2010]). This makes us questioning about the effectiveness of these measures. Beyond that, we can wonder what are the barriers to firms' participation and SMEs' probability of winning.

Looking at existing studies, we can notice a lack of empirical proofs to resolve this issue. First, as regards barriers to participation, most research relies on surveys (i.e. giving "perceived" barriers) and descriptive analyses (i.e. giving correlation effects). Going further, to the best of our knowledge, there are only the two studies of Coviello and Mariniello [2014] and Estache and Iimi [2009] using objective data (i.e. giving "effective" barriers) and econometrical strategies (i.e. giving causality effects). With our paper, we complement this very limited literature by adopting the same methodological approach with a focus on the delay of payment issue. Indeed, while the delay of payment has been highlighted as one of the main barriers to participation by the European Commission survey (European Commission [2010]), this variable has never been analyzed to test if it has effectively an impact

on the level of public procurement participation.

Turning to the determinants of SMEs' probability of winning, we know of only one study looking at the impact of expected barriers to participation ("the lack of knowledge and project management skills" in De Silva et al. [2013]). With our study, we aim to bring new evidences to this issue by looking at the effect of another perceived barrier to participation, the delay of payment.

In a nutshell, our objective is to analyze the effect of a variation in the delay of payment on i) the level of participation; and ii) SMEs' probability of winning. Towards this purpose, we start by the construction of our theoretical hypotheses on the expected impacts. These are further tested through an empirical study in the context of French public procurement. More precisely, we focus on auctions launched by the French ministers between 2008 and 2012. Our data come from the Tender Electronic Daily (TED) European Commission website. [38] It includes a large set of information such as the type of public buyer, the type of procedure, the number of bidders and the winning firm's identity. We use as exogenous treatment an increase in the delay of payment, which follows the implementation of a program called Chorus: a project of reforms applied to the French ministers in different steps implying the centralization and automation of their payment system. Because of the related reorganization, the involved ministers have experienced an adaptation period of about one year during which their delay of payment substantially increased (Observatoire des Délais de Paiement [2011]). On the firms' side, this led to emerging difficulties and fear as regards the related impact on their financial viability (Cour des Comptes [2011]). Thanks to the gradual implementation of Chorus, we were able to perform a difference-in-differences (diff-in-diffs) analysis taking into account time constant difference between our treatment and control groups.[39] Our results show a significant effect of an increase in the delay of payment on the participation level. However, when we use SMEs' probability of winning as dependent variable, the effect turns out to be not significant. Our

[38] See: ted.europa.eu.

[39] Our treatment is made by ministers that have been affected by the Chorus program, while our control group is made by ministers not affected by the program.

findings provide additional evidences on the "effective" barriers to participation in public procurement by adding the delay of payment as one of them. However, they question the expected automatic link beyond the European measures between barriers to participation and SMEs' probability of winning.

The remaining reports our analysis as follows. In section 2, we provide a review of literature on the determinants of participation and SMEs' access to public procurement as well as our contribution to this latter. Section 3 presents the construction of our theoretical hypotheses. In section 4, we describe the institutional framework of our study. In section 5 and 6, our data and empirical strategy. Section 7 provides some basic graphical analyses. In section 8 and 9, we present our results and some robustness checks. Finally, we conclude and discuss our findings in section 10.

3.2 Related Literature

Our paper contributes to two strands of research on procurement auction. First, it participates to the literature that aims at identifying the determinants of firms' participation to public procurement auctions. The related studies can be divided into two groups. The first one consists of interviews or surveys sent to firms of all sizes or SMEs only, providing evidence on their "perceived" barriers to participation. At the European level, European Commission [2010] with 885 responses of firms from 19 Member States highlights over-emphasis on price, late payment and slow payment as the most important obstacles. Regarding studies at national level, we can rely on a paper of Loader [2015] that provides a detailed summary of existing insights. This paper identifies two main types of barriers detected by the literature. The first type is attached to the public sector process and environment. Among them, there are the ones faced by all firms: slow payment, poorly defined specifications (MacManus [1991]), a long and expensive bidding process (Cabras [2011]), the focus on price as award criteria (Michaelis et al. [2003]), the difficulties

to identify opportunities (Michaelis et al. [2003], Loader [2007]). And there are the ones faced by SMEs in particular: contract size (Bovis [1996], Erridge et al. [1998], Morand [2003], Loader [2007]) and contract length (Loader [2011]), the need to demonstrate a track record (Loader [2005], Walker and Preuss [2008], Pickernell et al. [2011]), overly requirements (Loader [2005], Freshminds [2008]), long, costly and complex tendering process (Loader [2007], Freshminds [2008], Glover [2008], Cabras [2011], Peck and Cabras [2011]), public buyers' competing objectives and lack of clear priorities (Zheng et al. [2006], Loader [2007], Glover [2008]), aggregation of contracts (Loader [2011], Preuss [2011]). The second type of barriers is attached to SMEs' internal characteristics: a lack of electronic resource and legal expertise (Karjalainen and Kemppainen [2008]) as well as a lack of marketing capabilities (Michaelis et al. [2003], Walker and Preuss [2008]). A second group of studies covers econometrical analyses based on objective information extracted from public tenders. This methodology complements the above-mentioned studies by testing if i) the reported "perceived" barriers of participation are "effective" ones and, ii) the correlations found are causal effects. However, we only know two related papers: Coviello and Mariniello [2014] and Estache and Iimi [2009]. The first one relies on data regarding procurement auction for electricity projects in developing countries. The authors found a decreasing participation related to higher technical requirements. The second with data on Italian procurement establishes a significant link between publicity of tender and number of bidders. Our aim is to contribute to those findings by adding additional evidence on the "effective" barriers through a focus on the delay of payment.

The second strand of research we contribute to analyzes the efficiency of public policies that aim at increasing SMEs' probability of winning public procurement. Most of it focuses on discriminatory measures. A first group has been interested in set-asides (i.e. it reserves a number of contracts to SMEs). The related studies, Denes [1997] with data on American federal dredging contracts, detects no increase in cost; and Nakabayashi [2013] finds the same result with data on Japanese public construction projects. A second group looked at the effect of bid-preference pro-

gram (i.e. it gives an advantage in bidding to SMEs against un-favoured firms). Among them, Marion [2007] analyses auctions for road construction contracts in California and finds an increase in cost of 3,6%. Krasnokutskaya and Seim [2011] with the same data show a decreasing inefficiency with the size of the project (i.e. for small projects, the program produces moderate change in SMEs' access but an increase in cost by about 4%; while for large projects, the impact on participation becomes stronger and the cost is decreasing). Finally, Reis and Cabral [2015] analyze service contracts for four Brazilian federal government agencies. On one hand, they find that an increase in SMEs' access and probability of winning does not increase in *ex ante* costs; but on the other hand, it leads to a higher probability for contracts to be terminated due to poor performance. To conclude, on the overall these studies lean towards a risk of decreasing *ex ante* or *ex post* efficiency due to discriminatory measures.

In contrast in our paper, we analyze as an alternative, a non-discriminatory measure that aims at increasing SMEs' likelihood of winning indirectly through a decrease in barriers to participation. The only related paper De Silva et al. [2013] studies the effect of a learning program for "small and minority-owned firms" notably on their probability of winning. The result shows a non-significant impact on this outcome. However, we also depart from this analysis as we do not look at measures aiming only the targeted firms. Indeed, we look at a measure intended to have a particular impact on SMEs' likelihood of winning but with an application that makes no differences between the different types of firms. [40] Hence, we are the first to provide some empirical evidences questioning the link between barriers to participation, as targeted by the European measures, and SMEs' probability of winning.

The following presents our two related theoretical hypotheses: the first one regards the impact of a variation in the delay of payment on the level of participation and the second regards its impact on SMEs' likelihood of winning.

[40] The delay of payment is applied in the same way to all firms.

3.3 Theoretical hypotheses

3.3.1 Delay of payment and level of participation

The importance of the delay of payment for participation in contracts can be understood by looking at the financial literature. Indeed, a large trend of this research highlights the costly and rationed firms' access to external finance. The starting point is the Modigliani-Miller theory (Modigliani and Miller [1958]). Following their model, the value of an investment is neutral regarding its source of funding. This model is based on three main assumptions: there are no costs of failures, no asymmetry of information and markets are efficient. Even though these assumptions are very restrictive regarding the real environment, this study has been very influential and the framework for the subsequent works on the subject. Among the different strands of this literature, we focus on the ones that are the most relevant for our topic of interest: the Trade-Off Theory, the Agency Theory and the Pecking Order Theory. They all challenge the Modigliani-Miller results by relaxing one of the main assumptions and show how an investment becomes costly when using external funding. The trade-off theory (Miller [1977]) considers the existence of costs related to the probability of failure.[41] These costs taken into account, financing an investment through debt becomes costly. Indeed, it commits the manager to repay the borrowed amount plus the interest rate, increasing as a consequence the firm probability of failure and its related costs. The agency theory (Jensen and Meckling [1976]) takes into account the asymmetry of information between the manager and the stakeholders. Precisely, the investment policy undertaken by the manager cannot be easily monitored by the stakeholders. Hence, through a capital opening, the manager might have an incentive to behave towards its own interest (i.e. increase its non-pecuniary benefits and/or its discretionary expenses) rather than the stakeholders interests (i.e. optimize the investment policy) leading

[41] Those costs are classified in two categories: direct (i.e. administrative costs related to the bankruptcy proceeding) and indirect (i.e opportunity costs related to shareholders' hesitation of working with a firm entering or experiencing a period of crisis).

to further agency costs.[42] Those are all supported by the manager and the existing stakeholders since the new ones internalize the monitoring and residual costs and thus decrease the share price they are willing to pay. These agency costs taken into account, financing investment through capital opening becomes costly. According to the theory, those costs could be minimized by the use of debt. Indeed, debt is presented as having a power of discipline over the manager's behaviour because it binds him to pay the borrowed amount and interests via future cash flows (Jensen [1986]). Furthermore, it grants financers the right to take the firm into bankruptcy proceeding in case the promise is not maintained (Harris and Raviv [1991]). Thus, this gives an incentive for the manager to optimize the investment policy. However, according to the theory, financing investments with debt still leads to some agency costs related to the asymmetry of information. This concerns the quality of the investment (its level of risk and expected profit) and the manager's effort for its success. In this case, it leads to a risk for financers to select low quality projects (this is called the anti-selection problem) and for the manager to undertake riskier projects than the ones agreed (this is called the moral hazard problem). As before, this leads to further agency costs. Financers internalize the costs and risks they would have to bear and increase the interest rate accordingly. Hence, all costs are supported by the manager and existing stakeholders. As a result, financing investments through debt also becomes costly. The pecking-order theory (Myers and Majluf [1984]) emphasizes the asymmetry of information at the precise time when there is a capital opening. This is seen by the new stakeholders as a way for the manager to benefit from an overvaluation of the firm's value. Hence, they internalize it and devaluate the share price they are willing to pay. As a consequence, firms financing cost increases. Those different theories have shown (contrary to the Modigliani-Miller results) that the presence of costs related to the probability of failure, asymmetry of information and conflict of interests makes external financing costly decreasing a firms' investment value.

[42]Monitoring costs (in order for the stakeholders to ensure the manager acts in their interest), bonding costs (in order for the manager to give trust to the stakeholders) and residual costs (related to the remaining difference between stakeholders' interest and the manager behaviour.)

Another strand of the literature demonstrates that access to credit is not only costly but also rationed. Within their model, Stiglitz and Weiss [1981] consider the asymmetry of information linked to the difficulty for the bank to discriminate among the different projects. This leads to the risk of anti-selection and moral hazard (as presented above), consequently decreasing the financer's expected profit. The financer could increase the interest rate in order to face his increasing monitoring costs and risks, however this could have a side effect: attracting and giving the manager incentive to invest in even riskier projects. As a consequence, there is an equilibrium where credit is rationed: some credits are denied despite the willing of firms to pay higher interest rates. For his part, Williamson [1986] focuses on the asymmetry of information after the project is financed and realized. This leads to the risk of gain diversion by the manager. As before, the financer could increase the interest rate in order to face his increasing monitoring costs and risk and thus preserve its expected profit. However, this would, at the same time, increases the firm's probability of failure and have the contrary effect on the expected profit. Hence, Williamson concludes as well on the presence of an equilibrium where credit is rationed.
From these different theories, we understood that firms' access to external funding is costly as well as rationed. This makes their economic viability dependent from the availability of their internal resources. Hence, the delay of payment impacting this availability is likely to impact the incentive firms have to participate to the related contracts.

H1: An increase in the delay of payment will decrease the level of participation in public procurement auctions.

3.3.2 Delay of payment and SMEs' likelihood of winning

If the previous expected impact is found on participation, two scenarios are probable as regards SMEs' likelihood of winning: a decrease or no change. Referring

to the financial literature, it leads us towards the first one. Indeed, related studies generally show a particularly costly and rationed SMEs' access to external finance. To begin with, Berger and Udell [1998] highlight the higher asymmetry of information faced by SMEs. Indeed, according to the two authors, compared with large firms, SMEs do not enter into contracts that are publicly visible or widely reported within the press (contracts with their labour force, suppliers and customers are generally kept private), do not have audited financial statement that can be shared with any providers of outside finance, have little repayment history or record of profitability upon which external suppliers of fund can rely on, and even after some experience, small firms may remain opaque because they do not issue traded securities that are continuously priced in public market. Secondly, SMEs are presented as having a stronger financial fragility (Gertler and Gilchrist [1993]) and thus characterized by higher probability of failure (Psillaki [1995]). As a conclusion and following the general theories above-mentioned, because they are associated with higher asymmetry of information and risk of failure, SMEs suffer from a more costly and rationed access to external finance. This argument is supported by the empirical literature studying the link between a firm's cash-flow sensitivity and its growth. The idea behind is the following. If a firm access to external finance is limited, its level of investment will be affected by this constraint and thus its growth will sensibly be linked to the availability of its internal resources. Along this line, Carpenter and Petersen [2002] analyzed a sample of 600 small manufacturing firms and found a cash-flow sensitivity slightly above one; Wagenvoort [2003] with a sample of 358,693 firms' observation (between 1996 and 2000) shows a sensitivity of company growth to cash-flow rising as company size falls. Thus, both results provide evidence on the particular difficulties SMEs have to access external financing. As additional support, an interesting report is the one from the Conseil d'Analyse Economique (i.e. a French governmental institution) focusing on the funding of SMEs (Conseil d'Analyse Economique [2008]). The authors collected a number of figures and studies as evidences regarding the difficulties for SMEs to access external finance. For instance, they mention the

analysis by Aghom, Fally and Scarpetta [2007] with data on SMEs from developed and emerging countries showing that financial constraints constitute an obstacle for SMEs' growth. Other studies mentioned by the report are the one from Seply and Peranque [2007] showing a credit rationing for 40% of SMEs between 1905 and 1995 and the one from Auber and Charbonnier [2007] pointing out the non-satisfaction of a significant number of SMEs' credits in 2001 (it was not anymore significant in 2003, however due to a decrease in demand). This whole analysis emphasizes and supports the thesis regarding SMEs particularly costly and rationed access to external finance, making them highly dependent from the availability of internal resources. Hence, we can argue that a variation in the delay of payment impacting the level of this availability will have higher impact on SMEs' economic viability (compared to large firms) and thus on their incentive to participate in the related contracts. Some more empirical studies converge towards this argument. For instance, Choi and Kim [2005] analyzing data on American firms show that SMEs would be more affected by a negative macroeconomic shock on the interest rate. This would increase the delay of payment through a monetary tightening and this effect would have a relatively stronger impact on SMEs' trade balance. Similarly, the 2006 report from the French Observatoire des Délais de Paiement (Observatoire des Délais de Paiement [2011]) analyzed the profitability indicators according to the firms' size. It demonstrated that a longer delay of payment would decrease the profitability of firms and small firms would have to generate higher level of rentability on equity in order to face it.

This variation in SMEs' participation could have two effect at the award stage. First, as expected by the European Commission, it could be automatically translated into the same effect in terms of probability of winning.

H2a: An increase in the delay of payment will particularly decrease SMEs' participation and probability of winning.

But, it could also lead to the other case with no change at the award stage. Indeed,

some studies provide evidence of a significant link between SMEs and inefficient bids (Marion [2007] and Krasnokutskaya and Seim [2011]). In this case, SMEs' probability of winning would not be only or mainly explained by their level of participation but also by their bidding behaviors. Hence, we could consider a situation where a variation in SMEs' participation will not lead to the same as regards their chance of winning.

H2b: An increase in the delay of payment will particularly decrease SMEs' level of participation but not their probability of winning.

As regards to our second alternative on SMEs' participation, one could argue that public procurement offers relatively higher financial guarantee (compared to the private one). Indeed, there is more certainty about the payment from the public buyer to the private firm and thus from the firm to the bank. As a consequence, the difference between large and small firms in terms of difficulty to access external market would be less relevant in the context of public procurement. In this case, SMEs would not suffer from more difficulties and the impact of a variation in the delay of payment on participation would affect all firms similarly.

H3: An increase in the delay of payment will not particularly decrease the level of SMEs' participation and probability of winning.

3.4 Institutional Framework

In this section, we describe the institutional framework related to the delay of payment in French public procurement. We especially focus on the Chorus program that led to a variation in the delay of payment applied by the central government - the variation we use as exogenous treatment in our empirical analysis.
Driven by the European Commission's recommendations (European Commission [2008]), several measures have been implemented in France with the aim of reduc-

ing the delay of payment applied by the public buyers. Among them, a decree of December 31st, 2008 has reduced the legal delay of payment from 45 to 30 days.[43] The same year, as part of the French law regarding public finance (i.e. Loi Organique relative aux Lois de Finances (LOLF)), the government has introduced the Chorus program in order to reduce, this time, the effective delay of payment. This program was expected to improve the processing of public buyers' invoices through two main organizational changes: centralization and automation of their payment system. To understand this new process, in the following, we briefly list its main phases:

1. The purchasing requests from public buyers are entered into a computer file.
2. Those requests are transferred and centralized into the new common software "Chorus" in order to be submitted to validation by the Shared Service Centres. Then, emerge the payment commitment of public buyers.
3. As soon as the invoices from firms are received, the related requests of payment are transferred into Chorus and submitted to validation to the accounting services. If validated, Chorus automatically registers the different charges to be paid and the relative delays of payment. From this, a payment order is generated and sent to the public buyer.
4. Additionally, Chorus automatically calculates the potential default interest rates due by public buyers and generates the related requests of payment.

As regards its implementation, in order to guarantee appropriation of the new tools by public buyers, Chorus has been applied to the different ministers and their relatives programs in different steps: starting in June 2008 from some programs within the Minister of "Défense", "Budget" and "Enseignement Supérieur" to arrive at an application to all ministers in January 2012.
As regards the impact of this implementation, on one side, it was expected to allow

[43] See Décret n° 2008-1555.

a more efficient management system as well as a greater incentive for the public buyers to respect the legal delay of payment, and as a consequence, was expected to decrease the effective one. However, on the other side, as highlighted by the Observatoire des Delais de Paiement 2011 annual report (Observatoire des Délais de Paiement [2011]), the deployment of Chorus has led to an adaptation period of about one year for public buyers to learn and assimilate the new functionalities.[44] It has induced an increase in time for the treatment of invoices and thus an increase in the effective delay of payment during this period. On the firms' side, this led to emerging difficulties and fear as regards the related impact on their financial viability (Cour des Comptes [2011]). Overall, this institutional framework enables us to empirically investigate the question we are interested in. Indeed:

- The increase in the delay of payment allows us to look at the impact of its variation on our variables of interests (participation level and SMEs' probability of winning).
- The gradual implementation allows us to isolate this impact through a diff-in-diffs analysis.

In the next section, we explain more precisely our empirical analysis. First, we start by describing the data we used.

3.5 Data

Our data are part of the TED dataset collected by the European Commission in collaboration with European governments. Within this dataset, we use information regarding the *ex ante* auction's design (within the "call for tenders") and the *ex post* award (within the "contract award notice") with a focus on French procurements awarded from 2008 to 2011. Thanks to this dataset, that is the biggest

[44]The Observatoire des Délais de Paiement is The French Trade Credit Observatory.

in Europe regarding public procurement, we have available the main features characterizing a public procurement auction as well as our main variables of interest: the number of bidders and the identity of the auctions' winner (from which we can derive whether it is an SME or not). Variables are defined with respect to the auction i, the contracting authority (type of minister) s and the date of contract award t. Table 3.4 at the end of the paper reports the variables' description with the expected signs. In the following paragraphs we briefly explain the variables we use in our regressions and provide some related descriptive statistics.

Dependent variables

As previously discussed, we are interested in explaining the impact of the increase in the delay of payment due to Chorus application on the number of bidders and SMEs' probability of winning. Thus, we first introduce *bidders*, a variable capturing the number of participants in each public procurement auction; and as a development of the analysis, we furtherly use *SMEs*, which is a dummy equal to 1 when the winner is a SME and 0 otherwise. We define a SME according to the following four criteria:

1. its turnover of 2009 or (if 2009 is not available) 2008 or (if 2009 and 2008 are not available) 2010 was less than 50 million euros;
2. its employees of 2009 or (if 2009 is not available) 2008 or (if 2009 and 2008 are not available) 2010 were less than 250;
3. it is not part of a larger group;
4. it is part of a larger group with small dimensions (total turnover less that 50 million euros and total employees less than 250).

In accordance with European Commission [2003], we define as SME a firm that satisfies the first two criteria and at least one between the third and the fourth

criteria.

Explanatory variables

As we perform a diff-in-diffs strategy using a reduced form equation, we are interested in the change of trend of our dependent variables. More precisely, we aim at capturing differences over time between our treatment and control groups. This effect is obtained using as explanatory variable the interrelation of two dummies: a time variable that is equal to 1 for observations related to the period following the application of Chorus (d_t), a treatment dummy equal to 1 for contracts awarded by ministers firstly affected by Chorus (TM_s). On the one hand, for what concerns the variable d_t we consider the period between January and June 2008 as the pre-treatment, while we consider the period between January and June 2009 as the post-treatment. We decide to look at the same time of the year to avoid seasonality distortions. Moreover, the difficult implementation of the Chorus program that has caused the increasing delay of payment was consider as unexpected; thus expectations of bidders in relation to the delay of payment needed some months to be adjusted. On the other hand, for what concerns the variable TM_s, we include in the treatment group ministers that first applied the Chorus program: "Défense", "Budget" and "Enseignement Supérieur". Moreover, for our analysis we ruled out ministers that started the program in Janaury 2009: "intérieur", "économie", "agriculture" and "justice". Thus, our control group is not distorted and we can detect our desired average treatment effect (ATE).

Control variables

To strengthen the reliability of the diff-in-diffs, our empirical analysis also includes some control variables. Those regard the main channels through which our explained variables could be affected. In this way, we minimize any bias that could come from an omitted variable impacting differently our two trends during the study period. In the following, we list those control variables and briefly describe

their possible link with our explained variables:

- $procedure_{ist}$: a dummy equal to 1 when the contract is awarded through an open procedure.
  An open procedure and an adapted one are associated with different forms of implementation (such as publicity or administrative rules). Hence, the use of one or the other might impact firms' incentive to participate.

- CPV_{ist}: a dummy capturing the sector of activity.
  Different level of competition and number of SMEs within the market can be found in different sectors. Hence, those could influence the related participation level in public procurement.

- $allotment_{ist}$: a dummy reflecting whether or not the contract is divided and awarded in different lots.
  Increasing the number of lots might decrease the required competences needed to implement the contract. This could thus attract more firms, especially SMEs.

- $value_{ist}$: a variable reflecting the total size of the contract or the lot in euros. The value could also impact our variables of interest. For instance, an increasing one might attract more big firms (for more profits) but also less SMEs (with less resources).

Descriptive statistics

Overall, we have gathered 11.493 tenders and 29.613 award notices covering all sectors of activities.[45] The mean number of bidders was 4.51. In average, contract value accounted for 1.412.692 euros. In 90% of cases, an open procedure was used. Lots covered 75% of all awards. Finally, SMEs have won 13% of the total number of contracts.

[45]The difference is due to a number of tenders containing more than one lot

3.6 Empirical strategy

The methodology we use is a diff-in-diffs technique. This approach allows us to get rid of non-observable differences between treated and non-treated groups that are constant over time. Its implementation requires a treatment able to identify two comparable groups and a set of repeated cross-section or panel data. In our case, the treatment is embodied by the Chorus program implemented within French ministers since June 2008, while with the TED dataset we have available a repeated cross-section database of public procurement implemented by ministers in France from 2008 to 2012. Using as dependent variable either the number of bidders or the SMEs' probability of winning, we estimate the following model:

$$Y_{ist} = \beta_o + \beta_1 TM_s + \beta_2 d_t + \beta_3 TM_s d_t + \beta_4 X_{ist} + \epsilon_{ist}$$

where the index i indicates the awarded contract, s the minister, t the time. The coefficient of interest is β_3 that captures the different effect over time of being selected in the Chorus program in terms of number of bidders and SMEs' probability of winning. As above-mentioned, we control for the possible covariates that we think can differently impact the trend of the dependent variables between the two groups: the type of procedure, a dummy for the CPV code, a dummy for the use of allotment and the contract's value.

The diff-in-diffs strategy is based on two assumptions: the treatment is exogenously assigned to our treatment group and there is parallel trends over time between the two groups as regards the variables of interest making them comparable. Regarding the random assignment, as discussed in section 4.2, Chorus was gradually applied to the different ministers starting in June 2008 within three ministers ("Défense", "Enseignement Supérieur" and "Budget"). This assignment was not voluntary but decided by the central government; and evidently, the choice was driven neither by an impact on the delay of payment that was an uninten-

tional effect of the reorganization neither by an impact on the number of bidders or SMEs' probability of winning that, looking at the *ex ante* observations, are well balanced between the two groups.
Regarding the parallel trends, we believe this assumption to be valid since we focus our analysis on auctions launched at the central administrative level. Here, the involved ministers are facing the same institutional framework (legal, economic etc.). Besides, to the best of our knowledge, there has been no change in this framework that could have affected differently public procurement outcomes launched by the different ministers. As a consequence, there is no reason for our variables of interest to differ in their trends. Following this logic, regarding the number of bidders and SMEs' probability of winning, we can argue that without taking into account the application of chorus, dissimilarities between the two groups are constant making the two groups comparable. Before going through the results of our regressions, in the next section, we present some basic graphical analyses in order to discuss our hypothesis about the comparability of the two groups over time as well as to complement and interpret our further empirical findings.

3.7 Graphical analysis

We first present the dynamics regarding the number of bidders for our treatment and control groups. Subsequently, we look at the SMEs' probability of winning.

Figure 3.1: Number of bidders per semester

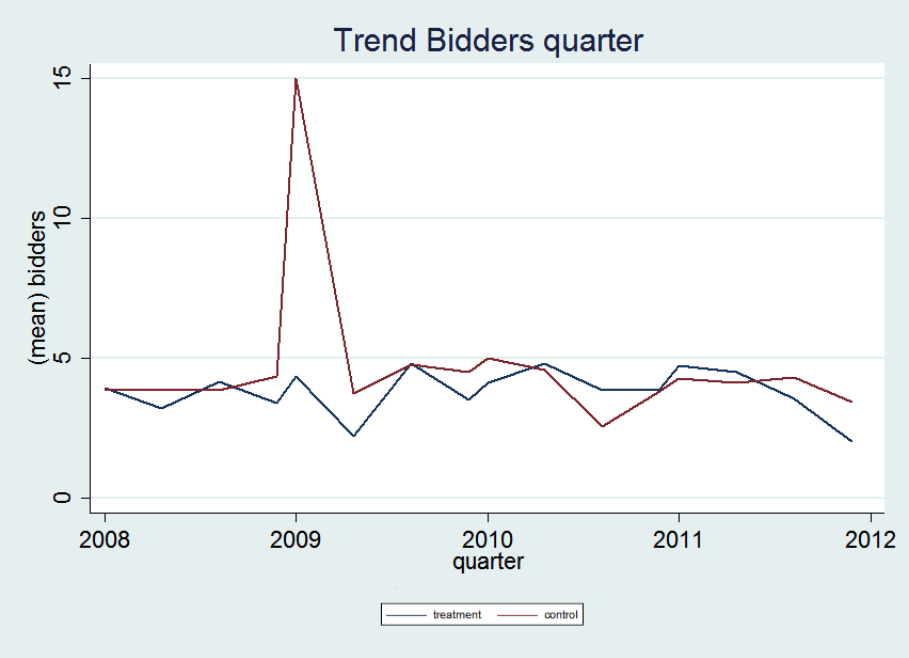

Figure 3.1 focuses on the number of bidders. The trend is reported by semesters and it relates to the period going from 2008 to 2011. Many aspects of this graph can be emphasized. At first, it is important to highlight how the two groups of ministers are similar regarding the number of bidders except for the period going from the second semester of 2008 to the second semester of 2009. This discontinuity between the two trends exactly reflects their different application of Chorus. Second, studying in detail the discontinuity period, we can observe how, during the first semester of 2009, ministers firstly affected by Chorus experienced a decrease in the number of bidders, while ministers within the control group followed an increasing trend: the average number of bidders goes from 4 to about 15. Referring to the institutional framework presented in section 2, this can be explained by the decrease in the legal delay of payment in January 2009 applied to all ministers. Indeed, we can argue that this new rule positively affected participation in public procurement auctions. Thus, its application can explain the positive dynamic of our control line. Nevertheless, it shows that the potential positive effect on our treatment group has been offset by the application of Chorus. Hence, the observed pick in the number of bidders for the control group is explained by the new rule

regarding the legal delay of payment and by a potential substitution effect. Indeed, participants in public procurement launched by ministers where Chorus was applied could have decided to switch towards more safe contracts offered by the other ministers. Because of this potential substitution effect, the impact of Chorus might not capture only the decrease of participants for the treatment group but also this switch of participants to alternative contracts.[46] A further conclusion can be reached when looking at the two trends together. Their similarities confirmed the comparability between the two groups. As a consequence this assumption, necessary for the diff-in-diffs strategy to be reliable, is valid. Moreover, the two trends show a decreasing number of bidders during the first semester of 2010 and the first semester of 2011 which is on line with the implementation of wave 3 and wave 6 of Chorus implying all ministers and a large number of programs (impacting as a consequence our two groups).

[46]Some projects might be specifics to one minister. In this case, firms having special competences for those could not switch their participation to auctions launched by other ministers. However, a number of them are being close to each other (e.g. public works). Besides, our database contains contracts of similar size (high value ones). Hence, we believe our hypothesis of a substitution effect is a reasonable one.

Figure 3.2: SMEs' probability of winning per semester

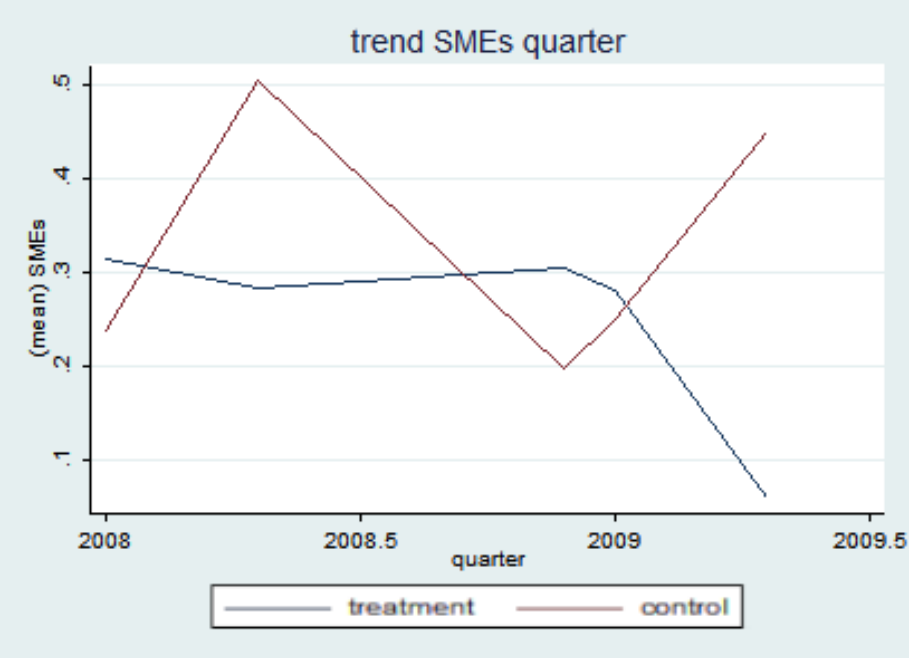

Figure 3.2 focuses on SMEs' probability of winning. In such a case, the available period is shorter than the one regarding the number of bidders. Indeed, we only observe the contracts awarded from the first semester of 2008 to the first semester of 2009. As a consequence, we cannot derive from the graph a clear understanding about the comparability of the two groups in terms of SMEs' probability of winning. Nevertheless, some aspects can be used and help to understand the impact of Chorus. First, when looking at the treatment line, we observe a constant part of contracts awarded to SMEs: around 30% till the middle of 2008. After the application of Chorus, the trend starts to be negative and, at the beginning of 2009, the average SMEs' probability of winning is around 15%. Switching our attention to the control line, we observe a decreasing curve till the application of Chorus. Afterwards, the trend starts to increase and reach an average SMEs' probability of winning higher than 30%. This positive trend after 2009 is probably driven by the above-mentionned new rule regarding the legal delay of payment and potential reallocation of firms between the two groups reflecting the substitution effect.
Thus, contrary to the previous graph, in this case, the effect of Chorus seems to be less clear. Indeed, the *ex ante* observations show an average probability for SMEs

to win higher by 10% for the control group; while the *ex post* observations show this difference to be about 15%. Thus, the impact of Chorus appears to be much lower with respect to the effect captured when looking at the number of bidders.

3.8 Results of the parametric analysis

We now present the results of our empirical regressions. At first, we look at the impact of Chorus in terms of number of bidders.

Table 3.1: Number of bidders

	2008/2009 bidders	2009/2010 bidders	2010/2011 bidders
value	3.53e-09***	5.20e-09**	4.32e-09
	(4.25)	(2.35)	(0.85)
allotment	0.179***	0.0764	0.0580
	(3.30)	(1.43)	(0.92)
type_auc	0.121*	-0.191	0.242***
	(1.83)	(-0.59)	(7.62)
cp	-0.328	0.00626	-0.201***
	(-1.42)	(0.02)	(-3.77)
treatment	0.0673	-0.875*	0.151
	(0.80)	(-1.94)	(1.27)
time	1.348***		
	(5.56)		
time_treatment	-1.249***		
	(-4.95)		
time2		-0.776	
		(-1.81)	
time_treatment2		1.084**	
		(2.70)	
time3			-0.0241
			(-0.14)
time_treatment3			-0.176
			(-0.85)
_cons	0.139	1.664***	0.741***
	(0.56)	(3.51)	(7.45)
N	1001	951	1019
r2	0.246	0.237	0.203

t statistics in parentheses

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

Our results confirm the conclusions derived from the graphical analysis. After the application of Chorus, the number of bidders in auctions launched by the ministers within our control group is almost double with respect to the one related to our treatment group. This effect is captured by the negative and significant coefficient of the time treatment variable in the regression comparing 2008 with 2009 observations. As explained within the previous section, this effect reflects the negative impact of Chorus application. In addition, when comparing 2009 with 2010 observations, the effect becomes positive and significant. This dynamic is

on line with the end of the adaptation period that realigns the trend of the two groups. This conclusion is confirmed by the third regression regarding the following period: it shows, as expected, no differences between the two groups. As to avoid any bias within our analysis, we use as *ex ante* observations contracts signed between January and July 2008, while we use as *ex post* observations contracts signed between January and July 2009. Thanks to this choice, we avoid seasonal differences and we can be sure that by January 2009 the impact of the first application of Chorus occurred in June 2008 has been internalized, in expectations, by firms. Furthermore, we exclude from the control group those ministers applying Chorus from January 2009. [47]

Finally, concerning the remaining covariates, we observe a positive and significant impact of the contract's value, the allotment dummy and the type of procedure. Those results could be expected and support the reliability of our analysis since an open procedure, a higher contract's value and the use of allotment (keeping constant the level of investment) can make the auction more attractive for potential bidders.

As a second step, we develop the analysis using as dependent variable the SMEs' probability of winning.

[47] "Agriculture", "Ecologie", "Justice" and "Intérieur".

Table 3.2: SMEs' probability of winning

	with controls SMEs	no controls SMEs
value	-0.000000166***	
	(-3.66)	
allotment	-0.195**	
	(-2.37)	
type_auc	-0.0480	
	(-0.21)	
cp1	-0.585***	
	(-16.31)	
treatment	0.0416	0.0230
	(1.16)	(0.75)
time	0.0331	0.00305
	(0.57)	(0.10)
time_treatment	-0.0543	-0.0405
	(-0.91)	(-1.18)
_cons	1.034***	0.253***
	(16.32)	(9.40)
N	746	1004
r2	0.0481	0.00121

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

We use the same strategy as before in order to define the treatment and time period, however, in this case, our probit regression shows no significant result of the time treatment variable.[48] As regards the remaining covariates, in this case, we find a negative and significant impact of the contract's value and the allotment dummy. Those results could be expected as contracts with higher value have more probability to be awarded to larger firms; and (holding constant the value), different lots have more probability to be awarded to a single larger firm (with a larger set of competences) than different contracts.

Overall, the results of our regressions validates hypothesis H1: the increase in the delay of payment decreased the level of participation. On the other hand, they go against hypothesis H2a: it did not decrease particularly SMEs' probability of winning.

[48]This is true either by including or excluding the control covariates.

Next section presents a development of our analysis aiming at better understanding whether the increasing number of bidders derive from an increase in SMEs' participation or not. In this way, we could discriminate between H2b and H3.

3.9 Empirical developments

We first report the graphical analysis describing the correlation between SMEs probability of winning and number of participants in public procurement auctions.

Figure 3.3: SMEs' probability of winning per semester

According to figure 3.3 higher participation entails a stronger SMEs' probability of winning. By looking at this correlation it is possible to deduce that the increase in number of bidders in public procurement auctions is mostly driven by a larger presence of SMEs that, in the end, implies a larger probability for a SME to obtain the winning bid. As a further development of our analysis we report the following tables aiming at capturing the impact of the number of bidders on SMEs' probability of winning. In the first column we report a simple regression linking the two variables, we use a robust specification for the standard error that are

further clustered based on the type of minister. In the second column we include as covariates the control variables we previously described.

Table 3.3: SMEs - number of bidders

	without controls SMEs	with controls SMEs
bidders	0.0684***	0.0234**
	(3.77)	(2.46)
value		-0.0251***
		(-7.70)
allotment		-0.0530
		(-1.62)
type_auc		0.0196
		(0.38)
cp		-0.932***
		(-112.71)
_cons	0.227***	1.269***
	(10.85)	(27.42)
N	1492	1143
r2	0.0121	0.158
ar2		

t statistics in parentheses

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

These two regressions show a correlation between the number of bidders and SMEs' probability of winning. On this line, we can ague that SMEs are the firms that mainly drive fluctuations of public procurement participation over time. Hence, this empirical development together with our graphical analysis show an effect of the delay of payment on the number of bidders likely due to SMEs' participation. However, in our case, this impact was not large enough to have the same effect as regards SMEs' probability of winning. This overall analysis is thus leading to a validation of hypothesis H2b (against hypothesis H3).

Following our theoretical discussion (section 3.2), this result demonstrates that SMEs' chance of winning can be but is not automatically affected by their par-

ticipation level. This latter might also be partly explained by SMEs' bidding behaviors.

3.10 Robustness checks

The findings of our regressions result from a diff-in-diffs strategy based on the assumption of comparable groups - necessary to isolate and capture the real effect of interest. In order to verify our compliance with this assumption and to make sure that our analysis is not biased by alternative differences in trends, we have performed the diff-in-diffs analysis in different periods of time (see our tables section 8). As expected, we found that after the adaptation period, the trend regarding the number of bidders increases during 2010 returning to equal level between the two groups and the analysis does not show any significant results for the following years. This confirms the reliability of our results concerning the number of bidders. As regards SMEs' probability of winning, as mentioned previously, due to a lack of observations, we are not able to undertake the same analysis. Nevertheless, as a second robustness check, we looked at the *ex ante* period[49] and as expected, we found no effect on our two variables of interest.[50] Thus, it allows to strengthen our result on SMEs.

In the next and final section, we discuss the interpretation of our results and conclude on their theoretical as well as practical implications.

[49] January, February and March 2008 as *ex ante* observations; April, May and June 2008 as *ex post* observations.

[50] Using as dependent variable SMEs' probability of winning, the robustness check is not respected when the control covariates are not included, while it is respected when those are considered.

3.11 Discussion and Conclusion

We empirically investigated the delay of payment as a determinant of participation and SMEs' access to public procurement. In order to so, we used data from the French public procurement auctions allowing us to perform a diff-in-diffs analysis. We found a negative effect of an increase in the delay of payment on the number of bidders. However, SMEs' probability of winning has not been affected.

How to interpret those results? First, our findings suggest that the increase in the delay of payment has been effectively internalized by the participating firms. Those have anticipated the risk of a negative impact on their financial viability; which significantly decreased their participation to the related contracts. Second, finding a positive link between number of bidders and SMEs' likelihood of winning suggest that the variation in participation was mainly driven by SMEs. However, this effect has not been strong enough to further affect their probability of winning.

As for the implications of our results, we first complement the research highlighting the effective barriers to participation by adding the delay of payment as one of them (Coviello and Mariniello [2014] and Estache and Iimi [2009]). Second we add further evidence on the lack of systematic link between barriers to participation and SMEs' probability of winning (supporting De Silva et al. [2013]).

From a public policy point of view, our findings open some discussions in terms of effectiveness. On the one hand, we provide some evidence regarding the effectiveness of measures with the aim of mitigating the delay of payment as it does have an impact on firms' participation. On the other hand, our results question the presence of an automatic link between barriers to participation and SMEs' probability of winning as implied by the European measures. It is important to note that we do not draw any definitive conclusion. Indeed, our results might be highly dependent on the object studied (i.e. the delay of payment) and thus be different with another variable. However, this opens some doubt and calls for further investigation on the topic. In this sense, the European measures should be analyzed to test if they effectively impact SMEs' probability of winning. This

is particularly important to evaluate their efficiency as regards the related goal of fostering SMEs' economic development. Besides, we need to emphasize further important limits to our results. First of all, as detailed in section 6, we believe our empirical strategy is reliable as regards the conditions of exogeneity (i.e. chorus should have no impact on our variables of interest except through the delay of payment) and the one of comparability (i.e. all our contracts have been launched at the central level and we use a number of control variables). However, as usual for a diff-in-diff, this cannot be totally ensured. Hence, we have to keep in mind that our hypotheses and thus our strategy could be discussed.

Second, due to a lack of data, to analyze the impact of SMEs' participation on the level level of competition, we used the link between their probability of winning and the number of bidders. Hence, our related result can only be considered as first insight. In order to obtain stronger results, a further analysis should directly regress the number of bidders on SMEs' participation and use an empirical strategy to get a causal effect.

Lastly, our results might be significantly linked to the context of our analysis. In particular, French public sector offers relatively high level of guarantee and security of payment. Hence, our results can be spread to other institutional framework with similar characteristics. However, further research should be undertaken if interested in countries with less reliable public sector. In this case, the impact on SMEs' participation and thus their probability of winning might be found larger.

Table

Table 3.4: Definition of variables and expected result

VARIABLE	DEFINITION	EXPECTED RESULT
DEPENDANT VARIABLES		
$bidders_{ist}$	Equals to the log of the number of bidders	
$SMEs_{ist}$	Equals to 1 if the bidder is a SME and 0 otherwise	
INDEPENDANT VARIABLES		
d_t	Dummy variable that is equal to 1 for the period after the application of the Chorus and 0 otherwise	
TM_s	Dummy variable that is equal to 1 for ministers affected by the Chorus program	-
$procedure_{ist}$	Dummy variable that is equal to 1 when the contract is awarded through an open procedure	+
CPV_{ist}	Set of dummies capturing the different sector of activity	
$allotment_{ist}$	Dummy variable equal to 1 if the procedure is a lot of a contract and 0 otherwise	+
$value_{ist}$	Log of the contract value	+ for $bidders$ - for $SMEs$

Chapter 4

The Use of Green Public Procurement: Evidence from France*

4.1 Introduction

Public procurement has been and is still promoted as a tool to achieve public policy objectives such as supporting local economies, social equity or minority businesses (Coggburn [2004], OECD [2015]). Along this line, since the 90s, it is presented as a key instrument to attain environmental goals (McCrudden [2004]). Hence, the promotion of Green Public Procurement (GPP) initiatives has taken an increasingly important place at all institutional levels. At the international level, during the 2002 Johannesburg Earth Summit, the world leaders committed to foster the use of "sustainable public procurement" (i.e. which covers economic, environmental as well as social concerns). At the European level, in 2004 the European Commission Directive (2004/18/EC) offers the possibility to integrate environmental matters within call for tenders. Finally, this directive has been transposed into the different national laws by Member States giving to their public procurers a legal basis

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and support for the use of GPP.

As for the practice, on one hand, it has been noticed an increasing uptake of GPP within the European community. However, on the other hand, the following points have been emphasized: i) a relatively low level of uptake as regards political targets; ii) an important difference of practices among countries and iii) the presence of substantial difficulties / barriers to implementation (European Commission [2012]). Those issues have raised some interests for the subject among researchers. However, this trend is very new and as a consequence only few related studies address this issue.

Looking at the literature, we can notice that green procurement practices have been largely analyzed through the concept of Green Supply Chain Management (GrSCM) practices. However, for the major part, this literature has been concerned with practices within the private sector; while, as expressed by recent studies on the subject, related practices within the public sector have been largely understudied (e.g. Preuss [2007], Testa et al. [2012]). This area of research is not only limited by its number of studies but also by the methodology that is used: almost all findings are derived from descriptive statistics, and as expressed by Testa et al. [2012], those provide useful insights but need to be further investigated to become sufficient proofs and be generalized. Hence, Testa et al. [2012] employ an econometrical analysis as a way to test the robustness of the existing evidences. We place our work and contribution on the same line by using the same methodological approach. Besides, we also aim at expanding this study in three ways. First, as expressed by the authors, their analysis is based on and limited by self-reported information collected though a questionnaire. It thus needs to be completed with objective data. Our study is heading in this direction by relying on a tenders analysis. Second, we provide additional proofs regarding the possibility to generalize the existing evidences by dealing with a different institutional framework. Third, we analyze and test variables never studied before with the aim of enlarging the existing literature. Our research starts by theoretically discussing the determinants of GPP implementation. Based on the existing literature, we

construct a number of hypotheses classified in three different groups depending on whether the studied determinants deal with the project's, the mayor's or the municipality's characteristics. Then, we undertake an econometrical analysis to test those theoretical hypotheses. In order to perform the empirical test, we have constructed a rich database from several sources. The main one is TED from which we extracted a sample of almost 20.000 tenders awarded by French municipalities between 2009 and 2012. It enabled us to obtain information, notably on the type of project, the identity of the municipality and the use of environmental criteria. Besides, we also use other French datasets to get the additional information needed on the mayor's and municipality's characteristics.

Turning to our results, with the use of environmental clauses within tenders as dependent variable, we found a significant effect attached to i) the project type and related EC recommendations; ii) mayor's personal characteristics (i.e. its political orientation and gender), iii) municipality's size and financial situation as well as mimetic behaviour and past experience. The remaining presents our analysis as follows. Section 2 provides a literature review on green procurement practices within the public sector and our contribution to this latter. Section 3 describes the construction of our theoretical hypotheses. Section 4 presents the data we have gathered, some descriptive evidences on the use of GPP as well as our empirical strategy. Section 5 reports the related results. Finally section 6 concludes on the implications and limits of our findings.

4.2 Related Literature and Contribution

This paper fits into the literature regarding the determinants of GrSCM practices, more particularly the one dealing with green procurement practices within the public sector.[51] Hence, in this section we aim to highlight i) the main evidences given by this literature and, ii) our contribution to this latter. Existing

[51] As mentioned by Srivastava [2007], within the literature, GrSCM has ranged from green purchasing to integrated green supply chain flowing from suppliers to manufacturers to customers.

analyses looking at the determinants of GPP implementation can be divided into two groups depending on the geographical scope of their analyses. The first one consists of studies undertaken at the European level: those are parts of reports regularly ordered by the Commission on the use of GPP within Member States. All being basically interested in the same outcomes, we can concentrate on the last ones. To begin with, in European Commission [2006], the authors use 860 responses to an on-line questionnaire and derive the following perceived barriers to GPP: additional costs of green products, public buyers' lack of knowledge, lack of training, lack of management support and lack of information / practical tools. The authors also identified a set of product groups as the most suitable for greening (through an analysis of their environmental impact, the availability of their greener version and existing practices). Within European Commission [2012], the authors conducted an analysis based on 856 responses to an on-line questionnaire regarding 10 product groups (for which a set of green criteria has been published by the European Commission). Their analysis highlights different levels of GPP uptake depending on the group of products. The authors notably identified three groups with more than 50% of contracts including environmental criteria and conversely, four others with a level of uptake below 20%.

GPP bas also been studied at the national level, mostly in the Northern countries. Those analyses and related findings are of particular importance since Northern countries are part of the most advanced ones regarding the use of GPP (European Commission [2012]). Among them, Kippo-Edlund et al. [2005] analyzed practices in Denmark, Finland, Norway and Sweden through 258 responses to a questionnaire sent to public buyers; and Parikka-Alhola et al. [2006] collected 180 calls for tenders identified in TED, with a focus on Denmark, Finland and Sweden. Both studies show a great difference between the various product groups in the use of environmental criteria within call for tenders; and point out the groups associated with the highest/lowest level of inclusion. Besides, Michelsen and de Boer [2009], with a focus on Norway, analyzed 111 responses to a questionnaire sent to different counties and municipalities. The authors found a clear positive correlation

between the size of municipalities and the focus on green procurement. They also conclude on a lack of competences / information of public buyers regarding GPP implementation. Additionally, some few studies have covered practices in other individual countries. Regarding Italy, Testa et al. [2012] collected 156 observations from a questionnaire sent to public buyers in three different regions. The results of their econometric analysis show that the use of GPP is significantly impacted by public buyers' level of information regarding GPP initiatives and tools, the size of municipalities, and the possibility to rely on external expertise. Lindgreen et al. [2009] look at the use of sustainable procurement (i.e. with environmental and/or social considerations) in the UK based on 106 responses received from a questionnaire sent to public buyers. They found the most salient barriers to be related to financial issues (such as the prohibitive cost of sustainable procurement or the lack of sufficiently large budget) as well as the awareness of public buyers. The most important facilitator mentioned was the top senior management support. Finally, staying in the UK, Thomson and Jackson [2007] conducted interviews with 5 municipalities. Those highlighted the lack of priority at the senior level and the cost as the most important limits for the uptake of GPP.

As a general overview, we can conclude on the following evidences given by the literature regarding the determinants of GPP implementation: i) group of products, ii) public buyers' level of knowledge, competence, training, management support and availability of information / practical tools; and iii) municipalities' size and financial situation. Through our study, we aim at contributing to this literature in two ways. First, by studying variables already analyzed in the literature but in a different institutional context and/or with a different empirical approach - as a way to test the relevance of the findings and their generalization beyond the given studies. Second, by studying other variables never analyzed before that could also explain the use of GPP.

4.3 Theoretical Hypoteses

In the following, we present our theoretical hypotheses regarding the determinants of GPP implementation. Those are classified in three different groups depending on whether they deal with the project, the mayor or the municipality's characteristics. As seen previously, some studies have already been interested in the link between project or municipality's characteristics and the uptake of GPP. Hence, those will be the bases for the construction of our theoretical hypotheses; our objective being here to test the related findings. On the other hand, no studies exist on the impact of mayor's characteristics. However, a large literature emphasized the significant effect of top executives' attributes on an organization's practices. This made us interested in applying and testing the presence of this link in our case. Our objective is to see whether those variables, never analyzed before, could also be part of the explanation regarding the uptake of GPP.

4.3.1 The product group

Considering the existing literature, we can expect a large influence of the product group on GPP implementation. Indeed, European Commission [2006], Kippo-Edlund et al. [2005] and Parikka-Alhola et al. [2006] for Northern countries, all show a very different level of GPP uptake according to the type of products. One may wonder whether these practices are the same or vary among the various institutional frameworks (i.e. the various countries). In order to investigate this point, we notice that i) a number of empirical studies find a strong influence of public buyer's availability of information / practical tools on GPP implementation (European Commission [2006], Michelsen and de Boer [2009], Lindgreen et al. [2009]) and Testa et al. [2012]), ii) those information / practical tools are largely coming from the European level. Indeed, the European Commission has implemented a website dedicated to GPP with numerous reports, studies and practical

guidances for Member States and their public buyers. In particular, in 2008, the Commission has published the common reference document (in cooperation with Member States) "Public Procurement for a better environment" in which a set of environmental criteria has been developed for 10 selected products. Following this communication, Member States were supposed to transpose these guidelines into their national action plans and guidances on GPP. Moreover, as to ensure this inclusion, the Commission has implemented a monitoring and diffused the related outcomes (European Commission [2012]. Hence, linked to our first point (i.e.: the importance of public buyer's availability of information / practical tools), we can expect, in all Member States, a larger use of GPP for the products selected by the European Commission.

Turning to the empirical evidences, two studies are relevant for our question. First, the one of Parikka-Alhola et al. [2006] in which three of the four products found with the highest level of environmental criteria correspond to the ones selected by the European Commission (i.e. Transport services, Paper products, and Cleaning products). Second, the one of Kippo-Edlund et al. [2005] in which the same result appears for most of the products studied (i.e. Repair, Maintenance and installation services, Refuse services, Computer and related services, and Cleaning services). Thus, both studies converge towards a link between the European guidelines and public buyers' practices. To conclude, based on the existing literature, we can expect an impact of the European guidelines on the level of GPP implementation.

H1: The type of product will significantly influence the use of environmental clauses within public tenders.

H2: EC recommendations related to the different types of product will significantly influence the use of environmental clauses within public tenders.

4.3.2 The mayor's characteristics

In this section, we start by presenting the main influence of mayor (as the top leader actor within a municipality) on the uptake of GPP; then, linking this point with the literature, we analyze the related impact of its key characteristics.
Empirical evidences emphasize the importance of managerial and political support for the uptake of GPP: the survey from Lindgreen et al. [2009] highlights it as a leading facilitator; while European Commission [2006] points the lack of it as a major barrier. This managerial and political support can be found at the central level but also, for a large part, at the local one. Indeed, the European Union has recognized the principle of "local autonomy" regarding the management of public affairs (see "The European Charter of Local Self-Government", 1985). This confers to municipalities a wide range of discretion as regards public procurement policy and notably the use of GPP. Within those municipalities, the leading actor is the mayor; its powers vary from one case to another, but in a number of countries, those powers are largely extended. For instance, in France, Belgium, Spain, Portugal or Italy, the mayor is vested with the executive power; he can also have a primary role relative to the exercise of legislative power and the management of local administrations. Thus, from this background, we can expect a substantial influence of the mayor as regards the political and managerial support towards GPP within a municipality - more specifically, in municipalities where the mayor has predominant powers.
Linking this with the literature on the determinants of an organization's practices and outcomes makes it interesting to look at the mayor's characteristics to see if and how those can influence the uptake of GPP. Indeed, if it exists no related studies on green procurement practices, a wide body of literature emphasizes the significant effect of the leading actor's characteristics on management, strategic decision etc. within an organization. As expressed by the pioneer work on the topic by Hambrick and Mason [1984]: "Both strategies and effectiveness are viewed as reflection of the values and cognitive biases of powerful actors in the organization.

The decision-maker brings a cognitive base and value to a decision, which creates a screen between the situation and his/her eventual perception of it. If a great deal of discretion is present, then managerial characteristics will become reflected in strategy and performance." Hence, considering the mayor in its role of top leader actor within a municipality, in the following, we will look at some of the main attributes studied in the literature and analyze their expected influence in our case.

Two strands of literature can be applied in order to analyze our case. The first one looks at the influence of top executive's characteristics on organization practice, innovation in particular. This also involves GPP, which we consider here as «...a practice that is new to the adopting organization...» (i.e. the definition of innovation in Damanpour and Schneider [2009]). The second one analyses the link between individual characteristics and environmental concerns. Hence, in the following, we will review these literatures for each characteristic to see whether i) it influences organization's practices / innovation and, ii) it is linked with individual environmental concerns. From this analysis, we can then derive our theoretical hypotheses. For instance, if a top leader attribute is found to influence organization's practices/innovation and is also linked with individual environmental concerns, it will likely have an impact on environmental practices within an organization; and, applied to our case, on the uptake of GPP within a municipality.

Mayor's gender

As regards organization's practices in general, the literature seems to agree on a significant impact of top leader gender. For instance, Jacobson et al. [2009] review a number of studies pointing out its influence on management style, policy preference and strategy. Further, their empirical findings confirm this effect regarding orientation and strategies. On the same line, Fox and Schuhmann [1999] found a significant difference in management style and choice depending on whether the city manager is a man or a woman. However, when looking at the literature on innovation practices in particular, only few studies have been interested in the

subject. Moreover, following the literature review of Damanpour and Schneider [2009], those are generally reporting no impact of the gender variable: for instance, the results of Sonfield et al. [2001] show no influence of gender on venture innovation or risk situation strategies; Damanpour and Schneider [2006] found the same for innovation practice in public organizations. Damanpour and Schneider [2009] subsequently confirmed those findings through their empirical analysis with data on local governments in the U.S. Thus, we can expect no influence of gender on innovation practices.

As for environmental concerns, the literature review of Davidson and Freudenburg [1996], Dietz et al. [1998]) and Hayes [2001], all highlight the lack of consensus regarding its link with gender: some studies show that men are more pro-environmental than women, others the contrary and finally a number of findings present no significant effect. Hence, from this existing research, we can conclude on an ambiguous effect of gender on individual environmental concerns. To conclude, this overall analysis leans towards no influence of gender on environmental practices within an organization; and, applied to our case, on the uptake of GPP within a municipality.

H3: Mayor's gender will not significantly influence the use of environmental clauses within public tenders.

Mayor's age

As regards the impact of age, the literature has not been interested in a wide range of organization's practices but has mostly focused on innovation. In this regards, with some exceptions (e.g.: Damanpour and Schneider [2006]), as expressed by the literature review of Young et al. [2001] and supported by their empirical findings, age of top executive is generally found to be negatively associated with innovation practices. The explanation being that older managers i) are less able to learn and adopt new ideas or behaviours, ii) have greater psychological commitment to status quo and iii) are less inclined to take risks (Hambrick and Mason [1984]).

As for environmental concerns, the literature review of Dietz et al. [1998] em-

phasizes age as being its "strongest and most consistent predictor" with analyses consistently reporting that younger are more pro-environmental (Jones and Dunlap [1992], Kanagy et al. [1994], Mohai and Twight [1987]). Hence, from this overall analysis, we can expect a negative impact of age on environmental practices within an organization; and applied to our case, on the uptake of GPP within a municipality.

H4: Mayor's age will negatively influence the use of environmental clauses within public tenders.

Mayor's political orientation

Regarding the impact of political ideology on practices in general, we found mitigated results. Indeed, the closest study to our case (Ferreira and Gyourko [2007]) shows no effect of a mayor's political orientation on policy outcomes. However, as mentioned by the authors, most studies at the central level have found opposite effects. Besides, if we look at the literature on private organizations, we generally find a significant effect of top leader's political orientation on outcomes (e.g. Christensen et al. [2014]) for tax policies avoidance, Di Giuli and Kostovetsky [2014] for CSR policies, Hong and Kostovetsky [2012] for investment decisions and Hutton et al. [2014] for financing and investing policies). As concerns innovation practices in particular, empirical evidences mostly converge towards an influence of political ideology (e.g. Brudney et al. [1999]) for the adoption of innovative reform in public agencies; and Damanpour and Schneider [2009] for innovation adoption in local governments). Thus, despite some contradictory results, from this overall literature, we can lean towards an effect of top executive's political orientation on organizations practices / innovation.

Turning to environmental concerns, as expressed by the literature review of Dunlap et al. [2001] as well as Neumayer [2004] and confirmed by their empirical findings, here there is a clear consensus on its link with political ideology: left wing individuals are regularly found to be more pro-environmental than right wing ones. To conclude, we can expect top executives from left wing to be associated with

environmental practices within an organization; and, applied to our case, with the uptake of GPP within a municipality.

H5: Left-wing mayors will positively influence the use of environmental clauses within public tenders.

4.3.3 The municipality's characteristics

Existing studies have mainly analyzed the influence of municipalities' characteristics on the uptake of GPP through their size (Michelsen and de Boer [2009], Testa et al. [2012]). The significant results found have notably been explained by the link between dimension and the availability of economic resources (e.g. a larger municipality would be associated with a higher level of GPP due to its bigger budget). Besides, other eventual factors have been advanced to explain the influence of size such as the purchasing capacities of municipality.[52] However, those theoretical assumptions have never been analyzed and confirmed by any empirical evidences. Indeed, no studies have looked at dimension by itself (i.e. separately from the economic resource variable) to see whether other factors could also be part of the explanation. Hence, in the following, we investigate this point by constructing and further testing two separate hypotheses, one for the municipality's economic resource and another one for its size. Besides, based on the literature analyzing the dynamics of organizations, we have been interested in the effect of two additional determinants: municipality's mimetic behaviour and past experience. Thus, we construct two additional hypotheses attached to those variables.

Municipality's financial situation

The majority of empirical studies point out financial matter as one of the most important barrier for the uptake of GPP. European Commission [2006], Thomson

[52]Purchasing capacities notably cover organizational skills and functional competences or the diversity of products and services bought.

and Jackson [2007] and Lindgreen et al. [2009], all relate public buyers' perception of higher costs for green products. Added to the tight budget constraints, this cost issue is found to play a leading role for the uptake of GPP. Hence, from those analyses, we can expect municipality's financial situation to be of particular importance: higher is the availability of economic resource, higher will be the level of GPP implementation.

H6: Municipality's financial situation will positively influence the use of environmental clauses within public tenders.

Municipality's size

Taking the number of inhabitants as a proxy for the size of a municipality, all empirical evidences converge on its positive impact on the public buyer's level of environmental consideration. For instance, Michelsen and de Boer [2009] for "the frequency of putting forward environmental demands" in Northern countries, Nogueiro and Ramos [2014] for "the development of environmental practices" in Portuguese local administration, and the closest to our case, Testa et al. [2012] for "the uptake of GPP". As mentioned above, on one hand the influence of size is presented as being principally channeled through municipalities' economic resources. On the other hand, other factors have also been presented to explain this impact. Following this second point, size could have an impact on the uptake of GPP not only associated with financial issues. However, we can argue on the link there is very likely between those factors and economic resources. For instance, municipalities with bigger budget will be the ones able to acquire higher purchasing capabilities - they could hire more and better experienced people. Hence, our expectation is to find no direct link between size and the uptake of GPP.

H7: Municipality's size will not significantly influence the use of environmental clauses within public tenders.

Municipality's past experience and mimetic behaviour

Looking at the literature on organizational dynamics, GPP is likely to be influenced by internal practices through past experience and external ones through mimetic behaviour.

To begin with, the important role we can expect from internal practices is attached to the "organizational learning" approach (Askim et al. [2008], Moynihan and Landuyt [2009]). This concept refers to "the development of knowledge held by organizational members that is being accepted as knowledge and is applicable in organizational activities therewith implying a (potential) change in those activities" (Berends et al. [2003]). Thus, following this idea, past experiences through the acquisition of related knowledge would influence organizational change / current practices. In particular, Jiménez-Jiménez and Sanz-Valle [2011] enumerate a number of theoretical as well as qualitative and quantitative studies showing a positive link between organizational learning and innovation. Those are further supported by their empirical findings. As expressed by the authors, "organizational learning allows the development, acquisition, transformation and exploitation of new knowledge that enhance organizational innovation". Hence, related to our case and considering GPP as an innovative practice, we can expect a positive impact of past experience on the acquisition / development of related knowledge, and thus on its current use.

Regarding external factors, a pioneer work of DiMaggio and Powell [1991] has pointed out the importance of taking into account "mimetic isomorphism" to explain organizational change. This term refers to the tendency of an organization to copy other organization activities, systems or structures, especially under uncertainty. On this line, subsequent works have been interested in testing and analyzing such behaviors. For instance, Ashworth et al. [2009] found mimetic isomorphism to play a role as regards public organizations' practices in the UK. Besides, Jun and Weare [2011] emphasized the related importance attached to proximity. The authors enumerate a number of studies demonstrating that organizations are sensitive to the choice of nearby jurisdictions. Those latter are then supported by its

empirical analysis showing an impact of other regional organization's practices on innovation. Finally, very close to our case is the paper of Preuss [2007] analyzing sustainable procurement practices by local governments and health care organizations within the UK. Its further empirical findings corroborate the related role of mimetic forces: peer behaviors are found to be significant explanatory variables of such practices. As expressed by the author, mimetic isomorphism is particularly relevant within public procurement that is characterized by strong cooperation and interpersonal trust. This, combined with the uncertainty surrounding sustainable procurement practices leads to "similar organizations (to) use each other as social reference frames" indicating "what constitutes acceptable or desirable behaviors". Hence, following this literature, we can expect GPP practices to be influenced by similar behaviors within proximate organizations.

H8: Municipality's past experience will significantly influence the use of environmental clauses within public tenders.

H9: Municipality's mimetic behaviour will significantly influence the use of environmental clauses within public tenders.

4.4 Empirical Analysis

4.4.1 Data and variables

To analyze the decision to use environmental clauses in French public procurement we combine several datasets from different sources. Most importantly, we have data on above-threshold tenders from TED, which is maintained by the European Commission. Currently, public works above 5,186,000 euros need to be reported, and services or supplies if the contract exceeds 414,000 euros. From all tenders in the database we select the ones on the municipal level, which we eventually merge with other municipal level information. From those, we extracted

relevant information regarding the type of project, the awarding authority, as well as procedural details including the award and participation criteria. The tenders therefore represent the information we have concerning the project itself and are the unit of observation in the following empirical analysis. Overall, we have 4 years of data with roughly 20,000 tenders from 2009 to 2012. From this data we construct the indicator variables for the type of project, signified by the 10 priority product and service groups as identified by the European Commission for their Green Public Procurement initiative: 1 - Cleaning products and services, 2 - Clothing, uniforms and other Textiles, 3 - Construction, 4 - Energy, 5 - Equipment used in the health sector, 6 - Food and Catering, 7 - Furniture, 8 - Office Machinery and Computers, 9 - Paper and Printing Services, 10 - Transport and Transport Services. In addition to these ten groups, we define all other goods and services as Non-Priority goods and services.

Here, we consider two main possibilities for the public buyer to insert environmental clauses into the tender: Firstly, participation criteria that require the bidding firm to have pre-specified qualifications like the ISO 14001 certificate. It is important to note that these clauses relate to the bidding firm itself and are independent from the project.

Secondly, public buyers can decide to give environmental concerns a certain weight in the awarding process. A typical scoring auction of this type would specify a weight for the price, a weight for quality, and a weight for environmental issues. Each bid is then evaluated according to these criteria, awarded a certain grade or points, which are then weighted to obtain the final score of the bid. To ensure that it is a genuine environmental criteria, we do not consider environmental criteria that are a sub-item of a more general category (like quality).

We take both possibilities into account and check in the relevant sections of the tender for associated criteria. For the empirical analysis we therefore distinguish participation criteria and award criteria, which are 1 if the respective tender contains an environmental clause and 0 otherwise. Tenders may even contain both types of environmental criteria. To take factors on the municipal as well as regional

level into account, we complement the project information with public finance data from the respective municipality, political data from municipal elections and information about the mayors. The public finance data stems from the website of the Ministry of Economy and Finances, which covers municipal budgets for the period between 2004 and 2012. This database records general budget information such as investments, expenses, but also the revenue structure including deficit and public debt. The variables debt_capita and deficit_capita are obtained from this source and correspond to thousand euros per capita municipal debt and deficit.

Regarding political data, we use a dataset from the Center of Socio-Political data of the Paris Institute of Political Studies (Sciences Po). This dataset contains the main information about the municipal elections of 2008 such as the vote count per political party or voter turnout. These data inform us about the political ideology of the local council and thus the one of the mayor.[53] Here we only have information on a subset of larger French municipalities as detailed electoral data is not available for smaller municipalities. From this dataset, we construct an indicator for left wing mayors left, which is a dummy variable that is one whenever a declared left wing party is the strongest party.[54] We complement this by adding information on the demographic characteristics of the mayor such as age, profession and sex from the National Repertory of Politicians, which is a branch of the Ministry of the Interior. The binary indicator female equals one if a mayor is a female and zero otherwise. The age of a mayor is incorporated through the variable age.

Finally, we add further municipal information beyond such as population. This information comes from the French National Institute of Statistics and Economic Studies (INSEE). Unlike the previous data, information like population is based on the 2010 Census and therefore does not vary over time. To capture the potential nonlinear impact of population, we recode the population data into a set

[53] In France, citizens vote to elect the local council, and then, the council elects the mayor among its members. Hence, the strongest party as regards the municipal election reflects the mayor's political orientation.

[54] This comprises the following parties: Liste d'extrême gauche (LEXG), Liste présentée par le Front de gauche (LCOP), Liste présentée par le PCF hors de l'alliance du Front de gauche (LCOM), Liste du parti socialiste (LSOC), Liste présentée par Europe Écologie Les Verts (LVEC), Liste divers gauche (LDVG), Liste d'Union de la gauche (LUG).

of dummy variables corresponding to the size classifications according to INSEE. The population groups are cut along the following thresholds: 5000, 10000, 20000, 50000, 100000, yielding 5 group indicators. Municipalities below 5000 inhabitants are chosen as the (excluded) base category and therefore the other coefficients are interpreted as contrasts to it.

Variable definitions and sources are displayed in Table 1. Moreover, summary statistics of these variables are exhibited in Table 2.

4.4.2 Descriptive Evidence on the use of Environmental Clauses

To give a first overview of municipal public procurement and the use of environmental clauses in France, this section presents some descriptive statistics. This also helps to motivate the details of the empirical strategy outlined in the next subsection.

Looking at the sheer size of the market, Figure 1 shows that our sample contains roughly 20,000 projects of almost 12 billion euros value. The somewhat unequal distribution among years results from the fact that some tenders awarded in 2009 were already noticed in 2008 and before. Similarly, if a project noticed in 2012 has not been awarded yet, it is not contained in our dataset. This should, however, only be a timing effect and we don't expect this to bias our results.

With respect to the type of projects, Figure 2 shows the number of projects by CPV group, and also weighted by value.[55] Two things become obvious: firstly, French municipalities seem to procure projects of virtually all kinds, with services representing the most important category in terms of the number of projects. Secondly, when considering project value, construction projects and other services account for over 75% of project value. The large heterogeneity among CPV groups in terms of value also suggests that controlling for the project type is indispensable.

A first result regarding the use of environmental clauses in France is presented in Table 3. Out of the roughly 20,000 projects we were able to identify 2,482 projects

[55] a CPV group regards the sector of activity.

with environmental award criteria and 261 projects with environmental participation criteria. 83 projects included both types of criteria. Environmental criteria are therefore used in about 13% of all projects. There seems to be a clear preference for award criteria, which are used almost 10 times as much a participation criteria. As Table 4 shows, roughly the same relations hold when looking at the value of projects.

As the European Commission identified ten priority sectors for its green public procurement initiative, it is interesting to see how prevalent environmental clauses are in these market segments. The associated data is presented in Figure 3 and shows the share of environmental clauses in each priority sector and for all other "Non-priority" goods and services. It is clear from the graph that the uptake of green public procurement tends to be higher in the priority sectors as defined by the European Commission. Among the forefront of green public procurement are Cleaning products and services, Furniture, Office machinery with more than 20% of all tenders including environmental award criteria. Sectors below the share of non-priority goods are Energy, Paper and printing services and Equipment used in the health sector. When looking at the use of environmental criteria from a regional perspective, it becomes obvious that the 10% award criteria are rather unevenly distributed across space. Aggregating the data to the department level, Figures 4 and 5 reveal substantial heterogeneity in the use of environmental procedures. However, no clear pattern arises as to whether some regions systematically adopt more environmental criteria for public procurement.

An important factor driving these regional differences comes from the fact that a large number of municipalities never adopt environmental clauses. As shown in Table 5, out of the 2,064 municipalities which ever launch a project in our sample, 1,427 did not use environmental criteria once. Figure 6 shows the share of projects with environmental award criteria over municipalities, excluding those municipalities that never used environmental award criteria. The figure shows that apart from a few outliers, municipalities that ever used environmental award criteria apply them quite frequently. The distribution of the number of award criteria peaks

at 0.2 suggesting an environmental award criteria in every fifth tender. Conditional on ever using environmental award criteria, the mean share is as high as 0.38. Although this value is slightly biased by a few municipalities which have a small number of projects with an extremely high share of criteria - represented by the small peak at 1.0 - it clearly shows that the unconditional mean of 0.12 is heavily influenced by a large number of municipalities not using environmental criteria at all.

Another piece of information from the tenders is the weight municipalities chose to give to environmental award criteria. As can be seen in Figure 7, a 10%-weight is by far the most frequent choice when using award criteria. The figure also shows that award criteria with 5%-weights are considerably less frequent than 10%, which is slightly surprising but suggests that public buyers do not just add environmental award criteria for the sake of the criteria without any potential impact on the award decision. On the other hand, weights above 20% are very rare, which can be taken as a sign that other factors such as price or quality are more important than the environmental side of a project. To summarize, in addition to project and municipal characteristics that may affect the use of environmental criteria, this section has shown that regional heterogeneity might actually be an important factor. Moreover, there seems to be a general divide between municipalities that use environmental criteria and those who don't. Existing experience with environmental clauses may therefore matter gravely.

4.4.3 Empirical Strategy

Given the aim of this paper, the basic choice model that we estimate in this work is given by the following specification:

$$P(Clause_{jit} = 1|X) = F(\beta_0 + \beta_k X_{jit}) \tag{4.1}$$

where $P(Clause_{jit}$ is the conditional probability that project j in municipality

i in year t contains an environmental clause. While the variables in X are assumed to have a linear additive impact on the latent variable $Clause^{*}$[56], the response probability is actually a nonlinear function of the covariates. While it matters little for the empirical results, we use a probit specification that is typical for this type of analysis. All regression coefficients have the interpretation of marginal effects.

We rerun equation 1 three times, once for both criteria combined, once for award criteria only, and once for participation criteria only. Moreover, to capture year specific effects that may for instance arise through the unequal sampling in 2009 and 2012, we also add year fixed effects to the regressions.

4.5 Results

Table 6 presents the baseline results from correlating environmental clauses with the potential determinants. Starting with EU priority groups, we find that the results from descriptive statistics largely carry over to the regression analysis. Compared to non-priority product groups, which are the base category, project tenders in one of the sectors which the EU deems important for green public procurement have a higher probability of containing an environmental criteria. Contracts relative to Cleaning, Furniture and Office machinery have a 10% higher probability of containing environmental criteria than standard non-priority goods and services. The overall effect in column 1, where the dependent variable is one if either a participation or an award criteria is used, is largely determined by the award criteria. Looking at participation criteria alone (column 3), we find that such clauses are not typically used in the EU priority sectors for GPP. On the contrary, they are used less frequently in Construction, Food, Furniture and Transport projects. This raises the question whether participation criteria are used for different reasons

[56]The equivalent latent variable model is $Clause^{*}_{jit} = \beta_0 + \beta_k X_{jit} + \epsilon_{jit}$ with $Clause_{jit} = 1[Clause^{*}_{jit} > 0]$

by public buyers or if the type of criteria is chosen strategically. The results in Table 1 at least suggest that the type of project and sector alters the probability with which we will observe different types of environmental criteria. We therefore cannot reject hypothesis 1, as a few select groups seem to exhibit very little environmental criteria at all. Overall, also hypothesis 2 appears valid. However, the observed use of award criteria is much more aligned to the European guidelines than participation criteria. If the former are used in priority sectors to comply with European guidelines, the motivation to use participation criteria for different products cannot easily be explained. Regarding mimetic behavior as well as past experience indicators, we find that they enter the regressions highly statistically significant. The number of past environmental clauses has a very clear positive effect on the probability that a tender contains an environmental clause. One more clause in the past year is associated with a marginal increase in the probability that a tender contains an environmental clause by 0.6%. Considering that environmental clauses are used in roughly 10% of all projects, the effect is sizeable. This strongly supports the idea that past experiences matter as a kind of path dependency. Once a municipality has gained experience in the use of environmental criteria, the odds are much higher that it will use environmental criteria in future contracts.

The same applies for the number of clauses in the region, which also has a positive and highly statistically significant impact on the probability to observe environmental award or participation criteria. This finding combined with the strong regional heterogeneity in Figures 4 and 5 suggests that spillovers effects are highly important.

Regarding the demographic characteristics of the mayor, we find that municipalities with female mayors use less award criteria. This finding leads us to reject hypothesis 3 that gender does not play a role in the uptake of environmental criteria. It is not clear why cities with female mayors should be slower in the uptake of GPP. With respect to age, we find no evidence for hypothesis 4. Although age exhibits a negative coefficient in all cases, the size of the association is very small

and not statistically significant.

The impact of mayor's political ideology appears as predicted by hypothesis 5: left wing is associated with a higher probability of environmental clauses. The effect is highly statistically significant. Looking at the pure size of the coefficient, ideology seems to be a relevant predictor of environmental criteria, increasing the probability to observe an environmental clause by 3%. There is also some evidence that the financial stance of a municipality in terms of debt and budget deficit is relevant for the use of environmental criteria. The coefficient of both debt and deficit is negative in all specifications. The effect is also statistically significant for participation criteria whereas the results are less clear for award criteria. We therefore cannot reject hypothesis 6 that the financial situation of a municipality affects the uptake of environmental clauses in public procurement.

Finally, the population indicators yield an interesting pattern in the sense that we observe contrary results for award criteria and participation criteria. We find that increasing municipality size also increases the probability to observe environmental award criteria in procurement contracts, at least until a population of 50,000. In complete contrast, we find that increasing the size tends to decrease the probability of observing environmental participation criteria. Overall the two effects slightly compensate each other but still leave large municipalities above 50,000 with a higher propensity to use environmental clauses in general. Although it is hard to pinpoint the reason for this pattern, it shows that different types of environmental criteria may be used under different circumstances by different types of public buyers.

4.5.1 Extensive vs Intensive Margin of Environmental clauses

Up until now we have restricted our attention to the question under what circumstances municipalities might use environmental clauses. In addition to the question, whether to add such a clause, municipalities also have to decide which weight environmental award criteria should have in a scoring auction. Hence in

addition to the extensive margin, we now focus on how the observed factors affect environmental criteria at the intensive margin. Empirically, this amounts to re-estimating equation (1) for different intervals of the weight an environmental award criteria has received. The dependent variable is 1 if the weight falls into the interval, and zero otherwise. As already shown in Figure 7, most of the weights are rather small and typically below 20%. There is a bunching of weights at the discrete values 5, 10 and 20. As a result, the intervals are: y=0, $0 < y < 10$, $y = 10$, $10 < y < 20$, $20>y$. The associated results are shown in Table 7. In the first column, we basically replicate the model of column 2 in Table 6. As we now predict the probability that the award criteria weight is zero, signs are reversed. The coefficient estimates are not exactly the same as before because the sample is slightly smaller, reduced by those tenders which contain an award criteria but do not specify its exact weight.

In columns 2 to 5, we observe how marginal effects of the predictors change with different award criteria weights. For the project type, we find that most of the previous findings are confirmed over the different intervals of award criteria weights. However, the results for some product groups like Furniture and Office machinery seem to get stronger over the intervals. This suggests that some of those project types that are already above average likely to contain environmental clauses also have a higher probability to contain rather large weights on these environmental criteria.

In contrast, for some segments like Clothing, which also had above average probability to contain environmental clauses, the effect is driven by smaller weights and is no longer present when looking at larger environmental weights. While no clear policy message arises, this suggests that there is not only heterogeneity with respect to the use of criteria across the products and services identified as priorities by the European Commission. On top of that different services vary considerably in the weight environmental concerns obtain in scoring auctions.

A slightly clearer picture arises for mimetic behavior and the past use of clauses. Importantly, past clauses not only increase the probability to observe more clauses

in the future, it also increases the probability to observe weights of all sizes, even those above 20% (column 5). Conversely, regional spillovers seem limited to increase the probability to observe environmental clauses with lower weights until 10%. The coefficient is statistically insignificant for clauses above this threshold (columns 4 and 5).
In terms of mayor's characteristics or the financial stance of the municipality, the results do not indicate whether these factors change the expected size of environmental criteria. The variation over the intervals does not lend itself to clear conclusions as regards their effect on the intensive margin.

4.6 Discussion and Results

Contrasting with the large political promotion and communication around the use of GPP to achieve environmental goals, a recent report from the European Commission emphasized the relatively low level of implementation and major practical difficulties (European Commission [2012]). Within this context, a recent trend of literature has emerged trying to identify what determine the use of GPP - the aim being to understand GPP practices and thus provide recommendations on how to go further in its implementation. However, those studies present important limits, first in terms of number and second in terms of methodological approach. Indeed, they are all based on surveys or interviews (e.g. subjective data) and descriptive analyses (with the risk of empirical biases). Hence, our paper had the objective to partly overcome those limits by relying on data extracted from tenders (i.e. objective data) and an econometrical analysis (minimizing eventual biases). In this way, looking at variables already analyzed before, we could test their generalization beyond the given studies. Besides, we investigated other variables never analyzed before that could also be part of the explanation. Turning to our findings, we first support the literature underlying the impact of product groups on the level of GPP (Kippo-Edlund et al. [2005], European Commission [2006], Parikka-Alhola

et al. [2006]). Even more interesting, we also confirm the influence of EC related recommendations (Kippo-Edlund et al. [2005], Parikka-Alhola et al. [2006]). In particular, we find contracts relative to Cleaning, Furniture and Office machinery to have higher probabilities to contain an environmental clause. Regarding municipality's characteristics, as expected, our results show a positive impact of its economic situation. This confirms existing studies that emphasize financial issues as major barriers for GPP implementation (European Commission [2006], Thomson and Jackson [2007]). Hence, as expressed by Lindgreen et al. [2009], for sustainable procurement in general, when there is a perception of higher cost, budget constraints are attached to major deterrent effect. Second, we also validate the link between larger municipalities (controlling for economic resources) and higher level of GPP found by Michelsen and de Boer [2009] and Testa et al. [2012]. Following those studies, this result can be explained by the greater capabilities and better structure of large municipalities. This allows them to establish a dedicated purchasing strategy (for instance, to have specialized personal with the time and opportunity for training and developing specific competences and skills). As regards variables never analyzed before, we found an impact of mayor's personal characteristics. Thus, we support the significance of its influence for the uptake of GPP. In particular, being a male or left wing significantly increases the probability for a contract to contain an environmental clause. Following our literature review, our results suggest that these two characteristics reflect different values or beliefs and thus condition the mayor's approach/decision making as regards GPP. Our results also confirm the influence of mimetic behavior: practices of proximate municipalities significantly impact the level of GPP uptake of a given organization. And, finally we found a particularly strong impact of past experiences: it influences both the level of GPP uptake and the weight of environmental concern within the award criteria. As expressed before, this reflects the importance of organizational learning effect. Here, the deployment of GPP knowledge facilitates and thus allows an increase in the use of GPP.

Regarding the implications of our results, three points need to be especially empha-

sized. First: the importance of EC recommendations. Related practical guidelines should therefore continue to be produced and shared with Member States and their public buyers. Second: the impact of mimetic behavior. This calls for the sharing of experiences / knowledge among municipalities. Third: the significant role of organizational learning. Hence, the acquisition of knowledge within organizations should be highly promoted (for instance, through specialized training). Those different practices should allow a decrease in uncertainty through the deployment of awareness and know-how of public buyers, and thus increase their use of GPP.

To conclude, an important limit of our findings should be noted. The impact we found on variables never analyzed before might be dependent on the institutional framework of our study. For instance, past experience or mayor's characteristics could have different effects in another country (with different rules, organizational culture etc.) Hence, further analyses should be undertaken on those latter to see whether they are valid and can be generalized to other environmental contexts.

4.7 Appendix

Table 4.2: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
All clauses	0.14	0.35	0	1	18837
Award_crit	0.13	0.34	0	1	18837
Participation_crit	0.02	0.13	0	1	18837
Clauses_past	4.05	6.09	0	43	13348
Clauses_proximity	12.89	15.05	0	65	18837
EUpriority Cleaning	0.01	0.09	0	1	18837
EUpriority Clothing	0.01	0.11	0	1	18837
EUpriority Construction	0.19	0.39	0	1	18837
EUpriority Energy	0.03	0.16	0	1	18837
EUpriority Health Equipment	0.01	0.12	0	1	18837
EUpriority Food	0.04	0.19	0	1	18837
EUpriority Furniture	0.03	0.17	0	1	18837
Non-Priority	0.53	0.5	0	1	18837
EUpriority Office Machinery	0.05	0.21	0	1	18837
EUpriority Paper	0.02	0.13	0	1	18837
EUpriority Transport	0.1	0.29	0	1	18837
Female	0.14	0.35	0	1	18837
Age	61.24	8.98	29	88	18837
Left	0.56	0.5	0	1	18837
Debt_cap	1.17	0.85	0	12.15	18837
Deficit_cap	0.15	0.16	-1.3	3.44	18837
Pop 2500+	0.03	0.16	0	1	18837
Pop 5000+	0.07	0.26	0	1	18837
Pop 10000+	0.12	0.33	0	1	18837
Pop 20000+	0.27	0.45	0	1	18837
Pop 50000+	0.2	0.4	0	1	18837
Pop 100000+	0.3	0.46	0	1	18837

Table 4.1: Variables and definitions

	(1) Unit	(2) Definition	(3) Source
Award criteria	dummy indicator	0 - no criteria, 1 - environmental award criteria	TED
Participation criteria	dummy indicator	0 - no criteria, 1 - environmental participation criteria	TED
EU priority	dummy indicators	1 - Cleaning products and services, 2 - Clothing, uniforms and other Textiles, 3 - Construction, 4 - Energy, 5 - Equipment used in the health sector, 6 - Food and Catering, 7 - Furniture, 8 - Office Machinery and Computers, 9 - Paper and Printing Services, 10 - Transport and Transport Services	TED
female	dummy indicator	0- male, 1 - female	National Repertory of Politicians
age	years	Age of mayor	National Repertory of Politicians
left	dummy indicator	0 - center or right, 1 - left	Center of Socio-Political data of the Paris Institute of Political Studies (Sciences Po)
debt_cap	1000 euro per capita	Per capita financial debt of municipality at year end	Comptes des communes
deficit_cap	1000 euro per capita	Per capita deficit of municipality in current year	Comptes des communes
popcut	dummy indicators	Size classifications according to INSEE. Thresholds: 5000 10000 20000 50000 100000.	INSEE
criteria_proximity	number of criteria	number of environmental award and participation criteria in the same d'epartment in the current year	TED
criteria_past	number of criteria	number of environmental award and participation criteria in TED tenders in the past year	TED

Table 4.3: Projects with award and participation criteria

	award_crit		
part_crit	0	1	Total
0	17,126	2,482	19,608
1	261	83	344
Total	17,387	2,565	19,952

Table 4.4: Value of projects with award and participation criteria

	award_crit		
part_crit	0	1	Total
0	10,439	1,876	12,316
1	197	120	317
Total	10,636	1,996	12,633

Table 4.5: Criteria per municipality

Number of clauses	Number of municipalities
0	1,427
1	299
2	116
3+	82
5+	71
10+	37
20+	17
30+	15
Total	2,064

Table 4.6: Regression: Probit with marginal effects and additional covariates

	(1) All Clauses	(2) Award Criteria	(3) Participation Criteria
EUpriority Cleaning	.12***	.13***	.0077
	(.029)	(.027)	(.0093)
EUpriority Clothing	.084***	.097***	-.022
	(.023)	(.022)	(.014)
EUpriority Construction	.049***	.057***	-.0053*
	(.0078)	(.0075)	(.0029)
EUpriority Energy	-.068***	-.044*	-.15
	(.025)	(.024)	(4.9)
EUpriority Health Equipment	-.09***	-.065**	-.15
	(.031)	(.029)	(5.7)
EUpriority Food	.067***	.082***	-.024**
	(.017)	(.016)	(.0099)
EUpriority Furniture	.12***	.13***	-.021**
	(.015)	(.014)	(.0088)
EUpriority Office Machinery	.1***	.1***	-.0045
	(.012)	(.012)	(.0049)
EUpriority Paper	-.027	-.0057	-.015
	(.025)	(.024)	(.01)
EUpriority Transport	.051***	.064***	-.022***
	(.01)	(.0096)	(.0056)
clauses_past	.0066***	.0063***	.00052***
	(.00053)	(.0005)	(.00019)
clauses_proximity	.0016***	.0015***	.0003***
	(.0002)	(.0002)	(.000079)
debt_cap	-.0048	-.002	-.0039**
	(.0041)	(.0039)	(.0017)
deficit_cap	-.058***	-.039*	-.018**
	(.022)	(.022)	(.0083)
female	-.03***	-.03***	-.002
	(.0089)	(.0086)	(.0033)
age	-.00041	-.00042	.000097
	(.00036)	(.00034)	(.00014)
left	.034***	.03***	.0077***
	(.0063)	(.0061)	(.0025)
pop 5000+	.061	.12***	-.016*
	(.038)	(.044)	(.0098)
pop 10000+	.057	.12***	-.02**
	(.036)	(.043)	(.0089)
pop 20000+	.058	.13***	-.02**
	(.035)	(.042)	(.0084)
pop 50000+	.071**	.14***	-.024***
	(.036)	(.042)	(.0085)
pop 100000+	.02	.089**	-.028***
	(.036)	(.042)	(.0085)
year 2010	-.013	-.012	-.0026
	(.0084)	(.0081)	(.003)
year 2011	-.02**	-.016**	-.0084***
	(.0083)	(.008)	(.0031)
N	13349	13349	12867
Pseudo_R2	.046	.052	.05

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.7: Extensive and intensive margin: Probit with marginal effects for different intervals of environmental criteria weights

	(1)	(2)	(3)	(4)	(5)
	$y = 0$	$0 < y < 10$	$y = 10$	$10 < y < 20$	$20 \leq y$
share	0.896	0.022	0.044	0.012	0.026
EUpriority Cleaning	-0.0874***	0.0146	0.0319*	0.0167**	0.0216
	(-3.26)	(1.10)	(1.80)	(2.14)	(1.56)
EUpriority Clothing	-0.0816***	0.0261***	0.0416***	-0.00353	0.00646
	(-3.96)	(2.98)	(3.22)	(-0.34)	(0.51)
EUpriority Construction	-0.0409***	0.00544	0.0169***	0.00326	0.0150***
	(-5.77)	(1.51)	(3.53)	(1.24)	(4.06)
EUpriority Energy	0.0440*	-0.0277	-0.0436**	0.00637	-0.000553
	(1.91)	(-1.59)	(-2.18)	(1.06)	(-0.05)
EUpriority Health Equipment	0.0400	0.0114	-0.329	-0.00524	-0.00592
	(1.53)	(1.19)	(-0.05)	(-0.51)	(-0.45)
EUpriority Food	-0.0623***	0.0182***	0.0236**	0.0102**	0.0106
	(-4.11)	(2.60)	(2.31)	(2.06)	(1.26)
EUpriority Furniture	-0.112***	0.0206***	0.0318***	0.0147***	0.0382***
	(-8.77)	(3.38)	(3.57)	(3.56)	(6.29)
EUpriority Office Machinery	-0.0905***	0.0206***	0.0344***	0.0118***	0.0230***
	(-8.18)	(3.97)	(4.63)	(3.16)	(4.00)
EUpriority Paper	0.0171	-0.0112	-0.0309	0.00311	0.00941
	(0.68)	(-0.77)	(-1.47)	(0.39)	(0.84)
EUpriority Transport	-0.0517***	0.0141***	0.0262***	0.00574*	0.00544
	(-5.73)	(3.27)	(4.42)	(1.77)	(1.05)
clauses_past	-0.00506***	0.000741***	0.00234***	0.000806***	0.000899***
	(-10.56)	(3.21)	(7.08)	(5.36)	(3.66)
clauses_proximity	-0.000907***	0.000312***	0.000416***	0.0000747	0.0000323
	(-4.83)	(3.51)	(3.34)	(1.09)	(0.30)
debt_cap	0.00231	0.00350**	-0.00284	-0.00134	-0.00474**
	(0.64)	(2.31)	(-1.13)	(-0.98)	(-2.06)
deficit_cap	0.0216	-0.0159	0.0129	-0.000978	-0.0189*
	(1.07)	(-1.51)	(1.00)	(-0.13)	(-1.69)
female	0.0199**	-0.00546	-0.00256	-0.00308	-0.00846*
	(2.50)	(-1.39)	(-0.49)	(-1.07)	(-1.90)
age	-0.00000652	0.0000442	-0.0000865	-0.0000346	0.0000389
	(-0.02)	(0.28)	(-0.40)	(-0.29)	(0.23)
left	-0.0311***	0.00595**	0.0204***	-0.000380	0.00601**
	(-5.43)	(2.12)	(5.15)	(-0.19)	(1.97)
pop 5000+	-0.0638*	0.0118	0.00802	0.101	0.0289
	(-1.67)	(0.54)	(0.33)	(0.02)	(1.27)
pop 10000+	-0.0661*	0.0159	0.0158	0.1000	0.0230
	(-1.80)	(0.77)	(0.69)	(0.02)	(1.04)
pop 20000+	-0.0771**	0.0229	0.0261	0.0949	0.0238
	(-2.14)	(1.14)	(1.17)	(0.02)	(1.09)
pop 50000+	-0.0810**	0.0296	0.0280	0.0986	0.0140
	(-2.25)	(1.47)	(1.25)	(0.02)	(0.64)
pop 100000+	-0.0404	0.0208	-0.00356	0.0940	0.0197
	(-1.12)	(1.03)	(-0.16)	(0.02)	(0.90)
year2010	0.0119	-0.00726*	0.0000185	-0.00285	-0.00210
	(1.58)	(-1.92)	(0.00)	(-1.08)	(-0.53)
year2011	0.0124*	-0.000888	-0.00721	-0.00272	-0.00134
	(1.67)	(-0.25)	(-1.41)	(-1.06)	(-0.35)
N	12260	12260	12260	12260	12260

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

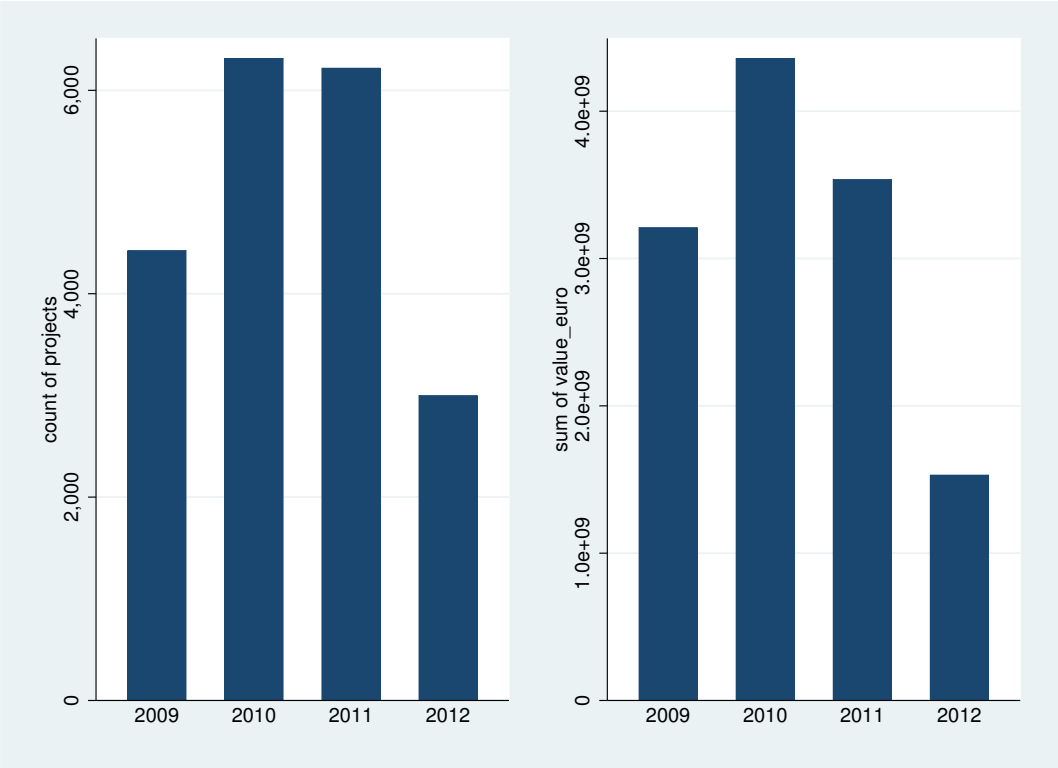

Figure 4.1: Number of projects and Value by year

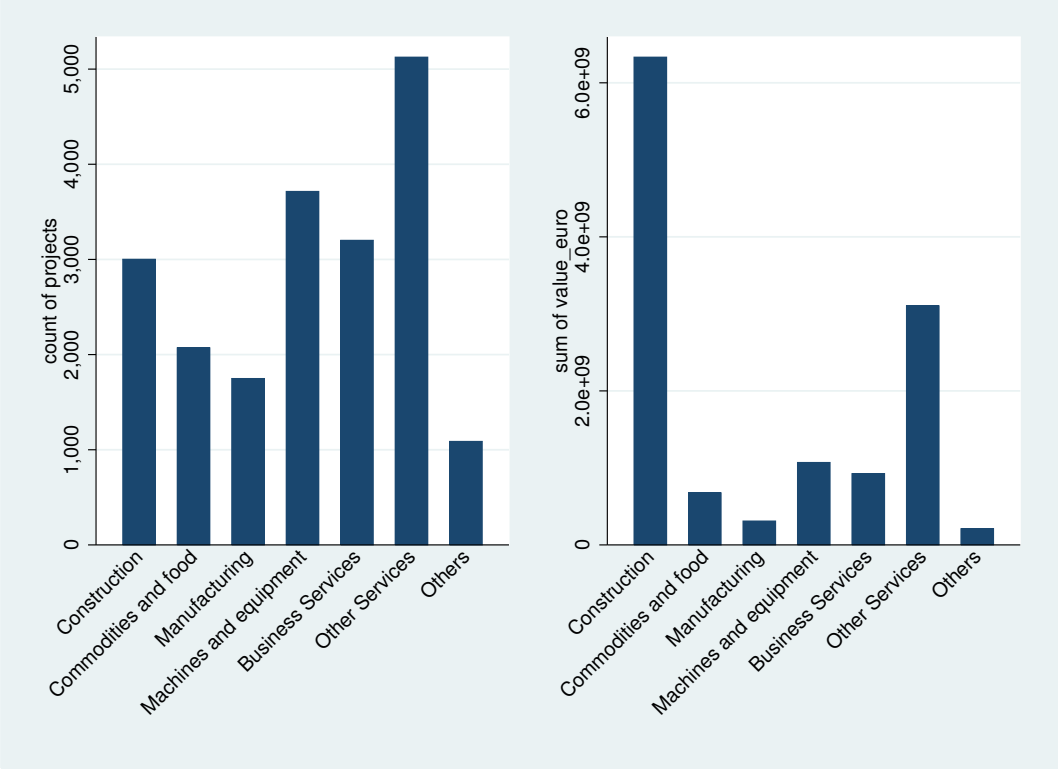

Figure 4.2: Number of projects and Value by CPV group

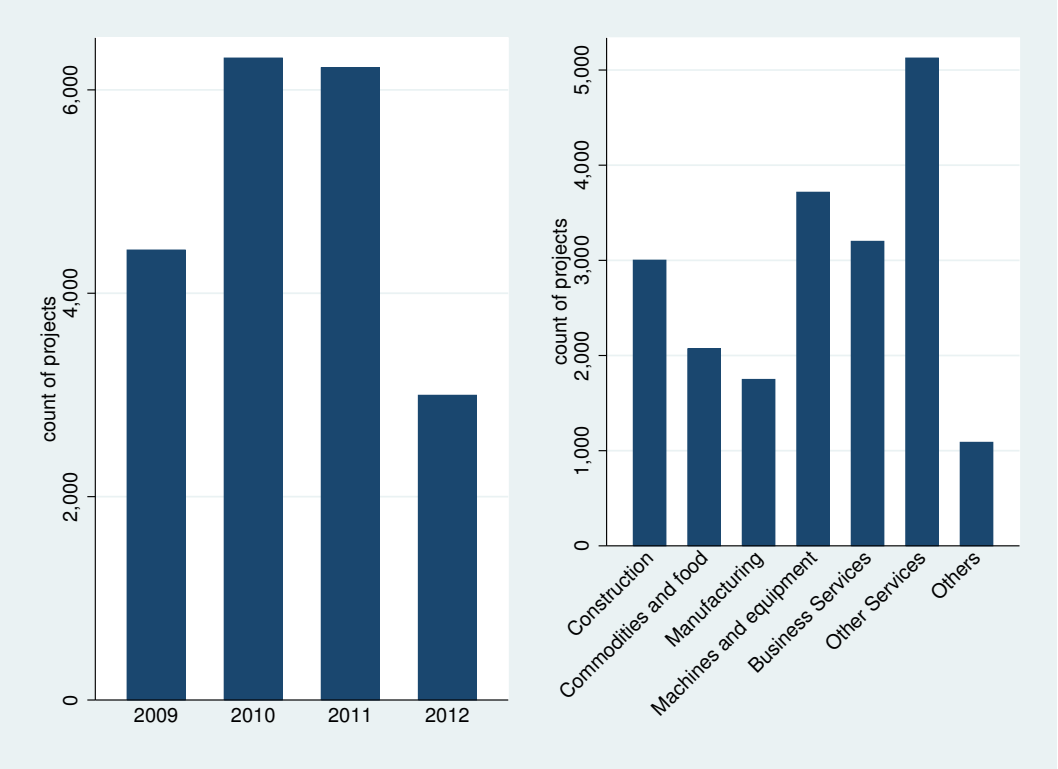

Figure 4.3: Share of projects with environmental clause by EU priority product groups

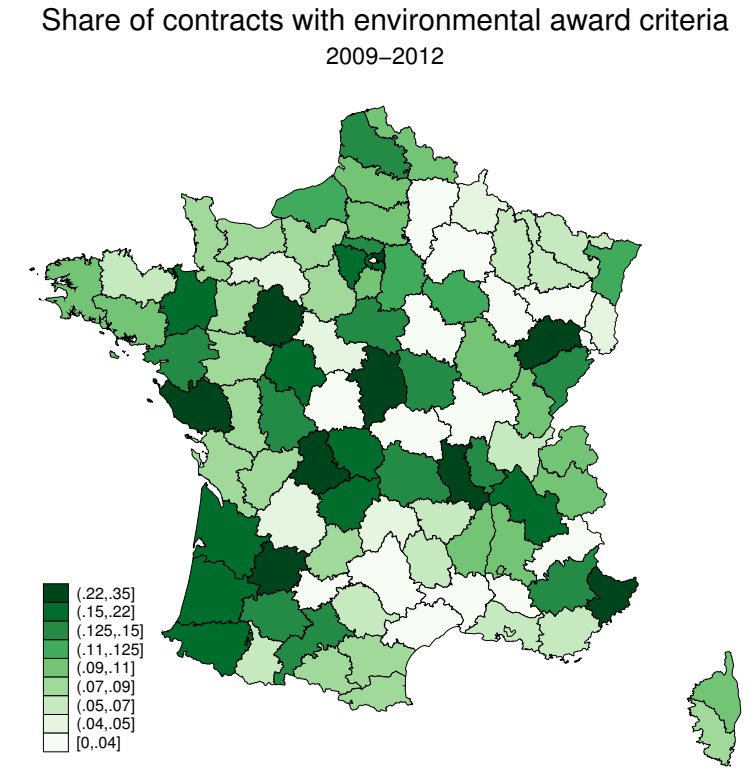

Figure 4.4: Award criteria per region

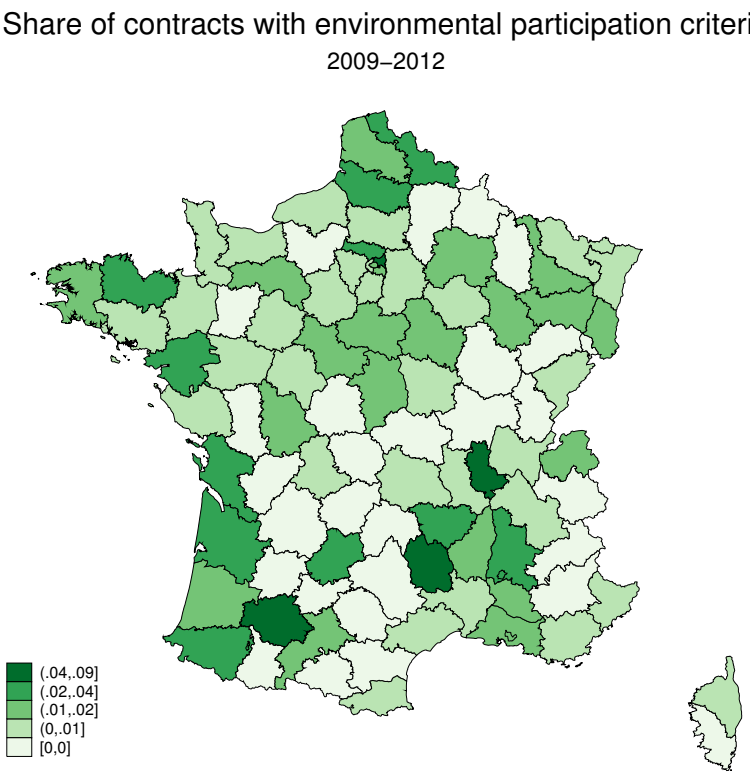

Figure 4.5: Participation criteria per region

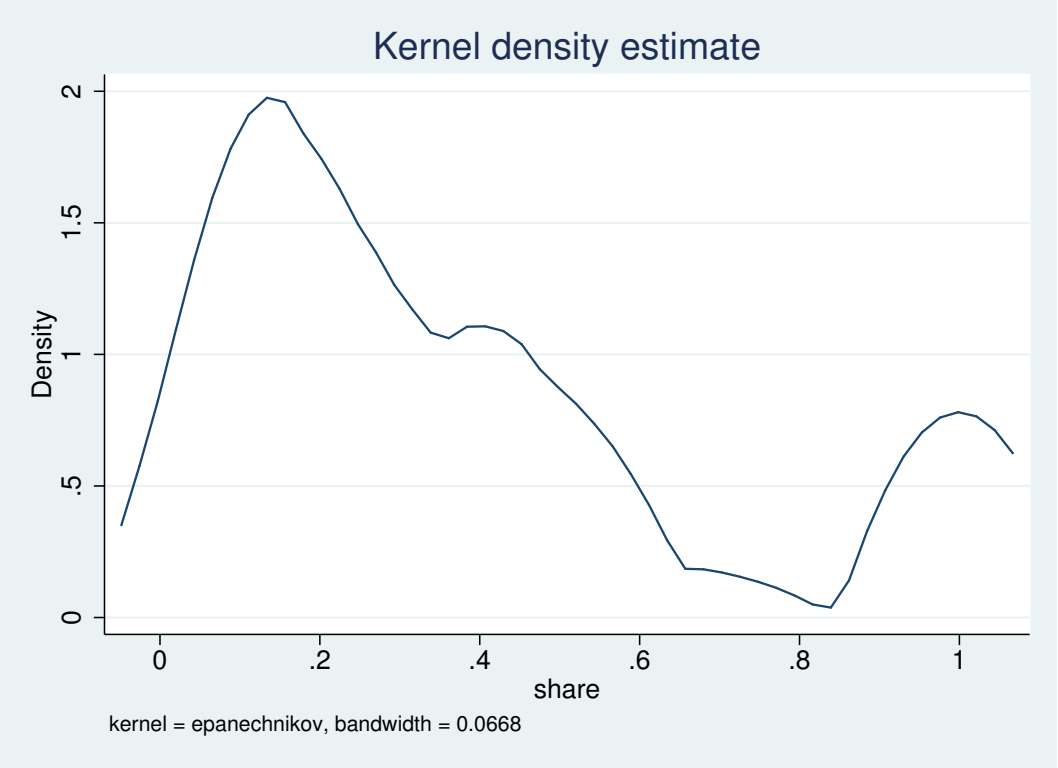

Figure 4.6: Share of projects with environmental clause, conditional on using clauses at least once

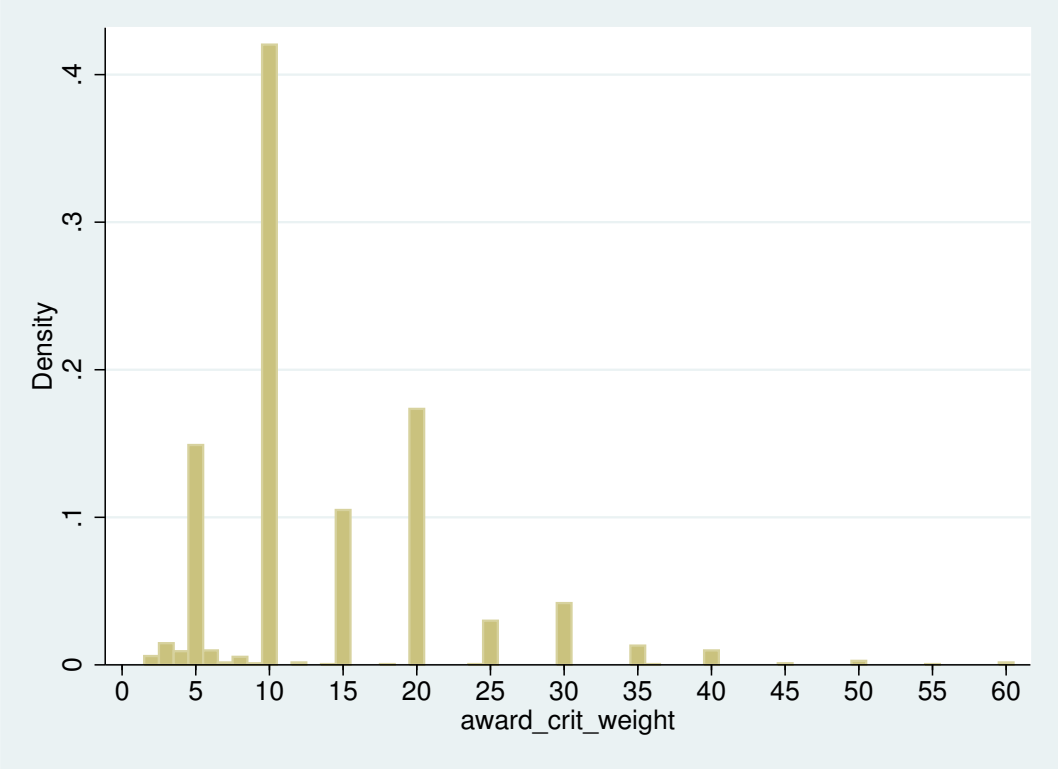

Figure 4.7: Distribution of weight regarding environmental award criteria, conditional on using an environmental award criteria

General Conclusion

Summary of our findings

In time of fiscal crisis, the regulation of public procurement has traditionally been governed by a neoliberal paradigm around the objective of cost-minimization. Along this line, its theoretical foundations were based on the idea of competition as the best guarantee for an efficient spending of public money (e.g. Public Choice Theory, Competition Theory). However, given its importance in terms of amount and visibility, public procurement has also become a key issue within the political arena. Hence, for some time now, it is promoted as a tool to reach public policy objectives such as innovation, environmental and social goals or SMEs' growth. In particular, staring slowly with the 2004 Directives, the European Commission is now presenting public procurement as a "policy strategy tool" and its 2014 one calls for a complete modernization of its regulation towards this aim.
Concerned with the necessity of evaluating and guiding those reforms towards the given objectives, recent studies have been investigating the effectiveness of such a change. With a focus on SMEs' growth and environmental objectives, this dissertation aimed at contributing to this research. The following summarizes our main

findings.

Our first chapter introduces our work through a literature review. We start by looking at the main existing insights. These call into question the current effectiveness of this reform and investigate the potential to go further. In a second place, we pinpoint the main limits of those studies to derive issues for further research. We especially conclude on a lack of robust empirical empirical analyses. The three remaining chapters are precisely devoted to partially fill this gap. With a focus on SMEs' growth and environmental objectives, in each one of them we undertake an econometrical analysis on the effectiveness of using public procurement towards policy objectives .

Chapter 2 and 3 focus on the SMEs issue. The motivation beyond was the following statement: since the introduction of the 2004 European measures towards their access to public contracts, in practice there has been no related increase until now. This made us wondering about the effectiveness of such measures. However, to the best of our knowledge, it exist no related studies. Our aim was to investigate this question through the impact of two "perceived" barriers to participation: formalism and delay of payment. Indeed, the logic behind the European measures was to decrease barriers to participation as to automatically increase SMEs' probability of winning. However, while our results show an effective increase in the presence of SMEs at the bidding stage, we found no such impact on their likelihood of winning. Our results are thus putting in doubt this expected link between barriers to participation and SMEs' probability of winning.

Our third chapter relates to GPP. It departs from the same statement of a low level of implementation as regards the political aspiration. Our aim was to contribute at understanding the determinants for their use and thus derive some directions to go further. With our results, we support the significant impact of the European practical guidelines, the municipality's size and financial situation, mayor's characteristics as well as mimetic behaviors. We emphasize the particular impact of organizational learning through the strong effect we found of our "past experience" variable.

Contributions and Implications

As above-mentioned, our research fits into the new trend of studies investigating the effectiveness of using public procurement as a "policy strategy tool". We contribute to this literature by partially filling the lack of robust empirical evidences. Besides, each of our chapter is also related to a more traditional research. First, with our chapter 2 and 3, we contribute to the literature that aims at identifying what determines firms' decision to participate in procurement auctions. Our results add formalism and delay of payment as "effective" barriers to this participation.

Second, chapter 1 is also contributing to the literature analyzing the effect of discretion on outcomes. Indeed, the regulation public procurement was traditionally shaped around strict rules and standards. Discretion was viewed as a main channel for deviant behaviors and thus inefficiency. However, a recent literature argues that, on the contrary, discretion should be increased as to enable public buyers to reach better outcomes (i.e. a more efficient process and public policy goals). Through our results, we provide additional empirical support to this claim. Indeed, we found that discretion leads to better results (i.e. an increase in the efficiency of the process and a better access of SMEs at the bidding stage), with no side effect on price.

Third and finally, chapter 3 fits into the literature on the determinants of innovative practices within organizations. We notably provide additional empirical support to the strong effect of organization learning.

Concerning the implications of this research for public policy, in a first place, our results are putting in doubt the effectiveness of the European non-discriminatory measures towards SMEs' access. Indeed, we did not find the expected automatic link between barriers to participation and their probability of winning. Through those findings, we suggest that bidding behavior is also an important determinant

for SMEs' access to contracts. Hence, if they participate more but bid inefficiently, they will not be awarded more contracts. As a result, on one hand, we plead for the implementation of this kind of measure as it is beneficial for the overall process through an increase in participation. On the other hand, for the purpose of SMEs' growth, this European policy seems in need to be reviewed. To go a bit further, we can link our insights to the literature on discriminatory measures. While, those measures allow (by definition) an increase in SMEs' access to contract, they are also attached to the risk of a decrease in efficiency. Hence, from this overall analysis, it might be that an arbitration is necessary: considering discriminatory measures would ensure to reach the increase in SMEs' access but this could be at the cost of efficiency.

The second implication of our findings regards the effectiveness of GPP. Our results provide robust support to the literature as regards the importance of developing the knowledge of public buyers. This would enable to decrease uncertainty and thus increase their incentive to use GPP. Hence, the development of tools such as practical guidance, sharing of experience and best practices or trainings should be placed as main goals within the political agenda to increase GPP implementation and thus its effectiveness.

Limits and Areas for Further Research

Underlying the main limits of this research is particularly important in order to understand how to read our results and what should be done to go further.

To begin with, some limits are related to our empirical methodology. First of all, as long as a natural experiment is not used, any econometrical strategy is attached to the risk of biases. In our case, it concerns for instance: the exogeneity of our instrument (for the use of "instrumental variable" in chapter 2), the comparability of our two groups (for the use of "diff-in-diffs" in chapter 3) or omitted variable (for the use of control variables in chapter 4). Besides, our results might also

be dependent on the database and variables we analyze. With those considerations in mind, our results should be understood as "suggestions". While to derive more definitive conclusions, those should be read together with the ones of similar studies. This point is especially important regarding our results on the European measures. Indeed, our findings lean towards their ineffectiveness. However, we are the first to look at those issues . Hence, other research should be undertaken with different empirical strategy, explanatory variables or databases to go further in this evaluation and have more conclusive results.

Second, our results are restrained by the data we have available, especially the ones from TED. Those concern only contracts above the European thresholds. As a consequence, our sample does not contain the small value contracts. This has to be taken into account when considering the analysis of chapter 2 where we should read: the variation in the delay of payment had no impact on SMEs' probability of winning big contracts. On one hand, we believe our results to be relevant since SMEs' difficulty of access is mainly relative to high value projects. On the other hand, to have a more complete analysis, it would be interesting to also look at the effect on the small ones. Besides, as regards our study on the determinants of GPP, the same cautious has to be taken: our results apply to big contracts. While, other analyses would be interesting to see whether our results stand or change when looking at small contracts.

Third, the scope of our analysis is limited by the outcomes studied. We have been looking at SMEs in general, while this category regroups firms that can have very different size. Besides, a firm can be considered small in one sector but large in another one. Hence, further analyses should taken those issues into account as to have a finer vision of firms' difficulties to access public procurement attached to their size. Additionally, our study lacks information on subcontracting. Indeed, one could argue that SMEs are already well represented in public procurement through their access to this subcontracting. However, to the best of our knowledge, it exists no analysis on this issue. This is mainly due to a lack of data. But, very recently, the French OEAP started to collect such information at the

contract level. Hence, further studies should look at those in order to have a global overview of SMEs' access to public procurement. This point could be particularly important to challenge the necessity at all of the European policy towards SMEs' access. Finally, our analysis on GPP is focusing on environmental selection and award criteria. Additional analyses would be needed to look at technical specifications and clauses related to contract performance as the related difficulties / determinants of implementation might be different.

A final important limit is attached to the institutional framework of our research. Especially, the data we use in chapter 2 are all related to one public buyer - Paris Habitat-OPH. This point has to be particularly kept in mind since Paris Habitat-OPH is characterized by a great level of competence and transparency. Hence, our results support the claim for an increase in discretion to similar public buyers. However, those cannot be generalized to public buyers not presenting the same level of competence and transparency. Indeed, in this case, discretion is linked to a high risk of deviant behaviors and thus inefficiency. The same limit has to be noticed at the national level for our two databases. Indeed, our studies are only dealing with French contracts. Thus, the possibility to generalize our results should be linked to this point. For instance, in chapter 2, besides the characteristics of our public buyer, the better outcomes found with discretion are also very likely dependent from the quality of French institutions. In this sense, our results cannot be directly applied to countries where for instance transparency or court efficiency are not guaranteed. In this case, more discretion could also lead to an increase in misbehaviors. A second representative example can be found in our results regarding the effect of the delay of payment in chapter 3. Those can be generalized to countries where the public buyer is a reliable contractor. While, in the other case, further analyses should be undertaken as the impact can be different, especially higher on SMEs' access.

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Abstract

Using Public Procurement for Policy Objectives: Opportunities and Pitfalls - *An Empirical Analysis*

For some time now, political bodies promote a use of public procurement driven by the pursuit of other objectives rather than merely cost-minimization. In particular, the European Commission seeks to reshape its regulatory framework towards this aim. This PhD dissertation empirically investigates the effectiveness of such a change (i.e. the attainment of the given objectives in practice). A special focus is made on the pursuit of Small and Medium Enterprises (SMEs)' growth by facilitating their access to the related contracts and environmental goals by allowing the use of Green Public Procurement (GPP). To this end, in chapter 1, we start by introducing our work through a literature review. We first analyze existing studies: these call into question the current effectiveness of this reform and investigate the potential to go further. Related insights notably show i) a large gap between the political aspirations and the practice, ii) related barriers / conditions for effectiveness. Second, we emphasize their limits and derive the needs for additional research. It especially regards the need for robust empirical analyses. Our three remaining chapters precisely aim at filling this gap. In each of them, based on two large French public procurement databases, we perform an econometrical analysis on this effectiveness issue. Chapters 2 and 3 are interested in the expected impact of two "perceived" barriers to participation on SMEs' access. In this respect, we find formalism and the delay of payment to effectively impact the presence of SMEs at the bidding stage. However, this result does not remain when looking at their probability of winning. Chapter 4 focuses on GPP implementation. We found it to be positively influenced by the European practical guidelines, a municipality's size and financial situation, mayor's characteristics and mimetic behaviors. Our results show a particularly strong impact of internal learning through our "past experience" variable. Besides, we believe our findings are also contributing to a more traditional research. First, the one on the determinants of firms' participation in auction by adding formalism and the delay of payment. Second, the one on the determinants of innovative practices within organizations by supporting the importance of internal learning. From a public policy point of view, in a first place, our results call into question the effectiveness of the European measures towards SMEs' growth. Indeed, we did not find the link on which they are based between barriers to participation and SMEs' access to the related contracts. In a second place, they call for the deployment of tools towards the acquisition of GPP knowledge by public buyers as a way to increase their implementation.

Keywords: Public Procurement, SME, Environment, Effectiveness, Policy Eval-

uation, Econometrics.

Résumé

Les Marchés Publics comme Instruments de Politiques Publiques: Opportunités et Obstacles - *Une Analyse Empirique*

Depuis un certain temps maintenant, les instances politiques poussent à une utilisation des marchés publics guidée par la poursuite d'autres objectifs que la seule minimisation des coûts. Dans cette optique, depuis une Directive de 2004, la Commission Européenne cherche à redessiner le cadre de régulation relatif à ces marchés. Cette thèse étudie empiriquement l'efficacité d'un tel changement au regard de l'atteinte en pratique des objectifs poursuivis. Nous portons une attention particulière à la poursuite de deux de ces objectives: la croissance des Petites et Moyennes Entreprises (PME) en leur facilitant l'accès à ces contrats et l'atteinte d'objectifs environnementaux en permettant l'utilisation de Marchés Publics Verts (MPV). Le chapitre 1 commence par introduire notre travail à travers une revue de littérature. Dans un premier temps, nous analysons les études existantes sur le sujet: celles-ci remettent en cause l'efficacité actuelle de ces réformes et en analysent l'efficacité potentielle. Leurs résultats montrent notamment: i) un décalage important entre les aspirations politiques et la pratique, ii) l'existence de barrières et conditions d'efficacité relatives. Dans un second temps, nous mettons en avant les limites de ces études pour en dériver les besoins en termes de recherche additionnelle. Ces besoins sont liés tout particulièrement au manque de résultats empiriques suffisamment robustes. Nos trois chapitres restant ont précisément pour objectif de combler ce manque. A l'aide de deux larges bases de données sur les marchés publics français, dans chacun d'entre eux, nous menons une analyse économétrique relative à cette efficacité. Les chapitres 2 et 3 portent sur l'impact attendu de deux barrières à la participation "perçues" sur l'accès des PME aux marchés publics. Nos résultats montrent ainsi que le formalisme de procédure et les délais de paiement ont effectivement un impact sur la présence des PME au stade compétitif. Cependant, ce résultat ne se retrouve pas quand on s'intéresse à leur probabilité de gagner. Le chapitre 4 porte sur les MPV. Nous trouvons que leur utilisation est positivement influencée par: les recommandations pratiques de la Commission Européenne, la taille et situation financière des municipalités, les caractéristiques du maire et les comportements mimétiques. Nos résultats soulignent l'influence particulièrement forte de l'apprentissage en interne à travers notre variable "expérience passée". Au delà de cette récente littérature, nous pensons que nos résultats contribuent également à une recherche plus traditionnelle. Tout d'abord, celle qui porte sur les déterminants de la participation des entreprises aux marché publics en y ajoutant le formalisme de procédure et les délais de paiement. Ensuite, à celle s'intéressant aux déterminants des pratiques innovantes dans les

organisations en soulignant l'important de l'apprentissage en interne. Concernant nos implications en termes de politiques publiques, dans un premier temps, nos résultats remettent en question l'efficacité des mesures Européennes en faveur de la croissance PME. En effet, nous n'avons pas retrouvé le lien sur lequel celles-ci sont pensées entre barrières à la participation et accès des PME aux contrats relatifs. Dans un second temps, ils encouragent les pratiques visant à développer les connaissances des acheteur publics sur les MPV afin d'en accroître l'utilisation.

Mots clés: Marchés Publics, PME, Environnement, Efficacité, Evaluation de Politiques, Econométrie.