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Guiding principles in setting cartel sanctions

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Marcel Boyer

marcel.boyer@umontreal.ca

Emeritus Professor of Economics

University of Montreal

Anne Catherine Faye

annecatherine.faye@analysisgroup.com

Vice-President and Economic Consultant

Analysis Group, Montreal

Éric Gravel

egravel@statlogconsulting.com

Managing Partner and Econometrician

Statlog Consulting, Quebec

Rachidi Kotchoni

rachidi.kotchoni@parisnanterre.fr

Senior Economist

World Bank, Cotonou

Associate Professor of Economics

University of Paris-Nanterre (Paris X)

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marcel.boyer@umontreal.ca

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Rachidi Kotchoni

rachidi.kotchoni@parisnanterre.fr

Senior Economist
World Bank, Cotonou

Associate Professor of Economics
University of Paris-Nanterre (Paris X)

ABSTRACT

We discuss various theoretical and empirical hurdles that antitrust authorities and courts must overcome to determine appropriate cartel sanctions, namely regarding the probability of detection, cartel dynamics, cartel duration, and cartel overcharge.

Nous discutons des enjeux et embûches théoriques et empiriques auxquels les autorités de concurrence et les tribunaux font face pour sanctionner les cartels, à savoir la probabilité de détection, la dynamique de cartel, la durée de l'impact et le surprix.

Guiding principles in setting cartel sanctions

I. Introduction

1. Many antitrust authorities use fines and prison terms to prevent the formation of cartels or to destabilize operating ones. Sanctions against cartels are usually higher than those set for other infringements of competition laws, reflecting the consensus that price fixing, limitation of production, and market allocation cases (the so-called “naked cartels”) are particularly serious antitrust offenses that should be punished severely. Using relatively stiff sanctions, antitrust authorities pursue two objectives: restitution and deterrence.

2. The development of such antitrust public policy is grounded in economic theory from the pioneering contributions of economists in the 1960s to recent advances in assessment methods and econometrics. Gary S. Becker (1968) and William M. Landes (1983) developed the leading economic approach underlying the deterrence of criminal activities. Their basic proposition is that a firm will refrain from cartel activity if its expected net incremental profit of doing so is negative, i.e., if the expected cartel profit is lower than the expected loss, which is measured by the product of the anticipated fine and the probability of detection and conviction.

3. Over time, the prominence of economic analysis has been continuously reaffirmed in the development and implementation of antitrust policy. Boyer, Ross, and Winter (BRW 2017) draw a historical overview of how economics was gradually integrated into competition policy. They suggest that fifty years ago, economists were playing a minor role in the antitrust world, typically collecting statistics under lawyers’ instructions, although “[t]he economic basis for competition policy towards cartel pricing was understood from the start [and] the basic proposition was clear: cartels lead to higher prices to the detriment of consumers and the economy.” BRW characterize recent developments as an effort to incorporate into competition policy a more holistic vision of economics, organizations, and institutions. Today, economists and policy makers attempt to distinguish between collaboration mechanisms that could enhance efficiency and wealth creation and those that represent an outright exercise of market power.

4. In this paper, we discuss four challenges that represent issues of methodological importance in setting optimal cartel fines: the multi-period probability of detection and conviction, the modelling of cartel dynamics, the estimation of the cartel duration, and the measure of cartels’ typical price overcharge. Our analysis provides an outlook on how economics, law, and antitrust rules and practices can converge towards the common goal of setting optimal cartel sanctions.

II. The multi-period probability of detection and conviction

5. Becker (1968) put forth an economic approach to crime and punishment and determined optimal policy tools to fight criminal offenses. In this paradigm, the reduction of crime can take place through different channels including the increase in wages and profits in the legal sector, the reduction of benefits in the criminal sector, the increase in the probability of detection and conviction, and the severity of the punishment in case of conviction. According to Becker, the government could reduce policing costs, hence the probability of discovery, and simultaneously increase the level of punishment as long as socially costless means of punishment (such as fines) are available.

6. Landes (1983) built on the pioneering research of Becker to analyze the theoretical foundations of an optimal antitrust penalty and applied his findings to various antitrust violations including predatory pricing and cartels. Landes suggests punishing antitrust violations such that proper behavior is encouraged, i.e., impose harm-based rather than gain-based penalties. A large body of the economic literature on the deterrence of cartel activities relies mainly on the theory developed by Becker and Landes: The optimal fine should equal the harm caused by the cartel divided by the probability of detection and conviction. In principle, the harm caused by a cartel includes not only the damages incurred by competitors and clients or consumers but also the resources devoted by antitrust authorities and courts in their fight against cartels. However, the bulk of harm imposed by a cartel is epitomized by the price overcharge.

7. The Becker-Landes rule aims for the return of the cartel excess profits to all stakeholders in the economy that have been harmed by the cartel's activity. This rule requires that the expected net gain of a firm contemplating to join a cartel is equal to zero. At the aggregate level, the rule guarantees that the "cartel game" clears: Firms found guilty of price-fixing behavior pay for those that remain unnoticed. In other words, if a firm commits ten similar crimes but is caught only once, it would be fined ten times the harm caused by its single detected crime.

8. Let's assume that a cartel makes a constant excess profit $\Delta\pi$ above the competitive level in every period and that it has a probability α of being detected in every period. If the cartel operates for N periods before being detected and convicted, its cumulated cartel profit is equal to $N\Delta\pi$. The probability of detection over N periods is $1-(1-\alpha)^N$. In this case, the optimal fine based on the Becker-Landes approach is:

$$F_N = \frac{N\Delta\pi}{1 - (1 - \alpha)^N}$$

9. Given that the Becker-Landes rule treats the cartel game as a static one, the fine implied by this rule is equal to the cumulative overcharge of the cartel over its lifetime divided by the cumulated probability of detection. The denominator $1-(1-\alpha)^N$ converges to 1 as the duration N increases. Intuitively, the longer a cartel operates, the more likely it will end up being detected.

10. An important but common mistake would be to divide the cumulative overcharge $N\Delta\pi$ by the one-period probability of detection α . Indeed, using α rather than $1-(1-\alpha)^N$ leads to overestimating the optimal fine and the severity of the overestimation intensifies as the number of periods N increases.

11. A fining rule that aims at deterrence à la Becker-Landes will often violate the principle of proportionality, which stipulates that a sanction should be set in proportion to the harm caused and should not be more severe than the minimum level needed to deter the unlawful behavior.

12. The Becker-Landes rule, which considers a static framework in setting a cartel sanction, has some limitations: It fails to account for (i) the dynamic nature of the interactions between the firms participating in a cartel, and (ii) the strategic nature of each firm's decision, repeated under no commitment, to join and remain a cartel member, a challenge discussed in the next section.

III. The modelling of cartel dynamics

13. Firms make strategic decisions in a dynamic environment with the objective of maximizing their overall profit or value. Although cartel members implicitly agree to abide by the rules for an indefinite period, each firm can decide to deviate at any point in time if doing so is perceived to be more profitable than the status quo. Analyzing these firm decisions requires a dynamic framework. Such a dynamic analysis has profound implications on our understanding of the formation of cartels, their stability over time, as well as on the optimal fining rule.

14. Allain, Boyer, Kotchoni, and Ponsard (ABKP 2015) consider an infinitely repeated game where several symmetric firms communicate at the beginning of each period to decide whether to form or continue a cartel or not. By definition, the consent of all firms is needed for the cartel to be created or maintained. In each period, any given firm can decide to participate and abide by the rules of the cartel or deviate.

15. There is no simple way to characterize the dynamic environment of cartels but the ABKP formulation is sufficiently general to be representative of most cases. In each period, firms first communicate and agree or not to form or continue the cartel (stage 1) and then, if the cartel is agreed upon, each firm decides (stage 2) whether to abide by the cartel rules or not. If one or more firms

refuse to participate (stage 1), the cartel does not proceed. If all firms agree to participate, then each firm may either follow the cartel strategy or deviate (stage 2)—if one firm deviates, all firms observe the deviation at the end of the period and the cartel dissolves for all future periods.

16. A firm typically considers three levels of possible one-period profit: its cartel profit, its deviation profit, and its no-cartel profit. ABKP assume that the deviation profit level is the largest, followed by the cartel profit level, and the no-cartel “competitive” one. Assuming that all other firms abide by the cartel agreement, a given firm will abide also if its value under the cartel is larger than its value under deviation and will deviate otherwise. Its value under the cartel is the present value of the forever sequence of cartel profit levels. Its value under deviation is the larger one-period deviation profit and the present value of the subsequent lower no-cartel profit levels.

17. ABKP also assume that antitrust authorities can discover a cartel only if it is active. If a firm deviates, the cartel dissolves and the authorities will never discover it, and therefore no fine will then be imposed on cartel members. Comparing the discounted firm values leads ABKP to characterize the fine level F^d that, given the one-period probability of detection α , induces a firm to deviate and cause the collapse of the cartel. ABKP show that F^d must be no less than the cartel excess profit $\Delta\pi$ divided by α . In other words, the fine must satisfy $\alpha F^d \geq \Delta\pi$.

18. The fine F^d differs from the Becker-Landes deterrent fine F_N defined above. ABKP conducted a firm-level analysis of European cartels between 2005 and 2012. For each firm, they compared the actual fine with the dynamic deterrent fine F^d under several scenarios of cartel overcharge, competitive markup, and demand elasticity. They found that between 30% and 80% of the fines imposed by the European Commission during this eight-year period are above their respective dynamic deterrent level.

19. In a dynamic context, the fine F^d is the proper deterrent fine level. However, it may fail to be compensatory or restitutive, that is, large enough to compensate the victims for the harm caused by the cartel. In particular, if the cartel has been operating for many years. Ignoring discounting issues and other social costs generated by the cartel, the compensatory fine may be estimated as the cumulative excess profit over the lifetime of the cartel: $F^c = N\Delta\pi$. An optimal fine F^* may therefore be robustly defined as the larger of the compensatory and deterrent fine levels: $F^* = \max \{F^c, F^d\}$.

20. To ascertain the compensatory fine F^c , one needs to determine the value of N , that is, the duration of the cartel or more precisely the duration of its impact. This is another challenge we discuss in the next section.

IV. The estimation of the cartel’s impact duration

21. Accurate information about the period during which a cartel operates is important for a precise calculation of its cumulative overcharge over time. Sometimes, the detailed data needed to calculate the overcharge (e.g., marginal cost, markup, etc.) are available only for one year. If it is established that the cartel operated during N years, the one-year data may be used to estimate the overcharge for that particular year, which can then be multiplied by N to obtain an estimate of the total cumulative overcharge of the cartel over time. However, determining N is no easy task as the cartel may have been operative more or less for a longer period than the period appearing in the “legal” indictment.

22. Harrington (2006) developed a set of collusive indicators, which if present, can help distinguish between collusion and competition. Harrington argues that certain price markers are especially relevant in informing whether a cartel may be in operation. These include: a higher list price and reduced price variation across customers; a series of steady price increases preceded by steep price declines; an increase in prices while imports decline; whether firms’ prices are strongly correlated; whether there is a high degree of uniformity across firms in product, price, and other dimensions including prices for ancillary services; whether there is low price variance across customers; and whether prices are subject to regime changes. Although these markers may be useful starting points, they may also be characteristics of competitive markets with firms reacting to changes in their environment. Their most important drawback is that to be estimated, these price-based markers require detailed data gathering on specific markets. The number of such collusion-prone markets may be very large.

23. In general, antitrust authorities must rely on information collected by investigators or on economic experts’ conclusions to estimate the duration of cartels. However, cartels members tend to understate the true cartel duration in their statements to investigators, including those members aiming for leniency. In some cases, cartels continue to operate several months after investigations have started in order to cast ambiguity on the but-for price, hence the level of the actual overcharge, because keeping a high price after the “legally defined” end of the cartel would raise the but-for price. Lowering the price immediately after the beginning of an investigation would contribute to proving that an effective and successful cartel was in fact in operation.

24. Unless they recognize the cleverness of cartel members, antitrust authorities may end up underestimating the cartel overcharge and overall harm. It is therefore important to distinguish between the legal collusion period as defined in the indictment and the

relevant period for purposes of estimating the impact of the collusion. The relevant period is the period during which coordination between the parties had an influence on prices. The collusion may have started before or may have continued, at least implicitly, beyond the legal period. If the analysis is performed on the incorrect period, economic experts may find insignificant cartel price overcharges despite the overwhelming evidence that a cartel operated during the alleged period.

25. The American Bar Association in its 2014 econometric textbook warns analysts about the common mistake of simply taking the legal period as the relevant period for estimating cartel damages. The ABA suggests that antitrust authorities rely on the evidence obtained in discovery, market facts, and analyses performed by economic experts, including econometricians, when determining the relevant cartel duration for calculating damages (see also Hüschele and Veith 2011, 2016).

26. The following two examples illustrate this crucial point. The first case is reported in Boyer, Faye and Pinheiro (2019) and relates to a retail gasoline cartel in Canada. A sharp reduction in price volatility across sellers suggested a relevant period of cartel operation between January 2001 and June 2006, while the indictment filed by antitrust authorities defined a legal period from January 2004 to June 2006. In estimating the effect of the cartel on prices, the data from January 2001 to December 2003 (three years of data), even if outside the legal or alleged period of collusion as mentioned in the indictment, could not be considered as free of collusion. To avoid falling into a Type II analytical error, i.e., discharging as not guilty a harmful cartel, three years of data prior to the legal period were dropped from the econometric analysis. At trial, one of the accused cartel members admitted that indeed the collusion began in early 2001.

27. The second case is reported in Boyer and Gravel (2019) and relates to a mid-2000s conspiracy by two British airlines to fix the passenger fuel surcharge (PFS). The authors claim that one should not underestimate the sophisticated reasoning of cartel strategists, even after one cartel member filed evidence seeking full leniency. The data show that the relevant period of collusion, insofar as the empirical impact of the PFS conspiracy on ticket prices is concerned, may have extended until November 2006, that is, five months after the antitrust authorities' raid (June 2006) and three quarters after the end of the legal or alleged conspiracy period (February 2006). Whether this is the appropriate period or not is in good part an empirical question but a significant one in estimating cartel damages.

28. The above two cases show the power of economic and econometric analyses in identifying the duration of the cartel (case 1) and the duration of the cartel impact (case 2). The value of N is one of the two main components of the cartel excess profit $N\Delta\pi$, the other one being the cartel price overcharge. If the estimation of the relevant value of N is a challenging task, the factors underlying the value of $\Delta\pi$ is also a significant source of pitfalls, hence errors in assessing cartel deterrent and

compensatory fines. In some cases, no clear evaluation of $\Delta\pi$ is possible and antitrust authorities must rely on benchmarks. A benchmark analysis is discussed in the next section.

V. The measure of price overcharges

29. The but-for price is the price that would prevail in a hypothetical world where the cartel is absent. This counterfactual world is difficult to characterize because the trajectory of observed prices over time is the result of several causes. For instance, an inelastic demand may grant firms significant market power that translates into high markups, absent collusion. Product differentiation can create and maintain the conditions for an oligopolistic competition.

30. An overcharge (expressed as a percentage of the but-for price) obtained from the conversion of a Lerner index (i.e., a measure of a firm's market power relating price to marginal cost) is often biased upward relative to the proper cartel-based overcharge when the but-for world deviates from pure and perfect competition (e.g., oligopoly, monopolistic competition). Clearly, nonzero markups exist and tend to be the norm rather than the exception. The estimation bias of a Lerner index conversion is proportional to the ratio of the "imperfectly competitive, cartel-free markup" to the marginal cost, which is higher when market power absent collusion is more important. Intuitively, as compared to perfect competition, the outcome of an oligopolistic or monopolistic competition market game is closer to that of a collusion. As an implication, firms that operate in oligopolistic sectors where market power is high would have a higher likelihood of incurring inflated cartel fines.

31. The estimation risk associated with the conversion of a Lerner index may be avoided by considering alternative methods such as "before-and-after" or "with-and-without/yardstick" methods (Connor 2010). In the before-and-after method, one estimates the overcharge as the difference between the sample averages of prices observed inside and outside the periods covered by the cartel episode. In the with-and-without/yardstick method, one compares the average price that prevailed on the cartelized market with the average price on a yardstick market that operated under "competitive cartel-free" conditions during the same period. However, these methods have their own estimation problems and risk.

32. Besides the fact that the period covered by the cartel is difficult to identify with precision, the before-and-after method is not robust to shifts in firms' cost structure and shifts in market conditions that naturally change prices in a competitive environment. Moreover, a cartel may start or end by a price war that pushes prices below the marginal cost. As for the with-and-without/yardstick method, it must consider that the price increase caused by

the cartel can bring about a demand shift toward nearby (yardstick) markets. Similarly, competing firms that are not participating in the collusion may tend to follow the cartel price (the so-called “umbrella effect”).

33. Given the complexity of estimating the but-for price, simplistic overcharge calculation methods will often be biased. Carefully specified structural econometric models are needed to handle the complexity of the real world and mitigate any estimation bias. Econometric methods can be used to simulate oligopolistic competition (e.g., Cournot and/or Bertrand), predict the Lerner index of market power, or estimate demand and cost functions that account for dynamic strategic interactions among firms. However, structural models require internal accounting data that may not be available to the experts in charge of damages calculation.

34. The estimation of cartel overcharges would be tedious and costly if antitrust authorities had to conduct detailed investigations on a case-by-case basis. Therefore, antitrust authorities need a reference interval that can be used in cases where the exact evaluation of the cartel overcharge is overly costly.

35. As a result, antitrust authorities have designed administrative rules to determine fines without detailed measures of the cartel impacts. The U.S. Sentencing Guidelines (USSG) Commission prescribes a base fine of 10% of the affected volume of commerce for a firm that is convicted of cartel activity, plus another 10% for the harm “*inflicted upon consumers who are unable or for other reasons do not buy the product at the higher price.*” This yields a recommended fine of 20% of affected sales, subject to further adjustments for aggravating and mitigating factors. The total cartel fines generally range from 15% to 80% of affected sales.

36. Similar rules apply in Europe as well as in other jurisdictions. The European Commission sets the base fine in the range of 0% to 30% of affected commerce. To this base fine, 15% to 25% may be added as a dissuasive measure. However, the total fine must be kept under 10% of the worldwide group turnover in the financial year preceding the decision.

37. Academic researchers have questioned whether the fines implied by these guidelines are too high or too low. For instance, Cohen and Scheffman (1989) argue that an increase of 1% of a price above its competitive cartel-free level will likely result in a reduction of sales of more than 1%. Based on this, they concluded with respect to the USSG that “*at least in price-fixing cases involving a large volume of commerce, ten percent is almost certainly too high.*” More recently, Adler and Laing (1997, 1999) and Denger (2003) also judge that fines imposed to cartels in the U.S. are “*astronomical*” or “*excessive.*”

38. Connor and Lande (2008) examine a large number of overcharge estimates available in previous studies and conclude that: “*the current Sentencing Commission presumption that cartels overcharge on average by 10% is much too low.*” They find an average overcharge in the

range of 31% to 49% and a median in the range of 22% to 25%. Connor (2010, 2014) reaches similar conclusions by using an extended sample of overcharge estimates.

39. Combe and Monnier (2011, 2013) analyze 64 European cartels and conclude that the fines imposed against cartels by the European Commission are too low. However, Allain, Boyer, and Ponsard (2011) using a dynamic rather than static model of cartel stability to reassess those results find that fines imposed by the European Commission in these 64 cartels are on average above the deterrence level.

40. Boyer and Kotchoni (2015) reassess the study of Connor and Bolotova (2006) using an extended version of their database and a more appropriate econometric methodology. The database contains information on 1,119 overcharge estimates as well as several variables that describe the cartel episodes (e.g., duration, scope, geography, etc.). The database also includes variables that describe factors or events that are posterior to the cartel episode (e.g., estimation method or publication source). Boyer and Kotchoni (2015) find mean and median bias-corrected overcharge estimates of 16.7% and 16.2% for the subsample of effective cartels (with strictly positive overcharge estimates), and of 15.5% and 16.0% for the whole sample. These bias-corrected overcharges are significantly lower than the corresponding mean and median suggested by the raw data.

41. Building on those results, Allain et al. (2015) consider a recent European database on cartels and conclude that the majority of firm-level fines imposed by the European Commission over the period 2005–2012 are above the deterrence level.

42. Using advanced economic and econometric analytical tools, these authors were able to reassess cartel fines and bring some support to the administrative rules used to determine sanctions. Their findings ran against the dominant view that cartel fines were too low to deter cartel activity.

VI. Conclusion

43. We discussed challenges and pitfalls faced by antitrust authorities in determining sanctions against cartels, namely, the assessment of the probability of detection and conviction, the modelling of cartel dynamics, the identification of the relevant cartel duration and the estimation of but-for prices and cartel overcharges. We showed that both the harm caused by cartels—or the illicit profits $N\Delta\pi$ gained—and the probability of detection pose significant measurement problems, which may lead to significant errors in the assessment of fines. We showed also that the modelling of cartel dynamics has significant implications for the level of deterrent fines.

44. These developments bring theoretical and empirical support to the administrative rules used by European and American antitrust authorities, among others, in determining appropriate cartel fines. ■

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