ENHANCING EFFICIENCY IN PUBLIC PROCUREMENT IN PORTUGAL: AN OVERVIEW OF THE RELEVANT COMPETITION ISSUES

António Ferreira Gomes [*] */ Ana Sofia Rodrigues* [**]

Abstract: *Public procurement accounts for a substantial share of a country's economic activity. Competition is key in ensuring that these funds are efficiently allocated. However, collusion often plagues public procurement procedures, jeopardizing good value for taxpayers' money. Poor procurement outcomes also often follow from inadequate tender design and lack of performance monitoring during the execution phase of the contract. This paper reviews some of the competition issues in the pursuit of the overarching aim of efficiency in public procurement and argues for the advantages of a mixed policy approach that addresses the various trade-offs and complementarities between policy options. A mix of ex-post and ex-ante action against bid rigging, a broad detection toolbox, tender design optimisation and effective performance monitoring generate self-reinforcing effects which are key in a well-structured policy approach towards efficient procurement. Furthermore, the promotion of awareness and accountability is crucial in aligning the incentives of competition agencies and the procurement related entities. These various interrelated factors are also the cornerstones of the Strategic Action Plan of the Portuguese Competition Authority for Public Procurement.*

Summary: 1. Introduction. 2. A snapshot on the efficiency of public procurement in Portugal. 3. Cartels in Public Procurement. 3.1. Bid rigging conspiracies: a threat to value for taxpayers' money. 3.2. Policy mix: *Ex-post* and *ex-ante* action on cartels, reactive and proactive detection tools. 3.3. Integrity in public procurement: collusion and corruption. 4. Beyond bid rigging: promoting and capturing the benefits of competition in public procurement tenders. 4.1. Promoting bidder participation. 4.2. Tender design when quality matters. 4.3. "Abnormally Low Tenders". 4.4. Dividing Contracts into Lots. 4.5. Framework Agreements. 5. Aligning Incentives: raising awareness and accountability. 6. Final Remarks.

---

* President of the Portuguese Competition Authority.

** Chief Economist and Director of the Studies and Market Monitoring Bureau of the Portuguese Competition Authority.

1. INTRODUCTION

Public procurement has been set as a key priority on the agenda of the Portuguese Competition Authority (PCA), and is one of the pillars of the Europe 2020 Strategy for Growth. It is crucial to ensure that competition is put to work for the overarching aim of an efficient allocation of government resources. The reasons are self-evident.

Public procurement accounts for a substantial share of the economic activity. In 2013, public procurement expenditures accounted for almost 30% of total government spending in OECD countries. In terms of economic activity, the share of public procurement spending on GDP was, on average, 12%[1] in OECD countries and around 16% to 18% in the European Union (EU)[2]. In Portugal, purchases by public authorities of works, goods and services represented approximately 19.5% of total government spending and 10% of GDP[3].

These numbers, while *per se* overwhelming, nonetheless underestimate the relevance of efficient public procurement. Inefficient public procurement entails wastage of public funds, which could be freed up for other welfare increasing ends, such as health, science, justice and education or public investment, among others. The economic turbulence experienced by the Eurozone has further raised awareness regarding the need for an efficient use of public funds. Indeed, the opportunity cost of wastage in public procurement spending is more visible under scarcity of resources than in times of prosperity.

On the other side of the Atlantic, President Barack Obama has highlighted the US Federal Government's overriding obligation in ensuring "*that taxpayer dollars are not spent on contracts that are wasteful, inefficient, (or) subject to misuse*"[4]. This concern was particularly relevant when the American Recovery and Reinvestment Act, a multi-billion dollar economic stimulus programme, was enacted in February 2009 by the Obama Administration. In order to protect the funds allocated to the programme, the Antitrust Divi-

1 OECD, 2015.

2 Available at http://europa.eu/youreurope/business/public-tenders/rules-procedures/index_en.htm and http://ec.europa.eu/trade/policy/accessing-markets/public-procurement/.

3 *Ibid* and OECD, 2015.

4 Available at https://www.whitehouse.gov/the-press-office/memorandum-heads-executive-departments-and-agencies-subject-government-contracting.

sion of the Department of Justice launched an initiative aimed at "*training agency procurement and grant officials, auditors, and investigators at the national, regional, and local levels on techniques for identifying "red flags of collusion" before the award of Recovery Act funds*"[5].

Competition Authorities can play a key role in the challenge of good governance because competition is at the core of an efficient public procurement system. The competitive interaction amongst suppliers is a *sine-qua-non* condition for allowing the government to achieve the best value for money when acquiring goods and services. The moment in which a public procurement contract is awarded provides a unique opportunity for capturing the benefits of bidder competition. Furthermore, as a sizable buyer, the government can strategically determine today's buying pattern to promote competition in the marketplace as well as in future tenders. Ensuring that these procedures are optimally designed and implemented, both from a static and a dynamic standpoint, is vital in the pursuit of better value for taxpayers' money.

Yet collusion and poor design often drive unfavourable tender outcomes. Public procurement is particularly prone to collusive schemes (so called "bid rigging conspiracies"), the breach of competition law that brings upon the highest welfare losses to society. Undesirable outcomes also arise from inadequate preparation and bad tender design, as well as incomplete or poorly specified contracts, which prevent the benefits of competition from being realized.

In Portugal, in spite of the benefits generally brought about by competitive tendering, contracting agencies seem to rely little on competitive procedures for making their purchases. In 2013, direct awards accounted for more than 80% of the number of public procurement contracts and for about half of the corresponding value. Furthermore, the share of competitive procedures has been decreasing over the past few years. These figures signal the need for increasing awareness as to the potential gains for public spending efficiency that could be achieved through enhanced competition.

Merely resorting to auctions or tenders for acquiring goods and services does not, however, in itself ensure that the outcome will be competitive. There are a number of considerations in designing tenders to promote compe-

5 Statement of Scott d. Hammond Deputy Assistant Attorney General of the Antitrust Division before the Committee on Homeland Security and Governmental Affairs of the US Senate, entitled *"Follow the money: an update on stimulus spending, transparency and fraud prevention"* available at http://www.justice.gov/sites/default/files/atr/legacy/2015/05/05/250274.pdf.

tition. Contract design is also central in ensuring that the tender outcome is efficiently implemented. Without proper contract design and performance monitoring, the competitive achievements of the tender may be fully, or at least partially, lost.

The remainder of the paper provides a "helicopter tour" of the main competition issues in public procurement discussed in the literature, with the Portuguese experience as background. Section 2 provides a brief snapshot of efficiency and competition in public procurement in Portugal. Section 3 addresses the problem of cartels in public procurement and Section 4 goes beyond bid rigging, to discuss the broader role of competition in enhancing public procurement efficiency. Section 5 addresses the strategic relevance of ensuring the alignment of incentives of the entities involved in public procurement. Section 6 concludes and sets the main building blocks of an agenda for competition in Public Procurement in Portugal.

2. A SNAPSHOT ON THE EFFICIENCY OF PUBLIC PROCUREMENT IN PORTUGAL

The legal framework for public procurement in Portugal is provided in the Code of Public Contracts, approved by Decree-Law 18/2008, of January 29 which transposed, to the National Public Procurement System, the EU Directive 2004/18/EC, of March 31, 2004. On February 26, 2014, the European Parliament and the Council of the European Union adopted EU Directive 2014/24/EU on public procurement, repealing EU Directive 2004/18/EC, and giving Member States until April 18, 2016 to transpose the new directive to their national legal frameworks. In Portugal, the legislative procedure to amend the Code of Public Contracts is on-going.

Some features of the Portuguese Procurement System are at the forefront of international best practices, namely concerning electronic tendering and centralisation.

The National Public Procurement System (SNCP – *Sistema Nacional de Contratação Pública*) is based on a central purchasing body, ESPAP (*Entidade de Serviços Partilhados da Administração Pública*), in an interrelated system with ministerial purchasing units and a network of contracting authorities and entities. Integration in this network is mandatory for central administration and public institutes. Municipalities, regional authorities, local entities and state-owned companies can join the SNCP voluntarily.

Portugal stands as a case study for good practices with respect to electronic public procurement. E-procurement is perceived as a crucial tool to increase transparency, streamline procurement procedures and cut red tape, achieve savings in administrative costs, reduce the time span of the procurement procedure and enhance procurement monitoring. Portugal was the first EU Member State to have mandatory electronic public procurement. Since November 2009, competitive procedures for public procurement have to be run through electronic platforms in all their phases, from the tender notice to the tender award.

According to a study on the impact of the introduction of e-procurement in Portugal, the estimated overall reduction in costs in the first year was between 6% and 12% of total government spending[6]. This translates into cost savings of 650 million euros, which could have achieved 1.2 billion euros if all contracting agencies had implemented their procurement procedures in the public procurement web portal (*Portal Base*). The study estimated competition as the source of 98% of the cost savings, with administrative cost savings accounting for no more than 2% of the cost reduction. Furthermore, a comparison between the best bids for public work contracts by 50 Portuguese public hospitals in 2010, using e-procurement, and in 2009, using paper based procurement, showed cost savings of 18%[7].

Based on the information registered in the Procurement Web Portal, the Portuguese Institute of Public Markets, Real Estate and Construction (IMPIC) publishes a yearly report on public procurement in Portugal. While the coverage of the data, in terms of the total amount of public procurement in Portugal, is only partial[8], it nonetheless provides some relevant statistics.

According to the data published by IMPIC, in 2013, 83.5% of the public procurement contracts reported to *Portal Base*, worth around 2 billion euros,

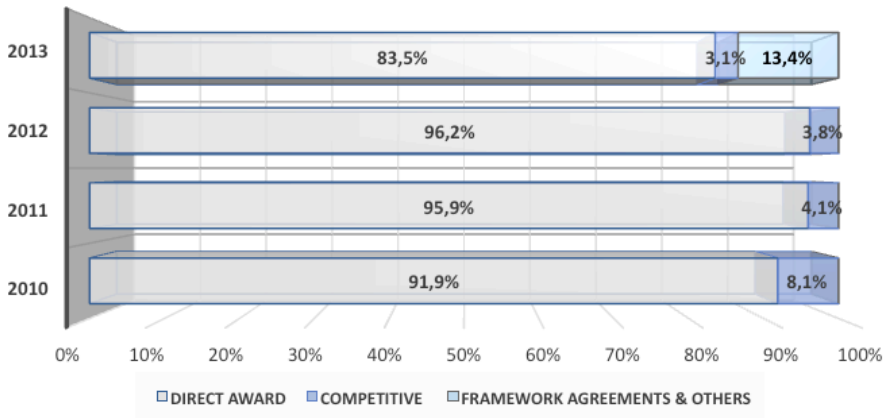
6 Tavares, 2011.

7 The European Commission Communication of April 20, 2013: "*A strategy for e-procurement*" refers to these various estimates.

8 The amount of public procurement reported to *Portal Base* is substantially lower than the one reported by both the EC and the National Accounts. For example, in 2012, *Portal Base* registered public procurement contracts amounting to 2.1% of the Portuguese GDP while according to the statistics made available by the EC, public procurement in Portugal in 2012 accounted for 10.7% of GDP.

were directly awarded. Figure 1 illustrates the increasing trend in the share of direct awards in the reported period[9]. In terms of value, while the share is smaller, direct award procedures nonetheless accounted for about half of the contracted value in 2013, and this share has been generally increasing in the reported period (Figure 2). The contracting authorities that used direct awards accounted for 97.9% of the total of contracting entities reporting to *Portal Base*, in 2013.

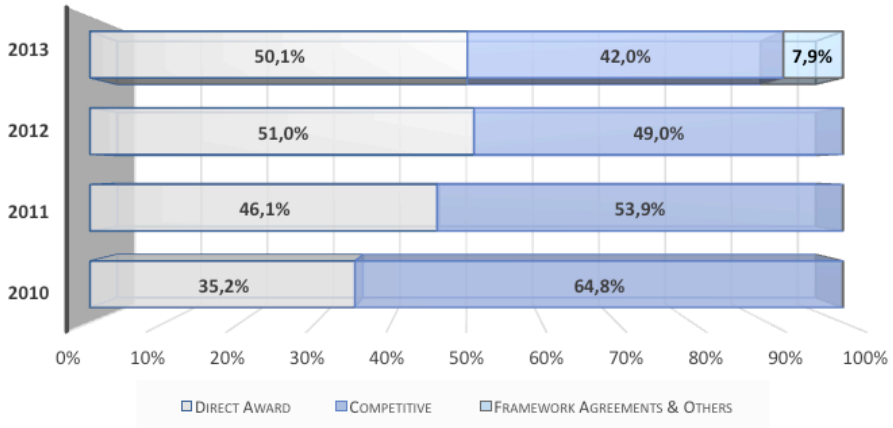
Figure 1: **Representativeness of awarding procedures, by number of public procurement contracts**



Source: Report of Public Procurement in Portugal published by IMPIC (various yearly editions).

9 The share in 2013 is smaller than in 2012, but as the IMPIC report clarifies, it must be interpreted taking into account the inclusion, in the 2013 data, of contracts following framework agreements. In fact, while the number of direct awards in 2013 increased by 19.1% with respect to 2012, the number of contracts awarded through competitive procedures increased by only 9.5%.

FIGURE 2: **Representativeness of awarding procedures, by value of public procurement contracts**



Source: Report of Public Procurement in Portugal published by IMPIC (various yearly editions).

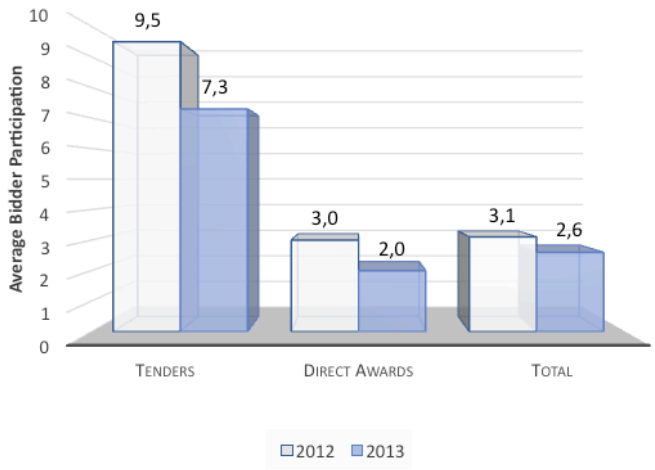
The representativeness of competitive procedures is particularly small in terms of number of contracts, and has been decreasing, both in terms of the total number of contracts and in terms of total contracted value. Competitive procedures accounted for 8.1% of the number of contracts awarded in 2010, and in 2013 the share was only 3.1%. Furthermore, according to the statistics in the IMPIC report, in 2013, the value share of contracts that was directly awarded due to "substantive criteria"[10], in which there is no competition, was 19.4% and the number of contracts awarded through this procedure rose by more than 25% from 2012 to 2013.

The numbers reported by IMPIC also show that average bidder participation in public procurement has decreased from 2012 to 2013, regardless of the procedure used for the award. In 2013, there were on average 2.6 bids per public procurement procedure. In the case of public works, average bidder participation was higher (3.3) than in procurement for goods and services (2.4).

10 The substantive criteria are set in the Portuguese Code of Public Contracts and include "*the extent to which the direct award is strictly necessary, for reasons of imperative urgency emerging from events that could not have been foreseen by the contracting authority and which could not have been met with alternative procedures*" (article 24).

Figure 3 below shows a disaggregation per type of award procedure. Average bidder participation decreased by 2.2 bidders in competitive tendering. In direct awards, the reduction was on average of one bidder, and it was more prominent for public works than for the purchase of goods and services. In fact, in public works, the average bidder participation in direct awards decreased to under 2 bidders in 2013.

Figure 3: **Average Bidder Participation in Procurement Procedures in Portugal**



Source: Data from the 2013 Report on Public Procurement in Portugal, published by IMPIC.

The European Commission also computes a set of indicators to characterise the performance of member states in public procurement. The European Union Single Market Scoreboard uses notices published in the *Tenders Electronic Daily (TED)* database[11] to produce three main indicators, namely *Bidder Participation*, *Accessibility* and *Efficiency of the Procedure* for each Member State. Bidder participation is measured as the proportion of contract award notices with more than one bidder[12], and aims to capture competition and red tape. The accessibility measure reports the share of all public procurement

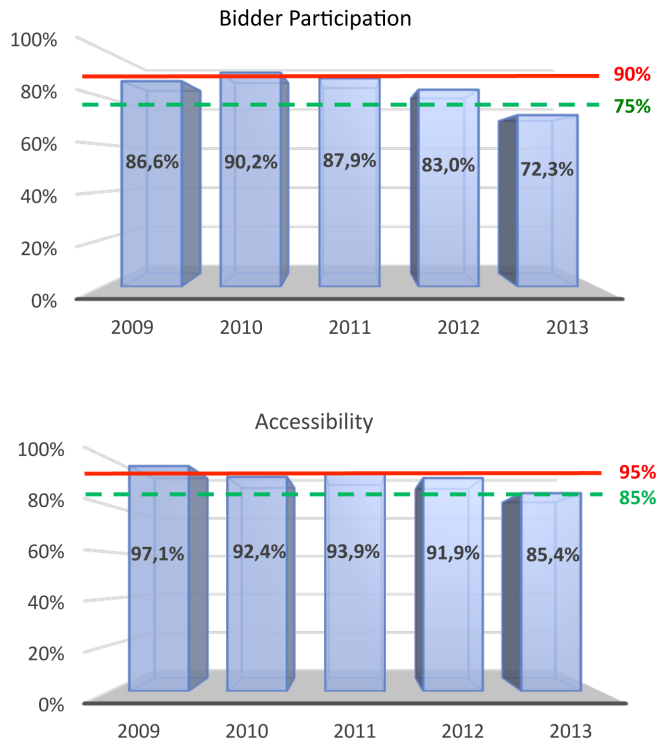
11 Tenders Electronic Daily (TED) is the electronic counterpart of the Supplement to the EU Official Journal, where notices of European public procurement tenders are published.

12 Framework agreements are not included due to different reporting patterns.

tenders conducted within open procedures, restricted procedures, competitive dialogue and negotiated procedures.

Both the key indicators for bidder participation and accessibility in public procurement in Portugal show a decreasing trend in the last few years, as displayed in Figure 4 below. The bidder participation indicator has been decreasing since 2010, bringing the classification to unsatisfactory in 2013. Accessibility to public procurement tenders in Portugal is characterized as average, and has also deteriorated since 2011.

FIGURE 4: **Single Market Scoreboard Key indicators for Public Procurement in Portugal**



Note: The dashed green and the solid red lines identify the thresholds for satisfactory and unsatisfactory performance, respectively.

Source: Adapted from http://ec.europa.eu/internal_market/scoreboard/performance_by_memr_state/portugal/index_en.htm, accessed in October 2015.

This brief snapshot shows the small share of competitive procedures in public procurement in Portugal, as well as a decreasing trend in terms of tender participation. It is important to understand why contracting authorities tend to rely so little on competitive procedures for acquiring goods, services and public works. Within this discussion, the impact of potentially excessive formal requirements on the incentives of contracting authorities to avoid public tenders needs to be assessed. Another factor that is often put forward to justify the need to resort to direct awards is procedural speediness. However, it is important to acknowledge that this comes at a cost. As the Antitrust Division of the U.S. Department of Justice has highlighted, "*when lucrative government contracts are at stake and need to be disbursed quickly, the potential risk of collusion and fraud increases dramatically. Importantly, however, these experiences have also taught us that these risks can be dramatically minimized when an early and strong emphasis is placed on prevention and detection*"[13].

Above all, these results show the need for promoting a culture of competition in public procurement in Portugal, and raise awareness as to the potential cost savings from supplier competition for the provision of goods, services and works to the public sector.

3. CARTELS IN PUBLIC PROCUREMENT

3.1. Bid rigging conspiracies: a threat to value for taxpayers' money

Cartels are the most serious breach to competition law, with the highest impact on welfare. In public procurement, cartels can arise in the supply of goods and services to the government, for the pursuit of important social roles, such as health care or education.

The enforcement record of the PCA illustrates this reality. In 2005, in two separate decisions, the PCA fined five pharmaceutical firms (Abbott, Bayer, Johnson & Johnson, Menarini and Roche) for cartels regarding the supply of reactive test strips in a public tender set for the Hospital Centre of Coimbra (PCA's first decision) and in 36 public tenders (PCA's second

13 Statement of Scott d. Hammond Deputy Assistant Attorney General of the Antitrust Division before the Committee on Homeland Security and Governmental Affairs of the US Senate, entitled "*Follow the money: an update on stimulus spending, transparency and fraud prevention*" available at http://www.justice.gov/sites/default/files/atr/legacy/2015/05/05/250274.pdf.

decision) set for 22 hospitals spread all over the country[14]. The five firms were shown to regularly meet and jointly fix the prices of their bids so as to induce a price increase. More recently, in August 10, 2015, the PCA fined 5 firms for a cartel in the supply of pre-fabricated modules for the purpose of setting up temporary classrooms to *Parque Escolar*, the entity in charge of the modernisation programme of schools in Portugal. The bid rigging conspiracy consisted of an agreement to divide and share the lots that were being tendered, by previously determining the winner of each tender[15].

Collusion in public procurement arises in the form of bid rigging conspiracies, also called "bidding rings", aimed at supressing interfirm rivalry, soften price competition and increase profits, at the expense of buyers' welfare. The specificity of the environment that characterises public procurement tenders makes them an area of particular concern. Graham and Marshall (1987) highlight this vulnerability stating that "*so prevalent are rings, in fact, that a retired auctioneer once noted that in 40 years of auctioneering, he had yet to attend an auction at which a ring was not present*". Unlike private entities, procurement agencies are bound to follow a number of regulations and formal procedures with substantial transparency requirements. These rules seek to reduce discretion and protect the integrity of public procurement procedures but, as a by-product, they ease communication amongst bidders and assist firms in spotting price cuts. This transparency thus facilitates the mechanism for detecting and punishing deviations and favours the well-known conditions for collusion (Stigler, 1968). Furthermore, the often predictable nature of tenders in public procurement, with contracts being frequently re-tendered, can strengthen the conditions for collusion. As a result, the stability of cartels in public procurement might be enhanced when compared with other market settings (e.g., Heimler, 2012).

Bidders may resort to a variety of collusive tendering strategies in order to extract additional profits. For example, bidders may decide beforehand who will win the tender and agree to divide the supra-competitive payoffs between them according to a given sharing rule or design a compensation

14 Press release available at http://www.concorrencia.pt/vPT/Noticias_Eventos/Comunicados/Paginas/Comunicado_AdC_200801.aspx.

15 Press release available at http://www.concorrencia.pt/vPT/Noticias_Eventos/Comunicados/Paginas/Comunicado_AdC_201518.aspx.

scheme through subcontracting services to losing bidders. In these schemes, rivalry is eliminated through cover bidding or bid suppression. Under cover bidding firms submit bids which are purposely placed to resemble a competitive environment, but that are either higher than the pre-selected winner or otherwise unacceptable to the buyer. Bid suppression occurs when firms agree to refrain from submitting (or withdraw) their bids so as to allow the pre-selected bidder to win the tender. Firms may also agree to bid rotation schemes, taking turns in being selected as the winning bidder. Market allocation schemes, on the other hand, occur when firms agree to "*share the pie*" (e.g., per type of client or geographical area) and commit not to bid for (or at least not to outbid) the market assigned to the other firms.

These bid rigging conspiracies are extremely harmful for society. Detecting, investigating and prosecuting these unlawful agreements must thus be a key priority.

3.2. Policy mix: *Ex-post* and *ex-ante* action on cartels, reactive and proactive detection tools

***Ex-post* and *ex-ante* measures are complementary policies in a well-structured approach towards cartels in public procurement**. Getting the right policy mix will deliver high value gains to society.

***Ex-post*, vigorous enforcement against cartels not only allows to break-up existing cartels, but it also has an important deterrence effect**. However, *ex-post* action does not exhaust the toolbox that can be used to fight bid rigging.

***Ex-ante*, tenders can be designed to be more "collusion proof", by weakening the conditions which assist bidders in curbing competition and reaping supra-competitive profits**. These considerations are particularly relevant in the design of public procurement procedures, repeatedly set for acquiring undifferentiated or standardised goods and services, in concentrated markets with few players and little or no entry. In such bidding markets, concerns with collusion are particularly acute because the coexistence of these factors facilitates the conditions for coordination.

The academic literature and the accumulated experience of various jurisdictions have produced an array of practical considerations that can assist procurement officials in designing public procurement procedures to reduce the risk of collusion. A number of tender design features (in terms of auction formats, information disclosure, entry requirements, timings, lot

division) can be used, and others can be avoided, so as to hinder collusion in a tender.

Promoting bidder participation, reducing the information flow amongst bidders, reducing the frequency of procurement opportunities and introducing unpredictability in purchasing patterns are key in constructing pro--competitive procurement procedures. "Scrambling the rules of the game", avoiding repeated purchasing patterns, aggregating or disaggregating contracts or changing the type of procurement procedure, can weaken the conditions for collusion. Ascending auctions have been shown to be more vulnerable to collusion than sealed-bid auctions (e.g., Marshal & Marx, 2009, Milgrom, 2004). The details of information release are also relevant. Avoiding opportunities for communication amongst bidders within the tender procedure should be a concern for procurement officials, for example, by non-transparent registration, promoting remote, rather than in-person, bid submission (e.g., by e-mail) and not disclosing the identity of the bidders (e.g., using numbers rather than names to identify them). Procurers may also require bidders to submit a certificate of independent bid determination to recall them of the unlawful nature of collusion, highlighting the potential associated penalties. The OECD, in particular, has developed extensive work on all these matters[16].

Relationships among bidders, such as bidding consortia and subcontracting, can also have an impact on the competitive environment in a public procurement tender. The regulation of joint bidding in procurement varies significantly across EU Member States, and the question of if, how and to what extent joint bidding should be regulated is still an open one (see, for example, the survey by Albano et al, 2009). Consortia can bring about efficiencies, namely through cost synergies, the pooling of capabilities or skills and risk sharing. Under certain circumstances, joint bidding can promote entry, namely if the members of the consortium could not participate as solo bidders in the tender. The European Commission "Guidelines for the Assessment of Horizontal Cooperation Agreements" explicitly foresee this safe harbor for joint--bidding in recital 237, stating that in this case there "*is no restriction of competition within the meaning of Article 101(1)*" of the TFEU[17]. However, bidding

16 OECD, 2012.

17 For a recent discussion of the EU Competition Law approach towards joint bidding, see Thomas, 2015.

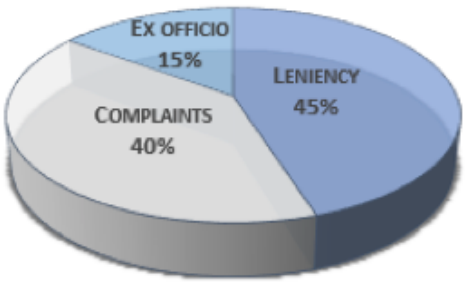
consortia can also be a strategy to reduce the number of bidders in a tender and can assist bid rigging conspiracies (Klemperer, 2008). If the firms can make stand-alone bids, and no substantial efficiencies are shown to emerge from the cooperation, joint bidding will result in the elimination of direct rivalry[18] (e.g., OECD 2007). Subcontracting, another form of cooperation amongst bidders in procurement, may also raise concerns as to the risk of collusion. In these arrangements, a firm bids as the prime contractor and, upon award, subcontracts part of the work to another firm(s). This possibility may offer opportunities for compensation mechanisms within a bid rigging conspiracy (e.g., a firm agreeing not to participate in a tender and being compensated with a subcontracting arrangement by the winning bidder). In the "Recommendation on Fighting Bid Rigging in Public Procurement" (2012), the OECD highlights the role that subcontracting can play in assisting bid riggers, and that procurement officials should require bidders to disclose upfront if they intend to use subcontractors.

For *ex-post* action on cartels, competition agencies can rely on reactive or proactive detection methods. Reactive detection methods are those triggered by third parties (e.g., leniency applications, customer complaints, whistle-blowers) bringing information of the existence of a cartel to the competition agency. Pro-active detection methods, on the other hand, are agency-generated, i.e., the competition authority pro-actively launches an *ex-officio* investigation for suspicious market conduct. In their enforcement activity, agencies heavily rely on reactive detection methods, and the PCA is no exception to this respect, as depicted in Figure 5 below. This uneven mix of policy tools has generated some discussion as to whether competition agencies are overly relying on reactive tools, particularly given the complementarities between the two methods. In fact, the mix of reactive and pro-active methods can strengthen action on cartels. Scaling up proactive detection of bidding rings can enhance the perceived risk of being fined, raising the incentives for leniency applications and weakening cartel stability. Furthermore, leniency is more likely to emerge when collusive arrangements are less stable. Proactive

18 In a decision of October 24, 2007, the Portuguese Competition Authority (PCA) fined two firms (Aeronorte, Transportes Aéreos, S.A. and Helisul – Sociedade de Meios Aéreos, Lda.) that formed a consortium in a public procurement procedure for the supply of aerial forest fire-fighting means, for reducing the number of competing undertakings, inducing a price increase and sharing the market. However, the Lisbon Court of Commerce annulled the PCA's decision in May 21, 2008. Available at: http://www.concorrencia.pt/vPT/Praticas_Proibidas/Decisoes_da_AdC/Paginas/PRC200520.aspx.

detection methods complement reactive methods by allowing stable cartels to be detected sooner. These feedback effects further intensify the advantages of a mixed policy approach (e.g., OECD, 2013a; Hüschelrath, 2010; Friederiszick & Maier-Rigaud, 2008).

FIGURE 5: **Cartel cases of the PCA (2003 – To date), segmented according to the detection method**



Source: PCA

Proactive detection methods include empirical screens based on a variety of elements of market information, which can assist in flagging market circumstances where collusion might be a concern. Unlike reactive methods, screening will likely not generate hard evidence for the case. However, they may signal market settings where further investigation can prove fruitful. Screens can be structural or behavioural.

Structural screens are cross-markets searches seeking to identify market settings that are particularly prone to collusion. These tools are based on the joint evaluation of a number of market characteristics, namely structural features (e.g., high concentration, few market players, high barriers to entry, repeated interaction amongst firms, information transparency), supply-side factors (e.g., undifferentiated products, multimarket contacts, cross-shareholdings, similarity of cost structures) and demand-related factors (e.g., low elasticity of demand, absence of countervailing buyer power).

Behavioural screens consist of statistical tests to data on prices, bidding patterns, costs and market shares, among other elements, to search for

events that are highly unlikely in the absence of coordination or use a control group to detect anomalous events in bidding patterns[19]. These screens try to pick up discernible traces that cartels often leave behind. In public procurement, the problem of lack of data availability may be less acute than in other market settings. E-procurement, in particular, provides many advantages for the efficiency of public procurement, and one of them is the creation of a rich dataset on public procurement. The electronic data available in Portugal is an important advantage for this purpose. Enhancing the coverage of electronic procurement can provide substantial improvements and increase the scope for screening accuracy.

In constructing an effective approach to fighting bid rigging, it is also vital to engage procurement officials, who are first in line for detecting signs of bid rigging conspiracies. They also have a deep knowledge of the industry and its evolution over time. They may however lack the competition knowledge to detect signs of collusion. A variety of guidance, screens and checklists have been developed to assist procurement officials in the task of searching for suspicious patterns[20]. Providing procurement officials with outreach sessions and training on how to make use of this array of practical information can increase the accuracy of a first screen for collusive schemes, raising red flags for potential conspiracies. It is also crucial to strengthen cooperation mechanisms and to establish good communication channels between competition authorities and the institutions involved in public procurement, from contracting to auditing entities. These channels can improve the flow of information, promote the degree of awareness and skills of procurement officials with regards to competition and contribute to the number of bid rigging suspicions being reported to competition agencies.

3.3. Integrity in public procurement: collusion and corruption

While collusion entails an agreement between bidders to curtail competition in a procurement procedure so as to artificially raise prices and profits, corruption is primarily a principal-agent problem, whereby procurement agents use their power to bias the procedure at the exchange of a bribe. Corrup-

19 See, for example, Abrantes-Metz & Bajari, 2009.

20 In December 2015, the PCA issued Guidelines on Fighting Bid Rigging in Public Procurement, available at ttp://www.concorrencia.pt/vPT/Praticas_Proibidas/Documents/Guia%20Boas%20Práticas%20Contratação%20Pública.pdf.

tion often takes place at the moment of tender award, but it can happen at any stage of the procurement lifecycle. For example, corruption can take place post-award within a renegotiation process of the terms and conditions of a given procurement contract, tilting the outcome in favour of the contractor.

Both collusion and corruption distort what should be a competitive procedure, drifting the outcome away from the efficient solution. They both undermine the efficient allocation of public funds, potentially compromising growth and welfare. The extent of the associated damage is enormous. The European Commission estimates that corruption alone costs the EU economy 120 billion euros a year, a figure just a little smaller than the annual EU budget[21], and public procurement is perceived as the government activity with the highest bribery risk (OECD, 2013b).

While collusion and corruption are two distinct threats to the integrity of public procurement, "*they may frequently occur in tandem, and have a mutually reinforcing effect*" (OECD, 2010). A number of theoretical arguments have been put forward to explain why corruption and collusion are strategic complements (e.g., Compte et al 2005 and Lambert & Sonin, 2003). The entwinement between these two concerns is substantial. Bribery may emerge as a payoff to a procurement official for subverting the competitive process. It may be a payment in exchange of granting a tender to a given firm, or a payment for the official to otherwise assist in the coordination mechanism of a bid rigging conspiracy. Furthermore, the rents associated with collusion may boost incentives for misconduct (e.g., Ades & Di Teolla, 1999).

Given the synergetic relationship between these two threats to public procurement integrity, fighting corruption should reduce collusion in public procurement, and fighting collusion should decrease the opportunities for corruption. There are substantial complementarities between these two strategic goals. Policies aimed at fighting these two important problems, that plague procurement systems around the globe, must rely on raising awareness through advocacy actions, strengthen accountability, deter misconduct through strong enforcement and adequate sanctioning, establishing best practices on the design and implementation of tender procedures and providing procurement officials with the tools and skills to follow these principles.

---

21 See the *EU Anti-corruption Report from the Commission to the Council and the European Parliament* issued in February 2014 and available at http://ec.europa.eu/dgs/home-affairs/e-library/documents/policies/organized-crime-and-human-trafficking/corruption/docs/acr_2014_en.pdf.

Nonetheless, while these two aims are strategic complements in nature, trade-offs emerge in terms of the policies to achieve them. **The chief policy instrument to fight corruption is the promotion of transparency in public procurement procedures**. This often entails the choice of open and transparent competitive procedures, which leave less room for discretion, as well as the disclosure of relevant information, such as participation criteria, awarding criteria and corresponding weights, bidder identity, terms of the winning bid, among others. Transparency contributes to the wider scrutiny of procurement decisions, facilitates monitoring and auditing of procurement procedures, enhances the likelihood of misconduct detection, and promotes accountability of tender participants and officials. Transparency may also tilt the environment in favour of confession by conspiracy participants.

However, enhanced transparency can strengthen the conditions for collusion in the market. The requirements for information disclosure may facilitate monitoring and detection of deviations from agreed terms by cartel members, ease the enforceability of the agreement and thereby enhance the sustainability of bid rigging conspiracies. Thus, caution must be exerted when designing measures aimed at promoting transparency, and account must be taken of the impact of each single measure in terms of the conditions for coordination.

Policies aimed at efficiency in public procurement should thus be more broadly interrelated, so as to address the existing trade-offs and reconcile the identified tensions. The choice of the bidding procedure and the design of transparency requirements should balance the benefits in terms of fighting corruption and the impact on the conditions for collusion.

A number of considerations are relevant for this assessment[22]. The choice of the procurement procedure can have an impact on conditions for collusion and corruption, but the specific circumstances of each case very much determine the adequacy of each tender procedure. For example, in general, open ascending auctions ease communication amongst bidders, while sealed bid auctions are less prone to collusion. In some very specific settings, direct negotiations with bidders may enhance the efficiency of the tender outcome. However, the high degree of discretion for procurement decisions in these procedures makes them more prone to corruption and favouritism. In what concerns disclosure requirements, any release of information on the terms and conditions of the bids increases the risk of collusion. Measures should thus

22 For a detailed discussion of these policy considerations see, for example, OECD, 2010.

focus on partial information disclosure, avoiding bidders' access to information that could facilitate collusion. For example, while the disclosure of information about the winning bid seems unavoidable for evident reasons, terms and conditions of losing bids should be confidential, especially to competitors. Whenever certain elements of information are central for the monitoring and auditing of the procurement procedure but their wider release could endanger the competitive conditions, the information should only be made available to the auditors/monitors. Furthermore, not only what information is disclosed matters, but also when it is released. The timings of disclosure should thus take into account that delaying the release of information about the tender can hinder collusion.

Eradicating corruption and collusion are two crucial policy goals for avoiding wastage of public funds. Ensuring integrity and competition in public procurement markets should thus be tackled as "*a dual challenge for good governance*" (Kovacic et al, 2011).

4. BEYOND BID RIGGING: PROMOTING AND CAPTURING THE BENEFITS OF COMPETITION IN PUBLIC PROCUREMENT TENDERS

Bid rigging conspiracies are a major problem hindering competition in public procurement tenders. But the discussion of promoting competition and efficiency in public procurement is a broader one, which deals with what can be done to ensure competitive outcomes from public procurement. The approach should also look at the whole procurement lifecycle, from the preparation of tender specifications to the implementation of the contract.

4.1. Promoting bidder participation

Tender participation is one of the cornerstones of good auction design. Auctions with low bidder participation may entail an unprofitable outcome for the auctioneer[23]. Attracting bidders is thus one of the practical concerns when conducting an auction. There are a number of principles that emerge in the theoretical literature and which can guide decisions on how to structure public procurement tenders to promote bidder participation. Ascending auctions create a more favourable environment to entry deterrence and predatory behaviour and are thus more likely to perform poorly in terms of bidder participation, while sealed bid auctions are more likely to attract potential

23 Bulow & Klemperer, 1996.

entrants (e.g., Klemperer, 2002). Inadequate or unreasonable entry requirements in public procurement tenders can jeopardise participation, creating unjustified entry barriers. Another key aspect is to ensure low bidding costs. Cumbersome requirements, red tape and bureaucracy can deter bidder participation. It may also be the case that some tender participants see scope in the excessive formality requirements for driving competitors out of the tender, alleging incompliance of their bids with formalistic aspects. In assessing the efficiency of a public procurement system, the extent of bureaucracy is thus central: it may create unnecessary bidding costs, it may foster incentives to circumvent established procurement rules and it can be strategically used to exclude competitors. Bureaucracy requirements also raise procurement costs, and may affect procurement agencies' choice of tender procedures, for example, to save the administrative costs of having tenders with many bidders. There are also instruments that can be used to promote participation, namely dividing contracts into lots and having "set-asides" for new entrants.

Entry barriers may also emerge, like in any other market, from incumbency advantages. This thus brings a dynamic dimension to the discussion of entry barriers in tenders. Incumbents may benefit from comparative advantages, namely due to the learning and reputational effects, privileged access to information, enhanced ability to estimate the costs and risks associated with a procurement project, which can entrench incumbents' market power. Providing bidders with the adequate time and information to prepare their bids can ease some of these barriers to entry. The public sector may also strategically source its requirements to mitigate the anticipated reduction of competition in future tenders driven by the advantages of incumbency, for example, by dividing contracts into lots and seeking multi-sourcing. This can serve a dual aim of promoting competition in the marketplace, for the benefit of consumers, as well as competition in future tenders, to achieve higher value for taxpayers' money in an intertemporal approach.

4.2. Tender design when quality matters

Another important challenge in aligning the tender outcome with the preferences of the government in its purchaser role has to do with how to account for quality. In the purchase of simple, highly standardised goods or services, the efficiency of the tender outcome is almost fully determined by the price of the winning bid (eventually specifying minimum quality requirements) and optimisation can be achieved through a well specified price-only

tender. However, when the government cares about competition in price and non-price attributes, the tender procedure must account for multiple criteria. Well-designed scoring rules, which fully reflect the government's preferences, allow handling these trade-offs. Scoring rules assign a weight to each criterion, and allow the ranking of offers to identify the winning bid. The exact choice and design of scoring rules depends on the specific features of the tender (for a discussion on the design of scoring rules see Dini et al, 2006). The concept of the "Most Economically Advantageous Tender" (MEAT) in the EU envisages the concept of weighting the different attributes valued by the government.

It is important to highlight that tender design is not a one size fits all, and in some specific circumstances a standard approach to the competitive procedure might not necessarily be efficiency enhancing. When quality is verifiable and the needs of the buyer are unlikely to change during the contract's lifetime, efforts should be placed in gathering the knowledge required for the specification of the relevant attributes and corresponding valuations. In these contexts, contract design entails setting the standards for the relevant attributes and ensuring incentives for quality and/or cost reduction.

However, in some cases, particularly in complex "*off-the-shelf*" public procurement projects, there may be uncertainties that can only resolve upon contract implementation. This may follow from the impossibility to specify in the contract some of the relevant quality dimensions and subsequently monitor the contractor's performance to that respect (the so-called "uncontractable quality"). These situations may call for added flexibility in the tender procedure and contract design. However, this added flexibility necessarily entails granting further degrees of freedom to public procurement officials. Addressing this trade-off entails a combination of added flexibility and accountability (e.g., Albano et al, 2006 and Bergman et al, 2012). Yet, difficulties arise in reconciling this approach with that of establishing procurement systems that rely on tight rules designed to limit discretion. This is certainly a challenging discussion, in which the public procurement and the competition communities should further engage.

4.3. "Abnormally Low Tenders"

Governments and public procurement agencies often have concerns with the risk of awarding the contract to a low-price bid and subsequently being faced with unfavourable outcomes upon contract implementation (e.g., sacrifice of quality, project delays, cost-overruns, disproportionate claims and

disputes or even contract default). These concerns, which are particularly acute in public infrastructure works, led to procurement practices aimed at addressing the problem of the so-called "Abnormally Low Tenders". The concept is, however, not clearly defined, neither in the academic literature, nor in the procurement systems that envisage them[24]. Their use is nonetheless widespread, as illustrated by a recent OECD (2015) survey[25].

The most common approach to Abnormally Low Tenders is to try to gauge whether a bid is abnormally low by assessing the distance between the price of the bid and either the government estimates for the contract's costs or some statistic of the prices of all (or some) of the bids in the tender (OECD, 2015). In Portugal, a bid is considered as potentially abnormally low when it is at least 40% lower than the base price[26], in the case of public works, and at least 50% lower than the base price, for all the other contracts.

In general, these provisions do not allow for the automatic exclusion of the bid before the bidder is provided with an opportunity to justify the price of the offer. The latter is the approach followed in the EU Directive on public procurement, and also in Portugal following the transposition. Another approach that has been put forward to address the issue of abnormally low tenders are procurement awarding mechanisms based on the average price, the so-called "Bid Average Methods".

The impact of these approaches in the tender outcome is not fully ascertained, and concerns have been raised as to their implications for competition and efficiency. The exclusion of a bid on grounds that its price is "too low" may entail the exclusion of competitive bids. Indeed, the price of a bid may be low for a number of reasons. Bids which are "too low" may bring an added risk of underperformance or contract default, for example, when they follow from either cost underestimation or from bidders bidding too aggressively in anticipation of an opportunity to later renegotiate the terms of the contract (the so-called "low-balling strategy"[27]). However, prices may appear "too low"

24 For an interesting discussion on the concept of abnormally low tenders, and the notion of a "normal price", see Albano, 2015.

25 OECD, 2015.

26 The base price is a feature in the Portuguese Code of Public Contracts (article 47) that stands for the maximum price that the contracting authority is willing to pay for the provision of the goods, services or works covered by the contract.

27 See, for example, the analysis of the impact of the endogeneity between the bid strategy and ex post adjustments in Limi, 2013.

for a number of other reasons which are pro-competitive (for a discussion, see OECD, 2015). They may be lower than government cost estimates if the latter overestimated the project's costs or when there are complementarities between the procured contract and the bidder's other activities. Also, a bid may be lower than the other bids in a tender if it is placed by a new entrant in a procurement procedure where there is a long-standing collusive agreement. The task of discerning the reasons underlying a price offer seems challenging, particularly within the timings of public procurement procedures, raising some scepticism concerning the accuracy of this approach. Furthermore, the risk of having a bid excluded on the grounds of a price which is "too low" may reduce firms' incentives to place competitive bids. Average bidding methods, on the other hand, may distort firms' incentives to bid their true valuation, may drift the outcome away from the efficient solution and may induce coordination in bidders' strategies (e.g., Albano et al, 2006 and Decarolis & Klein, 2012).

There are however, approaches to address cost underestimation and strategic low bids that do not distort bidding behaviour. Devoting efforts to the planning of tender procedures, establishing specifications and incentive/disincentive schemes to ensure commitment and contract compliance, improving performance monitoring and adopting a tough reputation towards renegotiation may weaken the prospects of recoupment and thus mitigate the incentives for strategically placing low bids. Providing adequate time and information for bid preparation can reduce the risk of cost underestimation. Furthermore, procurement agencies may seek financial protection from poor outcomes, e.g., through conventional instruments such as surety or performance bonds, whereby surety companies guarantee that the contractor will deliver as stated in the bond.

4.4. Dividing Contracts into Lots

The division of procurement contracts into lots is being increasingly promoted and adopted in procurement systems. This tendency is closely linked to the increasing role of public procurement as an instrument to pursue other strategic goals of the State, such as the promotion of SMEs.

The number and size of the lots influence the degree of competition, and thus, bidding strategies in the tender. The decision on the number and size of lots can affect the participation rate, by determining which potential bidders have the capacity to submit a bid for at least one lot. Furthermore, the struc-

ture of the lot division can make it more or less easy for bidders to reach and sustain a collusive agreement, for example, by "sharing the pie". Albano and Spagnolo (2010) address the opportunity for procurers to weaken the conditions for collusion by exploring the heterogeneity in the value of lots, and by counteracting the bidding ring stabilisation effects that arise from sequential procurement auctioning. There are also efficiency considerations in contract partitioning, namely when there are complementarities between the different lots. When this is the case, the value of a package of lots is higher than the sum of the value of individual lots. The uncertainty as to which lots a bidder will win affects his valuation of the tendered lots, an effect that is known in the related literature as the "exposure problem". Package bidding is one approach to address this problem, but it may be that, in the absence of caps on the maximum number of lots which large firms can bid for, the aim of boosting participation is compromised.

All these aspects introduce complexity to the task of contract division. Grimm et al (2006) refer to the division of contracts into lots as "*one of the procurer's most crucial decisions*". Yet, in this respect, procurement agencies are given full discretion and there is little guidance which can assist them in pursuing this task (OECD, 2015). In order to ensure that tenders are designed pro-competitively and efficiently, further guidance needs to be produced to develop a set of principles that can serve as an umbrella in instructing procurers on the details of the challenging task of contract division.

4.5. Framework Agreements

A framework agreement is "*an agreement between one or more contracting authorities and one or more economic operators, the purpose of which is to establish the terms governing contracts to be awarded during a given period, in particular with regard to price and, where appropriate, the quantity envisaged*" (article 33, Directive 2014/24/EU). They are, in essence, instruments of aggregated procurement for the provision of goods or services for a certain period of time. The use of this procurement instrument has been on the rise in many EU countries, for example, in Portugal.

The scope for cost savings fostered the adoption of framework agreements. The main drives are the potential economies of scale emerging from demand aggregation, the increase in bargaining power vis-à-vis suppliers, the streamlining of procurement procedures, the reduction of procurement costs and the scope for knowledge sharing, among others.

In spite of the scope for benefits associated with framework agreements, it is important to discuss their potential impact on the degree of competition in the tender and in the marketplace. There may be opposing effects on tender participation. Demand aggregation promotes competition amongst a given number of competitors, but the more demanding requirements of larger sized contracts may limit the capacity of smaller firms to participate in the tender procedure (Albano et al, 2010). On the other hand, the enhanced standardisation can reduce bidding costs and foster participation. Depending on the time span covered, framework agreements can bring about lock-in and incumbency advantages.

In terms of efficiency, the main challenge that emerges when discussing the centralization of procurement is the loss of flexibility in adjusting the contract to the different contracting entities' procurement requirements (Albano et al, 2010).

The above are just a few notes on the exiguous discussion on the topic that has been developed in the literature so far. The increasing relevance of this procurement instrument will both provide useful experiments and call for further analysis of the implications of framework agreements for competition in public procurement procedures.

5. ALIGNING INCENTIVES: RAISING AWARENESS AND ACCOUNTABILITY

In a well-designed policy towards efficient public procurement, it is important to "*pay more attention to elementary theory, to the wider context of the auctions, and to political pressures, and pay less attention to sophisticated mathematical theory*" (Klemperer, 2004). Indeed, it is fruitless to discuss how to train procurement officials in detecting suspicious bidding patterns and design competitive tenders, without taking a step back to discuss the incentives of all the procurement related entities in pursuing the aim of enhanced competition in public procurement. The cornerstones for achieving incentive alignment are awareness and accountability.

Raising awareness of political leaders, civil society, businesses and procurement officials as to the potential cost savings from enhanced competition in public procurement is key to promoting broad scrutiny of procurement choices and ensure policy effectiveness. Furthermore, the pursuit of the overarching aim of efficient public procurement has many dimensions, which may sometimes be difficult to reconcile. Procurement officials may be parti-

cularly vigilant about the need to ensure a regular and timely supply of high quality goods, services and works to the public sector. The length of procurement procedures is also often accounted for in performance indicators on public procurement activity. Procurement officials may thus perceive themselves as more accountable for the speediness and smoothness of tender procedures than for the task of cartel detection. A suspicion of a collusive scheme in a tender may raise uncertainty as to the impact of such findings in tender duration and outcome or, if post award, in the continuity of the procurement contract. The fears of disruption and additional procurement costs may discourage proactive action in reporting the suspicion to the competition authority. As such, training of procurement officials must focus, not only in broadening their skills on detecting signs of bid rigging, but also in raising their awareness regarding the risks and costs associated with these unlawful agreements. It is also important to demystify perceptions regarding the disruptive impact on tender procedures of reporting a suspicion to the competition authority. Cartel detection must be made a shared objective for competition authorities and procurement agencies. A successful collaboration means diligence from both sides under a common objective function, which is efficiency in public procurement. This should entail attempts at reconciling potential tensions between effective bid rigging detection and procurement procedural efficiency.

Promoting accountability, the other cornerstone of aligning incentives, may entail a shift from formalistic compliance to an outcome based performance assessment. This approach is argued for in some academic papers, namely some that produced interesting empirical results by which more discretion may have translated into higher efficiency (e.g., Bandiera & Valletti, 2009 and Spagnolo et al, 2015). Currently, the level of performance of public procurement activity is mainly assessed with reference to procedural duration and the degree of compliance with procedural rules. Having the efficiency of the tender outcome matter for the performance assessment of contracting agencies would promote accountability and efficiency. Performance assessment can, however, be a challenging task. While centralization and e-procurement offer important opportunities in creating the conditions for performance monitoring, the multi-objective nature of public procurement, which is increasingly regarded as a means to achieve other strategic goals (e.g., environmental, innovation) may introduce added complexity. Furthermore, benchmarking will likely be an issue in procurement for complex projects. Again, while this may be challenging, it is yet another discussion which is worth undertaking.

6. FINAL REMARKS

The overarching aim of good value for taxpayers' money can only be addressed through a policy mix that combines a variety of building blocks for ensuring efficient public procurement procedures. The Portuguese Competition Authority is committed to playing a key role in the pursuit of this common goal. The PCA's Strategic Action Plan on Public Procurement envisages scaling up both advocacy and enforcement, covering the broad range of interrelated factors that are required for efficient public procurement (Figure 6).

FIGURE 6: **Policy-mix approach to promoting competition and efficiency in public procurement**

Source: PCA

A key aspect of this Strategic Action Plan is the strengthening of the interaction between the Portuguese Competition Authority and the entities involved in public procurement, namely contracting entities, in particular the central purchasing body (ESPAP), the Portuguese Court of Auditors and the Institute of Public Markets, Real Estate and Construction (IMPIC). It is crucial that we pull together means and skills and establish efficient communication channels in a spirit of close collaboration that we believe can serve the aim of ensuring that Portuguese taxpayers' money is efficiently allocated.

REFERENCES

Abrantes-Metz, R. & Bajari, P.
2009 "Screens for Conspiracies and their Multiple Applications", *Antitrust*, Vol. 24(1), pp. 66-71.
Ades, A. & R. Di Teolla
1999 "Rents, Competition and Corruption", *American Economic Review*, Vol. 89(4), pp. 982-993.
Albano, G.
2015 *Note for the Hearing on Auctions and tenders: Further Issues*, OECD.
Albano, G., Ballarin A. & Sparro, M.
2010 "Framework Agreements and Repeated Purchases: the Basic Economics and a Case Study on the Acquisition of IT Services", *Quaderni Consip*, IV.
Albano, G., Bianchi M. & Spagnolo, G.
2006 "Bid Average Methods in Procurement", *Rivista di Politica Economica*, Vol. 96(1), pp. 41-62.
Albano, G., Calzolari, G., Dini, F., Iossa, E. & G. Spagnolo, G.
2006 "Procurement Contracting Strategies", in *Handbook of Procurement*, edited by N. Dimitri, G. Piga & G. Spagnolo, Cambridge: Cambridge University Press, pp. 82-120.
Albano, G. & Spagnolo, G.
2010 "Asymmetry and Collusion in Sequential Procurement: A "Large Lot Last" Policy", *The B.E. Journal of Theoretical Economics*, Vol. 10 (1), Article 43.
Albano, G., Spagnolo, G. & Zanza, M.
2009 "Regulating Joint bidding in Public Procurement", *Journal of Competition Law and Economics*, Vol. 5(2), pp. 335-360.
Bandiera Prat & Valletti
2009 "Active and Passive Waste in Government Spending: Evidence from a Policy Experiment", *American Economic Review,* 99(4), pp. 1278-1308.
Bergman, M., Lundberg, S. & Spagnolo, G.
2012 "Public Procurement and Non-contractible Quality: Evidence from Elderly Care", No 846, Umeå Economic Studies, Umeå University, Department of Economics.
Bulow, J. & Klemperer, P.
1996 "Auctions Versus Negotiations", *The American Economic Review*, Vol. 86(1), pp. 180-194.
Compte, O., Lambert-Mogiliansky, A. & Verdie, T.
2005 "Corruption and Competition in Procurement Auctions", *The RAND Journal of Economics*, Vol. 36(1), pp. 1-15.

Decarolis, F. & Klein, M.
2012 "Auctions that are Too Good to be True", Working Paper Series, Frankfurt School of Finance & Management, 186.
Dini, F., Pacini, R. & Valletti, T.
2006 "Scoring Rules", in *Handbook of Procurement*, edited by N. Dimitri, G. Piga & G. Spagnolo, Cambridge: Cambridge University Press pp. 293-321.
Friederiszick, H. & Maier-Rigaud, F.
2008 "Triggering Inspections Ex-officio: Moving beyond a Passive EU Cartel Policy". *Journal of Competition Law and Economics*, Vol. 4(1), pp. 89-113.
Graham, D. & Marshall, R.
1987 "Collusive Bidder Behavior at Single Object Second Price and English Auctions", *Journal of Political Economy*, Vol. 95, pp. 1217-1239.
Grimm, V., Pacini, R., Spagnolo, G. & Zanza, M.
2006 "Division in Lots and Competition in Procurement" in *Handbook of Procurement*, edited by N. Dimitri, G. Piga & G. Spagnolo, Cambridge: Cambridge University Press pp. 168-192.
Heimler, A.
2012a "Cartels in Public Procurement", *Journal of Competition Law & Economics*, Vol. 8(4), pp. 1-14.
Hüschelrath, K.
2010 "How Are Cartels Detected? The Increasing Use of Proactive Methods to Establish Antitrust Infringements", *Journal of European Competition Law & Practice*, pp. 522-528.
Klemperer, P.
2002 "What Really Matters in Auction Design", *Journal of Economic Perspectives*, Vol. 16(1), pp. 169-189.
2004 "Using and Abusing Economic Theory", in *Contemporary Issues in Economics and Econometrics: Theory and Application*, edited by S. Hurn & R. Becker, Edward Elgar Publishing.
2008 "Competition Policy in Auctions and 'Bidding Markets'", in *Handbook of Antitrust Economics*, edited by P. Buccirossi, MIT Press.
Kovacic, W., Anderson, R. & Mueller, C.
2011 "Ensuring Integrity and Competition and Public Procurement Markets: A Dual Challenge for Good Governance", in *The WTO Regime on Government Procurement: Challenge and Reform,* edited by S. Arrowsmith & R. Anderson.
Lambert-Mogiliansky, A. & Sonin, K.
2003 "Collusive Market Sharing and Corruption in Procurement", *Journal of Economics & Management Strategy*, Vol. 15(4), pp. 883-908.

Iimi, A.
2013 "Testing Low-Balling Strategy in Rural Road Procurement", *Review of Industrial Organization*, Vol. 43, pp. 243-261.
Marshal, R. & Marx, L.
2009 "The Vulnerability of Auctions to Bidder Collusion", *The Quarterly Journal of Economics*, Vol. 124(2), pp. 883-910.
Milgrom, P.
2000 'Putting Auction Theory to Work: The Simultaneous Ascending Auction', *Journal of Political Economy*, Vol. 108, pp. 245-272.
OECD
2007 *Policy Roundtable in "Public Procurement"*, available at http://www.oecd.org/competition/cartels/39891049.pdf.
2009 *Guidelines for Fighting Bid Rigging*, available at http://www.oecd.org/competition/cartels/42851044.pdf.
2010 *Policy Roundtable on "Collusion and Corruption in Public Procurement",* available at http://www.oecd.org/competition/cartels/46235884.pdf.
2012 *Recommendation on Fighting Bid Rigging in Public Procurement,* available at http://www.oecd.org/competition/oecdrecommendationonfighting bidriggininpublicprocurement.htm.
2013a *Policy Roundtable on "Ex Officio Cartel Investigations and the Use of Screens to Detect Cartels"*, available at http://www.oecd.org/daf/competition/exofficio-cartel-investigation-2013.pdf.
2013b Report "*Implementing the OECD Principles for Integrity in Public Procurement Progress since 2008 Implementing the OECD Principles for Integrity in Public Procurement: Progress since 2008*", available at http://www.oecd-ilibrary.org/governance/implementing-the-oecd-principles-for-integrity-in-public-procurement_9789264201385-en.
2015a *Government at a Glance*, available at http://www.oecd.org/gov/govataglance.htm.
2015b *Issues Note of the Secretariat for the Hearing on "Auctions and Tenders: Further Issues",* available at http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=daf/comp/wp2(2015)1&doclanguage=en.
Spagnolo, G., Coviello, D. & Guglielmo, A.
2015 "The Effect of Discretion on Procurement", CEIS Working Paper No. 361.
Stigler, G.
1968 *The Organization of Industry*, Chicago, IL: University of Chicago Press.

Tavares, L.
2011 "*A strategy to reduce public expenditure based on e-tendering and procurement business intelligence: The case of Portugal*", European Vortal Academy.

Thomas, C.
2015 "Two Bids or not to Bid? An Exploration of the Legality of Joint Bidding and Subcontracting under EU Competition Law", *Journal of European Competition Law & Practice*, 2015, Vol. 6(9) pp. 629-638.