



Research Papers



ISSN 2610-931X

CEIS Tor Vergata

RESEARCH PAPER SERIES

Vol. 23, Issue 2, No. 594 – February 2025

Using Multiple Tools to Enhance Competition in Public Procurement

Clara Calini, Alessandra Catenazzo and Elisabetta Iossa

Using Multiple Tools to Enhance Competition in Public Procurement *

Clara Calini [†] Alessandra Catenazzo [‡] Elisabetta Iossa[§]

November 18, 2024

Abstract

Well-functioning competitive procurement is essential to reach efficiency of public services and public spending. Drawing from the experience of the Autorità Garante della Concorrenza e del Mercato, this paper argues that fostering competition in public procurement is most effective when employing a diverse range of tools.

First, identifying the functioning of compensatory mechanisms that result in anomalous bidding behaviour, as well as diversifying the sources of information, is important for effectively prosecuting bid rigging *ex post* and helping contracting authorities detect anticompetitive conduct. Second, *ex ante* advocacy contributes to enhance the competence of public buyers, helping them design pro-competitive procurement processes. Third, adopting legality rating systems incentivizes compliance with competition law and also helps select the most efficient bidder. The paper makes these points whilst reviewing enforcement practice.

Keywords: Antitrust, Advocacy, Bid rigging, Legality Rating, Public Procurement

JEL Codes: D44, D73, H57, K4, L4.

*The authors wish to thank Claudia D'Amore and Ombretta Main for their helpful comments. The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Italian Competition Authority.

[†] Italian Competition Authority - Autorità Garante della Concorrenza e del Mercato, AGCM. Email: clara.calini@agcm.it

[‡] Italian Competition Authority - Autorità Garante della Concorrenza e del Mercato, AGCM. Email: alessandra.catenazzo@agcm.it

[§] Commissioner at the Autorità Garante della Concorrenza e del Mercato, and Professor of Economics, University of Rome Tor Vergata (on leave). Email: elisabetta.iossa@uniroma2.it.

1 Introduction

The purchase by governments and state-owned enterprises of goods, services and works, known as "public procurement", constitutes a share of around 13 percent of GDP and 30 percent of total public spending in OECD countries (OECD (2021)). Selecting suppliers that meet the needs of public procurers at the best available price and quality combination can therefore generate significant savings of public money and substantial benefits for the society.

In practice, three factors contribute to impede the well functioning of procurement markets; interestingly, they share the first letter "C": Competition (lack of); Competence (lack of) and Corruption. Drawing from the experience of the Italian Competition Authority (the *Autorità Garante della Concorrenza e del Mercato*, hereafter "AGCM"), where bid-rigging cases account for almost 50% of cartel decisions adopted between 2015-2022, this paper argues that National Competition Authorities ("NCAs") have an important role to play.¹ By using the diverse range of tools at their disposal - for the AGCM these include competition policy, advocacy and rating systems - NCAs can exploit the complementarities that exist between fostering competition, enhancing the competence of public buyers and fighting corruption, so as to increase the efficiency of public procurement.

First, NCAs can help maintaining the integrity of the procurement process on the side of the bidders when they act against bid rigging.² The paper discusses such enforcement activity from a twofold perspective. From an objective standpoint, it provides a comprehensive analysis of the type of compensatory mechanisms used by cartelists to sustain the illegal agreement. From a subjective standpoint, the paper provides an overview of the informants behind infringement decisions, which include contracting authorities, public prosecutors, competitors, whistle-blowers and leniency applicants, as well as input gathered internally based on datasets shared by contracting authorities or pure endogeneous evidence. Identifying such sources of information and understanding the incentives of informants is crucial to maintain an informative and diversified information stream in the long run.

Second, whilst most investigations will likely fall within the scope of anti-cartel provisions, efficient competition amongst potential suppliers may also be hindered by abuses by current legal monopolists, such as when they refuse to provide the information necessary to issue a new tender or when they hinder the takeover by the new entrant winning the tender, as the AGCM has also seen in practice.

¹See Calini (2023) for more details.

²Bid rigging amounts to higher costs for public buyers and for citizens. For example, following the collapse of a cartel for generic insulin in Mexico, the price of insulin paid by the Mexican healthcare system fell by 78%, which resulted in increased insulin usage by 42%, decreased complications by 25%, and lower mortality by over 3% (see Barkley (2023)).

Third, NCAs can also play an important role in supporting public procurers through *ex ante* advocacy interventions aimed at ensuring that the procurement process is designed to stimulate competition and to reduce the risk of cartels.³ As this is often a complex evaluation requiring legal, economic and technical skills, the competence of public procurers is essential to ensure that the process is well designed and managed.⁴ Advocacy interventions can therefore directly enhance the competence of contracting authorities and be as important as intervening *ex post* against harmful conduct, *e.g.*, by requesting to modify invitations to tender containing restrictive provisions or by advocating against irregular in-house providing or direct awards.

Fourth, compliance rating schemes may provide incentive to comply with antitrust law and, when used as a criterion in public tenders, they may also help select the most efficient bidder, in the light of the growing evidence on a positive correlation between a company’s compliance standards and the efficiency of its operation.⁵

Maintaining the integrity of the procurement process also requires that public buyers do not alter their choices to unduly favor one or more suppliers, in exchange of some personal benefits or bribes. Corruption in public procurement remains widespread in many OECD countries.⁶ While NCAs cannot directly pursue anti-corruption policies, their action against bid rigging and

³When designing a tender and subsequent contract, it is indeed essential to consider the market conditions and the characteristics of the good or service being purchased. On the role of these factors, see, for example, Decarolis (2018); Decarolis et al. (2021); Albano et al. (2006).

⁴Empirical evidence indicates that, all other factors being equal, more competent public buyers result in improved outcomes in procurement. For example, Decarolis et al. (2020) show that an increase in the level of procurer competence causes a significant and economically important reduction in time delays, cost overruns and the number of subsequent renegotiation of public contracts. Also, Bandiera et al. (2009) demonstrate that the extra costs paid by public bodies in Italy are 80% due to incompetence and only 20% to corruption. See also Baltrunaite et al. (2021) who show that the characteristics of a contracting authority - in terms of workforce composition, workload/experience and administrative efficiency - affect the average duration of public contracts. Recent literature also shows that when the competence of the contracting authority is high, a broader level of discretion improves efficiency. In Bosio et al. (2022), the authors demonstrate how stricter procurement regulation is associated with better outcomes in countries where contracting authorities are less competent, and with worse outcomes in countries with competent procurers, that is when regulation inhibits the socially optimal exercise of discretion. Similarly, Buccioli et al. (2020) show that, in public procurement for medical devices in Italy, the introduction of a policy imposing a cap on the unit price of each standard medical device (used to assess discretion) increased the prices paid by competent entities and reduced the prices paid by less competent ones.

⁵Combining the Italian Legality Rating dataset with a comprehensive dataset of public works in Italy, Iossa and Latour (2023) analyze the relationship between the procurement performance of firms in terms of extra costs and time delays with the firms’ legality score level, using a fixed-effect OLS regression model. The evidence shows that firms’ efficiency and firms’ legality standards are inherently interlinked: each point increase in the legality score is associated with a significant reduction in the average time delay and extra cost. This evidence is in line with other studies that show the existence of a positive correlation between legality and financial outcomes, including in terms of lower tax avoidance (Ginesti et al. (2020)), better financial performance (Caputo and Pizzi (2019)), and greater capital expenditure (Acconcia et al. (2023)).

⁶According to the OECD Foreign Bribery Report (2014), half of foreign bribery cases occurred to obtain a public procurement contract in OECD countries. Coviello and Gagliarducci (2017) found that, in Italy, the stability of a given public position over the years has a negative impact on the functioning of public procurement (number of bidders, cost of public works), and when a major stays in power for longer there is higher probability of corruption by contractors.

for the promotion of a culture of competition amongst public officials might generate positive spillover effects which reduce the risk of corruption. Indeed, bid rigging and corruption are often observed together, and both find fertile grounds in the presence of weak institutions.⁷

The paper is structured as follows. Section 2 discusses the enforcement against bid rigging (the "C" for Competition), identifying a number of red flags and compensatory mechanisms resulting in anomalous bidding behaviour. It also provides a comprehensive analysis of the decisional practice of the AGCM, particularly regarding the type of compensatory mechanisms observed in practice. Section 3 discusses the sources of information used to initiate bid-rigging investigations, including public buyers, public prosecutors, competitors, whistle-blower submissions, leniency applications as well as *ex officio* initiatives based on the analysis of datasets. Section 5 focuses on advocacy (the "C" for Competence), and illustrates the main areas of intervention, while Section 6 describes Italy's compliance rating scheme - the Legality Rating System - to reward corporate compliance (the "C" for Corruption). Some final remarks are provided in Section 7.

2 Red Flags and Compensatory Mechanisms

Bid rigging (or collusive tendering) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or reduce the quality or variety of goods or services for purchasers who wish to acquire products or services through a bidding process.⁸ Bid-rigging is pursued by NCAs within the scope of anti-cartel provisions (in Europe, article 101 TFEU or equivalent national provisions).

While individuals and businesses might opt to execute bid-rigging schemes through diverse methods, they generally employ one or more common tactics. These tactics, in turn, may generate detectable patterns for procurement officials, aiding in the identification of bid-rigging schemes.

Based on the OECD Guidelines for fighting bid rigging in public procurement (OECD (2009)), the AGCM drafted a checklist identifying the following red flags to help uncover bid rigging schemes: (i) bid rotation or market allocation; (ii) joint bidding and sub-contracting; (iii) cover

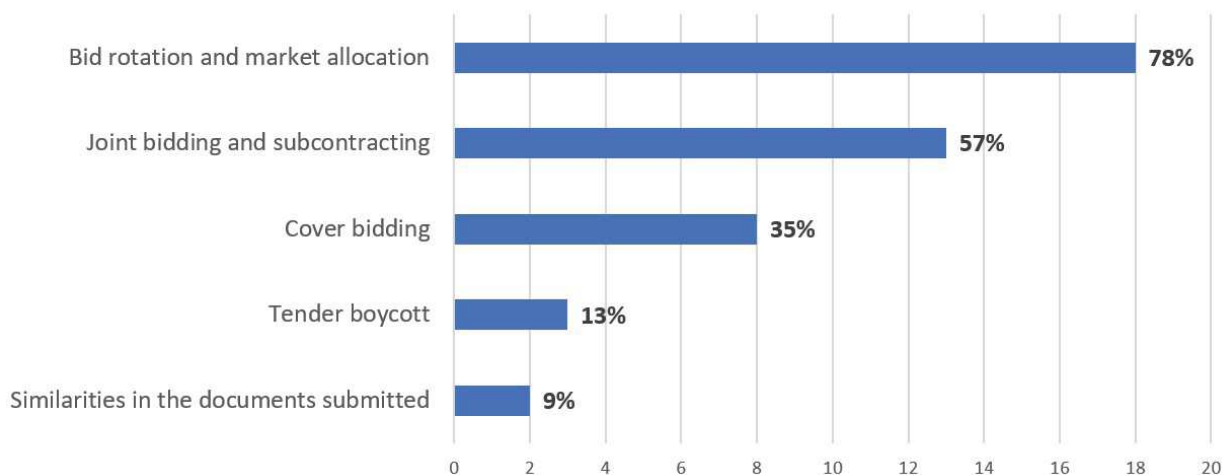
⁷For example, corruption was present in 56% of cartel cases covering the period 2016-2020 in Italy (see Iossa et al. (2022)). Since corruption might enhance the stability of the cartel, markets characterized by higher corruption levels might be more susceptible to collusion. A negative correlation between cartels and corruption is also possible. That is because corruption transfers rents from companies to the corrupt officials, and thus represents a damage for such companies. While such companies might not have an individual incentive to report corruption for the fear of legal costs and/or other repercussions, leading to free-riding behaviour, the existence of a solid and cooperative industrial structure may strengthen the incentives to report illegal activities (see Dixit (2015) and Burguet et al. (2024)).

⁸Definition of bid rigging from OECD Guidelines for fighting bid rigging in public procurement (OECD (2009)).

bidding; (iv) tender boycott; and, (v) similarities in the documents submitted. These are tools to implement the collusive agreement, from which one can infer the existence of an underlying cartel.⁹ Multiple mechanisms can be used in conjunction with one another and this is what often happens in practice. In addition, a collusive scheme may only be evident when looking at a number of tenders over a period on time, as in some cases of bid rotation.

Figure 1 provides a description of the suspicious bidding patterns identified in the checklist and allocates all decisions adopted by the AGCM between 2010 and 2023 on that basis, to give an idea of what red flags might be more relevant. In 78% of the investigations, it was possible to observe a path of rotation or market sharing. Bid rotation occurs when competition is assessed within a single tender scenario and competitors agree to take turns at winning a given tender. Market allocation may rather be evident when looking at the results of a number of tenders over a period of time. In this case, competitors agree not to compete for certain customers or in certain geographic areas. Patterns of joint bidding and subcontracting are present in approximately 57% of the decisions. Joint bidding relates to those cases where competitors agree to submit a joint bid (eventually in a bidding consortia) or subcontract part of the work to unsuccessful or potential bidders, but each participant would be able to participate on its own. Cover bids, in which the non-designated bidder submits offers designed to lose, are found in nearly 35% of cases, while red flags showing tender boycott and similarities in the document submitted are present in 13% and 9% of the decisions, respectively.

Figure 1: Bid Rigging Red Flags (2010-2023)



Notes: Based on own classification. The data cover all infringement decisions by the AGCM from 2010-2023.

More generally, and differently from other types of cartels, bid rigging agreements typically require a more extensive level of coordination among cartelists. Whilst in other cartels, cartelists obtain simultaneous benefits from the illegal agreements by raising their prices (or reducing

⁹See AGCM (2013).

their quantity, variety etc.), in bid rigging cases there is only one winner per tender or lot, and therefore compensatory mechanisms are needed to reward non-designated winners. The larger the number of cartelists, the greater the level of coordination necessary to find adequate compensations to make the cartel sustainable.

Hence, another approach to identifying collusion strategies is by seeking out potential elements that could reveal patterns of compensation. Compensatory mechanisms can be divided in two categories: "within-tender" or "across-tender" mechanisms, although such situations are not mutually exclusive. In the former, each cartelist obtains a share of the benefit from the collusive agreement *within* the tender. This can occur, for example, under one of the following mechanisms:

- *Division in lots*: when the tender is divided into lots, cartelists assign the lots to different designated winners;
- *Joint bidding*: cartelists agree to submit a joint bid, for example through a temporary association of companies;
- *Subcontracting/sublicensing/purchase of materials*: designated winners agree to subcontract or to sublicense to non-designated winners, or to purchase materials from them within the tender;
- *Tender boycott*: competitors agree not to submit bids, to force contracting authorities to maintain the current contractor or to negotiate contracts outside a formal tendering process (*e.g.*, dividing the work pro quota among all competitors).

Under "across-tender" mechanisms, non-designated winners obtain their compensation in *other* tenders taking place at the same time or in the future. This can occur for example under one of the following mechanisms:

- *Bid rotation*: cartelists take turn at winning a same tender over time;
- *Customer or Market allocation*: Cartelists agree to split customers and submit bids only in certain geographic areas/in tenders issued by a given contracting authority;
- *Subcontracting/Sublicensing across tenders*: cartelists compensate non-designated winners by subcontracting/sublicensing across different tenders.

Each compensatory mechanism may then be implemented through either "bid withdrawals", in which the non-designated winner decides not to bid, or through "cover bids" in which the non-designated winner submits offers designed to lose. For example, cover bids can be used to allow a division of the lots of a single tender, with each cartel member submitting a cover bid for the lots assigned to other co-cartelists. Alternatively, using the same logic, cover bids can

be the instrument to implement a dynamic market allocation across multiple tenders.

The distinction between the two forms of allocation of the collusive rents across cartelists is important both in terms of cartel stability and in terms of easiness of detection. From a theoretical perspective, cartel stability may be greater under within-tender mechanisms, as the sharing of the collusive rent within a single tender reduces the net gain from a deviation, compared to the case where non-designated winners must wait for the next tender to obtain their share of the collusive rent.

At the same time, within-tender mechanisms may be easier to detect than cartels based on across-tender mechanisms. By studying the way in which firms bid within a single tender, public buyers can identify suspicious bidding patterns. Doing so across tenders is more complicated, as tenders may regard different buyers, who only have information about their own tender, and thus miss the general picture.

Below, we provide a comprehensive description of the decisional practice of the AGCM, focusing on the compensatory mechanisms observed in various investigations.

2.1 Within-tender Compensatory Mechanisms

2.1.1 Division in Lots

When designing a tender, procurers must choose whether to award the contract to a single supplier or instead divide the tender into lots, thus allowing for the possibility that different suppliers are awarded different parts of the contract. Other things equal, a greater number of lots in a tender helps to promote participation, especially of SMEs, but the presence of multiple lots also makes it easier for cartelists to “split” the procurement contract and sustain collusive agreements without using monetary compensations.¹⁰ The downside (for cartelists) is that such means of implementing a collusive deal is a well known red flag, which prompts the attention of procurers and antitrust authorities. The AGCM has indeed investigated many cartels in which the cartelists have used the division in lots to share the collusive rent.

In *I784 - Ecoambiente*, the bidding process was characterized by an anomalous parallelism of participation patterns. Despite that all firms were able to participate in several lots, they submitted only one bid each, and all in different lots. Moreover, the economic bids were all very similar and only slightly lower than the tender reserve price. Such “chess-board” bidding pattern, with only one bid per tender, similar bid discounts, and proximity of the bids to the reserve price, prompted the AGCM to open the case. In the inspections that followed, the Authority found evidence of contacts among cartelists which confirmed the initial

¹⁰See Grimm et al. (2006) and Dimitri et al. (2006).

predictions.¹¹

Sometimes cartelists secure a main compensatory strategy of a division in lots using a number of additional tools that help divide the collusive rent within the tender, and possibly also enhance the stability of the cartel. In *I808 - Gara Consip FM4 - accordi tra i principali operatori del facility management*, four cartelists submitted bids for the maximum number of lots permissible under the tender rules, which was four, resulting in a total of eighteen lots and four participants. Only two instances saw overlapping bids within the same lot, and in both cases the second offer was deemed to be a non-competitive cover bid. Consequently, the four largest players were awarded the maximum number of lots allowed by the tender rules. Following preliminary monitoring activities conducted by the AGCM on its own initiative, data was requested to the centralized procurement agency (Consip) in charge of the tender. The Authority initiated proceedings based on the assumption that such pattern of participation was difficult to explain without referring to a possible underlying collusive agreement, thus relying solely on the observation of the tender's suspicious outcomes. A leniency application was submitted after the initiation of proceedings, following an internal compliance procedure leading to a change in the management of one of the cartelists.¹²

In *I796 - Servizi di supporto e assistenza tecnica alla PA nei programmi cofinanziati dall'UE*, the AGCM discovered that the Italian branches of four large accounting and consulting firms had collaborated on a bid for providing support and technical assistance services to audit authorities in EU co-financed programs. The centralized procurement agency Consip issued a tender divided into nine lots: the cartelists were assigned five of the nine lots, while other bidders won the remaining four. The investigation stemmed from a complaint by Consip, noting that the most competitive bids from the four firms always pertained to different lots, avoiding overlaps: the most competitive bids offered discounts of up to 30-35%, compared to non-competitive bids offering discounts of only 10-15%.¹³ The inspections found evidence of contacts among the big four, including emails and meeting minutes, which however predated the tender's announcement (*i.e.*, taking place before the parties knew the number and value of the lots). The Authority took the view that the absence of bid overlaps, the pattern of economic offers resembling a common scheme across different lots as well as the evidence of direct contact in the proximity of the tender formed a compelling case for anticompetitive behavior, shifting

¹¹AGCM, prohibition decision of 29 July 2015, case *I784 - Ecoambiente*, AGCM Bull. n. 30/2015. The Italian Competition Authority's decision has been confirmed with redetermination of the fine by Italian lower courts and confirmed by Italian upper courts.

¹²AGCM, prohibition decision of 17 April 2019, case *I808 - Gara Consip FM4- accordi tra i principali operatori del facility management*, AGCM Bull. n. 19/2019 (confirmed with redetermination of the fine by Italian lower and upper courts).

¹³AGCM, prohibition decision of 18 October 2017, case *I796 - Servizi di supporto e assistenza tecnica alla PA nei programmi cofinanziati dall'UE*, AGCM Bull. n. 43/2017. The Italian Competition Authority's decision has been partially confirmed with redetermination of the fine for some parties by Italian lower courts and confirmed by Italian upper courts.

the burden of proof to the companies. The decision was upheld on appeal due to the companies failing to provide credible alternative explanations for their actions.

2.1.2 Joint Bidding

Joint bidding is an instrument foreseen by the law, which allows firms to submit a joint bid when they are unable to bid individually. Yet, joint bidding is sometimes used as an instrument to sustain collusive agreements, by sharing the collusive rents within the tender. Joint bidding can be implemented either through a temporary business associations, designed for joint participation in a specific tender, or through more stable and enduring structures, like consortia.

In a decision regarding the markets for sludge management in the Italian regions of Piemonte and Lombardia (*I765 - Gare gestione fanghi in Lombardia e Piemonte*), the AGCM found that joint bidding was used as a tool to divide the collusive rent in approximately 80 tender procedures (over a total number of 150 between 2008 and 2013). Temporary associations of firms were used in an instrumental way to facilitate market sharing among cartelists (together with other mechanisms such as subcontracting). The evidence collected also showed that firms had continuously searched for a stable mechanism of coordination, discussing the possibility to create a permanent consortium reflecting the companies' market shares, in order to enhance the stability of the cartel over time.¹⁴

In *I782 - Gare per servizi di bonifica e smaltimento di materiali inquinanti e/o pericolosi presso gli arsenali di Taranto, La Spezia ed Augusta*, the AGCM uncovered a bid-rigging scheme affecting three public tenders for the removal of asbestos from Italian naval vessels in Taranto, La Spezia and Augusta. The three competitive procedures were managed centrally for the first time, rather than by individual arsenals. The cartelists formed three temporary associations of firms for the participation to the three tenders, each of which was divided into three lots. The primary contractors for each of the three associations were the incumbent firms of the Taranto, La Spezia and Augusta arsenals. In each tender, only the association led by the incumbent firm for the specific lot submitted a bid, in order to maintain a pattern of geographic market allocation. Furthermore, the Authority determined that the agreement also involved price-fixing, thereby artificially reducing the level of bid discounts offered over time. Based on the evidence gathered during the investigation, the AGCM observed that the associations had been designed as oversized consortia relative to the scope of work to be carried out, encompassing multiple firms with the same expertise in each relevant product area. In addition, when looking at the execution of the contracts, and particularly at the reallocation of tasks among the parties,

¹⁴AGCM, prohibition decision of 3 February 2015, case *I765 - Gare gestione fanghi in Lombardia e Piemonte*, AGCM Bull. n. 6/2015. The Italian Competition Authority's decision has been confirmed by Italian lower courts and upper courts.

it was possible to observe that the work had been carried out by only a few of the companies forming the consortia.¹⁵

In *I740 - Comune di Casalmaggiore - Gara per l'affidamento del servizio di distribuzione del gas*, despite being able to compete independently and against each other, two gas distributors formed a temporary business association to participate in the tender announced by the municipality of Casalmaggiore, acting as the contracting authority for 8 municipalities in the province of Cremona. In this case, joint bidding was used as a tool to divide concessions according to a logic of maintaining the *status quo ante*: the contract between the parties in fact provided that each of the two companies would continue to autonomously manage the gas distribution service exactly in the municipalities where it previously held the concession. The elimination of mutual competition through joint participation also allowed the two gas distributors to obtain the most favorable economic conditions permitted by the tender (the temporary association was in fact the only participant in the tender and offered at the minimum). It is interesting to note how, in its initial complaint, the municipality of Casalmaggiore did not identify possible patterns of collusive behaviour but complained about the refusal of one of the former service providers to grant access to its facilities to the other companies invited to participate in the tender. The Authority identified a pattern of collusion noting that the refusal to grant access, which triggered the initial complaint, could be seen as complementary to the collusive scheme, as it effectively neutralized the ability of third parties to participate in the tender. As discussed later, in the Authority's practice the refusal to cooperate by current legal monopolists has also been pursued as an autonomous abuse of dominance.¹⁶

2.1.3 Subcontracting/Sublicensing and Purchase of Materials

Most legislative provisions on public tenders allow the use of subcontracting by bidders, as this enhances the opportunities for firms to best organize their supply. For example, subcontracting helps firms overcome capacity constraint or outsource parts of the contracts to more efficient suppliers. The consequential increase in efficiency can potentially be reflected into better economic and technical offers in the tender, and thus in better terms for the procurer. The AGCM has advocated in favour of lifting limits to subcontracting which were present in the Italian

¹⁵AGCM, prohibition decision of 18 November 2015, case *I782 - Gare per servizi di bonifica e smaltimento di materiali inquinanti e/o pericolosi presso gli arsenali di Taranto, La Spezia ed Augusta*, AGCM Bull. n. 45/2015. The Italian Competition Authority's decision has been confirmed by Italian lower courts and partially confirmed with determination of the fine for some parties by Italian upper courts.

¹⁶AGCM, prohibition decision of 2 August 2012, case *I740 - Comune di Casalmaggiore - Gara per l'affidamento del servizio di distribuzione del gas*, AGCM Bull. n. 31/2012. The Italian Competition Authority's decision has been annulled by Italian lower courts, but confirmed by Italian upper courts.

legislation, as a means to promote competition.¹⁷

At the same time, subcontracting can also constitute a mechanism for cartelists to compensate non-designated firms within the tender, by simply re-allocating parts of the contract to co-cartelists. When the applicable legislation also requires that the bidder identifies its potential subcontractors and foresees that they shall refrain from submitting a parallel bid, then subcontracting might become a tool to enhance the stability of cartels; that is because a firm that has been selected as subcontractor cannot deviate from the collusive agreement and submit a more convenient bid.¹⁸

In a case concerning the provision of road maintenance services to a highway network located in the north of Italy (*I845 - Gara manutenzione pavimentazioni tratte autostradali di Milano Serravalle - Milano Tangenziali*), the Authority observed that each of the three competitors, in a position to bid, submitted an offer only for one lot (over a total of three), and indicated the two other competitors as possible sub-contractors. Interestingly, when executing the contract, none of the parties actually made use of these sub-contractors. The parties argued that capacity constraints forced them not to submit offers for additional lots, but then in the AGCM's view it could not be explained why each of them had parallelly accepted to act as sub-contractors in favour of their competitors. In the same case, another piece of circumstantial evidence was represented by a symmetry in the content of the replies sent by the parties to the contracting authority to justify their bids, in which the three companies indicated equal or at least similar percentages of general expenses and profits (10-11% for general expenses and 3% for business profits). On direct evidence, the AGCM pointed to the fact that the agendas of some of the company's employees referred to meetings with their competitors, marked as related to this tender, even if it did not find any minutes of such meetings during its dawn raids.¹⁹

Similar mechanisms to subcontracting are co-insurance or sublicensing. In *I731 - Gare assicurative ASL e aziende ospedaliere campane*, four insurance companies engaged in a restrictive agreement in the context of a number of tender procedures for the coverage of third party liability and liability towards employees issued by hospitals in Campania. The parties coordinated their behaviour also through coinsurance contracts, both prior to and following the tender award process, as a tool to exchange the shares of risks and activities to be carried

¹⁷For example, most recently, in the AS1730- *Proposed reforms of the Annual Law for the Market and Competition, Year 2021*, the Authority had reiterated the need to remove the provisions on subcontracting that conflict with the European orientation and unduly hinder the participation of small and medium-sized enterprises (SMEs) in public procedures. Such participation needed to be more encouraged, also taking into account the health and economic crisis that characterized 2021.

¹⁸See Albano et al. (2006) for a discussion.

¹⁹AGCM, prohibition decision of 13 December 2022, case I845/*Gara manutenzione pavimentazioni tratte autostradali di Milano Serravalle - Milano Tangenziali*, AGCM Bull. n. 1/2023. The Italian Competition Authority's decision has been annulled by Italian lower courts on procedural grounds, but as of 11 October 2024 appeal before upper courts is still pending.

out in each tender. The use of coinsurance gave the parties the possibility to proceed with contract withdrawals or takeovers in the interest of their co-cartelists and beyond a legitimate process of risk sharing, with the aim of avoiding a competitive confrontation within the tender process.²⁰

2.1.4 Tender Boycott

Competitors might also agree not to submit bids, to force contracting authorities to maintain the current service providers or to negotiate individual contracts outside a formal tendering process (*e.g.*, dividing the work *pro quota* among all competitors).

For example, in *I792 - Gare ossigenoterapia e ventiloterapia*, the AGCM acted against a complex bid rigging arrangement by a number of companies providing oxygen-therapy and ventilotherapy services to hospitals, which started from parallel initiatives aimed at convincing public procurers not to opt for tenders (but rather for the renewal of current contracts) and continued with either tender boycott or concerted bids if the tenders were ultimately issued. Documents submitted by an anonymous whistle-blower included evidence of coordination in the drafting of the letters sent to the various hospitals by their suppliers to induce them to renew their current contracts.²¹

2.2 Across-tender Compensatory Mechanisms

While previously described mechanisms allow a coordination of behaviour and a revenue sharing within the single tender, other types of collusive agreements can be based on an across- tender allocation. These agreements may be difficult to sustain, especially when there is uncertainty (*e.g.*, regarding the value, timing and characteristics of future tenders), but they are also harder to detect. A single contracting authority may in fact not have the information on previous and future tenders issued by other procurers to detect suspicious patterns. The contracting authority may also not have sufficient incentives to investigate previous and future bidding behaviour related to tenders it does not administer; the strict monitoring by a particular contracting authority generates positive externalities on other buyers that are not internalized (free riding risk).²²

²⁰AGCM, prohibition decision of 28 September 2011, case *I731 - Gare assicurative ASL e aziende ospedaliere campane*, AGCM Bull. n. 39/2011. The Italian Competition Authority's decision has been confirmed by Italian lower courts and upper courts.

²¹AGCM, prohibition decision of 21 December 2016, case *I792 - Gare ossigenoterapia e ventiloterapia*, AGCM Bull. n. 2/2017. The Italian Competition Authority's decision has been partially confirmed for some parties by Italian lower courts, and confirmed with re-determination of the fines for some parties by Italian upper courts.

²²See Iossa et al. (2024) on the implications that these spillover effects generate on the ability of individual buyers to efficiently deter collusion.

2.2.1 Bid Rotation

Bid rotation occurs when competitors take turn at winning over time. Based on the experience of the AGCM, bid rotation seems a rather less used means of collusion in bid rigging (albeit a different explanation is that limited number of cases stems from the difficulty to detect them), unless it involves a wider market partition agreement whereby each losing bidder in a given tender is at the same time designated as winner in another tender, as illustrated in the next paragraph.

2.2.2 Customer or Market Allocation

Customer or market sharing occurs when looking at a number of different tenders issued by the same or by different contracting authorities over a period of time. In this case, competitors agree to submit bids only in certain geographic areas/in tenders issued by a given contracting authority.

For example, in a case concerning the supply of water meters to a number of local water service operators (*I835 - Mercato dei contatori d'acqua*) the AGCM analyzed the full set of tenders issued in the relevant market between 2011 and 2019, and observed - over a total of 161 tenders - a clear pattern of stability in the geographic allocation of winning tenders, with each supplier always resulting as the winning bidder for the same customer over time. In that case, competitors agreed either not to submit bids when another competitor was designated as the winning bidder or to submit cover bids. It is interesting to note that successful and unsuccessful bidders submitted similar discounts across the various tenders (depending, in particular, on what position was assigned to each of them in that specific tender - first, second or third). The AGCM found a series of faxes containing the name of the various contracting authority, followed by (i) the indication of the designated winner identified by the initial letter of the company name, and (ii) the amount of discount to be offered by the non-designated winners (with indications such as "*maximum discount 1%*" or "*do not participate*" or "*stay above the following minimum prices*").²³

Another example is *I806 - Affidamento appalti per attività antincendio boschivo*, where the parties agreed to participate to multiple tenders for the provision of helicopter rescue and wild-land firefighting services on the basis of a pre-defined scheme, with a common pattern of bid withdrawals and minimal price rebates (around 1%). The AGCM also found that, in the context of the Italian helicopter association, the parties set a price list to be published every year, which was registered at the chamber of commerce and was mainly conceived as a tool to

²³AGCM, prohibition decision of 1 February 2022, case *I835 - Mercato dei contatori d'acqua*, AGCM Bull. n. 6/2022. The Italian Competition Authority's decision has been confirmed by Italian lower courts, but as of 11 October 2024 parties' appeal before upper courts is still pending.

influence the behaviour of contracting authorities with regard to the definition of the tender reserve price.²⁴

A complex system of compensation across-tenders was also uncovered in *I759 - Forniture Trenitalia*, concerning a bid rigging scheme implemented by the main operators active in the supply of electromechanical goods and services for the railway sector. The cartel was put in place between March 2008 and September 2011 and covered 24 tenders issued by Italy's incumbent railway operator: the parties divided the various tenders among themselves and created specific databases whose function was to record the debit or credit positions of individual entities. In this way, companies with credit (debit) positions from past procedures accrued rights (waivers) for future procedures, even in the form of the commitment of the winning bidder to transfer part of the contract (*e.g.*, through subcontracting, specific orders, cross-supplies, etc.) to entities that were not even formally among the participants in the relevant procedure.²⁵

2.2.3 Subcontracting across Tenders

Subcontracting is sometimes also found as a tool to implement compensation across a number of different tenders allocated to different competitors.

For example, in *I814 - International rights*, the AGCM looked at a number of distinct tenders related to the acquisition of international broadcasting rights for different Italian soccer championships (Serie A, Serie B, Coppa Italia, etc.) and uncovered a comprehensive collusive scheme aimed at allocating such tender among three parties: in particular, a first cartel member acquired the rights of Serie A while two other cartel members acquired those of Coppa Italia and Supercoppa, and through sub-licenses, the various assignees exchanged rights among themselves and with IMG, sharing the revenues accordingly.²⁶

Another example is *I846 - Gare per la fornitura di vestiario professionale e accessori tecnici*, where the parties coordinated their behaviour in the context of various tenders for the provision of clothing and accessories for public employees. In particular, the parties agreed that (i) non-designated winner would either submit cover bids or refrain from making offers and (ii) the designated bidder would sublicense/purchase materials from all other cartel members, as a mechanism of compensation. Since the Italian law applicable at the time provided that public procurers could not opt for a direct award in favour of the existing suppliers (so-called rotation principle),

²⁴AGCM, prohibition decision of 13 February 2019, case *I806 - Affidamento appalti per attività antincendio boschivo*, AGCM Bull. n. 9/2019. The Italian Competition Authority's decision has been confirmed for all but two parties by Italian lower courts, and confirmed for some parties, annulled for two parties, and partially confirmed with redetermination of the fine for the other parties by Italian upper courts.

²⁵AGCM, prohibition decision of 27 May 2015, case *I759 - Forniture Trenitalia*, AGCM Bull. n. 21/2015. The Italian Competition Authority's decision has been confirmed by Italian lower courts and upper courts.

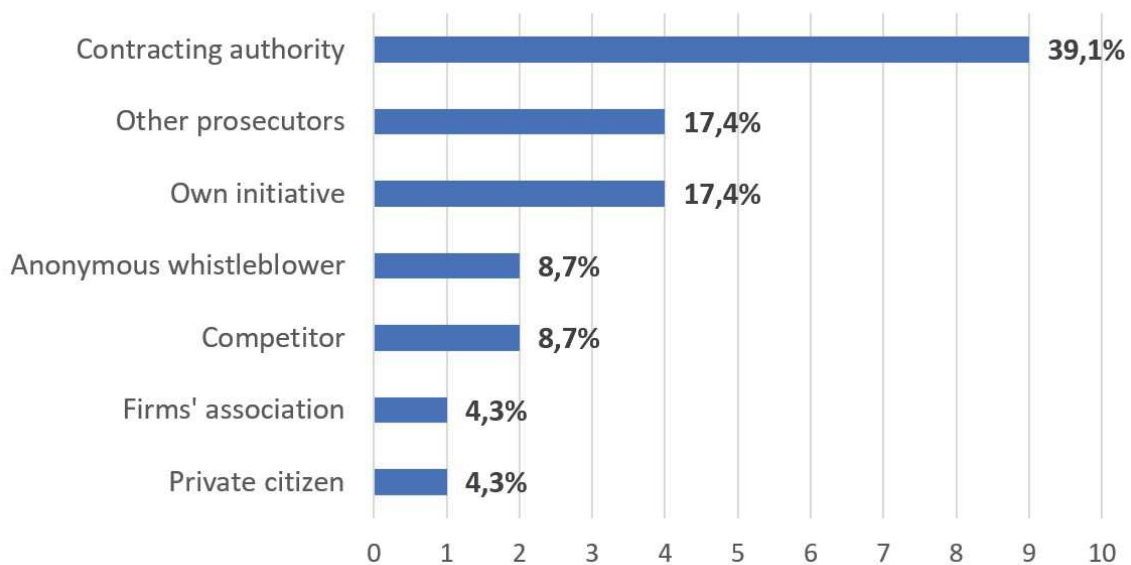
²⁶AGCM, prohibition decision of 24 April 2019, case *I814 - International rights*, AGCM Bull. n. 20/2019. The Italian Competition Authority's decision has been confirmed with redetermination of the fine for some parties by Italian lower courts and upper courts.

the latter would use their influence to ensure that public procurers awarded the contract to one of their co-cartelists, who would then share part of the cartel rent with them through sub-licensing.²⁷

3 Sources of Information

In general, antitrust investigations can stem from various sources. Figure 2 describes the informants behind the infringement decisions adopted by the AGCM.

Figure 2: Bid Rigging by Reporting Agent (2010-2023)



Notes: Based on own classification. The data cover all infringement decisions by the AGCM from 2010-2023.

Identifying such sources and understanding the incentives behind the decisions to come forward is crucial to maintain an informative stream in the long term. At the same time, it is also important to preserve a plurality of discovery channels, to reach the widest possible spectrum of conduct and angles of observation.

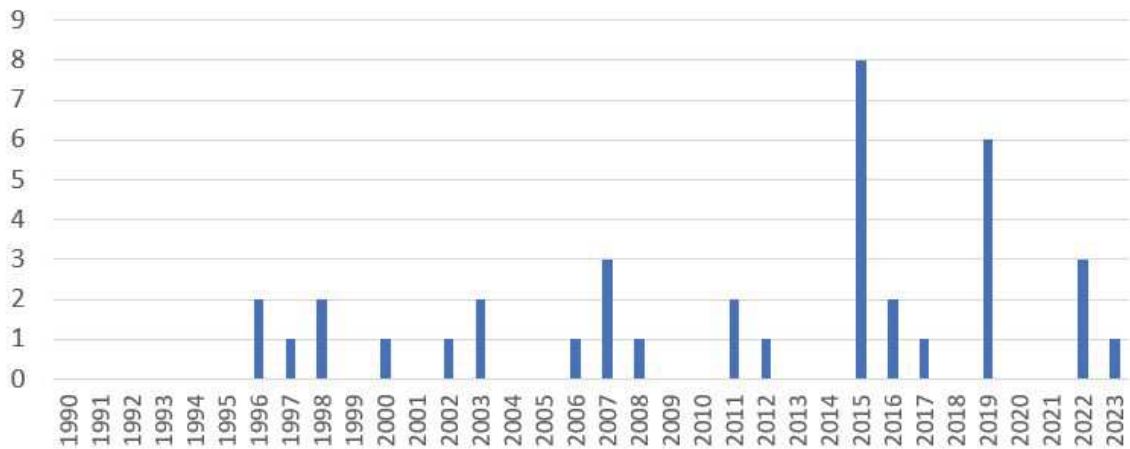
3.1 Contracting Authorities

Figure 2 shows that, in 39,1% of cases, the initial complaint leading to the opening of a case comes from a contracting authority. The AGCM's guidance paper on bid rigging drafted in 2013 was shared with a good proportion of the 25.000 public procurers present in Italy at that time. As shown in Figure 3, this lead to a notable surge in complaints and subsequently to a

²⁷AGCM, prohibition decision of 1 March 2022, case *I846 - Gare per la fornitura di vestiario professionale e accessori tecnici*, AGCM Bull. n. 10/2022. The Italian Competition Authority's decision has been confirmed by Italian lower courts.

significant increase in the number of infringement decisions adopted on bid rigging in particular as of 2015.

Figure 3: AGCM Bid Rigging Cases (1990-2023)



Notes: Based on own classification. The data cover all decisions by the AGCM, including cases of non-infringement, from 1990-2023.

3.2 Public Prosecutors

According to Italian law, antitrust violations do not constitute criminal offenses, resulting in infrequent interaction between antitrust and criminal proceedings. However, bid rigging is classified as a criminal offense, providing an opportunity for cooperation between antitrust authorities and criminal prosecutors. In four instances, cases were opened based on the initial input by public prosecutors or their supporting police units.

Input from public prosecutors has been essential not only to launch investigations but also to ensure a more robust set of evidence: in a wider range of situations, and sometimes based on a request for information issued by the AGCM, public prosecutors have shared documents included in criminal files, including phone call transcripts, and the Authority has successfully used such documents to support its decisions. In January 2018 the AGCM entered into specific protocols with public prosecutors in Milan and Rome to regulate the process for exchanging documents and ease co-operation, thereby strengthening this channel of information.

3.3 Competitors

In some cases, information about an ongoing cartel is reported to the Authority by the cartelists' competitors. As competitors are active in the same or adjacent geographic markets, even if they are not part of the cartel they are well placed for detecting any irregularities in the dynamics of one or more tenders.

As illustrated in Figure 2, the initial input from the cartel members' competitors served as the

basis for opening two investigations. In a first case the complaint was submitted in relation to a bid rigging scheme within a specific tender set up by the complainant's competitors in the production and sale of diagnostic imaging equipment.²⁸ In the second case, a competitor that was not part in the cartel outlined a factual scenario whereby seven companies colluded repeatedly over time across multiple tenders for the provision of helicopter rescue and wild-land firefighting services, so that each tender would have only one offering bidder winning the contract with little or no discount (often less than 1 percent). These behaviors were systematically carried out over several years and affected a significant portion of the tenders issued at the regional level by the relevant administrations.²⁹

3.4 Whistleblowers

Whistleblowers can also play a role for detecting and successfully prosecuting bid rigging. In *I835 - Mercato dei contatori d'acqua*, as described in Section 2.2.2, the AGCM opened the case based on evidence submitted anonymously by an employee of one of the cartelists as well as benefited from anonymous documents sent shortly after the opening of the proceedings.³⁰

An anonymous complaint was also submitted in an earlier case concluded in 2015 (*I792 - Gare ossigenoterapia e ventiloterapia*), which has also been described in section 2.1.4, even if in that occasion the anonymous complainant did not produce evidence but simply reported his perception of possible collusion.

These cases highlight the importance of developing specific whistle-blower programs that provide enforcers with fully protected channels of communication with informants and protect informant anonymity to avoid retaliation. In this spirit, the AGCM has implemented a whistleblower tool in 2022 which is proving particularly successful. As of October 2024, four cartel investigations have been opened on that basis (even if, so far, not on bid-rigging).

An issue that remains to be explored with respect to whistleblower tools and bid rigging remains that the latter is a criminal offence in a number of jurisdictions and individuals who have put in place the conduct (and have access to the information) might not have an incentive to report an infringement that might also entail their criminal liability. Individuals directly involved in bid rigging (who are still working for the same company) might rather prefer to induce

²⁸AGCM, prohibition decision of 4 August 2011, case *I729 - Gara d'appalto per la sanità per le apparecchiature per la risonanza magnetica*, AGCM Bull. n. 33/2011. The Italian Competition Authority's decision has been annulled by Italian lower courts and upper courts.

²⁹AGCM, prohibition decision of 13 February 2019, case *I806 - Affidamento appalti per attività antincendio boschivo*, AGCM Bull. n. 9/2019. The Italian Competition Authority's decision has been confirmed for all but two parties by Italian lower courts, and confirmed for some parties, annulled for two parties, and partially confirmed with redetermination of the fine for the other parties by Italian upper courts.

³⁰AGCM, prohibition decision of 1 February 2022, case *I835 - Mercato dei contatori d'acqua*, AGCM Bull. n. 6/2022. The Italian Competition Authority's decision has been confirmed by Italian lower courts, but as of 11 October 2024 parties' appeal before upper courts is still pending.

their employer to submit a leniency application, because in that case they might benefit from the protection from criminal sanctions now granted to directors of the immunity applicant by the ECN + Directive, which was transposed at the national level at the end of 2021. But what about former employees who might want to report illegal conduct? Or if a worker wants to challenge misconduct outside of the line management chain? The whistle-blower directive recently adopted in Europe protects employees only in the employment arena but is silent in respect of immunity from criminal prosecution where the whistleblower is implicated in criminal conduct.³¹ Therefore, currently whistleblowing is only plausible if the complainant is not directly involved in the illegal activity; going forward, enforcers might consider to ask legislators to foresee a criminal immunity also for the different case of self-reporting, to identify an additional tool of discovery of cartels in public procurement. Another possible tool to incentivise whistle-blowers is that of offering rewards based on a percentage of the cartel fine.³² Similar systems are currently present in the UK for antitrust issues, with the CMA recently announcing that it has increased the reward to individuals who blow the whistle on cartel activity from £100,000 to £250,000.³³ Reward-based whistle-blower programs have been in place for many years in the US for violations of securities/commodities law and a reward up to 30% of any fine imposed. The Italian system currently does not foresee rewards for whistle-blowers.

3.5 Leniency Programs

In bid-rigging cases, the AGCM has so far always acted outside the scope of leniency programs, with all 38 bid rigging cases concluded so far being opened based on other sources of information.

Yet, leniency applications have provided useful information. In two bid rigging cases, they were submitted after the opening of the case and the subsequent inspections. In particular, in *I808 - Consip tender FM4* described in section 2.2.1, one of the companies involved in the cartel changed its management following an internal self-cleaning procedure triggered by the investigation, and the new directors decided to submit a leniency application in the pending

³¹Directive (Eu) 2019/1937 of The European Parliament And of The Council of 23 October 2019 on the protection of persons who report breaches of union law.

³²Recent research by Nyrröd and Spagnolo (2021) warns that in weak institutional environments, high-powered tools like whistle-blower rewards should be avoided, as in the hands of incompetent law-makers and corrupt or captured regulators, they would likely produce more harm than good. Similarly, Buccirosi et al. (2021) consider that whistle-blower programs with rewards are not viable in environments where protection is imperfect (high risk of retaliation) and court precision is low, or where sanctions against false reporting are mild.

³³See CMA press release “*Blowing the whistle on cartels*”, 6 June 2023.

case.³⁴ The second case *I814 - International rights*, discussed in section 2.2.3, is rather interesting because it shows that, even when it does not contribute to the discovery of the cartel conduct, input from leniency applicants might play a crucial role in reinforcing the evidentiary basis of the decision.³⁵

At the same time, with a view to diversifying the sources of information, it remains important to consider how to generate incentives to submit leniency applications with a discovery effect (*i.e.*, that help uncover the cartel conduct); the academic community is grappling with these issues, having observed a reduction in the number of leniency applications received (despite some fluctuations over the years), but a specific question regarding cartels in tenders - which are typically of national scale and often involve small and medium-sized enterprises - appears necessary.³⁶

It is possible that leniency applications might play a more prominent role in the detection of bid rigging practices thanks to the ECN + Directive which now foresees immunity from criminal sanctions for directors of the immunity applicant, thus providing a specific additional incentive to come forward. Some positive signs were perceived in Italy in 2022, after the transposition of the Directive at the national level, but do not seem to have evolved in a stable trend.

When considering bid rigging, which typically follows the logic of local or sub-national cartels, it is crucial to acknowledge that cartelists will largely consist of SMEs. Therefore, one way to facilitate leniency may be through informational campaigns conducted at chambers of commerce or by simplifying the tools for submitting applications (*e.g.*, the Commission offers an e-lenieny program allowing for applications comparable to those submitted orally). Establishing communication channels with SMEs to promote the use of leniency can, on one hand, stimulate more applications in absolute terms and, on the other hand, increase applications from SMEs relative to larger enterprises (thereby reducing the so-called "bid-fish" effect, where leniency applications are typically submitted by larger companies with a traditionally greater awareness of competition law issues).

In this context, the Italian leniency program is in the process of being revisited. As a way to generate more incentives to uncover cartels, the AGCM is considering to clarify the difference

³⁴AGCM, prohibition decision of 17 April 2019, case *I808 - Gara Consip FM4- accordi tra i principali operatori del facility management*, AGCM Bull. n. 19/2019. The Italian Competition Authority's decision has been confirmed on appeal with redetermination of the fine.

³⁵AGCM, prohibition decision of 24 April 2019, case *I814 - International rights*, AGCM Bull. n. 20/2019. The Italian Competition Authority's decision has been confirmed with redetermination of the fine for some parties by Italian lower courts and upper courts.

³⁶According to OECD competition trends 2022, leniency applications dropped by 64% in 2015-2020 in 40 jurisdictions. Only recently this trend seems to have slightly reversed, with OECD competition trends 2024 showing that, for the first time since 2015, the total number of leniency applications increased in all regions. The total number of leniency applications increased from 201 in 2021 to 248 in 2022, an annual growth rate of 23.4%. The resurgence began in 2021 in Europe, continuing in 2022, and accompanied by an increase in all regions.

between Type 1A immunity (before inspections or the opening of proceedings) and Type 1B immunity (after inspections or the opening of proceedings) in terms of evidence expected from the applicant. While in the first scenario it will be sufficient to provide evidence that enables targeted inspections, it will become clearer that in the second scenario immunity is contingent upon providing decisive information that proves critical in establishing the existence of the cartel. In addition, a clear ranking system is introduced for subsequent applicants, with the aim of creating stronger incentives for early applications that contribute to the detection of the cartel. This change is intended to curb the possible generosity offered under the program which currently foresees that all subsequent applicants are eligible for a fine reduction of up to 50 percent.³⁷

The AGCM is also in the process of introducing an e-lenieny tool, to make the leniency program more accessible for small and micro-firms, representing almost 80% of the national economic fabric.

3.6 Bid Screening Techniques

Going forward, it is important to preserve and enhance the ability of competition authorities to uncover illegal conduct on their own initiative, particularly by developing internal expertise to conduct screening activities on the outcomes of tenders.

The AGCM has undertaken two projects aimed at detecting bid-rigging cartels by analyzing-datasets requested from contracting authorities. A first project was launched in 2014 based on a set of data on tender outcomes shared by the Italian Anticorruption Authority; the idea was to perform statistical tests to build “rough” indicators that could be used to detect bid rigging across different product markets. The project distinguished between so called “fever indicators”, which were trying to capture collusive outcomes such as stability in winning patterns, and “bug indicators”, which tried to identify potentially dangerous behaviour such as bidding consortia or subcontracting. The information provided, which had been collected by the contracting authority for other purposes, turned out to be ineffective for the performance of antitrust screening activities (*e.g.*, the dataset provided did not include information such as bids submitted by non-winning participants).

A second project followed closely on a narrower dataset shared by Consip, Italy’s centralised procurement agency. Screening tests were performed on tenders issued by Consip between 2012 and 2016 leading to the opening of two investigations. The first investigation was based on the observation of anomalous behaviour by two bidding consortia (composed of players deemed able to participate on their own) who did not submit bids in competition with one another in the

³⁷For a discussion on leniency generosity and its deterring effect on immunity applications, see Marvao and Spagnolo (2024). For a discussion on leniency trends and possible causes, see Iossa and Calini (2024).

vast majority of the tender lots³⁸; a second investigation was launched noticing the absence of bid overlaps and a pattern of economic offers resembling a common scheme across different lots, with the most competitive bids offering discounts of up to 30-35% compared to non-competitive bids offering discounts of only 10-15%.³⁹

In more recent years a number of empirical methodologies have been defined to help identify patterns or indices suggesting the presence of possible collusive strategies and a number of competition authorities (such as the Spanish CNMC) have made public statements about the use of such techniques.

The economic literature explores different types of tests that can be used to detect bid rigging in public tenders. The most used and easy applicable methodologies are screens, which are statistical tools to verify whether collusion likely exists in a particular market, thereby flagging unlawful behaviour: screens can be used to identify markets and industries that will then be subject to further investigation by the authority (Huber and Imhof (2019)). A distinction can be made between behavioural screens, used to identify abnormal behaviour departing from expected competitive patterns, and structural screens, which rather look for market characteristics that may favour collusion (Harrington (2008)).

Behavioural screens are often based on price analysis, and one of the most widely used is the coefficient of variation (CV), defined as the ratio of the standard deviation and the mean of bids:

$$CV_t = \frac{s_t}{\mu_t} \quad (1)$$

The logic behind this screen is that prices are more stable in tenders where bids are set as a result of collusion: while under competition firms change price in response to costs and demand shocks, in case of collusion firms react only after communicating and coordinating. The coefficient of variation captures the variance from the distribution of the bids and therefore, the smaller the CV, the more likely is collusion. Since it is scale invariant, the CV tool allows comparisons between tenders (Imhof (2017b)).

Another behavioural screen based on price is the relative distance test (RD), defined as the difference between the two lowest bids over the standard deviation of all losing bids:

$$RD_t = \frac{b_{2t} - b_{1t}}{s_{t,losingbids}} \quad (2)$$

³⁸AGCM, prohibition decision of 22 December 2015, case *I785 - Gara Consip servizi di pulizia nelle scuole*, AGCM Bull. n. 50/2015. The Italian Competition Authority's decision has been confirmed with redetermination of the fine for some parties by Italian lower courts and upper courts.

³⁹AGCM, prohibition decision of 18 October 2017, case *I796 - Servizi di supporto e assistenza tecnica alla PA nei programmi cofinanziati dall'UE*, AGCM Bull. n. 43/2017. The Italian Competition Authority's decision has been confirmed by Italian lower courts and upper courts.

The RD screen has also been developed in an alternative version showing the mean of the differences between adjacent bids as denominator. The idea is that cartelists manipulate the tender award by creating a notable difference between the bid of the designated winner and cover bids. Hence, if $RD > 1$, it is considered as an indicator of bid rigging. Both low variance and high mean/low variance tests are easily applicable even if the data available relates to multiple auctions. RD screens have been defined as the most predictable over a set of 65 similar tools by Huber and Imhof (2019).

Other - relatively simple - price tests include: (i) cover bidding analysis to spot rotation patterns⁴⁰; (ii) tests to flag firms with suspicious deviations from winning bids (*e.g.*, when losing bids are 7%, 7,5% or 8%, but not 7,3% higher than the winning bid); (iii) tests for V-shaped prices (prices falling prior to the cartel and raising thereafter); (iv) tests for convergence of bids (kurtosis statistics) or for symmetry of distribution of bids (skewness statistics); (v) quantity tests, based on the assumption that market shares are more stable under collusion; or, (vi) tests on the number of bidders (*i.e.*, flagging tenders that received just one bid, or tenders with a number of bidders below the average reported for that category).

More complex behavioural screens use econometric tools or structural estimation of auction models to detect suspicious outcomes (Abrantes-Metz and Bajari (2009)). One example is the low probability event test, using Benford's law to check for mathematical similarity in costs⁴¹; another example is control group screening (Bajari and Ye (2003)), using auction theory to identify the following two parameters of competitive bids: (i) they must reflect costs (exchangeability test); and (ii) they should be conditionally independent (conditional independence test). When both conditions are unsatisfied, it is possible that collusion was present and further investigations are carried out using regression analysis on bids and firm co-variates.

Moving to structural screens, the OECD divides them into three groups depending on whether they are based on structural, supply-related or demand-related factors. More generally, examples of market features increasing collusion risks, and generally taken into account in those tests, are: (i) products characterized by low differentiation; (ii) homogeneous and repeatedly interacting procurement formats; (iii) joint bidding; (iv) restricted lists of qualified bidders; (v) lot-splitting; (vi) average bid (endogenous) winner selection; (vii) price-only criterion; and subcontracting.⁴²

⁴⁰See ComCo intervention at OECD (2018).

⁴¹Benford's law states that 1 will be the first digit in around 30% of all numbers while the digit 9 only is expected to be the leading digit in about 5% of all numbers in a naturally occurring number set. If the digit distribution in bids deviate significantly from Benford's law, it might be an indication that bids are not submitted independently.

⁴²See OECD (2013) for more details.

Finally, the use of screens can also be mixed with more sophisticated machine learning techniques: Huber and Imhof (2019) suggest that competition authorities should mix screens with machine learning techniques to strengthen their enforcement activity. For example, the Danish Competition and Consumer Authority uses a digital screening tool to detect anti-competitive conduct, based on a software called “Bid Viewer” that mixes simple screens with machine learning techniques.⁴³ The Catalan competition authority has developed an unsupervised machine-learning model called the Smart Administrative Procurement Collusion Research Tool (ER-ICCA), aiming at identifying tenders that are more likely to be touched by collusive behaviour and flagging suspicious clusters of firms.⁴⁴

The use of screens might enhance detection of bid rigging in the years to come. To achieve this goal, however, it will also be important to cooperate in advance with contracting authorities, possibly central ones when present, to prepare datasets to be used fruitfully by competition authorities depending on the type of analysis that they might intend to conduct (for example, not only data related to the winning bidder but also information about those who submitted bids for different lots and their values). While some contracting authorities might already have datasets on the tenders they issue over time for their internal purposes, it is important to set up informative channels that may be fit for the precise function of antitrust screening, defining *ex ante* the information deemed necessary to conduct such different analysis; the definition of common formats might help compare data gathered from different contracting authorities. Recruiting data scientists should also be a priority on the agenda. In this spirit, the AGCM has recently set up a Data Science Unit.

The use of screen can also help ruling out the plausibility of alternative explanations, as illustrated in the following paragraph.

3.7 Endogenous vs. Exogenous Evidence

So far, the discussion has focused on initiating an investigation, based on input from informants who have observed anomalous behaviour in the context of one or multiple tenders or based on screening tools identifying red flags. However, a distinct challenge is providing sufficient evidence and compelling reasoning to convince a court that the claims or assertions made are accurate and should be accepted.

A main distinction is drawn between endogenous/circumstantial evidence, *i.e.*, observing abnormal behaviour in the context of a given tender that seems to have no plausible explanation other than collusion, and so-called exogenous evidence, meaning evidence of direct contact between the parties acquired in the context of dawn raids.

⁴³See the Danish Competition and Consumer Authority’s document, KFST (2022).

⁴⁴See Schrepel and Groza (2022) for a discussion on computational tools used by Antitrust Authorities.

Italian courts have annulled numerous decisions based on endogenous/circumstantial evidence when the AGCM was deemed unable to exclude that the conduct put in place had other plausible explanations. The underlying rationale is that the "story" told in the decision should have a "narrative consistency" in the sense that it should be either the only plausible explanation to the facts or clearly preferable to all other possible justifications (such as, for example, cost differences, tender design, incumbency advantages). In such cases, where the Authority is considered to have achieved a sufficient level of narrative consistency, the burden shifts to the involved parties to present compelling evidence demonstrating the existence of alternative explanations and rational economic behavior.⁴⁵

In the AGCM's experience, a solid case is rarely successfully built on circumstantial evidence alone. Evidence of contacts plays a crucial role, and conducting dawn raids becomes essential for gathering such evidence. Of course, if there is a pattern of abnormal behaviour in a given tender, even limited evidence of contacts in the proximity of the tender may be considered sufficient.⁴⁶

4 Abuses of Dominance related to Tender Proceedings

Most investigations will likely fall within the scope of anti-cartel provisions but efficient competition during the tendering process may also be hindered by abuses by incumbents (*e.g.*, current legal monopolists), such as when they refuse to provide information necessary to issue a new tender or when they hinder the takeover by the new entrant. The AGCM has a pattern of

⁴⁵Cf. judgment of Italy's Consiglio di Stato of 27 December 2021, n. 8613.

⁴⁶For example, in *I822 - Consip/Gara sicurezza e salute 4*. Consip submitted a complaint based on the observation of the tender outcome suggesting the existence of a chess-board pattern of participation. The AGCM opened a case considering that the anomalies detected appeared difficult to explain outside of a collusive context. The agreement was implemented through bid withdrawals and cover bids across the nine lots foreseen in the tender, with the aim of ensuring no real overlap with the most competitive offer submitted by the designated bidder. However, the lower court annulled the decision finding that the parties had provided a reasonable alternative explanation for their bidding behaviour. The Authority then decided not to appeal the decision at the upper court. AGCM, prohibition decision of 18 September 2019, case *I822 - Consip/Gara sicurezza e salute 4*, AGCM Bull. n. 40/2019. Another example is *I775 - Procedure di affidamento dei servizi ristoro su rete autostradale ASPI*. Here the AGCM took the view that a number of cover bids had been submitted to secure a division in lots among cartel members: in the lots of interest, the designated cartel member submitted an appealing technical bid paired with a moderately favorable economic bid, while the non-designated cartel member submitted unappealing technical and economic bids. According to the AGCM, the parties wanted to exploit the mathematical formula employed as the award criterion in the tender, known as the "average-bid criterion," which academics have highlighted for its pro-collusive characteristics (see for example Conley and Decarolis (2016)). The average-bid criterion implies that the high economic bids submitted by the non-designated cartel members would flatten the score assigned to the economic offers, diminishing the significance of the economic bid submitted. Consequently, the bid evaluation would primarily rely on the content of the technical bid, ensuring that the designated cartel member would secure the tender. The case was annulled on appeal; the court took the view that, given the absence of evidence proving the existence of contact between the parties, there could exist alternative legitimate explanations to the conduct put in place. AGCM, prohibition decision of 22 April 2015, case *I775 - Procedure di affidamento dei servizi ristoro su rete autostradale ASPI*, AGCM Bull. n. 16/2015. The Italian Competition Authority's decision has been annulled by Italian lower courts and upper courts.

active enforcement also in this field.

As a matter of priority, the AGCM has acted in markets for gas distribution, at a time when it was in the process of being liberalised in Italy, thus promoting an effective and smooth liberalisation process. In particular, since 2011, it has initiated multiple proceedings against current service providers who refused to supply various local municipalities with the information needed to prepare tenders for selecting the next service provider. For example, in *A432 - Comuni vari - Espletamento gare affidamento servizio distribuzione gas*, the incumbent initially refused, and then delayed providing essential information needed to shape the tenders for awarding the gas distribution service in two municipalities. By exploiting the resulting information asymmetry, the incumbent was able to submit the most competitive offer and benefit from an extended period of direct awarding, which was deemed necessary due to the delayed tenders.⁴⁷

More recently, the AGCM has concluded an abuse of dominance case against the incumbent provider of road transport services in Tuscany, which adopted a complex strategy to hinder the takeover by the new entrant, challenging various aspects of the tendering process in court and refusing to hand over the assets and information necessary to provide the service).⁴⁸

5 Enhancing Competence through Advocacy

When drafting tenders and contracts, it is essential to understand market conditions and the nature of the goods or services to design appropriate provisions. Public procurers' competence significantly impacts procurement outcomes, with more competent procurers leading to fewer delays, cost overruns and contract renegotiation.⁴⁹

Advocacy can assist public procurers designing the procurement process to foster competition and reduce the likelihood of cartels. It can also be used to act in court against irregular in-house providing or when the AGCM issues a binding opinion requesting to modify invitations to tender containing restrictive provisions, when the public entity fails to follow the Authority's recommendations. Most recently, the AGCM has encouraged the legislator to promote the use of public tenders, avoiding unjustified renewals⁵⁰, and has intervened to ensure that in-house

⁴⁷AGCM, prohibition decision of 14 December 2011, case *A432 - Comuni vari - Espletamento gare affidamento servizio distribuzione gas*, AGCM Bull. n. 50/2011. The decision has been confirmed by Italian lower courts, with minor adjustments on duration and fine. For similar conducts, see also AGCM, prohibition decision of 14 March 2012, case *A433 - Affidamento del servizio di gestione integrata dei rifiuti solidi urbani nel Comune di Messina*, AGCM Bull. n. 13/2012.; AGCM, commitment decision of 14 January 2020, case *A527 - Comune di Genova/Distribuzione gas naturale*, AGCM Bull. n. 5/2020; AGCM, commitment decision of 23 February 2021, case *A540 - Condotte abusive Italgas/Atem Venezia 1*, AGCM Bull. n. 10/2021.

⁴⁸AGCM, prohibition decision of 21 June 2022, case *A536 - Regione Toscana/Gara per l'affidamento del servizio di trasporto pubblico locale*, AGCM Bull. n. 27/2022. The Italian Competition Authority's decision is pending before Italian lower court.

⁴⁹See footnote 4 for more details.

⁵⁰See, e.g., AS1550 - *Concessions and Competition Issues* (2018).

providing is used only when all the applicable legal conditions are met.⁵¹

Non-binding opinions are issued under articles 21 and 22 of law n. 287/1990, whilst binding opinions find their legal basis in article 21 *bis*.⁵² Overall, advocacy interventions, count for approximately 80 opinions per year. For example, in 2022-2023 the AGCM issued 32 opinions regarding restrictive provisions in tenders, focusing on participation or award criteria, discriminatory requirements, and the number of lots. It has also acted 41 times to ensure that local municipalities and government bodies appropriately use in-house providing or direct awards, only when all relevant conditions are met, and opting for competitive procedures in all other cases. Figure 4 categorizes the AGCM's advocacy interventions in 2022-2023 based on their primary focus.

Figure 4: AGCM Advocacy Activity by Type of Intervention (2022-2023)

| <i>ART 21, 21-bis and 22 (2022-2023)</i> | | <i>N. Cases</i> | <i>N. Categories</i> |
|---|-------------------------------------|------------------------|-----------------------------|
| <i>Restrictive provisions in tenders</i> | | 32 (26%) | |
| | Participation/award criteria | | 31 |
| | Discrimination between participants | | 11 |
| | Tender lots | | 11 |
| <i>Direct awards</i> | | 41 (34%) | |
| | Awarding procedure | | 9 |
| | Awarding criteria | | 8 |
| | Renewals/excessive duration | | 16 |
| | In-house award | | 21 |
| <i>Other</i> | | 49 (40%) | |

Notes: Based on own classification. The data cover advocacy interventions by the AGCM, from 2022-2023. Categories are not mutually exclusive, as each intervention can be relevant for more than one category.

The efficacy of these recommendations has been estimated in approximately 69% across all sectors, including public procurement, in 2023.⁵³ This rate reflects the percentage of cases where the recipient of the recommendation (public authorities or local municipalities) at least partially implemented the AGCM's suggestions.

⁵¹See, e.g., AS1730 - *Proposed reforms for the annual competition law adopted by the Italian Parliament* (2021).

⁵²Article 21-bis enables the AGCM to issue an opinion regarding regulatory or administrative acts that restrict competition. The AGCM issues a formal recommendation requesting the entity in question (such as a municipality or regional authority) to amend or revoke the act. If the entity does not comply within 60 days, the AGCM may escalate the matter to the administrative court, which can review the case and potentially annul the act if it finds it unjustifiably restrictive to competition.

⁵³See the Authority's Annual Report on 2023 activity, AGCM (2023).

6 Promoting Legality

Cartel members sometimes use corrupt officials to implement collusive strategies. Corrupt officials may for example facilitate the award of the tender to the designated cartelists, by tailoring its design to their advantage. They can intercept bids from non-colluding companies, enabling the cartelists to adjust their bids accordingly, or intercept bids from cartel members defecting from the agreement, thus reducing the risk of deviations.⁵⁴ When bid rigging and corruption are observed together, the enforcement against bid rigging and the fight on corruption mutually reinforce one another.

With the aim of incentivizing legality and deterring anticompetitive behavior, in 2012 Italy introduced a Legality Rating System which certifies companies' level of compliance in different legal fields, including antitrust, anti-bribery, and data protection legislation. Companies established in Italy with a minimum turnover of two million euros can apply to the AGCM with a description of their compliance efforts. The AGCM verifies the information and scores the application on a seven-point scale, following well-defined criteria. Companies that have committed serious antitrust infringements, once confirmed by upper courts, are not eligible for the rating for the subsequent two years. No rating is granted also when the company's executives have been convicted of certain criminal offences (such as, corruption, fraud and bankruptcy) in the previous 5 years, or if the company has committed serious administrative infringements (such as tax offences or offences related to health and safety).⁵⁵

Over time, companies have consistently shown a growing interest in the rating: for example, applications in 2023 have increased by 30,52% compared to 2022, and by 42,14% compared to 2021. As of December 31, 2023, 12.313 companies hold the Legality Rating.

Figure 5 illustrates how scores have evolved over time. The majority of companies have been awarded additional points in subsequent requests, progressively increasing their compliance efforts.

The Italian Legality Rating System can be considered as a complementary or alternative tool to debarment rules, as mentioned in a note prepared by the AGCM for the 139th OECD Competition Committee meeting.⁵⁶ Unlike bidder exclusion, legality rating systems do not generate the undesired effect of curbing tender participation which may be problematic in case of few potential bidders. In addition, the Legality Rating produces no negative effects on leniency applications because it is foreseen that bid riggers do not lose it when the prohibition decision stems from a leniency application that they have submitted, as immunity or subsequent

⁵⁴For a theoretical analysis of these mechanisms, see *e.g.*, Lambert-Mogiliansky and Sonin (2006) and Lambert-Mogiliansky (2011).

⁵⁵See the Authority's regulation on the Legality Rating System, AGCM (2020).

⁵⁶See the OECD Note by Italy on data screening tools, OECD (2022d).

Figure 5: Legality Rating Score Evolution (2018-2023)

| Score | December 31, 2018 | December 31, 2023 |
|-------|-------------------|-------------------|
| ★ | 10% | 1% |
| ★+ | 32% | 11% |
| ★★+ | 24% | 41% |
| ★★ | 15% | 19% |
| ★★+ | 8% | 12% |
| ★★++ | 5% | 8% |
| ★★★ | 6% | 9% |

Notes: Based on own classification. The data cover rating awards by the AGCM in 2018 and 2023.

applicant.

In addition, recent social theories show that reward mechanisms may often be more effective than punitive systems, helping to promote a positive mindset and generate long term changes in companies' behaviour. Transaction costs and the need to minimize expensive litigation may also make reward systems more favorable.⁵⁷

Considering the potential benefits of legality rating systems, Italian public buyers have recently been inclined to take the companies' Legality Rating into account when designing their tenders, granting additional points to offers submitted by rated bidders. This, in turn, might trigger more applications from rated firms and, in the medium term, generate significant effects on efficiency of public services and in public spending.

7 Conclusions

By implementing a multifaceted approach making use of a number of complementary tools, competition authorities can contribute to foster a more competitive landscape in public procurement, which is crucial for the efficient allocation of public resources and the promotion of innovation and growth in the markets of tomorrow. In particular, this paper identifies three building elements for promoting efficient public procurement which share the first letter C: Competition, Competence and Corruption. The paper has explored the interconnections between competition, competence, and efforts to combat corruption in public procurement. We argue that the promotion of competition by NCAs, through a variety of *ex ante* and *ex post* tools, generates positive spillover effects on the competence and integrity of public buyers, ultimately reducing corruption and promoting more efficient public procedures.

⁵⁷See Bigoni et al. (2014) for experimental evidence on the differential effect of reward and punishment systems, and Main (2023) for a discussion on legality rating systems.

Going forward, it is important to preserve and enhance the ability of competition authorities to uncover illegal conduct on their own initiative, particularly by developing internal expertise to conduct screening activities on the outcomes of tenders. NCAs should continue to invest in new tools, including recruiting data scientists and setting the appropriate framework for a fruitful cooperation to share the relevant data with other public entities.

Private enforcement might also contribute to promote competitive procurement procedures. So far there have been no private actions initiated by public buyers in Italy and a similar reluctance of public procurers has been observed in most jurisdictions.⁵⁸ If public buyers become fully aware of the multifaceted benefits associated with a competitive tendering process, private enforcement might emerge as a complementary mechanism to public enforcement, providing an additional impetus to improving efficiency in public procurement.

⁵⁸See Giosa (2018) for a discussion on why contracting authorities typically do not lodge actions for damages against bid riggers.

References

- Abrantes-Metz, R. and P. Bajari (2009). Screen for conspiracies and their multiple applications. *Antitrust* 24, 66.
- Abrantes-Metz, R. M., L. M. Froeb, J. Geweke, and C. T. Taylor (2006). A variance screen for collusion. *International Journal of Industrial Organization* 24(3), 467–486.
- Acconcia, A., M. Alfano, A. Baraldi, and C. Cantabene (2023). Public certification, information asymmetry, and investment. *Working paper. University of Naples Federico II*.
- AGCM (2013). Vademecum per le stazioni appaltanti, volto all’individuazione di criticità concorrenziali nel settore degli appalti pubblici. *Autorità Garante della Concorrenza e del Mercato. Rome, Italy*.
- AGCM (2020). Regolamento attuativo in materia di rating di legalità. *Autorità Garante della Concorrenza e del Mercato. Rome, Italy*.
- AGCM (2022). Relazione sull’attività svolta nel 2022. *Autorità Garante della Concorrenza e del Mercato. Rome, Italy*.
- AGCM (2023). Relazione sull’attività svolta nel 2023. *Autorità Garante della Concorrenza e del Mercato. Rome, Italy*.
- Albano, G., P. Buccirossi, G. Spagnolo, and M. Zanza (2006). Preventing collusion in procurement: A primer. *Handbook of procurement*, 347–380.
- Albano, G., G. Calzolari, F. Dini, E. Iossa, and G. Spagnolo (2006). Procurement contracting strategies. *Handbook of Procurement, Cambridge University Press*.
- Bajari, P. and L. Ye (2003). Deciding between competition and collusion. *Review of Economics and statistics* 85(4), 971–989.
- Baltrunaite, A., T. Orlando, and G. Rovigatti (2021). The implementation of public works in Italy: institutional features and regional characteristics. *Bank of Italy Occasional Paper* (659).
- Bandiera, O., A. Prat, and T. Valletti (2009). Active and passive waste in government spending: evidence from a policy experiment. *American Economic Review* 99(4), 1278–1308.
- Barkley, A. (2023). The human cost of collusion: Health effects of a mexican insulin cartel. *Journal of the European Economic Association*.
- Bigoni, M., G. Spagnolo, and P. Valbonesi (2014). Sticks and carrots in procurement: an experimental exploration. *The BE Journal of Economic Analysis & Policy* 14(3), 893–936.

- Bosio, E., S. Djankov, E. Glaeser, and A. Shleifer (2022). Public procurement in law and practice. *American Economic Review* 112(4), 1091–1117.
- Buccioli, A., R. Camboni, and P. Valbonesi (2020). Purchasing medical devices: The role of buyer competence and discretion. *Journal of Health Economics* 74, 102370.
- Buccirossi, P., G. Immordino, and G. Spagnolo (2021). Whistleblower rewards, false reports, and corporate fraud. *European Journal of Law and Economics* 51(3), 411–431.
- Burguet, R., E. Iossa, and G. Spagnolo (2024). Procurement cartels and the fight against (outsider) bribing. *European Journal of Political Economy* 81, 102506.
- Calini, C. (2023). Antitrust enforcement in Italy: recent trends and cases. *European Competition Law Review*.
- Caputo, F. and S. Pizzi (2019). Ethical firms and web reporting: Empirical evidence about the voluntary adoption of the italian "legality rating". *International Journal of Business and Management* 14(1).
- Conley, T. G. and F. Decarolis (2016). Detecting bidders groups in collusive auctions. *American Economic Journal: Microeconomics* 8(2), 1–38.
- Consiglio Dei Ministri (2023). Nuovo codice degli appalti. <http://documenti.camera.it/leg19/dossier/pdf/Am0006.pdf> \ <http://documenti.camera.it/apps/nuovosito/attigoverno/Schedalavori/getTesto.ashx?file=0019.pdf&leg=XIX#pagemode=none>.
- Coviello, D. and S. Gagliarducci (2017). Tenure in office and public procurement. *American Economic Journal: Economic Policy* 9(3), 59–105.
- Decarolis, F. (2014). Awarding price, contract performance, and bids screening: Evidence from procurement auctions. *American Economic Journal: Applied Economics* 6(1), 108–132.
- Decarolis, F. (2018). Comparing public procurement auctions. *International Economic Review* 59(2), 391–419.
- Decarolis, F., G. de Rassenfosse, L. M. Giuffrida, E. Iossa, V. Mollisi, E. Raiteri, and G. Spagnolo (2021). Buyers' role in innovation procurement: Evidence from us military r&d contracts. *Journal of Economics & Management Strategy* 30(4), 697–720.
- Decarolis, F., L. M. Giuffrida, E. Iossa, V. Mollisi, and G. Spagnolo (2020). Bureaucratic competence and procurement outcomes. *The Journal of Law, Economics, and Organization* 36(3), 537–597.
- Dimitri, N., G. Piga, and G. Spagnolo (2006). *Handbook of procurement*. Cambridge University Press.

- Dixit, A. K. (2015). How business community institutions can help fight corruption. *The World Bank Economic Review* 29(suppl_1), S25–S47.
- Esposito, F. and M. Ferrero (2006). Variance screens for detecting collusion: An application to two cartel cases in Italy. In *Second ACLE Workshop on Forensic Economics in Competition Law Enforcement*.
- Ginesti, G., L. V. Ballestra, and R. Macchioni (2020). Exploring the impact of firm-level legality on tax avoidance. *European Management Review* 17(2), 499–514.
- Giosa, P. (2018). The case for reforming the rules on contracting authority damages claims for bid rigging in the eu. *Public Procurement Law Review* 27(6), 12–2018.
- Grimm, V., R. Pacini, G. Spagnolo, and M. Zanza (2006). Division in lots and competition in procurement. *Handbook of procurement*, Cambridge University Press.
- Harrington, J. E. (2008). Detecting cartel. *Handbook of Antitrust Economics*. The MIT Press.
- Huber, M. and D. Imhof (2019). Machine learning with screens for detecting bid-rigging cartels. *International Journal of Industrial Organization* 65, 277–301.
- Hüschelrath, K. and T. Veith (2014). Cartel detection in procurement markets. *Managerial and Decision Economics* 35(6), 404–422.
- Imhof, D. (2017a). Econometric tests to detect bid-rigging cartels: does it work? *Technical report*, Université de Fribourg.
- Imhof, D. (2017b). Simple statistical screens to detect bid rigging. *Technical report*, Université de Fribourg.
- Iossa, E. and C. Calini (2024). Declining trend in leniency? Causes and responses. *forthcoming in Antitrust Chronicle*.
- Iossa, E. and C. Latour (2023). Firms’ legality and efficiency: Evidence from public procurement. *Revise and Resubmit*, *European Journal of Law and Economics*.
- Iossa, E., S. Loertscher, L. M. Marx, and P. Rey (2024). Coordination in the fight against collusion. *American Economic Journal: Microeconomics* 16(1), 224–261.
- Iossa, E., B. Raganelli, and F. Marconi (2022). Appalti e turbative: corruzione, cartelli e criminalità nella lente della corte di cassazione. *Mercato Concorrenza Regole* 34(1), 9–49.
- Jakobsson, M. (2007). Bid rigging in swedish procurement auctions. *Working paper*.
- KFST (2022). Collusion detection in public procurement using computational methods. *Danish Competition and Consumer Authority*.

- Lambert-Mogiliansky, A. (2011). Corruption and collusion: strategic complements in procurement. *The International Handbook on the Economics of Corruption, Volume Two (Cheltenham UK: Edward Elgar, 2011)* pp, 108–140.
- Lambert-Mogiliansky, A. and K. Sonin (2006). Collusive market sharing and corruption in procurement. *Journal of Economics & Management Strategy* 15(4), 883–908.
- Main, O. (2023). Etica d’impresa e compliance: dalle sanzioni ai premi passando per i nudges. il ruolo del rating di legalità. *Mercato Concorrenza Regole* 25(1-2), 223–242.
- Marvao, C. and G. Spagnolo (2024). Leniency inflation, the damages directive, and the decrease in cartel cases. *CEPR*.
- Nyreröd, T. and G. Spagnolo (2021). Myths and numbers on whistleblower rewards. *Regulation & Governance* 15(1), 82–97.
- OECD (2009). Guidelines fo fighting bid rigging in public procurement. *Organization for Economic Cooperation and Development. Paris, France*.
- OECD (2013). Ex officio cartel investigations and the use of screens to detect cartels. *Organization for Economic Cooperation and Development. Paris, France*.
- OECD (2018). Summary of the workshop on cartel screening in the digital era. *Organization for Economic Cooperation and Development. Paris, France*.
- OECD (2021). Government at a glance. *Organization for Economic Cooperation and Development. Paris, France*.
- OECD (2022a). Data screening tools for competition investigations: note by Danemark. *Item 3 of the 136th Working Party 3 meeting, Organization for Economic Cooperation and Development. Paris, France*.
- OECD (2022b). Data screening tools for competition investigations: note by Italy. *Item 3 of the 136th OECD Working Party 3 meeting, Organization for Economic Cooperation and Development. Paris, France*.
- OECD (2022c). Data screening tools for competition investigations: OECD competition policy roundtable background note. *Item 3 of the 136th OECD Working Party 3 meeting, Organization for Economic Cooperation and Development. Paris, France*.
- OECD (2022d). Director disqualification and bidder exclusion – note by Italy. *Item 4 of the 139th OECD Competition Committee meeting, Organization for Economic Cooperation and Development. Paris, France*.

Porter, R. H. and J. D. Zona (1993). Detection of bid rigging in procurement auctions. *Journal of political economy* 101(3), 518–538.

Schrepel, T. and T. Groza (2022). The adoption of computational antitrust by agencies: 2021 report. *Stanford Computational Antitrust*.

RECENT PUBLICATIONS BY *CEIS Tor Vergata*

Rage Against the Machine or Humans?

Luca Delle Foglie, Stefano Papa and Giancarlo Spagnolo

CEIS Research Paper, 593 February 2025

Firms' Legality and Efficiency: Evidence from Public Procurement

Elisabetta, Chiara Latour

CEIS Research Paper, 592 February 2025

Green Ambiguity

Marco Carli

CEIS Research Paper, 591 February 2025

Who Decides Matters: Female Representation and Academic Career Advancement

Marianna Brunetti, Annalisa Fabretti and Mariangela Zoli

CEIS Research Paper, 590 December 2024

Multivariate Rough Volatility

Ranieri Dugo, Giacomo Giorgio and Paolo Pigato

CEIS Research Paper, 589 December 2024

With a Little Help from Nurseries. Childcare Services and Mothers' Employment in Italy

Chiara Puccioni and Daniela Vuri

CEIS Research Paper, 588 December 2024

SMEs Performance in Public Procurement and the Italian Legality Rating

Andrea Fazio, Erminia Florio and Gustavo Piga

CEIS Research Paper, 587 December 2024

A Reinforcement Learning Algorithm For Option Hedging

Federico Giorgi, Stefano Herzel and Paolo Pigato

CEIS Research Paper, 586 December 2024

The Long-Run Effects of R&D Subsidies on High-Tech Start-Ups: Insights From Italy

Christoph Koenig, Letizia Borgomeo and Martina Miotto

CEIS Research Paper, 585 October 2024

With a Little Help From the Crowd: Estimating Election Fraud with Forensic Methods

Christoph Koenig

CEIS Research Paper, 584 October 2024

DISTRIBUTION

Our publications are available online at www.ceistorvergata.it

DISCLAIMER

The opinions expressed in these publications are the authors' alone and therefore do not necessarily reflect the opinions of the supporters, staff, or boards of CEIS Tor Vergata.

COPYRIGHT

Copyright © 2025 by authors. All rights reserved. No part of this publication may be reproduced in any manner whatsoever without written permission except in the case of brief passages quoted in critical articles and reviews.

MEDIA INQUIRIES AND INFORMATION

For media inquiries, please contact Barbara Piazzzi at +39 06 72595652/01 or by e-mail at piazzzi@ceis.uniroma2.it. Our web site, www.ceistorvergata.it, contains more information about Center's events, publications, and staff.

DEVELOPMENT AND SUPPORT

For information about contributing to CEIS Tor Vergata, please contact at +39 06 72595601 or by e-mail at segr.ceis@economia.uniroma2.it