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école doctorale "Sciences de la Décision et de l'Organisation" - ED 533
équipe de recherche GREGOR - EA 2474

Discretion and Manipulation in Public Procurement:
Evidence from France

Thèse

présentée et soutenue publiquement le 9 décembre 2013

en vue de l'obtention du

Doctorat en Sciences de Gestion

par

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Acknowledgements

During my time as a Ph.D student, the number of people I wanted to thank and the number of things for which I was thankful kept increasing. This section may be long but it is still incomplete.

First and foremost, I would like to thank Professor Stéphane Saussier, my Ph.D. advisor. Stéphane literally gave me the opportunity to pursue a Ph.D.. The quality of the working conditions he offered me were astounding. Before and during my time as a Ph.D. student, I've often heard stories from my peers about the lack of follow-up from their own advisors. I cannot remember having to wait more that 10-15 minutes for Stéphane to reply to an important e-mail and even this was mainly due to iPhone limitations. Appointments, when needed, were almost always scheduled the same week. His advice, tips and corrections throughout these three years were priceless. In addition, his continuous support (even when I messed up) was decisive in the completion of this dissertation. For all he has done for me during these three years (and that is a lot), I am tremendously indebted to him.

I would also like to thank my Masters thesis advisors, Anne Yvrande-Billon and Eshien Chong for their support, before and during these three years. In particular, I suspect that they played an integral part in the decision to offer me the opportunity of pursuing my Ph.D. and I am very thankful to them for that. In spite of a very tight schedule, Anne always took time to attend my presentations at the Chaire EPPP. Her feedback and both formal and in-

formal discussions on my work and on related topics were very important for this dissertation. I am delighted that Anne agreed to be part of my dissertation committee. Throughout these three years, Eshien was my go-to guy for questions I needed an immediate response to (mostly econometrics, Stata or LaTeX related). He always took time to discuss my problems at length. Eshien's kindness is legendary and I consider myself very lucky to have had the opportunity of getting to know him better as a co-author and while attending conferences together.

It is easier to go through the different steps of a Ph.D. along with another student with whom you can share and discuss this experience. For me, that person was Lisa Chever. I was lucky to have the opportunity of co-authoring a paper with her at the beginning of my Ph.D. and I learned a lot from this experience. Since then, Lisa and I have come to know each other through lengthy discussions, especially while attending conferences together. Now, not only do I consider her as a very talented colleague, I am also glad to call her a friend.

This Ph.D. would not be the same without my co-authors Anissa Boulemia, Lisa Chever, Eshien Chong and Michael Klien. Co-authoring papers is an amazing experience as it gives you the opportunity to discuss with and learn from others. I believe that I improved a lot from working with each of them. Since his arrival at the Chaire, I have hugely benefitted from discussions with Michael. Like Eshien and Lisa, Michael always happily took time to discuss any of my numerous questions and problems and provided me with top notch answers. Working with Anissa taught me a lot about organising and discussing ideas inside a paper. Debates and discussions with her were always very challenging and stimulating.

As most Ph.D. students, the writing of this dissertation was punctuated by moments of doubt. During these moments, I am particularly grateful to

Aude Le Lannier for her reassuring words and her general positive attitude. I cannot overstate her importance during my time as a Ph.D. student. Tra Phuong Tran's awesome cooking and karaoke nights also helped a lot. As did any football related discussion with Jean Beuve. I am also very grateful to Paula Berdugo for her work and her patience. Among the great working conditions provided to me by Professor Stéphane Saussier is the joyous, yet hard working, atmosphere he has created at the IAE. For this, I am of course very thankful to my colleagues at the Chaire EPPP : Miguel Amaral, Laure Athias, Paula Berdugo, Jean Beuve, Anissa Boulemia, Julie de Brux, Lisa Chever, Eshien Chong, Claudine Desrieux, Guillaume Fonouni-Farde, Freddy Huet, Michael Klien, Aude Le Lannier, Zoé Le Squeren, Simon Porcher, Maria Salvetti, Carine Staropoli, Jean-Christophe Thiebaud, Phuong Tra Tran, Heidi Wechtler and Anne Yvrande-Billon.

I would like to express my gratitude to Eric Brousseau, Marian Moszoro, Anne Yvrande-Billon, Bertrand Quélin and Stéphane Saussier for accepting to be part of my Ph.D. dissertation committee. It is truly an honour for me to have such distinguished scholars in my jury.

During my time at the Chaire EPPP, I was lucky to meet some great researchers who kindly took time out of their busy schedules to listen and comment on my work. For this, I am hugely in debt to Decio Coviello, John de Figueiredo, Ricard Gil, Brian Silverman and Steven Tadelis. In addition, Stéphane Straub's gracious email with comments on the fourth chapter of this dissertation was extremely helpful. I also learned a lot from my participation in ESNIE related events. I am grateful to the whole ESNIE team and, in particular, to Maria Breidy and Eric Brousseau. I also would like to thank every scholar who discussed or commented on my presentations at any conference I attended.

During a Ph.D., friends have the arduous task of having to cheer you up

when things are going badly and to listen to boring discussions on your topic when things are going well. For this, I am thankful to them and, in particular, to Pierre Besnard, Sylvain Casenave, Carole Chapin, Charlotte Decoin, Julien Decoin, Charlotte Desseix, Julie Ferrand, Jessica Ferré, Etienne Giraudeau, Antoine Pasquier, Vincent Puech and Capucine Steurer.

I would like to thank my family for their continuous encouragements during these last three years. Visits to my sisters and their families were always lively and happy times and felt like breaths of fresh air. I am very grateful for the moments we shared and I thank Samantha, Anna, Mika, Jeremy, Mateo, Eléa, Agata, Léo, Tom, Hugo and Malo (whom I have yet to meet). My parents' unconditional love and support throughout my time as a student were ever so important. They also did a remarkable job of reading through this entire dissertation to correct my English. I am very grateful to them both for this and for so much more. Last but not least, I would like to thank Cindy for her love, for her support, for her understanding and for inspiring me in so many ways.

J.

Foreword

This Ph.D. dissertation, entitled "*Discretion and Manipulation in Public Procurement: Evidence from France*", consists of four chapters in the fields of Public Management and Industrial Organization. The General Introduction describes the different research questions addressed in these chapters, as well as the links that can be established between them. The Summary of Findings and Contributions summarizes the results and their implications for public policies and future work. Nevertheless, each chapter can be read separately. This implies the presence of redundant information across chapters, notably concerning the related literature and the industry studied. The reader should also bear in mind that although the datasets from Chapters 3 and 4 come from the same source, they widely differ in the amount of information available.

Abstract

Discretion and Manipulation in Public Procurement:
Evidence from France

This dissertation empirically investigates the link between public buyers' discretionary power and manipulation of public procurement. The popular belief in the inefficiency of the public sector has attracted the attention of scholars of both Management and Economics. Literature from both the New Public Management (NPM) and Transaction Cost Economics (TCE) fields has pointed out that these inefficiencies, particularly in public procurement, may be the result of the overwhelming regulation of the public sector. Public buyers are believed to be unable to seek efficiency as they are constrained by or focused on rules. Among the solutions proposed was the convergence towards private sector practices with reliance on the independence and the discretion of public buyers focused on achieving clear and transparent goals. Yet, in this quest for efficiency, the potential adverse effects of such solutions on public procurement manipulation (e.g. collusion, corruption, favouritism, political influence) have been partially overlooked. The relative absence of work focusing on these adverse effects is particularly worrisome considering that among the main goals of procurement regulation was the prevention of favouritism and

corrupt practices. This Ph.D. dissertation aims at filling this gap by studying the impact of NPM influenced procurement reforms on the extent of procurement manipulation. In a first part, we study two types of manipulations that occur in public procurement and, in a second part, we analyse two awarding procedures that allow more discretionary power to public buyers and discuss how they can reduce manipulation while, if anything, improving efficiency of the purchases.

Chapter 1 focuses on the influence of politicians on public procurement. In particular, our goal is to assess whether politicians running for elections procure goods and services differently. To do so, we use a complete dataset on public work procurement contracts awarded by French municipalities between 2005 and 2007. We show that, to enhance their electoral perspectives for the 2007 *legislative* elections, candidate mayors influenced the timing of project completion by increasing the proportion of contracts ending before the election compared to municipalities whose mayor did not run. Chapter 2 analyses the impact of the participation of outside firms on cartels in public procurement. We aim at assessing whether the number of outside firms bidding for contracts in which a cartel is active has an impact on cartel bids and their probability to win the contracts. In order to do so, we have constructed an original dataset using public information taken from the decisions of the French Competition Authority from 1991 to 2010. We show that the number of outside firms is a significant determinant of the low bid of the cartel but does not significantly impact the cartels' probabilities of being awarded contracts.

In Chapter 3, we study the use of adapted procedures, awarding procedures that give the public buyer some discretion to adapt the procedure to his needs. Using such procedures, public buyers have, for instance, more freedom to adapt the publicity and the delays of the procedure to the work to be done as well as more freedom regarding pre-qualification requirements. This decrease in procedural rules aims at fluidifying the procurement process as well as increasing

the access to public procurement by SMEs. Using a complete dataset on the 472 contracts awarded by Paris Habitat-OPH, the largest social housing constructor in Europe, between 2004 and 2011, we find positive results on these two aims. Moreover, we show that these positive results do not come at a higher price for the public body. Thus, the increase in discretionary power is not suspected to lead to more corrupt practices. Implications on the fight against collusion are also discussed. Chapter 4 analyses the growing possibility, for public buyers, to complete the call for tenders with a multilateral negotiation phase. Using an original and comprehensive database from Paris Habitat-OPH, we empirically assess the use of such procedures on price. We find that these procedures significantly decrease the amounts of the received bids by close to 26% and reduce the probability of renegotiating the contract. If anything, similar decreases in price are found when analysing the total cost of the contract (i.e. the winning bid plus the amount renegotiated). We find that this increase in discretion helped decrease collusive practices and did not lead to higher levels of corruption.

Keywords: Public Procurement, Discretion, Negotiations, Auctions, Procedural Rules, Awarding Procedures, Political Influence, Collusion, Corruption, Public Management, Industrial Organization.

Résumé

Discrétion et Manipulations dans les Marchés Publics :
Étude du Cas Français

Cette thèse étudie empiriquement les liens entre la discrétion des acheteurs publics et la manipulation des marchés publics. La croyance populaire dans l'inefficacité du secteur public a attiré l'attention des gestionnaires et des économistes. Les travaux de la Nouvelle Gestion Publique (NGP) et de l'économie des coûts de transaction ont montré que ces inefficacités, particulièrement dans les marchés publics, pouvaient être dues à la règlementation stricte en vigueur dans le secteur public. En recherchant l'efficacité, les acheteurs publics seraient focalisés et/ou contraints par l'accumulation de règles. Parmi les solutions proposées se trouve la convergence vers les pratiques du secteur privé, avec des acheteurs publics indépendants et jouissant d'une marge discrétionnaire importante, en vue d'atteindre des objectifs clairs et transparents. Ces solutions semblent être préconisées à la fois par les gestionnaires et les économistes. Cependant, les effets adverses potentiels de ces solutions sur les manipulations des marchés publics (notamment la collusion, la corruption, le favoritisme et l'influence du politique) ont été partiellement négligés. L'absence relative de travaux se concentrant sur ces effets adverses est inquiétante étant

donné que la réglementation des marchés publics a pour but de limiter les pratiques de favoritisme et de corruption. Cette thèse a pour objectif de combler cette absence de travaux en étudiant l'impact de réformes inspirées par la NGP sur le niveau de manipulation dans les marchés publics. Dans une première partie, nous étudions deux types de manipulations dans les marchés publics (l'influence du politique et la collusion) et, dans une seconde partie, nous analysons l'impact de deux procédures d'attribution donnant plus de pouvoir discrétionnaire aux acheteurs publics sur l'étendue des manipulations.

Dans le premier chapitre, nous étudions l'influence du politique sur les marchés publics. Plus précisément, notre but est de déterminer si le fait d'être candidats à une élection future influence les décideurs publics dans leurs pratiques d'achats de biens et services. Pour cela, nous utilisons une base de données complète recensant l'ensemble des marchés publics de construction attribués par des municipalités françaises entre 2005 et 2007. Nous montrons que, pour augmenter leurs perspectives électorales en vue des élections législatives de 2007, les maires candidats à ces élections influencent l'attribution des contrats. La proportion de projets se terminant avant l'élection est en effet significativement plus élevée chez ces derniers, comparativement aux maires non candidats. Le deuxième chapitre analyse l'impact de la participation de firmes externes sur les ententes dans les marchés publics. Notre but est de déterminer si le nombre de firmes externes participant à l'appel d'offres a un impact sur le montant des offres des ententes ainsi que sur leur probabilité de remporter des contrats. A cette fin, nous avons construit une base de données originale en utilisant les informations publiques disponibles dans les décisions de l'Autorité de la Concurrence entre 1991 et 2010. Nous montrons que le nombre de firmes externes a un impact significatif sur l'offre la plus basse de l'entente mais n'impacte pas la probabilité que des contrats lui soit attribuée.

Dans le troisième chapitre, nous étudions l'utilisation des procédures adaptées qui augmente la discrétion de l'acheteur public en lui permettant d'adapter

la procédure à ses besoins. En utilisant ces procédures, les acheteurs publics ont, par exemple, plus de liberté pour adapter la publicité, les délais de la procédure ainsi que les conditions de qualification des firmes au contrat. Cette baisse du nombre de règles des procédures a pour but de fluidifier l'attribution de contrats ainsi que d'augmenter l'accès des PME aux marchés publics. En utilisant une base de données complète sur les 472 contrats attribués par Paris Habitat-OPH entre 2004 et 2011, nous trouvons des effets positifs sur les deux buts fixés. De plus, nous montrons que malgré ces résultats positifs, les coûts n'ont pas augmenté pour la partie publique. De ce fait, l'augmentation de la discrétion de l'acheteur n'est pas suspectée d'avoir augmenter le recours à la corruption. Nous concluons en discutant des implications de nos résultats dans la lutte contre les ententes. Le quatrième chapitre analyse la possibilité, pour les acheteurs publics, de compléter l'adjudication par une phase de négociations multilatérales. En utilisant une base de données originale et complète de Paris Habitat-OPH, nous étudions l'impact de l'utilisation de ces procédures sur les prix. Nous trouvons que ces procédures permettent de réduire significativement le montant de l'ensemble des offres reçues d'environ 26% et de diminuer la probabilité de renégocier les contrats. De telles diminutions de prix sont parfois également trouvées en analysant les coûts totaux des contrats (le montant de l'offre gagnante plus le montant des renégociations). Nous montrons que cette augmentation de la discrétion des acheteurs a limité la collusion et n'a pas mené à une augmentation du recours à la corruption.

Mots Clés : Marchés Publics, Discrétion, Négociations, Enchères, Règles des Procédures, Procédures d'attribution, Influence Politique, Collusion, Corruption, Management Public, Organisation Industrielle.

Contents

General Introduction

Discretion and Manipulation in Public Procurement

Public procurement constitutes a large part of the state's provision of goods and services. It accounts for more than 13% of OECD countries' annual GDP (OECD [2013]). These goods and services are of prime importance as they directly or indirectly participate in the provision of public goods and services consumed by individuals. Thus, the price paid and the quality obtained through procurement are crucial in maximizing overall welfare. To compensate for the lack of initial competition in the market and to ensure the efficiency of this provision, tendering processes are often used. These tendering processes are meant to create competition between potential suppliers so as to guarantee the best prices along with similar (or higher) quality.

Yet, given the importance of public procurement in terms of the amounts involved, the different actors involved in the process may be tempted to divert it from its initial aim so as to obtain personal benefits. Politicians and bureaucrats, the principal actors responsible for the attribution of public contracts may, for instance, manipulate the procurement process to gain financial benefits (i.e. corruption, see e.g. Lengwiler and Wolfstetter [2006], Iossa and

Martimort [2011]) or to satisfy electoral perspectives (i.e. favouritism, see e.g. McAfee and McMillan [1989], Laffont and Tirole [1991], and/or political influence, see e.g. Mougeot and Naegelen [2005], Soreide [2006]). Firms may also try to benefit from the procurement process by, for example, bribing the public servant (i.e. corruption) or by forming a coalition aiming at increasing procurement costs or lowering delivered quality through a reduction in competition (i.e. collusion, see e.g. McAfee and MacMillan [1992], Marshall and Marx [2007]).

In spite of the fact that manipulations can take many forms in public procurement (i.e. they involve different actors and occur at diverse stages of the procurement process), all of the above mentioned practices share the common feature of leading to distorted outcomes in terms of price and/or quality, but also in terms of allocation. These practices might be particularly worrisome considering (i) the amounts involved in public procurement (ii) that quality is an important feature of public procurement, as public procurement is often used to acquire medical supplies, roads and bridges, defence supplies, etc. (iii) that these practices generate unfair treatment among potential suppliers, contrary to the example-setting role and ethics expected by governments (Kelman [2000]).

Precisely quantifying the total losses that manipulations impose on public procurement would be an impossible task given the limited data available on procurement, the indirect effects that may stem from these practices as well as the secretive natures of these manipulations. Moreover, while some issues such as collusion, favouritism and corruption in public procurement have received a fair amount of attention both from the public and from academics (see Marshall and Marx [2012], Arozamena and Weinschelbaum [2011] or Lengwiler and Wolfstetter [2006] for the most comprehensive and up-to-date surveys of literature on, respectively, collusion, favouritism and corruption), the study of other practices such as the influence of politics on procurement is still an

up-and-coming one (see Coviello and Gagliarducci [2013]). In the following paragraph, we provide anecdotal evidence of the importance and persistence of these practices and report some estimates assessing their effects on procurement efficiency.

Without quoting a precise figure, in a 2006 brief for the OECD, the French president of the "*Service Central de Prévention de la Corruption*" (SCPC, hereinafter), France's official watchdog on issues related to corruption and favouritism, noted that public procurement was a prime area for frauds and corruption.[1]. Concerning collusion, during the last 20 years, the French Competition Authority has fined over 750 different firms for rigging bids in public procurement. These firms operated in a wide range of sectors including public-works, public and sanitary transportation, hospital supplies, etc. Between 2006 and 2011, half of the cases of collusion giving rise to a financial sanction concerned collusive practices in public procurement. Though estimates of the damages differ from case to case, the meta-analysis carried out by Connor and Lande [2006] showed the median cartel overcharge in public procurement to be close to 21%. As for corruption, in 2004, the World Bank estimated that kickbacks might represent approximatively 3.5% of the total amount of public procurement around the world, i.e. an estimated 200 billion dollars a year.[2] Such estimations of damages for favouritism are not available but the SPCP counted between 26 and 38 sanctioned infractions a year between 2007 and 2010 in France (SCPC [2011]).

A traditional answer to part these problems has come from regulation of the procurement process. More specifically from imposing strict procedural rules on public buyers in order to prevent them from resorting to favouritism or corruption. Indeed, the procurement process can be seen as a traditional

[1]Source: J.-P Bueb "La lutte contre la fraude et la corruption dans les marchés publics" in Room Document of the 2006 OECD Global Forum on Governance.

[2]Source: Daniel Kaufmann: "Six Questions on the Cost of Corruption" available on the website of the World Bank and E. Auriol "Silence sur la corruption" in l'*Expansion* n°717 from March 2007.

principal-agent problem (Berle and Means [1932], Jensen and Meckling [1976]) in which a principal (the government) delegates decision-making authority to an agent (a procurement officer, traditionally referred to as a bureaucrat[3]) to procure goods and services on his behalf. Because the agency and the principal have divergent interests and because monitoring the bureaucrat's performance is costly for the principal, there is a possibility that the agency's interests will override those of the principal. McCubbins et al. [1987] argue that strict regulation through rigid procedural rules achieve the principal's aim of aligning the agency's interests on his because any deviation will be judicially punished. Thus, according to these authors, the discretion of public buyers should be kept to a minimum to avoid them from turning to abnormal behaviour such as corruption and favouritism.

Starting from the early 90's, the rule-based approach to the regulation of public procurement, in force at the time, was widely criticised by both the New Public Management (NPM, hereinafter) and the Transaction Costs Economics (TCE, hereinafter) scholars.[4] The NPM literature points out the failures of the public sector, in particular concerning its organisation and the procedures used and discusses ways of achieving more effective and competitive public service delivery. Central to the NPM literature is the analysis of overwhelming bureaucratic regulation (Hood and Scott [1996]). These regulations are viewed as clear limitations to achieving efficiency as bureaucrats are more focused on rules than on outcomes (see Kelman [1990, 2005] for the case of public procurement). Instead, the NPM literature defends a set of *doctrines* in order to achieve more efficient outcomes. Among them, the ideas that bureaucrats should be independent and empowered to reach clear and transparent goals

[3]Though, as noted above, these can be bureaucrats or politicians.

[4]For the sake of simplicity, we treat NPM and TCE as distinct theories. Yet, this distinction is not as clear as this brief presentation argues. The two following arguments show how in practice, both theories are actually quite linked. First, as argued by Barzelay [2001], because NPM draws heavily on New Institutional Economics and TCE in particular. Second, because TCE scholars also exploit arguments stemming from the management literature and, in particular, from the work of Kelman (see e.g. Greenstein [1993], Tadelis [2012] and Spagnolo [2012]).

using increased discretionary power (Hood and Jackson [1991]). In addition, control over bureaucrats should be observed using "measurements of outputs rather than control of means via legal and administrative procedures" (Pires [2011]).

The TCE approach to regulation, on the other hand, calls for opening the "black box" of regulation (Spiller [2013]). That is, as opposed to the one-rule-fits-all approach advocated by incentive theory, regulation should consider both the sectors and the institutional environments in which the transactions take place (Spiller and Tommasi [2005]). In the case of procurement, as argued by Greenstein [1993], "procedural rules cannot be fine-tuned for all possible situations". In particular, in complex environments, procedural rules force procurement officers to make suboptimal decisions as these rules do not make use of the information at the disposal of the agency. This TCE way of considering procurement regulation was later theorised by Bajari and Tadelis [2001]. Their approach blended both incentive theory and TCE with strong emphasis on adaptation costs, i.e. *ex post* costs incurred by the public body as a result of the *ex ante* contractual incompleteness. Their analysis concludes that, in order to minimise adaptation costs, public buyers should adapt their choice of procedure to the complexity of the environment (Tadelis [2012]). In particular, they advocate the use of auctions for simple transactions as these latter provide the best incentives for firms to be efficient and adaptation costs might be low due to higher contractual completeness. On the other hand, complex transactions where adaptation costs might be higher due to increased contractual incompleteness should be procured via negotiations that allow public buyers to discuss the details of the projects *ex ante* with the firm and thus prevent difficulties that may arise in the execution stage.

Subsequent works have further shown the inconsistency of regulation by strict procedural rules which should instead be tailored to the environment. We here give two commonly cited examples of rules that may have positive im-

pacts in some situations and detrimental outcomes in others while focusing on public procurement manipulation. A first classical example of which is the regulation of joint-bidding, i.e. the possibility, for several competitors, to submit a joint bid for a contract. Joint-bidding may be positive in some environments as it increases competition through the participation of firms that would not have been able to submit a bid on their own (see for instance the results from Hendricks and Porter [1992] for oil and gas offshore leases). Yet, joint-bidding may also have an adverse effect on competition if used to artificially reduce the number of participants (see the discussion by Iimi [2004]). These practices might thus dissimulate a collusive scheme (see, in that sense, discussions in Albano et al. [2009] and Autorité de la Concurrence [2004]). Restricted tenders' effects on competition are also discussed within the economic literature. Restricted auctions allow the public buyer some discretion in the selection of the firms admitted to participate in the tender. In the infamous case, commonly referred to as the "*Affaire des Lycées d'Ile de France*" which combined collusion and corruption (see Lambert-Mogiliansky and Sonin [2006] for additional details), restricted auctions were used by the public buyer (in exchange for kickbacks) to select only the members participating in the collusive scheme in order to facilitate market sharing by eliminating outside competition with the cartel (see Autorité de la Concurrence [2007]). Yet, some recent studies underline the positive effects of restricted auctions to induce adequate execution when non-contractible dimensions such as quality are important (Calzolari and Spagnolo [2009], Coviello et al. [2011]) as well as to limit transaction costs incurred by public buyers in the selection stage when tendering small contracts (Chever et al. [2011]). Thus, these studies have also underlined the limits of the one-rule-fits-all approach to regulation.

It is interesting to note that procurement regulations in the United-States and the European Union have changed in reaction to these results (most notably those of the NPM) since the beginning of the 90's. In the US, the procurement reforms, initiated in 1993 and part of the "reinventing govern-

ment" effort and lead by then vice-president Al Gore during the Clinton administration, largely drew on the NPM literature and both Gore [1993] and Kelman [1990].[5] In a survey conducted prior to the reform, MacManus [1991] found that the principal obstacles discouraging firms from entering public procurement were slow payment, the imprecise bid specifications, the difficulty of contracting and the paperwork involved. Among the discontentment issues that existed inside the procurement bureaucracy, Kelman [2005] identifies "the desire for autonomy" as well as "the job burdens and stress caused by bureaucracy". The reform in itself introduced, among other things, the possibility for firms to consult public buyers prior to their bid elaboration, the possibility of using credit cards for "micro purchases" as well as the increased possibility to take firms' past performance into account (see the discussion by Kelman in Swedish Competition Authority [2012]). Five years after its introduction, an assessment of the "reinventing government" effort by Kettl [1998] gave the procurement reform an "A" and noted that the induced "changes helped make the lives of government managers easier and made the federal government a better partner to its private contractors". In a 2008 assessment of US public procurement reforms since 1993, Potoski [2008] also showed a decrease in the regulatory burden on procurement officers compared to prior the procurement reform.

Procurement laws in the EU have historically relied on strict rules and regulation (Morton [2012]). In 1996 the European Commission issued a Green Paper on the modernization of public procurement regulations (European Commission [1996]). Responses by practitioners to this Green Paper, analysed in a 1998 communication of the EC, pleaded for simplification and flexibility of the procurement process (European Commission [1998]). The 2004/18/EC Directive that followed did allow the public buyer increased discretion (notably through the introduction of the Competitive Dialogue procedure or the

[5] As a matter of fact, after the publication of his 1990 book, Steve Kelman was appointed "administrator of the Office of Federal Procurement Policy" and served as such between 1993 and 1997 (Kelman [2005]). He thus led the reforms on public procurement in the U.S.

facilitation of electronic auctions), yet Arrowsmith et al. [2010] have argued that "rules remained complex". In response to the subsequent Green Paper of 2010, practitioners again pushed for increased flexibility and lower complexity by asking for the generalisation of negotiated procedures, the raise of thresholds and the ability to take past experiences of firms into account (European Commission [2011]). The future Directive, approved in September 2013, is unlikely to considerably change European public procurement regulation. Indeed, while Arrowsmith [2012] notes that the new Directive is likely to increase discretion (e.g. by allowing broader use of negotiated procedures), it will also imply "more rigidity and burdensome requirements". The author argues that the new rules will lead to more complexity (instead of simplification) and that the resulting regime is likely to resemble a "Frankenstein's Monster".

Hence, although EU procurement regulation has seemingly failed to reduce the administrative burden and complexity of its rules, both the US and the EU have, to different extents, raised the discretionary power of public buyers. It follows that the analysis of how discretion affects procurement practices and outcomes should be a priority considering the important place occupied by public procurement in both the US and the EU. Indeed, results from such work could have prime consequences on the shaping or reshaping of procurement regulation. Yet, as argued by Potoski [2008], there is a lack of empirical studies focusing on analysing how discretion impacts procurement outcomes and, in particular, efficiency. To the extent of our knowledge, only a few recent studies have sought to do so by assessing, for instance, the impact of the possibility of choosing between several procedures (Coviello et al. [2013]) or that of using restricted auctions (Coviello et al. [2011], Chever et al. [2011]) on prices paid by the public buyer. Apart from prices, an outcome of prime importance in public procurement is the extent to which the process is manipulated. Arguably, the fear of manipulation of the process by the different actors involved explains much of the high degree to which public procurement was (and sometimes continues to be) regulated. Yet, in an influential

study on the subject, Bandiera et al. [2009] found no significant impact of the discretionary power of the public buyer on the level of corruption in public procurement. Hence, it also appears urgent to have a better understanding of the link between discretion and manipulation in public procurement.

This dissertation precisely intends to fill these gaps by empirically analysing recent increases in the discretion of French public buyers and how they have affected outcomes with special emphasis on manipulation. Our main goal is to assess whether discretion can actually be used to mitigate procurement manipulation. To do this, this dissertation regroups four chapters divided in two parts. A first part of this dissertation analyses two types of manipulation that affect public procurement (namely, political influence and collusion) and discusses ways through which these manipulations can be fought. In a second part, we show how public buyers' discretionary power (namely, through his freedom to adapt the procedure to his needs, his possibility of using negotiated procedures and his independence) can reduce manipulations in public procurement, focusing on political influence and collusion but also on corruption.

The rest of this dissertation is organised in the following way. Next, we provide a concise summary of each chapter. The first part of this dissertation consists of our two chapters analysing manipulation in public procurement. In a second part, two additional chapters assessing the benefits of increased discretionary power on manipulation and efficiency in procurement are presented. A final section concludes with policy recommendations.

Summary of Chapters

Part 1. Manipulations in Public Procurement

Chapter 1: Do politicians procure their way to congress?

Since the pioneering studies of Kramer [1971] and Tufte [1975], it has been argued that the formulation of economic policy may be subject to politicians' electoral considerations. In particular, politicians may be tempted to adopt policies that can artificially lead to good economic conditions to please electors and thus to enhance their election or reelection perspective. The political budget cycle literature investigates cycles related to fiscal instruments that are induced by electoral cycles (Rogoff [1990]) and has been associated with mixed results at the empirical level (Drazen [2001]). Interestingly, recent empirical studies have detected the presence of such cycles in developing countries while no such cycles have been detected in developed countries (Shi and Svensson [2006]). In this paper, we seek to detect the presence of a political budget cycle in a developed country using data on public procurement in French municipalities.

Do politicians running for elections procure goods and services differently? Is public procurement used by politicians to enhance their election perspectives? If so, how? To study these questions, we use data on public work procurement in 2000 French municipalities between 2005 and 2007. Using a difference-in-difference approach, we compare public work procurement of municipalities whose mayor was a candidate in the 2007 legislative elections with those of municipalities whose mayor did not run in these elections. We find that the proportion of public work contracts ending just before the election is larger in municipalities whose mayor ran for legislative elections. In contrast, we find no evidence that the share of public work contracts ending in the post-election year is different between municipalities with a mayor partic-

ipating in the 2007 legislative election and those without. We interpret these observations as indications that electoral considerations influence the conduct of public procurement, at least in France. In particular, our results suggest that mayors running for legislative elections in France attempted to enhance their election perspective by influencing the timing of project completion in their conduct of public work procurement.

Chapter 2: Cartels Facing Competition in Public Procurement

Bidder collusion is a pervasive problem in public procurement (Pesendorfer [2000]). Yet, how do cartels deal with competition from outside firms in public procurement? Indeed, while it is easy for cartels to identify competitors in classical markets, the same cannot be said for public procurement as potential competitors may choose to compete or not for each contract. Understanding how cartels react to the participation of outside bidders is a challenging question with potentially crucial implications for public policy, as outside competition may limit cartel profits. Yet, this question has been partially overlooked in the empirical literature due to the lack of reliable data and to theoretical assumptions from the auction theory literature which postulate that (i) cartel firms are more efficient than outside firms (ii) cartels are able to anticipate the number of outside firms bidding for any contract. In this paper, our goal is to empirically investigate these assumptions.

In order to do this, we use public information on convicted bid-rigging schemes taken from the decisions of the French Competition Authority. The dataset we have constructed consists of information on 33 different cartels operating in 114 public work tenders. Our goal is to investigate the impact of outside bidders on cartels by testing a proposition derived from the previously mentioned auction theory literature assumptions. We confirm this proposition by showing that the number of outside firms is a significant determinant of

the low cartel bid but does not significantly impact the cartels' probabilities of being awarded contracts. Our results provide additional evidence of the existence of cost asymmetries between cartels and outside firms and provide further support for the auction theory literature.

Part 2. The Impact of Discretion on Outcomes

Chapter 3: Procedural Rules, Access of SMEs and Efficiency

For the last 20 years, a series of public procurement reforms inspired by the NPM literature has sought to enhance the efficiency of purchases by increasing public buyers' discretionary power. Yet it has been argued that there is a lack of empirical results concerning the impact of such reforms on outcomes, including efficiency (Potoski [2008]). In this paper, we attempt to fill this gap by studying the use of French "adapted procedures", a tendering procedure that increases public buyers' discretion by allowing them to adapt most dimensions of the procedure to their needs. Public buyers have, for instance, more freedom to adapt the publicity and the delays of the procedure to the work to be done as well as more freedom regarding pre-qualification requirements. Broader use of these procedures has been allowed since the beginning of the financial crisis to fluidify the procurement process and to make it more accessible to small businesses.

Our goal is to empirically assess the impact of such procedures on these aims as well as on efficiency. 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. These contracts were tendered between January 2004 and July 2011. We assess the choice of using adapted procedures on the length of the procedure (a proxy for the fluidity of the procurement process), the proportion of small businesses en-

tering (i.e. sending a candidature), their probability of submitting satisfactory candidatures (i.e. being admitted to bid) as well as their probability of winning contracts. We also look at the impact of these procedures on the amount of the winning bid. We find some evidence that these procedures enable a significant reduction in the length of the tendering process (a proxy for the fluidification). We also show that they allow broader admissions of SMEs to the bidding stage. Finally, we find that these positive results do not come at a price for the public body as the winning bid is found to decrease although the associated coefficient is not significant. A corollary to the latter result is that this increase in the discretion of public buyers did not lead to more corrupt practices.

Chapter 4: Discretion and Efficiency in Public Procurement

With public procurement accounting for a large share of developed countries' GDP (European Commission [2008]), improving public procurement efficiency should be high on the legislators' agenda. According to new public management scholars, higher efficiency could be achieved by increasing the discretionary power of public buyers. In this respect, the new European legislative proposals on public procurement suggest allowing more discretionary power to public buyers by widening their possibility to complete the call for tenders with a negotiation phase. On one hand, these negotiated procedures are thought to enable public buyers to receive offers better matched to their needs while lowering collusive practices (European Commission [2011]). While on the other hand, they are also suspected of potentially increasing the risk of favouritism and corruption and are believed to lead to lower rebates than open or restricted procedures.

Such procedures have been available in France for work contracts up to 5 million euros since 2004. Yet, their impact on public procurement efficiency

is still to be empirically assessed. This chapter proposes to fill this gap. In order to do so, we have constructed an original and comprehensive database from Paris Habitat-OPH, the largest social housing constructor in Europe. We have gathered information on the 427 public-work contracts tendered between January 2004 and December 2009. After satisfactorily dealing with the endogeneity issue associated with the use of negotiated procedures, we find that such procedures significantly decrease the amounts of the received bids by close to 26% and reduce the probability of renegotiating the contract. If anything, similar decreases in price are found when analysing the total cost of the contract (i.e. the winning bid plus the amounts renegotiated). Our results clearly show that this increase in the discretion of public buyers did not induce higher corruption levels. Moreover, we find some statistical evidence that negotiations enable collusive practices to be decreased.

Table Outline

In Tables 1 and 2, 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 Part I: Research Questions, Methodology and Main Results**

Research Questions	Methods and Data	Main Results
• **Chapter 1**: Do politicians procure their way to congress? • **Research Questions**: Do politicians running for elections procure goods and services differently? Is public procurement used by politicians to enhance their election perspectives?	• Econometrics: OLS with FE (Panel) and LPM with FE (Cross Section). • Differences-in-differences. • Complete dataset on public work procurement contracts awarded by French municipalities between 2005 and 2007.	• We find a political budget cycle in a developed country using micro data. • Mayors running for congress manipulate public procurement to enhance their election perspectives. • Candidate mayors increase the proportion of projects completed before the election date. • This political cycle is found to start at least 2 years before the election date.
• **Chapter 2**: Cartels Facing Competition in Public Procurement • **Research Questions**: Do cartels anticipate the number of outside firms bidding for contracts? Does the number of outside firms threaten the cartels' ability to win contracts ?	• Econometrics: OLS, Probit, OLS with FE, 2SLS. • Dataset on 33 cartels constructed using public information from the Competition Authority on convicted cartels in public procurement.	• We provide support for several common assumptions in the auction theory literature. • Cartels are able to anticipate the number of outside firms and adapt their bids accordingly. • This adaptation of the bids enable cartels to limit their losses due to the presence of outside firms. • We provide additional evidence of the existence of cost asymmetries between cartel and outside firms.

Table 2: **Summary of Part II: Research Questions, Methodology and Main Results**

Research Questions	Methods and Data	Main Results
• **Chapter 3**: Procedural Rules, Access of SMEs and Efficiency • **Research Questions**: What is the impact of lowering procedural rules on the duration of the procedure, on the accessibility to small businesses and on efficiency ?	• Econometrics: OLS, Probit, LIML, 2SLS, Moreira's CLR. • Robustness checks with FE and clusters. • Complete dataset from Paris Habitat-OPH on 472 public work contracts tendered between 2004 and 2011.	• We find that lowering procedural rules enables a decrease in the duration of the procurement process. • We also find that it enables to significantly enhances the accessibility of the bidding stage to small businesses. • The positive results we find do not come at a higher price for the public body. • As far as we observed, the increase in discretion did not lead to higher levels of corruption.
• **Chapter 4**: Discretion and Efficiency in Public Procurement • **Research Questions**: What is the impact of allowing public buyers to negotiate the offers received on efficiency and on renegotiations ?	• Econometrics: OLS, 2SLS. • Complete dataset from Paris Habitat-OPH on 427 public work contracts tendered between 2004 and 2009.	• Negotiating offers decreases the amounts of the received bids by close to 26%. • It also significantly decreases the probability of renegotiating the contracts. If anything, negotiated procedures decrease the total cost of the contract. • We also find that negotiated procedures limit bidder collusion. • We find no link between the supplementary discretion induced by negotiations and the level of corruption.

Part I

Manipulations: Political Influence and Collusion

Chapter 1

Do politicians procure their way to congress? An empirical analysis of public procurement and elections*

1.1 Introduction

Since the pioneering studies of Kramer [1971] and Tufte [1975], it has been argued that the formulation of economic policy may be subject to politicians' electoral considerations. In particular, incumbent politicians may be tempted to adopt policies, such as monetary policy or fiscal policy, that can artificially lead to good economic conditions to please electors. This, in turn, allows them to enhance their election or reelection perspective. According to these strands of literature, electoral considerations can therefore induce macroeconomic cycles. In terms of welfare consequences, such electoral considerations also imply that economic policies adopted by politicians can be inefficient.

Economists and political scientists have devoted much effort in the past

*This chapter is based on a joint work with Eshien Chong and Michael Klien. The authors would like to thank the participants in the 6th International Conference on "*Contracts, Procurement, and Public-Private Arrangements*" and in the 2013 International Workshop on "*Sustainable Public Procurement: Research Trends and New Challenges*" for their valuable comments.

few decades following the seminal contribution of Kramer [1971] and Tufte [1975], to understand theoretically and to search for empirical evidence on the presence of such cycles in the economy. The political budget cycle literature investigates cycles related to fiscal instruments that are induced by electoral cycles (Rogoff [1990]). At the empirical level, evidence on political budget cycles has been mixed (Drazen [2001]). Interestingly, the more recent empirical studies have detected the presence of such cycles in developing countries—where political competition may not be particularly strong—while no such cycles have been detected in developed countries (see e.g. Shi and Svensson [2006]; Eslava [2011]).

In this paper, we intend to empirically investigate the basic question formulated by the political budget cycle literature: Do electoral considerations drive the formulation of economic policies? In contrast with previous existing work, we base our investigation by considering one particular policy instrument—public work procurement—, and consider its use in a relatively homogeneous institutional environment, that of France. More specifically, we use data on public work procurement in 2000 French municipalities between 2005 and 2007. Using a difference-in-difference approach, we compare public work procurement of municipalities whose mayor was a candidate in the 2007 *legislative* elections with those of municipalities whose mayor did not run in these elections. In doing so, we depart from the bulk of existing studies in the political budget cycle literature by our use of micro-data (on procurement contracts) in a more homogeneous context. While micro-data can avoid the issues related to confounding effects often associated with aggregated data, we are unable to consider the whole palette of policy instruments available to politicians. Our analysis only focuses on public work procurement contracts. Hence, we see our paper as complimentary to existing ones in the literature. The context that we consider is also interesting, in that our control group are municipalities or mayors who are not subjected to electoral consideration for membership of parliament. In contrast, most existing studies identify po-

litical budget cycles based on politicians not running for reelection during a particular period.

We believe that public work procurement is an area that is propitious to political budget cycles. Indeed, public work often concern the construction of infrastructure such as roads, schools etc. These infrastructures provide economic services to the general population, and their presence is often quite visible. Hence, politicians may wish to signal their competency and/or the fact that they hold the public interest at heart by engaging in public work (and therefore public work procurement). In the French context, as in many other countries, municipalities are also responsible for the construction and maintenance of local infrastructure such as pre-schools and elementary schools, libraries, sports facilities, (communal) roads, etc. Hence, public work procurement is one of the main policy instrument for politicians working in municipalities. Lastly, in France, there is a "golden rule" that allows deficit financing only for investments. This latter is directly related to public work procurement. This implies that, if a politician intends to increase spending to enhance his(her) election perspectives, public work procurement is a very likely tool.

Our empirical analysis shows that the share of public work contract value ending during pre-election periods is larger in municipalities whose mayor also ran for legislative elections when compared to municipalities whose mayor did not run for a member of parliament (MP) position. In contrast, we find no evidence that the share of public work contract value ending in post-election period is different between municipalities with a mayor participating in the 2007 legislative election and those without. Our empirical results hold when we consider the share of public work procurement contract value that terminates during the pre-election period, and when we consider the probability of individual projects terminating before election takes place.

Our results suggest the presence of a political budget cycle in public work procurement, at least in the case of French municipalities. However, our results also suggest that the nature of these cycles is different from the one considered in the existing literature: in French municipalities, what seems to matter is not so much the absolute level of spending, but *when a project is completed*. In a way, our results seem to suggest that mayors running for election favoured projects that will be completed before the election takes place. This observation may help to explain existing empirical results in the political budget cycle literature: in developed countries, where institutional environment is stronger and monitoring of politicians is more elaborated, politicians may be more subtle in how they influence policy instruments to enhance their election perspectives instead of relying on straightforward increases in consumption spending. In our case, the results suggestion the time that a project is completed serves such a role.

To the best of our knowledge, our paper is the first study to consider the use of micro-data in public work procurement to understand political budget cycles, and to show that such cycles can arise in terms of the timing of procurement projects instead of increased public spending. We also believe that our paper contributes to the small but burgeoning strand of literature trying to understand the interplay between politics and (efficient) public procurement. In particular, existing studies in this area considered the effects of ideology (political partisanship) (Hyytinen et al. [2009]), on mayors' tenure in office (Coviello and Gagliarducci [2013]), and political third party opportunism (Chong et al. [2011]) etc., on the conduct of public procurement. In our paper, we document another potential channel through which politics can drive decisions made in public procurement—that of electoral considerations. To our knowledge, this channel has yet to be explored in this particular strand of literature.

Our paper is organised as follows: in the following section, we summarise

the existing literature on political budget cycles and argue how public procurement can be affected by election considerations. Section 1.3 then provides an overview of the institutional context in France, on the organisation of legislative elections and on public expenditures at the municipal level. Section 1.4 describes our data and provides a first glance into our empirical results. Section 1.5 discusses our empirical strategy, while our results are presented in Section 1.6. Concluding remarks follow.

1.2 From the nature and origins of political budget cycles to spendings through procurement

1.2.1 Budget cycles and elections

In recognition of the influence of economic conditions on voting outcomes, initiated by Kramer [1971] et Tufte [1975], economists and political scientists have been interested in understanding how electoral considerations by policymakers shape macroeconomic policies and economic variables. The underlying idea is quite simple: if economic outcomes have an incidence on electoral outcomes, then elected politicians will have incentives to manipulate macroeconomic policies to favour their reelections. This gave rise to the literature on political business cycles, starting with the seminal work of Nordhaus [1975]. Nordhaus [1975] shows theoretically that a policy maker will have an incentive to opportunistically orchestrate an economic boom through expansionary monetary policy to enhance his reelection perspectives if voting were based on economic performance in the recent past, and under the assumption that expectations are backward-looking. Hibbs [1977] considered the same issue, with an emphasis on partisanship and initiated literature trying to understand business cycles driven by politics and ideology.

These studies, by emphasising the incidence on the real economy related

to electoral considerations, found relatively weak empirical support (see, for instance, Drazen [2001] for a review).[6] As a consequence, the literature shifted towards focusing on how policy makers' use of instruments are affected by electoral considerations rather than their attempts to modify the real economy in terms of GDP or unemployment (Shi and Svensson [2003]). More specifically, this political budget cycle literature seeks to understand if and how fluctuations in a government's fiscal policy can be explained through politicians' electoral concerns. Notwithstanding the issue of empirical evidence, the shift towards cycles in fiscal policies is also motivated by the recognition that a government does not directly control real economic variables, but rather policy instruments. More specifically, the political budget cycle literature now focuses on the changes in government spending, deficits or taxes in the election year. The basic underlying intuition is again based on the idea that politicians may be induced in the year preceding an election to manipulate policy instruments in order to enhance their (or their party's) re-election perspectives.

While the basic argument for the presence of political budget cycles may look simple, it is in fact conceptually inconsistent with forward-looking rational voters. Indeed, rational voters can, and will, anticipate the long term consequences of manipulations in fiscal policies (e.g., higher deficits in the post-election years). If these modifications come with a cost which has to be borne in the longer term, rational voters will be unlikely to "reward" politicians who engage in pre-election-year manipulations of fiscal (or policy) instruments. If anything, rational voters who dislike fiscal manipulations may in fact punish incumbent politicians if there are changes in fiscal policy during election years. Moreover, if voters like good economic conditions, budget cycles should conceptually arise if and only if fiscal policies can translate into real economic outcomes.

Rogoff and Sibert [1988] and Rogoff [1990] are among the first to show

[6] Although there has been some empirical support on the partisan approach to business cycles (see Alesina [1987]; Alesina et al. [1997]).

that fiscal expansion during pre-election years can be compatible with forward-looking rational voters. The authors consider informational problems between politicians and voters. In their setting, fiscal expansion is a means for an incumbent to signal their competence to voters, since the pursuit of such policies is less costly for more competent politicians than less competent ones. In these models, a politician is assumed to be more competent when he is capable of providing more public good or government programs at a given cost. In Rogoff [1990], incumbent politicians can also signal their competence by shifting investment spending to consumption spending, assumed to be more visible in the short run. Recent developments rely rather on a "moral hazard" type of argument as the source of political budgetary cycles (Persson and Tabellini [2000]; Shi and Svensson [2006]). In these recent developments, politicians can exert a hidden effort to use a policy instrument unobservable to the voters, thereby increasing government programs and leaving voters with the impression that they are more competent. In contrast with theories based on adverse selection, models based on "moral hazard" predict that a budget cycle can arise regardless of the politician's competence. Nevertheless, a budget cycle that is compatible with rational voters can arise.

These theoretical developments share a common prediction that points to an expansionary fiscal policy in periods near an election. In other words, politicians will choose to exert more effort when the election is close. This prediction hinges on the assumption that the incumbent politician's recent performance is more informative. Martinez [2009] relaxes this assumption, and shows that political budget cycles can arise when past performance is also informative (although less than recent performance). In doing so, he takes into account an incumbent politician's reputation, which should be related to his competence. He shows that, in contrast with previous literature, more recent effort can in fact be less effective in manipulating voters' belief, so that budget cycles due to electoral considerations can also arise between elections (and not necessarily only in the period directly preceding an election).

Tufte [1978] provides a first empirical analysis of budget cycles and electoral considerations. He documented, for instance, changes in governmental transfers in the US during pre-electoral periods. Alesina [1988] also investigates the US setting. He found a significant election-year increase in net transfers (over GNP) between 1961 and 1985. However, it appears that the electoral effect is stronger in the US prior to 1980 (Drazen [2001]). Alesina et al. [1997] also provide some empirical evidence on political budget cycles in various industrialized countries. In their empirical investigation, they found empirical support that government deficits are influenced by election years in OECD countries between 1961 and 1993. Interestingly, developing countries also experience election-induced policy cycles (Kraemer [1997]; de los Angeles Gonzalez [2002]; Khemani [2004], etc.). Moreover, according to Schuknecht [2000], public investments are particularly prone to electoral cycles in developing countries. His result is based on a sample of 24 countries between 1973 to 1992. Likewise, Shi and Svensson [2006] show, using a sample of 85 countries from 1979 to 1995, that balance deficits tend to deteriorate and public expenditures tend to increase in pre-electoral periods in developing countries. In comparison, political budget cycles seem to be less pronounced in developed countries. Taken together, this recent empirical evidence suggests that electoral cycles in fiscal policies tend to take place in environments in which voters are unable to monitor effectively the choices of incumbent politicians (Eslava [2011]).

To sum up, recent developments in the political budget cycle literature point out that politicians can have an incentive to manipulate policy instruments to enhance their re-election perspectives. This manipulation is conceptually compatible with forward looking rational voters when there is some information asymmetry in the relation between voters and politicians. For manipulation of policy instruments to have an impact, these manipulations should be translated into visible outcomes for voters, and may start before an election year. Political budget cycles vary empirically in size and according

to a country's politico-institutional environment. At the aggregated level, the empirical evidence for political budget cycles is more pronounced in developing countries than for industrialised ones.

1.2.2 From public spending to local public procurement

In this paper, we empirically investigate the issue of political budget cycles at the local level (municipality) using public procurement data for public work. Local governments are also politicians, which means that they care about re-elections. As such, they may also have an incentive to manipulate policy instruments in order to enhance their re-election perspectives. At the empirical level, there is evidence of electoral cycles at the local level (Petry et al. [1999]; Baleiras and da Silva Costa [2004]; Binet and Pentecôte [2004]; Foucault et al. [2008], etc.).

We believe that looking into public procurement data offers the following advantages over more aggregated expenditures or tax rates. Firstly, public procurement is one of the many means by which spendings are realised. Hence, an examination of how public procurement is influenced by electoral considerations, if such a link exists, can enhance our understanding of how manipulation of the public budget is realised. Moreover, in industrialized countries, local public finances are generally subjected to some regulations.[7] This means that budgetary manipulation for electoral concerns may be more limited. On the other hand, while public procurement is also a highly regulated activity, a politician can have some discretion over the choice of projects and how they can be implemented. Lastly, Foucault et al. [2008] have shown that a budgetary cycle exists on capital expenditure in French municipalities (as compared to operational expenditure). This prompts us to consider public work procurement, as it is directly related to capital expenditure. Hence, it seems to us that

[7] See below for the French case.

investigating procurement data on public work is relevant and can be useful in uncovering how capital expenditure cycles come into being. Moreover, according to Binet and Pentecôte [2007], local investments account for almost 70% of total public expenditure at the national level, at least in France. Therefore, the stakes involved seem substantial.

Furthermore, public procurement is an important subject. It accounts for a large part of economic activity (more than 13% of GDP on average in OECD countries in 2011 according to OECD [2013]). Efficient public procurement can lead to substantial savings to the general public. To the extent that politicians are sometimes decision-makers in public procurement, it is useful to understand how political considerations may affect choices made in public procurement. To our knowledge, existing empirical studies investigating politics and public procurement tend to focus more on favouritism by politicians in public procurement (Hyytinen et al. [2009]; Coviello and Gagliarducci [2013], etc.). We believe therefore that electoral considerations can also provide an interesting perspective on how politics and public procurement may interact with each other.

Based on our literature review, we believe that if there is a budget cycle, then procurement patterns in a municipality with a candidate running for election will be different from those without a candidate running for election. Moreover, budget cycle during to electoral considerations may arise to the extent that fiscal policy translates into observable results for voters, we expect that in procurement projects will be timed to finish during the year (or a bit earlier before election time). To the extent that public work procurement are often investments which take time to be realised, we expect that a larger share of procurement contracts will finish during an election year in municipalities where a candidate is running for election compared to those that do not have candidates running for election. We believe that this prediction is still consistent with the general political budget cycle in that past decisions may matter

to signal to voters a politician's competence in a world where politicians have reputational capital (Martinez [2009]). Hence, we expect politicians to time public procurement projects in such a way that projects are realised during election year, and therefore can be visible to voters. In the following, we take these predictions to the data.

1.3 Elections, Circonscriptions and Municipalities

In this section, we start by briefly describing the French political system. We then concentrate on *circonscriptions*, the subdivision of the French territory on which legislative elections occur. We describe the *circonscriptions* as they existed during the 2007 legislative election on which we focus in the paper.[8] Since our work links these elections with procurement practices of municipalities, a final part of this section addresses municipal spendings.

1.3.1 French Elections

France has a bicameral system. Legislative power is divided between a Senate and a National Assembly. The 348 members of the former are elected indirectly (i.e. by local or regional representatives) for 6 years with elections held every three years to replace half of the senators. These elections are held at the *département* level and the number of senators per *département* is a function of its population (currently between 1 and 12 senators).[9]

The legislative elections (i.e. elections for members of parliament sitting at the National Assembly known as *députés*), on the other hand, are direct

[8] In 2010, a reform of the *circonscriptions* changed the way the French territory was subdivided (although it did not alter the actual number of *circonscriptions*). The goal of this reform was notably to create *circonscriptions* for French citizens living abroad (e.g. French citizens living in the U.S.).

[9] *Départements* are administrative divisions of the French territory. There are currently 101 French *départements* including 5 located in overseas territories.

elections held every 5 years at the *circonscription* level, a subdivision of the *département*.[10] Each of the 577 *circonscriptions* elects one *député* for a mandate of 5 years according to a majority voting system in two rounds. To be a candidate, one must basically be a French citizen and not have been pronounced ineligible by a court. During the first round of the election, electors vote for one of the candidates. If one candidate gets 50% of the votes and at least 25% of the registered voters' votes, he is elected. In other cases, a second round is organised for all candidates who received more than 12.5% of the registered voters' votes. The candidate who gets the most votes during this second round wins the election. For simplicity reasons, in other parts of this paper, we refer to *députés* as "members of parliament" (or "MPs") in the rest of this paper.

1.3.2 Circonscriptions: Cities, Voters and Candidates

Table 1.1 contains statistics on the 2007 legislative election both at the *circonscription* and at the municipal levels.[11] There were, on average, 76,298 voters per *circonscription* coming from just over 64 different municipalities. 86 out of the 36,693 French municipalities were split between more than one *circonscription*. This is mainly the case for large municipalities (there were, on average, 77,916.81 voters in municipalities that were split while only 1,007.06 in municipalities that were not); the most split municipality being Paris that is divided between 21 different *circonscriptions*.

There were 7587 candidates for the 571 *circonscriptions* we observe, coming from more than fifteen different political parties.[12] On average, each *circon-*

[10]The number of *circonscriptions* per *département* is also a function of its population.

[11]Statistics reported in this subsection were computed using a dataset on the results of the 2007 legislative election taken from data.gouv.fr, the official French open data website. Although there were 577 *circonscriptions* overall, in the following we report statistics on 571 *circonscriptions* due to missing information (at the municipal level) on 6 overseas *circonscriptions*.

[12]Source: http://www.cnccfp.fr/index.php?art=783#P1T2ch2_2.

Table 1.1: **Summary statistics on the 2007 election**

Variable	N	Mean	Std. Dev.	Min	Max
At the *circonscription* level					
Number of voters	571	76,298.14	16,896.76	22,318	163,122
Number of municipalities	571	64.52	63.80	1	344
Number of candidates	571	13.29	2.11	6	20
At the municipal level					
Number of voters in the complete sample of municipalities	36,693	1,187.32	8,350.35	8	1,247,925
Number of voters in municipalities with one *circonscription*	36,607	1,007.06	2,756.78	8	83,859
Number of voters in municipalities with more than one *circonscriptions*	86	77,916.81	144,416.3	245	1,247,925

scription had in excess of 13 candidates, with a minimum of 6 and a maximum of 20. In spite of apparent competition, there are recurring debates in France over both the non-renewal of political elites and the "*cumul des mandats*", i.e. the fact that French elected representatives often hold more than one office at the same time.[13] The outcomes of the 2007 legislative election triggered more debates on the "*cumul des mandats*". Indeed, according to Rouban [2012], 87.3% of the members of parliament that were elected in 2007 held at least one other mandate.[14] The most frequent additional office held being mayor (for 22% of the MPs).

1.3.3 Expenditures of French Municipalities

French municipalities have responsibilities over a wide variety of areas including, but not limited to, education, culture, social and sanitary, and sports and leisure.[15] Municipality spendings are divided between operational expenditures and revenues (the former notably includes wages of municipal employees and furnitures, while the latter includes different perceived taxes as well as

[13] See for example François [2006]; Bach [2009]; Navarro et al. [2013].

[14] Although it is unlikely to impair their results, note that this study only takes 552 MPs into account.

[15] More specifically, municipalities are in charge of organising the community centres for social action, as well as the construction and maintenance of pre- and elementary schools, libraries, museums, sports facilities, communal roads, etc.

State subsidies) and capital expenditures and revenues (the former consisting of equipment expenses and subsidies, while the latter consists of additional perceived subsidies from regional or central governments). French municipalities have to follow a "golden rule": over a given year, deficit financing is only allowed for investment expenditures.[16] It is therefore likely that, if a political cycle is to be observed in French municipalities, the cycle will be more important in capital expenditures (e.g. public work procurement as it is the case in this paper) than in operational expenditures.

Table 1.2: **Municipalities: Expenditures and Revenues**

Type of Expenditure	Year 2005 (Billion €)	Evolution 2005/2004 (in %)	Year 2006 (Billion €)	Evolution 2006/2005 (in %)	Year 2007 (Billion €)	Evolution 2007/2006 (in %)
Total Expenditures	82.9	+ 3.8	85.8	+ 3.5	89.8	+ 4.7
Including:						
Operational Expenditures	55.5	+ 4.0	56.9	+ 2.5	58.8	+ 3.3
Capital Expenditures	27.4	+ 3.3	28.9	+ 5.5	31.1	+ 7.5
Total Revenues	83.6	+ 3.9	86.7	+ 3.7	89.6	+ 3.4
Including:						
Operational Revenues	66.1	+ 2.6	67.8	+ 2.6	69.6	+ 2.5
Capital Revenues	17.5	+ 9.0	18.9	+ 7.8	20.1	+ 6.4

Table 1.2 exposes expenditures and revenues of French municipalities for the three years we study.[17] Over the period studied, both total expenditures and total revenues of French municipalities systematically increase. On the whole, the "golden rule" seems to be well respected by municipalities as operational revenues are always greater than operational expenditures.[18] However, equipment expenditures consistently exceed revenues. On average, capital expenditures account for approximately one third of total expenditures.

[16] According to Sutherland et al. [2005], similar rules apply, for example, to Germany, Japan, Sweden or the Netherlands.

[17] The data in Table 1.2 is taken for the 2008 Annual Report of the "*Observatoire des Finances Locales*", the official watchdog for local and regional expenditures. Link: http://www.collectivites-locales.gouv.fr/files/OFL2008_10.pdf

[18] Note that since this rule applies on an individual basis (i.e. for each municipality rather than for municipalities overall), we would have to look at individual municipal spendings to perfectly judge whether the rule was uniformly respected.

1.4 Data and First Evidence

In this section, we start by describing the data we have gathered on municipal procurement and mayors that ran for the 2007 legislative election. Some restrictions of the dataset are discussed. In a second part, we examine several graphs showing first evidence of a political cycle for the 2007 election.

1.4.1 Data

We use a dataset on construction procurement contracts tendered by French municipalities between 2005 and 2007. This dataset comes from the "*Observatoire Economique de l'Achat Public*", the French official watchdog for public procurement. The database contains the full set of construction contracts over the 90,000€ threshold tendered by French municipalities.[19]

The public procurement database was then merged with information on whether the mayors ran for the 2007 legislative election, collected from the website of the Ministry of Home Affairs.[20] We voluntarily restricted our sample to municipalities that belonged to a sole *circonscription*. This is mainly due to the fact that we do not observe the spatial location of a given project. Therefore, even if a mayor from a municipality split between more than one *circonscription* ran for election, we would not have been able to identify whether a specific project was located in the *circonscription* in which the mayor ran or in one of the other(s) *circonscription*(s) of the municipality. Attributing all the contracts tendered by the municipality to a sole *circonscription* would have likely resulted in biasing our estimations.

[19] The 90,000€ threshold corresponds to the obligation, for public buyers, to publicise the call for tenders at the national level. Contracts below this threshold are not actively collected by the "*Observatoire Economique de l'Achat Public*".

[20] Link: http://www.interieur.gouv.fr/Elections/Lesresultats/Legislatives/elecresult___legislatives_2007/(path)/legislatives_2007/index.html

Table 1.3, shown in appendix, describes the dataset and provides summary statistics at both the contract and the municipal levels. In our dataset, we observe 6,141 municipalities from 2005 to 2007, which procured, throughout this period, a total of 12,168 contracts. 8% of the mayors were candidates for the 2007 election and were responsible for slightly less than 20% of the tendered contracts. This gap is mainly due to the fact that mayors who run for legislative elections often come from larger cities. In order to avoid any selection bias when looking at the municipal level, all the cases where municipalities did not procure a contract in a given year were still taken into account and coded as yielding a 0 contract value. This explains why, when looking at the municipal level, precisely one third of the contracts start in each of the three years we study. Municipalities have a higher share of contract value finishing in 2007. This is also true when looking at the contract level: more contracts finish in 2007 than in other reported years. Contracts have a mean duration of slightly more than 9 months and, on average, contracts are tendered by municipalities that procure close to 8.5 contracts every year. Unsurprisingly, the open auction is the most used procedure (for two thirds of the contracts) while negotiated procedures and adapted procedures respectively account for 16.2% and 12.5% of awarding procedures used.

In our data, we do not observe the exact date at which contracts were procured. In other words, we know in which year a given contract was awarded but we have no information on the precise day or month. This is likely to be an important drawback given that we are primarily interested in looking at the timing of the procured contracts for the 2007 election. In order to circumvent this obstacle, we use three different hypotheses, satisfying variant degrees of likelihood, to approximate the starting date of projects. Our default hypothesis, which is used to report the descriptive statistics shown in Table 1.3, postulates that, on average, all projects in a given year will start in the middle of that year (i.e. all projects start in July). In that case, any project with a duration equal to or lower than 5 months will finish in the same year

it started. Projects with durations between 6 and 17 months will terminate in the following year and so on. To test the robustness of our results, we also use two alternative and extreme hypotheses. Our first alternative hypothesis postulates that all contracts in a given year will start in January, while our second hypothesis assumes that all contracts start in December. In the case of the former (resp. latter), all contracts with duration equal to or lower than 11 months (resp. 0 months) will terminate in the same year it started and contracts with durations between 12 and 23 months (resp. 1 and 11 months) will end in the following year, and so forth.[21] We further discuss this issue in Section 1.5.

1.4.2 First Evidence

We here intend to provide first evidence of the strategic timing of contracts by mayors running for the 2007 election. Indeed, in order to send a positive signal to potential electors regarding their quality, we postulate that mayors running for election will try to maximise the number of contracts ending close to the election date. Figure 1.1 shows three graphs plotting the timing of contracts for different subsamples of our dataset.[22] The upper graph includes all mayors, while the two lower graphs respectively restrict to non-candidate mayors and candidate mayors. On every graph, the colour of the line distinguishes between the years the projects were launched (blue for contracts launched in 2005, red for 2006 projects, etc.). Plotted on the graphs are the percentage of contracts ending in "the year the project started + t". The graphs should be read as follows: on the upper graph, at t=0, the blue line indicates that approximatively 40% of the contracts launched by all mayors and starting in

[21] Note that since no contracts in our dataset have a duration of 0 months, our second alternative hypothesis postulates that no contracts that start in a given year will finish in that same year.

[22] The statistics used to create these graphs were computed at the contract level and use our default hypothesis concerning the starting date of the project (i.e. all projects in a given year start in July).

2005 will end in 2005 (2005 + t = 2005, since t=0). On the lowest graph, at t=2, the green line indicates that close to 5% of the contracts that candidate mayors launched in 2007 will end in 2009 (2007 + t = 2009, since t=2).

Looking at the lowest graph, at t=0, t=1 and t=2, we see that the highest lines are, respectively, the green, red and blue line. That is, the highest percentage of contracts ending in the same year for candidate mayors are from 2007 which coincides with the election year. The highest percentage of contracts ending the year after they were launched are from 2006 and the same observation can be made for contracts ending two years after they were awarded which had the highest percentage in 2005, both of which being contracts ending in the election year. By comparing with the middle graph, we observe a very different pattern for non candidate mayors. Indeed, at t=0, t=1 and t=2, we can see that the highest lines are, respectively, the red, the blue and the red line which does not match the sequence observed for candidate mayors. We believe that these graphs provide first evidence that candidate mayors adapt the timing of the allocation of their contracts so that, for a given year and compared to other years, a higher percentage of contracts they award will end in 2007, the election year.

1.5 Empirical strategy

1.5.1 Methodology

In order to analyse the potential effect of the French legislative elections on public procurement we are basically comparing the pre-election procurement expenditures between municipalities with mayors running for MP and those with mayors not running for MP. To account for unobserved heterogeneity between these two types of municipalities, e.g. candidate municipalities are substantially larger than non-candidate municipalities, all estimations will contain

municipality fixed effects. Identification of the election cycle effect therefore rests exclusively on the different spending patterns that we observe for candidate and non-candidate municipalities over time. Instead of considering the period when the contract is concluded (which is typically also the period when public expenditure increases), we consider the finalisation of the construction project as the relevant anchor.

The most basic prediction from the PBC literature is that politicians seeking re-election will try to signal good performance before an election. This in turn should give municipalities an incentive to start projects early enough so that they finish before the election. In the absence of an election, we would not expect a strategic manipulation of the finishing date of a project and the non-candidate municipalities therefore serve as the control group. Consequently, candidate municipalities should exhibit a higher share of contracts written in 2005 and 2006 to finish in 2007 than non-candidate municipalities.

The basic relationship that we are estimating is therefore on the municipal level and represented by the following model:

$$Y2007_{it} = \eta_t + (\eta_t * Cand_i)\beta + \alpha_i + \epsilon_{it} \tag{1.1}$$

with α_i and η_t corresponding to municipality fixed effects and time fixed effects for the contract starting years 2005, 2006 and 2007.[23] $\eta_t * Cand_i$ is the interaction between the time effects and $Cand$, the dummy indicator showing if a mayor is running for MP (=1) or not (=0). The dependent variable $Y2007_{it}$ represents the share of expenditures by municipality i in year t that finishes in 2007, the election year. Our hypothesis of strategic timing of project finalisations towards elections would lead us to expect a positive interaction effects, indicating that the share of contracts stemming from 2005 and 2006

[23]The last available year, which is usually 2007 will be used as the base or comparison year.

that end in 2007 is larger for candidate municipalities. As we have previously stated, to avoid issues of selection bias, it is necessary to recognise that no contract in a given year by a municipality is also an observation, yielding 0 contract value. As a result, we replace missing values for municipal contract values with 0. E.g. if we have no contract for municipality i written in t that finishes in 2007, the value for $Y2007_{it}$ is 0.

In addition to this basic test, two additional models are estimated:

$$Y2006_{it} = \eta_t + (\eta_t * C_i)\beta + \alpha_i + \epsilon_{it} \tag{1.2}$$

$$Y2008_{it} = \eta_t + (\eta_t * C_i)\beta + \alpha_i + \epsilon_{it} \tag{1.3}$$

with $Y2006_{it}$ and $Y2008_{it}$ representing the share of spending that is finished in 2006 and 2008. These additional specifications are helpful to show that the previous findings are actually the result of the political cycle. The potential problem of $Y2007_{it}$ lies in the fact that the French legislative elections take place already in June 2007 and it is therefore unclear if projects finished in 2007 are early enough. In order to be sure that politicians try to finish projects before the election, the estimations with $Y2006_{it}$ should again show a positive interaction effect. As contracts from 2007 cannot possibly be finished in 2006, all those contracts are excluded when using $Y2006_{it}$ as the dependent variable in order to avoid artificial results driven by zero inflated observations.

Regarding $Y2008_{it}$, in contrast to 2006 and 2007 the regressions should show an insignificant or negative coefficient for β. We would typically expect a non significant interaction term for the regressions with $Y2008_{it}$ as the dependent variable because both types of municipalities have the same incentive to target contract termination into 2008. A negative effect may arise, however, if

those contracts directed towards 2007 by candidate municipalities are at the expense of contracts that finish in 2008. The regressions using $Y2008_{it}$ can also be interpreted as a placebo test where a positive significant finding would shed doubt about the diff-in-diff strategy that we are applying. For instance, finding a consecutively higher β for candidate municipalities may simply mean that they have a longer average duration of contracts or a different trend than non-candidate cities.

In addition to the municipality fixed effects we are using cluster robust standard errors (on the municipal level) to account for within municipality error correlation and heteroscedasticity in all estimations.

As discussed in Section 1.4, a problem of the database is that we do not know the exact date when the contract was signed and therefore there is also some uncertainty regarding the finalisation of a project. The default choice we are using is to assume that durations with between 0 and 5 months will finish in the current year, 6 to 17 will finish in the consecutive year and so forth. This assumption yields to the following formulisation:

$$finish\_year = round(start\_year + (duration/12)) \tag{1.4}$$

which means that we add the number of months divided by 12 to the starting year and round the result to calculate the most likely finish year. As a robustness check we will use different assumptions to arrive at the $finish\_year$. Two extreme alternative assumptions to rounding the expression $start\_year + (duration/12)$ is to use the floor and the ceil functions.

$$finish\_year = floor(start\_year + (duration/12)) \tag{1.5}$$

$$finish\_year = ceil(start\_year + (duration/12)) \tag{1.6}$$

In the former case, any duration between 1 and 11 months will in the current year, 12 to 23 months in the following and 24 to 35 months two years from now. Conversely, in the case of the ceil function only durations of 0 are considered as finished in the current year. Since the minimum duration in the database is 1 month this means that no contracts can by definition finish in the same year - which is a fairly extreme assumption.

Finally, given the underlying nature of our data, which is in terms of contracts rather than municipalities, we also consider estimations on the contract level. The main advantages of analysing contracts directly is that no information is lost when aggregating to the municipality level and that observable characteristics can be directly used as covariates.[24] Although the municipality fixed effects should take care of most heterogeneity between municipalities, the dataset at hand allows us to control for a few additional municipal and contract characteristics. All of these control variables are intended to purge remaining time variant differences that may affect the finishing dates of projects. To this end, the project duration (*duration*), the number of contracts per municipality per year (*number_ct*) as well as a dummy indicator for the specific procurement procedure (*proced_1* to *proced_4*) are added to the regressions.

The estimated regressions will then be a linear probability model which is 1 if a contract finishes in 2007 and 0 otherwise:

$$finish\_2007_{jit} = start\_year_t + (start\_year_t * candidate_i)\beta + Controls_{jit}\gamma + \alpha_i + \epsilon_{jit} \tag{1.7}$$

[24] Also, the contracts represent basically the whole universe of contracts (all above 90,000€) and therefore no substitution of missing information with 0 values is necessary to avoid selection bias as on the municipal level.

with α_i and $start\_year_t$ corresponding to municipality fixed effects and time fixed effects for the contract starting years 2005, 2006 and 2007. Again, $start\_year_t * candidate_i$ is the interaction between the time effects and the candidate dummy. The dependent variable $finish_2007_{jit}$ represents a dummy indicating whether contract j of municipality i written in year t finishes in 2007, the election year. The duration and procurement procedures vary by contract whereas the average number of contracts varies only on the municipal level per year. Because we care about contract value, the regressions are weighted by the value of the contract. We are using a linear probability model (LPM) instead of a probit model in order to keep the fixed effects to account for municipal heterogeneity.[25]

To strengthen the results, the corresponding models for the years 2006 and 2008 are also estimated:

$$finish\_2006_{jit} = start\_year_t + (start\_year_t * candidate_i)\beta + Controls_{jit}\gamma + \alpha_i + \epsilon_{jit} \tag{1.8}$$

$$finish\_2008_{jit} = start\_year_t + (start\_year_t * candidate_i)\beta + Controls_{jit}\gamma + \alpha_i + \epsilon_{jit} \tag{1.9}$$

As before, we would expect the interaction term in 2006 and 2007 to be positive and negative or non-significant in 2008.

[25]There is no consistent estimator for unconditional fixed effects probit model.

1.6 Results

The results from our baseline models in equations 1.1, 1.2, 1.3 for 2006, 2007 and 2008 are exhibited in Table 1.4. The model of main interest is displayed in Model 2 and tests whether the share of contract value signed in 2005 and 2006 that finish in the election year 2007 is different for candidates and non-candidate municipalities. The coefficients on the overall time dummies η_{2005} and η_{2006} show a negative sign, which is not surprising as most contracts finishing in 2007 are from 2007 itself and less so from the previous year 2006 or even 2005. While this finding is also true for the candidate municipalities, the interaction terms are indicating a significant difference between the two groups of municipalities. Compared to non-candidate municipalities, in municipalities where the mayor runs for MP there is a relatively higher share of contract values from previous years that end in 2007. The size of the effect is substantial and suggests that the share of contract value from contracts signed in 2005 and finishing in 2007 is roughly 17% higher for candidate municipalities. For contracts written in 2006 the effect is almost twice as large, indicating that the share of contract values shifted into 2007 by mayors running for MP is roughly 33% higher.

Looking at the differences between candidates and non-candidates in other years, the results are as expected. There is some weak evidence that candidate municipalities have a higher share of contract values from 2005 finishing in 2006 than when a non-running mayor is present, approximatively 11%. On top of that, the pre-election differences we find disappear when looking at projects finishing in 2008 (Model 3). Here the share of project values finishing in 2008 coming from previous years 2005 and 2006 is negative yet not statistically significant. These two results lend further credibility to the observed shifting of project finalisations into 2007 by candidate municipalities. We find a similar but smaller effect for 2006 and no more effect for 2008.

The first robustness tests relate to the assumption of when the contracts start during the year, which also affects the expected finishing year. Table 1.4 was estimated under the assumption that all contracts begin in the middle of the year (July) and therefore only contracts with a duration of less than 6 months are finished in the same year. While without further information this is probably the most reasonable assumption in terms of expected timing of the start of the contract, alternative assumptions and their effect on the results should be considered.

The two polar assumptions of all contracts beginning in January (floor function) and all contracts beginning in December (ceil function) are displayed in Tables 1.5 and 1.6. For the former, the results strongly resemble those of the previous regression table. If we assume all contracts start in January and therefore any contract with a duration of less than 12 months finishes in the current year, we still observe a significant difference between candidate and non-candidate municipalities. Mayors running for MP lead to 15% and 24% higher value of projects finished in 2007 for contracts signed in 2005 and 2006 respectively. Moreover, there is no statistically significant difference in 2008, after the election. In addition to the slightly smaller differences, applying the floor function also renders the interaction term in Model 4 of Table 1.5 insignificant. There is no more evidence that candidate municipalities have a higher share of contract value finished in 2006.

When using the ceil function, all contracts start in December, the most important difference to the baseline regressions is displayed in Model 9 of Table 1.6. While the other results (Models 7 and 8) are qualitatively the same as before, here our placebo test for 2008 fails. Hence if we assume that all contracts written in t finish later than t (all contracts have a duration of at least 1 month), we find a significant and positive interaction term in 2008, where we should find (a negative or) a non significant effect. It is therefore clear that the assumption of all contracts starting in December is too strong.

To see how far we can go with the assumption of when the contracts were written, we successively reduced the month until the placebo test for 2008 is satisfied. As these tests show, our working hypothesis is rejected until October and satisfied for all months below.[26] The estimations under the assumption of all contracts written in September are shown in Table 1.7. Here again, the baseline results are confirmed.

The bottom line of this robustness exercises is that our results hold for a wide range of assumptions regarding the starting date of the contracts. Without further information our best guess remains to assume that contracts are equally distributed over the year and therefore start on average in June or July. As the previous regressions show, however, the results are still consistent with the assumption that the contracts have been written at some point between January and September during a year. Our empirical approach is rejected as soon as we assume that all contracts were written in the last quarter of the year.

Finally, we are analysing the hypothesis of strategic manipulation of contract finalisations before an election on the contract level. Instead of the share of contract value that will finish in a given year, here the dependent variable is the probability that a contract finishes in year t. To still be able to estimate our regressions with municipality fixed effects we estimate this as a LPM. In addition, the regressions are weighted by the value of the contract in order to be comparable with the previous estimations and because larger contracts are also more important if the goal is really vote-seeking. The estimations for these models are exhibited in Tables 1.8 and 1.9, without and with covariates respectively.

Re-analysing the question of strategic timing of a contract finishing just

[26]The assumption was formalised as follows: $finish\_year = ceil(start\_year + ((duration - X)/12))$ where X is the number of months. The assumption of all contracts written in December equals $X = 0$ and September would be $X = 3$.

before an election is also supported by the results in Table 1.8. The probability that contracts written in 2005 and 2006 finish before the election, particularly in 2007, is substantially higher for candidate municipalities. The results for 2008 in Model 15 are again suggesting that this was a real timing effect before the elections because there is no statistically significant difference between the two after the election.

The estimations with the additional covariates are not only qualitatively the same as before but, due to their higher precision, they strongly corroborate our previous findings. Controlling for duration, which has a negative impact on contracts finishing in 2006 or 2007, particularly improves the fit of the model. While the effect of the procedures and the number of contracts seems to be limited, we find that they have a significant impact on the probability of seeing a contract finished in 2008. This should, however, be interpreted with caution because the actual contract data from 2008, with all contracts written in 2008, is not comprised in the underlying dataset.

1.7 Concluding remarks

In this paper, we sought to detect the presence of a political budget cycle by investigating data on public procurement in French municipalities. We use a difference-in-difference approach to compare public work procurement of municipalities whose mayor was a candidate in the 2007 legislative elections with those of municipalities whose mayor did not run in these elections. We found that the share of public work contract value ending during pre-election periods is larger in municipalities whose mayor also ran for legislation elections. We interpret these results as evidence that mayors running for elections privileged projects that will be completed before election takes place. This observation may help to explain a puzzling result in existing empirical literature on political budget cycle, namely political budget cycles are detected only in developing

countries. Our results suggest that political budget cycle may also be present in developed countries, albeit in a different form. More specifically, in countries where institutional environment is stronger and monitoring of politicians is more elaborated, politicians may be more subtle in how they influence policy instrument to enhance their election perspectives. They may prefer some other means to signal their competence and/or their motivation than straightforward increases in consumption spending. In our case, our results suggest that the politicians rely on the timing of public work projects. In addition, while most of the empirical literature on political business cycles finds that cycles start one year before the election, we find evidence from a cycle that starts at least two years before the election date. The longer length of the cycle is due to the time that public work projects need to be completed.

We believe that our paper is the first study to consider the use of micro-data in public work procurement to understand political budget cycles, and to show that such cycles can arise in terms of timing of procurement projects instead of increased public spending. It also shows how politics may influence the conduct of public procurement and how this influence may arise at least two years prior to the election.

Nevertheless, our analysis also raises several question. In particular, we are, as yet, unable to determine the channel through which politicians influence the timing of project completion: Are projects anticipated to finish in a certain period privileged over alternative (and, maybe more socially useful) ones by politicians? Do politicians delay and launch in advance projects that are to be implemented anyway so that their completion can coincide with electoral periods? What are the projects concerned by these phenomena? What are the welfare consequences? We hope to be able to answer at least some of these remaining questions in the near future. In any case, we believe that micro-data can be useful to understand political budget cycles.

Appendix

Table 1.3: **Summary statistics on our dataset**

Variable	Definition	N	Mean	Std. Dev.	Min	Max
	At the municipal level					
$Cand$	Equals 1 if the mayor of the municipality is a candidate to the 2007 election, 0 otherwise	6,141	0.080	0.271	0	1
η_{2005}	Contracts started in 2005	6,141	0.333	0.471	0	1
η_{2006}	Contracts started in 2006	6,141	0.333	0.471	0	1
$Y2006$	Share of contract value that finishes in 2006	6,141	0.129	0.305	0	1
$Y2007$	Share of contract value that finishes in 2007	6,141	0.232	0.391	0	1
$Y2008$	Share of contract value that finishes in 2008	6,141	0.149	0.330	0	1
	At the contract level					
candidate	Equals 1 if the mayor of the municipality is a candidate to the 2007 election, 0 otherwise	12,168	0.198	0.399	0	1
start_2005	Equals 1 if the contract started in 2005, 0 otherwise	12,168	0.294	0.456	0	1
start_2006	Equals 1 if the contract started in 2006, 0 otherwise	12,168	0.255	0.436	0	1
finish_2006	Equals 1 if the contract finished in 2006, 0 otherwise	12,168	0.254	0.436	0	1
finish_2007	Equals 1 if the contract finished in 2007, 0 otherwise	12,168	0.342	0.474	0	1
finish_2008	Equals 1 if the contract finished in 2008, 0 otherwise	12,168	0.229	0.420	0	1
duration	Duration of the contract (in months)	12,168	9.278	10.072	1	180
number_ct	Number of contracts tendered by the municipality this year	12,168	8.486	8.394	1	48
proced_1	Equals 1 if the awarding procedure is an open auction, 0 otherwise	12,168	0.673	0.469	0	1
proced_2	Equals 1 if the awarding procedure is a negotiated procedure, 0 otherwise	12,168	0.162	0.368	0	1
proced_3	Equals 1 if the awarding procedure is an adapted procedure, 0 otherwise	12,168	0.125	0.331	0	1
proced_4	Equals 1 if the awarding procedure is another procedure, 0 otherwise	12,168	0.040	0.196	0	1

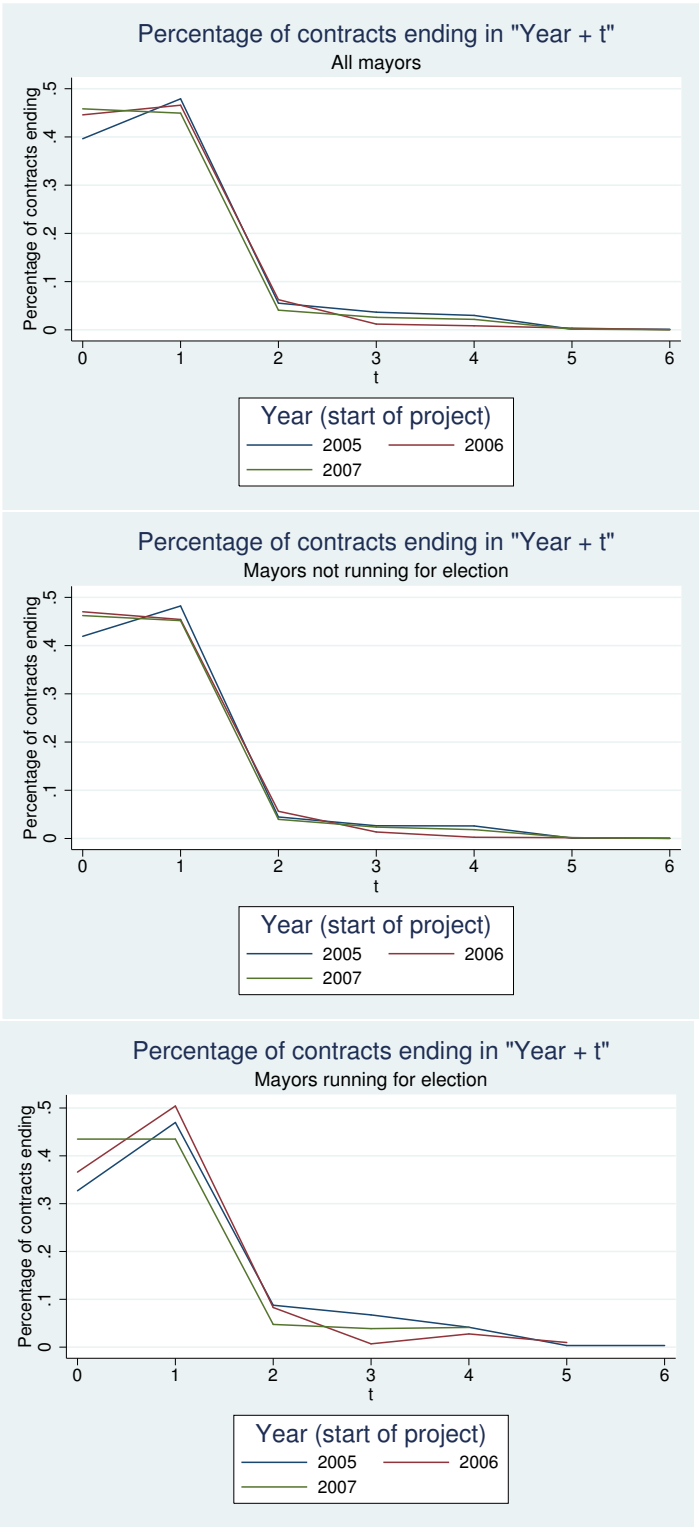

Figure 1.1: **Timing of projects depending on the types of mayors**

Table 1.4: **Baseline: Share of Contract Value**

	Model 1 OLS *Y2006*	Model 2 OLS *Y2007*	Model 3 OLS *Y2008*
η_{2005}	-0.014	-0.508***	-0.406***
	(0.015)	(0.013)	(0.013)
η_{2006}		-0.364***	-0.403***
		(0.016)	(0.013)
$\eta_{2005} * Cand$	0.109*	0.168***	-0.015
	(0.056)	(0.043)	(0.043)
$\eta_{2006} * Cand$		0.327***	-0.030
		(0.055)	(0.042)
$Constant$	0.197***	0.510***	0.420***
	(0.007)	(0.009)	(0.008)
R^2	0.5883	0.5251	0.5603
Adj. R^2	0.1760	0.2871	0.3400
Nb. Obs.	4096	6144	6144

Note: Cluster robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.5: **Robustness Start and Finish: Floor function**

	Model 4 OLS *Y2006*	Model 5 OLS *Y2007*	Model 6 OLS *Y2008*
η_{2005}	-0.231***	-0.806***	-0.131***
	(0.015)	(0.010)	(0.009)
η_{2006}		-0.756***	-0.137***
		(0.012)	(0.009)
$\eta_{2005} * Cand$	-0.040	0.150***	-0.035
	(0.063)	(0.041)	(0.033)
$\eta_{2006} * Cand$		0.237***	-0.040
		(0.047)	(0.033)
$Constant$	0.314***	0.802***	0.146***
	(0.007)	(0.007)	(0.006)
R^2	0.6007	0.7886	0.4083
Adj. R^2	0.2008	0.6827	0.1118
Nb. Obs.	4096	6144	6144

Note: Cluster robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.6: **Robustness Start and Finish: Ceil function**

	Model 7 OLS *Y2006*	Model 8 OLS *Y2007*	Model 9 OLS *Y2008*
η_{2005}	0.333***	0.035***	-0.871***
	(0.015)	(0.005)	(0.009)
η_{2006}		0.325***	-0.848***
		(0.013)	(0.010)
$\eta_{2005} * Cand$	0.227***	0.062***	0.135***
	(0.051)	(0.022)	(0.039)
$\eta_{2006} * Cand$		0.204***	0.177***
		(0.046)	(0.043)
$Constant$	0.000	-0.000	0.875***
	(0.007)	(0.005)	(0.006)
R^2	0.6195	0.5095	0.8563
Adj. R^2	0.2384	0.2636	0.7843
Nb. Obs.	4096	6144	6144

Note: Cluster robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.7: **Robustness Start and Finish: Ceil function adjusted by 3 months**

	Model 10 OLS *Y2006*	Model 11 OLS *Y2007*	Model 12 OLS *Y2008*
η_{2005}	0.136***	-0.305***	-0.592***
	(0.015)	(0.012)	(0.013)
η_{2006}		-0.088***	-0.584***
		(0.017)	(0.013)
$\eta_{2005} * Cand$	0.145***	0.136***	0.032
	(0.054)	(0.038)	(0.043)
$\eta_{2006} * Cand$		0.279***	0.031
		(0.055)	(0.045)
$Constant$	0.113***	0.315***	0.602***
	(0.007)	(0.009)	(0.008)
R^2	0.5987	0.4100	0.6732
Adj. R^2	0.1967	0.1143	0.5094
Nb. Obs.	4096	6144	6144

Note: Cluster robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1.8: **Contract regressions: LPM on whether a contract ends in a given year**

	Model 13 LPM *finish_2006*	Model 14 LPM *finish_2007*	Model 15 LPM *finish_2008*
*start_*2005	0.104***	-0.332***	-0.367***
	(0.039)	(0.031)	(0.026)
*start_*2006		0.112**	-0.319***
		(0.044)	(0.038)
*start_*2005 $*$ *candidate*	0.123*	0.245*	-0.070
	(0.074)	(0.127)	(0.088)
*start_*2006 $*$ *candidate*		0.212**	-0.068
		(0.085)	(0.083)
Constant	0.325***	0.342***	0.453***
	(0.018)	(0.020)	(0.016)
R^2	0.3861	0.4192	0.5299
Adj. R^2	0.2655	0.3016	0.4347
Nb. Obs.	6680	12182	12182

Note: Cluster robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Regressions weighted by the value of the contract.

Table 1.9: **Contract regressions with covariates: LPM on whether a contract ends in a given year**

	Model 16 LPM *finish_2006*	Model 17 LPM *finish_2007*	Model 18 LPM *finish_2008*
start_2005	0.116***	-0.339***	-0.363***
	(0.037)	(0.029)	(0.026)
start_2006		0.090**	-0.312***
		(0.040)	(0.038)
*start_2005 * candidate*	0.128**	0.278**	-0.104
	(0.063)	(0.129)	(0.087)
*start_2006 * candidate*		0.228***	-0.090
		(0.079)	(0.076)
duration	-0.013***	-0.007***	0.000
	(0.001)	(0.001)	(0.001)
number_ct	0.006	-0.004	0.008***
	(0.004)	(0.004)	(0.003)
proced_1	0.002	-0.030	-0.030
	(0.054)	(0.049)	(0.048)
proced_2	0.035	-0.014	0.031
	(0.063)	(0.054)	(0.053)
proced_3	-0.075	-0.009	-0.140***
	(0.068)	(0.050)	(0.049)
Constant	0.413***	0.499***	0.399***
	(0.064)	(0.065)	(0.058)
R^2	0.4482	0.4459	0.5393
Adj. R^2	0.3392	0.3334	0.4457
Nb. Obs.	6680	12182	12182

Note: Cluster robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Regressions weighted by the value of the contract.

Chapter 2

Cartels Facing Competition in Public Procurement: An Empirical Analysis*

2.1 Introduction

Public procurement accounts for a substantial share of the public sector's provision of goods and services, representing up to 10% of French GDP and close to 16% of European countries' GDP. Tendering procedures are used to compensate for the lack of competition in the field by introducing competition for the field, guaranteeing lower prices along with the same (or a higher) level of quality. Yet, bidder collusion is a pervasive problem in public procurement (Pesendorfer [2000]). Collusion distorts prices and/or quality by lowering the level of competition for the market through tacit or explicit agreements between firms. Over the period ranging from 1991 to 2010, the French Competition Authority issued more than 220 decisions for collusion cases in public

*The author is grateful to Joan-Ramon Borrell, Lisa Chever, Eshien Chong, Yannick Perez, Emmanuel Raynaud, Stéphane Saussier, Steven Tadelis, Heidi Wechtler and Anne Yvrande-Billon for their valuable comments on different versions of this chapter. The author would also like to thank the participants in the 2011 International Conference on "*Public Procurement and Sustainable Growth*", the 2011 *ESNIE* Conference, the 2012 "*Economics of Public-Private Partnerships Conference* and the 2012 *ISNIE* Conference for their comments. A French version of this paper was published in 2013 in the "*Revue d'Économie Industrielle*".

procurement leading to the fining of more than 750 different firms.[27]

One particular case of bid-rigging inspired the idea behind this paper (Autorité de la Concurrence [2001]). In 1989, the French city of Le Havre invited tenders using a first-price sealed-bid auction for electrical work in a city school. The contract was estimated at 9 275€ by the administration's engineer. On the 12th September 1989, the tender commission unsealed the nine bids received for this particular tender and discovered a post-it note on the bid submitted by the firm *SFEE*. On this note figured the exact price submitted by *SFEE* along with the name of another firm, *Simon & Lacherey*, participating in the same tender. Suspecting a bid-rigging scheme, the tender commission alerted the French Competition Authority. After an extensive investigation, the French Competition Authority prosecuted *SFEE* and *Simon & Lacherey* on the grounds of bid rigging on three different markets. For this particular contract, *Simon & Lacherey* submitted a serious bid, 9 546€, *SFEE* submitted a high complementary bid of 21 200€ while six other bidders submitted bids ranging from 9 970€ to 12 964€.[28] However, the ninth firm, *Normandie Electricité*, outbid the cartel with an offer of 8 629€ and was awarded the contract.

While it is easy for cartels to identify competitors in classical markets, the same cannot be said for public procurement as potential competitors may choose to compete or not in each tender. Determining the exact number of outside bidders (or outsiders, hereinafter) that cartels face on a particular tendering procedure may therefore be complicated to anticipate. A mis-anticipation of the level of competition may enable the possibility, for a cartel outsider, of winning the contract. This issue is linked to what economists have called

[27]See www.autoritedelaconcurrence.fr for all the decisions issued by the French Competition Authority starting from 1991.

[28]It is interesting to note that the serious bid submitted by *Simon & Lacherey* is only slightly above the engineer's estimate while the complementary bid submitted by *SFEE* is approximately 2,3 times this estimate and over 60% above the second highest competitive bid.

the external stability of cartels (Güth [1986]). While the internal stability of a cartel raises the question of members breaching the cartel's agreement, the external stability of a cartel concerns the possibility for a cartel to be outbid by non-members.[29] Throughout this paper, we focus on the latter.

Understanding how cartels deal with outside bidders is a challenging question with potentially crucial implications for public policy as outside competition may limit cartel profits. These questions have been partially overlooked in the existing economic literature. Two complementary arguments justify this lack of attention. First, it is widely believed that cartel members enjoy cost asymmetries over outside firms. These asymmetries may be due to the fact that only efficient firms are invited to join the cartel, but they can also be due to the selection of the low cartel bidder. Marshall et al. [1994] summarise the latter argument : "If all bidders are *ex ante* homogenous then collusion among subsets of bidders is very likely to generate asymmetries between participants at an auction". Second, a widespread assumption in theoretical models is that cartels have information on the number of outsiders and on their cost distribution. Thus, if the low cartel bidder enjoys cost asymmetry over other participants, then he might be able to adapt his offer to the number and costs of outside firms, therefore lowering the probability of being outbid by a cartel outsider.

We provide the very first empirical study focusing exclusively on these questions. We first concentrate on the assumption that cartels adapt their offers to the number of outside firms. Given the strict anonymity rules of French public procurement, that is bids are sealed, the identity of bidders is kept secret and valuations are private, we argue that this assumption concerning information available to the cartel may be too strong. We thus first aim at testing whether cartels adapt their low-bid to the number of outside firms. We then study the impact of the number of outside firms on the cartel's probability

[29] A more thorough distinction between both cartel stabilities is available in Fehl and Guth [1987].

of being awarded contracts. Our goal there is to determine whether increased competition by outside firms may prevent cartels from winning procurement contracts.

To compute our tests, we have constructed an original database using public information available in the decisions of the French Competition Authority from 1991 to 2010. To the extent of our knowledge, such a database has not yet been constructed nor exploited in the economic literature.[30] We have gathered data on 114 construction procurement contracts where 33 different cartels have been prosecuted. Available information includes, in particular, the type of tendering procedure used, the number and amounts of the lowest bids submitted by colluders and competitive bidders, the engineer's estimate of the value of the contract as well as the identity of the winning bidder.[31]

We first show that despite the strict anonymity rules of French public procurement, cartels are able to adapt their offers to the number of outside firms. This may be due to information pooling among cartel members: if one firm may not have enough information to precisely estimate the number of firms that will bid for a particular contract, a small number of firms may estimate this number more precisely (see e.g. Clarke [1983] on information sharing among cartel firms). An alternative explanation can be drawn from the growing body of work that links collusion to corruption (Lambert-Mogiliansky [2011]). Cartel members may corrupt the auctioneer in order to access information on the bidders or to lower their bids if an outside firm has outbid them.[32] We then show that this adaptation of the low-bid to the number of outsiders enables cartels to limit their losses due to outside firms. In our discussion, we point out

[30] A recent paper by Arai et al. [2011] mobilizes a database constructed using information taken from the decisions of the Japan Fair Trade Commission. However, the data they have gathered is on cartel organisation. A more thorough presentation of their work is available in our literature review.

[31] An extensive presentation of the data available will be made in Section 2.3.

[32] For instance, Ingraham [2005] provides an example of a corruption scandal in the New York City construction of public schools where the auctioneer manipulated the amounts of the offers of the bribing firms to allow them to win the contracts.

the potentially positive effects of public policies such as allotment procedures aiming at stimulating competition in public procurement by notably raising the number of small businesses participating in the tenders. Indeed, we argue that increasing the number of small firms bidding at an auction may lower the bids even in the presence of a cartel.

The paper is organised as follows. In the next section, we discuss the relevant literature on auctions and collusion and specify how our work departs from it. In section 2.3, we offer a presentation of the database we have constructed and perform a simple statistical test aiming at providing additional support to the quality of our dataset. We adapt the framework developed by Maskin and Riley [2000] to derive a testable proposition and discuss our empirical methodology in section 2.4. In section 2.5, we take our tests to the data and present our results. Section 2.6 discusses the results while our last section concludes with practical implications of public policies.

2.2 Partial Collusion and Data on Collusion

Theoretical results on partial collusion (i.e. when the cartel is not all-inclusive) in auction procedures plead for the use of first-price auctions, the most used procurement procedure at the French and European levels (Chong et al. [2009]). Most notably, Fehl and Guth [1987] study the external stability of cartels in different auction types. They show that this stability is at its lowest in non-incentive compatible pricing rules such as the first-price auction. Moreover, Brisset [2002] shows that when a partial collusive scheme is active, the public buyer's revenue will be higher in first-price auctions than second-price auctions.

The existence and the implications of cost asymmetries between cartel members and outside firms have also been studied in the economic literature. Using data from two cartels of milk supply to public schools in the 1980's,

Pesendorfer [2000] studies the difference in the distribution of bids from cartel members and outsiders. He shows that the *ex ante* cost distribution of cartel bids is stochastically inferior to that of outside firms. This result is compatible with the hypothesis of cost asymmetries between collusive and non-collusive firms. Some theoretical contributions have shown that accounting for cost asymmetries, it is impossible to derive the general form of the cartel's optimal bid (Maskin and Riley [2000]). To circumvent this caveat, Marshall et al. [1994] use numerical methods to approximate these functions.

Most empirical studies on collusion (with the exception of meta-analyses such as Connor and Bolotova [2006]) use data from a single public buyer to study a particular cartel (Porter and Zona [1993, 1999], Bajari and Ye [2003], Lee and Hahn [2002] and Ishii [2009]). To the best of our knowledge, only one other paper on collusion uses a dataset comparable to ours. Yet, contrarily to our work, Arai et al. [2011] study the organisation of collusive agreements using decisions from the Japan Fair Trade Commission. The authors analyse collusive schemes using seven organisational indicators and show that in practice, the schemes studied are relatively simple and generally use no more than two of the seven indicators. Moreover, in 20% of the cases, the organisations of the collusive agreements only cared about equity in the division of the spoils. Yet, the authors argue that their results might be biased as simple schemes may be easier to detect.

Our study departs from previous work for several reasons. First, the dataset we have constructed is original and, to the extent of our knowledge, unique in the literature. Indeed, we use information on public procurement procedures where a collusive scheme has been fined by a Competition Authority. Our dataset contains information on 33 different collusive schemes, enabling us to capture the problems outside firms cause to cartels in a wide diversity of environments. Furthermore, we propose an empirical test enabling us to assess the validity of commonly used hypotheses in the theoretical lit-

erature. Finally, we conclude our study with practical recommendations for public policies.

2.3 Collusive Agreements in the French Construction Industry

2.3.1 Data

The relative absence of work focusing on collusion in public procurement is due to the lack of reliable data on such secretive practices. Yet the internet website of the French Competition Authority now gathers every decision issued since 1991. Moreover the descriptions of the procurement processes in which a collusive scheme was active are more and more detailed. Thus it allows us to get access to a reliable source of data on collusion. Over the period ranging from 1991 to 2010, we have focused on the 221 decisions concerning collusion in the attribution of public contracts. Each of these decisions focused on one cartel operating in at least one market. For the sake of homogeneity, we have restricted ourselves to the construction industry that accounted for 135 of the 221 decisions. Moreover, we only retained the 88 decisions where the Competition Authority proved there was collusion.

The data gathered benefits from a certain diversity compared to previous empirical work. Indeed we have gathered information on 33 different cartels with heterogeneous numbers of members, outsiders and cost distributions. These cartels operated in a wide variety of markets, from simple painting jobs to more elaborate civil engineering. We believe that this diversity enables us to better apprehend the problems caused by outside firms to cartels. Yet we still retain a certain degree of homogeneity, as recommended by the literature.[33] We could have constructed a dataset from more than one country or from

[33]Indeed, as we have already noted, a large part of previous empirical work have relied on case studies following recommendations from Hendricks and Porter [1989].

different sectors. Yet, by restricting ourselves to French cases in public work procurement, we maintain a relatively homogeneous institutional framework.

2.3.2 A decision from the Competition Authority

We now provide a description of the structure of a standard French Competition Authority decision. Although the quality and the quantity of information may vary, there is nevertheless a similar pattern in organisation. Notably, the first page sums up basic information including the title and the reference number of the decision, the instigator of the case and a list of people who were interviewed during the investigation. In a first part, facts about every market in which the cartel is suspected to have been active are given. Unfortunately, the amount of information about each market is random and somewhat unpredictable.[34] This description is then followed by an impartial exposition of the potential evidence of bid-rigging, either observed or found during the dawn raids.

The second part discusses the investigation and the evidence found. Since firms tend to contest the legal formality of the procedures used to retrieve evidence, a first section addresses these claims. A second section provides a detailed discussion of the evidence exposed for every market in which the cartel has been suspected of operating along with the declarations of the main actors (most notably CEOs and employees of suspected and outside firms as well as the public purchaser). On the basis of the evidence and the declarations, prosecution for bid-rigging on each particular market is discussed. A third part calculates the financial sanctions to each firm. The maximum fine is now 10% of a firm's turnover.[35] However, a variety of other factors are taken into

[34]The amount of information varies from the name and date of the tendering procedure to a detailed analysis including, in particular, the engineer's estimation as well as the identity of every bidder and the amount submitted.

[35]In 2001, during the period we study, the maximum fine was raised from 5% of a firm's turnover in France to 10% of its overall turnover.

account, most notably the gravity of the collusive practices, the estimation of the damages to the economy as well as legal precedents and the role of each colluding firm in the scheme.[36] A final part sums up the names of prosecuted firms as well as their individual financial sanctions.

2.3.3 Data gathered

Using information provided in the selected decisions of the French Competition Authority, we have gathered 249 observations, each of which accounts for a construction public tender where a single collusive scheme was sanctioned. Since our focus is on incomplete cartels in first-price sealed bid auctions, 44 observations of all-inclusive cartels and 11 observations of negotiated procedures were dropped, leaving us with a total of 194 public tenders. However, due to lack of information, 80 more observations were dropped leaving us with our final sample of 114 distinct public tenders.

Table 2.1, shown in the appendix, summarises all the available variables and provides basic descriptive statistics. We have notably gathered data on the public buyer which we have divided, in accordance with Chong et al. [2009], between central buyers (i..e. the State, public administrations and public firms) and local buyers (i.e. regions, counties and municipalities) with the variable *Local*. We also have information on the engineers' estimations (*Estimate*), the number of colluders (*Nb_Colluders*) and outsiders (*Nb_Outsiders*) as well as the lowest bids of each of these two groups (resp. *Cartel_Bid* and *Outside_Bid*). We also have identified the firm who submitted the winning bid and whether this firm was part of the cartel (*Cartel_Win*). Approximatively 38% of the contracts in our dataset were awarded by local buyers. Overall cartels were awarded slightly more than 80% of these contracts. In the ten-

[36] For more information on the way the financial sanctions are calculated, we refer the reader to the notice "*on the Method Relating to the Setting of Financial Penalties*" issued by the French Competition Authority, available online at http://www.autoritedelaconcurrence.fr/doc/notice_antitrust_penalties_16may2011_en.pdf

ders, there was a mean of 4.3 cartel members bidding for the contracts and 3.6 outside bidders. Interestingly, there was a lower average number of outside firms when the cartel was not awarded the contract than when the cartel was (respectively, an average of 3.27 and 3.73 outside firms, yet this difference is not statistically significant). Due to missing observations, we could only collect 99 of the 114 observations of the lowest outside offers. Over this sample, the lowest outside bid was on average 3% above the lowest cartel bid.

In order to be more confident of the quality of our data, we use Benford's Law to show that cartel bids were more likely to have been manipulated than outside bids. This law provides the reference frequency distribution of single digits numbers according to their position in a figure. Benford's Law is based on the observation that the number 1 occurs more often than the number 2 as a first digit of real-life data if the data was not manipulated. The same observation can be made for, respectively, the number 2 and the number 3, and so forth. This law has been previously used to detect frauds and manipulations of real-life data such as the manipulation of the Libor rate by banks (Abrantes-Metz et al. [2011, 2012]) or bid-rigging schemes in public procurement (see Vellez [2011]). Results are shown in Table 2.2 and in Figure 2.1 and Figure 2.2, for the two first significant digits of, respectively, cartel bids and outside bids. On these figures, the red line symbolises the reference frequency distribution while the bars show the distribution of our data. Both the observation and the goodness of fit tests tell us that manipulations of the bids are likely to have occurred in the case of cartel bids but not in the case of outside bids, thus comforting us in the quality of our data.[37]

[37]Our graphics and the tests shown in Table 2.2 and in Figure 2.1 and Figure 2.2 are performed on two different samples of observations (99 observations of the lowest bids from outside firms and 114 observations of the lowest bids from cartels). However we obtain the same results when performing both analyses on the 99 observation sample.

2.4 Framework and Empirical Methodology

2.4.1 Framework and Proposition

The following framework focuses on first-price sealed-bid auctions. Consistent with previous work, we use the independent private values paradigm to model construction procurement (Pesendorfer [2000], Bajari and Ye [2003]). Furthermore we focus on asymmetric auctions to analyse collusive behaviour among bidders. It has been argued that, when facing outside competition, cartel members should enjoy *ex ante* asymmetries because, in order to make extra profits, cartel members need to shade their bids up by more than outsiders do.[38] Therefore cartels may only invite efficient firms to join. Moreover cartels are likely to select their most efficient firm to submit their low bid.[39] This selection is likely to create further asymmetries as the chosen cartel firm will enjoy, on average, lower costs than most competitive bidders.

Consider n bidders competing for a public procurement contract. Each bidder's valuation v_i is private information while for other participants it is a random variable $\tilde{v_i}$ with cumulative distribution function (c.d.f.) $F(.)$. A coalition is formed between k of the n bidders ($2 \leq k < n$). The low-cost individual from the coalition is chosen to be the only participant in the auction while the other $n - k$ bidders act non-cooperatively. We are therefore left with a total of $n - k + 1$ bidders. As previously argued, the choice of a single participant among a subset of bidders will create asymmetries between participants. We describe the single coalition bidder as "strong" (s) with c.d.f. $F_s(.)$ and postulate that $F(.)$ first-order stochastically dominates $F_s(.)$. We assume the coalition is unobservable to outsiders. The $n - k + 1$ remaining

[38] Cartel bids should at least reflect the costs of organising the scheme and the probability of being detected and sanctioned. Moreover, in order for the collusive scheme to be profitable for its members, a low cartel bid should include a larger primer than that of outsiders.

[39] Since this is not the goal of this paper, we do not discuss the way the low-cost coalition member is chosen. See Marshall and Marx [2007] for thorough discussions of this topic in similar settings.

bidders then simultaneously submit a bid b_i for the contract.

To sum up, the cartel has three pieces of information available: the precise valuation of its low-cost bidder (v_s), the number of outsiders ($n-k$) and F(.), their valuation distribution. Cartels are supposed rational and will therefore use all the information available to them to maximize their profits. This leaves us with an equilibrium cartel bid b_s of the form:

$$b_s = f[v_s, n-k, F(.)] \tag{2.1}$$

The preceding framework tells us that in order to bid optimally, cartels need to correctly evaluate their own valuation of the contract as well as the number of outside bidders and their valuation distribution. This paper does not seek to prove whether cartels use incentive-compatible mechanisms to choose their low-cost bidder. Moreover, we are unable to estimate the cost distribution of outside firms using the limited data at hand. Instead, we are interested in knowing if cartels at least anticipate the number of outsiders and if this anticipation is done in such ways that it maximises cartel profits. Thus we aim at testing the following proposition.

General Proposition: *When facing competition, cartels should adapt their low bids to the number of outside firms so as to maximise their expected profits.*

2.4.2 Empirical Methodology

In order to test our general proposition, we perform two different sets of regressions. First, our goal is to assess whether the number of outside firms influences the level of the low cartel bid. In order to do so, we estimate the following equation :

$$Cartel\_Bid_i = Nb\_Outsiders_i\alpha_i + X_i\beta + \mu_i \tag{2.2}$$

Where $Cartel\_Bid_i$ is our dependent variable. $Nb\_Outsiders_i$ is the variable we are primarily interested in and α_i its associated coefficient. X_i is our set of covariates (including the number of colluding firms (*Nb_Colluders*), the public engineer's estimation of the amount of the contract (*Estimate*) and whether the contract was awarded by a local public buyer (*Local*)) and β its vector of coefficients. μ_i is the error term.

To be consistent with our general proposition, cartels should anticipate $Nb\_Outsiders_i$, the number of outsiders, which should have a negative impact on $Cartel\_Bid_i$, i.e. the higher the number of outsiders, the lower the serious cartel bid.

Proposition 1: *The number of outside firms should have a significant and negative impact on the amount of the low cartel bid.*

We are unable to directly show whether the resulting adaptation of the low cartel will lead cartels to maximise their profits. However, we can proxy the maximisation of profits by analysing the contract losses of cartels. Indeed, to a large extent, cartel profits are determined by whether collusive firms were awarded contracts or not. Thus, in our second test, our goal is to test whether the resulting adaptation of the low cartel bid (if any) enables cartels to limit their contract losses due to outside firms. We estimate the following equation:

$$P(Cartel\_Win_i = 1|Nb\_Outsiders_i, X_i) = \Phi(Nb\_Outsiders_i\alpha_i + X_i\beta) \tag{2.3}$$

Where $Cartel\_Win_i$ is our dependent variable. Φ is the standard normal c.d.f.. $Nb\_Outsiders_i$ is our variable of interest and α_i its associated coefficient. X_i is our set of control variables including *Nb_Colluders*, *Estimate* and *Local* and β its associated vector of coefficients.

To be consistent with our general proposition and supposing cost asymmetries, if cartels correctly anticipate and adapt their bids to the number of outside firms, then the number of outside firms should not have a significant impact on $Cartel\_Win_i$, i.e. cartel losses should be independent of the number of outside firms bidding for the contract.

Proposition 2: *If Proposition 1 holds and assuming cost asymmetries, the number of outside firms should not impact the cartels' ability of winning contracts.*

When estimating the two previous equations, we are likely to face an omitted variable bias. Indeed, the number of outsiders bidding for the contract may be correlated with unobserved characteristics of the contracts, of the environment or of the cartel operating which may all have an impact on our dependent variables. For instance, since outside firms are likely to be less efficient firms, a lower number of outside firms may participate in the call for tenders if the contract is complex.[40] Yet, the complexity of the work to be done is, in itself, likely to affect both the cartel's bid and its probability of winning the contract. Also, a lower number of outside firms may enter the market if, for example, an efficient cartel is known to be active. As for the complexity of the contract, the efficiency of the cartel will also directly affect both its bid and its probability of being awarded the contract. Thus, we suspect that, in

[40]Though we control for the engineer's estimation of the contract which is one of the proxy commonly used for the complexity of the works, we lack other proxies to better capture the complexity of the contract such as the estimated duration of the contract or the amounts subcontracted (Bajari et al. [2009]; Chong et al. [2009]).

both sets of regressions, our variable *Nb_Outsiders* might be endogenous.

We choose to deal with the endogeneity issue using two methods. First, we attempt to correct the omitted variable bias by estimating our regressions using fixed effects by cartel. Indeed, not only will these fixed effects capture the unobserved characteristics of the cartels but it may also capture some of the unobserved characteristics of the contracts and of the environment. Indeed, a given cartel is likely to compete for similar contracts, in a given sector and in a given period of time. Since all of these characteristics are likely to be captured, we thus believe that the addition of cartel fixed effects will, at least, attenuate the omitted variable bias we are facing. Second, we have constructed an instrument, *Instr_Out*, to deal with the endogeneity issue. A valid instrument should be both relevant (correlated with the variable to be instrumented) and exogenous (uncorrelated with unobserved factors affecting the dependent variable). Prior to the construction of the instrument, we divided our contracts into three sectors of activity that suited our data well (road construction, architecture work and civil engineering) and distinguished between five geographical zones in which the contracts were tendered.[41] For each observation, *Instr_Out* is designed to capture the log of the mean number of outside firms that cartels face in the same sector as the one from the current observation yet in different geographical zones. *Instr_Out* is thus correlated to *Nb_Outsiders* as it captures a proxy of the degree of competition that other cartels face in the same sector. In this sense, *Instr_Out* should have a significant and positive impact on *Nb_Outsiders*. Our instrument is also designed to exclude observations that may have an impact on unobserved factors of the current call for tenders by not making use of information from the same region. Thus, we are confident in the fact that *Instr_Out* is both relevant and exogenous. In the following section, we take our tests to the data.

[41] Sectors are an adapted version of the four sectors distinguished in Lee and Hahn [2002]. The number of sectors was reduced to three as none of our observations were for railroad works. We used the geographical zones created by the ARCEP, the French regulator of telecommunications, that divides the French territory into five distinct geographical zones. For more information, see http://www.arcep.fr/index.php?id=8146#c7916.

2.5 Results

2.5.1 How Cartels Bid?

Results from the regressions of *Cartel_Bid* on *Nb_Outsiders*, our variable of interest, and other covariates are reported in Table 2.3. For every set of regressions, we show two alternative specifications with the second also accounting for the number of firms from the cartel submitting an offer for the contract. This variable is not included in the first specification as we fear that, similar to *Nb_Outsiders*, *Nb_Colluders* may be endogenous. Results from our OLS regressions are shown in Models 1 and 2, while in Models 3 and 4 we add fixed effects by cartel. First stage regressions in Models 5 and 7 are, respectively, associated with our 2SLS regressions shown in Models 6 and 8. In the former models, our instrument is significant and has the expected sign. Moreover, our F-Statistic is above the rule of thumb of 10 (Staiger and Stock [1997]) telling us that we need not worry about a weak instrument issue. In our OLS regressions, *Nb_Outsiders*, our variable of interest has the expected sign yet it is not significant. However, we find that once the cartel fixed effects are taken into account, the coefficient associated with *Nb_Outsiders* becomes statistically significant. This finding is reinforced by our results from our 2SLS regressions where our variable of interest also shows a negative and statistically significant coefficient. Thus, we do find that, once we have satisfyingly corrected the endogeneity issue associated with our variable *Nb_Outsiders*, cartels adjust their bids to the number of outside firms: as the number of outsiders increases, cartels bid more and more aggressively. This finding is in line with Proposition 1.

2.5.2 Cartel Wins

Results from the regressions of *Cartel_Wins* on *Nb_Outsiders*, our variable of interest, and other covariates are reported in Table 2.4. Again, we show the same two specifications for every set of regressions. We report Probit regressions in Models 9 and 10. In Models 11 and 12, we use an Limited Probability Model (LPM) estimator with fixed effects by cartel.[42] Our first stage regressions in Models 13 and 15 are, respectively, associated with our 2SLS regressions reported in Models 14 and 16.[43] Since Models 13 and 15 are exactly similar to Models 5 and 7 of Table 2.3, our instruments are still significant and have the expected sign and we can rule out a weak instrument issue. In every specification reported in Table 2.4, *Nb_Outsiders* is associated with a coefficient that is not statistically different from zero. This finding is in line with Proposition 2.

2.5.3 Alternative Specifications

In our regressions, we have used the actual number of outside bidders as our variable of interest. However we have little evidence to back up our claim that the cartel bids (or the cartel wins) should linearly depend on the number of bidders. If, to our knowledge, most papers do use the actual number of bidders in their estimations of bids in public procurement, other papers have used other (non-linear) forms, such as the log of the number of bidders (see e.g. De Silva et al. [2003] or Price [2008]).[44] In our case, it may be tempting

[42] Unfortunately, we are unable to run probabilistic regressions as there is no consistent estimator for unconditional fixed effects probit models.

[43] Estimating the same specifications using an ivprobit regression yields qualitatively and quantitatively the same results, yet the user-written Stata command Stata "ivreg2" (Baum et al. [2007]) gives us additional qualitative information on our first stage regressions.

[44] In a few studies, other functional forms of the number of bidders have been used. In particular, some studies add the square term of the number of bidders along with the actual number of bidders (see e.g. Lundberg [2005]). However we are unable to do so in this study as such estimations would require at least one additional instrument. This impossibility may be viewed as a current limitation of our study.

to believe that a change from 1 to 2 outside bidders might force cartels to a greater adjustment of their bids than an change from 7 to 8 outsiders. A similar argument may be made for the probability of cartels being attributed the contract. Thus, we have re-estimated equations shown in Table 2.3 and Table 2.4 using the exact same specifications, yet replacing the number of outside bidders by its logarithmic value.[45] Results from these specifications are shown in Tables 2.5 and 2.6. Regressions shown in these tables comfort us in our analysis as they do not change our main findings.

When estimating our second set of regressions, we intend to proxy whether the resulting adaptation of cartels' bids to the number of outside bidders enabled them to maximise their profits. In these tests, we use a dummy variable assessing whether the cartel was attributed the contract or not as our dependent variable. Yet, to better proxy profit maximisation, we should also account for the value of the contracts won or lost. To do so, we ran additional specifications of the estimations shown in Table 2.4 by weighting the estimations on the contracts' estimated values.[46] These results are shown in Table 2.7. Again, these results do not change our main finding: the coefficient associated with the variable *Nb_Outsiders* is still not statistically different from zero.

2.6 Discussion and Limitation

We have shown that, in accordance with classical theoretical assumptions, cartels are able to adapt their low-bids to the number of outside firms. By doing this, they lower their contract losses due to outside firms. Apart from its direct implications, this result seems to root in favour of cost asymmetries between cartel and outside firms. These cost asymmetries may be even larger than expected if we take into account the fact that cartels suffer additional costs compared to outside firms (e.g., costs of organizing the cartel, costs

[45] To be consistent, the number of colluders was also replaced by its logarithmic value.
[46] To allow for weightings, Probit specifications were re-estimated using LPM.

to cover the probability of being detected and punished, etc.). However, as Pesendorfer [2000], we are unable to determine whether these cost asymmetries are *ex ante* cost asymmetries or due to the selection of the low bidder by the cartel.

A more direct implication of this result is that policies that aim at increasing competition to fight collusion may lower the bids from the cartels and therefore increase social welfare. Since cartels have the ability to anticipate and adapt to outside bids, increasing the number of bidders will result in lower cartel bids. We believe that policies such as allotment or decreasing pre-qualification requirements that are likely to increase the participation of small firms may yield particularly positive results when a collusive scheme is suspected. Indeed, as small firms are less efficient, they may not be invited to join the cartel. Thus, these firms are likely to act as outside firms that will force the cartel to lowers its bid.

However a puzzling question remains. Given the strict anonymity rules of French public procurement, how are cartel members able to anticipate outsiders' information? A first answer may come from information sharing among cartel members (see e.g. Clarke [1983]). If a single firm may not have enough information to anticipate its competitors' costs, an aggregation of information from every cartel member may enable them to foresee both the number of outside firms and their average valuation of the contract. An alternative answer may be found in the growing literature linking collusion to corruption. Lambert-Mogiliansky and Kosenok [2009] show that, in order to decrease the uncertainty inherent in public procurement contracts, cartels may capture public authority representatives. Although they primarily define uncertainty as asymmetric information among cartel members and stochastic government demand, we believe that the possibility for a cartel to be outbid by an outsider may equally qualify as environmental uncertainty. Therefore cartels could capture public authority representatives to either provide them with information

regarding other competitors or adjust their bids during the unsealing stage as it was the case in the New York City corruption scandal analysed in Ingraham [2005].

Our results currently have one important limitation. Indeed, we know our data is truncated since we only observe cartels that have been detected by a Competition Authority. In particular, we are concerned with the way the Competition Authority screens for potential collusion in public procurement since it may induce biases in our database. That is, if one specific aspect of bid-rigging or market characteristic is closely examined in order to detect collusion, in particular if econometric tests are performed to screen for collusion, we may end up with an overrepresentation of this aspect or characteristic in our database. If this were the case, we would likely be able to use information about the tests to correct our data. However, our talks with some representatives of the Competition Authority have led us to believe that econometric methods are not used. In fact, cases dealt with by the French Competition Authority are either filed by an ex-cartel member through the leniency programme or by a public entity or a cartel outsider as a complaint. Although this may induce fewer biases than if econometric tests were used, we still fear that our data may be biased. Since many reasons can motivate an ex-cartel member or a cartel outsider to report uncompetitive behaviour, we are unable to correct this potential bias. Therefore, the reader should bear in mind that this is a possible limitation of our results.

2.7 Concluding Remarks

We analyse less than all-inclusive cartels in construction-work procurement tenders. Our goal is to understand the impact of the number of outsiders on cartel behaviour. Using a database on 33 different cartels constructed using publicly available information in the decisions of the French Competition

Authority, we first show that the number of outsiders is a significant determinant of the cartel's low bid. Moreover, we show that the number of outside firms does not significantly impact the probability of cartels being awarded contracts.

Therefore, we conclude that the number of outsiders does not impact the ability of cartels to win procurement contracts because the latter anticipate the number of outsiders, thus allowing cartels to bid accordingly. If cartels are able to adjust their bids in such ways, we believe this provides further evidence of the existence of cost asymmetries between cartel members and outsiders. Unfortunately, it is impossible to distinguish between asymmetries that arise from the selection of the low-cost bidder by the cartel and those that are due to *ex ante* cost asymmetries between cartel members and outside firms. Nevertheless, we believe this result yields additional attestation of the efficiency of cartels. If our results are correct, we believe that policies that aim at fighting collusion by encouraging the entry of small businesses in the market may be efficient in lowering cartel bids. Therefore, public policies such as allotment or decreasing pre-qualification requirements should be encouraged, especially when a collusive scheme is suspected.

Appendix

Table 2.1: **Definition of Variables and Main Statistics**

Variable	Definition	Nb. Obs.	Min	Max	Mean	St Dev
Cartel_Win	Dummy variable that equals one when the cartel was awarded the contract	114	0	1	.8070	.3964
Estimate	Log of engineer's estimation	114	9.135	17.91	13.35	1.868
Cartel_Bid	Low cartel bid divided by the engineer's estimation	114	.5424	1.844	1.005	.1910
Outside_Bid	Low outside bid divided by the engineer's estimation	99	.6600	1.683	1.043	.1532
Nb_Colluders	Number of bidders from the cartel	114	2	12	4.316	2.247
Nb_Outsiders	Number of outside bidders	114	1	13	3.640	2.406
Local	Dummy equals to one if the public buyer is a local public buyer and 0 if not local	114	0	1	.3802	.4874
Instr_Out	Log of the mean number of outside firms that other cartels face in the same sector yet in different geographical zones	114	2.15	4.711	3.667	1.018

Table 2.2: **Goodness of fit tests for Benford's Law**

First Significant Digit of Lowest Bids

Test	**P-Value for Cartels**	**P-Value for Outsiders**
Pearson's $\chi 2$	0.0035	0.5914
Log Likelihood Ratio	0.0015	0.5693

Second Significant Digit of Lowest Bids

Test	**P-Value for Cartels**	**P-Value for Outsiders**
Pearson's $\chi 2$	0.2004	0.3681
Log Likelihood Ratio	0.1996	0.3822

Figure 2.1: **Low Cartel Bids and Benford's Law**

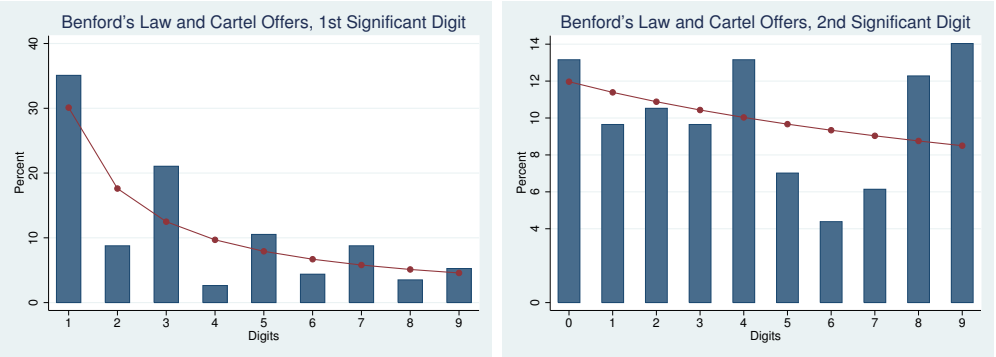

Figure 2.2: **Low Outside Bids and Benford's Law**

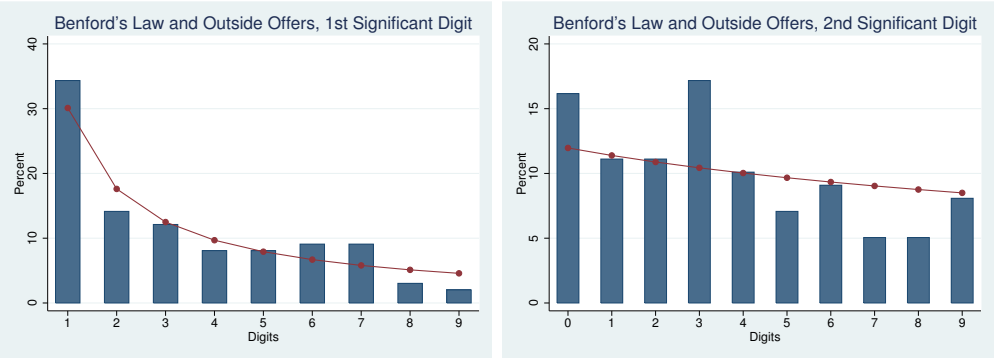

Table 2.3: **Regressions of the Cartel Bids**

	Model 1 OLS *Cartel_Bid*	Model 2 OLS *Cartel_Bid*	Model 3 OLS *Cartel_Bid*	Model 4 OLS *Cartel_Bid*	Model 5 1st Stage *Nb_Outsiders*	Model 6 2SLS *Cartel_Bid*	Model 7 1st Stage *Nb_Outsiders*	Model 8 2SLS *Cartel_Bid*
Estimate	-0.009	-0.009	-0.031	-0.033	-0.133	-0.023*	-0.136	-0.023*
	(0.007)	(0.007)	(0.023)	(0.024)	(0.100)	(0.013)	(0.102)	(0.013)
Local	0.060*	0.054+	0.011	-0.024	0.040	0.090*	0.060	0.086+
	(0.036)	(0.036)	(0.051)	(0.054)	(0.497)	(0.052)	(0.509)	(0.054)
Nb_Outsiders	-0.006	-0.006	-0.015*	-0.015*		-0.069**		-0.071**
	(0.007)	(0.007)	(0.009)	(0.009)		(0.034)		(0.035)
Nb_Colluders		-0.005		-0.013			0.031	-0.005
		(0.006)		(0.010)			(0.096)	(0.010)
Instr_Out					2.104***		2.135***	
					(0.539)		(0.567)	
Constant	1.132***	1.148***	-	-	2.662*	1.535***	2.525+	1.565***
	(0.098)	(0.107)	-	-	(1.484)	(0.265)	(1.553)	(0.284)
FE by Cartel	NO	NO	YES	YES	NO	NO	NO	NO
Nb. Obs.	114	114	101	101	114	114	114	114
R^2	0.029	0.032	0.053	0.077	0.090	-0.573	0.091	-0.612
F-Stat	-	-	-	-	10.98	-	10.36	-

Note: Standard errors in parentheses. + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. In our FE specifications, singleton observations of cartels were dropped.

Table 2.4: **Regressions of Cartel Wins**

	Model 9 Probit *Cartel_Win*	Model 10 Probit *Cartel_Win*	Model 11 LPM *Cartel_Win*	Model 12 LPM *Cartel_Win*	Model 13 1st Stage *Nb_Outsiders*	Model 14 2SLS *Cartel_Win*	Model 15 1st Stage *Nb_Outsiders*	Model 16 2SLS *Cartel_Win*
Estimate	0.029	0.007	0.001	0.003	-0.133	0.017	-0.136	0.016
	(0.071)	(0.073)	(0.054)	(0.055)	(0.100)	(0.029)	(0.102)	(0.029)
Local	-0.133	0.087	-0.388+	-0.363	0.040	-0.056	0.060	-0.025
	(0.284)	(0.308)	(0.257)	(0.272)	(0.497)	(0.087)	(0.509)	(0.088)
Nb_Outsiders	0.058	0.060	0.018	0.018		0.055		0.070
	(0.051)	(0.052)	(0.015)	(0.015)		(0.070)		(0.069)
Nb_Colluders		0.175**		0.010			0.031	0.035***
		(0.069)		(0.014)			(0.096)	(0.014)
Instr_Out					2.104***		2.135***	
					(0.539)		(0.567)	
Constant	0.325	-0.163			2.662*	0.406	2.525+	0.197
	(0.987)	(1.074)			(1.484)	(0.591)	(1.553)	(0.599)
FE by Cartel	NO	NO	YES	YES	NO	NO	NO	NO
Nb. Obs.	114	114	101	101	114	114	114	114
R^2	0.032	0.033	0.043	0.063	0.138	-0.299	0.140	-0.303
F-Stat	-	-	-	-	10.98	-	10.36	-

Note: Standard errors in parentheses. + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. In our FE specifications, singleton observations of cartels were dropped.

Table 2.5: **Regressions of the Cartel Bids (using the log number of outsiders)**

	Model 1 OLS *Cartel_Bid*	Model 2 OLS *Cartel_Bid*	Model 3 OLS *Cartel_Bid*	Model 4 OLS *Cartel_Bid*	Model 5 1st Stage *Nb_Outsiders*	Model 6 2SLS *Cartel_Bid*	Model 7 1st Stage *Nb_Outsiders*	Model 8 2SLS *Cartel_Bid*
Estimate	-0.010+	-0.010+	-0.031	-0.033	-0.048+	-0.023*	-0.049+	-0.023*
	(0.007)	(0.007)	(0.023)	(0.024)	(0.031)	(0.012)	(0.031)	(0.012)
Local	0.058+	0.055+	0.012	-0.023	-0.079	0.069+	-0.066	0.065+
	(0.036)	(0.036)	(0.056)	(0.067)	(0.127)	(0.043)	(0.135)	(0.044)
Log_Nb_Outsiders	-0.028	-0.028	-0.044	-0.040		-0.198**		-0.199**
	(0.026)	(0.027)	(0.033)	(0.033)		(0.093)		(0.093)
Log_Nb_Colluders		-0.012		-0.063			0.053	-0.012
		(0.026)		(0.047)			(0.128)	(0.038)
Instr_Out					0.747***		0.751***	
					(0.172)		(0.175)	
Constant	1.150***	1.164***			0.782*	1.501***	0.713	1.517***
	(0.101)	(0.117)			(0.463)	(0.236)	(0.506)	(0.256)
FE by Cartel	NO	NO	YES	YES	NO	NO	NO	NO
Nb. Obs.	114	114	101	101	114	114	114	114
R^2	0.029	0.032	0.053	0.077	0.090	-0.573	0.091	-0.612
F-Stat	-	-	-	-	13.63	-	13.31	-

Standard errors in parentheses. + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. In our FE specifications, singleton observations of cartels were dropped.

Table 2.6: **Regressions of Cartel Wins (using the log number of outsiders)**

	Model 9 Probit *Cartel_Win*	Model 10 Probit *Cartel_Win*	Model 11 LPM *Cartel_Win*	Model 12 LPM *Cartel_Win*	Model 13 1st Stage *Nb_Outsiders*	Model 14 2SLS *Cartel_Win*	Model 15 1st Stage *Nb_Outsiders*	Model 16 2SLS *Cartel_Win*
Estimate	0.021	0.004	0.000	0.001	-0.048+	0.016	-0.049+	0.015
	(0.073)	(0.072)	(0.054)	(0.055)	(0.031)	(0.029)	(0.031)	(0.028)
Local	-0.112	0.083	-0.374	-0.370	-0.079	-0.039	-0.066	0.006
	(0.280)	(0.298)	(0.301)	(0.310)	(0.127)	(0.080)	(0.135)	(0.079)
Log_Nb_Outsiders	0.063	0.066	0.025	0.025		0.159		0.173
	(0.193)	(0.200)	(0.052)	(0.052)		(0.200)		(0.197)
Log_Nb_Colluders		0.594**		0.007			0.053	0.147**
		(0.262)		(0.084)			(0.128)	(0.067)
Instr_Out					0.747***		0.751***	
					(0.172)		(0.175)	
Constant	0.564	-0.043			0.782*	0.433	0.713	0.227
	(1.046)	(1.125)			(0.463)	(0.564)	(0.506)	(0.575)
FE by Cartel	NO	NO	YES	YES	NO	NO	NO	NO
Nb. Obs.	114	114	101	101	114	114	114	114
R^2			0.021	0.021	0.138	-0.052	0.140	-0.031
F-Stat	-	-	-	-	13.63	-	13.31	-

Standard errors in parentheses. + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. In our FE specifications, singleton observations of cartels were dropped.

Table 2.7: **Weighted Regressions of Cartel Wins**

	Model 9 LPM *Cartel_Win*	Model 10 LPM *Cartel_Win*	Model 11 LPM *Cartel_Win*	Model 12 LPM *Cartel_Win*	Model 13 1st Stage *Nb_Outsiders*	Model 14 2SLS *Cartel_Win*	Model 15 1st Stage *Nb_Outsiders*	Model 16 2SLS *Cartel_Win*
Estimate	0.051**	0.045**	-0.012	-0.011	-0.320	-0.039	-0.318+	-0.026
	(0.020)	(0.021)	(0.040)	(0.040)	(0.238)	(0.084)	(0.205)	(0.071)
Local	-0.135	-0.119	-0.206	-0.215	-1.638***	-0.263	-1.727***	-0.210
	(0.101)	(0.094)	(0.144)	(0.154)	(0.453)	(0.183)	(0.450)	(0.164)
Nb_Outsiders	-0.003	-0.004	0.015	0.016		-0.157		-0.122
	(0.012)	(0.014)	(0.015)	(0.017)		(0.114)		(0.101)
Nb_Colluders		0.010		-0.002			0.110	0.014
		(0.008)		(0.006)			(0.161)	(0.017)
Instr_Out					2.203***		2.853**	
					(0.733)		(1.422)	
Constant	0.111	0.152			6.065	2.018	4.810	1.630
	(0.356)	(0.372)			(4.257)	(1.679)	(5.076)	(1.457)
FE by Cartel	NO	NO	YES	YES	NO	NO	NO	NO
Nb. Obs.	114	114	101	101	114	114	114	114
R^2	0.137	0.144	0.010	0.010	0.191	-0.534	0.216	-0.251
F-Stat	-	-	-	-	7.04	-	3.48	-

Standard errors in parentheses. + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. In our FE specifications, singleton observations of cartels were dropped. Regressions are weighted by the value of the contract.

Part II

The Impact of Discretion on Outcomes

Chapter 3

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

3.1 Introduction

To a large extent, the regulation of the procurement process is designed to prevent manipulation by bureaucrats. McCubbins et al. [1987] show that strict procedural rules can be used to align the interests of the regulator and the public agent, thus limiting favouritism and corruption. Yet, since the beginning of the 1990's, the New Public Management scholars have called for a decrease in the *ex ante* control of public buyers exerted through regulation. Instead, according to these authors, procurement should rely on the discretion and empowerment of public buyers to reach clear and transparent goals set by regulators. Indeed, procedural rules are viewed as barriers to efficiency as they imply more difficult, longer and more costly contracting, especially for small purchases (Potoski [2008]). On the public side, Kelman [2005] notes that

*This chapter is based on a joint work with Anissa Boulemia. The authors are grateful to Lisa Chever, Michael Klien, Stéphane Saussier, Carine Staropoli, Tra Phuong Tran and Anne Yvrande-Billon for their valuable comments on different versions of this chapter. The authors would also like to thank Paris Habitat-OPH for providing data and useful information.

rules imply delays which generate costs. The author also argues that strict rules will lead the public buyer to focus on implementing these rules rather than targeting efficient outcomes. On the firms' side, an accumulation of rules increases the fixed costs of submitting an offer (Greenstein [1995]) as they lead to longer procedures with increased paperwork. These additional costs may decrease the number of firms competing for contracts, and, in particular, the number of SMEs (Small and Medium Enterprises) for which participation costs are particularly high (Albano et al. [2006]).

With public procurement accounting for a substantial share of developed countries' GDP (around 13% of OECD countries' GDP in 2011 (OECD [2013])), the efficiency of public procurement is crucial. And, in particular, the accessibility of all firms to such an important market is decisive, both to ensure firms' growth and to improve the overall competitiveness of public procurement (Saussier [2009]). Still, there have been recurring debates surrounding the accessibility of public procurement to SMEs. Indeed, while on the one hand the economic development of SMEs through public procurement has been raised as an important vector for national growth (see the recent reports for the French government: Attali [2008] and Gallois [2012]), on the other hand statistics still emphasize the difficulties SMEs face to access these markets: they account for 43% of France's value added but only share an estimated 28% of the total value of French public procurement (OEAP [2011]).

In practice, it has been argued that major events could influence the degree of regulation of the procurement process. Pegnato [2003] shows how procurement legislation in the US has "oscillated" between very tight and very relaxed controls notably in response to wars. A similar event happened to the regulation of French procurement as a response to the current financial crisis. Indeed, as part of the recovery plan of the French government, a 2008 decree substantially raised the threshold restricting the use of adapted procedures ("adapted procedures" or "mapas", hereinafter) from 230 000€ to 5 150 000€

for public work contracts.[47] Compared to other available procedures, adapted procedures are non formalised procedures that give the public buyer some discretion to adapt most key dimensions of the procedure to his needs. Indeed, public buyers have, for instance, more freedom to adapt the publicity and the delays of the procedure to the work to be done as well as more freedom regarding pre-qualification requirements. This raise of threshold aimed at fluidifying public procurement by decreasing procedural rules imposed on public buyers. In addition, mapas have also been associated with the aim of increasing the access to public procurement by SMEs through a decrease in the barriers to participation (i.e. both entry costs and pre-qualification requirements).[48]

Along the same line, for the last 20 years, the New Public Management *doctrines* (see Hood and Jackson [1991]) have had a significant direct or indirect impact on the reshaping of procurement regulations. 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. Yet, in spite of positive feedback, Potoski [2008] notes that there is a lack of empirical studies focusing on the effects of increased discretionary power on outcomes. This gap in the existing literature is particularly worrisome considering (i) the amounts involved in public procurement (ii) that decreasing procedural rules may have an adverse effect on the level of manipulation of public procurement (in particular, it may increase favouritism or corruption) and thus lead to distorted outcomes in terms of prices and/or quality as well as in terms of allocation.

This study attempts to fill that gap by studying the effects of adapted

[47] Adapted procedures are often referred to as "mapa" or "mapas" in reference to their legal names "Marchés À Procédures Adaptées".

[48] Note that the aim of increasing the participation of SMEs through mapas is underlined in official documents. See for instance this explanatory leaflet on adapted procedures from the "Direction des Affaires Juridiques", a subdivision of the French Ministry of Finance and Economics (notably in charge of writing the French procurement code): http://www.economie.gouv.fr/files/directions_services/daj/marches_publics/conseil_acheteurs/fichestechniques/miseenoeuvreprocedure/marchesproceduresadaptees.pdf.

procedures on the two goals identified by the French government (fluidifying the procurement process and improving SMEs' access to procurement contracts) as well as on the overall efficiency of the process. We start by theoretically discussing the potential benefits of these procedures with respect to the two aims set. Our discussion underlines potential antagonisms between these goals. We then empirically test the impact of adapted procedures on several outcomes: the length of the procedure (a proxy for the fluidity of the procurement process), the proportion of SMEs entering (i.e. sending a candidature), their probability of submitting satisfactory candidatures (i.e. being admitted to bid) as well as their probability of winning contracts. We also assess the impact of these procedures on the amount of the winning bid. These effects are compared with those of traditional formalised procedures (i.e. open auctions and formalised procedures with a negotiation phase). 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. These contracts were tendered between January 2004 and July 2011. Available information includes the type of procedures used, the engineer's 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, the amounts of the winning bids, etc. Using information provided by Paris Habitat-OPH and taken from the candidature documents of firms, we also have distinguished SMEs from large firms.

We first provide some evidence that these procedures did in fact decrease the length of the process by focusing on a particular (yet representative) part of the procurement process. Then, after dealing with the endogeneity issue associated with the choice of using mapas, we find generally positive results on our other outcomes. Indeed, while these procedures did not alter the proportion of SMEs submitting candidatures, we do find that these procedures significantly raised the probability of SMEs being admitted to bid (yet, this

increased participation of small businesses to the bidding stage was not enough to significantly raise SMEs' probability of winning contracts). Moreover, we find that these positive results do not come at a higher price for the public body (on the contrary, these procedures are found to have a quite large and negative impact on prices although the associated coefficient is not statistically significant). All these results are robust to a range of robustness checks including the addition of firm fixed effects as well as clustering at the contract level. We conclude by underlining the limitations of our study and by discussing the implications of our results for public policies.

The rest of this paper is organized as follows. Section 3.2 provides a review of the literature on the impact of discretion on efficiency as well as on the factors determining the access of SMES to procurement contracts. Section 3.3 presents the institutional framework with emphasis on the awarding procedures available to French public buyers as well as their associated thresholds. We notably discuss adapted procedures and show that they are likely to lead to mixed results concerning the objectives set. Next, we describe the data we have gathered from our public buyer as well as its potential restrictions. Section 3.4 also provides empirical evidence of the impact of adapted procedures on the length of the procurement process. Section 3.5 describes our empirical methodology, discusses our choice of instruments for the public buyer's decision to select adapted procedures and presents our results. We also perform a range of robustness checks to enhance the credibility of our results. We discuss our results and their limitations in Section 3.6 and conclude by underlining the implications of our study for public policies.

3.2 Discretion, Small Businesses and Efficiency

3.2.1 Discretion and Outcomes

In this section, we review a recent body of empirical work that has attempted to contribute to our understanding of 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 study 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. In accordance with previous work, the effects of this procedure are notably assessed on efficiency. Yet we also depart from this work by focusing on a reduction of public buyers' administrative burden in a homogenous institutional environment. In addition, we also analyse the use of adapted procedures on another outcome aimed by the regulator: the access of SMEs to public procurement. Related to this last point, in the following subsection, we review and replace our work within the literature assessing the impact of several public policies on small business access to procurement contracts.

3.2.2 SMEs in Public Procurement

Morand [2003] theoretically studies the implications of such policies on two SMEs and one large firm. The author finds that both the bid preference program and the 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 the 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. [2011] 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.

With respect to the aforementioned studies which assess the impact of policies aiming at increasing SMEs' access to procurement contracts by discriminating in favour of these firms, our paper, on the other hand, evaluates the effect of a non-discriminatory procurement procedure that aims at increasing the access of small businesses to public contracts by decreasing barriers to participation. Thus, in the following, we present an overview of the related literature in order to identify those barriers.

3.2.3 Barriers to Participation and SMEs

Barriers to participation of firms in French public procurement can be divided into entry costs and pre-qualification requirements.[49] [50] 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 [2012] and Leslie and Zoido [2005]). 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).

[49] 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.

[50] 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).

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

3.3 Awarding Procedures: Description and Distinction

3.3.1 Thresholds and Organisation of Procedures

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).[51] [52] 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

[51] 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.

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

("the Code", hereinafter). Since these thresholds have been changed several times during the period we study, Table 3.1 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 3.1: **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. Table 3.5, shown in appendix, summarises this information on the three awarding procedures our public buyer used. 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.[53] [54] 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 a negotiation phase and adapted procedures, the negotiation phase has to be announced in the publicity.

3.3.2 Expected Impact of Non Formalised Procedures

This section aims at analysing the rationale beyond the implementation of mapa. To do this, 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) enable the fluidification of the process and (ii) impact the access of SMEs to public procurement, building on the barriers to participation identified in Section 3.2.3.

Regarding the publicity requirements, adaptations can be undertaken both in terms of support and content. Concerning the support, formalised procedures oblige the public buyer to publish the tender both within the French national database (BOAMP) and the European one (JOUE). Using mapa, the 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). 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 European ones. Using mapa, below 90,000 euros, the public buyer has no obligation regarding the content. From

[53]The implications of this difference regarding the number of candidatures received by our public buyer are discussed in Section 3.4.2.

[54]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.

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.

As regards to the pre-qualification requirements, formalised procedures require all the following documents:

- The "Lettre de Consultation" in which the public buyer has to request the necessary elements in order to ensure that the firm has the legal right to bid (i.e. a sworn statement regarding the respect of its social and financial obligations), as well as the necessary competence to execute the contracts.[55]

- The "Cahier des Clauses Administratives Générales / Particulières" (CCAG / CCAP) which defines the administrative dispositions of the contract (e.g. identification of the contractors, definition of the subject, mention of the price, duration of the contract).

- The "Cahier des Clauses Techniques Générales / Particulières" (CCTG / CCTP) or "Cahier des Charges" describing the public buyer's technical requirements. On this basis, the firm has to establish its offer in the form of a methodological note or technical brief containing a number of elements related to the different requirements (e.g. diploma, certification,

[55]Concerning proofs of competences, the documents the public buyer can require are listed within the law (Governmental order August 26, 2006): While the public buyer is not obliged to ask for all of them, he has nevertheless to request a sufficient number of them for the technical, professional and financial experience of the firm to be evaluated (CE 2008, CE 2009).

implementation methodology, allocated resources).

- The "Acte d'Engagement" in which the final offer is formalised.
- The "Bordereau des Prix" that gives details of the different elements of the final price.

When using mapa, the public buyer can reduce this formalism to the following documents: the "Lettre de Consultation" (here, the public buyer does not have to follow the law in terms of documents to be required (see footnote 55) but any other substitutes of proof can be accepted) and eventually a mini "Cahier des Charges". From the public buyer's side, this adaptation enables a reduction of his administrative burden both in terms of the number of documents and content to be produced for tendering and consequently to be analysed and compared before awarding the contract. From the firms' side, it might decrease the costs related to the preparation and submission of the 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.

Concerning delays, formalised procedures impose a minimum of 52 days for firms to submit their offers (starting from the publication of the notice). When using mapa, no minimum is required.[56] Formalized procedures also oblige the buyer to wait 16 days after he has sent losing firms an explanation for their elimination in order for them to be able to contest the decision. Using mapa, the public buyer does not have to respect this delay. From the public buyer's side, this reduction in the procedural delay enables more flexibility and to adapt the process to the degree of urgency of his 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

[56]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.

time-consuming for these firms.

Finally, concerning post-selection requirements, formalised procedures oblige the public buyer to undertake two administrative tasks before notifying the winning firm: first, the public buyer has to write a report justifying the regularity of both the procedure and his choices (e.g. justifying the procedure used, why some candidates were rejected or the reasons motivating the selection of the winning firm). Second, as discussed in the previous paragraph, the public buyer has to inform all eliminated candidates of the reason for their refusal. Using mapa, the public buyer is exempted from these constraints (though he can voluntarily execute them).[57] From the public buyer's side, this adaptation enables him to decrease the number of documents to be produced and thus his administrative burden. From the firms' side, information on the reasons why they were rejected might facilitate the preparation and submission of future offers. Hence, the removal of this information might decrease future participation of SMEs in particular (regardless of the procedure used).

From this section, we understand the rationale behind the implementation of mapa concerning the fluidification of the procedure through the possibility, for the public buyer, of reducing his administrative burden as well as of decreasing the delays of the procedure; on the other hand, the effect in terms of access of SMEs is found to be ambiguous regarding entry and positive regarding their probability to be admitted to bid. In the following, we start by presenting the data we used and then expose our empirical methodology to test these hypotheses.

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

3.4 Data

3.4.1 Our Dataset

We have gathered data 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.[58] These contracts consisted of the construction or restoration of social housings in the Parisian area.[59] Table 3.6, shown in appendix, summarises the information we have gathered. We have gathered information on the public engineer's estimate of the value (*Estimate*) and the duration (*Duration*) of the contract. We also have information on the procedure used and, in particular, whether the public buyer chose to use an adapted procedure (*Mapa*). Our variable *Nb Candidates* corresponds to the number of candidatures received for each contract. For each of those, we know whether the buyer chose found the candidature satisfactory or not (*Admitted*) and we have calculated a proxy for the experience of each firm by using the log of the number of candidatures previously submitted (*Firm Experience*). A similar proxy for the experience of the winning firms has been derived (*Winner Experience*). In addition, we calculated proxies for the backlog of each firm (*Utilization Rate*) as well as for the backlog of its rival candidates (*Rivals Utilization Rate*). Finally, we have data on the amount of the winning bid (*Norm. Winning Bid*, which is normalised using the estimated value of the contract) as well as on how much of this amount was subcontracted to other firms (*Subcontracted*).

Our public buyer received a total of 3868 candidatures for these contracts (i.e. a mean of 7.8 candidatures per contract) and more than 86% of these candidatures were accepted. The average contract lasted 8.7 months and was

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

[59] Paris Habitat-OPH is divided between several departments, each of which being in charge of a particular type of public work (e.g. construction of new buildings, rehabilitation of old buildings, etc.).

estimated at slightly more than 1.5 million euros. Contract values ranged from a minimum of 15,000€ to a maximum of 22,600,000€. Around 22% of the average contracts were subcontracted by the winning firm and, in our sample, 73% of the contracts had at least one subcontracting firm. Formalised procedures with a negotiation phase and mapas 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. An employee of Paris Habitat-OPH is in charge of keeping track of the structure of the firms who submitted at least one candidature for a contract. This information is taken from the documents included in the firms' candidatures.[60] We were therefore able to merge the data on contracts with information on individual firms. In order to distinguish SMEs from other firms, we retained the definition of the European Union.[61] The European Union defines an SME as a firm with less than 250 employees and a turnover under 50 million euros.[62] Out of the 3,686 candidatures received and the 472 winning firms in our sample, we were able to identify, respectively, 3,190 and 429 SMEs from large firms (see respectively our variables *Candidate SME* and *Winner SME*).[63] In the end, 53% of the candidatures received by Paris Habitat-OPH were from SMEs. They were awarded approximatively 50% of the contracts,

[60]Candidatures are made up of various administrative documents. Some of these documents include information on the firm. Most notably, we used the turnover, the number of employees and whether the firm is independent or affiliated with a group.

[61]Commission Recommendation of May, the 6th 2003. Available online at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:124:0036:0041:EN:PDF.

[62]The European Commission states that if a firm is affiliated with a larger group, the previously stated conditions should be applied to the group as a whole. Since we do not have any information on the turnovers or the number of employees of the groups, we only retained independent firms as SMEs (i.e. all group-affiliated firms were treated as non-SMEs). Consequently, our definition of an SME is slightly more restrictive than that of the European Commission. Nevertheless, since industrial groups from the construction industry in France tend to be quite large (e.g. *Bouygues*, *Vinci*, *Eiffage*, *Veolia*, etc.), the difference between the two definitions should be quite small.

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

yet these contracts only accounted for less than one third of the total value of the contracts awarded, this latter figure being 7 percentage points under the corresponding aggregate figure for French public work procurement (OEAP [2011]).[64]

3.4.2 Restriction of the Data

Traditionally, researchers use the number of candidatures either to assess entry or to control for the competitiveness of the environment. However, as we have discussed in Section 3.3.1, formalised procedures with a negotiation phase are differently organized than mapas 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 3.2). 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. Thus, 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. These restrictions of the data have two important drawbacks for our study. Firstly, we are unable to directly compare the number of candidate SMEs in adapted procedures to that in other procedures. We circumvent this caveat by focusing on the proportion of candidate SMEs (*Share SMEs*) which should not be affected by this difference in organisation of the procedures. Second,

[64]Note that this difference may be partially due to the fact that the "Observatoire Économique de l'Achat Public" (OEAP) used a less restrictive definition of SMEs (they used the definition of the European Commission, see footnote 62 for more details). Moreover, differences in average contract value or complexity between our sample and the whole sample of French public work contracts may also play a role. Unfortunately, the OEAP does not provide such information for the public work contracts considered in their study.

we are also unable to control for the competitiveness of the environment by adding the number of candidates as a covariate in our tests.

Table 3.2: **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

In addition, we miss information on two important aspects: negotiations and technical quality. On the latter, we lack information on the technical quality associated with the winning bid. This may have important implications as our public buyer always selected offers according to both price and quality. Thus, the absence of information on technical quality may be troublesome when estimating the impact of adapted procedures on the amount of the winning bid. Though our instrumental variable strategy will cure the omitted variable bias issue, further limitations of our absence of information on quality is discussed in Section 3.6.

3.4.3 Mapas and Administrative Burden

The use of mapas enables public buyers to avoid some of the paperwork required in formalised procedures as well as to reduce some of the delays of the procedure. Section 3.3.2 provided the main documents and delays that could be adapted to the work to be done. Reducing the administrative burden of public buyers is likely to have an impact on the length of the procedure (see Kelman [2005]) contributing to reach the government's aim of fluidifying the procurement process.

Here we intend to test the link between the lower administrative burden and the duration of the procedure. Because adapted procedures can be used

with and without negotiation (which may increase the length of the procedure) and because we are lacking this information, a direct comparison between the lengths of mapas and formalised procedures might be misleading. Thus, we chose to focus our attention of a particular delay: the time elapsed between the "Commission d'Appel d'Offres" (in charge of selecting the winning firm) and the notification to the winning firm (i.e. the moment when the public buyer officially announces its selection to the supplier).

Because negotiations are unlikely to impact the delay between the CAO and the notification and because the reduction of the administrative burden during this time is representative of the differences between formalised and non formalised procedures as a whole, we use this gap of time to assess whether adapted procedures enable a reduction in the length of the procedure. Table 3.3 shows statistics on the number of months separating these two events in both formalised and non-formalised procedures. Evidently, non-formalised procedures seem to reduce this delay by an average of over two months.[65] Yet, these descriptive statistics do not account for differences that may impact this delay (e.g. simple transactions, to which mapas are restricted by thresholds, may imply less paperwork or the number of candidatures may increase the duration because buyers have to communicate with each evicted candidate). Thus, we report, in Table 3.7, simple OLS regressions accounting for differences in contracts (*Estimate*, *Duration* and *Subcontracts*), in competition (*Nb Candidates*) and in the backlog of contracts awaiting to be notified (*Nb Contracts*). All statistically significant results are as one would expect. As for *Mapa*, our variable of interest, we find that, once accounting for all covariates, adapted procedures allow a decrease in this particular delay of more than 40 days. Hence, we believe this result provides some evidence that the decrease in administrative burden of public buyers leads to a significant decrease in the duration of the procedure.

[65]Interestingly, both procedures have a few outliers. Yet, when looking closer at the data, non-formalised procedures only have one delay over 14 months (i.e. the maximum of 23 months) whereas formalised procedures have 9 delays between 14 months and 18 months.

Table 3.3: **Length in Months Between the Selection of the Supplier and its Notification**

Used Procedure	Nb. Obs	Mean	Std. Dev.	Min	Max
All Procedures	472	5.79	3.37	1	23
Formalised Procedures	283	6.78	3.36	1	18
Non-Formalised Procedures	189	4.30	2.81	1	23

3.5 Methodology and Results

3.5.1 Methodology

To assess the impact of adapted procedures on outcomes in public procurement, we use several dependent variables: the share of candidate SMEs, the probability of being admitted to bid for SMEs and large firms, the probability that an SME wins the contract and the amount of the winning bid. Thus, we estimate the following equations:

$$Share\ SMEs = \gamma_0 + Mapa_n\gamma_1 + Controls_n\Gamma_2 + C\Gamma_3 + \epsilon_n \tag{3.1}$$

$$P(Admitted = 1 \mid Mapa_n, Controls_{ni}, C) = \Phi(\gamma_0 + Mapa_n\gamma_1 + Controls_n\Gamma_2 + C\Gamma_3) \tag{3.2}$$

$$P(Winner\ SME = 1 \mid Mapa_n, Controls_n, C) = \Phi(\gamma_0 + Mapa_n\gamma_1 + Controls_n\Gamma_2 + C\Gamma_3) \tag{3.3}$$

$$Norm.\ Winning\ Bid = \gamma_0 + Mapa_n\gamma_1 + Controls_n\Gamma_2 + C\Gamma_3 + \epsilon_n \tag{3.4}$$

Where our dependent variables are either *Admitted*, *Winner SME*, *Share SMEs* or *Norm.* *Winning Bid* and $\Phi(.)$ is the standard normal cumulative distribution function. *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 or to firm i when bidding for contract n (*Estimated*, *Duration*, *Subcontracted*, *Firm Experience* and/or *Winner Experience*, *Utilization Rate*, *Rivals Utilization Rate* and *Price Index*) and Γ_2 its vector of coefficients. C is a matrix consisting of year and month 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. We also add month dummies to account for Paris Habitat-OPH's yearly agenda. γ_0 is a constant and ϵ the error term.

According to our discussions with public buyers of Paris Habitat-OPH, there was a centralised decision within Paris Habitat-OPH to encourage the use of mapa when possible. However, in our data, mapas were only used for approximatively 78% of contracts below the associated thresholds. Evidently, despite this recommendation, public buyers sometimes decided to use other procedures. Therefore, the procedure used still resulted, in some cases, from a decision taken by individual public buyers. As a result, when estimating the previous equations, we are likely to face an omitted variable bias. In particular, the choice of public buyers to use mapas may be based on his own expectations on the outcomes. For instance, since adapted procedures enable the public buyers to reduce pre-qualification requirements, they may be more prone to choose such procedures when they expect potential competition for the contract to be scarce. *Mapa* could therefore be suspected to be endogenous. To solve this endogeneity problem, we use an instrumental variable approach for which we have constructed three instruments. To be valid, our instruments must be relevant (i.e. correlated with the instrumented variable) and exogenous (i.e. uncorrelated with 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. 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. 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 in other departments, 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 procedure through another channel than the choice of the procedure, satisfying the exogeneity condition.

We have constructed two additional instruments related to the evolution of the activity of the Parisian administrative courts. There are two main administrative courts in France. The *Tribunal Administratif*, which is in charge of ruling all administrative litigations and the *Cour Administrative d'Appel*, in charge of dealing with the appeals of the former court. Notably, these courts are in charge of judging cases in which the organization of a procurement procedure was litigious. Every March, the *Conseil d'Etat* issues a report describing the previous year's evolution of the activity of these courts. To the best of our knowledge, these reports are the only official source of information on the activity of administrative courts. We believe that the publication

of these reports will influence the choice of procedure by public buyers. If the activity of administrative courts rises, it may indicate that the awarding of public contracts tends to be increasingly challenged on their overall organization as well as on specific rules. To avoid being challenged (and thus being discredited) in such ways, Paris Habitat-OPH's hierarchy may put more pressure on public buyers to use adapted procedures when the activity of the administrative courts rises. Indeed, since mapas consist of a lower number of rules and can be more freely adapted to the buyer's needs, the probability, for a public buyer, of being challenged on a specific rule or on the overall organisation of the procedure should be lower than with formalised procedures. Thus, adapted procedures seem to be a convenient choice of procedure to avoid being challenged by frivolous claims of evicted candidates. *Evolution TA* and *Evolution CAA* are, respectively, the previous year's evolution of the number of cases dealt with by the *Tribunal Administratif de Paris* and the *Cour Administrative d'Appel de Paris*.[66] These evolutions are reported in Table 3.4. Based on our previous discussion, we expect both of these variables to have a positive and significant effect on the choice of using adapted procedures. A potential problem with the exogeneity of these instruments would be likely to arise if these courts were also in charge of handling favouritism or corruption cases. In this case, our instruments would likely be correlated to the error term.[67] In France, favouritism and corruption are penal infractions that are dealt with by the *Tribunal Correctionnel*. Another feature of our instruments that comforts us in their exogeneity is that the evolutions specified in the reports of the *Conseil d'Etat* are lagged evolutions. Indeed, in a given year 't', the *Conseil d'Etat* reports the evolution between years 't-2' and 't-1'. This lag comforts us as it excludes any direct influence of these evolutions of litigations on our dependent variables (i.e. the change in behaviour of firms leading them to litigate more could also have impacted the way these firms answer the call for tenders, thus violating the exogeneity condition). Hence, we exclude any

[66] To do this, we use the data available in the reports of the *Conseil d'Etat*.

[67] Indeed, our instruments would have an impact on the outcomes through the buyer's decision to recourse to favouritism or corruption.

impact of the evolution of the activity of administrative courts on our outcomes other than through the choice of an adapted procedure, satisfying the exogeneity condition.

Table 3.4: **Values Taken by *Evolution TA* and *Evolution CAA***

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011
Value of *Evolution TA*	7.9	10.46	-7.81	21.21	-10.23	-3.96	18.87	-3.55	-10.2
Value of *Evolution CAA*	11.81	11.47	22.72	10.24	13.52	-13.46	6.9	6.53	3.57

3.5.2 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 and month dummies. In our instrumental variable regressions, depending on the strength of our instruments, we use 2SLS or Limited Information Maximum Likelihood (LIML, hereinafter) regressors. In all of our first stage regressions, our instruments consistently have the expected signs and, with a few exceptions, they are significant. We always reported the F-Statistic associated with these first stage regressions. Whenever these values are below Stock and Yogo [2005]'s 10% threshold, we may fear a weak instrument issue. Thus, in these cases, we also reported Moreira's Conditional Likelihood Ratio (CLR) confidence sets and corrected p-values for the tests of statistical significance. Moreira's CLR allows for robust inference in the case of weak instruments.[68] In our second stage regressions, we always report the p-values associated with the Hansen J-Statistic. These latter are consistently above the 10% threshold, telling us that we may consider our instruments exogenous provided that at least one of them is.

[68] Andrews et al. [2006] prove that Moreira's CLR is close to efficient regardless of the strength of the instruments.

3.5.2.1 Results on the Share of Candidate SMEs

We report the results from the OLS and LIML regressions of the variable *Share SMEs* on *Mapa*, our variable of interest and other covariates in Table 3.8. In Models 4 and 5, we show the OLS regressions (i.e. not taking into account the endogeneity issue associated with the choice of using mapas). Models 6 and 8 present the first stage regression of the choice of using an adapted procedure. They are, respectively, associated with the LIML regressions of Models 7 and 9. We show two specifications for each set of regressions. First, we only add exogenous variables related to the contract (*Duration* and *Estimate*). In the second specification, we add the variable *Subcontracted* that captures the amount of the contract that was subcontracted. This variable has been previously identified in the literature as being a proxy for the complexity of the contract (Chong et al. [2009]). Yet, since the amount subcontracted is only available for the winning firm, we fear this variable may be endogenous. Results from this last specification should therefore be taken cautiously.

In our OLS regressions, we find that mapas are associated with a positive yet statistically non significant coefficient. Adapted procedures are therefore expected to have no impact on the proportion of candidate SMEs for the contracts. Looking at the results from our covariates we find that the more expensive the contract, the less SMEs participate compared to the number of large firms. Yet, we cannot establish whether this result comes from the fact that, due to their limited available capacities, SMEs participate less in tenders for high valued contracts or from the fact that large firms may favour participating in tenders for large contracts over several small contracts because they allow for economies of scale (or both). Interestingly, neither the duration of the contract nor the amount subcontracted have a significant impact on our variable of interest. Results from the LIML regressions do not change from our OLS specifications in the sense that the coefficients associated with *Mapa* are still positive and non significant (though their magnitudes vary). We are

comforted in our results by the p-value for the test of statistical significance from Moreira's CLR which confirms that the coefficient associated with the use of adapted procedures is not statistically different from 0. The use of such procedures is therefore found not to have an impact on the share of SMEs participating in the call for tenders. Overall, results concerning our covariates are in line with those of our OLS regressions.

3.5.2.2 Results on the Probability of being Admitted to Bid

Table 3.9 reports the results of the Probit regressions of the variable *Admitted* on *Mapa*, our variable of interest and other covariates for the whole sample of firms and two subsamples (SMEs only and large firms only). Average marginal effects for our variable of interest are reported in Table 3.10. In Tables 3.11 and 3.12, we show the results from the 2SLS regressions using our three instruments, respectively for the whole sample and our two subsamples. For each sample, we show three specifications using different sets of covariates. Our first specification includes only exogenous variables related to the contract (*Duration* and *Estimate*). In the second specification we add *Firm Experience*, a variable designed to proxy the experience of the firm submitting the candidature. Our final specification adds a third variable related to the contract, *Subcontracted*.

Results from the probit regressions shown in Table 3.9 suggest that the use of mapas significantly raises the probability of being admitted to bid for large firms (by close to 5%) but not for SMEs, though the coefficient is positive. This result might come from the fact that Mapas were advertised as a pro-SME procedure and can be increasingly used by public buyers when they expect SMEs to have trouble being admitted to bid for the contract. If so and as we have previously discussed, the use of mapas is likely to be endogenous and the results from these estimations will be biased. Concerning our control

variables, firm experience naturally has a significant and positive impact on the probability of all firms being admitted to bid. A more experienced firm is therefore more prone to have its candidature accepted by the public buyer. Unsurprisingly, all measures of the complexity of the contract significantly reduce the probability of SMEs of being admitted. The same results are found for large firms with the exception of the estimation of the contract which has a positive sign (however it is not significant in most specifications).

Tables 3.11 and 3.12 show the results from the 2SLS regressions for the probability of being admitted. Results from these second stage regressions on the whole sample are similar to those of Table 3.9, though the coefficient associated with our variable *Estimate* is no longer significant (note that this is also true for the regression results on our two subsamples). The use of mapas significantly increases the likelihood of firms being admitted to bid by close to 16%, *ceteris paribus*. Results from our second stage regressions for our two subsamples, on the other hand, differ from those in Table 3.9 for our variable of interest. Indeed, we show that, when satisfactorily dealing with the endogeneity issue associated with the use of adapted procedures, our variable *Mapa* has a positive and significant impact for SMEs only, whereas it no longer has a significant impact for large firms. The use of adapted procedures therefore seems to only increase the probability of SMEs having their candidatures accepted, by slightly more than 20%.

3.5.2.3 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 Probit and LIML regressions of *Winner SME* are reported in Table 3.13. We report three alternative specifications which are close to those of the previous subsection with the exception that the variable *Firm Experience* is replaced with the variable *Winner*

Experience which proxies the experience of the winning firm by capturing the log of the number of contracts previously won.[69]

Unsurprisingly, our Probit results point to the fact that SMEs have lower probability of winning high value and more subcontracted contracts. The duration of the contract has a significant and positive impact on *Winner SME*. That is, holding the estimation of the contract constant (as well as other covariates), SMEs will have a higher probability of winning long term contracts. The experience of the winning firm is negatively correlated with our dependent variable. This might only result from the fact that SMEs are less experienced than large firms. Concerning *Mapa*, our variable of interest, we find a negative, yet non-significant coefficient. This finding is corroborated by our LIML regressions and by Moreira's CLR confidence sets and p-values which support our finding that the coefficient associated with *Mapa* is not statistically different from zero. The use of an adapted procedure therefore seems to have no impact on the probability that an SME will win the contract.

3.5.2.4 Results on Efficiency

In this last subsection, we focus on the effect of using adapted procedures on the amount of the winning bid (we normalise the winning bid by dividing it by the estimation of the contract). Results from our OLS and LIML regressions are shown in Table 3.14. We show three different specifications. In the first specification, we only account for exogenous variables that might have an impact on the level of the winning bid: the estimated duration (*Duration*) and amount (*Estimate*) of the contract and the price index in the construction industry (*Price Index*). Then, we also account for the amount subcontracted (*Subcontracted*). In the final specification, we add variables to account for the available capacities of the candidate firms : *Utilization Rate* and *Rivals*

[69]Note that our main results are unaffected by this change of variable.

Utilization Rate.

Our OLS result systematically show a negative and significant sign associated with our variable of interest. The use of adapted procedure is thus suspected to decrease the amount of the winning bid by close to 10%. Yet, this result does not hold once accounting for the endogeneity issue associated with the use of adapted procedures. Indeed, our LIML regressions still show a negative coefficient yet it is no more significant. Overall, our other results are as one would expect: longer and more subcontracted (i.e. more complex) contracts attract significantly higher levels of bids. Unsurprisingly still, the amount of the winning bid positively depends on the candidates' available capacities (when potential candidates have lower available capacities, the resulting winning bid is significantly higher). However, the coefficient associated with the variable *Utilization Rate* in Model 54 is more puzzling. The less available capacities a winning firm has, the lower the resulting winning bid. Previous work has sometimes found a similar result in comparable environments (see e.g. Chever and Moore [2013]). This result may be due to decreasing returns of scale, explaining why a firm handling more contracts submits a lower winning bid.

3.5.3 Robustness Checks

3.5.3.1 Adding Firm Fixed Effects

Adapted procedure has clearly been advertised as being a procedure in favour of SMEs. As a result, different firms may submit a candidature when this procedure is used compared to when the other two procedures are used. In particular, smaller firms, which have a lower probability of being accepted, may submit a candidature when a mapa is used. Since our goal is to capture solely the effect of the procedure on the probability that a candidature will be accepted, we run another set of regressions adding fixed effects by firm.

These fixed effects allow us to account for all unobserved heterogeneity at the firm level and therefore focus on the effect of the procedure itself. We expect the resulting effect of the addition of firm fixed effects to regressions shown in Tables 3.11 and 3.12 to actually play in our favour: if smaller firms are candidates to adapted procedures, then accounting for firm specificities will yield an even larger coefficient associated with *Mapa*, our variable of interest. Results from these regressions are shown in Tables 3.15 and 3.16. With the exception of the addition of firm fixed effects, Tables 3.15 and 3.16 reproduce the exact organisation of, respectively, Tables 3.11 and 3.12 (with the notable exception that Models 68, 70 and 72 are estimated using a LIML regression as our instruments fail to reach the critical value of Stock and Yogo (2005)'s 10% threshold when using a 2SLS estimator). In accordance with our prediction, results from Models 62, 64 and 66 yield a larger and more significant coefficient than without the use of firm fixed effects. On the other hand, results from Models 68, 70 and 72 do not change in the sense that the coefficient associated with *Mapa* is still negative and not statistically different from zero. We thus confirm that adapted procedures have a positive impact on the probability of candidate SMEs being accepted but no such effect on large firms.

3.5.3.2 Share of SMEs in Admitted Firms

In Tables 3.12 and 3.16, we estimated the impact of mapas on SMEs' probability of being admitted to bid. We found estimates ranging from a 19.8% to a 44% percent increase in this probability. On the other hand, probabilities of large firms being admitted to bid did not significantly change. From these results, we expect that when using mapas there should be a higher share of SMEs in the sample of firms having been admitted to bid than when using other procedures. We here intend to test whether this is the case in order to provide more comfort about our results. To do so, we have constructed the variable *SMEs Admitted* which captures the share of SMEs in the sam-

ple of firms having been admitted to bid. We use the same specifications as the ones from Table 3.8. LIML regressions of our variable *SMEs Admitted* are reported in Table 3.17, shown in appendix. Results confirm our previous findings: the coefficient associated with mapa is positive and significant and is corroborated by Moreira's CLR p-value. The use of adapted procedures is found to significantly increase the share of SMEs among the firms admitted to bid.

3.6 Discussion and Implications for Public Policies

In this paper, we analyse the impact of adapted procedures, awarding procedures that allow more discretionary power to public buyers to adapt some key dimensions of the procedure to their needs, on several outcomes. In particular, we assess the impact of these procedures on the two aims set by the government (fluidifying the procurement process and raising SMEs' participation in public procurement) as well as on efficiency. We first provide some evidence that using adapted procedures enables public buyers to decrease the overall length of the procedure. Thus, we believe that the decrease in the administrative burden did fluidify the procurement process by significantly decreasing the length of the procedure.

After dealing with the endogeneity issue associated with the use of adapted procedures, we show that entry is not mitigated by the use of such procedures, at least in terms of the share of SMEs competing. This result may be put in line with our discussion in Section 3.3.2 showing that several contradicting effects may influence entry decisions when using adapted procedures. In particular, allowing public buyers to adapt some aspects of the formalism of the procedures may enhance SMEs access. However, other aspects such as the decrease in publicity requirements or the possibility of decreasing the delay of response may deter the entry of SMEs.

We then show that the use of adapted procedures significantly raises SMEs probability of being admitted to bid. No such effect is found when analysing large firms. We interpret this as the result of the clear decrease in pre-qualification requirements (and thus a decrease in barriers to participation in public procurement) associated with these procedures. High qualification requirements are frequently underlined by SMEs as barriers to participation in public procurement (Loader [2007]).

Yet, we then have shown that in spite of the fact that adapted procedures significantly raise SMEs' probability of being admitted to bid, these procedures do not impact the probability that an SME is awarded the contract. We interpret this result as 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. We believe that this finding may be linked to the existence of cost asymmetries between SMEs and large firms. 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 find that these generally positive results do not come at a higher price for the public body. Quite on the contrary, our OLS results show a significant decrease while our instrumental variable strategy shows a non significant decrease in prices paid. Two caveats should be underlined here. First, while our public buyer chose bids according to price and technical quality criteria, we did not assess for the latter part of the offer. As a result, even if the amounts of the winning bids are found not to increase, there may be an adverse effect on the quality offered. Unfortunately, we are unable to assess whether this is the case. Second, we do not assess the impact of such procedures on the total cost of the contract (that is the amounts of the winning bid and renegotiations). In particular, we fear that decreasing pre-qualification

requirements, because it enables the participation of less experienced firms, could have an adverse effect on the amounts renegotiated.

Our results have several implications for public policies. First, there have been debates in both economic and management literature over whether decreasing procedural rules, as it is the case in adapted procedures, will increase the level of corruption. As far as we can tell from our data, the raise in discretion of public buyers associated with adapted procedures did not lead to significantly higher prices.[70] Thus, our results, along with other recent studies such as Bandiera et al. [2009], contribute to show that the link between discretion and corruption may not be as obvious as other works often argue in a transparent framework such as that of French public procurement.

Second, we found that adapted procedures significantly increase the participation of SMEs in the bidding stage. As argued by Moore [2012], this increase in the participation of SMEs is a means of fighting collusion. Indeed, when a collusive scheme is suspected to be active, increasing the number of SMEs bidding for the contract is likely to create competition for the cartel as less cost efficient firms will not be invited to join the scheme. This increase in competition from SMEs will then result in cartels submitting more aggressive bids to secure the contracts, thus lowering their collusive gains.

Finally, our results point to the fact that cost asymmetries may be another important barrier preventing SMEs from winning procurement contracts. If the legislator's goal is to promote fair competition between SMEs and large firms, allowing public buyers to use tools such as adapted procedures will, at least partially, contribute to reaching that goal. However if, as it has been sometimes proposed by politicians and legislators, the aim of a reform is to significantly enhance SMEs' probability of winning contracts, then other tools

[70] Though, as we have argued above, in order to completely rule out a significant raise in corruption, we should also assess the effects of these procedures on the total cost of the contracts (i.e. including the amounts renegotiated and holding the technical quality of the winning bid constant).

affecting the costs of SMEs or the level of competition they face from large firms should also be made available to public buyers. Theoretical and empirical studies (Morand [2003], Krasnokutskaya and Seim [2011] and Athey et al. [2011]) 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 lead to increased procurement costs (particularly for set-asides), these discriminating policies could still be considered as potential solutions and be made available to public buyers.

Appendix

Table 3.5: **Characteristics of the three awarding procedures used**

Open call for tenders (formalised procedure)	Publicity	Reception of the candidatures AND the offers	Selection of the candidates		Analysis of the offers			Selection of the winner	Notification to the winner
Formalised procedure with a negotiation phase	Publicity	Reception of the candidatures	Selection of the candidates	Reception of the offers	Analysis of the offers	Negotiation phase	Second offer analysis	Selection of the winner	Notification to the winner
Adapted procedure (non-formalised procedures)	Publicity	Reception of the candidatures AND the offers	Selection of the candidates		Analysis of the offers	Optional negotiation phase	Second offer analysis	Selection of the winner	Notification to the winner

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

Table 3.6: **Descriptive Statistics**

Variable Name	Description	Nb. Obs.	Mean	Std. Dev.	Min	Max
	Across Contracts					
Mapa	Equals 1 if the contract was awarded using an adapted procedure, 0 otherwise	472	0.400	0.491	0	1
Winner SME	Equals 1 if the winner of the contract is an SME, 0 otherwise	429	0.499	0.501	0	1
Duration	Estimated duration of the contract in months (derived by the public buyer prior to the start of the procedure)	472	8.752	6.585	1	38
Estimate	Log of estimated contract value in euros (derived by the public buyer prior to the start of the procedure)	472	13.039	1.491	9.616	16.933
Subcontracted	Log of the amount subcontracted by the winning firm	472	8.634	5.510	0	16.911
Nb Candidates	Number of firms who submitted a candidature for the contract	472	7.809	5.536	1	31
Winner Experience	Log of the number of previous contracts won by the winning firm	472	0.855	0.862	0	2.944
Share SMEs	Number of SMEs having submitted a candidature for the contract divided by the total number of candidates	469	0.522	0.308	0	1
SMEs Admitted	Number of SMEs admitted to bid for the contract divided by the total number of admitted firms	469	0.469	0.315	0	1
Norm. Winning Bid	Winning bid divided by the estimation of the value of the contract by Paris Habitat-OPH	472	0.907	0.283	0.149	2.799
Price Index	Price Index in the construction industry (derived by the French national institute for statistics (INSEE)	472	1417.4	109.38	1225	1638
Nb Contracts	Log of the number of contracts currently awaiting notification to the winning firm	472	3.428	0.393	1.098	3.951
	Across Candidatures					
Admitted	Equals 1 if the candidature of the firm was accepted, 0 otherwise	3686	0.8684	0.3381	0	1
Firm Experience	Log of the number of previous candidatures submitted by the firm	3686	1.567	1.211	0	4.465
SME Candidate	Equals 1 if the candidate is an SME, 0 otherwise	3190	0.5329	0.4990	0	1
Utilization Rate	Amount of contracts currently handled by the firm divided by the maximum amount of contracts simultaneously handled by the firm	3686	0.1075	0.2666	0	1
Rivals Utilization Rate	Mean *Utilisation Rate* of rival candidate firms for the current contract	3686	0.1181	0.1178	0	1

Table 3.7: **Mapas and Length of the Procedure**

	Model 1 OLS *Diff Length*	Model 2 OLS *Diff Length*	Model 3 OLS *Diff Length*
Mapa	-2.067***	-1.309***	-1.372***
	(0.315)	(0.332)	(0.340)
Nb Contracts			-0.523
			(0.397)
Subcontracted			0.055*
			(0.032)
Nb Candidates		0.160***	0.167***
		(0.028)	(0.028)
Duration	0.098***	0.128***	0.131***
	(0.031)	(0.029)	(0.029)
Estimate	-0.002	-0.086	-0.261+
	(0.164)	(0.149)	(0.175)
Constant	5.786***	5.067***	8.603***
	(2.005)	(1.815)	(2.762)
Nb. Obs.	472	472	472
Adj. R^2	0.158	0.212	0.217

Note: Standard errors in parentheses. + p < 0.15, * p < 0.10, ** p < 0.05, *** p < 0.01. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance.

Table 3.8: **Mapas and Share of SMEs**

	Model 4 OLS *Share SMEs*	Model 5 OLS *Share SMEs*	Model 6 1st Stage *Mapa*	Model 7 LIML *Share SMEs*	Model 8 *1st Stage* *Mapa*	Model 9 LIML *Share SMEs*
Mapa	0.060+	0.060+		0.186		0.188
	(0.038)	(0.038)		(0.201)		(0.203)
Subcontracted		0.001			0.000	0.001
		(0.003)			(0.004)	(0.003)
Duration	0.002	0.002	0.008**	0.002	0.008**	0.002
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
Estimate	-0.103***	-0.106***	-0.210***	-0.077*	-0.211***	-0.080*
	(0.016)	(0.019)	(0.019)	(0.044)	(0.022)	(0.044)
Routines			0.031		0.031	
			(0.022)		(0.022)	
Evolution CAA			0.008***		0.008***	
			(0.003)		(0.003)	
Evolution TA			0.004**		0.004**	
			(0.002)		(0.002)	
Constant	1.811***	1.839***	2.602***	1.472***	2.610***	1.493***
	(0.197)	(0.220)	(0.238)	(0.566)	(0.258)	(0.566)
Nb. Obs.	469	469	469	469	469	469
Adj. R^2	0.256	0.255	0.484	0.235	0.483	0.233
F-Stat			4.56		4.55	
10% Threshold			6.46		6.46	
Moreira's CLR				[-0.354, 0.892]		[-0.352, 0.899]
P-value				0.434		0.429
Hansen J Stat				0.521		0.512

Note: Standard errors in parentheses. + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance. The "10% Threshold" and "15% Threshold" reported in the Table correspond to the critical values of Stock-Yogo's weak identification test. We reported the p-values associated with the Hansen J-statistic. We also reported Moreira's Conditional Likelihood Ratio (CLR) confidence set and the corrected p-value for the test of statistical significance.

Table 3.9: **Admissions and MAPA: Probit**

	Model 10 Probit *Admitted*	Model 11 Probit *Admitted*	Model 12 Probit *Admitted*	Model 13 Probit *Admitted*	Model 14 Probit *Admitted*	Model 15 Probit *Admitted*	Model 16 Probit *Admitted*	Model 17 Probit *Admitted*	Model 18 Probit *Admitted*
	Whole Sample			**SMEs only**			**Non-SMEs only**		
Mapa	0.294***	0.291***	0.262**	0.181	0.178	0.159	0.504**	0.477**	0.420**
	(0.108)	(0.109)	(0.111)	(0.141)	(0.141)	(0.144)	(0.198)	(0.197)	(0.202)
Firm Experience		0.194***	0.209***		0.110**	0.124***		0.147***	0.168***
		(0.031)	(0.032)		(0.044)	(0.044)		(0.049)	(0.049)
Subcontracted			-0.038***			-0.032***			-0.048***
			(0.009)			(0.011)			(0.017)
Duration	-0.016**	-0.021***	-0.021***	-0.031***	-0.034***	-0.034***	-0.030**	-0.033**	-0.032**
	(0.007)	(0.007)	(0.008)	(0.010)	(0.010)	(0.010)	(0.013)	(0.013)	(0.014)
Estimate	-0.104***	-0.114***	-0.035	-0.343***	-0.339***	-0.267***	0.109+	0.096	0.191**
	(0.037)	(0.037)	(0.043)	(0.053)	(0.053)	(0.059)	(0.067)	(0.067)	(0.080)
Constant	2.181***	2.227***	1.451***	5.063***	4.954***	4.212***	-0.085	0.040	-0.799
	(0.445)	(0.446)	(0.494)	(0.665)	(0.659)	(0.705)	(0.813)	(0.811)	(0.914)
Nb. Obs.	3190	3190	3190	1594	1594	1594	1490	1490	1490
Pseudo R^2	0.070	0.091	0.098	0.143	0.148	0.154	0.052	0.064	0.077

Note: Standard errors in parentheses, + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance.

Table 3.10: **Average Marginal Effects relative to Table 3.9**

	Model 10 AME	Model 11 AME	Model 12 AME	Model 13 AME	Model 14 AME	Model 15 AME	Model 16 AME	Model 17 AME	Model 18 AME
	Whole Sample			**SMEs only**			**Non-SMEs only**		
Mapa	0.048***	0.047***	0.042**	0.036	0.035	0.031	0.058**	0.054**	0.047**
	(0.018)	(0.018)	(0.018)	(0.028)	(0.027)	(0.028)	(0.023)	(0.023)	(0.023)

Table 3.11: **Admissions and MAPA: 2SLS (Whole Sample)**

	Model 19 1st Stage *Mapa*	Model 20 2SLS *Admitted*	Model 21 1st Stage *Mapa*	Model 22 2SLS *Admitted*	Model 23 1st Stage *Mapa*	Model 24 2SLS *Admitted*
Mapa		0.125+		0.138*		0.142*
		(0.079)		(0.079)		(0.079)
Firm Experience			0.002	0.031***	0.004	0.034***
			(0.005)	(0.005)	(0.005)	(0.005)
Subcontracted					-0.003**	-0.005***
					(0.002)	(0.001)
Duration	0.011***	-0.003**	0.010***	-0.004***	0.010***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Estimate	-0.185***	-0.000	-0.185***	0.000	-0.176***	0.015
	(0.008)	(0.015)	(0.008)	(0.015)	(0.008)	(0.015)
Routines	0.078***		0.078***		0.078***	
	(0.008)		(0.008)		(0.008)	
Evolution CAA	0.003***		0.003***		0.003***	
	(0.001)		(0.001)		(0.001)	
Evolution TA	0.002***		0.002***		0.002***	
	(0.001)		(0.001)		(0.001)	
Constant	2.411***	0.816***	2.412***	0.790***	2.320***	0.641***
	(0.098)	(0.195)	(0.098)	(0.195)	(0.104)	(0.192)
Nb. Obs.	3190	3190	3190	3190	3190	3190
Adj. R^2	0.470	0.026	0.470	0.035	0.471	0.038
F-Stat	43.54		43.62		43.70	
10% Threshold	9.08		9.08		9.08	
Hansen J Stat		0.250		0.280		0.364

Note: Standard errors in parentheses, + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance. The "10% Threshold" reported in the Table corresponds to the critical values of Stock-Yogo's weak identification test. We reported the p-values associated with the Hansen J-statistic.

Table 3.12: **Admissions and MAPA: 2SLS (SMEs and Non-SMEs)**

	Model 25 1st Stage *Mapa*	Model 26 2SLS *Admitted*	Model 27 1st Stage *Mapa*	Model 28 2SLS *Admitted*	Model 29 1st Stage *Mapa*	Model 30 2SLS *Admitted*	Model 31 1st Stage *Mapa*	Model 32 2SLS *Admitted*	Model 33 1st Stage *Mapa*	Model 34 2SLS *Admitted*	Model 35 1st Stage *Mapa*	Model 36 2SLS *Admitted*
	SMEs Only						**Non-SMEs Only**					
Mapa		0.198*		0.204*		0.207*		0.023		0.022		0.018
		(0.108)		(0.108)		(0.108)		(0.108)		(0.108)		(0.108)
Firm Experience			0.008	0.020**	0.009	0.022***			0.009	0.018***	0.011+	0.021***
			(0.008)	(0.008)	(0.008)	(0.008)			(0.008)	(0.006)	(0.008)	(0.006)
Subcontracted					-0.002	-0.005***					-0.006**	-0.005***
					(0.002)	(0.002)					(0.002)	(0.002)
Duration	0.008***	-0.007***	0.008***	-0.008***	0.008***	-0.008***	0.012***	-0.003+	0.011***	-0.003*	0.011***	-0.003*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Estimate	-0.203***	-0.029	-0.203***	-0.027	-0.198***	-0.014	-0.165***	0.009	-0.166***	0.008	-0.152***	0.020
	(0.010)	(0.023)	(0.010)	(0.023)	(0.012)	(0.023)	(0.012)	(0.018)	(0.012)	(0.018)	(0.013)	(0.017)
Routines	0.084***		0.084***		0.084***		0.064***		0.064***		0.064***	
	(0.011)		(0.011)		(0.011)		(0.013)		(0.014)		(0.014)	
Evolution CAA	0.003**		0.003**		0.003**		0.002		0.002		0.001	
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Evolution TA	0.002*		0.002*		0.002*		0.002*		0.002*		0.002**	
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Constant	2.634***	1.118***	2.626***	1.084***	2.573***	0.936***	2.187***	0.787***	2.188***	0.791***	2.058***	0.675***
	(0.131)	(0.297)	(0.132)	(0.297)	(0.144)	(0.299)	(0.152)	(0.229)	(0.152)	(0.229)	(0.154)	(0.228)
Nb. Obs.	1700	1700	1700	1700	1700	1700	1490	1490	1490	1490	1490	1490
Adj. R^2	0.479	0.071	0.479	0.071	0.479	0.072	0.432	0.008	0.433	0.014	0.435	0.019
F-Stat	27.72		27.74		27.70		9.49		9.39		9.34	
10% Threshold	9.08		9.08		9.08		9.08		9.08		9.08	
Hansen J Stat		0.391		0.409		0.509		0.602		0.629		0.727

Note: Standard errors in parentheses, + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance. The "10% Threshold" reported in the Table corresponds to the critical values of Stock-Yogo's weak identification test. We reported the p-values associated with the Hansen J-statistic.

Table 3.13: **Mapas and SMEs' Wins**

	Model 37 Probit *Winner SME*	Model 38 Probit *Winner SME*	Model 39 Probit *Winner SME*	Model 40 1st Stage *Mapa*	Model 41 LIML *Winner SME*	Model 42 1st Stage *Mapa*	Model 43 LIML *Winner SME*	Model 44 1st Stage *Mapa*	Model 45 LIML *Winner SME*
Mapa	-0.124	-0.148	-0.143		0.102		0.081		0.059
	(0.187)	(0.191)	(0.193)		(0.359)		(0.358)		(0.352)
Winner Experience		-0.234***	-0.217**			-0.033+	-0.078**	-0.034+	-0.072**
		(0.084)	(0.085)			(0.022)	(0.032)	(0.022)	(0.032)
Subcontracted			-0.038**					0.003	-0.013**
			(0.016)					(0.004)	(0.006)
Duration	0.047***	0.052***	0.050***	0.011***	0.013**	0.012***	0.014**	0.012***	0.013**
	(0.017)	(0.017)	(0.018)	(0.004)	(0.006)	(0.004)	(0.006)	(0.004)	(0.006)
Estimate	-0.488***	-0.482***	-0.390***	-0.217***	-0.134*	-0.214***	-0.132*	-0.222***	-0.101
	(0.088)	(0.090)	(0.103)	(0.019)	(0.078)	(0.019)	(0.077)	(0.022)	(0.080)
Routines				0.047**		0.045**		0.046**	
				(0.022)		(0.022)		(0.022)	
Evolution CAA				0.008***		0.008***		0.008***	
				(0.003)		(0.003)		(0.003)	
Evolution TA				0.004*		0.004*		0.004*	
				(0.002)		(0.002)		(0.002)	
Constant	6.096***	6.050***	5.164***	2.684***	2.185**	2.653***	2.168**	2.731***	1.873*
	(1.095)	(1.125)	(1.229)	(0.243)	(1.009)	(0.241)	(0.995)	(0.267)	(1.018)
Nb. Obs.	429	429	429	429	429	429	429	429	429
Adj. R^2	0.100	0.113	0.123	0.506	0.074	0.508	0.089	0.507	0.101
F-Stat				5.52		5.36		5.37	
10% Threshold				6.46		6.46		6.46	
Moreira's CLR					[-0.779, 1.120]		[-0.802, 1.096]		[-0.821, 1.047]
P-value					0.795		0.836		0.877
Hansen J-Stat					0.813		0.863		0.869

Note: Standard errors in parentheses, + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance. The "10% Threshold" reported in the Table corresponds to the critical values of Stock-Yogo's weak identification test. We reported the p-values associated with the Hansen J-statistic. We also reported Moreira's Conditional Likelihood Ratio (CLR) confidence set and the corrected p-value for the test of statistical significance.

Table 3.14: **Mapas and Efficiency**

	Model 46 OLS *Norm. Winning Bid*	Model 47 OLS *Norm. Winning Bid*	Model 48 OLS *Norm. Winning Bid*	Model 49 1st Stage *Mapa*	Model 50 LIML *Norm. Winning Bid*	Model 51 1st Stage *Mapa*	Model 52 LIML *Norm. Winning Bid*	Model 53 1st Stage *Mapa*	Model 54 LIML *Norm. Winning Bid*
Mapa	-0.108***	-0.109***	-0.110***		-0.246		-0.122		-0.191
	(0.037)	(0.034)	(0.034)		(0.521)		(0.428)		(0.442)
Utilization Rate			0.002					-0.083	-0.109*
			(0.048)					(0.063)	(0.057)
Rivals Utilization Rate			0.073					0.152	0.206*
			(0.088)					(0.130)	(0.123)
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)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Subcontracted		0.018***	0.018***			0.001	0.018***	0.001	0.018***
		(0.003)	(0.003)			(0.004)	(0.003)	(0.004)	(0.003)
Duration	0.008**	0.009***	0.009**	0.008**	0.009*	0.008**	0.010**	0.008*	0.009**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.004)	(0.005)
Estimate	-0.038**	-0.085***	-0.087***	-0.210***	-0.067	-0.212***	-0.088	-0.212***	-0.103
	(0.019)	(0.021)	(0.021)	(0.018)	(0.107)	(0.021)	(0.090)	(0.021)	(0.093)
Routines				0.029		0.030		0.029	
				(0.023)		(0.023)		(0.023)	
Evolution CAA				0.007**		0.007**		0.007**	
				(0.003)		(0.003)		(0.003)	
Evolution TA				0.003		0.003		0.003	
				(0.002)		(0.002)		(0.002)	
Constant	-0.293	0.007	0.073	4.192***	0.526	4.201***	0.085	4.356***	0.621
	(1.581)	(1.552)	(1.533)	(1.416)	(3.355)	(1.417)	(2.911)	(1.430)	(2.986)
Nb. Obs.	472	472	472	472	472	472	472	472	472
Adj. R^2	0.032	0.102	0.100	0.487	0.003	0.486	0.102	0.486	0.097
F-Stat				2.90		2.89		2.69	
10% Threshold				6.46		6.46		6.46	
Moreira's CLR					[-inf, inf]		[-inf, inf]		[-inf, inf]
P-value					0.581		0.765		0.652
Hansen J-Stat					0.185		0.226		0.236

Note: Standard errors in parentheses, + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance. The "10% Threshold" reported in the Table corresponds to the critical values of Stock-Yogo's weak identification test. We reported the p-values associated with the Hansen J-statistic. We also reported Moreira's Conditional Likelihood Ratio (CLR) confidence set and the corrected p-value for the test of statistical significance.

Table 3.15: **Admissions and MAPA: 2SLS with Firm FE (Whole Sample)**

	Model 55 1st Stage *Mapa*	Model 56 2SLS *Admitted*	Model 57 1st Stage *Mapa*	Model 58 2SLS *Admitted*	Model 59 1st Stage *Mapa*	Model 60 2SLS *Admitted*
Mapa		0.225*		0.221*		0.212*
		(0.116)		(0.116)		(0.117)
Firm Experience			0.020	-0.024*	0.021	-0.023+
			(0.017)	(0.014)	(0.017)	(0.014)
Subcontracted					-0.003*	-0.002+
					(0.002)	(0.001)
Duration	0.009***	-0.006***	0.009***	-0.006***	0.009***	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Estimate	-0.183***	-0.009	-0.184***	-0.010	-0.176***	-0.007
	(0.009)	(0.022)	(0.009)	(0.216)	(0.010)	(0.021)
Routines	0.060***		0.060***		0.060***	
	(0.009)		(0.009)		(0.009)	
Evolution CAA	0.003**		0.002**		0.002**	
	(0.001)		(0.001)		(0.001)	
Evolution TA	0.002**		0.002**		0.002**	
	(0.001)		(0.001)		(0.001)	
FE by firm	YES	YES	YES	YES	YES	YES
Nb. Obs.	3003	3003	3003	3003	3003	3003
Adj. R^2	0.415	0.018	0.415	0.022	0.416	0.027
F-Stat	18.89		18.96		18.53	
10% Threshold	9.08		9.08		9.08	
Hansen J Stat		0.496		0.444		0.474

Note: Standard errors in parentheses, + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance. The "10% Threshold" reported in the Table corresponds to the critical values of Stock-Yogo's weak identification test. We reported the p-values associated with the Hansen J-statistic. Compared to Table 3.8, 187 observations were dropped because of singleton groups of firms.

Table 3.16: **Admissions and MAPA: 2SLS with Firm FE (SMEs and Non-SMEs)**

	Model 61 1st Stage *Mapa*	Model 62 2SLS *Admitted*	Model 63 1st Stage *Mapa*	Model 64 2SLS *Admitted*	Model 65 1st Stage *Mapa*	Model 66 2SLS *Admitted*	Model 67 1st Stage *Mapa*	Model 68 LIML *Admitted*	Model 69 1st Stage *Mapa*	Model 70 LIML *Admitted*	Model 71 1st Stage *Mapa*	Model 72 LIML *Admitted*
	SMEs Only						**Non-SMEs Only**					
Mapa		0.440**		0.440**		0.438**		-0.093		-0.117		-0.146
		(0.194)		(0.194)		(0.195)		(0.137)		(0.139)		(0.145)
Firm Experience			0.040+	-0.025	0.041+	-0.025			0.016	-0.037**	0.019	-0.034**
			(0.026)	(0.028)	(0.026)	(0.028)			(0.24)	(0.016)	(0.024)	(0.016)
Subcontracted					-0.002	-0.001					-0.006**	-0.005***
					(0.003)	(0.002)					(0.003)	(0.002)
Duration	0.006**	-0.008***	0.006**	-0.008***	0.006**	-0.008***	0.013***	-0.003+	0.012***	-0.003	0.124***	-0.003
	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Estimate	-0.204***	0.000	-0.203***	0.000	-0.200***	0.002	-0.167***	-0.023	-0.167***	-0.026	-0.155***	-0.021
	(0.013)	(0.040)	(0.013)	(0.040)	(0.014)	(0.040)	(0.013)	(0.023)	(0.013)	(0.024)	(0.013)	(0.024)
Routines	0.057***		0.057***		0.056***		0.060***		0.060***		0.060***	
	(0.013)		(0.013)		(0.013)		(0.014)		(0.014)		(0.014)	
Evolution CAA	0.003*		0.003*		0.003*		0.002		0.002		0.001	
	(0.002)		(0.002)		(0.002)		(0.001)		(0.001)		(0.001)	
Evolution TA	0.002+		0.002+		0.002+		0.001		0.001		0.001	
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Nb. Obs.	1551	1551	1551	1551	1551	1551	1452	1452	1452	1452	1452	1452
Adj. R^2	0.459	-0.100	0.461	-0.099	0.461	-0.097	0.381	0.009	0.381	0.001	0.384	-0.009
F-Stat	10.45		10.35		10.30		6.83		7.01		6.56	
10% Threshold	9.08		9.08		9.08		6.46		6.46		6.46	
Hansen J Stat		0.840		0.821		0.826		0.619		0.521		0.576

Note: Standard errors in parentheses, + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance. The "10% Threshold" reported in the Table corresponds to the critical values of Stock-Yogo's weak identification test. We reported the p-values associated with the Hansen J-statistic. Compared to Table 3.9 and due to singleton groups of firms, 149 and 38 observations were dropped, respectively, for the "SMEs Only" and the "Non-SMEs Only" cases.

Table 3.17: **Mapas and Share of SMEs in Admitted Firms**

	Model 73 1st Stage *Mapa*	Model 74 LIML *SMEs Admitted*	Model 75 *1st Stage* *Mapa*	Model 76 LIML *SMEs Admitted*
Mapa		0.408*		0.407*
		(0.226)		(0.225)
Subcontracted			0.000	-0.001
			(0.004)	(0.003)
Duration	0.008**	0.001	0.008**	0.001
	(0.004)	(0.004)	(0.004)	(0.004)
Estimate	-0.210***	-0.047	-0.211***	-0.046
	(0.019)	(0.048)	(0.022)	(0.048)
Routines	0.031		0.031	
	(0.022)		(0.022)	
Evolution CAA	0.008***		0.008***	
	(0.003)		(0.003)	
Evolution TA	0.004**		0.004**	
	(0.002)		(0.002)	
Constant	2.602***	0.968+	2.610***	0.955+
	(0.238)	(0.621)	(0.258)	(0.619)
Nb. Obs.	469	469	469	469
Adj. R^2	0.484	0.184	0.483	0.183
F-Stat	4.56		4.55	
10% Threshold	6.46		6.46	
Moreira's CLR		[-0.064, 1.305]		[-0.066, 1.304]
P-value		0.085		0.086
Hansen J Stat		0.389		0.390

Note: Standard errors in parentheses, + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The 15% threshold (+) is only given to enhance readability and should not be treated as statistical significance. The "10% Threshold" reported in the Table corresponds to the critical values of Stock-Yogo's weak identification test. We reported the p-values associated with the Hansen J-statistic. We also reported Moreira's Conditional Likelihood Ratio (CLR) confidence set and the corrected p-value for the test of statistical significance.

Chapter 4

Discretion and Efficiency in Public Procurement: Evidence from France*

4.1 Introduction

Public procurement is an important part of a developed country's economy [European Commission, 2008]. Improving procurement efficiency should therefore be high on a legislator's agenda. In this respect, the European Commission approved its new proposals aiming at modernising public procurement legislation in September 2013. They include the revision of the 2004/18/EC Directive. In particular, they suggest improving "the flexibility of procurement to better respond to purchasing needs of authorities" by allowing public buyers broader use of negotiated procedures with publication (European Commission [2011]).

*This chapter is based on a joint work with Lisa Chever. The authors are grateful to Miguel Amaral, Uri Benoliel, Eshien Chong, Decio Coviello, John M. de Figueiredo, Ricard Gil, Annick Juillet, Michael Klien, Jamus J. Lim, Stéphane Saussier, Stéphane Straub, Steven Tadelis, Patrick Warren, Anne Yvrande-Billon and participants in the *ESNIE* 2012, *EARIE* 2012, *EALE* 2012, *ISNIE* 2013, *JMA* 2013, *EURAM* 2013 and *AOM* 2013 conferences for their valuable comments and suggestions on different versions of this paper. The authors would also like to thank Paris Habitat-OPH for providing data and useful information. A short version of this paper was published in 2012 in the "*EPPPL*" review.

In 2004, a reform of the French Public Procurement Code (the Code, hereinafter) introduced and widened the possibility for public buyers to use negotiated procedures with publication up to around 5,000,000€.[71] These procedures consist of an open auction followed by a multilateral negotiation phase.[72] However, their impact on procurement efficiency is still to be assessed. While, according to the European Commission, this procedure should allow public buyers to get a "better match between their desired procurement outcome and solutions offered by the market" as well as a decreased probability of collusive practices between bidders, some drawbacks are still highlighted (European Commission [2011]). In particular, this procedure may increase the risk of favouritism and corruption and is thought of being "less efficient in generating savings than the open and restricted procedures" (European Commission [2011]). These pro-auction and pro-negotiation arguments from the European Commission reflect the still open debate in the economic literature concerning their relative efficiency.[73]

In this paper, we aim at empirically assessing the potential benefits of these negotiated procedures with publication on efficiency. We study the impact of using such procedures on the amounts of the received bids as well as on the amount of the winning bid and on the total cost of the contract (i.e. including the amounts renegotiated). The effect of using negotiated procedures on the probability of renegotiating the contract is also assessed. Their impact is compared with that of the open auction, the most frequently used procedure at the European level (European Commission [2009]). The implications will be twofold. First, we intend to contribute to the ongoing debates in the economic literature surrounding the efficiency of alternative tendering procedures. Second, we aim at finding out whether this new proposed reform of the European Commission is going in the right direction and therefore provide strong public policy recommendations.

[71] See Table 4.1 in Section 4.3 for the successive thresholds between 2001 and 2010.
[72] See Section 4.4.1 for additional details on the different procedures.
[73] See Section 4.2 for details on the "auction vs. negotiation" debate.

In order to do so, we have constructed an original database using information on 427 public-work contracts tendered by Paris Habitat-OPH, the largest social housing constructor in Europe, between January 2004 and December 2009. We have gathered data on every construction contract available and fulfilled at the time of coding. Available information includes, for each contract, the type of awarding procedure used, the estimated contract costs and duration, the number of candidates and bidders, the amounts of received bids as well as their technical grades and the total amounts renegotiated.

Following recommendations of the European Commission, all studied contracts are awarded to the best offerer (i.e. according to both price and quality of technique criteria). Our primary interest is on the effect of negotiated procedures on prices. To compare the prices of offers while keeping the level of technical valuation constant, some of our estimations include two indicators designed by our public buyer and capturing the technical quality associated with each offer. We also deal with a classical challenge of endogeneity, due to a potential omitted variable bias. Indeed, we suspect not being able to isolate some dimensions related to the complexity of the transaction. This complexity might influence both the decision to use a negotiated procedure and the competitiveness of the received offers. We use some exogenous changes in the environment of the public buyer to build instruments.

After dealing with the endogeneity issue, we show that the use of negotiated procedures has a significant negative impact on the amounts of the received bids as well as, if anything, on the the total cost of the contract. We also find evidence that negotiated procedures decrease the probability of renegotiating the contracts. We argue that negotiated procedures enable public buyers to benefit from both the competitive effect of open procedures and the dissipation of uncertainty that occurs during the negotiation phase. In addition, we suspect that collusive behaviours, in particular those making use of complementary bids, may be more difficult to sustain when negotiated pro-

cedures are used as bidders may be asked to justify any part of their offers during the negotiation phase. This argument is supported by simple statistical tests using Benford's Law. Finally, in accordance with Amaral et al. [2009], we believe that part of the positive effects we observe was made possible by the transparency-enhancing reforms that took place simultaneously with the introduction of these negotiated procedures and that may have played a great role in limiting abnormal behaviours of public buyers.[74] Practical implications of these results for public policies are then discussed.

This paper is organised as follows. Section 4.2 presents the debates of the economic literature on the potential advantages and drawbacks of negotiated procedures. The ongoing debates prevent us from making clear-cut predictions regarding the outcomes of this study. A discussion of the institutional framework as well as its recent changes is available in Section 4.3. In Sections 4.4 and 4.5, we respectively present our buyer's practices and the data we have gathered. Our empirical methodology and results are exposed in Section 4.6. Section 4.7 discusses the results. A final section concludes with practical implications for public policies.

4.2 The Auction vs. Negotiation Debate

A common view in the economic literature is that more competition is always desirable as it gives strong incentives to firms to be efficient and to reveal their private costs (Bulow and Klemperer [1996]). Moreover, open auctions are considered to be the most transparent procedure and thus less sensitive to corruption or favouritism. These beliefs widely explain why they are often the only available mechanism to award large contracts in public procurement.[75] However, some recent contributions pin down their limits: competitive incen-

[74] Examples of these transparency-enhancing reforms are available in Section 4.3.

[75] In particular, this is the case in French Public Procurement (as discussed in Section 4.3).

tives may not always be sufficient to reach procurement efficiency and the rigidities of open auctions would sometimes generate more costs than benefits. When dealing with complex transactions, buyers may indeed have difficulties in precisely specifying their needs: this leads to incomplete contracts which may give rise to costly ex post adaptations (Bajari and Tadelis [2001]). In these cases, more flexible procedures such as negotiated procedures should therefore be preferred to open auctions. Moreover, ex post adaptations also impact the ex ante stage. Indeed, using procurement data from Caltrans, Bajari et al. [2013] show that bidders anticipate when adaptations will be required at the execution stage. In order to compensate for this uncertainty, candidates extract a higher rent at the bidding stage. With these results in mind, negotiated procedures are also suspected to be more suitable, as the negotiation phase would reduce the degree of uncertainty regarding the execution of the contract.

Benefiting from the positive aspects of negotiated procedures still requires some conditions to be fulfilled. These conditions highly rely on the behaviour of the organisers of public procurement when tendering contracts. There are at least two main conditions to be fulfilled. First, in theory, public buyers should align the procurement mode on the characteristics of the transaction: negotiations should be used when contracts are complex. This alignment is observed for private buyers (Bajari et al. [2009]). However, politicians and bureaucrats - the two main actors in the organisation of public procurement - may either voluntarily or involuntarily fail to choose the right procedure for a given project. Chong et al. [2011] actually show that French mayors do not properly align the awarding procedure on the transaction's characteristics (they tend to favour open auctions even for complex contracts). The authors attribute this misalignment to the fear of being suspected of favouring some firms (Spiller and Moszoro [2012]). Thus, to avoid being discredited by a third-party, French public authorities would tend to routinely favour more traditional and consensual procedures - like open auctions - instead of using procedures inspired by

the private sector. In addition, the tendency of the public sector to resist change Kelman [2005], may also explain bureaucrat's misalignment of the procedure with the characteristics of the transaction. This functioning should lead to a greater tendency of bureaucrats towards conservatism and hence a lower probability of adopting new procurement tools such as negotiated procedures. Second, high transparency and accountability of public buyers should be enforced so as to prevent corruption. Indeed, politicians and bureaucrats may be corrupted (or may favour some firms) and try to influence the selection of the supplier so as to obtain personal benefits (Coviello and Gagliarducci [2013]; Hyytinen et al. [2009]). Since negotiations increase ex ante communication between parties and generate some opacity, they may help to sustain these types of strategies. If the use of negotiated procedures leads to a higher level of favouritism or corruption, then the benefits associated with such procedures may be much lower than expected.

Notwithstanding these obstacles, the empirical literature provides several studies on the efficiency of alternative procedures. Using data from the railway industry in Germany and after controlling for the endogeneity of the choice of procurement mode, Lalive and Schmutzler [2011] show that the use of open auctions is more efficient than direct negotiations with the former supplier. Open auctions increase, on average, the frequency of the service by 16% and decrease the procurement price by 25%. Closer to our subject, Thomas and Wilson [2002] experimentally find multilateral negotiations to be more efficient than auctions with four sellers (i.e. four firms in the case of public procurement) and equivalent to auctions with only two sellers. This study is corroborated by Vellez [2011] who also finds that multilateral negotiations decrease prices by close to 25% compared to open auctions and that these benefits increase with the number of bidders.

With respect to the aforementioned studies, our paper distinguishes itself for several reasons. In contrast to Lalive and Schmutzler [2011] who analyse di-

rect negotiations with the former supplier, we study the effect of multilateral negotiations. With the widening of the possibility of using negotiated procedures included in the forthcoming procurement Directive of the European Commission, multilateral negotiations are likely to become a more and more frequently used tool in public procurement. Moreover, our study also differs from that of Vellez [2011] since we deal with the endogeneity issue associated with the choice of using multilateral negotiations. In particular, we use a two stage least squares technique with instruments based on exogenous sources of variation in the environment of public procurement organisers. We also consider the impact of negotiated procedures on *ex post* renegotiations using two outcome variables (the total cost of the contract and the probability of renegotiations). Our study also sheds light on the link between discretion and manipulation (in particular collusion and corruption) in public procurement. Finally, to the best of our knowledge, our study is the first to include indicators of the technical quality associated with each offer. These indicators, created by our public buyer, enable us to appreciate the price of each bid holding quality constant.

4.3 Institutional Framework

French public buyers have to follow the Code. Its constitutional principles are invariant and written in the first article of the Code since 2001.[76] Yet, major changes to the Code have occurred during the last decade, encouraged by European legislation (Directive 2004/18/EC). They notably concern the allowed awarding procedures and they globally bring more and more freedom to public buyers in the organisation of their purchases, particularly regarding work contracts. The evolutions regarding the possibility of using the various types of procedures and the dates of the threshold changes are reported in

[76]These constitutional principles are: freedom of access to public contracts, equal treatment of the candidates and transparency of the procedure.

Table 4.1.[77]

Table 4.1: **Successive thresholds between 2001 and 2010**

Date of change	Possibility of using non-formalised procedures	Possibility of using formalised procedures with a negotiation phase	Open auctions (formalised procedure)
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€

A first major change is the tendency to reduce formalism. The allowed awarding procedures can indeed be divided into two groups, the formalised procedures and the non-formalised procedures; the area of the non-formalised procedures having clearly been enlarged, especially for work contracts. These non-formalised procedures enable the public buyer to adapt some key-dimensions of the procedure to its needs but also to add a negotiation phase. Conversely, formalised procedures are strictly defined and no adaptation is possible. Before 2001, formalised procedures were mandatory as soon as the estimated value of the contract reached 38,200€. For work contracts, this threshold reached 90,000€ after the 2001 reform, 230,000€ after the 2004 reform and 5,150,000€ at the end of 2008.[78] Therefore, before 2004, only formalised procedures were available over 38,200€, whereas they are now mandatory only over approximatively 5,000,000€ since the end of 2008 for work contracts.

A second major change for work contracts is on available formalised procedures. The 2004 reform of the Code introduced the possibility of using a formalised procedure which allows a multilateral negotiation phase after the open call for tender. Nevertheless, this possibility is forbidden for contracts

[77]Note that open auctions are still available below the thresholds presented in Table 4.1. However, they are mandatory above these reported values.

[78]Only major changes are described here; see Table 4.1 for more details about the successive thresholds.

exceeding around 5,000,000€ (the threshold has been changed three times; see Table 4.1); in these cases, a simple open call for tender is mandatory.

Beside these evolutions, the 2004 reform aimed at increasing the transparency of the procurement process and the accountability of public buyers. It appears to be the new paradigm of the Code: the simultaneous increase of discretion and transparency. For instance, public buyers now have more obligations concerning the information they have to communicate to the losing candidates and the increasing obligation to publicly announce the weightings of the selection criteria of the supplier.

To sum up, the 2004 reform introduced the possibility of adding a negotiation after an open call for tender, even for quite large work contracts. This possibility is allowed either through a non-formalised or through a formalised procedure, depending on the size of the contract and the time it is awarded. This greater freedom results from the transposition of the 2004/18 EU-Directive at the French level. However, the transposition of the Directive may vary from one country to another, which means that negotiated procedures are not uniformly available in all European countries.

4.4 Procurement Modes in Paris Habitat-OPH

We have comprehensive data on the 427 work contracts awarded by Paris Habitat-OPH between January 2004 and December 2009.[79] Paris Habitat-OPH is an independent local public buyer and the main constructor of social housing in Paris. It is organised as fourteen "departments", all located in the same offices. Each of these departments is in charge of some specific activity (construction of new buildings, rehabilitation, etc.). Overall, Paris Habitat-OPH procures around 500 contracts every year.

[79] Only purely fixed-price contracts are taken into account.

4.4.1 Characteristics of the awarding procedures used

Between January 2004 and December 2009, three different types of procedure are used by Paris Habitat-OPH. The main phases of these procedures are reported in Table 4.2.

Table 4.2: **Characteristics of the three awarding procedures used**

Open auction (formalised procedure)	Publication	Reception of the candidatures AND the offers	Selection of the candidates		Analysis of the offers			Selection of the winner
Formalised procedure with a negotiation phase	Publication	Reception of the candidatures	Selection of the candidates	Reception of the offers	Analysis of the offers	Negotiation phase	Second offer analysis	Selection of the winner
Non-formalised procedures	Publication	Reception of the candidatures AND the offers	Selection of the candidates		Analysis of the offers	Negotiation phase or not	Second offer analysis	Selection of the winner

The first procedure is the traditional open call for tender. The buyer publicly publishes its need to procure goods in order to inform potential suppliers. Then, he receives firms' candidatures, which are made up of various administrative documents, past references and a list of the firms' competencies, along with their offers. First, the buyer analyses the candidatures. Then, if a candidature is satisfactory, the buyer analyses the associated offer. Finally, he chooses the winner according to price and technical quality criteria.

As it is used by Paris Habitat-OPH to tender work contracts, the non-formalised procedure (with or without a negotiation phase) is rather close to the traditional open call for tender. The first main difference is the possibility to complete competition with a negotiation phase. However, this negotiation phase has to be previously announced in the publication. The second main difference is its "smoothness": the buyer has, for example, more liberty about the delays in the organisation of the procedure.

The last procedure used by Paris Habitat-OPH to procure work contracts is the formalised procedure with a negotiation phase. There are similarities with the two previously described procedures. Like the open call for tender, this procedure is strictly defined (no "smoothness") whereas the possibility of

using a negotiation phase is similar to non-formalised procedures. Nevertheless, the formalised procedure with a negotiation phase has its specificity: the buyer must separate the reception of candidatures and the reception of offers in two phases. During the first phase, the buyer receives the candidatures and analyses them. Project specifications are communicated to firms who submitted a satisfactory candidature. During the second phase, the buyer receives the offers and analyses them.

Our buyer negotiated all received offers when a negotiation phase was used. In accordance with the Code, this negotiation phase cannot result in re-defining the buyer's needs. It aims at verifying that the buyer's needs are properly understood by the bidders – in case of imprecise specifications, for instance – and, conversely, it enables the buyer to request clarification of the received offers. These precisions might be about the duration and the organization of the works, the quality of the material used, the price of some tasks, etc. In other words, discussions are about the technical but also the financial aspects of the offers, so as to make sure that the offers cover the needs. After this negotiation phase, firms are free to adapt the price and the quality of their proposal. Any negotiation, whatever its form (email, letter or meeting), is traceable since it gives rise to a detailed report. These reports may contribute to the transparency of negotiated procedures.

4.4.2 Buyer's practices

We have information on our public buyer's decision to negotiate the contracts and about the awarding procedures used to select the providers. This information is illustrated in Table 4.3 (regarding the buyer's choice to use a negotiation phase or not) and Table 4.4 (regarding the buyer's choice to use an awarding procedure or another).

To negotiate or not to negotiate ?

Contracts launched before 2004 are naturally procured through an open auction, that is without any negotiation phase, which reflects French public buyers' legal obligations at the time.[80] Subsequently, contracts are increasingly awarded after a negotiation phase: this is the result of a progressive implementation of the 2004 reform of the Code and a change in terms of our buyer's routines.

Table 4.3: **Number of contracts, use of a negotiation phase and year of publication**

	2003	2004	2005	2006	2007	2008	2009	Total
No negotiation phase	27 100%	47 58.75%	31 31.31%	18 22.78%	15 24.59%	6 10.00%	5 23.81%	149 34.89%
Negotiation phase	0 0%	33 41.25%	68 68.69%	61 77.22%	46 75.41%	54 90.00%	16 76.19%	278 65.11%
Total	27 100%	80 100%	99 100%	79 100%	61 100%	60 100%	21 100%	427 100%

Disentangling the use of a negotiation phase from other features of the procedures

From 2004 to 2009, negotiations may be used either through a formalised procedure or a non-formalised procedure (respectively around 35% and 38% of the formalised and non-formalised procedures are used without any negotiation phase). As a consequence, we are able to separately assess the impact of a negotiation phase from the impact of other features of the awarding procedures.

[80]Note that in contrast with the rest of the paper which uses the date of the attribution of the contract, Table 4.3 uses the date of the publication of the contract. This distinction is made to confirm that no contracts whose publication started prior to the 2004 reform of the Code were awarded using a negotiated procedure.

Table 4.4: **The decision to negotiate depending on the awarding procedure**

	Open auction (formalized)	Formalized procedure with negotiation	Non-formalized procedures	Total
No negotiation phase	99	4	50	153
Negotiation phase	0	192	82	274

4.5 Data

The descriptive statistics of the 427 contracts attributed by Paris Habitat-OPH between January 2004 and December 2009 are presented in Table 4.6, shown in the appendix.

4.5.1 Contract characteristics and bidder characteristics

For each project, before choosing the procurement mode, Paris Habitat-OPH calculates its own estimation of the value (*Estimate*) and the duration (*Duration*) of the contract. On average, the contracts studied are estimated at 1,220,696€ with an expected duration of slightly more than 8 months. The projects studied appear to be quite heterogenous in size considering that the estimated values of the projects range from 15,000€ to 22,600,000€, with a standard deviation which is twice the mean. To deal with this issue, we normalise all dependent variables (received bids (*Bid*), winning bids (*Winning Bid*) and total cost of the contract (*Total Costs*) by the variable *Estimate* as is commonly the case in previous works [De Silva et al., 2008; Ohashi, 2009].

Our buyer received 1,578 bids for the 427 contracts we study. The mean bid is 6% above the estimation of the contract while the average winning bid and the total cost of the contract are, respectively, 9 and 5% lower than this value. Individual bids from firms may depend on the number of contracts the firm is currently handling (i.e. a less occupied firm is likely to bid more aggressively than an overloaded one). To account for this issue, we have constructed

the variable *Utilization Rate* to control for differences in terms of available capacities across bidders (Bajari and Ye [2003]). We also have information on the volume of contract delegated to subcontractors (*Subcontracted*). According to practitioners, a more subcontracted contract is likely to be more complex. Finally, we add the variable *Index* to capture the evolution of prices in the construction sector; this variable is meant to account for changes in economical conditions over time.

4.5.2 Awarding procedure characteristics

65% of the contracts are procured using a negotiation phase (*Nego*); this fraction increases over time (as shown in Table 4.3 in Section 4.4.2). 31% of the contracts are procured through non-formalised procedures (*Less Formalism*). This rather low rate reflects the fact that, for more valuable contracts, this possibility only appeared at the end of the period studied. Another change related to awarding procedures and due to legal evolutions discussed in Section 4.3 is likely to affect the outcomes of public procurement. Before 2004, public buyers had no obligation to specify the weightings of the selection criteria in the publication of the call for tenders. They only had to specify that offers would be evaluated according to price and/or technical criteria. But since 2004, the Code imposes on the buyer to stipulate the weights associated with each of the two dimensions in the publication of the call for tender.[81] In our dataset, all the contracts are tendered without any precisions regarding weights before February 2005 (i.e. the variable *Criteria* is equal to 0). After September 2005, the weightings are systematically specified (i.e. the variable *Criteria* is equal to 1 and the observed *Technical Weight* is on average 43.34%). During the transition period (from February 2005 to September 2005), the variable *Criteria* takes the value 0 or 1. Given that this change will become systematic, it can be considered exogenous.

[81] See Mateus et al. [2010] for a discussion on the disclosure of selection criteria.

When *Criteria* is equal to zero, the buyer still ranks the offers according to their technical valuation. It is reported in the variable *Ranking*, which takes the value 1 if the offer was considered as the best technical offer; the variable *Ranking* takes the value 2 if the offer was considered as the second best offer from a technical point of view, and so on. It happened that the buyer judged that the offers were equally satisfying from a technical point of view. In this situation, the variable *Ranking* equals 1 for all the posted offers. When *Criteria* is equal to one, the buyer gives a technical rating of the offer, on a scale from 0 to 100. It is captured in the variable *Technical Mark*.

4.5.3 Level of competition

We have information on the number of candidates (*Nb candidates*) and the number of received offers (*Nb bidders*) for each tendered contract. At first view, both of these variables could be used to appreciate the level of competition. However, there are very strong disparities in the number of candidates between the procedure organised in two phases (the reception of candidatures and then the reception of offers) and the procedures organised in a single phase (candidatures and offers are received simultaneously). In the first case, the ratio *Nb bidders / Nb candidates* is equal to 0.33, whereas in the second case it is equal to 0.80 (See Table 4.5). Indeed, the costs incurred in preparing a candidature are extremely low compared to the costs of preparing an offer. Thus, the buyer received far more candidatures when the procedure was organised in two phases. Whereas we cannot exclude a correlation between the number of received offers and the procurement mode, the disparities are widely lower. Therefore, we choose to use *Nb bidders* to control for the level of competition.

Following Bajari et al. [2013], we control for the level of free capacities of the rival candidates. These authors use the utilization rate of the second lowest bidders to tackle it. As the second lowest bidder is not necessarily, in

Table 4.5: **Number of candidates and number of bidders depending on the awarding procedure**

	(1) Open auction (formalized)	(2) Non formalized procedures	(3) Formalized procedure with a negotiation phase	Average (1) and (2)
Nb candidates	5.4	4.7	11.5	5.0
Nb bidders	4.1	3.8	3.4	4.0
Nb bidders/Nb candidates	0.76	0.88	0.33	0.80

our case, the second "best" bidder according to price and quality criteria, we rather use the variable *Rivals Utilization Rate*, which measures the average utilization rate of all other candidates.

4.6 Empirical strategy and results

4.6.1 Econometric method

We aim at exploring the impact of the decision to use a negotiation phase on the received bids submitted by firm i for contract n as well as on the winning bid and total costs of contract n. Thus, we first estimate the following models:

$$Norm\ Bid_{ni} = \gamma_0 + Nego_n\gamma_1 + Z_n\Gamma_2 + W_{ni}\Gamma_3 + V_{ni}\Gamma_4 + X_{ni}\Gamma_5 + Index_n\gamma_6 + C\Gamma_7 + \epsilon_{ni} \tag{4.1}$$

$$Norm\ Winning\ Bid_{ni} = \gamma_0 + Nego_n\gamma_1 + Z_n\Gamma_2 + W_{ni}\Gamma_3 + V_{ni}\Gamma_4 + X_{ni}\Gamma_5 + Index_n\gamma_6 + C\Gamma_7 + \epsilon_{ni} \tag{4.2}$$

$$Norm\ Total\ Costs_{ni} = \gamma_0 + Nego_n\gamma_1 + Z_n\Gamma_2 + W_{ni}\Gamma_3 + V_{ni}\Gamma_4 + X_{ni}\Gamma_5 + Index_n\gamma_6 + C\Gamma_7 + \epsilon_{ni} \tag{4.3}$$

Where γ_1 is the coefficient associated with the variable we are primarily interested in. Z_n is a matrix of control variables related to contract n's characteristics (*Estimate*, *Duration*, *Criteria*, *Technical Weight*, *Less Formalism* and *Subcontracted*) and Γ_2 its associated matrix of coefficients. W_{ni} is a vector of variables containing characteristics related to firm i when bidding for con-

tract n (*Utilization Rate*) and V_{ni} is a matrix controlling for the heterogeneity in the degree of competition firm i faces when bidding for contract n (*Rivals Utilization Rate*, *Nb bidders*) with, respectively, Γ_3 and Γ_4 their associated matrix of coefficients. X_{ni} is a matrix that controls for the quality of the offer submitted by firm i on contract n (*Technical Mark* and *Ranking*) with Γ_5 its matrix of coefficients. γ_6 is the coefficient associated with our price index in the construction industry at the time the contract n was tendered. Finally, C includes several fixed effects to control for unobserved variations in time (by month and by year) with Γ_7 their matrix of coefficients. ϵ_{ni} is the error term.

Concerning our variable of interest, *Nego*, we are likely to face an omitted variable bias. Indeed, the decision to use a negotiated procedure may be driven by our buyer's expectations of the outcomes. For instance, the buyer may rationally use a negotiated procedure because he expects to receive less competitive bids due to a more complex contract. We choose to deal with this endogeneity issue by using an instrumental variable strategy. In order to do so, we have constructed three instruments (*Politics*, *Politics2* and *Routines*). To be valid, each of these instruments needs to fulfil two conditions: relevance and exogeneity.

Our first two instruments (*Politics* and *Politics2*) are related to the political cycle. Although Paris Habitat-OPH is officially an independent structure, we cannot root out its strong political links. In particular, several members of the board of direction of our public buyer are serving in elected offices at the municipal level. As we have discussed in Section 4.2, the choice of a procedure by a politician is likely to be influenced by the fear of being suspected of favouritism or corruption (Chong et al. [2011]; Spiller and Moszoro [2012]). In particular, we believe that awarding procedures that appear opaque are less likely to be used for contracts awarded immediately preceding and following municipal elections to avoid being challenged by a political opponent on the grounds of corruption or favouritism. Indeed, during this period, politi-

cians may be under higher scrutiny than during the rest of their mandate. In this case, buyers may choose to award contracts through an open call for tenders rather than a negotiated procedure, the latter being widely regarded as less transparent (Bulow and Klemperer [1996]). *Politics* measures the time in months that separates the current call for tender from the next Parisian municipal election while *Politics2* is the square of *Politics*. According to our discussion, we believe that *Politics* should have a significant positive impact on the decision to use a negotiated procedure (the closer to the next election, the smaller *Politics* and therefore the less negotiated procedures are used) while *Politics2* should have significant negative impact on the decision to use a negotiated procedure (contracts far from the next election, that is contracts tendered right after an election, will less likely be awarded through a negotiated procedure). In addition, we rule out any influence of our instruments on unobservable parts of our outcomes: the election dates are exogenous discontinuities and the changes in political pressure they are likely to induce regarding the choice of the awarding procedure would not be related to any expectations regarding the competitiveness of the received bids, satisfying the exogeneity condition.[82]

Our third instrument (*Routines*) is related to our public buyer's internal routines concerning the choice of a procedure. According to Kelman [2005], as well as to our descriptive statistics, we expect public buyers to be prone to resist change. We notice that newly available procedures such as negotiated procedures may take time to be "adopted" by the different departments of our buyer. Moreover, we suspect a spillover effect: the choice of procedure by a given department of our buyer is likely to be influenced by past choices of procedures from other departments of Paris Habitat-OPH either through internal discussions between the different departments or through the observation of other departments' practices. Our third instrument is constructed to capture this spillover effect. *Routines* is defined as the ratio of contracts

[82]Further evidence of the exogeneity of these instruments are available below.

awarded by other departments using a negotiated procedure during the last quarter divided by the ratio of contracts awarded by other departments using a negotiated procedure before the last quarter. Basically, *Routines* captures how the use of negotiated procedures has evolved in other departments during the last quarter compared to the past. If negotiated procedures were more frequently used by other departments during the last quarter than before that, we would expect a given department to be more likely to use such procedures to tender its current contract. According to our discussion, *Routines* should therefore have a significant positive impact on the choice of using a negotiated procedure. Furthermore, we believe that *past* choices of procedures in *other* departments will have no impact on the outcomes of the current procedure other than through the choice of the procedure. To calculate the instrument for a given contract, we indeed exclude observations that could be correlated with the outcomes of this contract, satisfying the exogeneity condition.

4.6.2 Estimation results

In this section, we start by estimating the impact of negotiated procedures on the whole sample of normalised received bids. We then turn to seek the impact of using such procedures on both the normalised winning bids and the total cost of the contracts. For every test reported in this section, we use three alternative specifications. These three models intentionally always include the same covariates from one test to another. The first specification includes our variable of interest, *Nego* and exogenous control variables (i.e. variables that neither depend on decisions taken by our buyer nor on strategies from firms). When switching from the first to the second model, we add variables related to the technical valuation of the offers: What weight is attributed to the technical dimensions in the selection criteria? What technical mark did the firm obtain? This switching enables us to capture some heterogeneity across projects and offers relative to quality. Adding these variables enables us to

isolate the level of requirement of the buyer and how well the offers satisfy these requirements. Finally, when switching from the second to the third model, we add covariates related to the level of competition, the procedure used and the amounts subcontracted. Results from this last specification should be taken with caution as some of the added covariates may potentially be endogenous.

Estimation on the received bids

In this section, we aim at exploring the effect of the negotiation phase on the whole sample of received bids.

Our results are presented in Table 4.7. In Models 1, 2 and 3, the dependent variable is the normalised received bids and we use an OLS regressor. In Models 5, 7 and 9 we show the results of the 2SLS regression of the normalised received bids with the first stage regressions, using our three instruments, respectively shown in Models 4, 6 and 8. All specifications include fixed effects by months and year to respectively account for Paris Habitat-OPH's internal agenda as well as unobservable economic differences over the studied period. All regressions were computed using heteroscedasticity-robust standard errors.

In our OLS regressions (Models 1, 2 and 3), *Nego*, our variable of interest, is associated with a positive yet non-significant coefficient. The use of a negotiation phase therefore seems not to have a significant impact on the amounts of the received bids. Results related to contracts' characteristics may be put in line with previous works. More subcontracted contracts are associated with less competitive bids. Indeed, these types of contracts are generally considered as more complex contracts (Bajari et al. [2009]). Longer contracts attract lower bids though the coefficient is statistically significant only in Model 3. On the other hand, the sign and significance of the coefficient associated with our variable *Technical Weight* is puzzling as contracts for which public buyers put more weight on technical quality attract significantly lower offers. This result

may be due to an inappropriate use of this tool by the buyer or to an over-estimation of the contract value when the contract involves highly technical transactions.

Models 4, 6 and 8 present the first stage regressions of the decision to use a negotiated procedure. All three of our instruments are statistically significant and have the predicted sign. Statistics reported throughout Table 4.7 tell us that we need not worry about a weak instrument issue (F-Stat) and that we cannot reject that our three instruments are exogenous provided that at least one of them is (J-test for overidentifying restrictions). Once we have satisfyingly accounted for this endogeneity issue, we find in Models 5, 7 and 9 that the decision to use a negotiated procedure is associated with significantly lower prices of the received offers. We believe that this difference is due to the fact that negotiated procedures are used for shorter, yet more complex contracts where competition seems to be an issue (see, respectively, the signs and significance of the variables *Duration Subcontracted* and *Nb bidders* in Models 4, 6 and 8) which is rather close to recommendations from the economic literature (Bajari et al. [2009]; Chong et al. [2009]).[83] The coefficient associated with *Nego* indicates that, once accounting for the choice of using a negotiated procedure, the normalised received bids are decreased by close to 26% when such a procedure is used. Overall, our other results are very close to those presented in Models 1, 2 and 3. In other words, the correction of the endogeneity issue does not affect the outcome equation.

Estimation on the winning bids and the total costs

In this section, we aim at exploring the effect of negotiated procedures on the winning bids and total cost of the contract.

[83]The fact that shorter contracts are significantly more frequently procured using negotiated procedures might be the result of the thresholds defined in the Code that prevent the use of these procedures for high-valued contracts (which may be longer to execute).

Our results are presented in Table 4.8. In Models 11, 14 and 17 the dependent variable is the normalised winning bid while it is the normalised total cost of the contract in Models 12, 15 and 18. Models 10, 13 and 16 present the first stage regressions of the choice of using a negotiated procedure associated with the 2SLS regressions shown throughout the table, using our three instruments. All specifications include fixed effects by month to account for Paris Habitat-OPH's yearly agenda as well as fixed effects by year to control for unobservable economic differences over the period studied. All shown regressions include heteroscedasticity-robust standard errors.

In all of our first stage regressions of the decision to use a negotiated procedure, our three instruments are statistically significant and have the expected sign. Statistics reported throughout Table 4.8 tell us that we need not worry about a weak instrument issue (F-Stats) and that we cannot reject that our three instruments are exogenous given that at least one of them is (J-test for overidentifying restrictions). Concerning *Nego*, our variable of interest, we find that negotiated procedures decrease both the winning bids and the total costs of the contracts. The coefficients associated with *Nego* are comparable in size to those in Table 4.7 and suggest that the use of a negotiated procedure may lead to a decrease in the normalised winning bids and the total cost of the contracts by close to 25%. Yet, in all but one case (Model 18), the results are not statistically significant. That is, if anything, the use of a negotiated procedure is found to have a significant effect on the normalised total costs of the contracts but not on the normalised winning bids. Results from our control variables are generally in line with previous works.

In Table 4.8, the absolute value of the coefficient associated with *Nego* is consistently larger when regressing the normalised total costs than when regressing the winning bids (comparing equivalent specifications only). The total cost of the contract being equal to the winning bid plus the amounts renegotiated, we interpret this result as first evidence that negotiated proce-

dures have an impact on *ex post* renegotiations. To confirm this evidence, we look at the impact of negotiated procedures on the probability of renegotiating the contract.[84] Results are shown in Table 4.9 where we regress the variable *Renego*, a dummy taking the value 1 when the contract was renegotiated and 0 otherwise, using a 2SLS regressor on *Nego*, our variable of interest, and other covariates. First stage regressions from Models 19, 20 and 21 in Table 4.9 are, respectively, identical to those shown in Models 10, 13 and 16 of Table 4.8. As expected, our variable or interest, *Nego*, is associated with a statistically significant negative coefficient. The use of a negotiated procedure therefore seems to significantly lower the probability of occurrence of renegotiations between the parties at stake. Longer contracts and more subcontracted contracts, indicators of the complexity of the project, also significantly increase the probability of renegotiations. More puzzling is the sign associated with our variable *Nb Bidders* which would suggest an inverse winner's curse effect. The construction sector is often thought of being close to the independent private values framework. Within this framework, we would not expect a significant effect of the number of bidders on the probability to renegotiate. We believe that our finding may be linked to the fact that higher valued contracts attract less bidders. Our coefficient is therefore probably additional evidence that more complex contracts lead to a higher probability of renegotiations.

Exogeneity of political instruments

Our political instruments measure the distance to the next election of the mayor of Paris. They respect the exclusion restriction if the unobservable characteristics of the projects do not change with the political cycle. Indeed, we assume that the political cycle affects public procurement only through a change in the preferences of politicians in terms of procedures.

[84] Estache et al. [2009] also use the probability of renegotiating the contract as a dependent variable, though their work is on the impact of multidimensional auctions.

To complement the Hansen J-tests we performed for each specification (which provide some statistical evidence of the validity of the exclusion restriction), we also perform an analysis of the potential link between the political cycle and the observable characteristics of the projects. We want to make sure that some unwanted discontinuities do not occur around the elections:

- If the observable characteristics of the project change around the elections, the unobservable characteristics might change too, violating the exogeneity condition.

- If no unwanted discontinuities occur, this would comfort our approach: observable characteristics are exogenous; it does not contradict our hypothesis that the types of projects are not affected by the political agenda.

Figure 4.1 displays the relationships between the month of awarding and the number of contracts, the mean contract duration and the log of the mean contract estimated value. Since Chong et al. [2013] have shown that political manipulation of procurement contracts is also likely to alter the amount of the realised spendings before the election, our lowest graph reports the log of the values of realised investments by month of delivery of the project. The vertical red line corresponds to the March 2008 municipal election (the only one that occurred during the period we study). We also reported the quadratic fitted values to estimate the approximate time of the discontinuity. Evidently, these graphs do not exhibit discontinuities around this election, comforting our approach.

4.7 Discussion

4.7.1 Why do negotiated procedures decrease the bids?

The discussion of the details of both the project and the offers that occurs during the negotiation phase leads to a decrease in the asymmetry of information for the two parties at stake. As argued in Section 4.2, when transactions are complex, buyers may have difficulties in correctly specifying their needs in the call for tenders. If buyers' needs are imprecisely specified, then bidders will compensate for the resulting uncertainty by extracting a higher rent at the bidding stage (Bajari et al. [2013]). Discussing the details of the project will lead to a lower level of uncertainty for the firms and therefore a decrease in the rents extracted as well as a decreased probability of renegotiating the contracts. In addition, discussing the details of an offer directly with the firm may lower the asymmetry of information on the buyer's side. The buyer may then be more able to evaluate what specific part of the offer may allow room for negotiations on price, therefore leading to a further reduction in the overall rent extracted by bidders.

Furthermore, our public buyer uses negotiated procedures in appropriate cases. Indeed, negotiated procedures would exhibit better results notably when used for complex projects with a low degree of competition (Bajari et al. [2009]). In our first stage regressions, we have shown that Paris Habitat-OPH used more negotiated procedures when contracts were more complex and when the level of competition was likely to be an issue (a lower number of bidders). Therefore, we cannot rule out that part of the positive effects we observe in this study comes from the fact that our public buyer chooses a negotiated procedure in accordance with specific recommendations of the economic literature.

The negotiation phase may also stimulate another pro-competitive channel. The buyer indeed has some freedom to decide on the content of the ne-

gotiations which prevents bidders from being able to perfectly anticipate the rules of the game. Maintaining some degree of uncertainty might make any *ex ante* coordination between bidders much harder to achieve. As a consequence, the decline in price we observe may also be driven by a decrease in collusive strategies - which are likely to be especially pregnant in the public work sector (Padhi and Mohapatra [2011]). We run simple statistic tests based on Benford's Law to support this argument.[85] We compare the first two digits of the amount of the winning bids by distinguishing open auctions and negotiated procedures.[86] Results are shown in Figure 4.2 and Table 4.10. Observation and results from the goodness of fit tests tell us that collusion may be more likely to have occurred in open auctions than in negotiated procedures. Since thresholds from the Code regarding the use of negotiated procedures may harm the application of Benford's Law, we perform additional tests on the distance between the winning bid and the estimation, which should allow us to circumvent this problem.[87] Results are shown in Figure 4.3 and Table 4.10. Again, we find that collusion is more likely to have taken place in auctions than in negotiated procedures.

Finally, negotiated procedures increase the level of discretionary power of the public buyer. This increase in discretionary power may in turn lead to an increase in abnormal behaviour of the buyer (i.e. favouritism and/or corruption). However, simultaneously to the introduction of the possibility of having

[85]Benford's Law gives us the reference frequency distribution that should be observed in real-life data (if not tampered with) of single digit numbers according to their position in a figure. It is based on the observation that the number 1 occurs more often than the number 2 as a first digit. The number 2 itself occurs more often than the number 3 as a first digit, and so on. Benford's Law has been repeatedly used to detect fraud or collusion in many settings (Abrantes-Metz and Bajari [2009]). One popular application has been to detect manipulation of the Libor rate (Abrantes-Metz et al. [2011, 2012]). Benford's Law has also previously been used to check for collusion in public procurement (Vellez [2011]).

[86]When looking at negotiated procedures, we use the amounts of the bids received prior to the negotiation phase to avoid the tampering that may come from the negotiation phase.

[87]This distance is simply coded as the absolute value of the difference between the winning bid and the estimated contract value. Contrarily to the values of the bids that are indirectly restricted by the legal thresholds of the Code (i.e. negotiated procedures are never available over 5 million €), the aforementioned distance should suffer from no such restrictions in values.

recourse to negotiated procedure, the 2004 reform of the Code significantly raised the levels of transparency and accountability of public buyers. Most notably, since the application of the reform, the weightings of the selection criteria have to be specified in the call for tenders. Moreover, public buyers are required to inform evicted firms of the specific reasons motivating the rejection of their offers. Finally, the traceability of the negotiations between parties might also contribute to the accountability of our buyer since the discussions leading to the final offers are verifiable by a third party. We believe that such a raise in the levels of transparency and accountability will put public buyers under more scrutiny from third parties (notably, from evicted firms). Hence, if public buyers are more likely to have their decisions challenged through increased transparency, they may consequently be less prone to exhibit abnormal behaviours (Amaral et al. [2009]).

4.7.2 How realistic is our coefficient?

This study finds that the use of negotiated procedures may lead to a decrease in the normalised received offers by close to 26%. We believe that, although this coefficient may appear high, several arguments point to the fact that this coefficient is actually very likely to be accurate. First, the sole rent extracted by bidders due to the high uncertainty surrounding the project at the bidding stage could represent up to 14.6% of value of the contract (Bajari et al. [2013]). As we have argued, discussing the details of the project during the negotiation phase may lead to a decrease of this rent. Second, based on our previous discussion, we know that these negotiated procedures were used in the best possible setting. That is, Paris Habitat-OPH appropriately chose when to use these procedures and the increase in transparency and accountability prevented public buyers such as ours from having recourse to abnormal behaviours. In addition, the previously discussed decrease in collusive practices may also lower the received bids. In his analysis, Connor [2010] finds

the mean cartel overcharge in public procurement to be slightly above 23%. Finally, Lalive and Schmutzler [2011] as well as Vellez [2011] find figures close to ours when comparing the price paid by a public buyer in two alternative awarding procedures.

4.7.3 Main limitation of the study

In this paper, we do not account for the increased transaction costs incurred by the public buyer when using negotiated procedures. Indeed, negotiated procedures require parties to dedicate time and resources to the discussions, therefore raising transaction costs. Firms are likely to compensate these additional costs by increasing the level of their offers. However, the unaccounted for supplementary costs incurred by public buyers are clear limitations to any positive result found on such procedures. Further results should try to incorporate estimations of these increased transaction costs on the buyer's side.

4.8 Conclusion and implications for public policy

In this paper we aim at investigating the impact of using a negotiated procedure on the amounts of the whole sample of bids as well as on the winning bids and the total cost of the contracts awarded by a major French public buyer. This issue should be at the top of the agenda since a similar procedure may soon be available in all European countries. The current European reform proposal in public procurement indeed explicitly suggests widening the possibility to negotiate the offers after a competition phase.

First, contrarily to the view expressed in the impact assessment of the new European proposals, our results point to the fact that these procedures may lead to price decreases when properly used.[88] With this result in mind,

[88]Indeed, the assessment underlines that negotiated procedures are thought of being

specific guidelines informing public buyers when negotiated procedures are appropriate should go hand in hand with the new Directive. Second, we interpret part of this beneficial effect of the discretionary margin as the result of a satisfying level of transparency, which puts public buyers under third party scrutiny. In this regard, a high level of transparency should be maintained with the application of the new Directive. Fortunately, the new reform proposal aims at compensating the greater freedom by an increase in public buyers' accountability.[89] We may therefore hope to observe similar positive effects of negotiated procedures with the application of the new Directive.

Nevertheless, some legitimate fears, which are specific to negotiations, are still to be empirically addressed. In particular, public buyers will have to acquire the appropriate expertise to properly handle negotiations as they are not in the culture of public purchasing.[90] It is likely that this expertise will have to be gained on the job. In this respect, deeper investigations should be led about the dynamic impact of negotiations: do learning-by-doing effects lead to better outcomes or do they progressively encourage abnormal behaviour on the buyer's side?

Appendix

"less efficient in generating savings than the open and restricted procedures" (European Commission [2011]).

[89] According to the EC: new rules "should aim at making life easier for CAEs and firms whilst at the same time continuing to guarantee a high level of transparency and efficient safeguards for equal treatment of bidders." (European Commission [2011]).

[90] "CAE' staff would have to acquire higher expertise to validly conduct negotiations." (European Commission [2011]).

Table 4.6: **Descriptive statistics**

Variable	Description	Mean	Std. dev.	Min	Max	N
	Across Contracts					
Estimate	Contract's estimated value (in euros)	1 220 969	2 552 604	15 000	22 600 000	427
Duration	Contract's estimated duration (in months)	8.27	6.15	1	38	427
Subcontracted	Volume of work delegated to subcontractors (in euros)	411 126.3	1 372 275	0	22 107 794	427
Nb candidates	Number of candidates for the contract	7.97	5.40	1	28	427
Nb bidders	Number of bidders for the contract	3.70	2.08	1	18	427
Nego	Takes the value 1 if the a negotiation phase is used, 0 otherwise	0.65	0.48	0	1	427
Less formalism	Takes the value 1 if the awarding procedure is a non-formalised one, 0 otherwise	0.31	0.46	0	1	427
Criteria	Takes the value 1 if the weight of technical and price criteria are specified, 0 otherwise	0.64	0.48	0	1	427
Technical Weight	Technical weight to evaluate bidder's offers (in%) - reported if *Criteria*=1	43.34	11.48	20	80	274
Index	Monthly construction price index, created by the National Institute of Statistics (INSEE)	733.75	48.32	646.8	815.5	427
Winning Bid	Amount of the winning bid	1 163 976	2 496 628	9 645.21	23 042 728	427
Norm. Winning Bid	*Winning Bid / Estimate*	0.911	0.267	0.149	2.67	427
Total Costs	Total costs of the contract (including renegotiations)	1 230 303	2 749 450	9645.21	30 494 464	427
Norm. Total Costs	*Total Costs / Estimate*	0.949	0.287	0.149	2.799	427
Renego	Takes the value 1 if the contract was renegotiated, 0 otherwise	0.550	0.498	0	1	427
	Across Bidders					
Bid	Final price submitted by the bidder (in euros)	1 216 931	2 571 441	9645.21	24 037 048	1578
Norm. bid	*Bid / Estimate*	1.06	0.40	0.15	4.68	1578
Utilization Rate[91]	Remaining value of contracts won but not yet completed (in euros) divided by the Maximum value of contracts won but not yet completed experienced by the bidder (in euros)	0.16	0.28	0	1	1578
Rivals Utilization Rate[92]	Average *Utilization Rate* of rivals candidates (in euros)	0.14	0.14	0	1	1578
Ranking[93]	Position of the offer in the technical ranking made by the buyer (if *Criteria*=0)	1.59	1.20	1	9	586
Technical Mark[94]	Technical value of the offer from the buyer's point of view on a scale of 0 to 100 (if *Criteria*=1)	68	21	0	100	992

Table 4.7: **Negotiation and received bids**

	Model 1 OLS *Norm. Bid*	Model 2 OLS *Norm. Bid*	Model 3 OLS *Norm. Bid*	Model 4 1st Stage *Nego*	Model 5 2SLS *Norm. Bid*	Model 6 1st Stage *Nego*	Model 7 2SLS *Norm. Bid*	Model 8 1st Stage *Nego*	Model 9 2SLS *Norm. Bid*
Nego	0.012	0.006	0.005		-0.279***		-0.246***		-0.281***
	(0.032)	(0.033)	(0.035)		(0.096)		(0.094)		(0.098)
Less Formalism			0.040					-0.042	0.021
			(0.034)					(0.031)	(0.035)
Criteria	-0.181***	0.057	0.052	-0.285***	-0.297***	-0.199**	-0.036	-0.188**	-0.055
	(0.057)	(0.096)	(0.096)	(0.052)	(0.066)	(0.091)	(0.102)	(0.092)	(0.104)
Technical Weight		-0.005***	-0.005***			-0.004***	-0.006***	-0.004***	-0.006***
		(0.001)	(0.001)			(0.001)	(0.001)	(0.001)	(0.001)
Technical Mark		0.031	0.033			0.104*	0.057	0.062	0.050
		(0.059)	(0.058)			(0.056)	(0.059)	(0.054)	(0.059)
Ranking		0.016	0.016			-0.035***	0.006	-0.025**	0.007
		(0.012)	(0.013)			(0.013)	(0.014)	(0.012)	(0.014)
Nb Bidders			0.007+					-0.040***	-0.004
			(0.005)					(0.004)	(0.006)
Utilization Rate			0.026					0.040	0.036
			(0.043)					(0.033)	(0.044)
Rivals Utilization Rate			0.057					0.066	0.075
			(0.084)					(0.081)	(0.086)
Duration	-0.002	-0.002	-0.004**	-0.012***	-0.005***	-0.012***	-0.005**	-0.018***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
Subcontracted			0.007***					0.006***	0.010***
			(0.002)					(0.002)	(0.003)
Index	0.005***	0.004***	0.005***	0.018***	0.008***	0.018***	0.007***	0.015***	0.007***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
Politics				0.065***		0.066***		0.059***	
				(0.007)		(0.006)		(0.006)	
Politics2				-0.001***		-0.001***		-0.001***	
				(0.000)		(0.000)		(0.000)	
Routines				0.067***		0.066***		0.077***	
				(0.017)		(0.018)		(0.016)	
Constant	-2.379**	-1.966**	-2.464**	-12.762***	-5.198***	-12.369***	-4.307***	-10.378***	-4.579***
	(1.005)	(0.994)	(1.083)	(0.813)	(1.422)	(0.809)	(1.391)	(0.861)	(1.412)
Nb. Obs.	1578	1578	1578	1578	1578	1578	1578	1578	1578
Adj. R^2	0.028	0.038	0.043	0.374	-0.054	0.382	-0.024	0.427	-0.030
F-Stat				52.676		54.737		52.738	
Hansen J Stat (Chi-sq(2) P-Value)					0.407		0.385		0.350

Note: Standard errors in parentheses. + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include month and year fixed effects.

Table 4.8: **Negotiation, winning bids and total costs**

	Model 10 1st Stage *Nego*	Model 11 2SLS *Norm. Winning Bid*	Model 12 2SLS *Norm. Total Costs*	Model 13 1st Stage *Nego*	Model 14 2SLS *Norm. Winning Bid*	Model 15 2SLS *Norm. Total Costs*	Model 16 1st Stage *Nego*	Model 17 2SLS *Norm. Winning Bid*	Model 18 2SLS *Norm. Total Costs*
Nego		-0.225	-0.240		-0.232	-0.251+		-0.262+	-0.283*
		(0.167)	(0.169)		(0.168)	(0.171)		(0.163)	(0.165)
Less Formalism							-0.108*	-0.052	-0.069+
							(0.060)	(0.041)	(0.045)
Criteria	-0.208**	-0.177**	-0.214**	-0.267	-0.299**	-0.348**	-0.340*	-0.368***	-0.420***
	(0.104)	(0.087)	(0.092)	(0.195)	(0.142)	(0.156)	(0.192)	(0.143)	(0.157)
Technical Weight				-0.003	-0.003*	-0.003*	-0.003	-0.003*	-0.003*
				(0.003)	(0.001)	(0.002)	(0.003)	(0.001)	(0.002)
Technical Mark				0.025	0.119+	0.156*	0.094	0.168**	0.208**
				(0.118)	(0.074)	(0.080)	(0.114)	(0.080)	(0.086)
Ranking				-0.186***	-0.154***	-0.138**	-0.200***	-0.160***	-0.148**
				(0.064)	(0.055)	(0.060)	(0.059)	(0.052)	(0.059)
Nb Bidders							-0.030***	-0.025***	-0.026***
							(0.010)	(0.009)	(0.009)
Utilization Rate							-0.045	-0.046	-0.068
							(0.075)	(0.048)	(0.053)
Rivals Utilization Rate							0.290*	0.277**	0.309**
							(0.150)	(0.138)	(0.148)
Duration	-0.013***	0.002	0.003	-0.013***	0.001	0.002	-0.019***	-0.008**	-0.008*
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.004)	(0.004)
Subcontracted							0.004	0.013***	0.014***
							(0.004)	(0.003)	(0.003)
Index	0.017***	0.007**	0.008***	0.016***	0.007**	0.008***	0.014***	0.007**	0.007**
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Politics	0.053***			0.054***			0.048***		
	(0.013)			(0.013)			(0.013)		
Politics2	-0.001***			-0.001***			-0.001***		
	(0.000)			(0.000)			(0.000)		
Routines	0.065*			0.061*			0.071**		
	(0.035)			(0.035)			(0.034)		
Constant	-11.624***	-4.808**	-4.868**	-11.338***	-4.593**	-4.713**	-9.731***	-3.814**	-3.763*
	(1.497)	(2.203)	(2.203)	(1.481)	(2.146)	(2.160)	(1.572)	(1.930)	(1.964)
Nb. Obs.	427	427	427	427	427	427	427	427	427
Adj. R^2	0.295	-0.173	-0.180	0.299	-0.168	-0.185	0.329	-0.079	-0.092
F-Stat	10.270			10.360			10.102		
Hansen J Stat (Chi-sq(2) P-Value)		0.7155	0.7711		0.6872	0.7809		0.7418	0.7905

Note: Standard errors in parentheses. + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include month and year fixed effects.

Table 4.9: **Negotiation and probability to renegotiate**

	Model 19 2SLS *Renego*	Model 20 2SLS *Renego*	Model 21 2SLS *Renego*
Nego	-0.486*	-0.527**	-0.570**
	(0.249)	(0.249)	(0.258)
Less Formalism			-0.154*
			(0.079)
Criteria	-0.219+	-0.496*	-0.590**
	(0.143)	(0.289)	(0.294)
Technical Weight		0.004	0.004
		(0.003)	(0.003)
Technical Mark		0.028	0.117
		(0.151)	(0.163)
Ranking		-0.055	-0.077
		(0.144)	(0.147)
Nb Bidders			-0.033**
			(0.014)
Utilization Rate			-0.204**
			(0.090)
Rivals Utilization Rate			0.314*
			(0.187)
Duration	0.030***	0.030***	0.017**
	(0.005)	(0.005)	(0.007)
Subcontracted			0.017***
			(0.006)
Index	0.008**	0.009**	0.007*
	(0.004)	(0.004)	(0.004)
Constant	-5.780**	-6.410**	-4.401+
	(2.938)	(2.894)	(2.705)
Nb. Obs.	427	427	427
Adj. R^2	-0.054	-0.092	-0.052
Hansen J Stat (Chi-sq(2) P-Value)	0.5383	0.5774	0.5027

Note: Standard errors in parentheses. + $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All specifications include month and year fixed effects.

Figure 4.1: **Contract characteristics and municipal election**

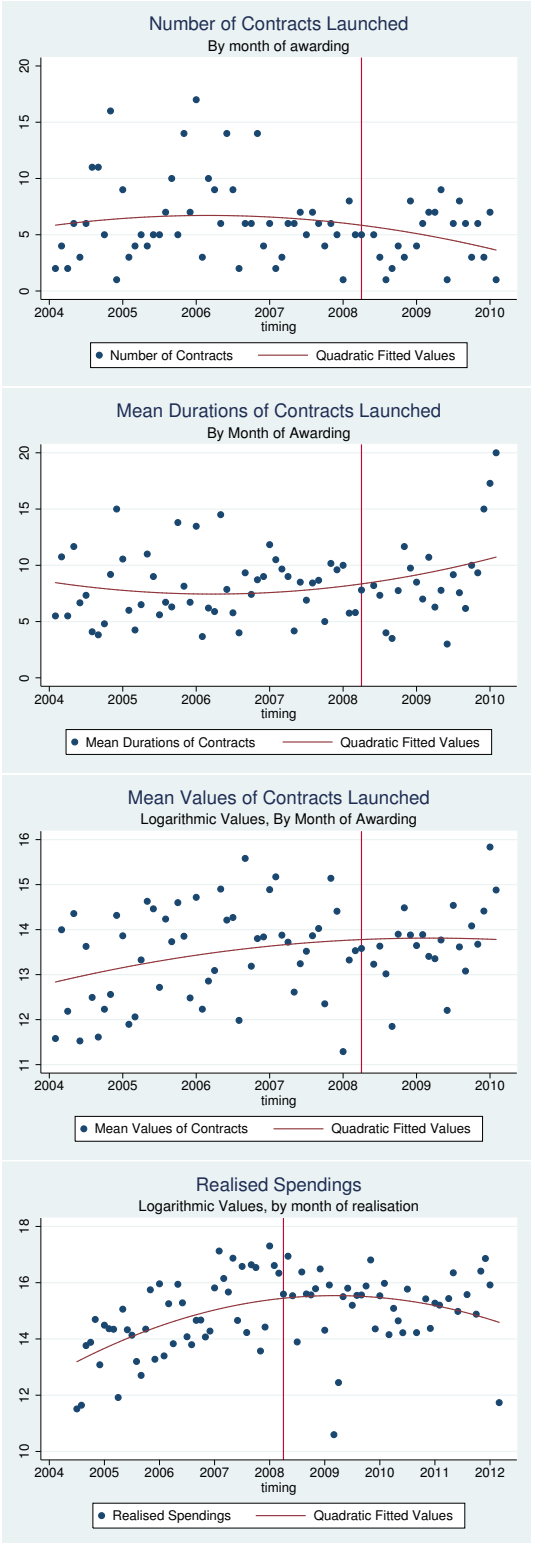

Figure 4.2: **Benford's Law and Winning Bids**

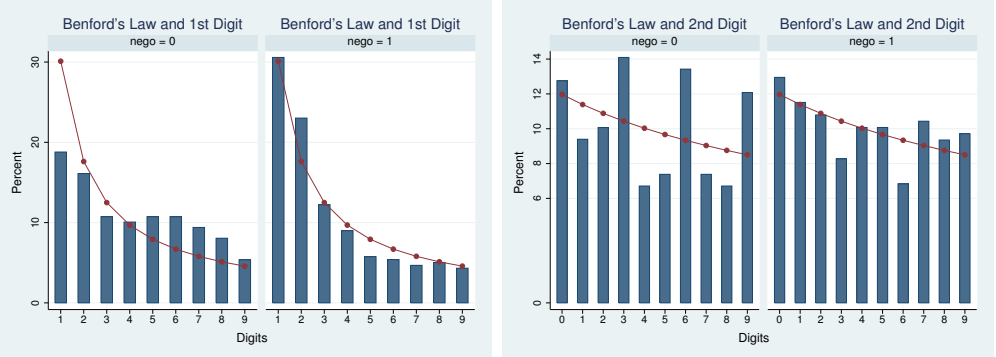

Figure 4.3: **Benford's Law and Distance to Estimation**

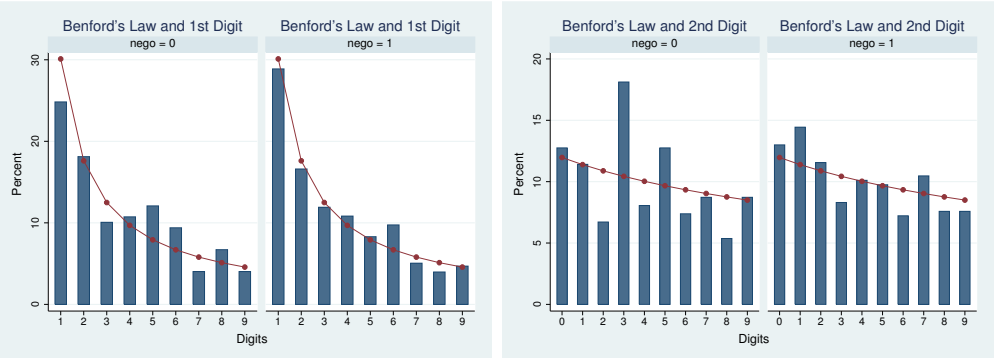

Table 4.10: **Goodness of Fit Tests for Benford's Law**

First Significant Digit of Winning Bids

Test	P-Value for Auctions	P-Value for Negotiations
Pearson's X2	0.0205	0.4540
Log likelihood ratio	0.0256	0.4682

Second Significant Digit of Winning Bids

Test	P-Value for Auctions	P-Value for Negotiations
Pearson's X2	0.2678	0.8694
Log likelihood ratio	0.2926	0.8507

First Significant Digit of Distance to Estimation

Test	P-Value for Auctions	P-Value for Negotiations
Pearson's X2	0.3595	0.6885
Log likelihood ratio	0.4021	0.7345

Second Significant Digit of Distance to Estimation

Test	P-Value for Auctions	P-Value for Negotiations
Pearson's X2	0.0773	0.6886
Log likelihood ratio	0.1011	0.6867

Summary of Findings and Contributions

The popular belief in the inefficiency of the public sector has attracted the attention of scholars of both Management and Economics. Literature from both the NPN and TCE fields has pointed out that these inefficiencies, particularly in public procurement, may be the result of overwhelming regulation of the public sector. Public buyers are believed to be unable to seek efficiency as they are constrained by or focused on rules. One of the solutions proposed was the convergence towards private sector practices with reliance on the independence and the discretion of public buyer focused on achieving clear and transparent goals. This solution seems to be shared by both NPM scholars (Kelman [1990]) and TCE scholars (Tadelis [2012], Spagnolo [2012]).

Yet, in this quest for efficiency, the potential adverse effects of such solutions on public procurement manipulation (e.g. collusion, corruption, favouritism, political influence) have been partially overlooked. The relative absence of work focusing on these adverse effects is particularly worrisome considering that among the main goals of procurement regulation was the prevention of favouritism and corrupt practices (McCubbins et al. [1987]). This dissertation aimed at filling this gap by studying the impact of NPM influenced procurement reforms on the extent of procurement manipulation. In

the following, we present our results concerning the link between discretion and manipulation and discuss their implications for public policies.

Summary of Main Findings

On Fighting Collusion

Our analysis of collusive schemes in Chapter 2 enabled us to uncover several of their particularities. In accordance with previous theoretical and empirical results (see e.g. Marshall et al. [1994] and Pesendorfer [2000]), the data we have analysed is consistent with the existence of cost asymmetries between cartel firms and outside firms. One of the main justifications would be that only efficient firms are invited to join the cartel. In addition, we found that cartels were able to anticipate the level of outside competition and to adapt their strategies accordingly by submitting more aggressive bids as the number of outside firms increased.

In Chapter 3, we analysed a procedure that decreased the formalism compared to traditional procedures (e.g. the traditional open call for tenders). For instance, buyers have more discretion to adapt the procedural delays, the pre-qualification and the post-selection requirements or the publicity to the work to be done. This procedure aimed at fluidifying the procurement process and increasing competition, in particular from small businesses. Positive results were found on both levels. On the latter, we found that this procedure enabled greater participation of SMEs in the bidding stage. We believe that such procedures may have positive results when a collusive scheme is suspected to be active. Indeed, it is probable that SMEs, because they are less efficient firms, will not be invited to join the cartel. Thus, an increase in the participation of SMEs in the bidding stage will increase outside competition for the cartel. This increase in outside competition is likely to result in more aggres-

sive low cartel bids, decreasing cartel profits (and thus limiting incentives, for cartel members, to participate in the scheme) and increasing social welfare.

Conclusion 1: *Increasing competition by small firms, as it has been found when using adapted procedures, may help fight collusion and increase social welfare by lowering cartel profits.*

In addition, in Chapter 4, we analysed the growing freedom, for public buyers, to negotiate the offers received from firms. During negotiations, public buyers have some discretion over the choice of the details to be discussed. We believe that the resulting uncertainty, for firms, over the content of negotiations may render collusive strategies more difficult to sustain *ex ante*. In particular, firms may fear that public buyers will be able to pin out the areas in which firms' prices were voluntarily inflated. Thus, to avoid being unveiled and reported to the Competition Authority by public buyers, firms may decide to avoid collusive practices. In Chapter 4, these arguments are supported by a test based on Benford's Law.

Conclusion 2: *Negotiated procedures limit firms' collusive practices.*

On Fighting Political Influence

The analysis of ways in which politicians influence public procurement has recently grown into a burgeoning empirical literature. In Chapter 1, we extend this literature by showing how politicians influence the timing of contracts to favour their completion prior to elections. We believe this timing of contracts is meant to increase politicians' electoral perspectives by sending positive signals to voters on their ability. Also, within the literature linking politics and procurement, Chong et al. [2011] found that French municipalities' choices between auctions and negotiations relied more on political grounds than on efficiency considerations.

In Chapter 3 and 4, we study the awarding of contracts by Paris Habitat-OPH, an arguably more independent public buyer than municipalities. Though we lack a control group to statistically infer this, our plotted graphs of the amounts of realised investments in Chapter 4 did not exhibit any discontinuity around the election date. Thus, contrarily to the municipalities in Chapter 1, our public buyer did not seem to influence the timing of his contracts to satisfy political interests. Moreover, in contrast with the results of Chong et al. [2011], we found that, while our public buyer was also influenced by elections in his choice between auctions and negotiations, efficiency considerations still played an important role in his decision.[95]

Conclusion 3: *Increased public buyer independence, as it decreases political influence over public procurement, enables public buyers to focus on efficiency considerations.*

On Efficiency and on the Link Between Discretion and Corruption

NPM and TCE scholars suggest raising the discretionary power of public buyers to increase efficiency. Our work contributes to the growing literature assessing such links (see e.g. Coviello et al. [2013] and Chever et al. [2011]) by analysing the impact of two discretionary procedures (the growing possibility, for public buyers, to use adapted or negotiated procedures) on efficiency. In Chapter 3, we find that the positive results on delays and on participation of SMEs exhibited when using adapted procedures did not come at a higher price for the public side. In Chapter 4, on the other hand, we find that the use of negotiated procedures significantly decreased the total costs incurred by the public body. We argued that part of these positive results may be due to the fact that our public buyer's choices between auctions and negotiations were in

[95] Arguably, this latter result could also be influenced by differences in experience between municipalities and Paris Habitat-OPH. We are unfortunately unable to disentangle the political effect from the experience effect.

line with recommendations from the economic literature (Bajari and Tadelis [2001]).

Conclusion 4: *Negotiated procedures enable public buyers to significantly reduce the total cost of contracts if used in accordance with recommendations from the economic literature.*

Leaving discretion to the public buyer has often been ruled out for fear of corruption. Yet, recent works have shown that this link may not be as straightforward (see e.g. Bandiera et al. [2009], Amaral et al. [2009]). Our results seem to corroborate these studies. Indeed, a corollary to the results of Chapters 3 and 4 on efficiency is that, as far as we could observe, the increased discretionary power did not lead to an increase in public spending that could be linked to corrupt practices. Quite on the contrary, if anything, discretionary procedures were associated with lower public spending.[96] The recent raises in the transparency and in the accountability of public buyers are identified as potential safeguards against corruption.

Conclusion 5: *Given satisfying levels of transparency and accountability, a raise in the discretionary power of public buyers is unlikely to lead to higher levels of corruption.*

[96] As noted in Chapter 3, a caveat of this result is that the impact of adapted procedures was only assessed on the winning bid and not on the total cost of the contract.

Policy Implications, Limitations and Areas for Future Research

Policy Implications

The implications of the previously exposed results for public policies may be numerous. In the following, we review some of the more direct implications.[97]

The current regulation of public procurement prohibits public buyers from using negotiated procedures above an approximative threshold of 5,000,000€. We believe this threshold is preventing public buyers from efficient contracting for three reasons. First, the ban on negotiations above the threshold is likely to be the result of the regulators' intention to prevent corrupt practices that may come from the opacity of negotiated procedures. Yet, as we have shown in Chapter 4, given sufficient safeguards, negotiations are unlikely to lead to more corrupt practices. As a matter of fact, negotiations are suspected to lead to better outcomes. Second, these better outcomes were observed when public buyers used negotiated procedures in accordance with recommendations from the economic literature (Bajari and Tadelis [2001]). Since higher complexity calls for more negotiation and since higher value contracts are likely to be more complex, the current threshold is a clear limitation to the application of these recommendations. Third, competition for high valued contracts is more scarce and may lead to repeated interactions between a small number of firms capable of fulfilling such contracts. Repeated interactions are suspected to foster collusion (see e.g. Ivaldi et al. [2003]). As we show in this dissertation, negotiations, because they force firms to be able to justify any part of their offer, are useful tools in the fight against collusion.

[97] More indirect implications could be drawn regarding current debates surrounding discretion in public procurement such as the use of restricted auctions or the possibility to select firms according to their past performance (see Doni [2006], Calzolari and Spagnolo [2009], Tadelis [2012], Spagnolo [2012]).

The French public procurement Code is based upon three clear principles: the freedom and equity of access of all firms to public tenders and the transparency of public procurement. Yet, in practice, there are additional aims that public buyers are expected to reach. Public buyers are increasingly pressed to obtain the best value for money. As we have noted in Chapter 3, with the financial crisis came the aim of fluidifying the procurement process. Finally, the access of small businesses to public procurement has also been repeatedly underlined as a potential goal in official documents, in reports and in declarations from politicians. In Chapter 3, we noted that the objectives of fluidifying procurement and the access of small businesses to public procurement could be conflicting. The latter goal may also be in contradiction with the basic principle of equity of access to public procurement. Furthermore, no clear objectives in terms of procedure duration or small business access were stated. As noted by Rainey [1993], "vague, multiple and mutually conflicting goals" create goal ambiguity which may be detrimental to the accountability and the performance of public organizations. Thus, we believe that regulators should revise their stated objectives in order to make them clearer and more transparent. Moreover, as argued in Chapter 3, adequate tools should be made available to public buyers in order for them to be able to reach these desired objectives.

As noted in Chapter 4, since the 2004 reform of the French procurement Code, public buyers are now required to inform eliminated firms of the reasons motivating the rejection of their offers, raising *ex post* oversight by bidders (Marshall et al. [1991]). Moreover, the weightings of the selection criteria of firms have to be specified in the call for tender thus raising transparency (Amaral et al. [2009]). We believe that these recent changes in procurement legislation that went hand in hand with the increases in discretionary power of public buyers may have limited favouritism and/or corruption practices. Indeed, as stated by Rose-Ackerman [1999], "systems that are more transparent and accountable can afford to give procurement officers more discretion

than others with less accountability". Thus, further increases in the discretion of public buyers should also consider increasing the transparency and/or the accountability of public buyers. Chun and Rainey [2005] note that given sufficiently clear and transparent goals, public buyers can be made more accountable. For instance audits may be used to assess whether public buyers reach their objectives without manipulation (Di Tella and Schargrodsky [2003]).

Limitations

In each chapter of this dissertation, we discussed the inherent limitations of our results. In addition to these, we identified several general limitations. Among them, the question of the external validity of our study is central. In particular, the applicability of our results to other countries is questionable. Indeed, as we have discussed in the previous subsection, the quality of the institutions of a country (e.g. regarding transparency or court efficiency and/or neutrality) is crucial for discretion not to lead to abnormal behaviour of public buyers. Thus, while we believe that similar reforms are likely to lead to equally positive outcomes in other developed countries, their application to developing countries is highly debatable. In addition, the application of New Public Management reforms to sectors other than public procurement need not result in similar positive results. Sectorial specificities may lead to divergent results and empirical evidence of the effectiveness of New Public Management reforms in other sectors is scarce (Andersen [2008]). Finally, though we have found some evidence suggesting that the link between discretion and corruption may not be as straightforward as one might imagine, we did not assess whether increased discretionary power for public buyers led to more favouritism.

While providing some answers, this dissertation also raises important questions for future research. First, further work should look at the implications of political influence on public procurement. In particular, is the strategic manipulation of contracts observed in Chapter 1 a common phenomenon in developed countries? Is the manipulation observed a change in terms of projects or timing? What can be said about efficiency concerns? Further work should also focus on the link between political independence of public buyers and the efficiency of their choices. For example, future research could compare purchasing bodies with different degrees of independence in the efficiency of their choices between auctions and negotiated procedures.

In addition, as previously discussed in our limitations, our work did not tackle the question of the link between discretion and favouritism. Does increased discretionary power of public buyers lead to more contracts awarded to the same firm(s)? If so, what can be said about the impact of such practices on other outcomes such as competition?

The effects of discretion on outcomes have been analysed over a period of approximatively six years. Yet the long term effects could differ from what we have observed. In particular, does experience in negotiations enable public buyers to procure more efficiently or do repeated interactions foster collusion between the buyer and the firms?

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List of Tables

List of Figures