



UMEÅ UNIVERSITY

NAVIGATING PUBLIC PROCUREMENT

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Abstract

Paper [I]: This paper studies the effect of Green Public Procurement (GPP) on competition, bids, and winning bids under two different regulation periods where the latter include more explicitly expressed GPP ambitions. Based on detailed data from Swedish internal cleaning service procurements, our results imply that environmental considerations might not influence the bids as required for GPP to be considered an effective environmental policy instrument. Over time, lower degree of competition and increased bids are found. This phenomenon can be attributed, at least in part, to regulatory influences, signifying an escalating complexity in the process of submitting bids.

Paper [II]: We combine theoretical and empirical analysis to investigate impacts of contractual requirements in procurement auctions with endogenous entry. Our analysis shows that contractual requirements impact expected payoffs, influencing the equilibrium number of bidders and their bids under zero-profit conditions. Specifically, we find that, in equilibrium, more contractual requirements increase competition by raising bidders' expected payoffs, while increased entry costs reduce competition. Overall, a rise in contractual requirements and entry costs results in higher equilibrium bids. Additionally, we highlight the importance of enforceability in shaping bidding behavior. Empirical evidence from public cleaning services procurement in Sweden corroborates the implications of our model.

Paper [III]: This paper investigates post-litigation impacts on bidder participation and composition within public procurement, utilizing Swedish data spanning from 2012 to 2018. The findings indicate an average decrease in bidder participation following a litigation process of approximately 8%, particularly in construction procurements, alongside a decline in the proportion of SME bidders and local firm participation. Furthermore, bidder participation, bidder composition, and procurement design significantly influence the probability of litigation.

Paper [IV]: This study examines the impact of local market concentration on the participation and success of small and medium enterprises (SMEs) in Swedish municipal cleaning service procurement auctions. A 10 percentage point reduction in the joint market share of the four largest firms (CR_4), while maintaining a constant Herfindahl-Hirschman Index (HHI), results in a 7.5% increase in SME participation and raises the likelihood of an SME winning by 2.4%. Furthermore, the 2014 revisions to the EU public procurement directives mitigated the adverse effects of market concentration. However, despite the increase in participation, there is no evidence that the success rates of SMEs improved following the implementation of the revised EU directives.

Keywords: Public Procurement, GPP, Regulation, Contractual Requirements, Endogenous Entry, Auction Theory, Litigation Processes, Bidder Participation, SMEs, Competitiveness, Regional Economics, Market Concentration, GMM, 2SLS, Probit, Poisson QMLE.

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Umeå, March 2025

Samielle Drake

Contents

This thesis encompasses an introduction followed by the subsequent standalone papers:

Paper [I]: Drake, S., Lundberg, J., & Lundberg, S. (2024). Market response to environmental policy via public procurement: An empirical analysis of bids and prices. *Journal of Environmental Management*, 365, 121547.

Paper [II]: Drake, S., & Xu, F. (2025). Contractual Requirements and Bidding Behavior in Public Procurement with Endogenous Entry. *Journal of Public Economic Theory*. 27, 1.

Paper [III]: Drake, S. (2025a). Bidder Participation Following Public Procurement Litigation. *Umeå Economic Studies*, no. 1033. Umeå University.

Paper [IV]: Drake, S. (2025b). Small Fish in a Big (Local) Pond: EU Directives, Market Concentration, and SME Success in Public Procurement. *Umeå Economic Studies*, no. 1034. Umeå University.

Introduction

Public entities typically do not produce all the goods, services, or construction projects needed to fulfill their public service objectives. For example, while a municipality is responsible for ensuring the availability of public transport, this does not mean it should allocate resources to manufacturing its own buses or trams. Instead, they delegate some of the delivery and production of goods, services, and construction work to private firms or other public entities through public procurement processes (Alchian & Demsetz, 1972). Public procurement is a regulated purchasing process designed to ensure open competition and the efficient use of public funds, with clear requirements for participating bidders and contracts allocated through a transparent and predetermined award method. Public procurement accounts for 13 to 20 percent of global GDP (World Bank, 2020) and approximately 13 percent of GDP within OECD countries (OECD, 2023).¹ Fair competition is vital for ensuring public procurement efficiency, value for taxpayers money, and accountability in the use of public funds. The competitive bidding process allows public authorities to select the best value offer based on price, quality, or both. Additionally, it can support secondary objectives, such as sustainable public procurement, by motivating and encouraging suppliers to adopt environmentally and socially responsible practices (Brammer & Walker, 2011), which are increasingly recognized as a part of the broader impact of procurement.

Research in public procurement often draws on theories from first-price sealed-bid (FPSB) auctions (Vickrey, 1961; Myerson, 1981; Milgrom & Weber, 1982; McAfee & McMillan, 1987b), particularly those addressing endogenous bidder entry (Smith, 1982; Samuelson, 1985; Mankiw & Whinston, 1986; Engelbrecht-Wiggans, 1987, 1993; Meyer, 1993; Levin & Smith, 1994), given its prevalence in real-world applications. In the context of endogenous bidder entry with positive entry costs, the decision to participate in procurement auctions depends on the expected payoffs, as outlined by McAfee & McMillan (1987a). Specifically, the equilibrium number of bidders is determined by a zero expected profit condition, where bidders enter as long as their expected profit exceeds the entry cost, and expected profits diminish as more bidders enter. Within this framework, Papers [I] and [II] explore the nature of endogenous entry decisions within their empirical analyses, focusing on Swedish data from cleaning services procurements. By employing instrumental variable techniques, specifically Generalized Method of Moments (GMM) and Two-Stage Least Squares (2SLS) methods, these studies examine the influence of regulatory measures on the number of bidders as well as the magnitude of the submitted bids.

One mechanism to safeguard fair competition and transparency in public procurement is the right for bidders to initiate litigation processes. If bidders believe the procurement process was unfair or violated legal provisions, they can challenge it, thereby reinforcing regulatory compliance and protecting competition. While this right enhances accountability and deters misconduct, it may also lead to strategic or meritless lawsuits, which can delay projects and increase costs while

¹On average, EU countries allocate 17% of their GDP to public procurement (European Commission, 2011) In 2018, Sweden allocated 18.5% of its GDP, amounting to 819 billion Swedish Kronor (SEK), to public procurement (Upphandlingsmyndigheten, 2022).

potentially deterring future competition. The existing economic literature on the consequences of litigation in public procurement is limited, and Paper [III] addresses this gap by examining the impact of litigation on future bidder participation, utilizing Swedish municipal cleaning services as a case study.

Paper [IV] shifts the regulatory focus to understanding how market concentration — a critical element of market competition — affects bidder participation, particularly for SMEs, in public procurement auctions. While a market dominated by a few large firms may appear competitive, the exit of key players can quickly result in a local monopoly, disadvantaging both the public and private sectors. In this context, SMEs play a vital role in maintaining competition, preventing market power concentration, and fostering a more resilient market that benefits both public entities and the broader local economy. Paper [IV] specifically examines the impact of local market concentration on SMEs' ability to compete and secure contracts in public procurement auctions, with a focus on the cleaning services sector, which is heavily reliant on local providers. Additionally, building on the findings of Paper [I] regarding changes in EU directives, Paper [IV] further explores how these changes interact with market concentration to influence SME participation and success.

To summarize, Papers [I] and [II] collectively emphasize the role of the requirements outlined in the call for tender and regulatory schemes on both bids and bidder numbers, which relates to *Regulations in Public Procurement* and *The Importance of Competitive Markets*. Paper [III] examines the consequences of litigation on bidder participation, while Paper [IV] contributes to the overall discussion by exploring how market concentration influences bidder participation, both of which relate to *The Importance of Competitive Markets* and *Transparent and Trustworthy Processes*. Additionally, Paper [IV] connects to *Regulations in Public Procurement*, focusing on the impact of changes in EU public procurement directives on SME participation and success. Collectively, these papers underscore the critical role of a competitive environment in shaping procurement outcomes by influencing the number of bidders and the composition of bidders, as well as the results of public contracts.

Regulations in Public Procurement

Public procurement is a regulated purchasing process designed to promote competition and ensure the efficient use of public funds. In Sweden, it is governed by the Public Procurement Act, which is based on EU directives. Additionally, procuring entities can set specific requirements in the call for tenders to ensure that firms, as well as the goods, services, or works they provide, meet certain standards. Public procurement regulations aim to safeguard public interests while achieving broader policy goals, such as environmental sustainability (Drake et al., 2024; Lundberg et al., 2022), SME inclusion (Hoeckman & Taş, 2022), job creation (Ambe, 2019), social welfare enhancement (European Commission, 2011), and innovation stimulation (OECD, 2017). These regulations and tender requirements can affect the costs faced by participating firms.² For instance,

²The decision to participate in public procurement depends on expected returns (McAfee & McMillan, 1987a), as individual gains decline with more bidders until they match entry costs.

Lundberg et al. (2015) examined the impact of environmental criteria on competition in Swedish cleaning procurements and found that such requirements led to reduced participation. Regulatory compliance is essential, requiring firms to meet tender eligibility and delivery standards, particularly in initiatives like Green Public Procurement (GPP), which integrates environmental goals to reduce emissions and foster eco-friendly innovation (European Commission, 2011). However, its effectiveness remains debated, as GPP may not always incentivize suppliers who are already meeting green standards (Marron, 1997; Lundberg et al., 2016). For GPP to succeed, criteria must surpass existing standards, encourage investment, and be supported by public willingness to absorb added costs (Lundberg et al., 2016). Beyond ensuring compliance, public procurement regulations promote transparency, fairness, and accountability in contract allocation, thereby mitigating risks such as favoritism, corruption, and inefficiency.

Positioned within the broader literature on GPP and procurement practices, Paper [I] contributes to understanding how GPP criteria and recent changes in the EU directives affect bidder participation and bids. Paper [I] shows that environmental management systems reduce bidder participation, whereas eco-friendly product regulations attract more bidders by increasing bids without deterring entry, challenging the traditional view that higher entry costs discourage participation. Paper [II] extends this analysis by demonstrating that the impact of regulations depends on whether they act as entry barriers or as contractual requirements imposed only on the winning bidder. The EU introduced environmental considerations in its 2004 Public Procurement Directives, refining them in 2014 to support broader goals such as the European Green Deal and the Circular Economy Action Plan (European Commission, 2020a, 2020b), with Sweden incorporating GPP in its climate policy action plan (Regeringens proposition 2019/20:65) and national procurement strategy (Regeringskansliet, 2016). Despite its potential, GPP faces challenges, including self-regulation by suppliers who may opt out of compliance by not bidding. While previous research has examined the impact of requirements stipulated in the call for tender on bids and the number of bidders, no study has explicitly differentiated between the effects of entry barriers and contractual requirements. Papers [II] fill this gap by analyzing how these mechanisms influence bidder participation and bids, demonstrating that requirements enforced before the evaluation phase act as entry barriers, reducing the number of participating bidders, whereas those imposed at the delivery stage serve as contractual obligations, raising bids without deterring entry. Paper [I] finds limited evidence of reduced bidder participation under GPP criteria, which could be a consequence of whom the requirements are imposed on.

Paper [I] finds limited evidence for GPP's effectiveness but notes that EU regulatory changes generally reduce bidder numbers while raising bids. Findings further show that eco-labelled products increase bidder numbers while Environmental Management Systems reduce participation. Paper [II] provides an explanation: eco-labelled products function as contractual requirements, applied only to the winning bidder, which raises production costs without discouraging entry. In contrast, Environmental Management Systems act as entry costs, incurring costs on all bidders and limiting participation. Paper [II] distinguishes requirements based on their target phase, extending

a theoretical first-price sealed-bid auction model, which is empirically tested using Swedish data. While GPP aims to surpass environmental standards and incentivize traditional suppliers to invest (Lundberg et al., 2016), Paper [I] highlights that specific requirements increase bidder numbers, and Paper [II] suggests this occurs because such requirements act as obligations enforced during the delivery phase. In contrast, requirements enforced before the evaluation phase serve as entry costs, reducing the number of participating bidders while increasing bids.

The Importance of Competitive Markets

Fair competition is a key factor in determining the efficiency of procurement processes, as a higher number of entrants generally leads to more competitive bidding, lower winning bids, and greater quality for public funds spent. Previous research has highlighted the significance of fostering competition to achieve optimal outcomes in public procurement. For instance, studies by Djankov et al. (2002) and Lundberg et al. (2015) emphasize how entry barriers influence bidder participation and the resulting bids. However, other factors may also affect bidder participation. Paper [IV] demonstrates that increased local market concentration results in fewer bidders for cleaning service procurements, a sector with a strong dependence on local suppliers, where the dominance of a limited number of large firms discourages smaller competitors from participating.

Public procurement presents significant opportunities for regional development, for example by enabling local SMEs to secure public contracts (Preuss, 2011). However, to prevent SMEs from being overshadowed by larger suppliers, competition must be carefully balanced. This requires policies that enhance SME participation and competitiveness in procurement processes. SMEs and local firms are often perceived as lacking the resources to navigate complex tender procedures, resulting in higher participation costs compared to larger national firms (Flynn, 2017). Additionally, they typically lack the economies of scale that larger firms can leverage, further exacerbating their competitive disadvantage. Ensuring the participation of local firms and SMEs is crucial for fostering a diverse and competitive procurement landscape. This becomes especially significant when considering the negative impact of market concentration on SME participation and success, as highlighted in Paper [IV]. Moreover, Paper [III] demonstrates that litigation can further reduce the share of SMEs and local firms in public procurement. Paper [IV] further illustrates that SMEs are more likely to be successful in their bidding when a higher proportion of bidders are SMEs; however, they encounter challenges in competing against larger firms.

It is well-established that lower bidder participation increases bids for public goods, services, and works, both theoretically (McAfee & McMillan, 1987b; Milgrom, 1989; Riley & Samuelson, 1981) and empirically (Onur et al., 2012). Hence, if past litigation processes reduce participation, it could escalate costs for public entities. Additionally, post-award litigation concerns could compel contracting authorities to exercise excessive caution (Heikkinen & Halonen, 2023) or modify procurement processes to avoid disputes. However, modifications that increase contract complexity could hinder bidder participation, particularly among SMEs (Flynn, 2017; Mahuwi & Israel, 2023; Tukiainen & Halonen, 2020). Moreover, excessive environmental criteria also discourage bidder

participation (Lundberg et al., 2015). There is limited research on the post-litigation effects in public procurement. Further investigation is needed to understand how litigation influences competition over the long term, particularly in relation to the participation of SMEs and local firms, as well as the role of the entity initiating the litigation.

Transparent and Trustworthy Procedures

To ensure fairness and allow firms to challenge perceived errors or biases in Swedish procurements (Tukiainen & Halonen, 2020), bidders can initiate litigation within 10 days of an award decision (Upphandlingsmyndigheten, n.d.). Challenges require bidders to prove harm and demonstrate faulty procedures, including violations of established principles. Successful challenges may lead to corrections; otherwise, the procurement process continues. Litigation, which can extend up to 13 months when escalated (Swedish Competition Authority, 2013), imposes costs on all parties involved. In addition to incurring legal expenses, public entities face costs associated with delayed supplier engagement and resource diversion, while suppliers face revenue losses or delays in revenue. Prolonged litigation can alter firms' expectations for future contracts and hinder performance or reimbursement (Dragos et al., 2011), with smaller, local firms being particularly susceptible to the financial strain imposed by such delays (Loader, 2011; Hoekman & Taş, 2022). Paper [III] explores these post-litigation effects and finds that bidder participation decreases following litigated procurements.

Predicting litigation remains a complex issue (Heavin & Keet, 2017), with factors such as bidder count, evaluation methods, contract duration, and procurement complexity influencing its likelihood (Tukiainen & Halonen, 2020). Lengthy litigation processes could lead to substantial costs, disproportionately disadvantaging smaller firms lacking financial resilience (Loader, 2016) and subsequently limiting their future participation. In fact, Paper [III] demonstrates that participation decreases following a litigation process, specifically reducing the share of SMEs and local firms participating. The Swedish Competition Authority (2014) emphasizes that skilled procurement teams and clear communication can significantly reduce misunderstandings and mitigate litigation risks. Conversely, overly detailed or complex criteria, high-value procurements, and subjective evaluations³ can escalate the likelihood of disputes.

Furthermore, legal frameworks such as EU Directive 2014/24/EU uphold fairness and transparency, thereby reinforcing the principles of non-discrimination and proportionality throughout EU procurement processes. These frameworks can be designed to support specific secondary goals, such as encouraging SME participation and integrating environmental considerations. Through the choice of allocation method, contract design, and requirements stipulated in the call for tender, public entities harness private market competition to achieve both value and secondary objectives, including the promotion of SME participation.⁴ Paper [IV] investigates the impact of EU public

³Qualitative features increase the unpredictability of outcomes, heightening litigation risks.

⁴This is often accomplished by employing strategies such as the economically most advantageous tender (Hoekman & Taş, 2022).

procurement directives on SME participation and success in public procurement, finding that EU directives mitigate the negative effect of increased market concentration on participation.

Concluding Remarks and Future Research

In short, these four papers collectively examine the links between regulatory frameworks, market structure, bidder behavior, and success in public procurement. Paper [I] finds that Green Public Procurement (GPP) functions more as guidelines than as a binding policy instrument in the Swedish market for cleaning services, maintaining rather than improving environmental standards. Paper [II] shows, both theoretically and empirically, that stricter contractual requirements can attract more bidders, while entry costs reduce participation, and that both factors can increase optimal bids. Paper [III] finds that litigation reduces bidder participation, particularly among SMEs and local firms, while highlighting a trade-off between participation and litigation risk. Finally, Paper [IV] identifies market concentration as a barrier to SME involvement and success, while acknowledging the role of regulatory measures in addressing structural challenges. These regulatory measures are shown to mitigate the negative effect of market concentration on SME participation.

Future research could build upon the findings of Papers [I], [II], [III], and [IV]. An area of interest is the impact of GPP on suppliers, as discussed in Paper [I], specifically whether they implement lasting environmental improvements or merely adjust standards during public contracts. Further research could also explore how environmental requirements affect SMEs compared to larger firms across various industries. Building on Paper [II], future research could examine the optimal design of entry costs and contractual requirements across different procurement settings, taking into account variations in enforceability.

Furthermore, additional research is needed on the positive relationship between SME participation and litigation initiations, as highlighted in Paper [III]. Future studies could also explore the long-term effects of litigation on bidder participation, particularly for SMEs, while considering the role of the litigation initiator. Finally, the findings of Paper [IV] highlight how skewed local market shares reduce SME participation and success in public procurement. Future research could further investigate the impact of market concentration on the participation of small and microfirms, while extending the analysis to other sectors to assess the external validity of these results.

Summary of the Papers

Paper [I]: Green Public Procurement (GPP) aims to promote sustainable development by motivating public authorities to acquire goods, services, and works with lower environmental impact. In the context of internal cleaning services, for example, this may involve requiring eco-friendly products, energy-efficient practices, or adherence to environmental management standards. Drake et al. (2024) specifically examine the influence of GPP criteria on bidder participation, bids, and winning bids in Swedish cleaning service tenders under two distinct regulatory frameworks, comparing procurement outcomes before and after the implementation of the stricter environmental requirements introduced by the revised EU directives.

The findings reveal a nuanced effect on bidder participation, where certain requirements enhance participation while others impede it. While environmentally conscious firms can be presumed to be attracted to green tenders, smaller firms and those lacking the necessary certifications or resources may be deterred, consequently reducing competition. Bids submitted under the latter regulatory scheme are shown to be higher on average, reflecting the costs of compliance and the additional red tape that followed the implementation.

Paper [II]: Drake and Xu (2025) combine theoretical and empirical analyses to examine the impact of contractual requirements (imposed on the winner of the auction) and entry regulations (imposed on all bidders) on bidding behavior and procurement outcomes in public procurement auctions. The study, utilizing Swedish tender data for cleaning services, demonstrates both theoretically and empirically that bidder participation and bids are significantly influenced by contractual requirements and entry costs, exhibiting differing magnitudes and effects. Furthermore, the analysis underscores the critical importance of enforceability in shaping the effectiveness of procurement policies, particularly in ensuring compliance with contractual standards.

Using a reverse first-price sealed-bid auction model with independent private values and endogenous entry, this study identifies two key regulatory mechanisms: entry regulations and contractual requirements. Entry regulations apply to all bidders and elevate participation costs, thereby reducing competition and increasing bids. In contrast, contractual requirements only impact the winning bidder; stricter contractual requirements elevate the contract's expected value, attracting a greater number of bidders, which enhances competition. Nonetheless, the impact of these requirements on bids is intricate. While an increase in the number of bidders typically drives down bids, the direct costs associated with more contractual requirements inflate the winning bidder's production costs, consequently leading to higher equilibrium bids. The model posits that this cost surpasses the competitive effect, resulting in higher bids. The empirical analysis employs a 2SLS method to address endogeneity related to bidder participation and corroborates the findings of the model.

Paper [III]: Effective public procurement heavily relies on competitive practices. Providing avenues for litigation enhances fairness and transparency by allowing firms to challenge errors and biases, such as favoritism (Tukiainen & Halonen, 2020). However, litigation can be both costly and time-consuming, imposing financial burdens and potentially shaping future contract expectations. This may, in turn, influence bidding behavior and entry decisions; an aspect that remains largely underexplored. Drake (2025a) investigates the potential post-litigation effect on bidder participation and composition using data from Swedish municipal procurement. The findings indicate that municipalities experience an average decline of 8% in bidder participation following litigation, alongside reductions of 5.4% in SME participation and 5.6% in local firm participation.

Furthermore, findings suggest that bidder participation is positively related to an increased likelihood of litigation being initiated, indicating a clear trade-off between enhanced bidder participation and litigation initiation. Additionally, the value of the contract, proxied by the duration of the contract and the option to extend the contract, increases the likelihood of litigation. Finally, findings indicate that employing an evaluation method beyond price increases the litigation risk; however, this effect is observed exclusively in service procurements.

Paper [IV]: Public procurement is important for regional economic development and job creation, with SMEs often argued to drive inclusivity and innovation. However, SMEs face significant barriers to public market entry and contract acquisition. In Sweden's cleaning services industry, despite rapid growth in the private sector and low entry barriers, SME participation in public procurement remains stagnant. Local markets that are dominated by a limited number of players may further restrict the participation and success of SMEs. Drake (2025b) examines the effects of market concentration, market skewness, and regulatory changes on SME participation and success in Swedish municipal cleaning service auctions. Markets with a larger joint share among the four largest firms (CR_4) in the local market are found to reduce SME participation. Specifically, a 10 percentage point increase in CR_4 , while holding the local Herfindahl-Hirschman Index (HHI) constant, leads to a 7.5% reduction in SME participation and a decreased likelihood for an SME bidder to win a public contract by 2.4%, highlighting the barriers SMEs face in concentrated markets.

Furthermore, the EU public procurement directives, revised in 2014, sought to enhance competition and SME participation by emphasizing transparency, lot-splitting, and evaluation methods that focus on attributes beyond price. This study finds that the directives have alleviating effects on the adverse impact of market concentration on SME participation; however, they did not significantly increase SME success rates. Non-price allocation methods, such as the best ratio between price and quality, on the other hand, which are argued to benefit SME participation, offer no apparent effect on the participation of SMEs, nor do they provide advantages for SMEs in securing contracts.

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