



CARTEL SCREENING IS FOR COMPANIES, LAW FIRMS, AND ECONOMIC CONSULTANCIES, NOT JUST COMPETITION AUTHORITIES

Joseph E. Harrington, Jr.

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Patrick T. Harker Professor, Department of Business Economics & Public Policy The Wharton School, University of Pennsylvania <https://joeharrington5201922.github.io> / harrij@wharton.upenn.edu

I. INTRODUCTION

An effective anti-cartel enforcement policy means shutting down existing cartels and deterring new cartels from forming. Achieving those goals is a three-stage process: detection, prosecution and conviction, and penalization. Closing down active cartels requires detecting and then prosecuting them. Deterring cartel formation requires that prospective cartelists find it sufficiently likely they will be discovered and convicted and that the penalties are sufficiently severe. The focus of this article is on the detection component of enforcement.

In the last 15 years, a new tool has emerged to aid in the detection of cartels: cartel screening. Cartel screening is the analyzing of market data for the purpose of discovering collusion¹. Relying on easily available data and using simple empirical methods, its deliverable is identifying markets worthy of further investigation. To be clear, screening does not provide the evidence that would convince a court (though it could be part of a body of evidence) but rather tells us that, among the many markets in an economy, these markets warrant an in-depth investigation to determine if firms have forsaken competition for collusion.

Cartel screening is a cost-effective method of detecting cartels for two fundamental reasons. First, collusion must involve firms pricing differently than under competition for it could not otherwise be worth pursuing. Collusion is a change in the price-generating process which, in principle, can be identified upon inspecting the prices that firms charge over time. Second, operating a cartel poses a unique set of challenges and, consequently, firms leave an evidentiary trail (“collusive markers”) as they seek to solve them. Furthermore, even if cartelists are strategic and act to avoid being detected, that is generally accomplished only at the cost of lessening collusive profit. As a cartel will not want to forego all of the gains from collusion, many screens have the ability to detect even when firms strive to avoid triggering them.

But the most compelling argument for the efficacy of cartel screening is that it has worked, and even when there was no conscious effort to find a cartel. Professors William Christie and Paul Schultz accidentally discovered a cartel when they found that market makers at the electronic stock exchange Nasdaq were avoiding making bid and ask quotes in odd-eighths². For example, market makers would

1 The form of screening discussed here is referred to as behavioral screening which is distinct from structural screening. For an explanation of how they differ, see Joseph E. Harrington, Jr., “Detecting Cartels,” in *Handbook of Antitrust Economics*, ed. Paolo Buccirossi (The MIT Press, 2008).

2 William G. Christie and Paul H. Schultz, “Why do NASDAQ Market Makers Avoid Odd-Eighth Quotes?,” *Journal of Finance*, 49 (1994), 1813-1840.

quote 10 and 10 1/4 but not 10 1/8. Though initially seen as an inexplicable feature of the data, it was ultimately determined to be a simple collusive practice to raise the bid-ask spread and thereby market makers' profits. More common is a competition authority intentionally engaging in cartel screening. In this manner, cartels were discovered in markets for cement (South Africa), subway construction (Korea), and retail gasoline (Brazil)³. Indeed, cartel screening has become quite common at competition authorities. At the 2016 ICN Chief/Senior Economist Workshop, 27 competition authorities in attendance were surveyed and 15 reported they were doing some screening⁴.

Though many competition authorities are engaged in screening, the extent of screening is likely to be suboptimal from an enforcement perspective. One reason for insufficient screening is that competition authorities are typically resource constrained. Often they are too occupied with their current caseload to invest much human capital and financial resources into finding new cases⁵. Underutilization of screening is also likely because competition authorities are apt to undervalue discovering cartels. The career concerns of lawyers running a competition authority may put more emphasis on obtaining convictions and consequently invest more resources on prosecution than detection. Lawyers strive for a high conviction rate which leads to taking on cases initiated with a leniency application rather than economic evidence obtained through screening. This choice may ultimately be a prudent allocation of limited resources but still society would do better if more resources went into screening. That conclusion is underscored when one considers that leniency applications may largely come from dying cartels in which case screening is needed to find the most effective cartels. Furthermore, the decline in leniency applications in many jurisdictions suggests the need for new tools such as screening.

However, the purpose of this article is not to make the case for a competition authority to do more cartel screening but rather that increased enforcement should come from recruiting private actors to perform cartel screening. Of course, we should only expect private actors to do what is in their best interests which is why this article will explain how cartel screening can be a profitable activity. Those actors include large companies who may be purchasing from cartels but also actors who would indirectly profit by offering a service of cartel detection such as law firms, economic consulting firms, and trade and consumer associations. Once having explained the benefit from cartel detection, the case will be made that the cost of screening is modest so that, on net, cartel screening is likely to prove profitable for some private actors.

II. DETECTING CARTELS BENEFITS MANY PRIVATE ACTORS

A company that is unknowingly purchasing inputs from a cartel (or, alternatively, selling their products to a buyers' cartel) would benefit in a myriad of ways from learning that those suppliers (or buyers) are colluding. Now knowing that it is buying from a cartel, a company can adapt its purchasing practices. It can approach new suppliers who may not be part of the cartel; e.g., foreign suppliers when there is a domestic cartel. Those non-cartel suppliers may be able to offer the product or service at a lower price

3 Some of the cases are mentioned in Ulrich Laitenberger and Kai Hüschelrath, "The Adoption of Screening Tools by Competition Authorities," *CPI Antitrust Chronicle*, 2 (September 2011).

4 Report on 2016 ICN Chief/Senior Economists Workshop, prepared by Nigel Caesar, Renée Duplantis, and Thomas Ross, 25 April 2017.

5 Illustrative of this point is a reaction from when I first spoke about cartel screening at the 2005 Lear Conference on the Economics of Competition Law in Rome. After my presentation, a prominent member of the Antitrust Division of the U.S. Department of Justice asked me: "Why do we need to screen when we already have so many cases?" Of course, the objective is to reduce the frequency of cartels in the economy, not keep economists and lawyers busy, in which case screening may be appropriate.

(even when their costs are higher) and, in addition, their presence may undermine the stability of the cartel and ultimately lead to its collapse.

Even in the absence of non-cartel suppliers, a company can redesign its procurement practices to make collusion more difficult. As many cartels engage in a market allocation scheme that can involve allocating customers, a company can rotate its business among suppliers to disrupt the collusive scheme or offer a long-term contract at attractive terms to cause a supplier to deviate. If procurement occurs through an auction, the company can lower the maximum acceptable bid as it knows that winning bids for a cartel are well above cost so there is room to force bids down without losing their participation. If a company offers many auctions with small contracts, they could combine contracts. Doing so makes it more attractive for a cartel member to deviate and, indeed, it was such a change that contributed to the collapse of a generic drug cartel in Mexico (which is discussed later).

The potential benefits of having detected a cartel are enhanced when it is reported to the competition authority and an investigation ensues. There are many cartels for which an investigation was sufficient to cause their collapse because they did not want to risk creating further evidence (especially of meetings) and there is heightened concern of another cartel member cooperating with the competition authority through a leniency program. With cartel collapse comes an immediate and often sharp fall in prices which would significantly benefit the company who engaged in screening.

In this manner, private and public enforcement can work together: a company screens to detect a cartel and then, upon reporting it, the competition authority investigates and prosecutes. It is useful to note that screening and leniency programs work together to advance enforcement. In cases involving ampoules (Chile) and cement (South Africa), screening by the competition authority produced evidence that led to a dawn raid which then induced firms to apply for leniency. The point applies as well to when it is a company that performs the first step of screening.

Thus far the benefit from having detected a cartel among a company's input suppliers comes from *paying lower prices in the future*, either due to cartel collapse or adjusting procurement procedures. A company can also benefit from *compensation for having paid higher prices in the past*. If the competition authority has been induced to bring a case and obtains a conviction, some jurisdictions – such as Chile – allow for a follow-up suit for customer damages. In other jurisdictions, a company can pursue private litigation even when the competition authority does not pursue a case. In the United States, private litigation without a public case is quite common and often results in companies receiving financial settlements. However, a company cannot collect damages if a cartel is not first discovered, and cartel screening helps make that discovery possible.

There could also be other possible benefits from detecting a cartel. For example, suppose a company is considering acquiring another company. If the latter is involved in an undiscovered cartel then the acquiring company is inheriting a hidden liability and the company's profits may not be sustainable should collusion end at some point. Only after its acquisition of SABMiller did InBev learn that it had bought into a cartel among beer suppliers in India⁶. Similarly, Cargill discovered after acquiring Ewos that Ewos was participating in a salmon feed cartel in Chile⁷. Knowing that a target company is a member of a cartel would be useful information for an acquiring company to have prior to an acquisition⁸.

6 "India Watchdog Fines United Breweries, Carlsberg In Price Fixing Case," *Competition Policy International*, 26 September 2021.

7 Cliff White, "Biomar, Skretting, Salmo Food accused of fixing price of aquafood in Chile, based off Cargill whistleblower complaint," *SeafoodSource*, December 20, 2019, www.seafoodsource.com/news/supply-trade/biomar-skretting-salmofood-accused-of-fixing-price-of-aquafood-in-chile-based-off-cargill-whistleblower-complaint.

8 "[S]creens can be valuable in the due diligence process before a merger or acquisition." Donald C. Klawiter, "Conspiracy Screens: Practical

To be more concrete, let me offer some examples of companies who are particularly likely to profit from cartel screening. Companies that purchase commodities or engage in price-only procurement auctions (i.e., the contract goes to the bidder offering the lowest price) would especially benefit because cartels are most common in such input markets⁹. Larger companies have greater input expenditure and thus stand to gain more in terms of cost savings from detecting a cartel which is likely to well exceed the cost of screening.

In order to flesh out who these companies are that would particularly benefit from cartel screening, consider some examples of inputs for which there have been documented cartels¹⁰. Manufacturing companies that purchase commodities such as chemicals, industrial gases, paper, and corrugated and cardboard boxes could all benefit from cartel screening; as would companies that ship whether they use air cargo suppliers, container shipping, moving and storage services, or freight forwarders. Examples include auto manufacturers – who bought inputs from cartels in auto parts, computer chips, and urethane – and computer manufacturers – who experienced cartels in their purchase of DRAMs, SRAMs, SD memory cards, graphics processors, liquid crystal display panels, and optical disk drives.

Construction companies routinely overpay for inputs as cement suppliers frequently collude and there have been cartels in bath and kitchen fixtures, steel and copper tubes and pipes, elevators, glass, plasterboard, PVC plastic, steel beams, asphalt paving, crushed stone and rubble, and explosives. Retail food companies, such as supermarkets and restaurant chains, have purchased cartelized inputs in the form of chicken, pork, canned tuna, pasta, eggs, and toilet paper. Food processing companies who purchased citric acid, vitamins, sugar, and salt did so at inflated prices due to collusion; while the same has been true with agricultural companies in their purchase of fertilizer and insecticides.

The point is that many companies are routinely buying inputs from suppliers who are participating in a cartel and, as a result, are paying excessively high prices. A large conglomerate firm is probably almost surely paying cartel overcharges. In response to having been a victim of multiple cartels among its input suppliers, the German railway company Deutsche Bahn is currently developing a screening program¹¹ which, I have been told, will be operational by the end of 2021.

While our attention is primarily focused on determining whether a company is buying from a cartel, there can also be value to a company learning that it is participating in a cartel. If senior management decides it does not want its employees to engage in an illegal cartel (though many cartels have involved senior managers), simply announcing such a policy may be insufficient when a manager's bonus or promotion rests on how well their division performs. If aggressive competition is harming profits, the temptation can be strong to cartelize in order to get prices and profits up. Using cartel screening methods to determine whether the company is colluding in some of its markets could end any collusion and, when screening is made known to a company's employees, deter cartel participation. In this manner, cartel screening would be analogous to internal audits to identify fraud or embezzlement.

Defense Perspectives," *CPI Antitrust Chronicle*, 1 (March 2012), 2.

9 Joseph E. Harrington, Jr., "Thoughts on Why Certain Markets are More Susceptible to Collusion and Some Policy Suggestions for Dealing with Them," OECD Background Paper, Global Forum on Competition, 19 October 2015.

10 Many of these cartels are from John M. Connor, "The Private International Cartels (PIC) Data Set: Guide and Summary Statistics," August 9, 2016.

11 Hannes Beth and Thilo Reimers, "Screening Methods for the Detection of Antitrust Infringements," 31 October 2019 (ComplianceBusiness - Das Online-Magazin, Edition 3/2019).

A cartel screening program also credibly conveys a desire to avoid cartels and that it is not simply “cheap talk” to placate a company’s compliance division or the government. After being one of the most prolific cartelists with involvement in at least nine cartels over 1987-2007¹², AkzoNobel espoused a commitment to compliance as CEO Hans Wijers announced:

The Board of Management considers compliance with competition law to be more than a legal requirement; it is core to AkzoNobel’s value of integrity and responsibility. ... We want it to be unmistakably clear to the outside world and to our employees alike, that we compete fairly and lawfully; and with integrity¹³.

If indeed this was the genuine sentiment of Mr. Wijers, institution of a cartel screening program would add action to make those words more meaningful¹⁴.

Another set of private actors are law firms and economic consulting firms who would provide a service to those companies who may be victims of cartels. The demand for this service may come from companies who have suspicions based on input suppliers’ conduct such as an inexplicable rise in prices or the lack of willingness of suppliers to bid for their business (which would be part of a customer allocation scheme). Or there may be talk between purchasing agents and sales representatives where the latter seem unconcerned with competition. As such suspicions may be insufficient to cause a company to modify its procurement procedures or bring a complaint to the competition authority, screening methods can help deliver the evidence to justify such actions. The clients of a law firm may share their concerns with it, and it would serve the law firm’s interests to be able to offer a constructive response with the assistance of an economic consulting firm. The latter would be compensated by a fee for service. The law firm can financially benefit through a fee for service but also in representing the companies in any subsequent damage litigation.

As trade associations are created to serve its members, they are another actor who could engage in cartel screening. Its members routinely supply them with data which could include input price data to be screened for evidence of collusion. A trade association that identified a cartel that was harming the profits of many of its members would be delivering a valuable service. In a similar spirit, consumer associations would be benefitting consumers by detecting cartels and reporting them to the competition authority.

III. CARTEL SCREENING IS COST EFFECTIVE

Thus far the focus has been on the benefit side of the cartel screening ledger as I have explained how companies, law firms, economic consultancies, and trade and consumer associations can benefit by detecting cartels. Of course, cartel screening is worthwhile only if cartels can be detected at a reasonable cost. While a proper coverage of this issue is beyond the scope of this paper, I will endeavor to show that the screening can require a modest amount of resources while still being effective.

Cartel screening requires: 1) data; and 2) knowing what to look for in the data. The trick to cost effective screening is to use easily available data and deploy general and simple empirical methods that can be

12 William E. Kovacic, Robert C. Marshall, and Michael J. Meurer, “Serial Collusion by Multi-product Firms,” *Journal of Antitrust Enforcement*, 6 (2018), 296-354.

13 *AkzoNobel Competition Law Compliance Manual*, August 2008.

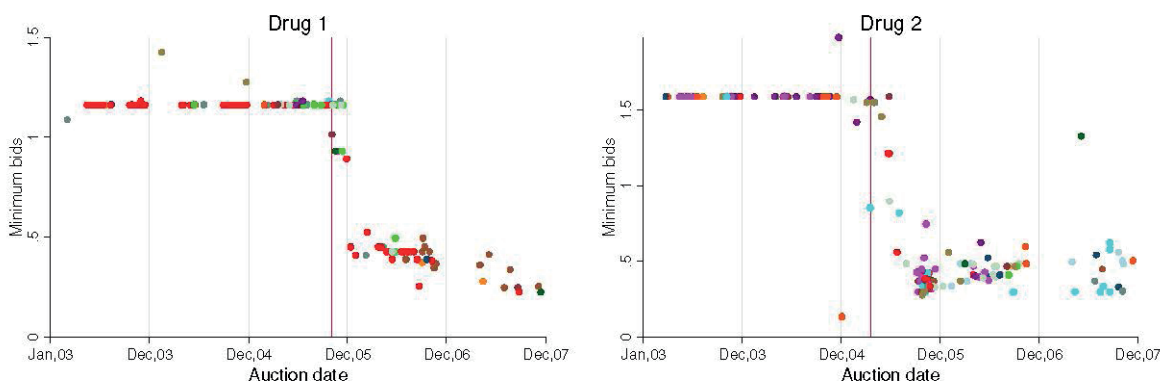
14 For a further discussion of the use of cartel screening for antitrust compliance and internal audits, see Klawiter “Conspiracy Screens”.

automated. My discussion will focus on the use of price (or bid) data which a company will have (as it is the prices they paid for inputs) and any of the other actors will be able to access from their clients or members. In some cases, price data is also publicly available, especially in the form of aggregate statistics which can be useful for screening¹⁵.

In terms of what to look for in that data, there are three general screening methods: 1) structural breaks; 2) collusive markers; and 3) anomalies. A “structural break” is a change in the data-generating process (whether it is prices or bids or some other variable such as market share) due to cartel birth, cartel death, or temporary disruption of collusive conduct. A “collusive marker” is a pattern in the data that is more consistent with collusion than competition. An “anomaly” is a pattern in the data that is inconsistent with competition and, upon some analysis, is found to be consistent with collusion. Once having the data, various empirical methods can be used to identify whether there is a structural break, a collusive marker, or an anomaly. In some cases, it is just a matter of plotting the data whereupon the naked eye reveals striking evidence that something is amiss. Here, I offer some cases to illustrate the methods and that screening can be straightforward¹⁶.

Whether a cartel forms, dies, or is temporarily disrupted, there can be a drastic change in the pattern of prices or bids. Various statistical methods are designed to look for a structural break but let me offer an example in which a simple plot of the data is sufficient for detection.

Figure 1: Generic Drug Prices During and After the Cartel¹⁷



In Mexico, the largest public health provider purchased generic drugs by conducting a procurement auction with the supply contract going to the lowest bidder¹⁸. As it turns out, it was paying a highly inflated price due to the presence of a cartel. This was easily observed in the data when certain events caused the cartel to collapse. By way of example, Figure 1 shows the price paid for insulin (drug 1) and calcium (drug 2). The vertical line marks the end of collusive bidding and there is a striking change in the data. Initially, the

15 For example, a government-provided cement price index provided evidence of a German cement cartel; see Kai Hüschele and Tobias Veith, “Cartel Detection in Procurement Markets,” *Managerial and Decision Economics*, 6 (2014), 404-422.

16 My discussion will focus on structural breaks and collusive markers. A previously mentioned example of an anomaly is the Nasdaq case where firms’ prices rarely ended in 1/8, 3/8, 5/8, or 7/8. Another example is the case of “missing bids;” see Sylvain Chassang, Kei Kawai, Jun Nakabayashi, and Juan Ortner, “Robust Screens for Non-Competitive Bidding in Procurement Auctions,” working paper, June 2021.

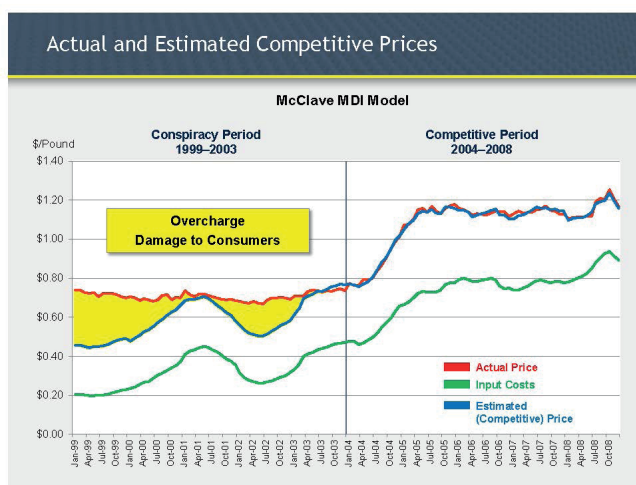
17 Ernesto Estrada and Samuel Vazquez, “Bid Rigging In Public Procurement Of Generic Drugs In Mexico,” draft.

18 Ernesto Estrada and Samuel Vazquez, “Bid Rigging In Public Procurement Of Generic Drugs In Mexico,” *Competition Policy International Journal*, 9 (2013), 100-122.

price was high and stable across tenders, but then it was much lower and more variable. No sophisticated empirical analysis is needed to conclude that there has been a radical change in how firms bid and the natural hypothesis is that there was a cartel. Clearly, an in-depth investigation would be warranted based on this evidence.

This case is not an outlier as a simple visualization technique was sufficient for other cartels. With a road paving cartel, the winning bid was periodically subject to a sharp decline¹⁹. The price paid was almost always in the range of 91-95% of a reference price but, whenever one or two firms participated in the auction, it would fall below 85% of the reference price. The winning bid was never in the 85-90% range! Plotting the data showed this striking gap in prices which is clearly inconsistent with competition. We now know there was a cartel and those two firms were not part of it. Their periodic participation caused a temporary hiatus on coordinated bidding.

Figure 2: Urethane Prices During and After the Cartel²⁰



Turning to collusive markers, one of the most effective markers is the coefficient of variation for prices (or bids). The coefficient of variation is the ratio of the standard deviation of prices (which measures the variability of prices across firms or across time) and the average price. Collusion tends to result in an abnormally low coefficient of variation for two reasons. First, collusion raises price so the average price is higher and that lowers the coefficient of variation (as the average price is the denominator in the coefficient of variation). Second, collusion often results in less variability of prices across firms and across time (as seen in Figure 1) which reduces the standard deviation of prices and that also lowers the coefficient of variation (as it is the numerator). Visually, one can see this for a urethane cartel where Figure 2 reports the prices paid for urethane (red line) along with the input cost for urethane (green line). (The blue line is the estimated competitive price but that is not relevant to this discussion.) Under competition, price and cost move together so there is a fair amount of volatility in prices coming from cost variability. In comparison, prices are very stable over time under collusion in spite of widely fluctuating cost.

The stark effect that collusion can have on the coefficient of variation is exemplified by a cartel of frozen perch (which is a type of fish)²¹. The coefficient of variation was more than four times smaller with a cartel.

19 Reiko Ishii, "Collusion in Repeated Procurement Auction: A Study of a Paving Market in Japan," working paper, 2008.

20 Class Plaintiffs' Response Brief, *In re: Urethane Antitrust Litigation*, U.S. Court of Appeals for the Tenth Circuit, February 14, 2014; 18.

21 Rosa M. Abrantes-Metz, Luke M. Froeb, John Geweke, and Christopher T. Taylor, "A Variance Screen for Collusion," *International Journal*

In the case of a Swiss construction cartel, the coefficient of variation was more than 2.5 times smaller under collusion²². Using machine learning, a recent study trained an algorithm to detect cartels using data on collusive and competitive episodes and found several effective markers including the coefficient of variation²³. Impressively, the algorithm had an 85% success rate in detecting a cartel in the data.

IV. CONCLUDING REMARKS

Cartels harm companies who buy from them through the higher prices that they pay. To avoid suffering further harm and receive compensation for past harm through private litigation, the cartel must first be detected. Using easily available data and simple empirical methods, cartel screening offers a cost-effective method for identifying markets with cartels. Deployed by many competition authorities, cartel screening can be a profitable activity for many private actors including companies who are victims of cartels, law firms and economic consultancies who can offer screening services for their clients, and trade and consumer associations who can perform this service for their members.

Those who are interested in training with regards to cartel screening can attend the Cartel Screening course offered by the Competition & Regulation European Summer School and Conference (CRESSE)²⁴. All of their competition policy courses are delivered annually and on request at agreed-upon locations.

of Industrial Organization, 24 (2006), 467-486.

22 David Imhof, "Econometric Tests to Detect Bid-rigging Cartels: Does It Work?," *Working Paper SES*, 483 (2017).

23 Martin Huber and David Imhof, "Machine Learning with Screens for Detecting Bid-Rigging Cartels," *International Journal of Industrial Organization*, 65 (2019), 277-301.

24 <https://www.cresse.info/>



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