

Chapter 5

DETECTING BID-RIGGING IN THE “BIG DATA ERA”

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I. INTRODUCTION

Cartels conviction requires the collection of evidence that meets a high standard of proof. According to the EU case law, to prove an infringement, the existence of an anticompetitive agreement must be the only plausible explanation of the observed behavior. Therefore, competition authorities look for documentary evidence to prove their allegations. However, firms have become very smart in concealing evidence of their misbehavior, making cartel prosecution very hard. Indeed, jurisdictions require high standard of proofs, especially in Civil Law countries. The “full conviction” principle is applied in European countries, which implies that the existence of a cartel must be the only plausible probative explanation. Common Law countries adopt the principle of “more likely than not” that means a probability threshold equal or greater than 50% in civil cases, while - in criminal jurisdiction - the jury must be convinced beyond any reasonable doubt that the facts alleged by the prosecution are true (probability above 90%).

So far, most of competition authorities has heavily relied on reactive cartel detection methods by adopting leniency programs and by fostering buyers/suppliers to report suspicious cases of collusion through direct complaints or whistle-blowing channels. Thanks to the increasing adoption of e- procurement platforms worldwide, procurement data are becoming more available in an “open data” format. Competition authorities could therefore switch to more proactive strategies for cartel detection by exploiting the data availability and using economics to perform so-called “screening tests”.

To enhance the detection and conviction rates and, in turn, the efficiency and value for citizens’ money, digitalization offers great opportunity. The availability of data could lead to the formulation and adoption of more effective policies against unsolved problems. However, to exploit fully digitalization, Governments still need to follow

some basic guidelines aimed at creating central e- platforms, compulsory publication of procurement data and introducing enforcement mechanisms. As of now, there are a lot of technologies available and Governments should invest more in their implementation.

The chapter will analyze both reactive and proactive approaches, highlighting the main benefits and limits of their adoption as detecting tools of collusion in public procurement. Two real cases of cartel detection and conviction will be also analyzed to demonstrate how it is possible to detect and convict successfully cartels thanks to the use of available public procurement data.

The chapter is structured in four main sections: cartel detection tools (Section 2); cartel conviction (Section 3); analysis of two cases of cartel detection and conviction based on data-driven investigations (Section 4); and main opportunities and concerns of the adoption of screening tests in the digitalization era (Section 5).

II. CARTEL DETECTION

Public procurement accounts for a large share of Gross Domestic Product (GDP) worldwide. According to OECD (2018), governments spend on average approximately 13% of GDP for the purchasing of goods and services (OECD, 2018). It is of utmost importance to avoid inefficiencies and waste of public funds. This means that public procurement should aim at ensuring the achievement of best value for citizens' money, intended as the optimal combination of price and quality. To do so, a set of basic principles must be guaranteed as economy, efficiency, effectiveness, non-discrimination, transparency, accountability and integrity. Competition is also a fundamental axiom, since it leads to an optimal allocation of public funds and avoids manipulations aimed at damaging the public interests for individuals' private gain.

Due to the high level of financial interests at stake in numerous sectors, public procurement is a "hot spot" for anti-competitive behaviors. In this chapter, the focus is on collusion and, specifically, on the practice of *bid rigging*. According to the definition of OECD (2012), *bid rigging* (collusive tendering or cartels) occurs when firms (bidders) secretly agree to rise prices and/or lower quality of goods and services for the purchaser. Hard core cartels impose significant harm on society

and therefore competition authorities around the world are increasingly active in fighting them. For example, the OECD (2014) has estimated that cartels lead to an average increase in prices of 10-15%. Bid rigging can take various forms:

- Cover bidding, when a participant agrees to submit a bid that is not compliant with the buyer's technical requirements or too high to be accepted. This form is the most used one since it simulates real competition.
- Bid suppression, when a participant renounces to submit bids or withdraws previously submitted offers. In this way, the designated winner's bid is more likely to be accepted.
- Bid rotation, when bidders agree on who will be the winner in each tender on the basis of a rotation scheme.
- Market allocation, when competitors decide to segment the market by customers, products, geographic area, etc. and agree not to compete on these segments.

Competition authorities monitor agreements between companies that can restrict competition. In general, they rely on both *ex-ante* and *ex-post* instruments to reduce the incentives to form cartels and to increase the probability that existing cartels are detected. Specifically, there are two different approaches to detect cartels: reactive and proactive (See Figure 1).

Reactive tools are based on information or evidence brought before the competition authority by third parties. Proactive methods are applied when competition authorities engage in cartel detection on its own initiative and do not rely on an external triggering event. In the following sections, both approaches will be analyzed more in detail.

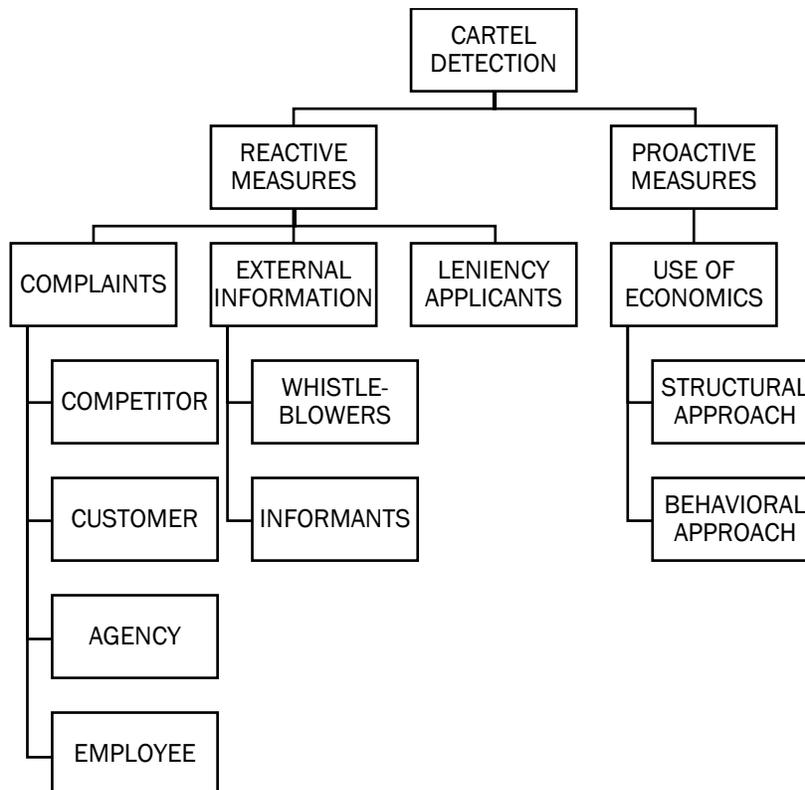
2.1. Reactive Methods

Competition authorities mainly rely on three reactive tools: (1) direct complaints; (2) external information and (3) leniency programs.

Direct complaints allow any competitor, customer, agency and employee to bring to the attention of the competition authority any suspicious behavior undertaken by other economic operators.

The external information mainly refers to *whistleblowing* that is the act of informing the public authorities that the organization the informant is working for, or dealing with, has adopted illegal actions. Whistle-blowers are important in national and global efforts to detect

FIGURE 1
Cartel Detection Tools



Source: Hüschelrath (2010).

and prevent collusion and corruption. However, reporting often comes at a high price. Whistle-blowers face the risk of retaliation and/or mobbing at their workplace. To be an attractive tool and to be efficient in detecting cartels, the national jurisdiction must provide sufficient incentives and secure and confidential reporting tool. In Europe, for instance, the majority of countries does not have dedicated legislation in place, and even where such laws do exist, they usually leave significant loopholes and fall short of good practice. According to Transparency International (2013), a good whistle-blowing legislation should ensure that:

- Protection have the broadest scope possible, including public and private employees as well as individuals outside the traditional employee-employer relationship;
- Protection from retaliation and retribution is always guaranteed, with the burden of proof on the employer to demonstrate that any measures taken against the employee were not connected to any disclosure;
- There should be several clearly defined reporting channels available to the whistle-blower, with the option of reporting to external parties and/or the public in certain cases of urgent or grave public interest;
- A full range of remedies should be available to the whistle-blower for any direct or indirect consequences of the disclosure, such costs as compensation for lost wages, medical support, and/or legal assistance; and
- Anonymity and confidentiality should be guaranteed for the whistle-blower, and the identity of the whistle-blower cannot be disclosed without the individual's explicit consent.

These recommendations are also included and addressed in the Resolution 2016/2224 (OECD,2017) issued by the European Parliament on October 24, 2017 about legitimate measures to protect whistle-blowers acting in the public interest when disclosing the confidential information of companies and public bodies.

The third – and last- reactive tool is the *leniency program*. This program was firstly adopted in the United States (US) in 1978 and consisted in granting full immunity to any corporation reporting anti-competitive behavior before a formal investigation is initiated by the Competition Authority. In 1993, the terms for the application of the leniency program were amended: the immunity was granted also after the beginning of the investigation and allowed not only to corporations, but also to individuals (e.g. employees, directors, etc.).

In 1996, also the European Commission introduced leniency programs that became a very effective tool to detect cartels soon. Indeed, the high successful detection rate and the provision of strong evidence on the existence and functioning of cartels made the leniency program the most widespread and used tool to detect, investigate and prosecute cartels. In EU, the leniency program rewards also subsequent applicants with a more lenient treatment. This is due to the fact that in some cases, for example, a competition authority is aware about the

existence of a cartel thanks to the first-in, but still not able to prove the infringement. Therefore, having additional evidence from other cartelists could be particularly valuable. Besides, additional co-operation may generate further cost-savings as strong evidence could be obtained without full investigation process.

Leniency programs work, and are successful, because they alter the collusive equilibrium of firms within a cartel. Indeed, cartels works - and are sustainable in the long term- if the long-term gains from future collusion is higher than the short-term gains from deviation. Thanks to a leniency application, the short-term gain of deviating firms increases, while the long-term gains remain stable. In fact, a deviating firm can report the cartel to the competition authority, and in exchange of information on the cartel, it gets lower fines or complete immunity. There is therefore a higher incentive to deviate. Since 1996, more than 90% of fines imposed in US can be traced to leniency applications. In EU, 88% of cartel decisions from 2002 to 2008 were triggered by leniency.

So far, the majority of competition authorities has heavily relied on reactive detection methods by adopting leniency programs and by fostering buyers/suppliers to report suspicious cases of collusion through complaints. However, over-relying on these instruments may threaten their power. Indeed, these programs try to put pressures on bidders' incentives, conflict interests and fear to be discovered in order to break down bid rigging. Consequently, if competition agencies exclusively use leniency programs, then it may happen that many cartels will never be detected. Moreover, there are some concerns in their adoption and effectiveness, especially in the field of public procurement.

Firstly, there is the risk that companies may collude and then report, abusing the programs and using it to their benefit. In addition, Abrantes-Metz & Bajari (2012), Levenstein & Suslow (2012) demonstrate that leniency programs mostly detect cartels that are already on their expiring path due to external shocks, meaning mature and dying cartels.

With regard to their adoption in public procurement, the envisaged design of the program has not proven to be successful due to several reasons:

- In several jurisdictions, colluding in public tenders is also a crime, and leniency program may not cover criminal liability or other sanctions as debarment.
- Collusion is a ground for exclusion according to the EU Directives (1) on public procurement, which states: “Contracting authorities may exclude from participation in a procurement procedure any economic operator where the contracting authority has sufficiently plausible indications to conclude that the economic operator has entered into agreements with other economic operators aimed at distorting competition”.
- Cartels in public tenders tend to be very stable over time due to the level of transparency of public procurement, where it is easy to detect any deviation from the cartel arrangements.

These concerns stress the importance of ex-officio investigations by competition authorities and, therefore, proactive measures for detecting collusion.

2.2. Proactive Methods

Several scholars stress the necessity to implement pro-active methods as a complementary tool to both enhance the success of the existing programs and increase the probability to detect more stable cartels (Harrington, 2008; Hüschelrath, 2010). Contrary to the reactive approach, competition authorities adopt a *pro-active* approach when they engage in cartel detection on their own initiative and do not rely on an external triggering event. Proactive methods may include industry monitoring (such as tracking individuals, infiltration, press and internet); cooperation among competition agencies and other authorities (e.g. contracting authorities) and the use of economics based on available data to perform the so-called “*screening tests*”. The latter are statistical tests aimed at identifying any distortion of competition due to collusive practices. Screening tests can be classified in (1) structural test and (2) behavioral test.

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Structural tests exploit economic theory and empirical analysis to understand which markets present structural features that make them more prone to collusion. The aim of structural tests is to identify markets where anti-competitive behaviors are more likely. Competition authorities look for different signaling factors, which do not require advanced technical skills and large set of data:

- Structural factors, such as high entry barriers, few competitors, market transparency and high frequency of interactions between competitors;
- Demand-related factors, including stable demand paths, low demand elasticity, buying power and the absence of club and network effect; and
- Supply-related factors, such as the mature phase of an industry, low innovation rates, costs symmetries, product homogeneity, structural links.

These tests are useful to perform a first screening but, of course, cannot provide any evidence of an illegal conduct. It is important to observe the behavior of firms in that market.

Behavioral tests focus on firms' behaviors and assess whether an observed behavior is more or less likely to occur in a competitive or collusive scenario. These tests are data-driven and require high-empirical knowledge to elaborate relevant data and capture the necessary information. This approach has a two-steps design. Firstly, it is necessary to identify the collusive markers that help to distinguish behaviors consistent with competition from those consistent with collusion. Subsequently, it is required to look at structural change and/or exogenous shock that can justify behaviors' changes with collusive or competitive models.

The following markers may signal cartels in public procurement:

- Bids should be independent in a competitive public procurement process. On the contrary, if a cartel is working, bids are highly correlated after controlled for costs and market power;
- Identical bids are unlikely to be submitted in a truly competitive tendering process (2).

- Bids in a competitive tender tend to reflect the cost structure of each bidder.
- Bids should present low differentiation in a competitive framework. If there are significant differences between the losing and winning bids, it may be due to anti-competitive agreement among bidders.

Both cartel detection approaches present benefits and implementations difficulties. The optimal and most effective solution is a combination and balanced adoption of both *reactive* and *pro-active measures*.

III. CARTEL CONVICTION

Cartel detection is a necessary, but not sufficient condition for the allegation of *bid rigging*. Cartels conviction requires the collection of evidence that meets a high standard of proof. According to the EU case law, in order to prove an infringement of an observed behavior, the existence of an anticompetitive agreement must be the only plausible explanation. Consequently, competition authorities need documentary evidence to prove their allegations. However, firms have become very smart in concealing evidence of their misbehavior, making cartel prosecution very hard.

To enhance the convictions rate, the exploitation of *circumstantial evidence* seems necessary to corroborate proof of cartels and increase the probability of the existing facts above the 50% (for the US standard of proof). Specifically, the main instruments that could rise the probative values of structural and behavioral screening tests are the so-called *plus factor*.

Kovacic et al. (2011) highlight the importance of the "*plus factors*" to distinguish tacit agreements from mere tacit coordination originated by oligopolistic interdependence. Indeed, a "*plus factor*" is an element that identifies typical actions that can be observed when collusive actions are in place and that are unlikely in absence of collusion. For example, typical cartel characteristics are higher prices with respect the competitive equilibrium, supply restrictions, allocation of collusive gains, incentives to foster collusion, or monitoring the compliance with the intrafirm agreement. The main *plus factors* related to these actions are fixed relative market shares, exchanges of price information, declining market shares of the leader, low variance in prices,

homogeneity of products and identical bids, negative correlation of prices and demand, positive correlation among firms' prices.

Furthermore, to better proving the collusive behavior, competition agencies may identify the *super-plus factors*, intended as actions or conducts that are highly unlikely to occur in the absence of a collusive agreement. Considering, for example, a booming phase of the market cycle, in a competitive framework it is expected higher prices and higher demand and supply. However, if a subset of firms reduces their supplied quantity, then it is highly probable that they have a collusive agreement.

Another example concerns the internal set of incentives. Indeed, the sales-force of a company is committed to increase the market share and, in a competitive scheme, they follow an incentive design coherent with this commitment. However, within a cartel-agreement, the primary goal is to maintain higher prices and consequently restricting market quota. This requires a change in the incentives scheme to the sales-force that under cartel agreement will shift toward "price before volume". This modification in sales-force behavior is a strong evidence of collusion, and therefore it can be classified as a *super plus factor*.

IV. ITALIAN CASES

The wide adoption of e-procurement and the availability of open-data make easier for the investigation authorities to adopt alternative measures to detect - and eventually convict cartels- and they are a combination of both structural and behavioral screenings. In the following sections, we present two cases where cartel detection and conviction was data-driven and based on the behavioral screen. Rising the authorities' skills and knowledge on their implementation could be an effective way to increase the competitiveness of public procurement systems and to respect its founding principles.

4.1. Case 1: Private Security Firms in Sardinia

This case (Decision No. 4496 - I148) of the Italian Competition Authority (ICA) concerns the public procurement for private security services for an Italian region (Sardinia) in the period between the 1990 and 1995. The market for private security services is highly regulated. Private firms must respect a set of specific standards established by the Prefecture in order to get the license necessary to

perform the services. The license outlines all the allowed services, which are constant surveillance, patrols, transport and escort of values on behalf of banks and/or posts. Moreover, the license sets the province as the market geographical boundaries within which it is possible to perform these security services.

During the considered period, the demand for private security services was composed as follows: 80% by Public Administration (PA); 10% by ENEL (the Italian main player of electricity and gas) and the remaining 10% by other private firms, including banks. This demand was satisfied by six companies, as follows: (1) Vigilanza Sardegna – 51.4%; (2) Sicurezza Notturna – 25%; (3) Cannas – 9.2%; (4) Sicurvis – 8.6%; (5) S. Elena – 4.4%; and (6) Gerrei – 1.4%. The principal cost-element in this market is the labor cost per day. The award criterion for all the considered tenders was the lowest offered price.

In 1996, the ICA began an investigation to examine the level of competition in public tenders for the private security services between 1990 and 1995. By looking at the market shares and clients of the main operators, it emerged that they were constant over the five years period. This meant that if Sicurezza Notturna worked for a specific public administration in 1990, it maintained this client for the entire period. The same holds for other firms. This trend raised a concern of a potential allocation of the public commissions.

The ICA then analyzed the bids submitted by the suspected cartelists. From this assessment, it emerged that the price-movements were signaling an anti-competitive behavior. In fact, it is possible to observe that in each auction the winner presented offer higher than what would have guaranteed the success.

To clearly demonstrate the bid rigging scheme, the ICA focused on the procurement launched by one contracting authority (i.e. Unità Sanitaria Locale or USL) from the 1990s. In this chapter, we restrict the focus of analysis to four years (i.e. 1990 – 1993). The Table 1 shows the market allocation of the colluding firms for the 11 lots.

In 1990, only A and B were qualified to participate. In 1991, despite the entrance of the third supplier C, A and B won exactly the same lots as the previous year, even though their offered prices were higher. In 1992, A and B submitted a bid only for those “historical lots”, intended as the ones that they won in the past two years. Even in this case, the offered prices of A and B are higher than the previous year. However, in

this case the new company D participated and submitted an offer only for two lots (9 and 10) and won both of them. With the exception of these two lots, the “historical” firms still maintained the previous allocation. In 1993, as a response to the new competitor (D) and in order to re-establish the original order, the incumbents A and B practiced aggressive bidding and obtained the same lots’ allocation as in 1990.

Considering these behavioral elements, the ICA collected the following evidence:

- Suppliers bids are higher for a particular lot than the same supplier’s bid for another similar lot;
- Significant past reductions from past price levels after a bid from a new or infrequent supplier, e.g. the new supplier may have disrupted an existing bidding cartel;

TABLE 1
Pricing Behaviors* (1990 – 1993) **

	1990		1991			1992			1993			
	A	B	A	B	C	A	B	D	A	B	D	E
1	22.1	22.4	25.2	25.4	26	26.5	-	-	8.9	8.95	-	-
2	22.3	22.1	25.8	25.4	26	-	26.3	-	9	8.95	16	-
3	22.3	22.1	25.8	25.4	26	-	26.3	-	9	8.95	15.5	-
4	22.3	22.1	25.8	25.4	26	-	26.3	-	9	8.95	14.7	-
5	22.3	22.1	25.8	25.4	26	-	26.3	-	9	8.95	-	-
6	22.3	-	25.2	25.4	26	26.5	-	-	8.9	8.95	-	-
7	22.1	22.4	25.2	25.4	26	26.5	-	-	8.9	8.95	-	18
8	22.1	22.4	25.2	25.4	26	26.5	-	-	8.9	8.95	-	18
9	-	22.4	25.8	25.4	26	-	26.3	17	9	8.95	12.2	18
0	22.1	22.4	25.2	25.4	26	26.5	-	17	8.9	8.95	12.2	18
	22.1	22.4	25.2	25.4	26	26.5	-	-	8.9	8.95	-	18

Notes: * Prices are to be considered in thousands Euro.

**A=Sicurezza Notturna; B= Vigilanza Sardegna; C= Cannas;
D=S.Elena; E=Gerrei.

Source: ICA’s decision No. 4493 (I148).

- There is a clear allocation of winning tenders. Firms submitted tenders that always win the same lots.
- Regular suppliers fail to bid on a lot they would normally be expected to bid for, but have continued to bid for other lots.

On the basis of the above evidence, the ICA succeeded in providing the “full conviction” standard of proof i.e. there was no alternative plausible explanation for the bidders’ behavior other than collusion. The alternative explanations provided by the cartelists were not sufficient to provide alternative and sound reasons for their behavior. Specifically, they argued that the intrinsic features of the market and its high-regulation, did not allow free competition. Therefore, given this market nature, the main operators tend to preserve their traditional clients and not to engage in price wars. In fact, B claimed that its primary goal was the employment protection to guarantee even with aggressive lower prices. Based on that, it also argued that it was more convenient defending its own shares, rather than trying to acquire new clients from A.

These arguments were not sufficient to prove the absence of any collusive agreement. The ICA issued an infringement decision, which was confirmed by the administrative courts in the following appeals.

4.2. Case 2: “Big Four” Consultancy Firms

This case (ICA’s Decision I796) is another example of adoption of screening test as a measure for cartel detection and conviction. In 2015, the ICA started an investigation on public auction launched by CONSIP (the Italian central procurement body) for technical and advisory services on the use of European structural funds. Local and regional public administrations are the typical clients of these consultancy firms. On the supply side, the so-called “big four” dominated the market: Ernst & Young, PwC, KPMG and Deloitte.

The investigation concerned a procurement for a contract divided in 9 lots, out of which 7 lots on the basis of geographical area and 2 lots dedicated to central administrations. The total amount of the public contract was 66.5 million of Euro differently allocated among each lot. There was a limit in the number and total value of lots that each firm could win: maximum 3 lots per firm and for a maximum total amount of 27 million of Euro. The award criterion was the most economically advantageous tender (MEAT). The evaluation of the technical proposals resulted in similar scores for all the “Big Four”. However, their financial

proposals were differentiated according to a specific scheme as described in Table 2.

TABLE 2
Price Reduction of the Big Four

	1	2	3	4	5	6	7	8	9
KPMG	30%	30%	10%	14%	11%	14%	10%	15%	30%
EY	11%	-	31%	11%	13%	31%	31%	11%	-
PwC	-	13%	13%	12%	32%	-	-	-	13%
Deloitte	10%	11%	13%	31%	12%	10%	-	31%	14%

Source: ICA's Decision I796.

The price reductions varied only among two specific ranges (i.e. 30-32% and 10-15%) and they never overlapped. The big four, won 5 out of the 9 lots and the winning offers range always between 30-32%. In this case, the key evidence was: (1) chessboard design of the bids; (2) two specific price-reduction ranges; and (3) un-competitive prices offered by other cartelists in the same lot with the purpose of altering the economic score. Indeed, it was established linear increase for higher price reductions, but the proportionality was lower for reductions above the mean, compared to those below than mean. This means that, thanks to the supporting bids (i.e. price reduction 10-12%), the designed winner could offer a lower discount with respect to potential outsiders.

The "Big Four" justified the price-discount patterns and contracts allocation on the basis of historical positioning, regional presence, transfer costs. However, these arguments did not prove a reasonable alternative justification for the adopted behavior differently from bid rigging. Therefore, the ICA claimed that all the probative elements demonstrated, in an incontrovertible way, the existence of an illegal agreement between the big four aimed at public contract allocation. Each of the four cartelists was convicted in first instance to pay fines ranging from 1.5million Euro (PwC) to 8.5 million Euro (EY).

V. SCREENING TEST: OPPORTUNITIES AND CONCERNS

Competition authorities are increasingly using behavioral screens tests as cartel detection method. These screens heavily rely on the

availability of data. Indeed, relevant and accurate information are necessary from the screen design, to its implementation, up to the interpretation of its results.

This digital era poses two main opportunities for pursuing good governance and safeguarding effective competition. On one hand, through digitalization and disclosure of public sector operations in main areas, including procurement, governments can become more accountable. On the other hand, the availability of big data could lead to the formulation of more effective responses to unsolved problems like bid-rigging. As of now, digitalization is not fully exploited by the Governments yet. Indeed, to fully exploit procurement data, it is necessary to have an appropriate data framework that takes in to consideration three main issues: data format, scope and quality.

Regarding the format, in most of the cases, all the procurement data accessible online are not structured in a way to be easily read and assessed. The majority of national public procurement systems publish tender announcements as online texts rather than as a database. As a consequence, a database has to be constructed from public records requiring a costly and lengthy programming work. In this sense, having a central platform for the collection of standardized procurement data is necessary to facilitate the database construction and to reduce the transactions costs for bidding companies. However, it is not sufficient to have a central website, it is also necessary to have data in appropriate format, i.e. “machine-readability” of information is essential for the quantitative analysis of public procurement data. Most countries provide html and/or pdf format, where it is harder to extract data and include them in database.

With regard to the scope of the procurement data, a wide range of information and variables is indispensable for meaningful research and for a comprehensive analysis of the whole procurement process. However, as of now procurement datasets focus only on the bidding and bid evaluation phases, without information on contract implementation and often not even on major contract modifications. This is because the publicity principle is mandatory only up to the contract award announcement and do not cover subsequent modifications.

Lastly, there is also a relevant problem in terms of quality and/or missing data. This is the consequence of poorly designed web-platforms and lack of enforcement (Czibik, Tóth, & Fazekas, 2015). To fully exploit big data and facilitate the implementation of new detecting

cartels techniques, the following actions should be taken:

1. Governments should install a central public procurement platform, free of charge and user-friendly. In this way, the market transparency and trust in public procurement will increase.
2. Governments should make compulsory the publication of procurement data by default and in open data format. As previously mentioned, the scope, quality and format of data are the necessary requirements to develop a public procurement dataset useful for performance and detecting assessments.
3. Governments should lower the reporting thresholds and applying procurement rules to all public bodies and spending areas.
4. The procurement data's scope must be widened. This means that information should refer to all the procurement cycle, take into account subsequent modifications and at least include the previous set of variables.
5. Government's should introduce enforcement mechanisms for the publication and respect of procurement data requirements. For this purpose, a control system and penalties' scheme for non-compliance could be adopted.

Thus, all the technologies and tools for an efficient procurement detecting cartels systems are available. Governments, who are the main actors and holders of these data, should better promote the use and construction of procurement database for both public entities, bidders, other private subjects and civil society.

VI. CONCLUSION

The chapter provides an overview of the main detecting tools currently available to competition authorities, when dealing with collusion in public procurement. The reactive measures mainly include complaints, whistle-blowing and leniency programs. Whistle-blowers are important players in national and global efforts to detect and prevent collusion, corruption and other anti-competitive behaviors. However, to be an attractive tool and to be efficient in cartels detection, it is necessary that national jurisdictions provide sufficient incentives and secure and confidential reporting tool. As of now, in Europe, for instance, the majority of Member States does not have dedicated legislation in place, and even where such laws do exist, they usually leave significant loopholes and fall short of good practice. With regard

to the leniency programs, they proved themselves to be highly successful in antitrust but less effective in public procurement due to the following limits:

- They tend to detect cartels that are on their expiring path, meaning mature and dying cartels.
- Collusion in public tenders is a crime, and leniency programs do not cover criminal liability or other sanctions as debarment.
- Leniency programs work, and are successful, because they alter the collusive equilibrium of firms within a cartel. Indeed, cartels works - and are sustainable in the long term- if the long-term gains from future collusion is higher than the short-term gains from deviation.
- In EU, according to the 2014 Directives on public procurement, collusion is a ground for exclusion from public tenders.
- Cartels in public tenders tend to be very stable over time due to the level of transparency of public procurement, where it is easy to detect any deviation from the cartel arrangements.

For all these reasons, reactive measures may not be sufficient in detecting bid rigging in public procurement. Several scholars have already stressed the need to implement also pro-active measures as a complementary tool to both enhance the success of the existing programs and increase the probability to detect more stable cartels. Proactive methods may include industry monitoring (such as tracking individuals, infiltration, press and internet); cooperation among competition agencies and other authorities (e.g. contracting authorities) and the use of economics based on available data to perform the so-called “screening tests”. The chapter focuses on the latter, which consists in statistical tests aimed at identifying any distortion of competition due to collusive practices. There are two types of screening tests: (1) structural test, based on understanding which markets and/or products structural features are more prone to collusion; and (2) behavioral test, focused on the observation of firms’ behavior to assess whether it is more or less likely to occur in a competitive or collusive scenario. The screening tests also raise some concerns.

Firstly, they are resource-intensive, requiring statistical and economical skills to identify empirically the anti-competitive behavior; and they are data-intensive, heavily relying on the availability of data. Indeed, relevant and accurate information are necessary from the

screen design and its implementation to the interpretation of the results. The current digital era poses two main opportunities for pursuing good governance and safeguarding effective competition. On one hand, through digitalization and disclosure of public sector operations in main areas, including procurement, governments can become more accountable. On the other, the availability of big data could lead to the formulation of more effective responses to unsolved problems like bid rigging.

Another limit of the screening tests is that they do not distinguish between explicit cartels (illegal) and tacit coordination, which could be originated by oligopolistic interdependence. Moreover, they have the risk of generating false positives, flagging cases that do not require further scrutiny, or false negative, failing to identify a collusion case. The use of “plus factors” and “super-plus factors” may overcome these existing limits and support the identification of the typical actions that can be observed when collusive actions are in place and these actions are unlikely (or highly unlikely for the super-plus factors) to be observed in absence of collusion.

The chapter provides two successful examples of cartel detection and conviction of bidders in Italy. In each of them, the ICA based its detection strategy on bidders' behavior in public tender. On the basis of the analysis performed, it is possible to conclude that the optimal and most effective approach for cartel detection is a combined and balanced adoption of both reactive and proactive measures. Indeed, an effective policy to detect cartels should include the following proactive and reactive components: leniency programs; screening tools; rewards for whistle-blowers; incentives for effective corporate governance; education of the business community on competition law issues; clear guidelines on horizontal exchange of information (Abrantes-Metz (2013)). In addition to these components, competition authorities should also give particular attention to the role of fines, as a strategic tool able not only to punish anticompetitive behaviors, but also to prevent and deter them in the future.

NOTES

1. See Article 57 (4.d) of the Directive 2014/24/EU and Article 38 (7.e) of the Directive 2014/23/EU
2. In the 1950s in the United States, a bid-rigging in electric

appliances procurement was discovered because seven bidders had submitted the same identical bid to the cents in a sealed-bid tender process.

REFERENCES

- Abrantes-Metz, R., & Bajari, P. (2012). "Screens for Conspiracies and Their Multiple Applications." *Competition Policy International Journal*, 8(1): 177-193
- Abrantes-Metz, R.M. (2013). "Proactive vs Reactive Anti-Cartel Policy: The Role of Empirical Screens." (Working Paper). [Online]. Available at <https://ssrn.com/abstract=2284740>.
- Czibik, Á., Tóth, B., & Fazekas, M. (2015). "How to Construct a Public Procurement Database from Administrative Records." (GTI - R/2015:02) (Technical Report). Budapest, Hungary: Government Transparency Institute.
- European Commission (2014). *Directives on Public Procurement 2014/24/EC and 2014/23/EC*. Paris, France: Author.
- Harrington, J.E. (2008). "Detecting Cartels." (Working Paper). Baltimore, MD: The Johns Hopkins University, Department of Economics.
- Hüschelrath, K. (2010). "How Are Cartels Detected? The Increasing Use of Proactive Methods to Establish Antitrust Infringements." *Journal of European Competition Law & Practice*, 1(6): 522-528.
- Italian Competition Authority (1996). "Istituti Vigilanza Sardegna". Provision No 4496 - *Decision I148*. Rome, Italy: Autorità Garante della Concorrenza e del Mercato
- Italian Competition Authority (2017). "Servizi di Supporto e Assistenza Tecnica alla Pubblica Amministrazione, Decision I796. Rome, Italy: Autorità Garante della Concorrenza e del Mercato,
- Kovacic, W.E., Marshall, R.C., Marx, L.M., & White, H.L. (2011, December). "Plus Factors and Agreement in Antitrust Law." *Michigan Law Review*, 110: 393-436.
- Levenstein, M. C., & Suslow, V. Y. (2012). "Cartels and Collusion-Empirical Evidence." (Paper No. 1182). [Online]. Available at <https://ssrn.com/abstract=2182565>; <http://dx.doi.org/10.2139/ssrn.2182565>.

- OECD (2012). “Leniency for Subsequent Applicants.” (Policy Roundtables, DAF/COMP (2012) 25). Paris, France: Author.
- OECD (2014). “Guide for Helping Competition Authorities Assess the Expected Impact of Their Activities.” Paris, France: Author. [Online]. Available at <https://www.oecd.org/daf/competition/Guide-competition-impact-assessmentEN.pdf>.
- OECD (2017). “European Parliament Resolution of 24 October 2017 on Legitimate Measures to Protect Whistle-Blowers Acting in the Public Interest When Disclosing the Confidential Information of Companies and Public Bodies.” [Online]. Available at <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2017-0402+0+DOC+XML+V0//EN>.
- OECD (2018). “Government at a Glance – 2017” Edition: Public Procurement [Online]. Available at <http://stats.oecd.org/Index.aspx?QueryId=78413>.
- Transparency International (2013). “International Principles for Whistleblower Legislation.” [Online]. Available at https://transparency.eu/wp-content/uploads/2017/11/EU-Whistleblower-Protection_Brief.pdf.