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# How High Do Cartels Raise Prices? Implications for Optimal Cartel Fines

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# AMERICAN ANTITRUST INSTITUTE SYMPOSIUM: THINKING CREATIVELY ABOUT REMEDIES

# How High Do Cartels Raise Prices? Implications for Optimal Cartel Fines

John M. Connor*
Robert H. Lande†

*This Article examines whether the current penalties in the* United States Sentencing Guidelines *are set at the appropriate levels to deter cartels optimally. The authors analyze two data sets to determine how high on average cartels raise prices. The first consists of every published scholarly economic study of the effects of cartels on prices in individual cases. The second consists of every final verdict in a U.S. antitrust case in which a neutral finder of fact reported collusive overcharges. They report average overcharges of 49% and 31% for the two data sets, and median overcharges of 25% and 22%. They also report separate results for domestic cartels, international cartels, more recent cartels, and bid-rigging. The authors conclude that the current Sentencing Commission presumption that cartels overcharge on average by 10% is much too low. If this finding is correct, the principles of optimal deterrence imply that the current levels of cartel penalties should be increased significantly.*

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## I. INTRODUCTION

How high do cartels raise prices? Do cartels often or typically raise prices a significant amount for a significant period? Or, as some suggest, are their anticompetitive effects ephemeral because most cartels, established out of misguided optimism by naive businesspeople, collapse so quickly that meaningful statistics about how high they raise prices cannot even be computed? In light of the answers to these questions, are the current United States Sentencing Commission (Commission) cartel penalties—which are based upon a presumption that cartels raise prices by 10%—set at the right levels? Was the Antitrust Criminal Penalty Enhancement and Reform Act of 2004—which raised the maximum cartel fine from $10 million to $100 million—wise legislation?[1] Given our desire optimally to deter anticompetitive behavior and to permit desirable behavior, should the current antitrust penalties for different types of collusion cases be changed?

Despite the importance and the fundamental nature of these questions, this Article represents the first systematic and comprehensive attempt to study them. This Article will assemble and analyze the relevant empirical, economic, and legal evidence, using two very different sources of data.

The first set of evidence consists of every serious, scholarly social-science study of the effects of naked collusion in individual cases we have been able to find.[2] With very few exceptions,[3] we

1. Antitrust Criminal Penalty Enhancement and Reform Act of 2004, Pub. L. No. 108-237, § 215, 118 Stat. 665, 668 (to be codified at 15 U.S.C. § 1).

2. The list of case studies we found and used can be found in John M. Connor, *Price-Fixing Overcharges: Legal and Economic Evidence 75-97* (Am. Antitrust Inst.,

attempted to report on every scholarly study that contained quantitative information on the price effects of private cartels.[4] We separately analyzed domestic and international cartels of different types from different time periods to determine whether the increased penalties of recent years have been having significant effects.

Our second data source was obtained by examining every final verdict in United States collusion cases that we were able to find.[5] We searched for antitrust cases in which a neutral finder of fact[6] reported collusive overcharges in percentage terms or presented conclusions that could be converted into an overcharge percentage.[7]

This Article will analyze these two sets of evidence using the standard optimal deterrence framework.[8] This process will help determine whether the current *United States Sentencing Guidelines* for cartels have been set at the appropriate level to deter antitrust violations optimally.

This examination is especially timely in light of the effects of the recent Supreme Court decision in *United States v. Booker* on the *Sentencing Guidelines*.[9] Writing for the Court, Justice Stevens held

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Working Paper No. 04-05, 2004), *available at* http://www.antitrustinstitute.org/recent2/355.pdf. Portions of this Article draw upon and are taken directly from this working paper. We would be grateful to any readers who can point out case studies that we inadvertently omitted. For our inclusion methodology, see *infra* Part IV.

3. A small percentage was excluded due to poor quality. *See* John M. Connor, *Appendix Tables for Price-Fixing Overcharges: Legal and Economic Evidence* (Purdue U. Agric. Econ., Staff Paper No. 04-17, 2005), *available at* http://www.agecon.purdue.edu/staff/connor/papers/PRICE_FIXING_OVERCHARGES_APPENDIX_TABLES_8-05.pdf. These tables provide the basis for the conclusions presented both in this Article and Connor, *supra* note 2.

4. In the vast majority of studies, the scholars themselves provided the overcharge calculations, although in a few cases we derived the results from the presented material. For a formal definition of the measured overcharges, see *infra* note 104 and accompanying text.

5. The list of the final antitrust verdicts that we found is in the Appendix. As discussed *infra* Part V, we attempted to find and include every final verdict in a U.S. cartel case. We would be grateful to any readers who can bring to our attention any verdict we inadvertently omitted.

6. We did not include settlements because parties sometimes settle for amounts that are unrelated to the actual overcharge involved or, in some cases, to whether the cartel at issue actually succeeded in raising prices. Nor did we include allegations made by government or private plaintiffs, or statements by defendants, because they often are subjective.

7. We made no attempt to critique or second-guess these judge or jury determinations.

8. For an explanation of the standard optimal deterrence framework, see *infra* Part II. This Article will not discuss whether the antitrust laws are exclusively concerned with deterrence or whether they are also concerned with compensation of victims.

9. 125 S. Ct. 738 (2005). A jury found the defendant guilty of possessing 92.5 grams of crack, a crime for which the statute authorized a minimum sentence of ten years and a maximum of life imprisonment, and for which the *Sentencing Guidelines* required the

that juries, not judges, must determine beyond a reasonable doubt every contested fact that might increase a defendant's punishment.[10] A separate opinion, by Justice Breyer, concluded that the *Sentencing Guidelines* were advisory instead of mandatory.[11] Although the effects of *Booker* on antitrust penalties are complex and difficult to predict,[12] under any plausible scenario the questions addressed by this Article are timely and of increasing importance.

To analyze this topic, this Article will first show how the current system of antitrust penalties was formulated. It will then demonstrate how optimal penalties for collusion should be related to the amount by which cartels are presumed to increase prices. This is the framework surrounding and the reasons underlying this Article's examination of how high cartels typically raise prices.

## II. OPTIMAL DETERRENCE AND THE 10% PRESUMPTION

The generally accepted approach to deterring antitrust violations optimally was developed by Professor William Landes.[13] He convincingly showed that to achieve optimal[14] deterrence[15] the damages from an antitrust violation should be equal to the violation's expected "net harm to others"[16] divided by the probability of detection and proof

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judge to select a base sentence between 210 and 262 months. *Id.* at 746 (Stevens, J., delivering the opinion of the Court in part). In a sentencing hearing, however, the judge determined by a preponderance of the evidence that Booker possessed an additional 566 grams of crack and was guilty of obstructing justice. *Id.* Therefore, the *Guidelines* required the judge to increase the sentence to between 360 months and life imprisonment. *Id.* The judge sentenced Booker to 30 years. *Id.* A similar scenario occurred in the companion case, *United States v. Fanfan*, 125 S. Ct. 738, 747 (2005).

10. The Court found that a judge may sentence a defendant based only on the "'facts reflected in the jury verdict or admitted by the defendant.'" *Id.* at 749 (quoting Blakely v. Washington, 542 U.S. 296, 303 (2004)).

11. *See id.* at 764 (Breyer, J., delivering the opinion of the Court in part).

12. *See infra* notes 236-249 and accompanying text.

13. William M. Landes, *Optimal Sanctions for Antitrust Violations*, 50 U. CHI. L. REV. 652, 656 (1983). Landes built upon and applied to antitrust a framework developed in Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169 (1968).

14. The quest is not complete deterrence because enforcement aggressive enough to deter all cartels is likely to penalize honest business conduct.

15. Professor Landes was not concerned with the compensation of victims. For an analysis that takes compensation into account, see Robert H. Lande, *Are Antitrust "Treble" Damages Really Single Damages?*, 54 OHIO ST. L.J. 115, 161-68 (1993).

16. The logic underlying the "net harm to others" standard was explained clearly by Professors Breit and Elzinga:

> The trick to discovering the optimal sanction is to find a rule that will force the potential cartelist to compare any cost saving from his activity with the deadweight loss triangle. If the cost saving were larger than the deadweight loss, it

of the violation.[17] Analysts of both the Chicago and post-Chicago schools of antitrust have almost universally accepted these principles.[18]

The "net harm to others" from cartels of course includes the overcharges they cause,[19] but also includes other, less obvious factors. First, market power produces allocative inefficiency—the deadweight loss welfare triangle.[20] Although allocative inefficiency often is significant empirically,[21] it apparently has never been awarded in an antitrust case.[22] Second, market power can produce "umbrella effects,"[23] another factor that can, in part, constitute a "net harm to

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> would be in his (and society's) interest to undertake the illegal activity. So after he deducts the monopoly profit rectangle . . . the cartelist will examine the deadweight loss (the remainder of the fine to be paid) and compare it with the value of the cost saving. The fine that is the sum of the deadweight triangle plus the profit rectangle is the correct sanction since it will encourage the "right" amount of illegal antitrust activity. Damages larger than this . . . could lead to over-deterrence . . . .
>
> . . . .
>
> A numerical example may help to clarify the concept of the optimal antitrust sanction. Assume that a potential cartelist calculates that joining a horizontal price-fixing conspiracy will increase his profits by $100 million. He also is aware that the deadweight loss imposed on society by his activity is $50 million. If the expected value of the fine imposed is the entire amount of consumers' surplus ($150 million) would he enter the cartel? He would do so if he believed that the cartel would be accompanied by cost reductions to him greater than $50 million. If the cost saving were, say, $60 million, he would still enter the price-fixing conspiracy because he would know that his fine would be $100 million (his cartel profits) plus $50 million (the deadweight loss) leaving him $10 million more revenue than would be the case if he did not enter the cartel. In this case the cartel is accompanied by cost reductions greater than the deadweight loss it imposes on society. On efficiency grounds, it should be permitted.

WILLIAM BREIT & KENNETH G. ELZINGA, ANTITRUST PENALTY REFORM: AN ECONOMIC ANALYSIS 11-12 (1986).

17. *See* Landes, *supra* note 13, at 666-68. Thus, if the harm were ten and the probability of detection and proof were .33, since 10/.33 = 33, the optimal penalty for this violation would be 33. This ignores risk aversion and other factors. *See id.*

18. *See* Lande, *supra* note 15, at 161-68. For this Article's purposes, however, the precise optimal deterrence standard used is not crucial. Similar results would arise if this article instead used a "gross harm to others" or a "net gain to the offenders" standard.

19. *See* Landes, *supra* note 13, at 656.

20. *See* EDWIN MANSFIELD, MICROECONOMICS: THEORY AND APPLICATIONS 277-92 (4th ed. 1982) (defining allocative inefficiency and providing proof that it is created by monopoly pricing); MICHAEL L. KATZ & HARVEY S. ROSEN, MICROECONOMICS 114 (3d ed. 1998).

21. *See* Frank Easterbrook, *Detrebling Antitrust Damages*, 28 J.L. & ECON. 445, 455 (1985). Judge Easterbrook made a number of standard assumptions and calculated that, due to the omission from damage awards of this factor alone, "'treble' damages really are [only] double the starting point of overcharge plus allocative loss." *Id.*

22. *See* David C. Hjelmfelt & Channing D. Strother, Jr., *Antitrust Damages for Consumer Welfare Loss*, 39 CLEV. ST. L. REV. 505, 505 (1991).

23. "Umbrella effects" is the name given to higher prices charged by nonviolating members that were permitted or caused by the violation's supracompetitive prices. PHILLIP E.

others" from anticompetitive conduct that is never or virtually never awarded.[24] Moreover, there are several additional types of harms that often are caused by cartels,[25] and cartel members sometimes have less[26] incentive to innovate or to offer as wide an array of nonprice variety or quality options.[27] Finally, all of a cartel's harms should be adjusted to present value.[28] When the adjustments that are at least somewhat quantifiable are combined, the results show that the "net harm to others" from a cartel typically is significantly more than the cartel's overcharges.[29]

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AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW 384-85 (Supp. 1992); William H. Page, *The Scope of Liability for Antitrust Violations*, 37 STAN. L. REV. 1445, 1465-67 (1985). To illustrate, OPEC never produced even 70% of the free world's supply of oil. *See* MOHAMMED E. AHRARI, OPEC: THE FAILING GIANT 203 (1986). Yet, when OPEC raised prices, noncartel members also increased oil prices. *See* OPEC, Annual Statistical Bulletin 20 (2004), *available at* http://www.opec.org/library/Annual%20Statistical%Bulletin/pdf/ASB2004.pdf (last visited Jan. 18, 2005). Moreover, the price of fuels that were partial substitutes for oil, such as natural gas, also rose. *See, e.g.*, Stephen P.A. Brown, *Natural Gas Pricing: Do Oil Prices Still Matter?*, SOUTHWEST ECON. 4 (Fed. Res. Bank of Dallas July/Aug. 2005), *available at* http://www.dallasfed.org/research/swe/2005/swe0504c.html; Mine K. Yucel & Shengyi Guo, *Fuel Taxes and Cointegration of Energy Prices*, CONTEMP. ECON. POLICY 12, 33-41 (1994). Relationships between oil prices and other fuels (e.g., coal and uranium) are more difficult to establish.

24. Umbrella effects of collusion cause allocative inefficiency, an additional "net harm to others." They also result in a wealth transfer from consumers to firms not participating in the cartel. This transfer would not count under a "net harm to others" standard. *See* Landes, *supra* note 13, at 666-68. Landes's decision to omit these transfer effects from his optimal deterrence formulation has been insightfully and thoughtfully criticized. *See* Page, *supra* note 23, at 1490. Moreover, Landes noted that it might sometimes be appropriate to count these transfers:

> Although the net benefit rule is perfectly general, the conclusion that the cartel should not be liable for any overcharges on units sold by the competitive fringe holds only under the cost conditions [described earlier]. If the fringe's marginal cost were to exceed the previous competitive price, then their rents or benefits would be less than the harm to consumers on the units purchased from the fringe. In the limit, if the fringe's marginal cost were constant and equal to the cartel price, optimal damages would equal . . . the entire overcharge plus the deadweight loss.

Landes, *supra* note 13, at 668. In addition, this transfer should be counted if one believes that a purpose of the antitrust laws is to compensate victims.

25. The omitted factors include: (1) uncompensated plaintiffs' attorneys' fees and costs, (2) the uncompensated value of plaintiffs time spent pursuing the case, and (3) the costs of the judicial system. *See* Lande, *supra* note 15, at 129-58.

26. Alternatively, one could argue that cartel members will have more funds to use for socially desirable innovation. We know of no evidence, however, that this effect is significant empirically.

27. *See* Neil W. Averitt & Robert H. Lande, *Implementing the "Consumer Choice" Approach to Antitrust Law*, ANTITRUST L.J. (forthcoming 2006) (on file with author).

28. Studies suggest that the average cartel probably lasts seven to eight years, with an additional four-plus-year lag between filing of suit and judgment. *See* Lande, *supra* note 15, at 130-34.

29. For the underlying calculations, see *id.* at 158-60.

Moreover, since not every cartel is detected or successfully proven, the "net harm to others" from cartels should be multiplied by a number that is larger than one (the multiplier should be the inverse of the probability of detection and proof).[30] Of course, no one knows the percentage of cartels that are detected and proven. In 1986, the Assistant Attorney General for Antitrust, Douglas Ginsburg (AAG Ginsburg), estimated that the enforcers detected no more than 10% of all cartels.[31] There are reasons to believe that the Antitrust Division's amnesty program has resulted in a larger percentage of cartels detected and proven today,[32] but there is anecdotal evidence that, despite the enforcers' superb efforts, many cartels still operate.[33] From an optimal

30. "Multiplication is essential to create optimal incentives for would-be violators when unlawful acts are not certain to be prosecuted successfully. Indeed, some multiplication is necessary even when most of the liability-creating acts are open and notorious. The defendants may be able to conceal facts that are essential to liability." *See* Easterbrook, *supra* note 21, at 454.

31. *See Sentencing Options: Hearing Before the United States Sentencing Commission (July 15, 1986), in* UNITED STATES SENTENCING COMMISSION: UNPUBLISHED PUBLIC HEARINGS 1986, at 15 (1988) [hereinafter *Sentencing Hearing*].

32. *See* Gary R. Spratling, *Detection and Deterrence: Rewarding Informants for Reporting Violations*, 69 GEO. WASH. L. REV. 798, 817-23 (2001).

33. The continued high number of Department of Justice (DOJ) grand juries, and the recent DOJ success rate in the courts, is evidence that many cartels still exist. As of February 2004, the DOJ had approximately 100 pending grand jury investigations, 50 of which involved suspected international cartel activity. ANTITRUST DIV., U.S. DEP'T OF JUSTICE, STATUS REPORT: AN OVERVIEW OF RECENT DEVELOPMENTS IN THE ANTITRUST DIVISION'S CRIMINAL ENFORCEMENT PROGRAM 1 (2004), *available at* http://www.usdoj.gov/atr/public/guidelines/202531.pdf (last visited Sept. 28, 2005) [hereinafter STATUS REPORT]. Between 1994 and 2003, the DOJ opened from thirty-three to sixty-three grand jury investigations per year, most of which resulted in convictions. ANTITRUST DIV., U.S. DEP'T OF JUSTICE, WORKLOAD STATISTICS: FY 1994-2003, at 4, 7 (2004), *available at* http://www.usdoj.gov/atr/public/12848.pdf (last visited Jan. 3, 2006). The following table, extracted from this data, shows the DOJ's success in prosecuting antitrust violations:

| Total Criminal Cases | '94 | '95 | '96 | '97 | '98 | '99 | 2000 | '01 | '02 | '03 |
|---|---|---|---|---|---|---|---|---|---|---|
| Filed | 57 | 60 | 42 | 38 | 62 | 57 | 63 | 44 | 33 | 41 |
| Won | 51 | 65 | 38 | 40 | 64 | 48 | 52 | 38 | 37 | 32 |
| Lost | 4 | 2 | 5 | 1 | 1 | 2 | - | 2 | 1 | 1 |
| Pending | - | - | - | - | 17 | 24 | 35 | 39 | 34 | 42 |
| Appeal Decisions | 9 | 7 | 6 | 4 | 6 | - | - | 5 | 1 | 2 |

During the last four years more than "80 years of imprisonment have been imposed on antitrust offenders, with more than 30 defendants receiving jail sentences of one year or longer." STATUS REPORT, *supra*, at 3. In 2002, defendants in cases prosecuted by the Antitrust Division "were sentenced to a record number of jail days, more than 10,000 in all." *Id.* In 2003, the average jail sentence reached a record high of twenty-one months. *Id.* at 1. If there

deterrence perspective it would be necessary to know the percentage of cartels that are detected and proven to know what number to multiply the "net harms to others" by.[34] At a minimum, however, we know that if the combined antitrust sanctions only total the actual damages, firms would be significantly undeterred from committing antitrust violations.

Ideally, optimal deterrence should be based upon the expectations of potential price fixers, not the results of their price-fixing or the actual fines imposed.[35] To ascertain this, however, we would have to interview a random sample of potential price fixers and discern their expectations.[36] In reality, however, it would be impossible to assemble a proper random sample or to get them to respond candidly.[37] So our

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had been little or no effective price-fixing during this period, the DOJ fooled a lot of grand juries, judges, and juries.

34. Instead of attempting to ascertain the actual probability of detection and conviction, an alternative approach would be to focus upon the perceptions of probable defendants. It would be extremely useful to know potential price fixers' perceptions of the probability that they will be caught and convicted of price-fixing, and their belief as to how much they will be forced to pay. We know of no reliable information on this issue, however.

35. Their expectations will, to some degree, be informed by their discussions with their antitrust lawyers, but there still could well be systematic differences between their expectations and reality. In addition, potential price fixers might well be risk seekers, and have other relevant psychological traits on the average.

Specifically, there could be a difference between how much potential price fixers think they would be likely to earn from price-fixing, and the amount a court or economist measures after the fact. Similarly, there could be a difference between reality and their estimate, at the time of the price-fixing, of the probability they will get caught and convicted, and their expectation as to how much the negotiated fine will be.

36. A different way to frame the optimal deterrence issue is in terms of whether cartels usually know in advance of litigation roughly how much they will be found to have overcharged. Can most firms that are members of cartels predict in advance of litigation, for example, that a court will find that it overcharged 5%, as opposed to 15%? Another issue is how risk-seeking or averse they are, in light of the probability that lengthy, protracted litigation could result in an uncertain result.

37. In addition, optimal deterrence theory is based on the balance between the present value of expected future corporate profits from the conduct and the present value of expected future monetary sanctions. If the firm is a proprietorship, considering only company rewards and punishment makes eminent sense, but if there is a separation between ownership and management, then the personal motives of managers will be pertinent in evaluating the effectiveness of sanctions. The simpler versions of optimal deterrence theory assume that there are no principal-agent divergences and that the managers are risk-neutral. In fact, it is generally the case that the reward structures of executive compensation contracts typically give short-term personal enrichment a greater weight in executive decisions than the long-run interests of stockholders. If the profits generated by price-fixing generate personal rewards for such managers, then the optimal ratio of sanctions to illegal profits must be higher than for a proprietorship. Similarly, a higher ratio will be required if managers are risk-loving in their corporate decision making rather than risk-averse. For these reasons, our focus on corporate-level performance in the present paper is at best a rather imperfect

substitute for the expectation questions is to attempt to determine how high price fixers actually have raised prices in the past, and then to assume that this is a close proxy for their expectations of how high they will be able to raise prices at the time of the price-fixing.[38]

An additional factor must, moreover, be considered whenever a cartel is international in scope. Fines calculated under the U.S. antitrust laws are likely to consider only purchases made by buyers in the United States.[39] If a significant percentage of the cartel's sales are outside the United States, a penalty calculated solely upon Unites States sales will result in significant underdeterrence.

While U.S. fines are supplemented by fines secured by foreign antitrust enforcers, these penalties tend to be significantly lower than United States fines, and private damage suits are virtually unknown outside the United States.[40] Although many of the world's antitrust agencies have increased their sanctions against international cartels significantly during the last decade,[41] we believe that the current level of foreign antitrust penalties are only a small fraction of those needed to reduce cartel recidivism to optimal levels. This is true for several reasons.

First, as noted, these fines tend to be smaller than U.S. fines for comparable situations.[42] Second, even these relatively low foreign fines were virtually always imposed on sales in either Western Europe or Canada.[43] Cartel violations in Asia, Africa, and South America have gone virtually unpunished.[44] Third, all the leading antitrust agencies

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surrogate for stockholder control, managerial risk aversion, and other factors that we would like to incorporate.

38. For this reason, we acknowledge that we are administering an imperfect test using a surrogate for what we really would like to measure.

39. *See* F. Hoffmann-La Roche, Ltd. v. Empagran S.A., 542 U.S. 155, 167-69 (2004).

40. For a comparison of antitrust fines by the United States, Canada, and the European Union against a variety of international cartels, see JOHN M. CONNOR, GLOBAL PRICE-FIXING: OUR CUSTOMERS ARE THE ENEMY 339-411 (2001).

41. John M. Connor, *Global Antitrust Prosecutions of Modern International Cartels*, 4 J. INDUSTRY, COMPETITION, & TRADE 239 (2004).

42. For a comparison of United States, EU, and Canadian fines against a large sample of international cartels, see *id.* EU fines for identical cartels averaged 72% of U.S. fine levels, and Canada's 6% of the U.S. average *Id.* at 263.

43. U.S., EU, and Canadian fines accounted for 79% of all corporate monetary sanctions imposed on international cartels during 1990-2003. Of the remaining fines, nearly all were imposed by *national* antitrust authorities within the EU. *See* Connor, *supra* note 41, at 255-62.

44. Australia, Mexico, Korea, Taiwan, and Japan have fined international cartels. However, these nations overwhelmingly concentrate their enforcement resources on local price-fixing violations. John M. Connor, *Private International Cartels: Effectiveness, Welfare, and Anticartel Enforcement* tbl. 18 (Dep't of Agricultural Econ., Purdue Univ., Staff

tend to offer large monetary concessions to cartelists that agree to plead guilty, fail to oppose administrative proceedings, offer incriminating information about their fellow conspirators, or cooperate in other ways with prosecutors.[45] These widespread corporate leniency programs have beneficial aspects to be sure, but they also exacerbate the tendency of governments to offer steep fine discounts to guilty parties.[46] And, of course, we are skeptical that more than a small fraction of international price-fixing currently is discovered.

In the United States deterrence against cartels is supplied by a combination of factors: private treble damages actions, jail sentences for some categories of violations, and criminal fines for some types of antitrust violations.[47] This Article only will focus on the last of these types of sanctions, criminal fines. We will not attempt to ascertain whether these other types of sanctions should be adjusted.

The current[48] criminal fines for cartels are established by *Sentencing Guidelines* promulgated by the Commission.[49] The *Guidelines* provide that the base fine level generally will be "20% of

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Paper No. 03-12, 2003), http://agecon.lib.umn.edu/cgi-bin/pdf_view.pl?paperid=11506&ftype=.pdf. Moreover, their ability to fine large international cartels is constrained by low absolute fine limits or by low maximum percentages (e.g., 6% in Japan) of local affected sales. Stuart M. Chemtob, Special Counsel for Int'l Trade, Antitrust Div., Dep't of Justice, Antitrust Deterrence in the United States and Japan, Address Before the Conference on Competition Policy in the Global Trading System 9 (June 23, 2000), *available at* www.usdoj.gov.

45. On average, corporations received 86% discounts from the base fine levels from 1974-1980. *See* Mark A. Cohen & David T. Scheffman, *The Antitrust Sentencing Guideline: Is the Punishment Worth the Costs?*, 27 AM. CRIM. L. REV. 331, 342 (1989). More recently, there is ample evidence that the DOJ has typically negotiated large discounts from the maximum fines specified by the *Sentencing Guidelines*. For example, the government settled for fines that were typically 75% to 85% below the maximum possible in the lysine, citric acid, and vitamins cartels. *See* CONNOR, *supra* note 40, at 360-73. Similar, but smaller, discounts were awarded by the European Commission in the same cases. *Id.* at 399-409. In the vitamins case, the second through fifth firms to plead guilty were granted average downward departures of about 80% from the *Guidelines'* maximum fines. As a result of U.S. sentencing practices, its criminal fines amounted to less than 11% of the vitamins cartel's global monopoly profits. Brief *Amicus Curiae* of Professors Darren Bush et al. in Support of Respondents at *16-17, F. Hoffman-La Roche, Ltd. v. Empagran S.A., 542 U.S. 155 (2004) (No. 03-724), *available at* 2004 WL 533933 (internal citation omitted).

46. The U.S. corporate leniency policy gives automatic amnesty (a 100% fine waiver) to the first company (and its officers) that apply and meet certain conditions. *See* Connor, *supra* note 2, at 11.

47. Brief *Amicus Curiae* of Professors Darren Bush et al., *supra* note 45, at *15-16.

48. The *Guidelines* originally provided that "[t]he fine range for an organization is from 20 to 50 percent of the volume of commerce, but not less than $100,000." FEDERAL SENTENCING GUIDELINES HANDBOOK § 2R1.1(c) (Wayne Barr et al. eds., 1990).

49. UNITED STATES SENTENCING GUIDELINES MANUAL § 2R1.1 (2005) [hereinafter USSG MANUAL].

the volume of affected commerce".[50] The Commission's cartel fine levels, established in 1987 and in effect today, follow from its famous presumption: "It is estimated that the average gain from price-fixing is 10 percent of the selling price."[51]

The Commission explained how it used this estimate to establish cartel fines. After noting that fines should be based on consideration of both the gain to the offender and the losses caused by the offender, the Commission noted that it would double the 10% estimate to account for harms "inflicted upon consumers who are unable or for other reasons do not buy the product at the higher prices."[52] The Commission added: "The purpose for specifying a percent of the volume of commerce is to avoid the time and expense that would be required for the court to determine the actual gain or loss."[53]

Although the preceding explanation does not completely clarify why the *Guidelines* doubled the assumed 10% loss, the explanation in the *Guidelines'* commentary implies that the doubling could be due to such factors as the allocative inefficiency harms of market power, the disruptive effects on victims, the lack of prejudgment interest caused by antitrust violations,[54] and/or the umbrella effects of market power.[55] Consideration of these factors would more than justify doubling the 10% figure to account for the "net harm to others" from cartels.[56]

Moreover, the doubling can perhaps be explained by the Criminal Fine Improvements Act of 1987, which provides an alternative fine: "If any person derives pecuniary gain from the offense, or if the offense results in pecuniary loss to a person other than the defendant, the defendant may be fined not more than the greater of twice the

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50. *Id.* § 2R1.1(d)(1).

51. *Id.* § 2R1.1, application n.3.

52. The full quotation reads:

> The loss from price-fixing exceeds the gain because, among other things, injury is inflicted upon consumers who are unable or for other reasons do not buy the product at the higher prices. Because the loss from price-fixing exceeds the gain, subsection (d)(1) provides that 20 percent of the volume of affected commerce is to be used in lieu of the pecuniary loss under § 8C2.4(a)(3).

*Id.*

53. *Id.*

54. This should include the value of corporate time and disruption caused by private suits to recover damages from cartels.

55. It is clear, however, that the Commission's decision to double the 10% presumed overcharge does not account for the small chances of finding and convicting cartels or the lack of prejudgment interest. There is no reason to believe that in 1988 the Antitrust Division uncovered and convicted 50% of cartels.

56. *See supra* notes 17-25 and accompanying text.

gross gain or twice the gross loss. . . ."[57] Perhaps the 20% figure in § 2R1.1 is a "proxy" for this "twice the gain or loss" provision in the Criminal Fine Improvements Act of 1987.

Regardless of the precise reason for this doubling, the start with a base fine of double the 10% presumed overcharge and use this in conjunction with the assigned base offense level (of 10) for antitrust offenses.[58] They adjust this offense level by a number of factors, such as whether bid-rigging[59] and other aggravating factors were involved, and by mitigating factors as well.[60] A complex series of adjustments result in a pair of "culpability multipliers" that are somewhere between .75 and 4.0. The product of the base fine (20% of the affected commerce) and the culpability multipliers (the pair of numbers between .75 and 4.0) results in the fine range that is to be imposed on a cartel member. (These fines usually are adjusted downward for cooperation or as a part of the Division's leniency program.[61]) As the United States Court of Appeals for the Sixth Circuit noted, the Commission "opted for greater administrative convenience" instead of undertaking a specific inquiry into the actual loss in each case.[62]

Since the 10% figure is so crucial to the Commission's cartel fine *Guidelines*, it certainly is worth asking where this figure came from, and what support was provided for this estimate. The record suggests that the Commission adopted the 10% presumption because its use was advocated by the (then) head of the Antitrust Division, Douglas

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57. Pub. L. No. 100-185, § 6, 101 Stat. 1279, 1280 (codified at 18 U.S.C. § 3571(d) (2000)).

58. USSG MANUAL, *supra* note 49, § 2R1.1.

59. If bid-rigging is involved, the base offense level is increased by 1. *Id.* § 2R1.1(b)(1). This indicates the Commission's belief that bid-rigging is worse than other forms of illegal collusion.

60. *Id.* § 2R1.1 & application n.1.

61. *See* Spratling, *supra* note 32, at 816-17. The Commission's Commentary also notes, "[i]n cases in which the actual monopoly overcharge appears to be either substantially more or substantially less than 10 percent," the Commission might not employ the 20% assumption. USSG MANUAL, *supra* note 49, § 2R1.1, application n.3. But in practice, prosecutors almost always use the figure of 20% of affected commerce as their starting point in their criminal fine calculations. *See* Spratling, *supra* note 32, at 816.

62. United States v. Hayter Oil Co., 51 F.3d 1265, 1276 (6th Cir. 1995). The court noted: "'The offense levels are not based directly on the damage caused or profit made by the defendant because damages are difficult and time consuming to establish. The volume of commerce is an acceptable and more readily measurable substitute.'" *Id.* at 1274 (quoting U.S.S.G. § 2R1.1). The court later stated, "We find nothing other than the following commentary language that indicates that the Sentencing Commission adopted the theory of optimal penalties: 'It is estimated that the *average additional profit* attributable to price fixing is 10 percent of the selling price.'" *Id.* at 1276 (quoting U.S.S.G. § 2R1.1).

Ginsburg.[63] In a statement to the Commission, AAG Ginsburg explained that the standard optimal deterrence model means that "[t]he optimal crime [fine] for any given act [of price-fixing is] equal to the damage caused by the violation divided by the probability of convictions. . . . [S]uch a fine would result in a socially optimal level of price fixing, which is in this case zero."[64] He also stated his judgment that "price fixing typically results in price increases, that has [sic] harmed the consumers in a range of 10 percent of the price," and that these violations had no more than 10% chance of detection.[65]

This, in turn, raises the question of how AAG Ginsburg arrived at his 10% overcharge estimate. While we do not know all of the reasons behind his conclusion,[66] a prominent analysis of this issue by Cohen and Scheffman published shortly after the antitrust *Sentencing Guidelines* were promulgated sheds some light on this subject.[67] They state that the economic evaluation of a (very small) number of price-fixing conspiracies was particularly important in shaping the 1986-87 conclusions of Ginsburg and the Commission that the overcharges from price-fixing conspiracies were approximately 10%.[68] Cohen and Scheffman included evaluations of *United States v. Container Corp. of America*[69] and the subsequent civil litigation,[70] the Federal Trade Commission case involving the bakers of Washington state,[71] and a short survey by DOJ economists of empirical studies of bid-rigging in the road-building industry in the 1980s.[72] Thus, the lynchpin of modern criminal fines—the Commission's simplifying assumption

63. Sentencing Hearing, *supra* note 31, at 13-15.

64. *Id.*

65. *Id.* at 15. If Justice Ginsburg was correct, damages for cartels should have been tenfold.

66. Interestingly, two economists at the Antitrust Division of the Department of Justice published an unusually thoughtful analysis of many of these issues at roughly the same time that AAG Ginsburg testified before the Commission. *See generally* Gregory J. Werden & Marilyn J. Simon, *Why Price Fixers Should Go to Prison*, 32 ANTITRUST BULL. 917 (1987). Included in this article was a tantalizingly brief survey of existing cases, and on this basis they concluded that a "conservative estimate of the average price increase from price-fixing is 10 percent." *Id.* at 924-25. Even though the article's first note cautions that all of the views in the article "are not purported to reflect those of the U.S. Department of Justice," one cannot help but note that this is the same estimate that AAG Ginsburg provided to the Commission. *Id.* at 917.

67. *See generally* Cohen & Scheffman, *supra* note 45.

68. *See id.* at 344-45.

69. 393 U.S. 333 (1969).

70. *In re* Corrugated Container Antitrust Litig., 80 F.R.D. 244 (S.D. Tex. 1978).

71. *In re* Bakers of Washington, Inc., 64 F.T.C. 1079 (1964).

72. Cohen & Scheffman, *supra* note 45, at 344-45 (for results of this survey, see Werden & Simon, *supra* note 66, at 925).

that cartels raise prices by 10%—is supported by a surprisingly small amount of evidence.

## III. IS THE 10% PRESUMPTION VALID: PRIOR ANALYSES OF THE EVIDENCE

The Commission's 10% presumption was attacked as unreliable and excessive soon after it was issued. For example, Cohen and Scheffman's 1989 critique concluded, "there is little credible statistical evidence that would justify the Commission's assumptions which underlie the Antitrust Guideline."[73] They also concluded "[a]t least in price-fixing cases involving a substantial volume of commerce, ten percent is almost certainly too high."[74] Moreover, the specific data that the Commission used was attacked as unreliable because, allegedly, "later research has cast considerable doubt on . . . these estimates, concluding that the markups, if they existed, were quite small."[75]

During recent years, this criticism has been repeated with more frequency and intensity. These attacks could be due to rising levels of criminal antitrust fines in recent years. Starting after 1990 "a series of record corporate fines were imposed for criminal price-fixing by U.S. courts."[76] Not surprisingly, attorneys who have defended companies accused of collusion in highly publicized international antitrust conspiracies have claimed that the 10% presumption has led to penalties so large they have resulted in overdeterrence. For example, just as the DOJ's campaign against international cartels was gathering steam, Adler and Laing concluded that "[t]he fines being imposed against corporate members of international cartels are staggering," and placed the blame on the "uniquely punitive" requirements of the *United States Sentencing Guidelines*.[77] After viewing an intensification of this trend for another two years, Adler and Laing were even more alarmed.[78] More recently, Michael L. Denger, a

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73. Cohen & Scheffman, *supra* note 45, at 333.

74. *Id.* at 343.

75. *Id.* at 345.

76. Connor, *supra* note 2, at 9. No new records have been made since 1999. "A similar upswing may be noted for fines imposed by the European Commission from 1995 to 2001." *Id.*

77. Howard Adler, Jr. & David J. Laing, *The Explosion of International Criminal Antitrust Enforcement*, BUS. CRIMES BULL., Mar. 1997, at 1, *available in* LEXIS-NEXIS Academic Universe.

78. "What is . . . troubling is that the company fines . . . have risen astronomically—to levels far higher than the fines for other serious economic crimes and in amounts that can be unrelated to the economic harm caused by the violations." Howard Adler, Jr. & David J. Laing, *As Corporate Fines Skyrocket Antitrust Offenders: Time To Revisit Treatment by*

former Chair of the ABA Antitrust Section, denounced the price-fixing fine levels because they "lack ... an empirical foundation."[79] He places the blame for excessive fines on the *Corporate Guideline*'s use of 20% of the volume of affected commerce.[80] This approach, he notes, presumes a pecuniary loss of 10% of sales due to price-fixing; unlike all other white collar federal crimes, the actual degree of direct harm caused does not have to be proven by prosecutors.[81]

Concerns about the excessiveness of antitrust sanctions are part of the larger issue of the effectiveness of antitrust interventions. In a provocative article[82] that quickly drew vigorous rebuttals,[83] Crandall

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*Sentencing Guidelines*, BUS. CRIMES BULL., Apr. 1999, at 1, *available in* LEXIS-NEXIS Academic Universe. In 1997, DOJ fines for antitrust were at least seven times higher per case on average than fines levied for corporate fraud, money laundering, or racketeering. *Id.* The authors depend on the multiple of seven to make their case; no evidence is presented as to the relative harm of these white-collar crimes in 1997 or any other year. *Id.* The authors also assert that availability of the "double the harm" standard for fines in the 1994 alternative fine provisions, see 18 U.S.C. § 3571(d) (2000), empowers prosecutors to intimidate many corporate defendants into acceding to excessively high fines as part of their guilty pleas. *See id.*

79. Michael L. Denger, Former Chair, ABA Antitrust Section, A New Approach to Cartel Enforcement Remedies Is Needed, Remarks at the ABA Section of Antitrust Law Spring Meeting, Chair's Program (Apr. 24-26, 2002). The ABA Section of Antitrust Law has recently offered a similar critique.

> The Section has questioned, and continues to question, whether the current presumption in determining criminal fine levels is empirically sound or good public policy. Having reviewed the Sentencing Commission's analysis of the issue, the Section concluded that the presumption that the "average gain from price-fixing is 10 percent of the selling price" was unsupported by empirical economic evidence.

Comments of the ABA Section of Antitrust Law in Response to the Antitrust Modernization Commission's Request for Public Comment on Criminal Remedies (Nov. 5, 2005), *available at* http://www.abanet.org/antitrust/comments/2005/11-05/criminal-remedies-comm.pdf. Similarly, Tefft W. Smith called for lowering the 10% presumption down "to 3 or 5%. That may be (equally) arbitrary but probably more realistic, 'fair' and desirable from an enforcement policy perspective." Comments for the Antitrust Modernization Commission Hearing on Criminal Antitrust Remedies (Nov. 3, 2005), http://www.amc.gov/commission_hearings/pdf/Smith_Statement.pdf.

80. *Id.* at 3-4.

81. Denger primarily uses an increase in settlement rates in treble-damage direct-purchaser suits to establish the alleged unfairness of the high fines imposed on corporate price fixers, an increase that, he believes, cannot be explained by increases in overcharge rates or other factors. *Id.* He cites about eight domestic U.S. law cases that he reports as settling for 2% to 4% of sales in the 1970s and one international case in 2001 that settled for 18% to 20%. *Id.*

82. Robert W. Crandall & Clifford Winston, *Does Antitrust Policy Improve Consumer Welfare? Assessing the Evidence*, 17 J. ECON. PERSPECTIVES 3 (2003).

83. Professor Kwoka faults them for their "startlingly selective" body of evidence. *See* John E. Kwoka, Jr., *The Attack on Antitrust Policy and Consumer Welfare: A Response to Crandall and Winston* (Dep't of Econ., Northeastern Univ., Working Paper No. 03-008,

and Winston argued that extant empirical evidence demonstrates that antitrust policy has been ineffective in either raising consumer welfare or in deterring anticompetitive conduct: "We find little empirical evidence that past [antitrust] interventions have provided much direct benefit to consumers or significantly deterred anticompetitive behavior."[84]

To support their view that cartels are ineffective and the prosecution of overt price-fixing is unwise, they cited five empirical studies of overt collusion which found that conspiracies convicted in U.S. courts have no upward effects on prices.[85] While Crandall and Winston later admitted that there are some "examples" of successful collusion, they cite no studies that support cartels' positive effect on prices.[86]

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2003), *available at* http://www.economics.neu.edu/library/research/03-008.pdf. He suggests that they should have included serious studies with appropriate evaluation of their credibility. *See id.* at 4; *see also* Jonathan Baker, *The Case for Antitrust Enforcement*, 17 J. ECON. PERSPECTIVES 27-28 (2003); Gregory J. Werden, *The Effect of Antitrust Policy on Consumer Welfare: What Crandall and Winston Overlook* (Econ. Analysis Group, Antitrust Div., U.S. Dep't of Justice, Discussion Paper EAG 03-2, 2003) (on file with author).

84. *See* Crandall & Winston, *supra* note 82, at 4. The great majority of their criticisms were directed at monopoly and merger enforcement, but remedies for the alleged overcharges that occur in collusion cases also attracted their disfavor. *See id.* at 6-23.

85. *See id.* at 14-15. We should note that space constraints do not appear to be responsible for such a skimpy treatment of a topic that is so crucial to their article's conclusion. Moreover, they list fifty-nine references, but their choice of two of the articles is unfortunate because both are deeply methodologically flawed. *See id.* at 24-26. The first article, Craig M. Newmark, *Does Horizontal Price-fixing Raise Price? A Look at the Bakers of Washington Case*, 31 J.L. & ECON. 469 (1988), is analyzed in Connor, *supra* note 2, at 12-26. The second, Michael F. Sproul, *Antitrust and Prices*, 101 J. POL. ECON. 741 (1993), is criticized by Werden, *supra* note 83, at 1. Two other studies focus on an atypical alleged episode of price-fixing, the so-called "overlap" group of twenty-three elite U.S. universities that met regularly to allocate needs-based graduate scholarships; this practice was permitted to continue under a consent decree that limited the degree of detail shared. *See* Dennis W. Carlton et al., *Antitrust and Higher Education: Was There a Conspiracy to Restrict Financial Aid?*, 26 RAND J. ECON. 131 (1995); Caroline M. Hoxby, *Benevolent Colluders?: The Effects of Antitrust Action on College Financial Aid and Tuition* (Dep't of Econ., Harvard Univ. & Nat'l Bureau of Econ. Research, Working Paper No. 7754, 2000), *available at* http://post.economics.harvard.edu/faculty/hoxby/papers/benevol.pdf.

86. Crandall & Winston, *supra* note 82, at 15. They say that the lysine, citric acid, and vitamins cases are "well known." *Id.* We are aware, however, of only one publication that covers the price effects of all three of these cases with a degree of depth. *See* Connor, *supra* note 41, at 239.

As for deterrence, Crandall and Winston rather grudgingly admit that the large DOJ fines meted out to cartels in recent years possibly deterred the most harmful cartels. *See* Crandall & Winston, *supra* note 82, at 4, 22. Their reasoning, however, is difficult to understand. Perhaps they are referring to international cartels, cartels with absolutely large overcharges, or conspiracies with high percentage overcharges. In any case, why they expect the probability of discovery or relative size of expected sanctions to be greater in such cases is not clear. Moreover, the worst cartels are less likely to have been deterred by the fines

The view that cartels never succeed in raising prices for any significant period has not gained many adherents in the antitrust community. Nevertheless, concern about the lack of empirical evidence regarding the extent of the actual harm caused by price-fixing is not confined solely to those critical of the increased exposure of corporate defendants to fines for price-fixing.[87] Those who believe that cartels sometimes or often can be effective naturally would like to ascertain the extent of this problem.

Not surprisingly, many economists have studied the price effects of individual cartels.[88] Several authors have even undertaken limited surveys[89] of this literature in the hope that the compilation of data would help to assess the empirical extent of the anticompetitive effects of cartels. Probably the best known of these surveys was undertaken by Judge Posner, who reported the results in the first edition of Antitrust Law,[90] with an updated version presented in the 2001 edition.[91] Posner analyzed and illustrated the social costs of cartelization by assembling data on twelve "well-organized (mainly international) private cartels."[92] He noted that "[s]uch estimates enable

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since they are based on a presumption of only a 10% overcharge. Their grudging admission is, moreover, immediately tempered by a citation to an entirely theoretical analysis of the dangers of overdeterrence. *See id.*

87. Refer to the discussion of this subject by Graubert, who notes that the controversy over whether antitrust payments are excessive (which he equates with payouts greater than reasonable damage estimates) is largely attributable to the "difficulty of gathering useful data." John D. Graubert, Office of the Gen. Counsel, Fed. Trade Comm'n, Address Before the American Bar Association, Section of Antitrust Law, Remedies Forum 7 (Apr. 2, 2003), *available at* http://www.abanet.org/antitrust/remedies/remediesintro.doc [hereinafter Remedies Forum]; *see also* Donald C. Klawiter, *After the Deluge: The Powerful Effect of Substantial Criminal Fines, Imprisonment, and Other Penalties in the Age of International Cartel Enforcement*, 69 GEO. WASH. L. REV. 745, 762-63 (2001).

88. In addition, there have been many studies of collusion that did not attempt to ascertain how high cartels raise prices. For example, Hay and Kelley authored a classic review of sixty-five U.S. price-fixing conspiracies. *See* George A. Hay & Daniel Kelley, *An Empirical Survey of Price Fixing Conspiracies*, 17 J.L. & ECON. 13 (1974). Fraas and Greer extended this review to 606 cases from 1910 to 1972. *See* Arthur G. Fraas & Douglas F. Greer, *Market Structure and Price Collusion: An Empirical Analysis*, 26 J. INDUS. ECON. 21 (1977). Both studies contain a wealth of information about the number of conspirators, duration, industry, and specific collusive methods employed. However, neither survey covered the topic of price effects.

89. By "limited surveys," we mean that the authors did not attempt to encompass all possible studies nor even all studies of some defined type or period. Surveying was ancillary to the principal objective of the works we cite.

90. RICHARD A. POSNER, ANTITRUST LAW: AN ECONOMIC PERSPECTIVE 254 (1976).

91. RICHARD A. POSNER, ANTITRUST LAW 304 (2d ed. 2001). This Article's analysis focuses upon Posner's most recent list.

92. *Id.* at 303. Judge Posner later explained that "these 12 were the best examples I found of well-organized cartels, with the requisite data. If there are other well-organized

us to derive a crude, and probably exaggerated, but nonetheless suggestive idea of the potential benefits of antitrust policy."[93] The studies yield a median cartel overcharge of 38% and an average cartel overcharge of 49.1%.[94] His survey is not beyond criticism,[95] but a reexamination of the original sources he relied upon produces similar numbers (a median of 37% and an average of 45.3%).[96]

The most recent prominent survey of collusion cases was by Greg Werden.[97] Werden presented data from thirteen economic studies, which showed price increases from 6.5% to 36%, with a median increase of 18% and an average of 21.3%.[98] His sample selection criterion suggest why his results are lower than those obtained by Posner: "The studies reviewed here examine criminally prosecuted cartels in existence after enactment of the felony provisions of the Sherman Act in late 1974. The price effects of cartels at earlier times may have been substantially different because sanctions were less severe."[99]

A working paper by two of the profession's most active cartel researchers, Levenstein and Suslow, aims at assessing three dimensions of cartel performance, one being "profitability," by which they mean collusive margins or overcharges.[100] This paper contains five price effects for pre-World War II cartels and seventeen for more modern international cartels.[101] They report a median overcharge of 44.5% and a mean of 43%.[102] However, the paper's estimates appear to include some peak, rather than average figures, so the median and mean figures may be somewhat high.

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cartels with the data needed to compute the cartel price increase, I overlooked them." E-mail from Richard A. Posner to John M. Connor (Feb. 2, 2004) (on file with author).

93. POSNER, *supra* note 91, at 304.

94. The low overcharge was 7% and the high was 100%. *Id.*

95. Interestingly, our results are more "conservative" than his.

96. The authors reanalyzed Posner's original sources and recomputed the relevant figures somewhat differently. For example, three of the price effects that Posner reported appear to have been short run or peak effects rather than average effects. But even after these adjustments were made, the overall results did not change very much.

97. *See generally* Werden, *supra* note 83.

98. *See id.* at 1-2.

99. *Id.* at 1 n.2. Werden notes, "While those experts [who prepared these studies] were not neutral observers, the peer review process for publication should have screened out studies not up to professional standards." *Id.*

100. Margaret C. Levenstein & Valerie Y. Suslow, What Determines Cartel Success?, tbls. 8, 15 (Univ. of Mich. Bus. Sch., Working Paper No. 02-001, 2002), http://ssrn.com/abstract=299415.

101. *See id.* at 11.

102. The low estimate was 10% and the high estimate was 100%. *Id.* at 30, tbl. 1.8.

A study by Professor Griffin tested an econometric model that predicts the price effects of international cartels from information on market structure and cartel practices.[103] The model was fitted to data on fifty-four cartel episodes, most of which operated during the interwar period.[104] Eliminating the sixteen episodes that were government-sponsored and, therefore, not the subject of this study, the mean overcharge for the thirty-eight private cartels is 45.6% and the median is 43.9%.[105]

Finally, the 2003 Organization for Economic Co-operation and Development (OECD) report on "hard-core" cartels contains the results of a survey of their government members on the economic harm caused by cartels recently prosecuted by the European Commission or by OECD members' national antitrust authorities.[106] Presumably, the examples chosen to be reported are among the best documented examples from 1995 to 2001 of the degree of harm available to the authorities. While only twelve of the responses are expressed in terms of overcharge percentages, the usable responses represent an unusually authoritative compilation of data on markups by contemporary cartels that have been prosecuted by courts or commissions.[107] The twelve cases yield a median overcharge of

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103. James M. Griffin, *Previous Cartel Experience: Any Lessons for OPEC?*, *in* ECONOMICS IN THEORY AND PRACTICE: AN ECLECTIC APPROACH 179 (L.R. Klein & J. Marquez eds., 1989). Griffin specifies a formal cartel model which allows for a fringe of competitive, noncooperating producers outside the cartel. *Id.* at 184. From this theoretical model, Griffin derives a simple empirical model that explains the degree of market power with three factors: intracartel concentration, the share of cartel market control, and a subjective index of the degree of the cartels' cohesion and monitoring methods. *Id.* at 185.

104. The measure of market power is the Lerner Index. *See* Abba P. Lerner, *The Concept of Monopoly and the Measurement of Monopoly Power*, 1 REV. ECON. STUD. 157, 157-75 (1934). Four of Griffin's point estimates are slightly below zero; we convert these to zero. Griffin, *supra* note 103, at 189. The Lerner Index is $L=(P-C)/P$, where $P$ is the observed market price and $C$ is the but-for or competitive price. Because $C$ is equal to marginal economic costs, $L$ is also a profit margin on sales. $L$ is zero in perfectly competitive markets and has a maximum value of one. The monopoly overcharge is a markup: $MO=(P-C)/C$. $MO$ is also zero in perfectly competitive markets, but can approach positive infinity when $C$ is very small. $MO$ is greater than $L$ whenever $L$ is positive. Simple algebraic substitution allows one to express $MO$ as a function of $L$, viz., $MO = L/(1-L)$. *See* Lerner, *supra*, at 157-75.

105. Somewhat surprisingly, government-sponsored cartels in this period had mean overcharges virtually the same as the private schemes.

106. ORG. FOR ECON. COOPERATION & DEV. (OECD), REPORT ON THE NATURE AND IMPACT OF HARD CORE CARTELS AND SANCTIONS AGAINST CARTELS UNDER NATIONAL COMPETITION LAWS, Annex A, 21-23 (2002), *available at* http://www.oecd.org/dataoecd/16/20/2081831.pdf. A few nonmembers that participated in an OECD-sponsored "Global Forum on Competition" also submitted responses to the survey.

107. *See id.*

12.75% and a mean of 15.75% (with a range of 3% to 31%).[108] We excluded four of the survey results because they almost surely are peak figures (i.e., price increases "up to 50%") instead of averages results, which might explain the report's conclusion that the results produce a median that is "between 15 and 20%."[109]

Table 1. Summary of Seven Economic Surveys of Cartel Overcharges

| Reference | Number of Cartels | Average Overcharge | |
|---|---|---|---|
| | | Mean | Median |
| | | Percent | |
| 1. Cohen and Scheffman (1989) | 5-7 | 7.7-10.8 | 7.8-14.0 |
| 2. Werden (2003) | 13 | 21 | 18 |
| 3. Posner (2001) | 12 | 49 | 38 |
| 4. Levenstein and Suslow (2002) | 22 | 43 | 44.5 |
| 5. Griffin (1989), private cartels | 38 | 46 | 44 |
| 6. OECD (2003), excluding peaks | 12 | 15.75 | 12.75 |
| Total, simple average | 102-104 | 30.7 | 28.1 |
| Total, weighted average | 102-104 | 36.7 | 34.6 |

Despite these prior surveys, there does indeed seem to be a broad consensus among legal and economic writers that the question of the optimality of price-fixing penalties turns mightily on the actual degree of harm caused by cartel conduct, and that we do not know enough about this issue. Moreover, even if the creators of the *Guidelines* were correct that in the 1980s cartels generally raised prices by 10%,[110] the harsher cartel sanctions imposed more recently could mean that this presumption is no longer justified. This is a gap in the literature that we hope to remedy in this Article. The goal of this Article is to undertake a comprehensive and systematic examination of the questions presented at its beginning.

108. *See id.*

109. *Id.* at 9. In addition, one of the results was "more than 14%," but we figured it at 14%. *Id.* at 22.

110. In light of the data available in 1987, we certainly are not criticizing the estimate made by AAG Ginsburg that cartels generally raised prices by roughly 10%. *See Sentencing Hearing*, *supra* note 31, at 15. Considering the state of knowledge at the time, his estimate was commendable. However, the broader sample available to us has yielded a larger average overcharge percentage.

## IV. THIS ARTICLE'S SURVEY OF OVERCHARGE STUDIES

In our quest to find case studies of the effects of cartels on price, we examined scores of refereed journal articles, working papers, monographs, and books that analyzed cartel[111] price effects.[112] Our sources primarily are published peer reviewed studies by economists, but a few were authored by historians and other serious students of the subject.[113] Other sources include antitrust agencies, parliamentary inquiries, and multilateral organizations.[114] These studies vary substantially in terms of depth and the degree of professional commitment to the study of cartels. While we have not placed any time limits on our literature search, three-fifths of our estimates are from publications dated after 1973.[115]

We aimed at collecting the largest possible body of information on the subject and tried to avoid applying some sort of subjective quality screening.[116] Consistent with most previous studies of cartel

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111. We defined "cartel" to include naked price-fixing, customer allocation, territorial allocation, and bid-rigging conspiracies. As far as we know, no case in our sample involved agreements that arguably were efficiency-enhancing and so might have been prosecuted under a rule of reason.

112. The majority of economic articles are written by North American academics using cartel episodes that affected commerce in the United States or Canada. Many were written primarily as historical case studies and mention price effects only in passing.

113. We utilized eighty-two peer-reviewed journal articles, many of which contained multiple estimates. The second most frequent source of estimates was the fifty-five books or chapters in books. Some have a degree of peer review, but this varies by publisher and author. We also should mention that a high, but unknown, share of the more recent articles and books were written by economists who served as paid experts to a party involved in the litigation. Other sources include government reports, economic working papers, and magazine articles. Only some of these sources are subject to internal reviews by department supervisors or senior editors. In sum, three-fourths of the estimates are drawn from the formal or informal writings of academic social scientists, and most of the remainder was the product of professionally trained scholars.

114. We have made every attempt to identify and collect all useful information on private cartel overcharges available from public sources. A few cartels operated prior to the 1890 Sherman Act, ch. 647, 26 Stat. 209, so even the activities of U.S. firms probably were legal. Moreover, many cartels headquartered in Europe predate the beginnings of antitrust law there (the late 1950s in the United Kingdom, Germany, and the European Economic Community). Because of this Article's antitrust orientation, commodity agreements sponsored or protected by national sovereignty are not included. There are many fine studies of such agreements, but the inclusion of government-sponsored or government-enforced cartels would tend to bias upward the overcharges in our sample. In general, we will aim to follow procedures that produce conservative results.

115. *See* Connor, *supra* note 3, tbl. 2.

116. We have only included journalists' accounts of cartels that were book-length treatments in the belief that such works are in-depth accounts of a cartel collected from many sources, some of them anonymous, over a period of time, and are sufficient for the author to provide a balanced account of conflicting claims. Books by journalists typically do not focus on the quantitative economic aspects of the case at hand, however, so in practice there are

effectiveness, we will treat each cartel episode as a unique observation.[117] We excluded from our survey cartels that were established or actively supported by governmental action.[118] We did this because we primarily are interested in the question of how high private cartels are able to raise prices without government assistance, rather than the activities of public cartels like the Organization of Petroleum Exporting Countries (OPEC), where government officials are directly involved in operating the cartel.[119]

Our catholic approach to data-gathering may create concerns in the minds of some readers about the reliability of the reported overcharges. We agree that substantial variation in the quality of the price data, the methods used, and the professional orientation of the sources will result in substantial variation in the actual or perceived reliability of the results.[120] Moreover, many economists trust results published in refereed journals more than other publication outlets that

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relatively few overcharges drawn from these sources in the present study. We do not include overcharge estimates from newspaper or magazine accounts. In some cases, however, we included overcharge estimates from articles in industry trade journals if they were cited favorably by scholars with a background in cartel studies and otherwise seemed to constitute serious analysis.

117. Most cartels are organized and fall apart only once, not counting brief disciplinary price wars. This describes one episode. However, many cartels are formed, disband, reform, and disband several times; each distinct cycle is an episode. The reasons for analyzing episodes rather than one cartelized market over time are fairly straightforward. Each time a new collusive episode begins, chances are that the methods and membership composition have changed. Moreover, pauses between episodes are often quite lengthy. Because the agreement and the players are different, a new cartel is deemed to have been launched.

118. A few of the included cartels were merely registered with government ministries or were state owned entities operating as private firms.

119. However, it is not always simple to decide whether a cartel is purely "public" or "private." Some cartels unquestionably are private and illegal. Others, however, especially cartels that operate completely outside the United States, are more difficult to classify. Some countries outlawed cartels, but rarely if ever prosecuted them. Other countries sometimes did prosecute cartels, but the penalties were so inconsequential that one can reasonably infer a national policy tantamount to implicit legality.

Our survey's general approach has been to be inclusive, but we excluded results for cartels we believe were likely to have been established or maintained by governmental action. We have, however, included some cartels whose legality is more questionable. For example, some of the overseas cartels might or might have been in violation of a law in one or more of the countries in which they operated, often depending upon a number of legal requirements. We erred on the side of including surveys of price effects of these more questionable cartels. For comparison, however, we note that the sample of cartels in Table 2 of the Appendix contains only cartels that unquestionably would be prosecuted as per se violations under today's U.S. antitrust laws. *See* Connor, *supra* note 3, tbl. 2.

120. However, it does not follow that differences in analytical quality will affect the average overcharge reported. This also is true for the studies contained in the survey articles that were reported in the last section.

receive less peer scrutiny, prefer modern quantitative methods to deep historical case studies, or express skepticism about the analyses of economists writing before the Age of Game Theory. To contend with the disparate preferences of our readers, we have chosen to cast our nets widely, but look across the sources for evidence of systematic variation.[121] Moreover, we have separately analyzed a sample of peer reviewed economics journal studies, *infra* Part IV.C.2.

### A. *The Cartel Episodes*

We found 845 useful estimates of cartel overcharges or undercharges in nearly 200 publications[122] that analyze cartels that operated in 234 markets.[123] Of these markets, 36% were cartelized by international agreements,[124] and the remaining 64% of the cartelized markets were national or smaller in scope.[125] Almost one-third of the

121. Indeed, the analysis of our data by source, time period, or method may provide useful insights in itself.

122. Overcharge estimates for identical episodes sometimes appear in multiple publications. We are counting the total number of books, articles, and reports containing one or more estimates. *See* Connor, *supra* note 3, tbls. 1-2.

123. *See id.*; *see also* Connor, *supra* note 2, at 56, tbl. 10. If one group of sellers decided to fix prices for one product in one geographical region and another group colluded on the same product in a separate geographical region, these will be viewed as two markets (e.g., if the U.S. and Canadian cartels involving the same product were separate, they were counted as two observations. If one cartel extended throughout North America, however, it was counted only once). The 194 markets were affected by a total of 498 episodes. However, three overcharge estimates were for groups of episodes (e.g., forty U.K. manufacturing cartels in the 1950s.) Collapsing these three to single "episodes" reduces the total number of episodes to 295.

Table 2. Number of "Average" Overcharge Observations, by Type of Cartel

| Type | Number | Percent |
|---|---|---|
| International membership | 365 | 54.2 |
| National or regional | 309 | 45.8 |
| Bid-rigging schemes | 185 | 27.4 |
| Classic cartels | 489 | 72.6 |
| Cartels found guilty or liable [a] | 384 | 57.0 |
| No record of sanctions ("legal") | 290 | 43.0 |
| Total | 674 | 100.0 |

Source: Connor, *supra* note 3, tbl. 1.
[a] Included are six cartels still being investigated by authorities.

124. "International" describes the membership composition of the cartel, not necessarily the geographic spread of the cartel's effects. Some international cartels affected directly the commerce of only one nation, though the vast majority were international in both senses.

125. A few markets were cartelized by both national and international cartels. Typically, a domestic cartel was expanded to respond to foreign competition. The potash cartel is one example. *See* Connor, *supra* note 3, at 7, tbl. 1. In this category, we count some

markets were affected by bid-rigging cartels.[126] This could be significant because many believe that bid-rigging leads to higher overcharges than otherwise identical conspiracies.[127] Finally, roughly 60% of the cartels were found guilty or liable by a court or commission.

Two kinds of cartel markup data are available. First, researchers usually report the *average* price increases over the whole episode. We have collected 674 of these estimates.[128] Some of these overcharge estimates actually were characterized in the studies as "minimum" estimates. To be conservative, however, we counted these minimums as averages.[129] Second, 210 of the overcharge figures we assembled are *peak* price effects,[130] which we distinguish from our average estimates.[131]

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purely national cartels that were formed for the sole purpose of controlling a nation's export sales; in the United States, these are called Webb-Pomerene Associations. *See* Connor, *supra* note 2, at 37. In addition, some domestic cartels had agreements with international cartels that often protected their domestic market from exports from the international cartel's members. *Id.* at 37-38. Counting episodes instead of markets, 54% are international and 46% domestic. *See supra* note 123, tbl. 2.

126. In Europe, bid-rigging is generally referred to as collusion involving "tenders." Although most cartels have some sales to government entities or industrial customers that purchase by tenders, the cartels we have classified as bid-rigging are only those explicitly indicated by their researchers to have substantially or exclusively engaged in bid-rigging. This means that the proportion we classify as bid-rigging is an underestimate because our sources did not always provide enough detail on the cartels to be certain of the degree of bid-rigging. The proportion of bid-rigging episodes was 27%. *See supra* note 123, tbl. 2.

127. *See* Cohen & Scheffman, *supra* note 45, at 345. The *Sentencing Guidelines* add a plus factor if bid-rigging is involved. USSG MANUAL, *supra* note 49, § 2R1.1(b)(1).

128. *See supra* note 123, tbl. 2. In some cases, the averages are carefully weighted by the sales in each year or month of the episode, but in most cases the authors give equal weights to the price changes in each subperiod during the total affected period. Sometimes it is not clear from the source whether the averages are weighted or unweighted; if the conspiracy period is marked by steady slow market growth, it matters little which is reported.

129. In addition, a few overcharges are given as narrow ranges, and we have preserved these ranges in some tables, but because the ranges are small we have shown the midpoints of the ranges in most tables.

130. Peak price changes indicate the potential for maximum harm when a cartel is at its most disciplined phase or point. Classifying a particular estimate as an average or peak figure in a few cases required judgment on our part due to imprecise underlying information. If the original source is unclear about which type of estimate is being presented, in order to be conservative we assumed that it is a peak figure. In some cases, the peak price was reached for only one day during a cartel period of several years; in other cases, the peak may be the highest year of a lengthy cartel.

131. Generally speaking, the peaks were at least 50% higher and typically were more than double the average price enhancement achieved. The pattern of peak overcharges is similar to that for the average overcharges. In almost all time periods, international cartels were able to reach higher levels of price effectiveness than the domestic or "national" cartels—on average 50% higher. Peak markups were not consistently related to whether the cartel was prosecuted, except during 1891-1945 when prosecuted cartels exhibited lower peak

Although we have collected data on cartels operating in 234 markets, we found multiple overcharge estimates for a large minority of the markets. There are more estimates than cartelized markets for two reasons. First, about half of the markets experienced multiple distinct phases or "episodes"[132] across which the price effects differed.[133] Second, for a few episodes, more than one study has been published.[134] Further, for a given episode, multiple methods of estimation are sometimes available.

### *B. Results of the Survey*

The overcharge estimates are presented in Table 3, divided into periods that roughly distinguish different antitrust regimes in the United States and abroad. The era up to 1890 is an obvious choice because of the enactment of the Sherman Act. The next break, 1919 was chosen because it represents the end of a period of U.S. antitrust activism and, because of World War I, a date by which most international cartels, many of them with U.S. corporate members, had ceased operating.[135]

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price changes. And, consistent with our earlier findings, cartels that fixed prices or production levels were significantly more harmful than bid-rigging agreements. For a more extensive analysis of the peak results, see Connor, *supra* note 2, at 39, 52-55.

132. If a cartel had more than one episode, each episode typically had changes in membership composition, the terms of the collusive agreement, method of management, geographic focus, or other major factors. We have identified a total of 333 to 539 episodes, depending on how they are counted.

Under current anticartel enforcement standards each episode is potentially an actionable offense. However, many legal systems treat a string of closely related episodes as one cartel. Moreover, some cartels prosecuted for fixing prices in multiple product markets can be viewed as a single offense for legal purposes, but as several cartels from an economic perspective.

133. In other words, when a cartel is distinctly reformed, it enters a new phase. The aluminum market, for example, went through six distinct phases that sometimes were adjacent in time and sometimes were several years apart. This heavily researched cartel has twenty-eight overcharge observations. *See* Connor, *supra* note 3, at 2, tbl. 1. Another study from which we obtained a dozen observations summarized the results of 109 price-fixing convictions in the fluid milk markets of the southeastern United States within a few years. Robert F. Lanzillotti, *The Great School Milk Conspiracies of the 1980s*, 11 REV. INDUS. ORG. 413, 428 (1996). We count each conviction as an episode. However, other studies that we cite incorporate multiple temporal phases.

134. For example, for the various aluminum cartels we drew on nine studies written by eight authors. *See* Connor, *supra* note 3, at 12-14, tbl. 2.

135. Many of the prewar cartels were reestablished after 1919, but in the majority of instances without the active participation of U.S. firms in price-setting or quota-setting. In addition, scores of U.S. criminal prosecutions of international cartels during 1940-1945 clarified the illegality of many more subtle forms of cartel participation, such as patent pools and cross-licensing of technologies. *See* Connor, *supra* note 2, at 42.

The post-World War II era is divided into three subperiods: 1946 to 1974, 1974 to 1991, and 1991 to the present.[136] This division was made because one milestone in U.S. anticartel legislation was the 1974 law that made price-fixing a felony, thereby lengthening maximum individual prison sentences and strengthening the bargaining power of the DOJ.[137] In addition, the period 1991 to the present constitutes the modern era. By 1990, all the present criminal sanctions available to the U.S. government through 2004 were in place. In 1991, penalties for corporations rose from $1 million to $10 million.[138] Moreover, 1987 legislation enabled the DOJ to impose fines above the $10 million statutory cap.[139] These and other policy changes made in the early 1990s were in some cases adopted by the EU and other antitrust authorities, which significantly improved the investigation and prosecution of international cartels.[140]

Several features of our data set are apparent from Table 3. There is an overall upward trend in number of observations per year.[141] The primary factor that explains the trend is the growth in the number of international cartels with usable data. The proportion of international schemes is especially high during the interwar period and after 1990 and especially low during the period from 1946 to 1990. The large number of overcharges available for our data set in the 1990s is mainly

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136. The transition years 1945-1973 correspond with several important relevant changes in anticartel enforcement. First, the antitrust idea became firmly implanted in the laws of countries outside North America for the first time: Germany and Japan in 1947, the United Kingdom in 1956, and the European Economic Community (EEC) in 1958. CHRISTOPHER HARDING & JULIAN JOSHUA, REGULATING CARTELS IN EUROPE: A STUDY OF LEGAL CONTROL OF CORPORATE DELINQUENCY 86-87, 107-08 (2003). Second, the European Commission (EC), the administrative arm of the EEC, successfully prosecuted its first cartel in 1969. *Id.* at 121. Third, U.S. price-fixing enforcement penalties became significantly more severe at the end of this period. Beginning around 1961, the DOJ began seeking guilty pleas from defendants, rather than allowing *nolo contendre* pleas, which eased the burden of proof for plaintiffs in civil treble-damage suits. *See* Connor, *supra* note 2, at 42.

137. Although the prosecution of price-fixing of domestic conspiracies was at a high level in 1974-1990, the investigation of international cartels was not a high priority for DOJ. Nor did it have success in the courtroom in the few cases it did pursue. *See* Connor, *supra* note 2, at 43.

138. USSG MANUAL, *supra* note 49, § 2R1.1, historical notes, 1991 amends.

139. *See* FEDERAL SENTENCING GUIDELINES HANDBOOK, *supra* note 48, § 2R1.1, Commentary, Background (stating that fines may exceed $10,000,000 for convictions on multiple counts).

140. U.S. DEP'T OF JUSTICE, FINAL REPORT OF THE INTERNATIONAL COMPETITION POLICY ADVISORY COMMITTEE TO THE ATTORNEY GENERAL annex 4-A (2000), *available at* http://www.usdoj.gov/atr/icpac/finalreport.htm.

141. The interwar period 1920-1945 is well above the trend, while the 1946-1990 periods are below it.

due to the launching of a historically high number of international cartel cases since the early 1990s.

Table 3. Number of Average Overcharge Observations by Year and Type

| Cartel Episode End Date | Membership | | Legal Status | | Bid-Rigging | |
|---|---|---|---|---|---|---|
| | National | International [a] | Found Guilty [b] | Legal or Unknown [c] | Primary Conduct | Other |
| | Number | | | | | |
| 1780-1890 | 59 | 5 | 9 | 55 | 4 | 60 |
| 1891-1919 | 61 | 36 | 38 | 59 | 9 | 88 |
| 1920-1945 | 9 | 147 | 45 | 111 | 1 | 155 |
| 1946-1973 | 72 | 20 | 63 | 29 | 39 | 53 |
| 1974-1990 | 59 | 20 (1 EU) | 60 | 19 | 40 | 39 |
| 1991-2004 | 49 | 137 (11 EU) | 169 | 17 | 92 | 94 |
| Total | 309 | 365 | 384 | 290 | 185 | 489 |

Source: Connor, *supra* note 4, tbls. 1 & 2.
[a] Cartels with corporate members from two or more countries. Those with all members from the EU shown in parentheses.
[b] At least one member of the cartel pleaded guilty, was found guilty at trial, paid civil antitrust fines, was the object of an adverse commission decision, or made a monetary settlement with the plaintiffs in a private suit.
[c] No evidence of guilty pleas, fines, consent decrees, or monetary penalties in the publication sources consulted. Includes registered export cartels.

A second important trend is that most cartel data now arise from prosecuted cartels. Prior to 1946, less than 30% of our observations refer to cartels known to have been prosecuted.[142] Until the early 1970s, national and international cartels comprised of European companies could form cartels subject only to registration requirements in most European countries (and the EEC after 1960). The European Commission began imposing fines on unregistered cartels that affected EEC trade beginning in 1969.[143] During 1974-1990, U.S. corporate sanctions on cartels became significantly harsher, and the European

142. The nine observations from a prosecuted cartel prior to 1890 refer to the U.S. anthracite coal market, which began as early as 1829 but was not convicted until eighty years later. *See* Connor, *supra* note 3, at 47-49.

143. *See* HARDING & JOSHUA, *supra* note 136, at 121.

Union's prosecutions moved in the same direction.[144] After 1990, 90% of the cartels in our sample were studied after they were prosecuted or fined by one or more antitrust authority. This pattern does not necessarily mean that the probability of discovery by prosecuting bodies has gone up significantly, but it probably does represent a heightened aggressiveness in anticartel enforcement as well as a shift in research methods by social scientists.[145]

A third trend manifest in Table 3 is the prominence of estimates derived from bid-rigging conspiracies since 1945. In 1946-1973, 42% of the episodes in our sample were primarily bid-rigging conspiracies; after 1973, half of the episodes involved rigged bids, many of them local milk or construction conspiracies in the United States. Most of the immediate victims of bid-rigging conspiracies were governments. Relatively few international cartels rely primarily on rigging auctions or tenders for public projects.[146]

1. Trends in Average Overcharges over Time

Table 4 displays the medians of all average overcharges reported, distinguished by the same time periods and types used for Table 3. We choose to show the median overcharge percentages rather than the mean overcharge percentages because a few very high overcharges in any particular category can overwhelm a mean calculated using the larger number of low-to-medium percentage overcharges.[147]

The median cartel overcharge for all types and time periods (a median that includes a significant number of zeros) is 25%.[148] There is

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144. Both jurisdictions imposed historically unprecedented penalties on international cartels beginning in the late 1990s. *See* John M. Connor, *Private International Cartels: Effectiveness, Welfare, and Anticartel Enforcement* 16-29, 32-37 (Dep't of Agric. Econ., Purdue Univ., Staff Paper No. 03-12, June 18, 2003), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=611909.

145. In the last decade, announcements of probes, guilty pleas, and fines on cartelists are found more and more to be in convenient internet sites and through internet search engines than they were formerly.

146. What may seem like a surge in this practice may, in fact, be a reflection of changes in data availability. Most of the articles we have found on bid-rigging have drawn on public records of state or federal agencies that have been the objects of these conspiracies. It is possible that the increase in bid-rigging cases seen in our data is simply due to the advent of open-records laws at the state and municipal levels similar to the federal Freedom of Information Act., Pub. L. No. 89-487, 80 Stat. 250 (1966).

147. In such situations the means are larger than the medians, and the median is a better representation of central tendency. Means, medians, and standard deviations are shown in Connor, *supra* note 3, at 74, tbl. 3.

148. The successful cartels (those with non-zero overcharges) overcharged by an average of 28% to 29%. Note that the 1946-1973 period displays the lowest overcharges; if

no strong trend in the cartel markups for all types over time, but if one examines the national cartels and international cartels separately the downward trend is more pronounced.[149] For the "classic" and punished cartels, moderate downtrends are evident.[150] However, for two types of cartels, bid-rigging and unsanctioned, there is no significant decline in average overcharges. It should, however, be noted that since 1990, the average overcharges of discovered cartels fell to 25% for international cartels.[151] Moreover, the thirty post-1990 domestic observations had a mean overcharge of 26.2% and a median overcharge of 24.5%.[152]

It is difficult to know what to make of the downtrends in profitability for most types of cartels. The influence of the spread of effective anticartel enforcement is perhaps the most obvious explanation.[153] The downward trend in overcharges among cartels that were caught by antitrust authorities tends to support the idea that cartelists find it increasingly difficult to hide their activities. Alternatively, the greater antitrust scrutiny in the United States from the 1940s and from Europe since the 1960s could prompt cartelists to refrain from full monopoly pricing increases so as to reduce the chances of detection. Some of these hypotheses will be investigated below.

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the Commission examined national cartels from this period, its 10% presumption is not unreasonable.

149. The simple correlation of median overcharges for all types over the six time periods is -0.29, but the correlations over time for the national and international cartels are -0.61 and -0.64, respectively. The declining overcharge rate after 1890 is verified in a more formal meta-regression analysis that controls for publication sources, calculation method, and several cartel characteristics. *See* John M. Connor & Yuliya Bolotova, *A Meta-Analysis of Cartel Overcharges*, INT'L J. INDUS. ORG. (forthcoming 2006) (on file with author).

150. Correlations are -0.33 and -0.39.

151. There were 137 international cartels analyzed for this period.

152. One estimate was a zero. Of the thirty observations, ten were bid-rigging, with mean and median overcharges of 21.5% and 16.5%, respectively.

153. There are also other possibilities. Perhaps the application of more sophisticated quantitative methods by researchers in recent decades systematically yield lower estimates of price effects than the earlier studies that relied on simpler before-and-after comparisons. Perhaps expected profit rates in cartelized industries have declined as an effect of globalization, and those companies that join cartels are satisfied with smaller percentage increases from collusion. Industry mix also could provide an explanation. The sample drawn from the earlier periods tends to contain more minerals and metals conspiracies, whereas the later estimates have a higher proportion of chemical, construction, and services firms represented.

2. Average Overcharges Across Types: International and Bid-rigging

A second pattern that emerges in Table 4 is that in every period studied international cartels have been more harmful than domestic (mostly based in the U.S.) cartels. International cartels are about 75% more effective in raising prices than domestic or "national" cartels.[154] This is not so surprising in the pre-World War II era because international cartels could operate without fear of prosecution. Even in the interwar period, U.S. companies may have operated under the assumption that they had structured their participation in a manner that would not run afoul the Sherman Act. But it is somewhat unexpected that the differences persisted in the postwar period is somewhat unexpected. The clearly greater price effectiveness demonstrated by international agreements may be due to a greater freedom from competition than would be true for geographically localized cartels.[155]

The cartels from which we collected the data on overcharges functioned over various geographic spaces. Some confined their operations to one nation, some to several countries in one continent, some were national conspiracies on export trade only, and some straddled continents (the last we refer to as global). Classifying the locus of cartel operations is usually straightforward because the headquarters of the members can be identified. If a significant share of the cartel's membership hailed from two or more continents, it is categorized as global. Export cartels are mostly drawn from single nations, but a few were composed of companies from several European countries. In our sample, 36% of the estimates were drawn from U.S. and Canadian cartels, 35% from Europe, 8% from other continents, and 20% were global conspiracies.[156]

There are significant differences in average overcharges across cartels by geographic type. Those managed in single European countries have the highest median overcharges (43%), but curiously those organized across national boundaries in Western Europe were as a group the least successful (16% median overcharge). North American conspiracies also had quite low average overcharges (21%).

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154. These are cartels that fixed prices in one country and export cartels comprised of firms from single countries. In three periods, international cartels were *twice* as profitable.

155. Connor, *supra* note 2, at 48. Also, international cartels are more likely to be involved with internationally tradable commodities with comparatively low long-distance transportation costs. *Id.*

156. *See id.* at 56, tbl. 9.

Median overcharges for Asian-based and global conspiracies were relatively high (29%).[157]

A third pattern noted in Table 4 is the inferior price effects of bid-rigging cartels (median 21%) compared to conventional conspiracies that set selling prices or allocated market shares (25-29%). Bid-rigging cartels often were organized to exploit tenders for government public works projects. Relatively few international cartels engage in bid-rigging, whereas bid-rigging occurs mostly in national or local conspiracies, so this distinction may be confounded with the geographic types just discussed above. Nevertheless, this finding directly contradicts prior economic conclusions[158] and the *United States Sentencing Guidelines* that impose higher penalties for bid-rigging.[159] It also challenges a rationale of the U.S. Government's overt policy shift in the 1980s that made bid-rigging conspiracies a higher priority.[160]

Table 4. Median of Average Cartel Overcharges, by Year and Type

| Cartel Episode End Date | Membership | | Legal Status | | Bid-Rigging | | All Types |
|---|---|---|---|---|---|---|---|
| | National | Inter-national | Found Guilty | Legal | Primary Conduct | Other | |
| | Median Percent[a] | | | | | | |
| 1780-1891 | 22 | 41 | 32 | 22 | 16 | 24 | 23.5 |
| 1891-1919 | 21 | 48 | 25 | 35 | 28 | 37 | 30.4 |
| 1920-1945 | 18 | 36-37 | 45 | 32 | 34 | 34 | 34.0 |
| 1946-1973 | 14 | 26 | 13 | 23 | 13 | 15 | 15.0 |
| 1974-1990 | 18-20 | 40-43 | 22 | 37 | 21 | 25-26 | 24.0 |
| 1991-2004 | 17-18 | 25 | 24-25 | 20 | 22 | 25 | 24.0 |
| ALL YEARS | 17-19 | 30-33 | 23-25 | 28 | 21 | 25-29 | 25.0 |

Source: Connor, *supra* note 4, tbl. 3.
[a]Medians of the lower bounds or the upper bounds of ranges, where appropriate. Includes many zero estimates. See Table 3 for the numbers of observations in each cell.

157. *See id.*
158. *See* Cohen & Scheffman, *supra* note 45, at 345.
159. *See* USSG MANUAL, *supra* note 49, § 2R1.1(b)(1).
160. *See* Connor, *supra* note 144, at 49.

Another interesting statistic concerns the low number of overcharges by unsuccessful cartels. Only about 7% of the data we collected indicated that a cartel episode was unsuccessful in controlling prices significantly.[161] We did, of course, include these observations in the calculations that appear in Table 4.

3. Overcharges and Market Size

A commentary in the Commission's *Guidelines* asserts that there is an inverse relationship between the size of affected sales and the height in percent of the overcharges achieved by cartels.[162] The commentary, however, presents no conceptual or empirical justification for this assertion. We are aware of no study of cartels available to the Commission that analyzed this relationship or provided an empirical or theoretical reason for this conclusion.[163]

Nevertheless, we decided to attempt to examine whether this hypothesis might be valid. The only source of appropriate data, of which we are aware, is a working paper by Connor that developed affected sales and overcharge data for a group of modern international cartels.[164] This paper contains ninety-two useful observations, and we were able to calculate correlation statistics for a number of subsamples. The first sample of fifty cartels examined the largest geographic market for each cartel; the coefficient was not significantly different from zero.[165] We also examined geographic subgroups of the cartels: global, U.S., EU, and other single national markets. The correlations for these four samples varied from -0.17 to +0.24, but none were statistically significant. The data therefore suggest that there is no support for the *Guidelines'* size-overcharge connection. The policy implication is that there is no justification for going easy on the largest cartels discovered in recent years, such as the vitamins cartel.

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161. We do not want to make too much of this statistic, however, because it may reflect selection bias by the authors of the studies that were published. Injurious cartels might be more noteworthy or interesting than incompetent cartels.

162. *See* USSG MANUAL, *supra* note 49, § 2R1.1, application n.4 ("Another consideration in setting the fine is that the average level of mark-up due to price-fixing may tend to decline with the volume of commerce involved.").

163. *See* Cohen & Scheffman, *supra* note 45, at 344-45.

164. *See generally* Connor, *supra* note 144.

165. The correlation coefficient $r = -0.105$. To see whether extreme observations might unduly affect the result, we repeated the experiment but dropped first all cartels with $5 billion in sales or more and second all cartels with overcharges of 65% or higher; in both cases $r$ became closer to zero (-0.065 and +0.019, respectively), which indicates that extreme observations do not affect the low correlation we have found.

4. Size Distribution of Overcharges

Given our interest in the foundations of the *United States Sentencing Guidelines*, examining the size distribution of our estimates would be logical. Table 5 classifies our average estimates into nine categories by size. Because of the *Guidelines'* 10% overcharge assumption for the average cartel, this break point is of special interest.[166]

Table 5. Mean Average Overcharges by Size Category

| Percentage Range [a] | Number of Observations | Distribution of Observations | | |
|---|---|---|---|---|
| | | Mean | Total | Non-Zero |
| | Number | Percent | | |
| Zero or less [b] | 46 | 0 | 7 | 0 |
| 0.1-9.9 | 90 [c] | 6.3 | 14 | 15 |
| 10.0-19.9 | 122 | 14.1 | 19 | 21 |
| 20.0-39.9 | 182 | 28.6 | 29 | 31 |
| 40.0-59.9 | 99 [d] | 47.9 | 16 | 17 |
| 60.0-79.9 | 39 | 67.8 | 6 | 7 |
| 80.0-99.9 | 13 | 88.6 | 2 | 2 |
| 100.0-199.9 | 25 | 129.0 | 4 | 4 |
| 200 or greater | 19 | 429.8 | 3 | 3 |
| Total | 635 | 49.4 [e] | 100 | 100 |

Source: Connor, *supra* note 3, at 51 tbl. 7; Connor, *supra* note 4, tbl. 2.
[a] Overcharges of 10% or higher are rounded to the nearest whole number. Midpoints of ranges.
[b] Four negative numbers are converted to zero.
[c] Four estimates of "weak cartels" are assumed to be 1% overcharges.
[d] Fifteen estimates of 50% are from Eckbo (1976).
[e] Excluding zeros, the mean is 78.4%.

Perhaps the most striking result from Table 5 is that 79% of the overcharges are above the 10% presumption that is the cornerstone of the *Sentencing Guidelines*. Indeed, 60% of the cartel episodes have overcharges above 20%. The mean overcharge of the episodes in the two lowest size ranges (0.1 to 19.9) is 11.6%. Perhaps these were the cartels imagined to be typical by the creators of the *United States Sentencing Guidelines*? By contrast, the cartel episodes with overcharges of 20% or higher have a mean overcharge of 75.3%—more than seven times the level assumed by the *Guidelines'* authors. If the *Guidelines* were examined from the perspective of whether they

166. Connor, *supra* note 2, at 51.

are likely to deter recidivism, fines building upon a 10% presumption would underdeter the vast majority of cartels.[167]

### *C. Reliability*

Analysts may have prior beliefs about the most appropriate data and methods to be used to derive estimates of the price effects of cartels. Some might regard a detailed historical investigation with access to the internal communications of a cartel's managers as the surest path to the truth. Others might give greater credence to such communications only where the cartelists had reason to believe that their activities were legal or where the managers were writing about an illegal cartel years after the statute of limitations had passed. Some might assume that disinterested social scientists are likely to be closer to the mark than prosecutors, plaintiffs' counsel, defendants' counsel, or other interested parties.[168] Among social scientists, ever cognizant of the march of progress in quantitative research methods, there may be a tendency to find peer-reviewed studies applying methods of the most recent vintage to highly disaggregated, detailed data the most reliable. As a result, we employed three approaches in an attempt to learn whether the various overcharge estimates are sensitive to the methods, data sources, time period, or disciplines of the authors.[169]

#### 1. Sources of the Estimates

Confidence in the estimates may be judged in part by the sources from which the overcharge estimates were derived. For example, 65% of the estimates are drawn from the traditional end-product outlets of academic research: academic books, book chapters, and peer-reviewed journals.[170] In addition, 15% of the estimates were taken from economist's working papers, most of which were distributed since 2000. These sources examined modern international cartels and appear to be intermediate versions of book chapters and journal manuscripts.

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167. *See id.* Moreover, the cartels that did not succeed in raising prices are less likely to be prosecuted by the enforcement authorities. By including these cartels in our calculations we may be underestimating the expected harms from the type of cartels that the enforcers are likely to prosecute.

168. *See id.* at 57. Indeed, the cross checks of a more global retrospective analysis might contradict delusions of cartel managers about their power over markets. *Id.*

169. These analyses are reported in detail in Connor, *supra* note 2, at 56-67. More formal analysis of the variation in the estimates are in Connor & Bolotova, *supra* note 149, at 14-43.

170. *See* Connor, *supra* note 2, at 58, tbl. 11.

We examined whether the average overcharge estimates which appeared in "peer-reviewed" sources are different from those that did not.[171] Furthermore, to allow for improvements in analytical rigor over time, we categorize publications into three time periods: 1888-1945, 1946-1973, and 1974-2003.[172] Finally, we divide the observations into those cartels that are known to have been legally sanctioned and those not sanctioned.

The results are shown in Table 6. Peer review does not systematically produce lower estimates of overcharges. In fact, among cartels that were not prosecuted, peer review since 1946 tends to result in slightly higher estimates than other sorts of studies. However, in the case of convicted cartels, peer-reviewed studies do display lower average overcharges; for example, the median overcharge of convicted cartels from peer-reviewed publications since 1973 was 22%; from other type of publications, the median was 36%. We note that the differences in overcharges between peer-reviewed and other types of studies narrowed over time.[173]

Table 6. Average Percentage of Cartel Overcharges, by Legal Status and Type of Study

| Date of Publication | Convicted Cartels [a] | | Legal and Undiscovered Cartels | |
|---|---|---|---|---|
| | Peer Reviewed [b] | Other | Peer Reviewed [b] | Other |
| | Median | | | |
| Before 1946 | 16 | 26 | 23 | 26 |
| 1946-1973 | 10 | 35 | 65 | 39 |
| 1974-2004 | 22 | 36 | 31 | 24 |

[a] At least one closely related episode was subject to an adverse decision of a court, commission, or antitrust authority.
[b] Peer review academic journals, dissertations, court and commission decisions, and OECD reports.

171. Peer review is held in high regard by scientists, and the process might induce caution in authors presenting overcharges for archival publications. We defined "peer-reviewed" sources to include academic journals, dissertations, and reports issued by the OECD. This is a restrictive concept of peer review, because doubtless some of the books and chapters from conference proceedings were also peer reviewed.

172. These are the same demarcations discussed in *supra* Part IV.B.

173. Connor, *supra* note 2, at 66. Looking only at peer-reviewed studies of discovered cartels, there is one finding that is either a bizarre coincidence or a highly revealing hint about the source of the "10% rule." Among the estimates drawn from 1946-1973 peer-reviewed publications, the median overcharge is exactly 10%. If the *Sentencing Guidelines* were based upon these studies, they could be considered to have had a perfectly rational foundation. However, after 1974, peer-reviewed studies of convicted cartels tended to have average overcharges that were 120% higher. It is likely that the sample of studies published during 1946-1973 was biased toward bid-rigging cartels, which we have shown were less destructive schemes than the classic or international cartels that would be studied after 1973. *Id.* at 66-67.

Perhaps the strongest pattern that emerges from Table 6 is the contrast between convicted and other cartels. Comparing the two columns of peer-reviewed studies, the undiscovered and presumptively legal cartels consistently generated higher price markups than unconvicted cartels. This finding has significant implications for anticartel policy because it suggests that, *ceteris paribus*, less effective cartels are the ones most likely to be caught and sanctioned. It also suggests that there is a large social payoff from increasing the probability of cartel detection.[174]

2. Sensitivity to Publication Dates

Here we examine the question whether there are systematic differences between the average overcharges across time, using the date of publication of the study as a proxy for analytical advances. The intuition here is that the authors of more recent empirical studies of cartels have learned to avoid the methodological pitfalls of their predecessors. Among the economic studies that dominate the sample, there is an undeniable trend away from mere narrative historical case studies sometimes embellished with simple graphical illustrations, toward more formal statistical modeling. In industrial economics, there is a trend away from evaluating cartels from the point of view of the theory of pure monopoly toward a more sophisticated and nuanced view informed by game theory and other conceptual advances.

Table 7. Average Overcharge Estimates by Publication and End Dates

| Cartel Episode End Date | Publication Date of Study | | | |
|---|---|---|---|---|
| | Before 1945 | 1945-1970 | 1971-1989 | 1990-2004 |
| Before 1891 | | | | |
| Median | 22.6[35] | 25.1[4] | 22.3[7] | 30.0[14] |
| Mean | 25.4 | 39.4 | 30.7 | 29.6 |
| | | | | |
| 1891-1945 | | | | |
| Median | 26.0[87] | 39.5[88] | 39.0[34] | 29.0[30] |
| Mean | 47.4 | 74.6 | 42.4 | 39.0 |
| | | | | |
| 1946-1990 | | | | |
| Median | • | 12.5[24] | 19.5[92] | 23.0[48] |
| Mean | • | 21.6 | 28.3 | 49.2 |
| | | | | |
| 1991-2003 | | | | |
| Median | • | • | • | 24.5[172] |
| Mean | • | • | • | 40.2 |

Source: Connor, *supra* note 3, at 59 tbl. 12; Connor, *supra* note 4, tbl. 2.
Note: Superscripts indicate sample size in cell.

174. *Id.* at 67.

Table 7 classifies publications according to four periods that correspond roughly to milestones in social-science analysis of cartels: before 1891, 1891-1945, 1946-1989, and 1990-2004.[175] It is not obvious that overcharges vary systematically over time. For example, in the case of cartels that ended in the pre-antitrust era, one sees that both contemporary and early writers arrived at moderate estimates of cartel price effects—median estimates of 22% to 30%. Studies published prior to 1990 tended to calculate relatively low median price effects. As the methods of scholarship improved, the estimated price effects of cartels active in the most laissez-faire of economic environments actually rose to a median of 30%. Nevertheless, simple correlations of overcharges over time do show downtrends for some types of cartels, but this trend could be confounded with a greater proportion of peer-reviewed publications in contemporary research.[176]

3. Intra-Episode Comparisons

The third check on reliability of estimates across various analytical methods controls for changes in the composition of the sample by focusing on pairs of estimates applied to identical cartel episodes. Recall that a cartel episode refers to a single market, time period, and form of cartel organization. There are 291 pairs of observations available for this analysis of reliability, which examines six general methods of estimation.[177]

By and large, Table 8 shows that different methods applied by different authors to identical cartel episodes do not result in markedly different estimates.[178] Nevertheless, there are three differences worth noting. One somewhat surprising result is that the before-and-after

175. For an explanation of why these periods were chosen, see *supra* Part IV.B.

176. For a more complete analysis of these results, see Connor, *supra* note 2, at 59-62.

177. The most widely used is the so-called before-and-after method in which the price during the episode is compared to one of three "but-for" or base prices. The "method unspecified" estimates are on average quite close to the before-and-after price method. The second most popular method is statistical modeling, which accounts for 20% of the estimates. The yardstick method accounts for about 10% of the sample. Overcharges derived from costs of production or profits are the least frequently employed method (about 3%). These five methods have been sanctioned by U.S. courts for determining damages in price-fixing trials. *See* John M. Connor, *Global Cartels Redux: The Amino Acid Lysine Antitrust Litigation*, *in* THE ANTITRUST REVOLUTION 252-76 (4th ed. 2004). Sixth, approximately 10% of this study's estimates are quotes from or interpretations of decisions made by antitrust authorities. Systematic differences across methods ought to be of forensic interest.

178. The correspondence among the estimates using but-for prices before, during, or after a conspiracy is quite close. A more formal analysis verifies that estimates based on pre-cartel prices are not significantly different from those using postcartel prices as the benchmark. *See* Connor & Bolotova, *supra* note 149, at 36-37, tbl. 6.

method produces cartel-overcharge estimates that are quite a bit *higher* than the econometric model applied to the same data. To be specific, the pre-cartel but-for prices are typically double estimates derived from econometric models, and the postcartel prices are triple. Econometric techniques offer the opportunity to the analyst to make precise allowances for several sources of shifts in demand and supply, for seasonality, for trends in technology, and for feedback effects. If, in fact, econometric techniques are the most accurate, what this result seems to suggest is that authors of traditional before-and-after analyses are failing to adjust for all the competitive factors that might drive up the competitive benchmark price. Second, compared with the before-and-after, the cost-based and yardstick techniques yield relatively high overcharge estimates. This suggests that the methods that use costs or profits fail to fully account for all competitive industry costs, perhaps those related to product marketing or overhead. Similarly, as most of the yardsticks are prices in regions in which the cartel did not attempt to fix prices, this result suggests that indirect geographic spillovers from cartel activity may be more common than most analysts anticipate. If the yardsticks are product substitutes, analysts may have inadequately adjusted for quality differences.

Table 8. Median Ratios of Estimates for Same Episodes but Different Methods

| Numerator Method | Denominator Method | | | | |
|---|---|---|---|---|---|
| | Median ratio [b] | | | | |
| | Unspecified | Before and After [a] | Cost Based | Yardstick | Econo-metric Model |
| Unspecified method | 1.00 [72] | 0.92 [39] | 0.74 [2] | 0.72 [20] | 1.86 [11] |
| Before and after | 1.07 [39] | 1.00 [143] | 0.78 [15] | 0.68 [33] | 2.01 [56] |
| Cost based | 1.34 [2] | 1.29 [15] | 1.00 [25] | 2.10 [1] | 0.60 [7] |
| Yardstick | 1.39 [20] | 1.48 [33] | 0.48 [1] | 1.00 [58] | 0.57 [4] |
| Econometric model | 0.54 [21] | 0.507 [56] | 1.66 [7] | 1.76 [4] | 1.00 [78] |

Source: Connor, *supra* note 4, tbl. 2.
—= No pairs available
[a] Comparison of effective cartel price to base period below.
[b] The median overcharge of the numerator method divided by the median of the denominator method.

In summary, overcharge estimates are sensitive to analytical method. Authors estimating cartel overcharges employ the before-and-

after or econometric methods more commonly than any others, and the first results in larger estimates than the second for identical cartel episodes.[179] Moreover, more often than not, the cost-based and yardstick methods also produce relatively high estimates of overcharges.[180]

## V. SURVEY OF FINAL VERDICTS IN CARTEL CASES

In theory, we should be able to determine how high cartels raise prices by a straightforward examination of a statistically significant sample of the many antitrust cases that involved cartels. However, the amount that prices changed, or even whether prices were affected at all, is not relevant to the issue of whether a cartel violated the antitrust laws.[181] It, therefore, is unnecessary for the court in criminal antitrust cases to calculate the extent of any overcharges or undercharges.[182] In civil cases, however, the damages awarded to a successful plaintiff are equal to three times the overcharges,[183] so in these cases, the plaintiff must demonstrate how much prices increased or decreased due to the actions of the cartel.

The necessary research has proven to be extremely difficult to undertake, however, because almost every private antitrust suit for

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179. In our sample, 59% of the average estimates were of these types.

180. If true, this suggests that to protect defendants' rights the cost-based and yardstick methods ought to be treated with healthy skepticism in forensic proceedings.

181. *See* LAWRENCE A. SULLIVAN & WARREN S. GRIMES, THE LAW OF ANTITRUST: AN INTEGRATED HANDBOOK 165-233 (2000). This shows that in per se cases, the plaintiff does not have to prove whether prices rose (or even whether defendants had market power). The issue of whether prices rose can be an element of a rule of reason case, but rule of reason cases do not give rise to criminal fines, and so are not the subject of this Article.

182. Normally, the government simply relies upon the 10% overcharge presumption. On this basis, the prosecutors and the defendants typically settle upon a criminal fine without calculating the actual overcharges involved. The first time in which the federal government attempted to prove the size of cartel overcharges was *United States v. Andreas*, in which the defendants were convicted of conspiring to fix the price and allocate the sales of lysine. No. 96 CR 762, 1999 WL 515484, at *2 (N.D. Ill. July 15, 1999). The DOJ recommended that the court apply the alternative sentencing provisions of 18 U.S.C. § 3571(d) (1996). *Id.* at *3. The court conditionally denied the defendants' motion to reject the sentencing provisions, and granted the parties' motion for an evidentiary hearing to present economic evidence regarding the gains or losses attributable to the conspiracy. *Id.* The DOJ retained the expert opinion of an economist, who based his estimate of the defendants' gains on a hypothetical "but-for" price. *Id.* at *4. When the defendants requested more time to research and respond to the expert's opinion, the court ordered the DOJ to assist the defendants in obtaining the necessary sales, price, and volume information from other lysine producers. *Id.* at *7. The court later found, however, that the DOJ's production of economic data was insufficient, and therefore granted the defendants' motion to bar imposition of the alternative fine provision. *Id.* at *9-14.

183. 15 U.S.C. § 15(a) (2000). The statute also provides that successful plaintiff will recover reasonable attorney's fees and expenses. *Id.*

damages settles or is dismissed before an overcharge can be calculated by a neutral observer and made part of the public record of the case. As a consequence, final verdicts involving cartels where a judge, jury, or commission[184] calculated an overcharge are surprisingly rare. As an example of their scarcity, there apparently has never been even a single final verdict in a damages case involving indirect purchasers, even though this is a very actively litigated area of antitrust law where more than 100 cases have been filed against a single defendant.[185]

The reasons for this high settlement rate are not completely clear.[186] One reason is because the litigation is so risky and expensive that settlement often is the most logical alternative for both parties.[187] Rather than incurring substantial litigation expenses,[188] risking personal and corporate time, expenses, and disruption for clients,[189] and facing

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184. Although there have been cases where its staff entered into agreements with defendants over the size of the illegal overcharges, we know of no cases where the FTC calculated the actual size of a cartel overcharge.

185. *See* Robert H. Lande, *Why Antitrust Damage Levels Should Be Raised*, 16 LOY. CONSUMER L. REV. 329, 339 (2004); Denger, *supra* note 79, at 4. For example, a very reliable source reported that in recent years at least 137 antitrust cases alleging overcharges were filed against Microsoft alone, involving both Sherman Act section 1 and Sherman Act section 2 allegations. *See* Jonathan Groner, *Chalk Up a Few Wins for Microsoft*, NAT'L L.J., Oct. 2, 2000, at A4.

As of July 2004, almost all had been dismissed or settled, and there have been no final verdicts. *See* Robert Weisman, *Microsoft OK's $34M Settlement in Mass.*, BOSTON GLOBE, June 30, 2004, at F1.

186. Most civil cases of all types settle or are dismissed. We have no information as to whether cartel cases are more likely to settle or be dismissed than other types of antitrust or nonantitrust cases. The fact that we have been able to find so few final cartel verdicts, however, suggests that the number of cases that settle may be higher. Unfortunately, these settlements virtually always provide little public information that would be useful for our purposes. Bentson notes that the most ambitious empirical study of private antitrust cases yielded too little publicly available information on settlement amounts to justify analysis. George J. Bentson, *A Comprehensive Analysis of the Determinants of Private Antitrust Litigation, with Particular Emphasis on Class Action Suits and the Rule of Joint and Several Damages*, *in* PRIVATE ANTITRUST LITIGATION: NEW EVIDENCE, NEW LEARNING 272, 318 (Lawrence J. White ed., 1988).

187. This type of complex litigation that goes to final judgment has sometimes colloquially been termed a "mutual suicide pact" because of the ardor involved for all concerned.

188. *See* Steven C. Salop & Lawrence J. White, *Private Antitrust Litigation: Introduction and Framework*, *in* PRIVATE ANTITRUST LITIGATION: NEW EVIDENCE, NEW LEARNING, *supra* note 186, at 3, 13. They calculated that attorneys' fees average 30% to 50% of the overcharge amount. Elzinga and Wood calculate attorneys' fees as being 58-102% of the overcharge. *See* Kenneth G. Elzinga & William C. Wood, *The Costs of the Legal System in Private Antitrust Enforcement*, *in* PRIVATE ANTITRUST LITIGATION: NEW EVIDENCE, NEW LEARNING, *supra* note 186, at 126.

189. The cost of this disruption to the affected firms can be tremendous. *See* Lande, *supra* note 15, at 142-44. James T. Halverson was reported to have recommended

an uncertain probability of an uncertain magnitude of gains (or a total loss[190]), counsel for all parties often recommend and negotiate a compromise.

It might instead be useful to ask why some cartel cases do not settle. One possibility is that the nonsettling cases are most likely to be those in which the parties have different beliefs as to the likelihood of victory. Settlement is very difficult if plaintiffs are optimistic that they will prevail and the award will be large, while defendants believe the opposite. For this reason, nonsettling cases might be those in which liability and damages are least susceptible to prediction, and in which the expected likelihood or magnitude of liability cannot be predicted with even a small amount of confidence.[191]

Since most cartel cases settle, it might be desirable to survey settlements as one way of determining the size of the cartel overcharges.[192] However, settlement amounts are too frequently an

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> that a defendant take exhaustive discovery, particularly if it has an advantage over the plaintiff in terms of resources. Halverson also suggested that any defendant show the plaintiff that it is not costless to sue. Thus a defendant should counterclaim. Halverson bluntly suggested that private plaintiffs look at their pocketbooks rather than the so-called "public interest," so defendants should make plaintiffs worry about their pocketbooks. He also suggested that if more than one private suit is filed, the defendant should get the weak suit to trial first. . . . [After] the plaintiff's board of directors has seen months of attorneys' fees and corporate disruption, the plaintiff's board will work in the defendant's favor and nudge its lawyers toward a compromise. . . . In sum, he stated, settle strong cases and try the weak cases, always while delaying the Government.

Frank Discussion of Antitrust Trial Tactics Provided at New England Conference (Dec. 7, 1976).

190. Both parties have a special incentive to settle cases that, if the plaintiff prevails, would bankrupt the defendant.

191. Other factors could include lawyer or client stubbornness, irrationality, or denial of the likely impending reality of the court's verdict. Another possibility is the unethical resistance by counsel to accept a settlement that would be good for their clients, but would generate fewer legal fees than litigation. This could be especially likely to occur in class action cases because class members cannot effectively supervise their attorneys. It also is possible that as a case develops, plaintiffs are more likely to settle to the extent that they come to believe that their case's potential rewards are likely to be less than the expected payoff. However, the costs of litigation are automatically recovered by prevailing plaintiffs. *See* 15 U.S.C. § 15(a) (2000). This factor is less important than in other fields. The extreme example of a large ratio of attorneys' fees to recovery surely is that of *United States Football League v. National Football League*, 887 F.2d 408 (2d Cir. 1989), *cert. denied*, 493 U.S. 1071 (1990). Although the plaintiff received only $1.00 before trebling, his attorneys received over $5,000,000 in fees. *Id.* at 409.

192. One might believe, for example, that a settlement represents the lower bound on the expected recovery if the case would go to trial (the present value of three times the overcharge plus attorneys' fees) since a risk-neutral defendant would be unlikely to settle for the entire expected verdict.

extremely unreliable guide as to the size of the underlying cases' overcharges. Settlements are by no means likely to be compromises for half of the overcharges.[193] Risk-averse plaintiffs with a strong case might settle for very little if they need the money quickly and, consequently, are in a weak bargaining position.[194] Conversely, risk-averse defendants with a strong case might settle for what might seem like an overly generous amount to avoid even a small probability that an irrational judge or jury will award an amount large enough to cripple the company.[195] The authors have heard such a wide variety of

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One might also believe the supposed rule of thumb that good antitrust cases usually settle for single damages, perhaps on the dubious theory that the trebling (which produces a higher number) and the lack of prejudgment interest (which produces a lower number) would roughly usually cancel one another. We have no evidence as to whether this is the way that plaintiffs, defendants, or their attorneys typically behave. We have, however, heard trustworthy plaintiff's and defendant's attorneys tell us, anecdotally, that they have settled "good" cartel cases for single damages.

193. If the plaintiff and the defendant each had, and knew that they had, a 50% chance of winning, then the settlement might well be for 50% of the present value of the automatically trebled overcharges. But this would not be true if the plaintiff's chance of prevailing was not 50%, if one party was a better bargainer, or if either party was unduly optimistic or pessimistic about their chances of prevailing. Suppose, for example, that difficult class action certification problems reduced the plaintiff's chances of winning to 25%. Even if defendants really did raise prices by 30%, this often can be very difficult for the plaintiff to prove. If the plaintiff only has a 25% chance of obtaining class certification and subsequently proving the damages, a settlement should be at far below the level of 50% of the discounted present value of three times the overcharges.

Moreover, publicly available settlements typically contain very little usable data. Often they do not even include the size of the affected commerce, making the calculation of the overcharge percentage highly speculative.

194. Plaintiffs' counsel typically asserts that defense counsel is able to find barely ethical ways to delay meritorious claims for years. Since antitrust awards do not contain prejudgment interest except in extraordinary circumstances that rarely occur, see 15 U.S.C. § 15(a), and plaintiffs often need the money in the short term, these delays harm plaintiffs' bargaining position significantly. Plaintiffs' counsel also asserts that defendants often are able to unreasonably prevent the necessary class certifications, and otherwise to make litigation so burdensome that plaintiffs have to settle for only a small fraction of the actual overcharges. *See supra* note 189 and accompanying text.

195. The authors have heard variations on this theme many times. Attorneys for defendants in cases that have settled for eight figures appear to believe, well after the cases were over and after there was any threat of further liability, that their clients never affected prices. Defendants' attorneys often assert that their clients (who were found by a court to have agreed to fix prices) were prevented by market forces from affecting prices significantly. However, rather than take the risk of having a judge or jury not believe them, they settle for a large sum.

One of the authors of this article once worked for a client who went to jail for rigging the bid for an extremely complex product. The author believes, after spending a considerable time trying to determine the relevant costs, that this client inadvertently fixed the price at too low a level. Their intention was of course to bid higher than the competitive price (but not so high as to attract suspicion). But the firm underestimated how costly the item was to make, so apparently it actually lost money.

claims from both plaintiffs and defendants[196] as to settlement motivations[197] that we do not believe that analysis based upon average settlements would be very meaningful.[198]

### A. *Sample and Results*

We instead attempted to obtain the largest possible sample of verdicts in collusion cases. We searched for final decisions in United States antitrust cases involving horizontal collusion—broadly defined to include bid-rigging and related practices—in which a judge, jury, or commission calculated the damages.[199] We found cases by the use of computer-assisted searches of data bases,[200] by searching through a large number of articles and treatises on cartels and on antitrust damages, and by asking groups of knowledgeable antitrust professionals for any examples they knew of that might contain useful

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Another factor that can make defendants want to settle even if they did not raise prices is antitrust's joint and several liability doctrine, which makes every member of a cartel liable for the overcharges of the entire cartel. *See* Denger, *supra* note 79, at 10. This can lead to extremely large potential damages, and even a small risk of a huge payout can, from the defendant's perspective, overshadow a weak liability case. The defendant might be forced to settle for a significant amount even if it did not cause prices to be elevated.

196. Interestingly, defendants sometimes assert that unscrupulous plaintiff attorneys often only have an interest in the size of their legal fees, rather than the amount they recover for their clients. If true, this gives rise to the possibility that plaintiff attorneys, especially in consumer class action cases, might settle for unduly low amounts solely to secure generous legal fees for themselves. The courts are supposed to prevent this from happening, but judges sometimes are too busy to do so optimally.

197. One of the most unusual settlement stories came from a very reliable defense counsel who is among the most honest members of the bar. His client settled generously despite winning numerous preliminary motions and discovering that the facts were developing more and more favorably to its position. The client unexpectedly instructed counsel to settle on any terms possible before the end of the calendar year. The company had decided to change to a profit sharing arrangement for the following calendar year, and its executives preferred to pay large damages before the end of the calendar year rather than risk even a small probability of paying modest damages, and certain legal fees, the following calendar year. Needless to say, the size of this settlement was unrelated to the actual overcharges (which in this case probably did not exist).

198. We are not asserting that it would be impossible to derive insights from an analysis of settlements. We only believe that it would be difficult. We could imagine, for example, a study of settlements based upon candid interviews with the participants that could yield a great deal of important information. Anonymous questionnaires about past cases are another possible research method. *See* Salop & White, *supra* note 188, at 12.

199. We excluded cases that were overturned on appeal.

200. Computerized searches were not, with only a few exceptions, particularly helpful. Most searches turned up hundreds of useless citations, including our searches for "price-fixing" or "bid-rigging" and "verdict," "amount of overcharge," "overcharge" and "percent," "auction" and "conspiracy" within "antitrust," "collusion," and "dollars" or "cents." We never were able to design a successful focused computerized case search.

information.[201] We have included every qualifying final collusion verdict we were able to find. However, many of the verdicts that we did find were only expressed in dollar amounts which we were unable to translate into percentages, so we reluctantly had to omit these cases.[202]

The vast majority of the cases we found settled or were dismissed.[203] This left a disappointingly small sample size to analyze. However, we know of no reason to believe that our sample is biased in any particular direction.[204] Moreover, our sample of twenty-five observations is roughly as large as the sample size of those in the prior surveys that we reported in Table 1 (which were 5-7, 12, 12, 13, 22, and 38 in number, respectively). Nevertheless, this sample is disappointingly small compared to the number of economic observations we were able to collect. Due to its small size, these results should be interpreted with caution. They should be considered only as additional data worthy of analysis and discussion, not as definitive material.

The results of our survey of final verdicts in collusion cases are that the twenty-five collusion episodes had a median average overcharge of 21.6% and a mean average overcharge of 30.9%. The nine cases that reported peak overcharges produce a median peak overcharge of 71.4% and a mean peak overcharge of 167%. All but five found that the cartel had raised prices by more than the Commission's 10% benchmark. Due to the small number of final verdicts, it would not be meaningful to analyze these verdicts in even smaller groups[205]—i.e., we could only find eight final verdicts

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201. For example, inquiries were made on the antitrust listserves of the ABA Antitrust Section, the National Association of Attorneys General, and the American Antitrust Institute.

202. *See, e.g.*, Chattanooga Foundry & Pipe Works v. City of Atlanta, 203 U.S. 390, 396 (1906); Phillips v. Crown Cent. Petroleum Corp., 602 F.2d 616, 621 (4th Cir. 1979); Bigelow v. RKO Radio Pictures, Inc., 150 F.2d 877, 882-84 (7th Cir. 1945), *rev'd*, 327 U.S. 251 (1946); Transnor (Bermuda) Ltd. v. B.P. N. Am. Petroleum, 736 F. Supp. 511, 513 (S.D.N.Y. 1990).

203. We surely found only a small percentage of final verdicts, and would be grateful if readers could inform us of final verdicts that we inadvertently omitted.

204. For a number of considerations, see the discussion *infra* Part V.B.

205. In addition, it could be argued that one, or possibly two, of these cases involved conduct that would be unlikely to be the subject of criminal fines. *Federal Trade Commission v. Superior Court Trial Lawyers Ass'n* involved a horizontal conspiracy by legal aid attorneys with an arguable political motivation to raise legal fees, by 16.7%. 493 U.S. 411, 415-18 (1990). *Palmer v. BRG of Georgia, Inc.* involved a naked division of markets for bar review courses that raised prices by 167%. 498 U.S. 46, 47 (1990) (per curiam). Neither case was treated criminally. Omitting these cases would leave the survey's median unaffected, but would lower its mean.

involving bid-rigging episodes, so it does not seem worthwhile for this Article separately to report the median or mean figures for bid-rigging cartels.

### *B. Reliability and Possible Biases*

How useful are the decisions of judges and juries in answering the question of how high cartels raise prices? Their verdicts are, of course, based on the opinions of the competing expert witnesses, who come to radically different conclusions about the size of the damages involved.[206] Both sides make their presentations and the finders of fact decide which expert is more believable on particular issues (with the plaintiff having the burden of proof).[207]

This may or may not be the best way to determine which expert witness's conclusions are more accurate since many skills besides facts and economic reasoning can play a role in the judge or jury determination.[208] While the common law system of jury and judge verdicts is far from perfect, it is the system our nation has chosen to use in a wide variety of life and death decisions affecting our society.[209] Since the United States has long continued to use this system,[210] our nation has made an implicit decision that judges and juries are the best way to arrive at the truth the largest percentage of the time. We know of no way to prove whether judges or juries achieve results better than those of the economists who publish studies in journals and books.

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206. It is extremely unlikely that there has ever been even a single antitrust case where experts for opposing sides agreed upon the amount of damages. Why do "neutral" experts who work for plaintiffs always calculate significant larger amounts than do those who work for defendants?

Similarly, although we find no evidence for the allegation, the economic studies reported elsewhere in this Article are open to the charge that some of the authors' and their methodology are biased.

207. Moreover, the likelihood and size of damages also will depend upon the absolute and relative abilities of the defending and prosecuting counsel. We know of no evidence, however, as to whether defendants or plaintiffs are likely to have the best legal representation on average.

208. Author Connor has been an expert witness and author Lande has worked with expert witnesses in antitrust cases. They have seen firsthand the truth of the conventional wisdom that presentation skills can be as crucial as economic and factual knowledge.

209. While it may be true that some juries, and also trial or appellate judges, are not objective, the burden of proof should be on those who would assert that the overall system, including its appeals, has a systematic bias, or that an alternative approach to answering the question of how high cartels raise prices would be superior.

210. In other nations with admirable judicial systems, judges or judicial panels are the vehicles of decision-making in antitrust cases, which typically are civil matters. *See, e.g.*, MARC VAN DER WOUDE & CHRISTOPHER JONES, EC COMPETITION LAW HANDBOOK 593-629 (2003) (discussing the approach of the EU).

Neither sample is perfect—each has its strong and weak points. But since the question of how high cartels raise prices is an important one that deserves as reliable an answer as we can ascertain, we are using this method as an additional one that deserves consideration.[211] And, since our two major approaches reinforce one another, the credibility of both is strengthened.

Further, since such a large percentage of cases settle, one reasonably might ask whether the few that do not settle are in some manner different from those that do. Since the motivations for settling and not settling are so varied, one can only speculate as to the biases involved.

Are there likely to be any significant systematic differences between cases that settle and those that do not? Is there reason to believe that classes of cases for which settlement will be less likely—such as in cases where the parties have different expectations as to what the outcome is likely to be—when the overcharge percentage is especially high? As examples we will present two contrasting possibilities. First, it certainly is possible that for cases in which the cartel overcharged by a large percentage the defendants might reason that the plaintiff is likely to be able to prove at least some overcharges to the fact finder's satisfaction. The defendant might be more likely to settle these cases.[212] Alternatively, it could be true that a small overcharge percentage—less than 5%—might be too small for the plaintiff successfully to distinguish from purely random movements in prices. If the plaintiffs believed that the defendant had increased the price by 4%, but knew that it would be extremely difficult to prove this, they would be less likely to sue.[213] As these examples illustrate, we can only speculate as to why a survey of verdicts could be biased in either direction and could yield results that are higher or lower than the actual mean or median cartel overcharge. While we certainly acknowledge this method's potential flaws, we know of no reason to

211. We welcome a healthy debate over the significance of this Article's methods and encourage other authors to find and employ alternate methods to ascertain cartel overcharges.

212. Some cases with large overcharges settle, while some smaller ones do go to trial.

213. Further, it might be less likely that a plaintiff would even file a civil case unless it believed that damages were likely to be high. However, this Article examines overcharge percentages, not total recoveries, and it focuses on medial percentages. Is it not true that plaintiffs are likely to file cases with large expected total payoffs, regardless of what overcharge percentage that constitutes? What difference does it make to plaintiffs or their attorneys if they prove a 1% overcharge on $1 billion in sales, 10% on $100 million, or 100% on $10 million? In all three examples, the amount of the expected overcharge would be identical.

believe that it is either systematically biased or unreliable, or why this unreliability would shift the results in a particular direction.

## VI. CONCLUSIONS

Our survey identified about 200 serious social-science studies of cartels which contained 674 observations of "average" overcharges.[214] Our primary finding is that the median[215] cartel overcharge for all types of cartels over all time periods has been 25%: 17-19% for domestic cartels and 30-33% for international cartels.[216] Thus, in general, international cartels have been about 75% more effective in raising prices than domestic cartels. Because the United States has historically had by far the toughest system of anticartel sanctions, this could imply that these sanctions have been having significant effects. These cartel overcharges are skewed to the high side, pushing the mean overcharge for all types of cartels over all time periods to 49%. These results are generally consistent with the few, more limited, previously published works that survey cartel overcharges. The six studies we thought exhibited the highest standards of scholarship (Table 1) report samples with simple average median overcharges of 28% and simple average mean overcharges of 31% of affected sales.

In our social-science sample, 79% of the overcharges were higher than the 10% presumption contained in the *Commission Guidelines*, indeed 60% were above 20%. Perhaps surprisingly, bid-rigging was no more injurious than other forms of collusion. If anything, our data suggests that bid-rigging might be about one-fifth less injurious. These results suggest that the Commission should amend its *Guidelines*, which currently treat bid-rigging more harshly than other forms of collusion. Nor is there any empirical basis for the Commission's statement that cartels are less dangerous when they are formed in larger markets.

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214. Average overcharges are those calculated from an entire cartel episode, not just a peak or isolated result.

215. All figures presented in this part incorporate all relevant zero estimates and omit peak results.

216. This study found results for 247 international cartel episodes and 198 domestic cartel episodes. In addition, we found significant differences in average overcharges across cartels by geographic type. Those managed in single European countries have the highest median overcharges (43%), but curiously those organized across national boundaries in Western Europe were as a group the least successful (16% median overcharge). North American conspiracies also had quite low average overcharges (21%). Median overcharges for Asian-based and global conspiracies were relatively high (29%). *See* Connor, *supra* note 2, at 56, tbl. 10.

For most types of cartels there have been modest downtrends in cartel markups over time.[217] In particular, it should be noted that since 1990, the average overcharges of discovered cartels fell to 25% for international cartels.[218] Moreover, the thirty post-1990 domestic observations had a mean overcharge of 26% and a median overcharge of 24%.[219] Because the post-1990 era has been the period with by far the highest level of fines imposed, these decreases are consistent with the theory of optimal deterrence discussed in Part II.[220] They also suggest that the recent worldwide trend toward the intensification of cartel penalties has been desirable.[221] If the worldwide system of criminal fines can be made to correspond more closely to the actual levels of cartel overcharges, sanctions against price-fixing will more closely provide optimal deterrence.

The results of the survey of final verdicts in decided U.S. collusion cases, only three of which were international cartels, show an average median overcharge of 22% and an average mean overcharge of 31%.[222] Thus, the twenty-five decisions produce average overcharges that are quite comparable to the results of the much larger set of economic estimates. All but five of the reported decisions found that the cartel had raised prices by more than the Commission's 10%

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217. The fact that cartel overcharge estimates have not changed much over the past century (except as noted above) provides a rough indication that progress in theories and empirical methods has not totally invalidated cartel case studies published in the early years of cartel scholarship. We also ascertained that median overcharges are not sensitive to whether or not a study was subject to formal peer review. However, in an analysis of finely matched cartel episodes, we did find that econometric approaches typically produced lower estimates than did application of the "before and after" method.

218. There were 137 international cartels analyzed for this period.

219. One estimate was a zero. Of the 30 observations, 10 were bid-rigging, with mean and median overcharges of 21.5% and 16.5%, respectively.

220. There has been a great deal of speculation about how price fixers behave and to what signals they do or do not respond. We cannot in any meaningful way truly psychoanalyze them and use these results to set up a system likely to provide them with optimal incentives. Nevertheless, the data suggests that the relevant corporate officials do respond to the incentives that have been created by the existing system of criminal penalties. This suggests that the current system of cartel fines has been a very successful program, and that for the first time in history they are large enough that they have started to have a significant effect on corporate behavior.

221. In the United States alone, cartel fines totaled $175 million in 1955-1988, $340 million in 1989-1997, and more than $1.8 billion in 1998-2002. These data are expressed in 2002 U.S. dollars. The increase in the European Union is even more dramatic. *See* Connor, *supra* note 41, at 239.

222. In addition, the nine cases that reported peak overcharges produce a median peak overcharge of 71.4% and a mean peak overcharge of 130%.

benchmark. Because of the relatively small number of verdicts,[223] however, we think it improper to place much weight on subgroups of these data, such as cartels formed since 1990 or bid-rigging cartels.[224]

This Article's Introduction noted that there is a view among some antitrust writers that there is little evidence that cartels raise prices significantly for a period long enough to justify extant anticartel laws and, especially, extant cartel penalties. Consequently, they argue for the repeal or scaling back of the fines or damages that result from collusion. Even some who recognize that a significant number of cartels are harmful believe that the Commission's presumption that cartels raise prices by 10% is too large. Our results, which are based upon an extraordinarily large amount of data spanning a broad swath of history of all types of private cartels, sharply contradict these views.

In fact, the data suggest the opposite. Median overcharges are, in fact, two or three times as high as the level presumed by the Commission. Moreover, the great majority of the overcharge estimates—those with overcharges above 20%—have a mean overcharge of 75%, more than seven times the *Guidelines'* presumption. Base fines of 20% of cartelists' affected commerce, even when adjusted by significant culpability multipliers,[225] will do little to deter most of these cartels.

The *Guidelines'* 10% overcharge presumption was, moreover, based upon the estimate that "the average gain from price-fixing is 10 percent of the selling price."[226] The *Guidelines'* "average" is the equivalent of our mean, not our median.[227] The correct comparisons are, therefore, not between the *Guidelines'* figure of 10% and our medians of 25% for the economic studies and 22% for the case verdicts. Rather, the truer comparison would be to our mean figures of 49% and 31%, respectively. We are agnostic on the question of whether, from the perspective of optimal deterrence, mean or median

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223. However, the other overcharge studies that we reported in Table 1, *supra*, had samples of 5-7, 12, 12, 13, 22, and 38 estimates, respectively. Our legal sample of 23 fits comfortably with these in terms of sample size.

224. For example, we could only find eight reported verdicts that involved bid-rigging, so it does not seem worthwhile for this article to report the median or mean figures for bid-rigging verdicts.

225. For a variety of factors, however, very few firms actually pay a fine amounting to 20% of the amount of commerce affected. Most violators have their fines reduced for a variety of reasons. *See* Spratling, *supra* note 32, at 801-07.

226. USSG MANUAL, *supra* note 49, § 2R1.1, application n.3.

227. The inclusion of a few highly successful cartels in a sample implies that the sample's mean is significantly higher than its median. The mean will also be higher than the median because overcharges cannot be less than zero.

figures should be used as the basis of the Commission's presumption. We simply note that our decision to focus on the median figures has been a conservative one.

There is another respect in which this Article has been conservative. We have focused solely on the public injury that arises from the transfer of income or wealth from purchasers to the cartel. As noted in Part I, cartels also can lead to allocative inefficiency, umbrella effects, less innovation, managerial slack, and nonprice harms to quality and variety, among other things.[228] Yet, we have not taken these harms into account. Nor have we adjusted our results for inflation.[229] Admittedly, many or most of these factors are extremely difficult to measure, especially in a litigation context. While the *Guidelines* seem to have doubled the 10% presumption to account for its omission of these factors,[230] we believe that this doubling has also been conservative.

For these reasons, if the Commission decides to reexamine whether 10% is the right overcharge presumption, it should consider raising the presumption to 15% for domestic cartels and 25% for international cartels.[231] This is a conservative and modest proposal in light of this Article's demonstration that cartels typically generate at least two or three times the harms presumed by the current *Sentencing Guidelines*.

Before the recent decision in *United States v. Booker*,[232] however, a jury determined whether a violation occurred, and the sentencing judge determined the volume of commerce affected by the violation to a preponderance of the evidence standard. Then, using the *Sentencing Guidelines*, the judge relied on the Commission's presumption that the defendant raised prices by 10% of the volume of affected commerce, doubled this figure,[233] and used a complex formula to adjust this amount.[234] If the fine would have exceeded the statutory maximum of

228. *See supra* Part II.

229. Suppose a cartel overcharges in years one through seven, followed by discovery and another three years of litigation. The penalties would be assessed in year ten. The overcharges from year one really should be adjusted for nine to ten years of inflation, but we have not done this. This omission means that our penalty recommendations are too low.

230. *See supra* notes 48-62 and accompanying text.

231. If the policymakers decide that it would be unwise to make this differentiation, however, a 20% overall presumption would be appropriate.

232. 125 S. Ct. 738 (2005).

233. *See* USSG MANUAL, *supra* note 49, § 2R1.1, application n.3.

234. Some of the adjustment factors, such as whether defendant was the organizer or leader or a cartel, increased the fine level. *See* USSG MANUAL, *supra* note 49, § 2R1.1, application n.1.

$100 million,[235] the enforcers would have had to rely on the alternative sentencing provision of "twice-the-gain or twice-the-loss."[236]

After *Booker*, the government will have to prove to a jury the amount of commerce involved beyond a reasonable doubt.[237] This should not, however, prove to be a significant additional burden.[238] Thus, most cases involving potential fines of less than $100 million should not be significantly[239] affected by *Booker*, except insofar as the *Guidelines*' criteria will be advisory instead of mandatory (and even this might not make much difference in practice).[240]

For the largest cartels, however, *Booker* could have a significant impact because "twice-the-gain or twice-the-loss" will now have to be proven to a jury beyond a reasonable doubt. Due to the nature of antitrust damages, this should prove a truly formidable task.[241] However, the Department of Justice could attempt to circumvent the

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235. In 2004, the maximum was increased from a $10 million to $100 million for corporations, and from $350,000 to $1 million for individuals. Antitrust Criminal Penalty Enhancement and Reform Act of 2004, Pub. L. No. 108-237, § 215, 118 Stat. 665, 668 (to be codified at 15 U.S.C. § 4301).

236. *See* 18 U.S.C. § 3571(d) (2000). In practice, however, every case in which the fine exceeded the statutory maximum settled. By choosing to settle, defendants made a calculated decision not to take the risk that the government would be able to prove an extremely large fine under the "twice-the-gain" or "twice-the-loss" standard, and instead settled for a significantly lower amount. For a discussion, see Tara L. Reinhart et al., *The Business of Sentencing: Facing the Facts After* Blakely, Booker, *and* Fanfan, THE ANTITRUST SOURCE, Jan. 2005, *available at* http://www.abanet.org/antitrust/source/01-05/jan05_full_source.pdf [hereinafter ANTITRUST SOURCE].

237. *Booker*, 125 S. Ct. at 738-42.

238. Nor should it be unduly difficult for the government to prove whether the defendant was a leader or organizer of the cartel, or the other factors that would lead to increases in the fine. *See* USSG MANUAL, *supra* note 49, § 2R1.1, application n.1.

239. For additional effects, see Reinhart et al., *supra* note 236, at 7-9.

240. *See* Gary Fields & Laurie P. Cohen, *Judges Maintain Sentence Formula Despite Ruling*, WALL ST. J., Feb. 11, 2005, at A5. The Chair of the Federal Sentencing Commission testified before a House Subcommittee that preliminary data, involving 692 cases, shows that virtually the same percentage of sentences in post-*Booker* cases as in pre-*Booker* cases were within the *Sentencing Guidelines*' ranges. *Id.*

241. Knowing the great difficulty the government would face if the case went to court, defendants should demand lower fines when they are plea bargaining. In addition, some defendants might now be less likely to reach plea agreements and more likely to take their chances in court. A jury would decide the "twice-the-gain or twice-the-loss" issue largely on the basis of testimony from economic experts, who would have to convincingly analyze huge amounts of complicated data about market events and price trends and levels. It would be extremely difficult for a government expert to convince a jury that prices rose a particular amount "beyond a reasonable doubt," particularly since the defendant would have an equally qualified expert testifying in its favor.

virtual $100 million de facto "cap" on fines[242] by returning to its former practice of splitting antitrust charges into multiple counts, by product or geographic market, for what could be argued to be the "same" cartel,[243] and by also charging multiple counts of mail fraud,[244] wire fraud,[245] or RICO violations for what essentially are antitrust offenses.[246]

By doing this the Department can attempt to effectively increase the antitrust fines involving the largest cartels in a manner more likely to lead to the optimal deterrence of antitrust offenses.

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242. *See supra* note 235 and accompanying text. Moreover, in response to *Booker*, Congress might well pass legislation to preserve as much of the *Sentencing Guidelines* as is constitutionally permissible or to increase the maximum fine under the Sherman Act.

243. For example, in *United States v. Allied Chemical & Dye Corp.*, which involved an international fertilizer nitrogen cartel, the DOJ successfully charged the same defendants with eleven separate Sherman Act violations. 42 F. Supp. 425, 426 (S.D.N.Y. 1941). Many of the largest cartels have involved multiple products. *See, e.g.*, Connor, *supra* note 40, at 277-337 (analyzing the many products at issue in the international vitamin cartel case).

244. *See* United States v. Brighton Bldg. & Maint. Co., 598 F.2d 1101, 1103 (7th Cir. 1979).

245. *See* United States v. Ames Sintering Co., 927 F.2d 232, 233 (6th Cir. 1990).

246. *See* Municipality of Anchorage v. Hitachi Cable Ltd., 547 F. Supp. 633, 636 (D. Alaska 1982).

## APPENDIX: FINAL JUDGMENTS IN COLLUSION CASES

| Name and Type of Case | Overcharge | |
|---|---|---|
| | Average % | Peak % |
| 1. Addyston Pipe & Steel Co. v. United States, 175 U.S. 211 (1899) (conspiring to allocate customers via secret bidding pool, and the court provided a typical result, but not an average figure)[247] | 34.7-42.6 | |
| 2. Armco Steel Corp. v. North Dakota, 376 F.2d 206 (8th Cir. 1967) (involving highway construction bidding conspiracy)[248] | 18.5 | |
| 3. Armco Steel Corp. v. Adams County, 376 F.2d 212 (8th Cir. 1967) (involving highway construction bidding conspiracy, with the same defendants as previous case but different victims) | 17.3-20.3 | |
| 4. Colorado *ex rel.* Woodard v. Goodell Bros., Inc., Civ.A.No. 84-A-803, 1987 WL 6771 (D. Colo. Feb. 17, 1987)[249] | 9.6 | |
| 5. FTC v. Super. Ct. Trial Lawyers Ass'n, 493 U.S. 411 (1990) (involving legal aid attorneys who conspired to raise fees)[250] | 16.7[251] | 75 |

247. 175 U.S. 211, 212 (1899).

> The cost of producing pipe at Chattanooga, together with a reasonable profit, did not exceed $15 a ton. It could have been delivered at Atlanta at $17 to $18 a ton, and yet the lowest price which that foundry was permitted by the rules of the association to bid was $24.25. The same thing was true all through "pay" territory to a greater or less degree, and especially at "reserved" cities.

*Id.* at 238. This means that the typical price increase was at least $24.25 - 18 = 6.25/18 = 34.7%. And, 24.25 - 17 = $7.25/17 = 42.6%.

248. 376 F.2d 206, 208 (8th Cir. 1967).

> We have no difficulty whatever in holding that there was adequate basis . . . for the jury to determine and find . . . proximate injury in the amount of $258,355, on the extent of the artificiality involved in the fixed prices and its ingrediency in the $1,396,500 list-price aggregate . . . which had entered into the construction projects let during the conspiracy period, and in the $2,000 quantity of direct purchases made by the State.

*Id.* at 211-12. If $258,355 of the $1,396,500 was an overcharge, then the overcharge would have been 22.7% of the base figure of $1,138,145.

249. The court found that the plaintiff had reliably proved the overcharges on two of the three contracts at issue; competitive prices of $333,253 and $343,051 were increased by $35,381 and $29,732. Civ.A. No.84-A-803, 1987 WL 6771, at *3 (D. Colo. Feb. 17, 1987).

250. 493 U.S. 411, 414 (1990). Legal aid attorney conspired to raise fees. Cartel/boycott by Washington D.C. lawyers (public defenders) who demanded (and received) a price increase from thirty dollars per hour court time and twenty dollars per hour noncourt time to $35 per hour for both in the span of a week. *Id.* at 414-18. They would later seek and obtain a price increase to fifty-five dollars per hour court time and forty-five dollars per hour noncourt time (without a boycott). *Id.* at 418.

251. The increase was 16.7% for in-court time and 75% for out-of-court time, but it was not possible to compute the average.

| Name and Type of Case | Overcharge | |
|---|---|---|
| | Average % | Peak % |
| 6. Freeman v. S.D. Ass'n of Realtors, 322 F.3d 1133 (9th Cir. 2003) (involving conspiracy to standardize subscription charges)[252] | | 150 |
| 7. Greenhaw v. Lubbock County Beverage Ass'n, 721 F.2d 1019 (5th Cir. 1983) (conspiracy to fix retail price of liquor for 4 1/2 years)[253] | 7.74 | |
| 8. Homewood Theatre, Inc. v. Loew's, Inc., 110 F. Supp. 398 (D. Minn. 1952) (involving first run films conspiracy)[254] | 6.3 | |
| 9. Kruman v. Christie's Int'l, 284 F.3d 384, 390 (2d Cir. 2002) (involving fine art auction cartel)[255] | 50 | 150 |
| 10. New York v. Hendrickson Bros., 840 F.2d 1065 (2d Cir. 1988) (involving three distinct episodes of bid-rigging on state construction contracts)[256] | 49.2<br>32.1<br>13.6 | |

252. 322 F.3d 1133, 1141 (9th Cir. 2003). A group of realtor associations combined and standardized their charges. *Id.* at 1141-42. Some raised subscription price from ten dollars up to twenty-five dollars, others lowered them. *Id.* at 1141. Although it was not a simple price-fixing conspiracy, Judge Kozinski called it "price-fixing." *Id.* at 1144. However, since he did not state how much the average charge increased, we did not include it in our median or average estimates.

253. 721 F.2d 1019, 1022 (5th Cir. 1983). The jury decided amount of overcharge and the appellate court upheld that determination. *Id.* at 1026, 1033.

254. 110 F. Supp. 398, 416, 418 (D. Minn. 1952). The case involved a $39,432.67 loss on sales of $625,763.78. *Id.*

255. 284 F.3d 384, 389 (2d Cir. 2002).

> On November 2, 1992, Sotheby's announced it would increase its buyer's premiums from 10% to 15% for the first $50,000.00 of the purchase price. On December 22, 1992, Christie's declared an identical increase in its buyer's premiums. The defendants allegedly agreed not to reduce these premiums.
>
> The defendants also agreed to set their seller's commissions at identical levels. Prior to March 1995, the defendants would permit clients to negotiate smaller seller's commissions. On or about March 10, 1995, Christie's announced it would implement a fixed schedule of non-negotiable seller's commissions ranging between 2% and 10% depending on the value of the item to be sold. On April 13, 1995, Sotheby's stated it would implement a fixed schedule of non-negotiable seller's commissions substantially identical to the schedule set by Christie's.

*Id.* at 390. For the items covered by the agreement, buyer's commissions rose by 50%, from 10% to 15%. *Id.* In addition, the new seller's commissions means that total commissions had increased from 10% up to as much as 25% - a 150% increase. *Id.*

256. 840 F.2d 1065, 1069 (2d Cir. 1988). The jury determined that contract overcharges were $590,000 on what should have been a $1.2 million contract (49.2%), $644,000 on what should have been a $2,004,000 contract (32.1%), and $1,113,000 on what should have been a $8,187,000 contract (13.6%). *Id.* at 1070-72. The court also noted:

> Amfar was advised not to "get too greedy," *i.e.*, it was to limit the excess profit included in its bid to 20-25% and was not to seek excess profits of 40-50%. Later review by Ambrosio of bids submitted by other co-conspirators led him to the conclusion that most of them were submitting bids that included excess profits higher than the 20-25% benchmark.

*Id.* at 1070.

| Name and Type of Case | Overcharge | |
|---|---|---|
| | Average % | Peak % |
| 11. New York v. Cedar Park Concrete Corp., No. 85 CIV 1887, 1997 WL 306909 (S.D.N.Y. Mar. 21, 1997) (involving construction bid-rigging during 7 year period)[257] | 6 | |
| 12. N. Tex. Producers Ass'n v. Young, 308 F. 2d. 235 (5th Cir. 1962) (involving conspiracy to exclude low cost milk seller)[258] | 36 | |
| 13. Ohio Valley Elec. Corp. v. Gen. Elec. Co., 244 F. Supp. 914 (S.D.N.Y. 1965) (involving electrical equipment manufacturing price-fixing conspiracy)[259] | 10.9 | |
| 14. Palmer v. BRG of Ga., Inc., 498 U.S. 46 (1990) (involving naked division of market for bar review courses)[260] | 167 | |
| 15. Pease v. Jasper Wyman & Son, 845 A.2d 552 (Me. 2004) (involving conspiracy to suppress prices paid for wild blueberries)[261] | 21.6 | 32.8[262] |

Most of the economic analyses we surveyed would have called these different episodes and analyzed them separately, even though legally they were treated together. This clearly is a judgment call upon which reasonable people could differ. If they were treated as one larger conspiracy, the overcharges would total $2,347,000 on a base of $11,391,000, or 20.6% overall. Alternatively the average of the three computed overcharges is 31.6%. In addition, the court found that a subcontract that should have been bid at $512,000 was given to a fellow conspirator, in return for not bidding, for an additional $338,000, a 66% overcharge. *Id.* This was not included as a separate overcharge figure, however, since is subsumed in the conspiracy for its prime contract.

257. No. 85 CIV 1887, 1997 WL 306909, at *1 (S.D.N.Y. Mar. 21, 1997). The conspiracy was organized personally by Paul Castellano, on behalf of "the governing body of New York's five organized crime families." *Id.* Yet the court only found that it raised prices by 6% (Overcharge of $1,506,000, divided by the competitive price of ($26,581,000-$1,506,000) = 6%.). Findings of Fact and Conclusions of Law at 24-25, New York v. Cedar Park Concrete Corp., No. 85 CIV 1887, 1997 WL 306909 (S.D.N.Y. Oct. 11, 2000).

258. 308 F.2d 235, 237 (5th Cir. 1962). This involved a horizontal conspiracy to exclude a low-priced milk seller that would have sold milk for sixty-nine cents instead of ninety-six cents. *Id.* He was awarded $100,000 in lost profit damages for the period at issues. *Id.* The important point for our study, however, is the court's conclusion that that the horizontal competitors caused the price of the milk that plaintiff would have sold to consumers at sixty-nine cents to be sold to them at ninety-six cents instead. *Id.* The conspiracy prevented a 36% price drop. *Id.*

259. 244 F. Supp. 914, 917 (S.D.N.Y. 1965). "This overcharge of $5,624,401 is slightly under eleven per cent of the total final order price for all units ($52,027,785) and slightly under ten per cent of the total final billed price, including escalation ($57,116,819)." *Id.* at 947. This totals 10.92% of the precollusive amount.

260. 498 U.S. 46, 47 (1990). This case involved an agreement by the only two bar review preparation companies in Georgia. *Id.* They entered into a naked division of markets, after which the price of a bar review course in Georgia went from $150 to "over $400." *Id.* We will conservatively assume that the price only went up to $400, an increase of 167%.

261. 845 A.2d 552, 553 (Me. 2004). This was a four-year average, calculated from Solow exhibit 10, "Underpayment to Growers," whose figures were accepted by the jury. A $56 million judgment was upheld. *Id.* at 556.

262. For the year 1997.

| Name and Type of Case | Overcharge | |
|---|---|---|
| | Average % | Peak % |
| 16. Story Parchment Co. v. Paterson Parchment Paper Co., 282 U.S. 555 (1931) (involving conspiracy to monopolize and destroy plaintiff's business)[263] | 27.7 | |
| 17. Strobl v. N. Y. Mercantile Exch., 582 F. Supp. 770 (S.D.N.Y. 1984) (involving conspiracy to lower the price of potato futures)[264] | 48.6 | |
| 18. Union Carbide & Carbon Corp. v. Nisley, 300 F.2d 561 (10th Cir. 1961) (involving 1938-48 conspiracy to reduce prices paid for vanadium ore)[265] | 22.5 | 38-47.5 |
| 19. United Nuclear Corp. v. Gen. Atomic Co., 629 P.2d 231 (N.M. 1980) (involving uranium cartel)[266] | | 567 |
| 20. United States v. Anderson, 326 F.3d 1319 (11th Cir. 2003) (involving bid-rigging on USAID contract)[267] | 16.4-39.2 | |
| 21. United States v. Andreas, 216 F.3d 645 (7th Cir. 2000) (involving conspiracy to raise lysine prices)[268] | | 71.4 |

263. 282 U.S. 555, 559 (1931). The jury awarded $65,000, before trebling. *Id.* The plaintiff had alleged that defendant reduced the value of property that cost $235,000 to only $75,000. *Id.* at 567. Therefore, damages must have been 65/235, or 27.7%.

264.

> The $460,000 figure reached by the jury, therefore, was the equivalent of a finding that the price of the May potato futures contract would have been approximately $18.00, instead of $9.25, had the market been operating solely on the basis of supply and demand. . . .
>
> . . . The jury could have concluded from the evidence of low supply that the price of Maine potato futures was artificially low during the conspiracy period.

582 F. Supp. 770, 779 (S.D.N.Y. 1984). Price, therefore, was depressed 48.6%.

265. 300 F.2d 561, 573 (10th Cir. 1961). "In these circumstances, we cannot say that the jury's finding to the effect that the free market price of 2 percent vanadium ore for the period October 1938 through March 1948 was 40¢ per pound instead of 31¢ was clearly erroneous." *Id.* at 580.

266. 629 P.2d 231, 239, 242 (N.M. 1980). "Fourth, between 1972, when the cartel apparently began, and 1975, when this suit was filed, the price of uranium in the United States increased from approximately $6.00 per pound to approximately $40.00 per pound." *Id.* The court concluded that the price of uranium had increased by 566% during the period of the conspiracy but did not say that all of this increase was due to the activity of the cartel. *See id.* For this reason, this cartel's increase has been put in the maximum column, not the average column.

267. 326 F.2d 1319, 1325 (11th Cir. 2003). Exhibits 16 and 24 say that the winning bids on the three contracts at issue were $283.984 million. In the Transcript of Sentencing Before the Honorable Robert B. Propst, May 20, 2002, 77 (No. CR-01-PT-0302-S), the judge found that the total overcharges for these three contracts were "greater than 40 and less than 80" million dollars. Using the $40 million loss figure—this would mean that the three jobs together should have cost $244 million, so 40/244 is 16.4%. For the higher overcharge finding, the contracts should have totaled $204 million, so 80/204 = 39.2%.

268. 216 F.3d 645, 651 (7th Cir. 2000).

> The meeting ended without a sales volume allocation agreement, but two months later, at the recommendation of Whitacre, the cartel raised prices anyway, and prices rose from $.70 to $1.05 per pound. . . .

| Name and Type of Case | Overcharge | |
|---|---|---|
| | Average % | Peak % |
| 22. United States v. Dynalectric Co., 859 F.2d 1559 (11th Cir. 1988) (involving bid-rigging on public works project)[269] | 34 | |
| 23. United States v. Foley, 598 F. 2d 1323 (4th Cir. 1979) (involving real estate companies which agreed to raise their commissions on houses)[270] | 16.7 | 16.7 |
| 24. *In re* Vitamins Antitrust Litigation, Animal Science v. Chinook Group, Ltd. No. 99-197 (TFH), 2003 WL 22114272 (D.D.C. Sept. 11, 2003) (involving choline chloride cartel jury verdict)[271] | 61 | |
| 25. Wall Prods. Co. v. Nat'l Gypsum Co., 357 F. Supp. 832 (N.D. Cal. 1973) (involving conspiracy over price of gypsum wallboard)[272] | 27 | |
| 26. Webb v. Utah Tour Brokers Ass'n,568 F.2d 670 (10th Cir. 1977) (involving conspiracy by tour brokers to deny plaintiffs entry into tour broker business)[273] | 5 | |

> . . . [Much later] [t]he producers also agreed on a new price of $1.20 for the United States market.

*Id.* at 652-53. The court inferred that at least one sale took place at $1.20, so its maximum increase was (1.20-.70)/.70 = 71.4%. *See id.* at 653. As is typical, this court was not perfectly clear as to what caused the price to rise. But the plain meaning of the quotation is that the court found that, as a maximum, the cartel raised the price of Lysine by 71.4%. In fact, this would be a modest conclusion because the court also wrote: "Together, the three parent companies produced all of the world's lysine until the 1990s, presenting an obvious opportunity for collusive behavior. Indeed the Asian cartel periodically agreed to fix prices, which at times reached as high as $3.00 per pound." *Id.* at 651. This would mean that the maximum increase was roughly (3.00-.70)/.70 = 329%.

269. 859 F.2d 1559, 1561-62 (11th Cir. 1998). The defendant made a $1.7 million profit on a $5 million contract—a margin of 34%.

270. 598 F.2d 1323, 1327 (4th Cir. 1979). On September 5, 1975, competing real estate executives agreed to raise their commission from 6% to 7%. *Id.* "Within the following months each of the corporate defendants substantially adopted a seven percent commission rate." *Id.* Since almost all, but not 100%, of the sales were at a 7% commission, 16.7% actually overstates the average actual rise somewhat.

271. The jury verdict was $49.54 million "before trebling and credit for prior settlements." The plaintiff's expert listed the total sales by the defendants at $130.85 million, an amount that the jury appeared to accept. This means that the jury verdict reflected overcharges (before trebling) at 38% of sales. Class Plaintiff's Memorandum of Support to Their Motion for Preliminary Approval of Settlement Between Class Plaintiffs and Defendants Mitsui & Co., Ltd., Mitsui & Co. (USA), Inc., and Bioproducts, Inc. at 6, Animal Sciences, Inc. v. Chinook Group, Ltd., 2003 WL 22114272 (D.D.C. Oct. 14, 2003).

272. 357 F. Supp. 832, 834 (N.D. Cal. 1973). Defendants conspired among themselves and with others, to stabilize and maintain the price level of gypsum wallboard.

273. 568 F.2d 670, 672, 676-77 (10th Cir. 1977).

> They had been able to obtain the same transportation service for 70 cents per mile from the other licensed brokers. However, with Greyhound they were obliged to pay a Special Operations Bus Order tariff of three and one-half cents per person per mile. Of the eleven tours operated they had to pay this higher rate for eight

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> tours. Plaintiffs calculated that they suffered a total loss of $10,165 as a result of having to pay the higher tariff for the tours that they took.

*Id.* at 676-77. 3.5 divided by 70 equals 5%.