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Optimal Cartel Deterrence: An Empirical Comparison
of Sanctions To Overcharges

John M. Connor & Robert H. Lande¹
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Cartels are the supreme evil of antitrust, overcharging consumers many billions of dollars each year.² Many believe that without the antitrust laws a substantial percentage of the economy of every industrialized nation would become completely cartelized.³ Indeed, one has to reach far outside the field's mainstream to find those who would leave consumers at cartels' mercy by not sanctioning them heavily.⁴

The United States imposes a diverse array of sanctions against those who collude, including fines and restitution payments for the firms involved, and prison, house arrest, and fines for the corporate officials involved.⁵ Victims of cartels can sue for mandatory treble damages and attorney's fees.⁶ Judge Posner called these the equivalent of dropping "cluster bombs" on defendants,⁷ and their multiplicity probably has led to the common belief that the

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² *See infra* Section III (A).

³ *See* Ari Hyytinen, Frode Steen & Otto Toivanen, *Cartels Uncovered* 34-35 (Mar. 11, 2011), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1868810.

⁴ Even most conservatives advocate sanctioning cartels heavily. *See, e.g.*, Frank Easterbrook, *Treble What?*, 55 ANTITRUST L.J. 95, 95 (1986). In 2004, the Bush Administration proposed and helped enact significant increases in the criminal fines against cartels. *See* Development and Promulgation of Voluntary Consensus Standards Act, Pub. L. No. 108-237, 118 Stat. 661 (2004) (substituting a \$100,000,000 maximum corporate fine for the existing \$10,000,000 maximum; a maximum \$1,000,000 individual fine for the existing \$350,000 maximum; and a maximum ten year prison sentence for the existing maximum three year sentence).

⁵ *Id.* There also are such relatively unusual or minor sanctions as disgorgement actions by the Federal Trade Commission (FTC) or the Department of Justice (DOJ). *See, e.g.*, *United States v. Keyspan Corp.*, 763 F. Supp. 2d 633, 635 (2011). Although individual disgorgement cases can be important, they are relatively rare. *See* Einer Elhauge, *Disgorgement as an Antitrust Remedy*, 76 ANTITRUST L.J. 79, 79 (2009) .

⁶ *See* 15 U. S. C. § 15 (2000). Prevailing plaintiffs also receive filing fees and expert witness fees. *Id.*

⁷ Richard A. Posner, *Antitrust in the New Economy*, 68 ANTITRUST L.J. 925, 940 (2001). *See generally* Spencer Weber Waller, *The Incoherence of Punishment in Antitrust*, 78 CHI.-KENT L. REV. 207 (2003).

current combination of sanctions is now adequate⁸ or even excessive.⁹ Since both direct and indirect purchasers can sue for treble damages,¹⁰ the private remedies often are singled out as especially likely to lead to overdeterrence.¹¹

⁸ The ABA Antitrust Section, for example, opposed increasing the Sherman Act's criminal penalties unless Congress first conducted a series of hearings and concluded as a result of information collected in these hearings that the answers to a number of difficult questions indicated higher penalties were appropriate. As the Section argued: "The deterrence issue has no easy answer but simply exemplifies the importance of the need for hearings or public briefings on these issues... Some also believe that combined criminal and civil provide too much deterrence that will chill the businessperson in his decisionmaking....Whether increased criminal penalties will provide an appropriate level of deterrence....should be the subject of hearings and public briefings to reach the proper deterrence balance." Comments of the ABA Section of Antitrust law on H.R. 1086: Increased Criminal Penalties, Leniency, Detrebling and the Tunney Act Amendment, at 11-12.

⁹ This view was eloquently articulated by Professors Lopatka & Page even before the criminal fine levels were significantly increased in 2004 (see note 4, *supra*):

[W]e are skeptical that the sum of all federal penalties for illegal antitrust overcharges is suboptimal. Civil liability in the form of treble damages is not the only penalty for price fixing. Criminal antitrust penalties are available and, as we noted earlier, actually precede a high percentage of indirect purchaser actions. Even setting imprisonment aside, the federal criminal penalties are substantial.□.□.□. The fines to which antitrust defendants have agreed in order to settle criminal price-fixing indictments have skyrocketed in recent years. In light of a more expansive corporate amnesty policy that increases the probability of uncovering concealable antitrust violations, and hence reduces the magnitude of the appropriate fine, the ceilings today may well be high enough that the optimal penalty can be imposed through criminal sanctions alone. . . .

It seems likely that the combination of federal penalties is adequate.

John E. Lopatka & William H. Page, *Indirect Purchaser Suits and the Consumer Interest*, 48 ANTITRUST BULL. 531, 567-68 (2003) (citations omitted).

For a similar pre-2004 view see Bruce H. Kobayashi, *Antitrust, Agency, and Amnesty: An Economic Analysis of the Criminal Enforcement of the Antitrust Laws Against Corporations*, 69 GEO. WASH. L. REV. 715, 716 (2001) ("[T]he recent increase in fines may have resulted in higher-than-optimal fines.").

For a post-2004 view, see Anthony V. Nanni, former Chief of the National Criminal Enforcement Section (formerly Litigation I) in the Antitrust Division of the United States Department of Justice: "In my view, current antitrust criminal penalties, both with respect to the new ten-year maximum period of incarceration for individuals, and corporate fines as implemented through the current Sentencing Guidelines, are too severe." Statement to the Antitrust Modernization Commission, Nov. 8, 2005, at 18, http://govinfo.library.unt.edu/amc/commission_hearings/pdf/051103_Criminal_Remedies_Transcript_reform%20.pdf.

Nevertheless, there has never been a satisfactory answer to the most important question concerning the antitrust treatment of cartels: overall, is the combined effects of these sanctions optimal? Indeed, no one has ever before even seriously attempted to answer this crucial question, perhaps because of data constraints, complexity, and the number of factors involved. This article is the first to undertake this formidable task.

This article will determine whether the United States' anti-cartel sanctions are optimal overall¹² by analyzing the total, combined impact of every existing anti-cartel sanction using the standard optimal-deterrence model.¹³ This framework assumes corporations and individuals contemplating illegal collusion will be deterred only if expected rewards are less than expected costs¹⁴ divided by the probability the illegal activity will be detected and sanctioned.¹⁵

¹⁰ For an analysis of when such suits can and cannot occur and their parameters *see* Robert H. Lande, *New Options for State Indirect Purchaser Legislation: Protecting the Real Victims of Antitrust Violations*, 6 ALA. L. REV. 447 (2010), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=12672021

¹¹ See Abbott B. Lipsky: “One can also speculate about why a treble damage remedy is needed for deterrence purposes at all, so long as Section 1 and Section 2 violations can be – and in the case of cartel violations, typically are, - prosecuted criminally and punished with actual incarceration for individuals and criminal fines.... Perhaps the availability of treble damages overcompensates – along or in combination with the “cluster bomb” of other remedies, including equitable disgorgement, state suits ... it is possible that the treble-damage claims unintentionally assume some of the characteristics of a wealth-transfer program that can be gamed to benefit the undeserving ...[similar to] other bounty payment mechanisms, including the redistributive and unwise legal methods that produced or at least inflamed the Salem Witch Trials....” (citation omitted).

For an example of an argument, without empirical evidence, that criminal fines and prison terms reduce the need for treble damages in antitrust class actions see David Rosenberg & James P. Sullivan, *Coordinating Private Class Action and Public Agency Enforcement of Antitrust Law*, 2 J. COMPETITION L. & ECON. 159, 162 (2006).

See also Nanni: “And so my problem is that when you have such large corporate fines combined with the other framework — i.e., civil treble damages — you really run the risk of pushing corporations to the brink of bankruptcy....and weakened corporations, I think, have the perverse effect of injuring consumers because you don't have innovation, they have higher debt, they may force consolidations within the industry. And at the end of the day you have less competition, which is really not the goal of antitrust enforcement.” Nanni, *supra* note 9, at 65.

For a related argument concerning the alleged overdeterrence caused by private enforcement *see* notes 269-70 *infra*.

¹² This article will not attempt to analyze penalties for offenses other than cartels.

¹³ *See infra* notes 19-20 for an explanation of the standard optimal deterrence approach.

¹⁴ Optimal deterrence depends upon the beliefs of potential cartelists as to a number of factors. We would like to know how much potential cartelists expect to gain from their collusion, how likely it is they think they will be apprehended, and how large a fine and how long a prison term

To accomplish this analysis we calculate the expected rewards from cartelization. We ascertain the average and median amounts of cartel profits, the probability cartels are detected, and the probability detected cartels are sanctioned. We also ascertain the sizes of the sanctions involved. These include corporate fines, restitution payments, individual fines, and the payouts in private damage actions. Finally, we determine the equivalent value (or disvalue) of imprisonment or house arrest for the individuals involved.¹⁶

As explained throughout this article, our analysis uses the best available data for each part of the optimal deterrence calculation. Some information is known with certainty, but some of the required information is not available with as much precision or the degree of confidence we would like. In recognition of these imprecisions we undertake a sensitivity analysis: We determine the highest and lowest likely values for each relevant factor, and combine them into appropriate low and high estimates of the relative sizes of cartels' expected gains and losses (due to sanctions) from cartelization. The article similarly assesses low and high estimates of the probability a cartel will be detected and convicted. We combine these estimates and calculates a range of low and high estimates of the overall optimal deterrence tradeoff.

This analysis shows that the combined level of United States cartel sanctions has been far too low. If mean average figures are used, the imposed sanctions have only been 16% to 21% as large as they should have been to protect potential victims of cartelization optimally. If median figures are used, the imposed sanctions have averaged only 9% to 12% of optimality. This means that, in the aggregate, the overall level of the United States anti-cartel sanctions should be at least five times as high as they are today.

This article proceeds in six sections. The first analyzes the optimal deterrence of cartels, including separate discussions of the necessary individual and corporate perspectives and incentives. The second section analyzes the sizes of the existing sanctions against cartels: payments made in private damages actions, corporate fines, individual fines, restitution

they believe they will receive should they be caught. Unfortunately, we have no way of knowing what goes on in the minds of potential cartelists. We only can estimate how much actual cartels have gained in the past, what the historical rate of apprehension has been, and how heavily they and their employees have been sanctioned. We will assume then that the historical outcomes match the cartelists' expectations—an admittedly rough approximation. *See infra* Section I(A) for a more detailed discussion.

¹⁵ In other words, a sanction slightly larger than \$300 would be necessary if a cartel expects to overcharge by \$100 and believes there is a 1/3 chance its activities will be detected and condemned. In operational terms, the optimal penalty will be assumed to be equal to (the cartel's overcharges) ÷ (the probability the cartel will be detected x the probability the detected collusion will be sanctioned).

¹⁶ It is of course impossible to equate incarceration and monetary sanctions in an objective manner since this would mean computing the "value" or "cost" of time spent in prison or under house arrest. Nevertheless, this article will utilize conventional social science approximations of the disutility of prison time and house arrest, ascertaining and combining several different measures of each. *See infra* Section I(B). In this way, the article's overall assessment of the aggregate of all the anti-cartel sanctions will be both as complete and as non-controversial as possible.

payments, and the monetary equivalents of imprisonment and house arrest for corporate officers engaged in collusion.

The third section summarizes the antitrust field's empirical knowledge about the harms to society from collusion (i.e., what we know about the mean and median sizes of cartel overcharges, and also the magnitude of the allocative inefficiency¹⁷ effects of market power). The fourth section analyzes the best existing estimates of the probability a cartel will be discovered and sanctioned. The fifth section combines all the estimates calculated in the earlier sections, using the high and low sensitivity analysis described above.

This article's analysis and results should be of paramount importance to anyone interested in protecting the public against collusion. Accordingly, a concluding section will discuss the implications of this research for public policy towards cartels. Because current cartel sanctions are astonishingly low, we suggest specific ways they could be increased to become more nearly optimal, thus saving consumers billions of dollars each year. Finally, we discuss the important implications of our findings for other parts of the antitrust world.

I. Optimal Deterrence: Individual vs. Corporate Perspectives¹⁸

How are cartels best deterred? Should sanctions focus upon corporations, individuals, or both? How large should each category of sanctions be relative to the harms from collusion?

A. Overall Framework for Analysis

The generally accepted overall approach to the optimal deterrence of antitrust violations was developed by Professor William Landes.¹⁹ He showed that to achieve optimal²⁰

¹⁷ For a definition of the allocative inefficiency effects of market power see *infra* Section III (B).

¹⁸ This section relies heavily upon and significantly extends some of the authors' earlier joint work. See John M. Connor & Robert H. Lande, *How High Do Cartels Raise Prices? Implications for Reform of the Antitrust Sentencing Guidelines*, 80 TULANE L. REV. 513 (2005), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=787907. This section also relies upon John M. Connor, Problems With Prison in International Cartel Cases (Draft August 13, 2010), forthcoming in *Antitrust Bulletin: Special issue on Cartel Sanctions and Deterrence* (Spring 2011 issue, Terry Calvani, editor), and upon Robert H. Lande & Joshua P. Davis, "Comparative Deterrence from Private Enforcement and Criminal Enforcement of the U.S. Antitrust Laws. (Draft of March 5, 2010, forthcoming in the *BYU Law Review*, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1565693.

¹⁹ 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 Becker, "Crime and Punishment: An Economic Approach" 76 J. Pol. Econ. 169 (1968).

²⁰ One might quite reasonably reason that, unlike the case for conduct that might violate the prohibitions against illegal monopolization, because price fixing is never in the public interest, we should attempt to design a regime that prevents all price fixing, not a regime that permits

deterrence²¹ the damages from an antitrust violation should be equal to the violation's expected "net harm to others"²² divided by the probability of detection and proof of the violation.²³ All

some "optimal" amount of price fixing . One might argue that we should not worry about imposing excessive penalties against cartels.

Our quest should not be complete deterrence, however, because enforcement aggressive enough to deter all cartels almost certainly would penalize and therefore discourage some honest business conduct. As with any legal system, there is some uncertainty at the margin of cartel illegality. Beneficial horizontal conduct near this line, conduct that results in efficiency gains for society, sometimes could be mistaken for illegal collusion. For this and other reasons sanctions should not be excessive. They should only be as large as necessary to deter most of the undesirable conduct. To give an extreme example, a mandatory death penalty for price fixing, if regularly imposed, surely would chill a significant amount of procompetitive behavior because most people quite understandably would avoid doing anything that could even give rise to even a small probability of being mistaken for price fixing.

²¹ Professor Landes was not concerned with the compensation of victims. *Id.* 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).

²² The logic underlying the "net harm to others" standard was explained clearly by Professors Breit & Elzinga. Their example is that of a horizontal cartel. However in their example the activity also produces a significant efficiency gain. Sometimes horizontal activity that produces a significant efficiency gain is labeled a "joint venture" rather than a "cartel". Other times "cartel" is simply a shorthand for horizontal activity that produces more losses than gains.

"The trick to discovering the optimal sanction is to find a rule that will force the potential cartel member to compare any cost saving from his activity with the deadweight loss triangle. If the cost saving were larger than the deadweight loss, it would be in his (and society's) interest to undertake the illegal activity. So after he deducts the monopoly profit rectangle ... the cartel member 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 overdeterrence...."

A numerical example may help to clarify the concept of the optimal antitrust sanction. Assume that a potential cartel member 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* (1986) at 11-12.

figures should, of course, be expressed in constant dollars. Most analysts of both the Chicago and post-Chicago schools of antitrust have accepted these principles.²⁴ The “net harm to others” from collusion of course includes the overcharges that result from cartel pricing.²⁵ They also include many other, perhaps less obvious, factors as well.²⁶

²³ See Landes, *supra* note 19, at 666-68. Thus, if the harm were 10 and the probability of detection and proof were .33, since $10/.33 = 33$, the optimal penalty for this violation would be 33. This assumes risk neutrality and other common assumptions. *Id.*

²⁴ See the discussion in Lande, *supra* note 21, at 161-68. Despite the general acknowledgement of the superiority of the Landes approach, however, many respected scholars and enforcers instead focus upon the gain to the lawbreakers, perhaps because it is simpler to observe or calculate. For a recent example see Gregory J. Werden, Sanctioning Cartel Activity: Let the Punishment Fit The Crime, 5 *European Competition Journal* 19, 28-31 (2009). For an insightful analysis see Wouter P. J. Wils, *Optimal Antitrust Fines: Theory and Practice*, 29 *World Competition* 183, 190-93 (2006). 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.

²⁵ See Landes, *supra* note 19.

²⁶ First, cartel market power produces allocative inefficiency — the deadweight loss welfare triangle. See E. MANSFIELD, *MICROECONOMICS: THEORY AND APPLICATIONS* 277-92 (4th ed. 1982) (defining allocative inefficiency and providing a proof that it is created by monopoly pricing); Allocative inefficiency often is significant empirically. See the discussion *infra* Section III(B). Nevertheless, it apparently has never been awarded in an antitrust case. See, e.g., David C. Hjelmfelt & Channing D. Strother, Jr., *Antitrust Damages For Consumer Welfare Loss*, 39 *CLEV. ST. L. REV.* 505 (1991).

Second, market power can produce “umbrella” effects the name given to higher prices charged by non-violating members that were permitted or caused by the violation’s supracompetitive prices. See Phillip E. Areeda & Herbert Hovenkamp, *Antitrust Law* par. 337.3 (Supp. 1992). This factor also is never or virtually never awarded. *Id.*

Moreover, there are several additional types of harms that often are caused by cartels. These include: (1) uncompensated plaintiffs’ attorneys’ fees and costs; (2) the uncompensated value of plaintiffs time spent pursuing the case; (3) the costs of the judicial system. See Lande, *supra* note 21, at 129-58.

In addition, cartels may have less incentive to innovate or to offer as wide an array of non-price variety or quality options. Alternatively, one could argue that cartel members will have more funds to use for socially desirable innovation. We know of no evidence, however, that these innovation effects are significant empirically.

The price fixers' own legal costs, the disruption in their own efficiency as a result of sanctions litigation, and any harm to their corporate reputation, by contrast, are not "harms to others" from collusion, and therefore should not be included in the optimal deterrence analysis.

Moreover, since not every cartel is detected or successfully proven, the “net harm to others” should be multiplied by the inverse of the probability of detection and proof.²⁷ The Antitrust Division’s amnesty program has resulted in a significantly larger percentage of cartels detected and proven in recent years.²⁸ Nevertheless, there is continuing evidence that, despite the enforcers’ superb efforts, many cartels still operate,²⁹ so there is significantly less than a 100% probability that a cartel will be detected and convicted. From an optimal deterrence perspective sanctions should be more than a cartel’s “net harms to others” to account for the probability that the conduct will go unpunished. As noted earlier, if a cartel that expected to overcharge by \$100 only faced a 33% chance it would be detected and proven to be illegal, the sanctions should slightly exceed \$300. Without this multiplier, firms would be significantly undeterred from committing antitrust violations.

²⁷ "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 3, at 455.

²⁸ See Nathan H. Miller. Strategic Leniency and Cartel Enforcement, 99 *American Econ. Rev.* 750-68 (2009).

²⁹ See generally Douglas H. Ginsburg & Joshua D. Wright, 6 *Competition Policy Int'l* 3 (2010). The continued high number of DOJ grand juries and the recent DOJ success rate in the courts also suggests that many cartels still exist. As of the close of FY 2010 the DOJ had approximately 124 pending grand jury investigations. Workload Statistics: FY 2001-2010, at 4 (2011), available at <http://www.justice.gov/atr/public/workload-statistics.pdf> (last visited July 17, 2011). Between 2001 and 2010, the DOJ filed from forty-four to sixty criminal cases per year, most of which resulted in convictions. *Id.* at 4. The following table, Table 1, extracted from this data, shows DOJ's success in prosecuting antitrust violations:

Total Criminal Cases	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10
Filed	44	33	41	42	32	34	40	54	72	60
Won	38	37	32	35	36	31	31	47	67	41
Lost	2	1	1	1	1	-	1	4	2	1
Pending	39	34	42	48	43	44	54	57	60	55
Appeal Decisions	5	1	2	7	4	5	1	4	2	7
Grand Juries Initiated	26	26	48	21	38	38	34	32	38	12

For analysis of what success for DOJ might mean in this contest see Section 4(B) *supra*. It seems clear that in the opinion of a large number of judges, grand juries, and juries, the DOJ Antitrust Division has been bringing a large number of meritorious anti-cartel cases in recent years. Note that in some years the DOJ won more cases than it filed because the cases the DOJ won in any given year were often filed in an earlier year.

Ideally optimal deterrence should be based upon the expectations of potential price fixers, not the results of others' past price fixing or the sanctions imposed on similar cartels.³⁰ The required expectation knowledge, however, is impossible to obtain.³¹ Guessing what goes on in the minds of would-be cartelists is hazardous. Nor do we know how often potential price fixers consult with their attorneys about the likely range of outcomes.³² The best we can do is to ascertain how much overall (in terms of a median or a mean) cartels have raised prices in the past, and how often and how much they have been sanctioned, and assume these are close proxies for the expectations relevant to the decision whether to collude.³³ In effect, we are using a general deterrence approach because a specific deterrence approach is infeasible.

B. Corporate v. Individual Sanctions

Even though the preceding analysis is accepted by most of the antitrust field with relatively little controversy, it does not answer the question posed at the start of this section: is optimal deterrence best achieved by focusing only on the corporations involved? On the

³⁰ 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. 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.

Moreover, 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 an 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.

³¹ To ascertain this one would have to interview a random sample of potential price fixers and discern their expectations. In reality, however, it would be impossible to assemble a proper random sample or to get them to respond candidly. 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 are they, in light of the probability that lengthy, protracted litigation could result in a high, or low, result. 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.

Experimental economics offer some promise of modeling choices of participants in cartel settings. However, to our knowledge no relevant experiments have been published on this issue.

³² See generally D. Daniel Sokol, "Cartels, Corporate Compliance and What Practitioners Really Think About Enforcement," Draft of Nov. 25, 2010.

³³ For this reason we readily acknowledge that we are administering an imperfect test using a surrogate for what we really would like to measure.

individuals involved (and, if so, should this be done by fines or through incarceration)? Or through some combination of corporate and individual sanctions?³⁴

Consideration of optimal sanctions for price fixing can be traced to Gary Becker's general legal-economic model of crime³⁵ and to Richard Posner's extensions of the Becker framework to price fixing.³⁶ According to these classic papers, hard-core price fixing is optimally punished almost exclusively through corporate fines.³⁷ Only when a company is unable to pay an optimal fine should imprisonment be imposed as a last resort, and only if the individuals are unable to pay optimal fines.³⁸

There are many arguments in favor of the criminalization of price-fixing offenses.³⁹ For example, publicity about severe sentences for price fixing may help educate other corporate executives about the true individual and corporate legal risks of being caught.⁴⁰ Publicity may

³⁴ Section B draws heavily upon material in Connor, "Problems With Prison in International Cartel Cases", supra note 18, and Lande & Davis, supra note 18.

³⁵ See Becker, supra note 19. See also John M. Connor, Albert A. Foer, and Simcha Udwin, "Criminalizing Cartels: An American Perspective," 1 New J. European Crim. L. 199 (2010) (presents historical, moral, and pragmatic reasons for supporting the criminalization of cartels)

³⁶ Richard A. Posner, *Optimal Sentences for White-Collar Crime*, 17 AM. CRIM. L. REV. 409 (1979-80).

³⁷ The conventional wisdom in the field was well summarized by V.S. Khanna, *Corporate Criminal Liability: What Purpose Does it Serve*, 109 Harv. L. Rev. 1477 (1996) ("Thus, some justification for corporate criminal liability might have existed in the past, when civil enforcement techniques were not well developed, but from a deterrence perspective, very little now supports the continued imposition of criminal rather than civil liability on corporations."). Previous empirical analyses may have been hampered by the greater difficulties of determining individual sanctions and the fact that individuals' fines can be miniscule compared to corporate fines.

³⁸ Id. Posner argued for "the substitution, whenever possible, of the fine (or civil penalty) for the prison sentence as the punishment for crime. . . ." Posner, supra note 33 at 418 n. 27 (acknowledging that he has made "an argument. . . in the antitrust context for confining criminal (or civil-penalty) liability to the corporation, on the theory that if it is liable it will find adequate ways of imposing on its employees the costs to it of violating the law."). He observes: "The fine [or civil liability] for a white collar crime can be set at whatever level imposes the same disutility on the defendant, and thus yield the same deterrence, as the prison sentence that would have been imposed instead." *Id.* at 410. Yet the fines would save the cost to society of incarcerating the lawbreakers, and also the opportunity cost to society of the time they spend in prison instead of working productively. Posner is familiar with resistance to this claim—indeed, his article responds in part to a criticism that contends that the threat of imprisonment is inherently greater than that of a fine. *Id.* at 413.

³⁹ See the sources cited in Connor, supra note 18, for a summary of the legal-economic arguments for and against individual criminal penalties for antitrust violations, including the available game theory arguments.

⁴⁰ See *infra* note 49 (the example of Alfred Taubman).

also contribute to the effectiveness and costs of corporate antitrust compliance programs. Imprisonment could improve the operation of public antitrust leniency programs because, by shifting corporate officers' expectations toward high personal penalties, top executives of cartel participants are more likely to seek the immunity from prosecution that accompanies awards of corporate amnesty. In addition, public fines on employees can be socially optimal if principal-agent problems exist such that employees fail to take enough care to avoid legal risks for the corporation and the employer is unable to impose a financial penalty as high as the required public fine.

Indeed, one could argue in the extreme that sanctions should focus mainly or exclusively upon individuals. Officials at the U.S Department of Justice Antitrust Division have been moving in this direction in recent years,⁴¹ as have some of the most respected members of the antitrust community, such as Judge Douglas Ginsburg and Professor Joshua Wright, who advocates lengthy debarment for negligent corporate officers and directors of publicly traded companies that fix prices.⁴²

⁴¹ For example, a 2001 speech by Scott Hammond about the Antitrust Division's Corporate Leniency Program, <http://www.usdoj.gov/atr/public/speeches/7647.htm>, contains a statement about the Division's belief that the threat of imprisonment overshadows all other sanctions as a cause of corporate leniency applications: "How do you put a price tag on an individual's freedom? ... [Is it even] possible to quantify the potential rewards and consequences as they relate to individuals with exposure.... Some of the commentary from the private bar on the pros and cons of pursuing corporate amnesty seems to be reduced to a cost/benefit analysis where the risks and benefits are measured in dollars and cents. However, as explained above, monetary cost savings may not be the most important consideration when the freedom of individuals is hanging in the balance." Id.

"[F]rom the Department's perspective ... [one] wouldn't need an empirical study to be satisfied that the threat of going to jail, to be taken away from your family, to losing your liberty, to ... the prospect of being sent thousands and thousands of miles away from home to spend time in a U.S. prison, would be the greatest deterrent to cartel activity. That's certainly what our experience has been.... Now I'll give you another [piece of] evidence.... eyewitness testimony to the effect that individual sanctions are having on our ability to deter conduct aimed at the U.S. You might say it is anecdotal, but I think it is very powerful.... We are now seeing examples of cartels that have been formed and have targeted the rest of the world except for the United States... because they didn't want to go to jail." Id.

⁴² See Ginsburg & Wright, *supra* note 29. Judge Ginsburg and Professor Wright certainly do not propose repealing corporate fines for price fixing. They do, however, advocate putting much more emphasis on individual sanctions. In particular, they propose lengthy debarment for negligent corporate officers and directors of publicly traded companies. Part of their preference for individual sanctions follows from their premise that the ever increasing levels of fines for price fixing have not sufficiently deterred collusion.

We certainly agree with Ginsburg and Wright that even though corporate fines have risen significantly in recently years, there still is significant underdeterrence of collusion. Ginsburg and Wright do not, however, analyze the possibility that even the current levels of corporate

The extreme form of this argument specifically rejects the logic of optimal deterrence principles. The dominant law-and-economics model of crime posits that rational choices drive corporate decisions (including the decisions of the individuals involved) to commit crimes – a “cost/benefit analysis” of the decision. Consequently, there exists a bundle of sanctions that the legal system can (at least in theory) calculate that optimally will deter the crime. Unless there are principal-agent problems⁴³, the monetary values of each of these sanctions is in principle a perfect substitute for one another.⁴⁴

There certainly are counter-arguments to the desire for vastly higher individual penalties for cartelization (indeed, the United States is the only nation, among the roughly 200 countries with anti-cartel laws, that incarcerates significant numbers of cartel managers⁴⁵). Some have expressed skepticism about the effectiveness of individual sanctions in deterring antitrust crimes. An executive summary of a Policy Roundtable on this topic sponsored by the OECD asserted:

finer are insufficient to deter price fixing optimally. Despite the higher fines of recent years, if corporations still expect to make a profit from collusion, still higher corporate sanctions might lead to optimal deterrence.

⁴³ If the firm is a proprietorship it does not matter whether the sanctions fall upon the individuals or the corporation. But if there is a separation between ownership and management, the personal motives of managers must be considered 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. However, it sometimes is true that the reward structures of traditional executive compensation contracts typically give short-term personal enrichment a greater weight than the long-run interests of stockholders.

If the profits generated by price fixing generate immediate personal rewards for such managers, but long term losses for shareholders (incurred only after years of litigation, when the managers may no longer be with the corporation) 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-seeking 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 surrogate for stockholder control, managerial risk aversion, and other factors that, if we were able to derive the necessary parameters, we would incorporate.

⁴⁴ “The Division does say that it is focused on both hammering corporations with big fines and sending their price-fixing executives to jail. But the reality is that, despite vehement Division protestations to the contrary, a key element of the Division’s enforcement approach appears to be a willingness to trade people (particularly senior executives) for money.” Written Statement of Teft W. Smith before the Antitrust Modernization Commission Hearings on Criminal Remedies, Nov. 3, 2005, at 5, http://govinfo.library.unt.edu/amc/commission_hearings/pdf/Smith_Statement.pdfId. at 5

⁴⁵ The only other nations we know of that have imprisoned antitrust violators at least once are Great Britain, Israel, Germany, Japan, and Ireland, but they have only done so on relatively rare occasions. Canada and other jurisdictions impose prison sentences but convert them to non-custodial sanctions. See Connor, *supra* note 18. However, the international trend is towards greater use of incarceration for cartelists. *Id.*

“There is no systematic evidence proving the deterring effects of sanctions on individuals and/or assessing whether such sanctions can be justified”⁴⁶

Moreover, an interesting set of criticisms was leveled at the DOJ’s imprisonment policies at a hearing of the Antitrust Modernization Commission. Teft Smith, a prominent U.S. antitrust lawyer who often represents defendants, testified that in his experience imprisonment is the DOJ’s “biggest (and most effective) stick” in cartel enforcement.⁴⁷ Nevertheless, he criticized DOJ for offering unduly short sentences⁴⁸ and because, with exceptions,⁴⁹ DOJ tends to

⁴⁶ OECD, *Cartel Sanctions Against Individuals*, 2005: Overview, available at <http://www.oecd.org/dataoecd/61/46/34306028.pdf>

⁴⁷ Smith, *supra* note 44, at 7-10.

⁴⁸ *Id.*

⁴⁹ For example, Alfred Taubman, the billionaire Chairman of Sotheby’s, was sentenced to a year and a day in prison in conjunction with the Auction Houses bid rigging case. See http://www.forbes.com/lists/2010/10/billionaires-2010_A-Alfred-Taubman_LWZ4.html At Taubman's sentencing hearing one of his lawyers said that his client's health at age 78 was poor: Taubman "... suffers from diabetes and sleep apnea, takes 26 pills[and] could be expected to live only 3.8 more years. 'To impose a prison sentence is to impose a life sentence,' he said" (*New York Times* April 23, 2002: 1). Taubman "entered a low-security medical prison in Rochester, Minnesota, on August 1 2002 and, after having his sentence reduced for good behavior, was released on May 15 2003." (*The Guardian* September 9, 2005: 18). In the years immediately following his sentencing, press reports on Taubman were almost invariably unflattering.

However, as of February 2011 Taubman is alive and doing well. His personal net worth reportedly doubled between 2002 and 2010. The day after Taubman was sentenced, the Board of Directors of Sotheby's Holdings Inc. at a "thinly attended annual meeting" elected Taubman to be a member of the Board, and his son Robert replaced him as Chairman. "The elder Mr. Taubman remains the company's controlling shareholder, with 13.2 million Class B shares, so the election of his son wasn't in doubt." *National Post* April 25, 2002: FP2. In addition to positions on other corporate boards, as of 2010 he was a Trustee of the Urban Land Institute (*Marquis' Who's Who* 2010).

His re-emergence into society may have begun in Detroit in 2005, when he accepted the first lifetime achievement award from the Detroit chapter of the Urban Land Institute. *Crain's Detroit Business* April 4, 2005: 8. Moreover, his social life has revived. "Today we are living at the dawn of the ultra-mega-uber-monster book party, celebrations so huge and elaborate that you might think you were at a wedding In April, 400 guests celebrated Alfred Taubman's book, *Threshold Resistance*.... at the Four Seasons" (*New York Times* August 26, 2007: Section 6: 226). Louis Auchincloss, novelist and chronicler of New York City mores, was quoted as "saying in amazement" that "[Taubman] comes out of jail and he's just as popular and giving as many parties as he ever did! There's no disgrace in going to jail anymore unless it's for some disgusting, disgusting crime." *The New Yorker* February 25, 2008. In addition, Taubman's name will remain forever on several buildings on the campuses of Harvard, Brown, and the University of Michigan. *Washington Post* September 15, 2002: A1.

prosecute mid-level sales or marketing executives rather than the most senior responsible officers of the company.⁵⁰ To the extent this is true⁵¹ it seriously undermines the overall effectiveness of prison as a way to prevent cartelization. Therefore, we attempted to track down the past and present positions of executives imprisoned for criminal price fixing.

Of the 152 known individuals who received a fine or prison sentence in cartel cases between 1990 and 2008, we⁵² were able to determine the position held during the cartel's existence for 151 of them.⁵³ Of those, 40 appear to have been one of the heads of the company for which they worked;⁵⁴ 24 appear to have occupied a corporate position that was very high, but below the level of those in the former group;⁵⁵ 77 appear to have been mid-level employees; 3 were co-owners or sole-proprietors of a business; 3 were stamp dealers; and 4 were consultants.⁵⁶ Thirty five of the mid-level employees were clearly involved in sales or marketing.⁵⁷

⁵⁰ Teft Smith wrote: "First, the individuals typically carved-out in the corporate plea agreements (which give a pass on prosecution, assuming cooperation with any Division investigative requests, to all but the 'carve-outs') tend to be mid-level sales and marketing executives with 'direct participation' or 'knowledge' and 'an ability to stop' the price-fixing. They tend not to be the senior executives, even when sometimes (in the Division's view) the senior executives are said by the Division to have been 'willfully ignorant' of the misconduct." Smith, *supra* note 44. at 9.

⁵¹ See Anthony V. Nanni: "And so it has always been true, and I am sure it is still true, that at the end of the day you're not going to get — it is very rare to get — the big multinational or national large corporation CEO or top guy as your antitrust defendant." Nanni, *supra* note 9, at 31.

⁵² This research was conducted by W. James Denvil, who is a student at the University of Baltimore School of Law, not a private investigator. He conducted his searches between July 15, 2010, and March 26, 2011, using Google, Bing, LinkedIn, Facebook, corporate websites, and the Federal Bureau of Prisons Inmate Locator. He searched for the individuals by using their full names, variants of those names, the names of their employers, descriptions of their cartels, the date of their convictions, and the recent years (i.e., 2007-2010) as search terms.

⁵³ Research results available upon request from the authors. It should be noted that job titles can be misleading and may not accurately reflect an individual's true position in the company.

⁵⁴ *See id.* This group is comprised of individuals with the title of Chairperson, President, Owner, Co-owner, Managing Director (of a European company), CEO, or COO.

⁵⁵ *See id.* This group is comprised of individuals with the title of Commercial General Manager, Operations Manager, Director, Executive Vice President, President (of a division within the company), Managing Director (of a division within the company), Vice President of Operations, Commercial Director, CFO, or Co-Managing Director.

⁵⁶ *See id.* This group is comprised of the individuals not included in the former two groups.

⁵⁷ *See id.* These individuals had the word "sales", "marketing", or "development" in their title.

Still another problem arises from the fact that some of the corporations involved forgive or even reward their price-fixing employees, directly or indirectly, legally or not, after they “take a bullet for the team” by going to prison.⁵⁸ Although it is difficult to determine when or whether it would be legal,⁵⁹ the authors would not be surprised if it were common for the corporations involved to pay their executives' fines directly or indirectly in the form of bonuses or promotions.⁶⁰

We attempted to discover how often convicted corporations forgive and even reward employees who violate the antitrust laws, and believe the results show that it may be common. We were able to determine the present whereabouts of 35 (34%) out of 103 managers⁶¹ known to have received a prison sentence in cartel cases between 1995 and 2010.⁶² Of those 35, nine (26%) are currently employed by the company for which they worked during the cartel, and another nine (26%) seem to be working at a different company within the same industry.⁶³ The remaining seventeen are either in prison, unemployed, employed in different industries, or

⁵⁸ See Dan Levine, "Antitrust Convictions Don't Mean End of Job for Some Executives", Law.com, April 12, 2010, <http://www.law.com/jsp/article.jsp?id=1202447903832&rss=newswire>. (Executive was sent to prison for 6 months for price fixing. When released, he was made a senior vice president “with more responsibility than he had before he entered prison....” One reason for this may be that “since the executives are not perceived to have ripped off shareholders for personal gain, companies often have no problem welcoming them back into their corporate suites....some corporate honchos believe executives that pleaded guilty took a bullet for the team, according to white-collar lawyers and industry observers.” Indeed, they have in all likelihood enriched the stockholders because the penalty their conduct led to probably was too low.)

There are also reports that some companies continue to pay employees while they are in prison. *Id.* In the opinion of Teft Smith the Antitrust Division does not get involved in employment decisions: “Third, in my experience, the Division appears indifferent as to what the companies do with even the carved-out individuals (let alone the other executives who may have been identified as having been directly involved in the price-fixing). They need not be fired, disciplined or even re-assigned to non-sales and marketing-oriented jobs.” *See* Smith, *supra* note 45, at 10.

⁵⁹ *See infra* note 75.

⁶⁰ John M. Connor, *Global Price Fixing* (1st Edition) Boston: Kluwer Academic (2001) at 420 (during cross-examination at the famous 1998 trial of three top executives of ADM for price fixing, the lead (immunized) witness for the prosecution was made to admit that his employer had paid his entire fine and promoted him to president of one of its largest subsidiaries).

⁶¹ In several cases individuals were sanctioned but not their very small businesses. Thus, we excluded individuals who were stamp dealers, consultants, sole proprietors, or co-owners during the cartel. Many of the 152 defendants' sentencing details are not posted on the Antitrust Division's Web site; we thank the Division for providing the missing sentencing documents.

⁶² Research results available upon request from the authors.

⁶³ *See id.*

deceased.⁶⁴ Because we were unable to discover the whereabouts of 68 of the 103 who received a prison sentence, these results might not be statistically significant. Nevertheless, if the employment statistics of the out-of-sample price fixers resembles those of the known ones, approximately half of those who served a prison sentence for their crime currently are working for their previous employer or in the same industry.⁶⁵

We were also able to discover the current whereabouts of four people who received fines, but no prison sentence during the period between 1995 and 2009.⁶⁶ Two of them are employed by the same company for which they worked during the cartel, one appears to be working in the same industry, and the other is working in another industry.⁶⁷

Indeed, for executives who went to prison, our figure of 52% almost certainly significantly underestimates the percentage of price fixers who went back to the same firm or industry. Some individuals may have reached retirement age, or returned to a firm or industry without notice of this fact being published in a source that is easily web-accessible, or the notice of some individual's re-employment may have been deleted from the Internet prior to July 15, 2010.⁶⁸ Our survey may have erroneously counted such people as not having returned to their firm or industry.

The fact that some – perhaps most – corporations do not punish and even reward the individuals responsible for antitrust violations is only one reason why we are not persuaded by the argument that only individual sanctions matter. First of all, the financial well-being of the affected corporations often do matter to the individuals involved, as evidenced by corporate executives who, by fixing prices, often knowingly risk imprisonment largely for the financial benefit of their employers. Moreover, the literature on antitrust law generally assumes that corporations maximize profits, which means it also assumes the interests of corporate representatives and corporations generally align.⁶⁹ A corporation that truly does not want to

⁶⁴ *See id.*

⁶⁵ *See id.*

⁶⁶ *See id.*

⁶⁷ *See id.*

⁶⁸ *See generally, supra* note 52 (noting that the research was conducted between July 15, 2010 and September 27, 2010).

⁶⁹ *See, e.g.,* RICHARD A. POSNER, ANTITRUST LAW ix (2d ed. 2001) (arguing there is in the antitrust field a consensus that “business firms should be assumed to be rational profit maximizers, so that the issue in evaluating the antitrust significance of a particular business practice should be whether it is a means by which a rational profits maximizer can increase its profits at the expense of efficiency”). (citing RICHARD A. POSNER, ANTITRUST LAW: AN ECONOMIC PERSPECTIVE 225-26 (1976)) [hereinafter “*Optimal Sentencing*”].

break the laws against price fixing because of the sanctions involved has any number of means to ensure that its employees follow company policy.⁷⁰

There are, moreover, a number of practical problems with exclusively or heavily relying on prison sentences as a means of deterring cartels, particularly international ones. First, it is more difficult to persuade managers of cartels who reside abroad to submit to U.S. jurisdiction. While indictments of foreign residents have increased, improvements in the ability of U.S. authorities to extradite individuals for price-fixing crimes have not kept pace.⁷¹ There are large numbers of indicted cartel managers who are fugitives residing abroad.⁷² Second, obtaining convictions of cartel managers who exercise their rights to a jury trial and who are within U.S. jurisdiction has proven challenging for the DOJ. Prosecutorial losses at trial are frequent.⁷³ Third, the demonstration effect of imprisonment requires adequate publicity about prison sentences. As the number and length of antitrust prison sentences has increased and become more routine, the “shock and awe” effect may decline. To offset such a trend, the DOJ has announced ever tougher standards for incarceration. It is unclear, however, whether these have been implemented to a significant extent or are mostly bluster. Fourth, coordination among those few antitrust authorities who incarcerate executives guilty of global price fixing is rare and likely to remain so in the future.⁷⁴ Where a cartel’s injuries are multi-jurisdictional, multiple corporate fines have become common. However, there are no treaties on multiple incarcerations of cartel managers, so double-jeopardy concerns may well undermine the chances that the overall level of individual sanctions could be optimal.

The following matrix illustrates some of the issues involving the public policy issues underlying decision to impose individual or corporate responsibility:

⁷⁰ See Posner, *supra* note 36 at 418 & n. 27 (1979-1980) (“if it [the corporation] is liable it will find adequate ways of imposing on its employees the costs to it of violating the law.”) Judge Posner noted: “A corporation has effective methods of preventing its employees from committing acts that impose huge [antitrust] liabilities on it. A sales manager whose unauthorized participation in a paltry price-fixing scheme resulted in the imposition of a \$1 million fine on his employer would thereafter, I predict, have great difficulty finding responsible employment, and this prospect should be sufficient to deter.” *Id.* Posner published this in 1979-80, when antitrust fines were very low. But if he believed that the corporation had an adequate incentive and means to control its employees when it faced the prospects of a \$1 million fine, a fortiori it would do so when faced with a possible \$100 million fine.

⁷¹ See Julian M. Joshua, Peter D. Camesaca & Youngjin Jung, “Extradition and Mutual legal Assistance Treaties: Cartel Enforcement's Global Reach,” 75 *Antitrust L. J.* 353 (2008).

⁷² See Section 4(B) *infra*.

⁷³ See Connor, *supra* note 18.

⁷⁴ See OECD, *supra* note 46.

Optimal Cartel Deterrence: Corporate v. Individual Sanctions Matrix			
Individual Executives' View of Incentives:	Corporate Perspective:		
	Corporation has little incentive to create right climate or control employees	Optimal Corporate Incentive Level	Corporation has excessive incentive to control employees, create a climate that rewards honesty
Too Low on Average	1	2	3 Wastes corporate resources, unfair to stockholders
Optimal	4	5 Ideal Balance	6
Too High on Average	7 Unless risk-loving, executives have little incentive to break law	8	9 Additional negative - unfair to honest employees. But firm can ameliorate by paying fines, payments or post-conviction employment

One way to analyze these possibilities is in terms of error analysis. Type I error involves problems arising from over-deterrence (this arises most in cell 9). Since collusion is judged under a criminal “beyond a reasonable doubt” standard, these errors are likely to be rare and mostly theoretical. Nevertheless, from the corporate perspective honest behavior can be mistaken for collusion, and this could be costly to society because it would cause corporations to refrain from procompetitive practices. The resulting fines would be unfair to stockholders and cause over-investment in collusion prevention (although the actual costs of compliance programs are likely to be very small). From an employee perspective: they face prison and fines for honest behavior. But firms can ameliorate this by paying these fines for them (legally or illegally,⁷⁵

⁷⁵ It is difficult to determine whether the antitrust fines imposed on corporate employees are ultimately paid by the employees, or are often or usually directly or indirectly paid by their employer. *See supra* note 59 and accompanying text. It also is difficult to determine whether it would be legal for the corporation to pay these fines. This area of law is exceedingly complex and, of course, even if indemnification is illegal, this does not mean it does not occur regularly. See ROGER MAGNUSON, *SHAREHOLDER LITIGATION* § 9:37 (West June 2010); Pamela H. Bucey, *Corporate Executives Who Have Been Convicted of Crimes: An Assessment and Proposal*, 24 *IND. L. REV.* 279 (1991); Note, *Indemnification of Directors: The Problems Posed By Federal Securities and Antitrust Legislation*, 76 *HARV. L. REV.* 1403 (1963).

directly or indirectly, perhaps through direct payments through foreign banks, and/or post-conviction employment). Such behavior, to the extent it is not merely theoretical, is inefficient.

Type II error involves problems from underdeterrence (this arises most in cell 1). Inadequate sanctions will fail to deter collusion optimally. From a corporate perspective: the corporation is unjustly enriched from the illegal overcharges. Untold billions of dollars will be stolen from U.S. consumers and businesses, often by foreign lawbreakers. One study covering just 40 private U.S. antitrust cases from 1990-2007 documented returned overcharges of more than \$18 billion.⁷⁶ From an employee perspective: Employee activity that should go into productive and competitive behavior instead often will be directed towards establishing or maintaining collusion, or preventing its discovery. Moreover, as noted earlier, collusion also results in allocative inefficiency and other inefficiencies.⁷⁷

In addition to Types I and II error, a system of cartel sanctions also should consider a third type of error. Type III error occurs when the system created to decide the issues leads to increased costs to businesses, consumers, enforcers, or decisionmakers.⁷⁸ In the cartel context, these costs include litigation expenses by the enforcers, plaintiffs, and defendants, and their expert witness costs. It includes the costs arising from delays, and also the value of corporate time spent on these issues. It also includes the undesirable effects on society arising from any increased business uncertainty, and the increased cost to the judicial system which imposes additional costs on taxpayers. Quantitatively, Type III error can be significant,⁷⁹ and any policy that ignores it runs a substantial risk of departing from an optimal result.

We know of no way to secure the information necessary to quantify and minimize these errors. Nevertheless, we believe it is likely that optimal deterrence only can be secured by a mix of corporate and individual sanctions.⁸⁰ If violations only were subject to corporate penalties,

⁷⁶ Robert H. Lande & Joshua P. Davis, "Benefits from Private Antitrust Enforcement: An Analysis of Forty Cases," 42. U. San Francisco L. Rev. 879 (2008), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1090661.

⁷⁷ See *supra* notes 21 & 26, and *infra* Section III(B).

⁷⁸ See Alan A. Fisher & Robert H. Lande, *Efficiency Considerations in Merger Enforcement*, 71 CAL. L. REV. 1580, 1670–71 (1983), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1684227 (introducing the concept of Type III error; defining and using these terms in a related antitrust context; merger enforcement).

⁷⁹ *Id.*

⁸⁰ In addition, it is important for a society to create a cultural norm that cartel behavior, like stealing, is something that is strongly condemned across society. It is important that the prohibition against price fixing become a moral or social standard that is internalized within the business community. Many people refrain from stealing because they think it is the right thing to do, not because of the threat of fine or incarceration. Attaching social stigma to the act is an important aspect of optimal deterrence. See generally Andreas Stephan, "Cartel Criminalization: The Role of the Media in the 'Battle for Hearts and Minds'" (2011), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=186628. See also Connor, Foer, and Udwin, *supra* note 34.

individuals might be unduly tempted to form cartels because success would benefit them tremendously and, as has been suggested by anecdotes⁸¹ and some research,⁸² they often do not face significant internal sanctions for their illegal behavior⁸³ and might well even be rewarded for their suffering in prison. On the other hand, if only individual penalties existed, it could be in the interests of some corporations to establish internal incentives that failed to discourage, rewarded, or even coerced employees into engaging in illegal behavior.⁸⁴ Some corporations might prefer to offer up a few executives for multi-year prison terms rather than pay \$100 million or more in a criminal fine or payout in private litigation.⁸⁵ The employees could be incentivized to risk prison by multi-million dollar bonuses, perhaps paid to foreign bank accounts or in the form of future employment. Even though these payments might be quite large for individuals, they easily could be dwarfed by the prospective fine that could be imposed under a regime oriented towards corporate fines.⁸⁶

We certainly do not know how to devise a formula to compare alternative cartel sanctions. Nevertheless, it is our judgment that a financial penalty against an individual has more of an impact on deterrence than a similar penalty against a corporation, and that prison time or the loss of one's corporate position⁸⁷ often is the equivalent of a very large financial penalty. We

⁸¹ See *supra* notes 58-71.

⁸² See *Id.* and *Corporate Crime and Punishment*, *supra* note 36, at 1458-59.

⁸³ Greg Werden suggests additional reasons: "This can occur as a result of defects in the design of compensation schemes, especially if the executives have short time horizons or are more willing than business enterprises to take risks. Consequently, business enterprises can incur substantial costs in monitoring their executives and complying with the law." See Werden, *supra* note 24, at 31-32 (footnotes omitted).

⁸⁴ *Id.* at 32.

⁸⁵ Suppose that instead of a corporate fine or payouts in private cases a corporation could offer up to the Department of Justice five executives who would each be sentenced to 2 years in prison or under house arrest. Suppose the corporation could pay each of the individuals involved \$6 million per year by depositing the appropriate sums in Swiss bank accounts, and also guarantee they would return to their position in the company upon release. This would only cost the corporation \$60 million, far less than many of the larger fines that have been imposed in recent years, and far less than many of the private payouts of recent years.

⁸⁶ Perhaps in part because corporations often would be able to compensate the punished individuals who "took one for the team", the "rogue manager" defense rarely has been accepted by the Antitrust Division or by the courts.

⁸⁷ Donald Klawiter, an extremely experienced practitioner and former Chair of the ABA Antitrust Section, at the American Antitrust Institute's Annual Conference, held June 23, 2011, in Washington, D.C., noted during the session on International Cartels:

From my experience in representing corporations and their executives in these cases, two things terrify executives. The first is the possibility that they will go to jail, if even for a week. And the second is that they will be, they will lose their high level positions in

make accommodations for these assumptions in our analysis in Section III *infra* by tripling the disvalue or deterrence effects of individual sanctions relative to corporate sanctions.

II. The Overall Levels of Current Cartel Sanctions

Violations of the U.S. antitrust laws can result in a diverse array of criminal sanctions. These include corporate fines and restitution payments, and prison, house arrest and fines for the corporate officials involved.⁸⁸ Between 1990 and 2009 the total of the corporate fines imposed in every DOJ criminal antitrust case was \$5.835 billion.⁸⁹ The total of the individual antitrust fines imposed during this period was \$69 million.⁹⁰ During this same period the Antitrust Division also secured the restitution of \$140 million in conjunction with criminal antitrust cases⁹¹ (which largely or totally consisted of restitution to the federal government for overcharges it paid).⁹²

DOJ prosecutions also frequently result in prison sentences and house arrest. From 1990 to 2009 criminal prosecutions by the Department of Justice Antitrust Division resulted in sentences against 338 individuals⁹³ that total 160,347 days (439 years) in prison.⁹⁴ In addition, Antitrust Division activity also has led to another 108 years of “house arrest or confinement to a halfway house or community treatment center” for 256 individuals.⁹⁵

corporations. Indeed, I've had some confess that taking them out of the CEO job or the head of sales job is much more traumatic to them than spending a year and a half in jail. That's sort of an interesting rationale and I think an interesting fact that we should look at.

<http://www.antitrustinstitute.org/content/international-cartels-presentation-and-audio-aa-annual-conference>

⁸⁸ This does not include such “minor” sanctions as disgorgement actions by the FTC. Although these cases can be important, they are relatively rare. See Elhauge, *supra* note 5.

⁸⁹ See U.S. DEP'T OF JUSTICE, ANTITRUST DIVISION WORKLOAD STATISTICS, *supra* note 29, at 12 (Yearly figures reproduced and added in Lande & Davis, *supra* note 18, Table 1.)

⁹⁰ *Id.* (Yearly figures reproduced and added in Lande & Davis, *supra* note 18, Table 2.)

⁹¹ *Id.* (Yearly figures added in Lande & Davis, *supra* note 18, Table 3.)

⁹² As the Division's Workload Statistics notes with considerable understatement, “Frequently restitution is not sought in criminal antitrust cases, as damages are obtained through treble damages actions filed by the victims.” *Id.* at n.13.

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ See *infra* Appendix III, Tables 5 and 7. However, these figures might be too high for the purposes at hand, for two reasons. First, these figures are for time sentenced, not time served.

Now we turn to civil sanctions. Cartels' victims receive mandatory treble damages and attorneys' fees.⁹⁶ Final verdicts in cartel cases are exceptionally rare, however. Our 2004 search for every final verdict in a U.S. cartel case since 1890 found only 26 examples.⁹⁷ Nevertheless, many private cases have resulted in significant settlements. An analysis of well over 100 international cartels prosecuted between 1990 and 2008 found a total of \$29 billion in announced private settlements in U.S. cases.⁹⁸ The only other estimate we have found was for a very limited sample of 25 large private cases filed against cartels between 1990 and 2007, which documented between \$9.2 billion and \$10.6 billion in cash payments (not including the value of products, coupons or discounts).⁹⁹

We were unable to determine how much of this time actually was served or how often sentences were reduced. For example, Alfred Taubman was sentenced to prison for a cartel offense for 12 months, but only served 9 1/2 months. See note 46 *supra*.

Second, sometimes an investigation by the Antitrust Division results in a sentence for another crime regardless whether an antitrust violation was uncovered. Non-price-fixing crimes can include perjury, mail fraud, contempt, obstruction of justice, and false statements. WORKLOAD STATISTICS 1999-2009, *supra* note 26, at 8 (listing these crimes under the header "Other Criminal Cases"). Since the Antitrust Division uncovered these crimes, often Antitrust Division investigators are in the best position to pursue these non-antitrust issues. Most often these other crimes are related to an antitrust offense—such as when a cartel bribes a federal purchasing agent. Other times they are not. Often they are very difficult to classify. According to the Antitrust Division, "Other Federal Crimes such as Perjury, Mail Fraud, Contempt, Obstruction of Justice, or False Statements" apparently constituted 36% of their criminal convictions since 1990 (53% during 2008-09).

We do not, however, know how many of the 160,347 days of prison were imposed for crimes that were not antitrust related. We should subtract these from the 160,347 total before we conduct our optimal deterrence analysis.

For lack of data, and to be conservative, we are ignoring these issues. The figures reported above for prison time and house arrest therefore will be used in our subsequent analysis even though they include some individuals serving time in whole or in part for non-antitrust offenses. And, as noted, these are time sentenced, not time served statistics. Because these statistics are larger than they should be for our purposes, their use will overestimate the probable deterrence effect of the DOJ anti-cartel program.

⁹⁶ Prevailing plaintiffs also receive filing fees and expert witness fees. See note 6 *supra*.

⁹⁷ See Connor & Lande, *supra* note 15.

⁹⁸ John M. Connor, *Cartels & Antitrust Portrayed: Private International Cartels from 1990 to 2008*: AAI Working Paper #09-06. (August 31, 2009) at slide 51. Available at <http://ssrn.com/abstract=1467310>.

⁹⁹ Since almost all of these cases were settlements, "alleged victims" would usually be a more accurate description. See Lande & Davis, *supra* note 18. These figures have not been adjusted for inflation. These cartel payouts constituted a part of a larger study of 40 private cases that documented a total of \$18 to \$19.6 billion returned to victims or alleged victims of antitrust violations. *Id.*

We have aggregated all of these types of cartel sanctions and analyze them according to the standard optimal deterrence model. First, we have assembled the financial penalties imposed on corporations, including the amounts they pay in corporate fines, restitution actions, and private treble damages actions.¹⁰⁰ Second, we have assembled the fines imposed on the individual corporate actors who were held personally responsible for cartel violations. Third, we develop monetary equivalents of time in prison (or time spent under house arrest) by approximating the disvalue, cost, deterrent value, or opportunity cost of incarceration time.¹⁰¹ Admittedly, establishing the likely disincentive effect of prison in an objective, accurate and

¹⁰⁰ There are three additional types of corporate monetary costs that we have not been able to quantify. First, antitrust suits are costly to defend. The amounts antitrust defendants pay in attorneys' fees usually are confidential, however, and we know of no way to systematically estimate them. One could assume they are equal in size to the plaintiffs' attorneys' fees, which are matters of public record in class action cases, and then include them in the calculations. We do not know, however, whether this would be a close approximation. Second, antitrust suits cause corporate disruption and wasted time for the corporate executives involved. We know of no method to evaluate this type of corporate loss. Third, an antitrust conviction could harm a company's reputation and cost it business. We know of no way, however, to quantify such losses.

¹⁰¹ Note the important difference in these two baselines: corporate actors might demand a different sum to risk prison than they would be willing to pay to avoid the risk of prison. For example, suppose someone would rather pay a \$6 million fine than be imprisoned for a year. How would that person react to the question of whether they would accept \$6 million in return to going to prison for a year? They might not agree to this deal. Part of the difference is the relative wealth of the actor in the two situations. A corporate actor could in theory demand an unlimited amount to accept the risk of prison. And any such payment increases his or her wealth. But the same person cannot pay an unlimited amount to avoid the risk of prison. She can only spend as much money as she has or can borrow. See David Cohen and Jack L. Knetsch, *Judicial Choice and Disparities Between Measures of Economic Values*, in *Choices, Values and Frames* 428 (2000).

But there is another element at play here as well. Empirical evidence shows that people's attitude toward costs and benefits depend on their perception of the status quo. *Id.* at 428-29. A person who accepts prison as the status quo may be willing to pay less to avoid it than a person who sees prison as a deviation from the status quo. A corollary is that, depending on the odds and stakes, people value avoiding losses -- and are willing to take risks to do so -- far more than they value gains, which they generally will not take risks to do (although, oddly, this principle may vary depending on the odds of the risk and the size of the gain or loss). See Daniel Kahneman and Amos Tversky, *Choices, Values, and Frames in Choices, Values and Frames* 35-36 (2000). This psychological phenomenon--and others--greatly complicates an economic analysis of behavior. So, for example, a corporate actor who perceives herself as taking steps that violate the antitrust law to return to the status quo (perhaps because she thinks her corporation is suffering from unfair competition) may be far more tolerant of risk than the same corporate actor who contemplates the same measure as a means of obtaining a perceived economic advantage. Even for a single corporate actor, then, there may be no single correct amount that represents her willingness to trade off between gain for her corporation and the risk of prison for herself.

non-controversial manner is impossible. Because our attempt to monetize incarceration is a relatively novel feature of this article, we allocate the major part of this section to this topic.

Some might contend that, because no corporate officer wants to spend any time in prison or under house arrest, they would be willing to pay virtually any amount of money to avoid the risk of prison. This is equivalent to placing an infinite (negative) value on prison time, and it implies that even a small probability of spending any time in prison or under house arrest has an infinite deterrence value. However, people do not *act* as if they infinitely disvalue the risk of getting put into prison or placed under house arrest for an antitrust offense. If they did, they would never try to form a cartel because this would put them at risk of going to prison. Rather, potential offenders act as if they tolerate the risk of prison to some extent. Perhaps they calculate, implicitly, on the basis of legal advice and what they have heard from other executives, their apparent chances of getting caught and convicted, and the prison sentence, house arrest, or fine they are likely to face, at least to some very rough degree.¹⁰² They then balance this chance of a penalty and its likely size, again in an extremely rough way, against the rewards of cartelization. In any case, we know that often they decide to form cartels. We know they often make this decision because cartelists surely know cartels are illegal, yet the number of cartels caught in recent years has been quite significant and does not seem to be decreasing.¹⁰³

Since the disutility of prison time is not infinite, in theory we can approximate its value, though to so in practice is, of course, difficult and speculative. There is no one objective way to compare the deterrence effect of time spent in prison to the deterrence effect of a criminal fine because different people would trade off prison versus fines in different ways. Any “average” figure used to equate the two is necessarily imprecise and arbitrary.

The valuation of custodial time is similar to one that, regrettably, society often must undertake for any number of public policy purposes. Sometimes even a life must be valued finitely. For example, our nation cannot afford perfect safety, nor would we want every automobile to be built as safely as technically possible.¹⁰⁴ Similarly, even though a life is beyond value and society does not want people to drive negligently, courts do not award infinite damages for the loss of life in car crashes.

We present five different approaches to the issue of how to evaluate the cost or value of time in prison.¹⁰⁵ We expect that considering the use of multiple approaches will increase the reliability of our results.

The first approach is to ascertain the valuations of lives and years of life used for various regulatory, public policy purposes.¹⁰⁶ In the United States, lives typically are valued at between

¹⁰² As noted earlier, direct or indirect payments of fines or rewards for imprisonment by their employers might sometimes also be a factor. *See supra* note 75 and accompanying text.

¹⁰³ *See supra* note 29.

¹⁰⁴ If society did this it would be forced to accept increased risks from other sources (i.e., society cannot afford perfect safety).

¹⁰⁵ These have been adapted from Lande & Davis, *supra* note 15.

\$3 million and \$10 million by federal government agencies when they set, for example, transportation or environmental policy.¹⁰⁷ Some of these studies are especially appropriate for our purposes because they place average values on a year of life. They generally calculate figures of \$300,000 to \$500,000 per person per year of life (depending upon a number of variables).¹⁰⁸

Second, lower figures on average, from \$1.4 million to \$3.8 million for a life, are awarded under Tort law, in wrongful death cases.¹⁰⁹

Third, following the September 11th tragedy, Congress created the Sept 11th Victim Compensation Fund to award compensation to victims' families.¹¹⁰ The Fund's payments constitute a prominent recent reflection of the monetary value our society places on innocent human life, even though these payouts were made under unique circumstances. The Fund's average award for a life was \$2,937,861. The median award was \$1,677,632, the maximum award was \$7,100,000, and the minimum award was \$250,000.¹¹¹ Significantly for our purposes, many of the Sept. 11 victims had been quite affluent. Eighty-nine of the victims had annual incomes between \$500,000 and \$1,000,000 per year (their estates were given average

¹⁰⁶ For a concise essay on economic methods for evaluating "statistical lives," see Thomas C. Schelling, "Value of Life," *The New Palgrave: A Dictionary of Economics* Vol. 4 (1987) pp. 793-796.

¹⁰⁷ See Joseph E. Aldy & W. Kip Viscusi, Adjusting the Value of a Statistical Life for Age and Cohort Effects, (Jan. 2008) (Vanderbilt Law and Economics Research Paper No. 08-01) available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=898189. Recently the Department of Transportation has used \$5.8 million for the value of a life. Memorandum from Tyler D. Duvall, Assistant Secretary for Transportation Policy & D. J. Gribbin, General Counsel to Secretarial Officers & Modal Administrators, <http://ostpxweb.ost.dot.gov/policy/reports/080205.htm> (last visited May 26, 2009). The Environmental Protection Agency currently uses \$6.9 million. All Things Considered: Value on Life 11 Percent Lower Than 5 Years Ago (NPR radio broadcast July 11, 2008) available at <http://www.npr.org/templates/story/story.php?storyId=92470116>.

¹⁰⁸ See Aldy & Viscusi, *supra* note 104. For example, values typically decline with age, and we note that most price fixers are mature businessmen. *Id.* A study by Stanford researchers calculated only \$129,000 per year. Kathleen Kingsbury, The Value of Human Life: \$129,000, *TIME*, May 20, 2008, available at <http://www.time.com/time/health/article/0,8599,1808049,00.html>.

¹⁰⁹ See Mark A. Cohen & Ted R. Miller, "Willingness to Award" Nonmonetary Damages and the Implied Value of Life from Jury Awards, 23 *INT'L REV. L. & ECON.* 165, 166, 179 (2003) (calculations made in 1995 dollars).

¹¹⁰ See the Air Transportation Safety and Stabilization Act, Pub. L. No. 107-42, 115 Stat. 230 (codified at 49 U.S.C. § 40101) (hereinafter "the Act") (We are grateful to Thomas Weaver for his research involving the September 11th Victim Compensation Fund)

¹¹¹ Feinberg, Final Report of The Special Master for the September 11th Victims, available at www.justice.gov/final_report.pdf, at 110, tbl 12.

awards of \$4,749,654), and eight victims' annual income exceeded \$4,000,000 per year (their estates were given average awards of \$6,379,287).¹¹² Although we do not know the average or typical pre-conviction annual incomes of imprisoned price fixers, we would not be surprised if the latter income levels are comparable.

A disadvantage of the first three approaches is that they address the cost or disutility of lost lives, not time spent in prison. It is likely that most people would view the prospect of spending a year in prison as not as bad as losing a year of life; after all, many prisoners with no chance at parole still resist the death penalty. Thus, the first three approaches may be regarded as an upper bound on the disutility of a year in prison.

A fourth method for approximating the disvalue of incarceration comes from examining the compensation provided to defendants who have been wrongly imprisoned. Sometimes people are wrongly imprisoned by, for example, perjured government testimony.¹¹³ The victims potentially can recover for a variety of torts depending upon the jurisdiction.¹¹⁴ Often no award will be given for imprisonment due to a simple, albeit tragic, error; some type of intentional act, malice or malfeasance typically is required.¹¹⁵ The highest payment we found for a case involving at least a year of prison was \$1.138 million per year, for three years of wrongful confinement for a false conviction.¹¹⁶ However, when shorter imprisonments are annualized, significantly higher awards sometimes have been made.¹¹⁷

¹¹² *Id.*, Table 6.

¹¹³ *See Limone v. United States*, 497 F. Supp. 2d. 143, 152 (D. Mass. 2007) (FBI was aware chief witness would perjure himself). *See also Newsome v. McCabe* 319 F.3d 301, 304-305 (7th Cir. 2003) (officers induced eyewitnesses to falsely identify plaintiff); *Mark Diaz Bravo v. Giblin*, 2002 WL 31547001, 2002 Cal. App. Unpub. LEXIS 10494 (Cal. App. 2 Dist. 2002) (investigating officer fabricated evidence).

The authors are grateful to Thomas Weaver for locating and analyzing these cases, and for performing research on this subject. *See Thomas Weaver, "The Part That Counts: Wrongful Incarceration Awards And The Value Of Human Life,"* (unpublished manuscript) (on file with the authors).

¹¹⁴ These torts include wrongful imprisonment, wrongful conviction, wrongful confinement, malicious prosecution, abuse of process, intentional or negligent infliction of emotional distress, false arrest, or an unconstitutional deprivation of their civil rights. *Id.*

¹¹⁵ *See, e.g., supra* note 113.

¹¹⁶ *Bravo v. Giblin*, 2002 WL 31547001, 2002 Cal.App.Unpub. LEXIS 10494 (Cal.App. 2 Dist. 2002). Suit filed under under 42 U.S.C. § 1983 yielded "damages in the amount of \$221,976 for his economic losses, \$3,537,000 to compensate him for 1,179 days of incarceration at the rate of \$3,000 per day, and \$1 million to compensate him for emotional distress suffered between the date of the incident and the date of his sentencing." *Id.* at *24, 2002 Cal.App.Unpub. LEXIS 10494 at *74. We arrived at the award per year of imprisonment of \$1,138,951.77 in this case by multiplying \$3,000 a day by 365.25 to arrive at \$1,095,750. The lost earnings of \$221,976, divided by 1,179 days in prison and multiplied by 365.25 days, comes to \$118.28 per day and

We should note that we have not been able to ascertain any of the falsely imprisoned defendants' incomes, but we suspect most had relatively low incomes, and none appear to have been corporate executives or upper class professionals.¹¹⁸ It is possible that a jury or judge would award a corporate executive wrongfully imprisoned for price fixing a larger-than-average amount for their suffering. Alternatively, a jury might react in the opposite direction. A jury might be less sympathetic to imprisoned upper class corporate executives. Still, these results do tend to show that compensation in the neighborhood of \$1 million per year appears generally to be the practical maximum that society is willing to award for a year wrongfully spent in prison.

Our fifth and final approach is to examine estimates of the disutility of prison time made by reputable scholars. We have been able to find only two estimates for an antitrust offense that seem plausible in this context.¹¹⁹ An article by Professors Howard P. Marvel and others equated a year in prison for price fixing to approximately \$600,000 in 2011 dollars.¹²⁰ A study by Professor Kenneth Glenn Dau-Schmidt and others equated a year in prison for price fixing with a

adds another \$43,201.77 per year. The total award per year of imprisonment thus comes to \$1,138,951.77.

¹¹⁷ The extreme case was *Ramirez v. County of Los Angeles*, 397 F. Supp. 2d 1208, 1215 (C.D. Cal. 2005) (investigating officer fabricated evidence) (10 month sentence led to a \$9 million settlement; this is an annual rate of \$10,800,000). Because the emotional stress and discomfort could be disproportionately for the very fact of the government malfeasance, or greater for the beginning of a prison sentence, it is unclear whether the award would have been increased proportionately if the victim had been imprisoned for a year, or for multiple years. As noted, in these cases, moreover, it is difficult to segregate the amounts awarded for false imprisonment from the amounts awarded for one time events or other torts. "Where the period of incarceration is shorter (e.g., less than one year), proportionately larger awards (measured by annualizing the award) have been rendered, presumably reflecting Limone's observation that the injury from incarceration may be more intense towards the beginning." *Smith v. City of Oakland*, No. C-05-4045 EMC, (N.D. Calif. March 17, 2008); 2008 U.S. Dist. Lexis 20735. See also John C. Coffee, *Corporate Crime and Punishment*, N.Y.L.J., Nov. 29, 1990, at 431 (noting that "the declining marginal utility of imprisonment means that each increment of incarceration increases the perceived penalty by a less than proportionate amount. Or, reduced to its simplest terms, a two-year prison term is not twice as bad as a one-year terms.").

¹¹⁸ See Lande & Davis, *supra* note 18.

¹¹⁹ We have found one other estimate, but it seems to value prison time at a level too low to apply to white collar criminals. See Tonja Jacobi & Gwendolyn Carroll, *Acknowledging Guilt: Forcing Self-Identification in Post-Conviction DNA Testing*, 102 NW. U. L. REV. 263, 283 & n. 52 (2008) (estimating value of prison at approximately \$200 per day, which amounts to slightly more than \$70,000 per year).

¹²⁰ See Howard P. Marvel, *et al.*, *Price Fixing and Civil Damages: An Economic Analysis*, 40 STAN. L. REV. 561, 573 (1988). The authors equated a year in prison with a \$300,000 fine. The article appeared in the February 1988 issue so we assume they were using 1987 dollars. The Bureau of Labor Statistics Consumer Price Index inflation calculator equates \$300,000 in 1987 to approximately \$582,000 in 2011. See <http://data.bls.gov/cgi-bin/cpicalc.pl>

fine of approximately \$1.5 million in 2011 dollars.¹²¹ These figures are higher than the national average valuations for a year of life noted earlier, perhaps because price fixers are wealthier on average and can afford to disvalue prison time much more than most people can, or perhaps because price fixers' time is more valuable on average.¹²²

These five approaches yield estimates that are broadly consistent with one another. To be conservative, we have taken the highest of these estimates, \$1,500,000 per year, and increased it to \$2 million (in 2010 dollars).¹²³ We will use this as the disvalue or deterrence-equivalent of a year in prison. We should use a lower figure, such as \$1,000,000, for the disvalue or deterrence equivalent of a year of house arrest, but for simplicity of calculations we will value it at \$2 million as well. We note that \$2 million is as much as the lower estimates for the value of an entire human life that were discussed earlier, and is much higher than the average annual national values of life.

As noted earlier, penalties directed against individuals might well have more deterrence effect than penalties directed against the corporations. To attempt to take this into account, we have trebled the deterrence effect of every individual penalty before adding them to the corporate penalties. This means we will use \$6 million (in 2010 dollars) for the deterrence value of a year in prison¹²⁴ or a year of house arrest. We also will treble the individual fines paid in antitrust

¹²¹ Kenneth Glenn Dau-Schmidt, *et al.*, *Criminal Penalties Under the Sherman Act: A Study of Law and Economics*, in 16 RESEARCH IN LAW AND ECONOMICS 25 (Richard O. Zerbe, Jr. ed., 1994) available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=712721. This article equated a year in jail with a fine of \$1 million. The Bureau of Labor Statistics Consumer Price Index inflation calculator equates \$1,000,000 in 1994 and \$ 1,486,000 in 2011. See <http://data.bls.gov/cgi-bin/cpicalc.pl> Professors Dau-Schmidt et al. were using 1982 data for much of their paper's analysis. If they meant their valuation of a year in jail to be expressed in 1982 dollars, their \$1,000,000 estimate would be the equivalent of approximately \$2,282,000 in 2011. *Id.*

¹²² Whether the time or the life of a price fixer is more, or less, valuable than that of an average person is an interesting philosophical question this article will not explore.

¹²³ We do not believe \$2 million is likely to be the true cost or deterrent value of a year in prison. We nevertheless decided to use this figure, which we believe to be unduly high, in our subsequent analysis in order to take a conservative and relative non-controversial approach to the issue.

¹²⁴ We note that valuing a year's worth of life at \$6 million would mean that a 20 year prison sentence would be disvalued at \$120 million, a figure far in excess of the amount that society places on an individual's life.

We will use the \$6 million valuation, in 2010 dollars, for the deterrence produced by a year spent in prison for price fixing even if that imprisonment occurred years ago.

cases before we add these figures to the corporate fines, restitution payments, and payouts in private damages cases.¹²⁵

III. Cartel Harms: the “Net Harms To Others” From Cartels

The standard optimal deterrence formula shows that the total amount of cartel sanctions should equal the cartel’s “net harm to others” divided by the probability of detection and proof of the violation.¹²⁶ The “net harm to others” from a cartel includes not only its overcharges, but also the allocative inefficiency¹²⁷ produced by its exercise of market power. The allocative inefficiency from cartel pricing should be added to their overcharges to get a true measure of cartels “net harms to others”.

In theory, each of these parameters should be an expectation that has been individualized for the cartel in question. For each potential cartelist we would ascertain what each thought their expected profits from cartelization were likely to be,¹²⁸ what their chances of getting caught and convicted were, and the total disvalue to them of the sanctions they thought would be imposed. This calculus would be made with due regard for how much each prospective cartel manager was risk-averse or risk-seeking.¹²⁹ As a practical matter, of course, ascertaining these required figures is impossible. The best we can do is to calculate what each figure actually has been on average in the past, and to assume that this figure is likely to be close to what the managers of potential cartels believe is likely to happen in the future. This is of course a highly imperfect exercise. Nevertheless, it is more likely to allow us to calculate whether cartel penalties have been set at the optimal level than any other approach we can devise.

A. Cartel Overcharges

In an earlier article we developed and presented a very different survey approach. We comprehensively and systematically examined cartel overcharges by assembling two data sets. ~~The first set of evidence consisted of every serious, scholarly cartel overcharge study. With very few exceptions, we attempted to analyze every corporate compliance study that you paid for. In addition, we attempted to analyze every serious, scholarly study that you paid for.~~ This assumes that price fixers actually pay their own fines. It is, however, difficult to determine whether trust fines imposed on corporate compliance studies that you paid for are often or usually directly or indirectly paid by their employer. *See supra* note 74.

~~quantitative information on the price effects of private cartels.¹³⁰ 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. We searched for antitrust cases in which a neutral finder of fact reported collusive overcharges in percentage terms or presented conclusions that could be converted into an overcharge percentage.~~ *See supra* note 20 and accompanying text. Ideally the overcharges also should be adjusted upwards for the umbrella effects of market power. *Id.* Ideally the costs imposed on taxpayers for the government to investigate and prosecute and for courts to try cartels, and the costs to the public of incarceration, also would be included since they too are “net harms to others” from cartels. We do not, however, have information as to how large these omitted factors are.

¹²⁸ Their expected cartel profits, moreover, would be a distribution of outcomes with assigned probabilities.

¹³⁰ *See* Connor & Lande, *supra* note 15.

¹²⁹ Another factor would be the opinion of each cartel manager as to their co-conspirators. Do they believe their co-conspirators are likely to turn them in under various circumstances?

¹³¹ *Id.* at 555-57.

Our most recent analysis of the social science literature found 1,517 useful estimates of cartel overcharges or undercharges in more than 200 publications that analyzed cartels that operated in 381 markets.¹³² Appendix 2 displays the medians of all average overcharges reported over time.¹³³ The median cartel overcharge for all types and time periods (a median that includes a significant number of zeros) is 23.3%. There is no strong trend in the cartel markups for all types over time. Indeed, the median since 2000 is virtually the same, 22.5%. But if one examines the international cartels separately, it is noteworthy that the median over time has been higher than for national cartels (30.0% v. 17.2%), but thanks to a downward trend the international and national medians since 2000 have been similar (25.8 v. 20.0).¹³⁴ The mean overcharge figures have averaged 49%, much higher than the median figures due to the presence of some extremely large overcharges in the sample.

Our search for verdicts in cartel cases proved to be extremely difficult,¹³⁵ however, because overcharges are not calculated in criminal cases,¹³⁶ and almost every private antitrust suit for damages settles¹³⁷ or is dismissed before an overcharge can be calculated by a neutral observer and made part of the public record of the case.

¹³² See John M. Connor, *Global Price Fixing* (2d. ed 2007).

¹³³ 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.

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. We did, of course, include these observations in the median calculations that appear in Appendix 3.

¹³⁴ It is difficult to know what to make of the downward trends in profitability for most types of cartels. The influence of the spread of, and increase in, effective anticartel enforcement is perhaps the most obvious explanation. 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 their chances of detection.

¹³⁵ We looked for cases by the use of computer-assisted searches of data bases, searching through a large number of articles and treatises on cartels and on antitrust damages, and asking groups of knowledgeable antitrust professionals for any examples they knew of that might contain useful information. *See id.* at 555-56.

¹³⁶ Price fixing is illegal regardless whether, or the extent to which, defendant affected prices, because the agreement to fix prices is illegal. For this reason the amount that prices changed, or even whether prices were affected at all, is not calculated in a criminal antitrust case. *Id.* at 551

¹³⁷ *Id.* For a discussion of settlement in this context, and why settlement amounts likely to be an extremely unreliable guide as to the size of the underlying cases' overcharges see *id.*

As a consequence final verdicts involving cartels where a judge, jury, or commission¹³⁸ calculated an overcharge¹³⁹ are rare, and we found a disappointingly small sample size of cases - 25 - to analyze. However, our sample is roughly as large as the sizes of the prior surveys we report in Appendix 1 (which were 5-7, 12, 12, 13, 22, and 38 in number, respectively). Nevertheless, due to its small size, its results should be interpreted with caution. The results of are that the twenty-five collusion episodes had a median average overcharge of 22%, and a mean overcharge of 31%.¹⁴⁰

Thus, our two data sets yield median cartel overcharges of approximately 25% and 22% overall. The mean results were 49% for the economic studies and 31% for the verdicts.¹⁴¹ For the economic studies' post-2000 sample the national and international cartel median overcharges averaged 20% and 25.8%.¹⁴² These figures will prove extremely useful when we formulate our policy recommendations in this article's Conclusion. Section V of this article, however, which will carry out the optimal deterrence calculations according to the standard approach, will use the actual amount overcharged by each individual cartel.

B. The Allocative Inefficiency Effects of Market Power

The "net harms to others" from cartels also include their allocative inefficiency effects (oftentimes called the deadweight welfare loss or "DWL").¹⁴³ Unfortunately, we do not know for very many cartels either how large their allocative inefficiency harms are or the relative size of a cartel's allocative inefficiency compared to its overcharges. We instead will select a representative ratio or range that is based on economic theory and constants derived from the empirical literature on cartels and monopolies. Then we will add the DWL to the cartel's overcharges when we implement the optimal deterrence calculations.

As an example of how adding this factor into the optimal deterrence calculations could make a difference, in an early paper on this topic Judge Easterbrook assumed that allocative inefficiency effects are 50% as large as overcharges on average.¹⁴⁴ If Judge Easterbrook were

¹³⁸ Connor & Lande, *supra* note 18, at 551-52.

¹³⁹ Moreover, many verdicts were only expressed in dollar amounts which we were unable to translate into percentages, so we reluctantly had to omit these cases. *Id.* at 556.

¹⁴⁰ *Id.* at 556.

¹⁴¹ *See id.* at 561. Mean figures are higher than median figures due to the effects of extremely high overcharges.

¹⁴² *Id.* at 541.

¹⁴³ For a definition of the allocative inefficiency effects of market power see *supra* note 26.

¹⁴⁴ *See* Frank Easterbrook, "Detrebling Antitrust Damages," 28 J. L & ECON. 445, 455 (1985). From a theoretical standpoint 50% is in fact the maximum possible percentage given a linear demand curve.

correct, this would mean that under the "net harm to others" standard, every \$100 in overcharges would be presumed to be accompanied by another \$50 in allocative inefficiency harm.

We have found a modest number of technically impressive empirical studies specifically about cartels that provide both overcharges and DWL estimates. Sølgaard computes a DWL/overcharge range of from 37% to 48% for a Norwegian cement cartel,¹⁴⁵ and Monke et al. find a 28% ratio for a Portuguese flour cartel.¹⁴⁶ Gallo et al. provide a comprehensive analysis of U.S. DOJ cartel cases; they illustrate the DWL issue using a 5.3% ratio, but their choice of parameters is not well explained.¹⁴⁷ Needless to say, these studies form too small a sample from which to generalize. In addition, there are many empirical studies of this issue that are concerned with market power in general, not specifically with market power resulting from cartels,¹⁴⁸ and a very interesting ratio calculated by the Canadian enforcement authorities in a merger case.¹⁴⁹

¹⁴⁵ Lars Sølgaard, Chief Economist, Norwegian Competition Authority, Speech at Seminar Hosted by the Norwegian Competition Authority, Cartels Investigations in Norway (February 22, 2007), *slides available at* http://www.konkurransetilsynet.no/iKnowBase/Content/425749/070222_LARS_SORGARD.PDF. Four companies were convicted and heavily fined in Norway for fixing the prices of corrugated cardboard paper from 1983 to 1990. *Id.* The decision sustained on appeal to the Supreme Court of Norway. *Id.* The chief economist of the Competition Authority favorably cites an expert opinion (apparently relied upon by the Court) that the overcharge was NOK70 to 80 million and the deadweight loss NOK30-40 million. *Id.* Thus, the ratio was from 2:1 to 2.67:1.

¹⁴⁶ Monke, Erik A. et al. Welfare Effects of a Food processing Cartel: Flour Milling in Portugal. *Economic Development and Cultural Change* 35 (1987): 393-407. A careful study of total welfare effects of a government-supported cartel found that the ratio of transfer to deadweight losses was 3.6:1. *Id.*

¹⁴⁷ Gallo, Joseph C. et al. Criminal Penalties under the Sherman Act: A Study in Law and Economics. *Research in Law and Economics* 16 (1994): 25-71.

¹⁴⁸ See Connor, John M. and Everett E. Peterson, New Estimates of Welfare Losses Due to Imperfect Competition in U.S. Food Manufacturing, *Contributions to Economic Analysis: No. 234 Agricultural Markets: Mechanisms, Failures, Regulations*, David Martimort (ed.). Amsterdam: Elsevier (1996). In Table 4 p. 226 of this chapter the authors conclude that ten published empirical studies of the food manufacturing industries—employing a variety of data sets and methods of analysis—found that the DWL/transfer ratio was 2.5% on average but varied from 0.7% to 36%. Retail food demand elasticities tend to be lower (-0.3 to -0.7) than elasticities seen in cartelized industries. *Id.* Five models based on price-leadership behavior averaged a relatively low 11% ratio. *Id.* However, these studies mostly include industries with implicit collusion and some unilateral market power. *Id.*

F. M. Scherer & David Ross, *Industrial market Structure and Economic Performance* 667-78 (1990) evaluate several empirical estimates of the relative sizes of the deadweight loss (0.5 to 2.0% of GNP) and transfer effects (probably at the lower end of the range of 3 to 12%) due to the exercise of market power in the whole U.S. economy in the 1950s to 1970s. Economy-wide

Another way to determine the ratio is through the use of economic theory and logic. Many textbooks do what Judge Easterbrook did and draw diagrams that imply a ratio of 50%, but these usually are heuristic illustrations not intended to be realistic representations of markets.¹⁵⁰ However, economic theory produces a formula for calculating this ratio. The DWL/transfer ratio is the long-run own-price elasticity of demand (at the collusive price) times the overcharge ratio, all of which is divided by 2.¹⁵¹ That is, DWL is a high share of the income transfer when the overcharge is high and the elasticity is an absolutely large number.

Theory provides some rough guides to appropriate elasticities. We know that the elasticity of demand for products that have been cartelized is generally elastic (less than -1).¹⁵² Following Posner's lead, a good range to consider initially is -1.0 to -2.0.¹⁵³ But we can do better by considering cartel and monopoly studies analyzing good data with the most advanced techniques.¹⁵⁴ We will highlight one monopoly and five cartel studies.

analyses tend to produce lower welfare losses than do disaggregated industry studies, but the effect on the ratio of interest is uncertain. *Id.* at 664. Despite the many caveats expressed by Scherer and Ross about these numbers, we interpret the average DWL/transfer ratio to be roughly 28%. The lowest ratio is perhaps about 8% and the lowest 36%. However, these studies include many industries with implicit collusion and some unilateral market power. *See id.*

¹⁴⁹ *See* Alan A. Fisher, Robert H. Lande, and Stephen F. Ross, "Legalizing Merger to Monopoly and Higher Prices: The Canadian Competition Tribunal Gets It Wrong," 15 *Antitrust Magazine*, No. 1, (2000), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1358448. The Canadian Competition Tribunal predicted that a proposed propane merger would raise prices by 8%, which came to \$43 million, and also produce another \$3 million in allocative inefficiency losses (a 7% ratio).

¹⁵⁰ *See, e.g.,* Scherer & Ross, *supra* note 148, at 662.

¹⁵¹ *See* Richard A. Posner, *The Social Costs of Monopoly and Regulation*, 83 J. POLIT. ECON. 807, 816. The overcharge ratio is the change in market price due to an increase in market power divided by a benchmark or but-for price. *Id.* Posner considers two types of price elasticities, one for linear demand and one for constant demand (a concave demand curve). *Id.* Constant-demand curves are most appropriate for highly differentiated products, not for the typical homogeneous products that are cartelized. Thus, we adopt the linear-demand-elasticity assumption herein. We also assume that unit costs are constant over the relevant range of output.

¹⁵² James L. Smith, *Inscrutable OPEC? Behavioral Tests of the Cartel Hypothesis*, 26 ENERGY J. 53 (2005) ("[E]stimated demand elasticities numerically below -1 would constitute evidence not inconsistent with the cartel hypothesis.").

¹⁵³ Posner, *supra* note 151.

¹⁵⁴ Economists have generated thousands of empirical estimates of demand that have reliable demand elasticities. *See, e.g.,* Craig A. Gallet, *The Demand for Alcohol: A Meta-Analysis of Elasticities*, 51 AUSTRAL. J. AGRIC. & RES. ECON. at 121 (comprising 132 high-quality published studies of the demand for alcoholic beverages). However, there are very few papers that contain both calculated overcharges and elasticities.

In the first cartel example, Posner calculates the DWL ratio for the first episode (1929-1931) of the global nitrogen fertilizer cartel to be 31%.¹⁵⁵ Second, the heavily studied Joint Economic Committee Eastern U.S. railway cartel yields DWL ratios of 26%.¹⁵⁶ Third, a well regarded study of the U.S. cane sugar cartel of 1890-1914 implies a DWL ratio of 12% to 13%.¹⁵⁷ Fourth, a 1923-1968 Norwegian cement cartel has a DWL ratio of 19%.¹⁵⁸ Fifth, an excellent dynamic simulation model of the U.S. lysine cartel suggests a DWL ratio of 21% to 27%.¹⁵⁹ In sum, five leading studies of effective cartels find that the elasticities are between -0.95 and -1.64 for effective cartels, as expected, and that the DWL ratios of 12% to 31% are strongly positively related to the overcharge rate. Finally, an impressive examination of the Alcoa U.S. aluminum monopoly during 1923-1940 concludes that demand elasticity was -2.1 and that the DWL was 62% to 66% of the income transfer.¹⁶⁰ The aluminum example illustrates a general finding of the cartel literature: cartels aim at achieving true monopoly power but typically must settle for a weaker degree of market power.

To arrive at a reasonable DWL ratio for contemporary private cartels, we will use a 45% mean average overcharge¹⁶¹ and combine it with the aforementioned -0.95 and -1.64 elasticity of demand range.¹⁶² These parameters result in a DWL ratio of 6% to 20%.¹⁶³ Using the median

¹⁵⁵ Posner *supra* note 151, at 820. The overcharge was 75% and the elasticity -1.45. *Id.*

¹⁵⁶ Glenn Ellison, *Theories of Cartel Stability and the Joint Economic Committee*, 25 RAND J. ECON. at 51 (Model 3)(finding an overcharge of 50.8% and elasticity of -1.59).

¹⁵⁷ David Genosove & Wallace P. Mullin, RAND J. Econ. at 367 (computing an average annual overcharge of 13.4% and elasticity of -2.03 to -2.24 during high season; during the five most effective years 1893-1897 the overcharge was 31.0%, implying a DWL ratio of 24% to 27%).

¹⁵⁸ Lars-Hendrik Röller and Frode Steen, "On the Workings of a Cartel: Evidence from the Norwegian Cement Industry," 96 *Am. Econ. Rev.* (2006) at 321 (which finds an overcharge of 34.5% and an elasticity of -1.47).

¹⁵⁹ Nicolas de Roos, "Examining Models of Collusion: the Market for Lysine," Intl. J. Indus. Org. at 1083. (estimating an overcharge of 61.5% and the author favors a manager's subjective notion of elasticity of -1.1 to -1.4).

¹⁶⁰ Valerie Y. Suslow, "Estimating Monopoly Behavior with Competitive Recycling," 17 RAND J. Econ. at 389 (computing an overcharge of 150% and an elasticity of -2.0 to -2.1).

¹⁶¹ In addition to the material in this section, this figure is based upon Connor and Lande, *supra* note 15, at 515. The literature studies' mean was 49% and the mean of verdicts was 31%. The mean for the 75 cartels in our study *supra* was 60.3%.

¹⁶² See John M. Connor, "Price Fixing Overcharges: Revised 2nd Edition: SSRN Working Paper (April 27, 2010). Available at SSRN: <http://ssrn.com/abstract=1610262>] (this study is an expanded and updated version of Connor and Lande *op cit.*; Table 7 shows that the mean overcharge for all cartels is 46%, including many with zero price effects).

¹⁶³ Applying the formula, we have $1/2 \times 0.45$, which is then multiplied by 1.0 or 1.65.

overcharge of 22%¹⁶⁴ instead, the DWL ratio range is reduced to 3% to 10%. Combined, these alternative calculations produce range extremes from 3% to 20%.¹⁶⁵ That is, the allocative inefficiency associated with cartelization is between \$3 and \$20 for every \$100 in cartel overcharges, and the "net harm to others" will be \$103 to \$120. Therefore, we will assume that for every \$100 in cartel overcharges, there is between \$3 and \$20 in accompanying allocative inefficiency effects.

C. Umbrella Effects of Supracompetitive Pricing

When a cartel raises prices the relevant market sometimes contains a non-colluding fringe of smaller firms that are able to raise prices due to the higher overall market price set by the cartel. Since the fringe firms did not participate in the collusion, they did not violate any law and so cannot be fined or sued successfully in a private case. Nevertheless, these "umbrella effects" are another "net harm to others" from the cartel. If a cartel raised prices by \$90 million, for example, and caused the non-colluding fringe to raise prices by \$10 million, the "net harm to others" from the cartel should rise to \$100 million. Ideally, we would adjust our optimal deterrence calculations to take this into account.

However, this factor might not be significant empirically, and it is likely to be difficult to ascertain even approximately. There certainly have been powerful cartels with significantly less than a 100% market share. For example, the citric acid cartel only had 60% of global production; for vitamin B1 the increase in Chinese production led to a cartel market share decline from 70% to 52%; for vitamin B2 the cartel had 75-85%.¹⁶⁶ We believe, however, that examples of effective cartels with low market shares are not common. We have calculated that, for a sample of 245 cartels, the mean market share was 87.2%. Because the sample results were skewed, however, the median cartel market share of 93% may be preferred.

Including this factor explicitly in the optimal deterrence calculations could also lead to other complications. First, we cannot be sure the fringe raised prices to the same extent as the cartel. Perhaps some or all of the fringe firms decided to price somewhat lower than the cartel and thereby gain market share. Second, sometimes reports about cartel cases are not careful about market definition, and many -- perhaps most -- cartel cases do not contain precise market definition findings by a court. This applies both to consent orders in criminal cases and to private settlements. For this reason it can be difficult to be sure which sales of non-colluding firms truly were in the same product and geographic market as the cartel. Moreover, as a practical matter almost every parameter in a consent order or private case, including market definition, is subject to a negotiation and potential compromise. No doubt many reported cartel market shares are

¹⁶⁴ In addition to the material in this section, this is based upon Connor and Lande, *supra* note 15, at 515. The literature studies' mean was 25% and the mean of verdicts was 22%. The median for the 75 cartels in our study *supra* was 20%.

¹⁶⁵ This is a conservative resolution of the issues.

¹⁶⁶ Iwan Bos & Joseph E. Harrington, "Endogenous Cartel Formation with Heterogeneous Firms," 41 *RAND Journal of Economics* 92, 92-93 (2010).

accurate, but there surely are other times where the size of reported relevant markets have been negotiated down or misdefined.

Although we are tempted to consider this factor in the optimal deterrence calculations through the use of an especially broad range of possible values, instead we will simply take note of this issue. We will not attempt to estimate how large cartels' umbrella effects are empirically or to take them into account in our optimal deterrence calculations. Instead we simply note that this omission is another reason why our analysis is conservative, and why our results underestimate the negative effects of cartels and thereby underestimate the size of the necessary anti-cartel deterrence.

IV. The Probability of Cartel Detection and Proof of Collusion

Optimal deterrence theory is concerned with the expectations of the founders of cartels as to whether any cartel they are considering forming will be detected and, if detected, proven in court to have violated the antitrust laws.¹⁶⁷ These individuals' predictions are formed by a variety of factors, including the perceptions and historical experience of the individuals themselves, their firms, their legal and financial advisors, and their observations of others in comparable potential price-fixing situations.¹⁶⁸ Since it is impossible to know the actual expectations of the "average" would-be cartel member, we instead use the closest approximations we can find: the actual record of how often cartels are detected and, once detected, proven in court to be illegal.

A. Cartel Detection

The first question - how likely is it that a cartel will be discovered - has been answered by researchers using three basic types of methodologies. The first is based upon quantitative economic studies. The original and most famous of these was by Bryant & Eckard.¹⁶⁹ They estimated the confidence interval for cartels' probability of detection (\square) to be 13% to 17%. Their data set consists of companies convicted for domestic U.S. price fixing during 1961-1988.

¹⁶⁷ This subsection is based upon John M. Connor, Deterrence Power of Penalties on International Cartels (August 6, 2009) (unpublished study, on file with authors).

¹⁶⁸ Case evidence supports the view that potential conspirators are adept at predicting the quarterly or annual profits from an effective cartel, though they might have uncertainty about the scheme's longevity *Id.* at 9. Historically, modern-era private international cartels endured a mean of 6.4 years, with a range from one day to 95 years; the average global cartel lasted 7.6 years, with a range from a few months to 30 years. *Id.*

¹⁶⁹ Jean-Claude Bosch & E. Woodrow Eckard Jr, *The Probability of Price Fixing: Evidence From Stock Market Reaction to Federal Indictments*, 73 REV. ECON. AND STAT. 309 (1991).

This study is widely cited by scholars¹⁷⁰ and approvingly cited by at least eight subsequent writers on antitrust enforcement who made their own detection estimates (See Appendix II).

Two subsequent empirical studies replicated Bryant & Eckard's approach.¹⁷¹ Golub et al. sampled convicted U.S. price fixers for a period after 1988; their estimated range for \square is identical with that of Bryant & Eckard.¹⁷² Their sample includes some international cartels and a period that overlaps with the revised DOJ Leniency Program. Combe et al. also apply the Bryant & Eckard method of analysis to a sample of firms that were fined for infringing EU price-fixing prohibitions.¹⁷³ All of these convictions involved international cartels (some of them intra-EU), but only a small share of these infringements occurred during the time that the EC had adopted a formal Leniency Program.¹⁷⁴ In sum, all three studies -using different data sets - point to a probability of detection in the 13% to 17% range. The stability of \square across differing time periods and jurisdictions is impressive.

Bryant & Eckard published their study in 1991, prior to the 1993 advent of the Department of Justice's wildly successful cartel leniency/amnesty programs which have in some form been adopted by more than 20 jurisdictions, including the European Union.¹⁷⁵ The vast increase in *numbers* of cartel being detected since 1993 is commonly interpreted by practitioners as an *increase* in the probability that cartels are detected.¹⁷⁶ In a highly original paper, Miller¹⁷⁷ provided an economic estimate of the post-1993 increase in the probability that cartels will be detected by the DOJ. His sample consisted of all cartels discovered and convicted by the DOJ between January 1985 and March 2005. Comparing the pattern of pre-1993 cartel enforcement

¹⁷⁰ A Google Scholar search on 2/9/11 found 50 citations.

¹⁷¹ All three use essentially the same method -- an event study of stock market prices -- to estimate a statistically calculated 90% confidence interval of the probability of cartel detection (p). However, the three apply that method to three different samples from two jurisdictions.

¹⁷² Golub et al., *The Profitability of Price Fixing: Have Stronger Antitrust Sanctions Deterred?*, Presented Before the International Industrial Organizations Conference (Apr. 8-9, 2005)(on file with authors).

¹⁷³ Emmanuel Combe et al., *Cartels: la probabilité d'être détecté dans l'Union Européenne*, 07-01-03 CAHIERS DE RESEARCHE PRISM-SORBONNE (2003); Emmanuel Combe et al., *Cartels: The Probability of Getting Caught in the European Union*, 07-01-03 CAHIERS DE RESEARCHE PRISM-SORBONNE (2008).

¹⁷⁴ Their point estimate of \square is close to 13%.

¹⁷⁵ See Scott D. Hammond, "The Evolution of Criminal Antitrust Enforcement Over the Last Twenty Years", Feb. 25, 2010, available at <http://www.justice.gov/atr/public/speeches/255515.htm>

¹⁷⁶ See *infra* notes 175-79. This does not, however, necessarily follow logically, as it is possible that the number of *undetected* cartels could have risen faster than the number detected.

¹⁷⁷ Nathan H. Miller. Strategic Leniency and Cartel Enforcement. *American Economic Review* 99 (May 2009): 750-68.

with the post -1993 period, he estimates that there was an increase of about 60% in the detection of existing cartels and a reduction of about 60% in the rate of cartel formation.¹⁷⁸ A possible limitation of Miller's study is that in his sample only 9% of the observations were international cartels.¹⁷⁹ Nevertheless, if one applies Miller's findings to the earlier three detection-probability studies, the post-1993 range for the probability of cartel detection becomes 20.8% to 27.2%.

A completely different method of estimating the probability that cartels are detected relies on the opinions of cartel scholars. Most have legal training or are writing in a legal-economic publication.¹⁸⁰ Many have prosecutorial experience; others have worked extensively with alleged cartel defendants.¹⁸¹ Those who have provided specific estimates are listed in Appendix II. The opinions and conclusions of these 25 authors predominantly suggest a 10% to 25% chance of detection, although some go as high as 33%.¹⁸²

It is clear that some of these estimates are meant to be purely illustrative,¹⁸³ while others are from surveys or are intended to be true depictions of reality.¹⁸⁴ The three writings that are clearly illustrative average 29%.¹⁸⁵ If one takes the non-illustrative estimates and eliminates those that depend on Bryant and Eckard, the remainder are independent estimates. For the ten independent estimates that are not purely illustrative, the upper-end estimates average 25.6%, which is comfortably close to the economists' 27% high estimate.¹⁸⁶

¹⁷⁸ *Id.*

¹⁷⁹ As we understand these results, both changes are simultaneous after 1993. To illustrate, suppose that there are 100 cartels being formed that affect the U.S. economy each year in the years before 1993. With a known median life of seven years and no enforcement, the total stock of prosecutable cartels would reach a steady state of 700 cartels. With discovery of 15%, then a net formation of 85 lasting 7 years would imply discoveries of 15 per year and a stock of 600 hidden cartels. Then, using Miller's results, with amnesty the number formations drops to 40 per year or 280 total cartels, of which about 70 are discovered per year and 210 are hidden in any given year. Thus, deterrence improves (fewer net formation and fewer hidden cartels), and detection rates per year also rise.

¹⁸⁰ *See infra* app. II.

¹⁸¹ *See id.*

¹⁸² *See infra* app. II.

¹⁸³ *See* Landes, *supra* note 19 at 657.

¹⁸⁴ *E.g.*, Alan R. Beckstein & Gabel H. Landis, *Antitrust Compliance: Results of a Survey of Legal Opinion*, 52 ANTITRUST L. J. 459, 487-516 (1982).

¹⁸⁵ *See* Landes, *supra* note 19; Posner, *supra* note 69; Gregory J. Werden, *Sanction Cartel Activity: Let the Punishment Fit the Crime*, 5 EUR. COMPETITION J. 19, 27-29 (2009).

¹⁸⁶ *See infra* app. II.

There is yet another way to estimate the average detection probability – opinion surveys. Although these surveys might not ask precisely the questions that are best for our purposes, they too suggest low cartel detection rates. For example, the survey by Feinberg of antitrust lawyers working in Brussels, only 5% disagreed with the statement, “The [EC] fails to detect most [price-fixing] violations,” whereas 62% agreed with the statement.¹⁸⁷ A large-scale 2006 survey of competition lawyers working in the UK and Brussels asked how many times one of their clients had, upon seeking legal advice, abandoned or changed a possible cartel practice because the clients feared an antitrust investigation, and how many of their clients had been the subjects of an adverse cartel ruling by the UK’s Office of Fair Trade. The result was that 22% were said to have been in violation of cartel laws.¹⁸⁸ This is, of course, a minimal indicator of detection because some participants in secret cartels do not seek legal advice.

Professor Daniel Sokol recently conducted another very interesting survey.¹⁸⁹ He asked a sample of 51 antitrust lawyers, “In the past 2 years, by total number of matters, how often have clients come to you with hard-core cartel issues that to your and/or their knowledge never got investigated by the US government enforcers (federal and state) enforcers as opposed to situations where the underlying behavior ultimately led to US investigation of your client?” If the “Not Applicable” responses are eliminated, 52% of the lawyers said this had happened to them at least once.¹⁹⁰

All told the above methods yield estimates for \square of 20.8% to 27.2%, 25.6%, and non-quantifiable but low estimates that are roughly consistent with the first two estimates. In the interests of being conservative, for the remainder of this article we adopt a relatively high 25% to 30% probability that cartels will be detected.¹⁹¹

B. Probability a Detected Cartel Will Be Convicted

¹⁸⁷ R.M. Feinberg, *The Enforcement and Effects of European Antitrust Policy: A Survey of Legal Opinion*, 23 J. COMMON MARKET STUD. 373 (1985). Other interesting results were: (1) 95% agreed that price fixing was intentional and for profit gain and (2) 100% agreed that the greatest deterrents are a high probability of detection and high EU fines. *Id.*

¹⁸⁸ OFFICE OF FAIR TRADE, THE DETERRENT EFFECT OF COMPETITION ENFORCEMENT BY THE OFT (2007) (Eng.).

¹⁸⁹ See Table 14 in D. Daniel Sokol, “Cartels, Corporate Compliance and What Practitioners Really Think About Enforcement,” Draft of Nov. 25, 2010.

¹⁹⁰ *See id.*

¹⁹¹ We believe our methodology has been overly conservative and that the actual chances a cartel will be detected are lower than 25-30%. As an indication of how conservative our methodology is, Ginsburg and Wright recently performed an analysis very similar to ours, including analyzing both the Bryant & Eckard and the Miller studies, and concluded that 25% was their best estimate as to the rate of cartel detection. *See* Ginsburg & Wright, *supra* note 29.

Even if a cartel is detected, its chances of being convicted are less than 100 percent. The DOJ asserts that in 95% of its cases, indictments end in convictions.¹⁹² Indeed, the evidence is so damning in most cases that defendants negotiate a guilty plea.¹⁹³ On the other hand, when accused individual price fixers choose to litigate a criminal price-fixing case, the government wins their cases only approximately half the time.¹⁹⁴ Thus, discovered cartelists able to afford the best legal defense team and adept at hiding or obfuscating the most incriminating evidence might well judge their chances of conviction to be less than the DOJ's 95% figure.¹⁹⁵

From 2005 to 2009, of the 91 individuals charged with international price fixing, 64 pled guilty and 4 were found guilty.¹⁹⁶ On the other hand, 7 were acquitted, 12 became fugitives, and 1 indictment was dismissed.¹⁹⁷ Therefore, in total, from 2005 to 2009, 68/89 (77%) were convicted. For the entire 1990-2009 period the corresponding figure is 168/233 (72%).¹⁹⁸ A high estimate of how often detected cartelists escape conviction would be the 23% -28% who were not convicted in DOJ proceedings.

However, some or all of the non-convicted defendants could have been innocent. Others could have been guilty, but perhaps DOJ simply could not prove their guilt sufficiently to meet the high standards for felony convictions. There is no way to know how many of those who were not convicted actually formed a cartel, and that this cartel was detected, but they nevertheless got away with their crime. At a minimum, however, we believe we can fairly make a presumption concerning the fugitives from prosecution. A total of 12 of the 89 defendants from 2005-09, and 47 of the 233 from 1990-2009, were fugitives.¹⁹⁹ We believe it is reasonable to presume that it is more likely that a fugitive is a price fixer who fled, rather than an innocent

¹⁹² U.S. Department of Justice, ANTITRUST DIVISION: WORKLOAD STATISTICS for FY 1990-1999 and FY2000-2009 (last one released March 2010), *supra* note 29.

¹⁹³ See Connor, *supra* note 18, at 14.

¹⁹⁴ *Id.* (finding that only 13 of 28 indicted individuals were convicted).

¹⁹⁵ John M. Connor, GLOBAL PRICE FIXING: STUDIES IN INDUSTRIAL ORGANIZATIONS (K. Cowling & D.C. Mueller eds., 2nd ed. 2007).

¹⁹⁶ See Table 3 in Connor, *supra* note 18. The Antitrust Division's official statistics reported *supra* note 29 cannot, however, be used to derive comparable won/lost ratios for domestic cases. For the 1990-2009 federal fiscal years, we can determine that there were 929 individuals indicted for Section 1 criminal offenses; of those, 57% were fined, 38% were imprisoned, and 28% were subject to other forms of confinement. But these three types of sanctions are not additive. While nearly all those who were imprisoned were also fined, we cannot determine what proportion of those fined were also imprisoned or otherwise confined. The DOJ does not trumpet the number of fugitives.

¹⁹⁷ *Id.*

¹⁹⁸ *Id.*

¹⁹⁹ *Id.*

person who couldn't prove their innocence.²⁰⁰ Therefore, on this basis there is (using data from the 2 time periods) a $47/233 = 20\%$, or $12/89 = 23\%$, chance that detected price fixers will get away with their crime.²⁰¹

By contrast, DOJ reports that from 2005 to 2009 they won 124 cases against corporate and individual defendants, mostly through plea agreements, and lost seven.²⁰² This is a 95% success rate; much higher than their 77% success rate for the same period when prosecuting individuals. Does this mean that the corporations are significantly more likely to be convicted than individuals? Yes, if one counts any corporate fine at all as a government "success". However, we cannot help wonder whether every DOJ "win" is truly a win. Most or almost all of the DOJ "wins" are plea agreements or consent orders. No doubt many corporate or individual defendants simply agreed to a "slap on the wrist" consent order rather than endure the significant legal expenses and corporate disruption involved in taking DOJ to court. No doubt many of the token DOJ "wins", which secured only minimal fines and no prison time, were really defendant victories. Ideally we would find and use in our calculations the percentage of detected cartels that not only were convicted, but that also received significant sanctions. Unfortunately, there is no way to tell which of DOJ's alleged "wins" are truly wins, and which ones mostly, in reality, should instead be categorized as being DOJ losses.

It seems likely, however, that individuals are less likely to plead guilty even to a token fine than are corporations. Corporations might readily agree to a "slap on the wrist" fine as part of a settlement with DOJ because to them small fines are almost like parking tickets, and some large corporations receive similar "costs of doing business" frequently.²⁰³ Moreover, corporate managers are paying fines with other people's (the stockholders') money. As a matter of ethics they would deny this makes a difference, but unless the corporate officer owns a large share of a company's stock, the principle/agent literature suggests he or she is more likely to let personal motives affect what is best for the owners.²⁰⁴ By contrast, an individual has more to lose and may be more risk averse. If an individual admits to a felony, even one resulting only in a small fine, their personal record has been stained, perhaps with dramatic results for the person involved. For these reasons, individuals are, on average, more likely to resist than a large

²⁰⁰ Innocent people sometimes flee. This is why one can only presume that fugitives actually fixed prices.

²⁰¹ These figures and ratios are for individuals, not for corporations, and most of our sanctions are corporate, not individual. We will, however, assume that the conviction rates for individuals apply to corporations as well,

²⁰² *Id.*

²⁰³ There are exceptions, of course. Corporate felony convictions can bar a firm from bidding for federal contracts for a number of years, and this could be a major blow to firms that depend on such sales for a significant portion of their revenues.

²⁰⁴ This topic, also studied under the titles "managerial capitalism" or "managerial utility," is reviewed by Alan Hughes, "Managerial Capitalism," *The New Palgrave: A Dictionary of Economics* Vol. 3 (1987) pp. 294-295.

corporation. If we are correct, DOJ's conviction rate for individuals is a better reflection of DOJ's real won/lost record than the corporate statistics.

We also believe that DOJ's 95% conviction rate indicates the Antitrust Division is risk averse, and usually indicts only when they have a relatively large chance of conviction in the event an alleged price fixer insists on a trial. There are a number of times, for example, when DOJ began a cartel investigation, but never filed an indictment, yet private plaintiffs secured a significant settlement against these same corporations.²⁰⁵

To be conservative, however, we will base our final conviction estimate on the statistics for individual convictions, and assume that 23-28% or 20-23% of detected cartels are not convicted.²⁰⁶ In our final calculations we will round these numbers slightly downwards, to 20%. We note, however, that DOJ's risk aversion and the fact that many of their wins are only token victories probably mean that the 20% figure we selected probably underestimates the percentage of detected cartels that truly escape punishment for their crime.

V. The Optimal Deterrence Calculations

As noted in Section I, under the optimal deterrence approach, cartel sanctions should be equal to their "net harms to others" \div (the probability of detection \times the probability of conviction). We have been able to ascertain approximations for each of the required quantities for 75 cartels that have been sanctioned in the United States since 1990.²⁰⁷ We illustrate how we

²⁰⁵ See, e.g., *In re Automotive Refinishing Paint Antitrust Litigation*, 177 F. Supp. 2d 1378 (E.D. Pa. Nov. 15, 2001); Robert H. Lande & Joshua P. Davis, *Benefits from Antitrust Private Antitrust Enforcement: An Analysis of Forty Cases*, 42 U.S.F. L. Rev. 879 (2008) (government investigation, but no government case filed; private recovery of \$106 million in cash)

²⁰⁶ Note that the probability of a cartel being detected *and* convicted then becomes $\square \times 0.80$, or 16% to 20%. We believe that the 20% estimate (which means that 80% of detected price fixers are convicted) substantially understates the probability that detected individuals or corporations will escape conviction. However, the only reliable data on this point we have been able to find concerns the fugitives, so we do not feel comfortable assuming, for example, that only 50% of detected cartels are convicted.

²⁰⁷ Although we started with a larger universe of cartels, we were forced to eliminate many from our sample because the necessary data was not available, was insufficiently reliable, or some legal actions were unresolved. Every one of our final group is an international cartel. Although we are unable to state with certainty that all of the assembled data on these 75 cartels are perfect and complete in every respect, we believe all of it to be generally reliable and accurate. As an example of its potential inadequacy, although we looked diligently for settlements in private cases and believe we found every significant settlement, there surely have been settlements that we missed, especially secret settlements and opt-out settlements too small to have made the legal, general or trade press. By contrast, class action settlements usually cannot be secret and almost always are reported in the legal, general, or trade press.

carried out the optimal deterrence analysis and calculations using the Lysine cartel as an example.

A. The Lysine Cartel as an Example

1. Background on the Lysine Cartel

The Lysine cartel was one of the earliest large international cartels to be heavily sanctioned in multiple ways.²⁰⁸ It dated back to mid-1992. The U.S. Department of Justice began an investigation in late 1992 that culminated in a June 27, 1995 raid where more than 70 FBI agents simultaneously raided the headquarters of Archer-Daniels-Midland Company (ADM) and a number of ADM officers' homes.²⁰⁹ Within a very short time investigators had also raided the offices of four other companies that manufactured or imported lysine.

During this cartel's existence the average manufacturers' delivered price of lysine in the United States rose from \$0.68 per pound to a plateau of \$0.98 (in October-December 1992), fell again to \$0.65 (in May 1993), and rose quickly again to above \$1.00 for most of the remainder of the conspiracy period.²¹⁰ Early in this cartel's existence an ADM Vice President was caught on tape saying that their recently concluded agreement would generate \$200 million in joint profits annually in a global market for lysine that generated from \$500 to \$700 million in annual sales.²¹¹ His prediction turned out to be astonishingly accurate.²¹²

Ultimately the lysine cartelists pled guilty, and in late 1996 incurred U.S. fines that totaled \$95.55 million.²¹³ The DOJ also prosecuted four lysine executives in a highly publicized jury trial held in Chicago in the summer of 1998.²¹⁴ Three of the four were found guilty and

²⁰⁸ See Connor, *supra* note 60.

²⁰⁹ This article's analysis of the Lysine case is based upon John M. Connor, *Global Cartels Redux: The Lysine Antitrust Litigation (1996)*; draft dated May 21, 2009, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1408070_.

²¹⁰ *Id.* at 12.

²¹¹ *Id.* at 13.

²¹² *Id.*

²¹³ *Id.* This includes \$94.3 million in corporate fines and \$1.25 million in individual fines, which we tripled to give more weight to individual sanctions relative to corporate sanctions. For a discussion of this tripling see Section II *supra*.

²¹⁴ Connor, *supra* note 209, at 1.

heavily sentenced, to a total of 99 months in prison.²¹⁵ The fourth defendant, a managing director of Ajinomoto of Japan, remains a fugitive.²¹⁶

Within a year of the FBI raids more than 40 civil antitrust suits were filed in U.S. federal courts.²¹⁷ Approximately 400 plaintiffs were certified as a single federal class of direct purchasers, and in July 1996, the federal class in *Amino Acid Lysine Antitrust Litigation* settled with the three largest defendants for \$45 million.²¹⁸ The two other defendants settled for almost \$5 million about a year later.²¹⁹ There also were significant numbers of indirect purchaser suits and opt-out suits which have been very difficult to trace, but these payments have been estimated to total more than \$25 million, to produce total payments in the US private suits of approximately \$82.5 million.²²⁰

2. Optimal Fine Calculations for the Lysine Cartel

What should the overall level of sanctions have been, ex-ante, for the Lysine cartel?²²¹ Before one could calculate this using the "net harm to others" approach, however, it is necessary to account for inflation or the time value (opportunity cost²²²) of money.²²³ Because we are

²¹⁵ *Id.* The cartel also was fined by the antitrust authorities of Canada, Mexico, Brazil, and the European Union a total of at least another \$121.5 million. *Id.* at 2.

²¹⁶ *Id.* at 2.

²¹⁷ *Id.*

²¹⁸ *Id.* The settlement was approved in late 1996, before the federal fines were announced, which is very unusual. *Id.*

²¹⁹ *Id.*

²²⁰ *Id.* In addition, a Canadian private damages suit, one of the first such suits in Canada, covered both direct and indirect purchasers and settled for the equivalent of U.S. \$3.4 million. *Id.*

²²¹ This number is only illustrative because society must as a practical matter focus upon general deterrence, not specific deterrence. We could never hope to know the mindsets of particular corporate executives well enough to calculate the penalty that optimally would prevent those individuals from cartelizing, the most we can do is to calculate a good overall general deterrence penalty and then implement it generally. For an analysis of these issues see Section I supra.

²²² "Opportunity cost" is a fundamental economic concept positing that the value of any economic choice actually made is approximately equal to the next best alternative course of action not taken. For example, the value of an afternoon's leisure to an individual might be approximated by the income foregone in employment. Similarly, the cost of consuming for a household today might be the future income from investing the same amount in some financial instrument.

²²³ Neither fines nor payments made in private cases contain prejudgment interest. However, once a private case results in a verdict or a court-approved settlement, post-judgment interest begins to accrue. *See* Lande, supra note 21.

attempting to determine how much purchasers were harmed by paying supra-competitive prices for their products or services, we should analyze the opportunity cost issue from the victims' perspective and attempt to place the victims in the position in which they would have been had no violation occurred. Adjusting for the time value of money can raise the amounts involved significantly, especially when there is a long lag between the collusive period and fine or the court approval of a settlement.

It is impossible to know what would have happened to the overcharges had the violation not occurred. Consumer-victims or business-victims might have invested the overcharges they were forced to pay to the cartel in, for example, Treasury Bills. Alternatively, suppose a victim had been harmed and believed it would recover from defendant in X years. A reasonable course of action for that victim might be to obtain an X year loan for the amount of the damages at the prevailing consumer loan or business loan interest rates, both of which would exceed the prime interest rate. Moreover, since the overcharges were involuntary (and illegal!), it would be fair to resolve doubts over the correct adjustment rate in favor of the victims. The members of the cartel, by contrast, might have invested the overcharges instead.

A conservative approach to these issues consistent with principles of financial economics is to approximate the opportunity cost to the victims of being deprived of their money for a period of time by using the prime rate of interest plus one percent.²²⁴ For simplicity, we will use as our initial year the midpoint year of the cartel,²²⁵ and as the fine year the year in which the first corporate defendant plead guilty.²²⁶ The terminal year for settlements in private suits is the year in which the federal class settlement or other private case receives preliminary judicial

²²⁴ The prime rate of interest includes a component that anticipates what lenders expect inflation to be over the loan period. Another portion of the prime rate is an average low-risk rate of return to be earned by borrowers. The one percent is added to account for the fact that borrowers expect to earn profits on the investment above a low-risk investment rate of return.

²²⁵ This approximates the mean date that buyers' funds were transferred to the owners of the cartels. If we had the data we would instead assess the magnitude of the cartel overcharges on a yearly basis, and would separately take into account the date of each of the imposed fines and settlements with each cartel, and make the adjustments accordingly. This would be slightly more accurate because cartels do not overcharge the same percentage every year, and because some fines and some settlements -- particularly opt-out settlements -- take place years later. As a practical matter, however, we rarely have the necessary information. We do, however, have good information concerning the starting and ending dates for all 75 cartels in our sample.

Normally overt collusion stops on the date subpoenas are served or inspections are carried out by an antitrust authority. In some cases collusion may have stopped years earlier. Other times the firms continue implicit collusion even after the explicit collusion is uncovered and the formal (proven) collusion ends.

²²⁶ This too is conservative, for two reasons. In some cartel cases the late-pleading participants take a year or two to plead after the first defendant does so. Second, defendants increasingly pay their fines in up to six installments spread over five years. Thus, by using the initial fine date we are over-inflating the effect of fines to some extent. But this assumption makes the calculations simpler.

approval.²²⁷ Although this approach is perhaps too low and thus too conservative from the "net harm to others" perspective, it does have the advantage of approximating the value of the overcharges to the cartelists, who of course continue to have use of the victims' money interest-free until they pay their fines or damages in private suits. After the net present value of the fines or settlements is calculated, we adjust the value of money, due to general inflation, to the year 2010, employing the annual Producer Price Index calculated by the U.S. Bureau of Labor.²²⁸ Expressing all penalties in 2010 dollars permits us to make meaningful comparisons across conspiracies and punishments that took place at different times.

If we restrict all data and calculations to the United States, for the Lysine cartel the optimal penalty ((net harms to others) ÷ (probability of detection x probability of proof)) can be calculated as follows:

- The net harms to U.S. direct purchasers were \$80 million, expressed in 1993-1995 dollars.²²⁹ To apply the "net harm" or investment-opportunity-cost adjustment, we use Federal Reserve Bank prime rates of interest for the years 1995 and 1996, plus 1%, or 12.22%. Thus, the damages were \$80 million,²³⁰ which is the sum that the victims ought to have received when the cartel operated. This is equivalent to \$119.8 million in 2010 dollars.
- These overcharge figures should be multiplied by 1.03 to 1.20 to account for the additional allocative inefficiency harms (deadweight loss) of market power.²³¹
- The average probability of cartel detection, the evidence shows, is 25-30%.²³²
- The average probability the enforcers will be able to prove that the cartel violated the law has been estimated at to be 80%.²³³

²²⁷ This date is conservative because in many instances there are opt-outs from the primary class, and opt-out suits typically take months or years to negotiate beyond the class approval date.

²²⁸ See <http://data.bls.gov/cgi-bin/cpicalc.pl>. We use the Producer Price Index for Intermediate materials, rather than the Consumer Price Index, because most cartelized products are inputs sold to manufacturers. If we had used the Consumer Price Index, however, the results would be similar.

²²⁹ See Connor, *supra* note 209.

²³⁰ \$80 million is the actual overcharge amount. To this should be added foregone profit of \$9.8 million which should have accrued between the dates of the actual overcharges and 1996. Another way of looking at the \$9.8 million is that it represents income to the cartelists on the \$80 million in illegal monopoly profits held in the companies' treasuries. By rights, this income belonged to the victims all along. This total of \$89.8 million is the figure that we convert to 2010 dollars.

²³¹ For an explanation of the allocative inefficiency adjustment see note 127 *supra*.

²³² See *supra* Section IV.A.

²³³ See Section 4(B), *supra*. Another issue concerns the distinction between "technical" convictions and "real" convictions. Some of DOJ's reported convictions may be technical

Therefore, for the Lysine cartel, the optimal US penalty (in millions of 2010 dollars) was:

$$\begin{aligned} & \$119.8 \times 1.03 \div 0.24 \text{ for the low estimate, or} \\ & \$119.8 \times 1.20 \div 0.20 \text{ for the high estimate} \\ & = \$514 \text{ to } \$719 \text{ million.} \end{aligned}$$

The optimal penalty should be compared to the actual U.S. sanctions that were imposed on the Lysine cartel. When expressed in terms of millions of 2010 dollars they were:

$$\begin{aligned} & \$114 \text{ fines (converting } \$98.55 \text{ million in fines in 1996 to 2010 dollars)} \\ & + 99 \text{ private suits (converting } \$82.5 \text{ million in recoveries in 1996 to 2010 dollars}^{234}) \\ & + 50 \text{ prison-equivalent for 99 months of US prison time @ } \$500,000/\text{month}^{235} \\ & \$263 \text{ total sanctions} \end{aligned}$$

Thus, even though the Lysine cartel was heavily sanctioned in the United States in three ways (by fines, prison for top executives, and by private litigation), the combination of the sanctions that were imposed is only 37% to 51%²³⁶ as large as the overall amount of sanctions that should have been imposed from the perspective of optimal deterrence.

C. Calculating Overall Optimal Deterrence Using Every Cartel in Our Sample

We have undertaken the same analysis for all 75 cartels for which we have been able to ascertain the necessary data.²³⁷ The overall results show that on average, the value of the imposed U.S. sanctions has been much less than they should have been for society to obtain optimal deterrence against cartelization. If mean average figures are used, the total value of the

convictions that amount only to "slaps on the wrist" and produced only token fines. Perhaps we should have attempted to find and use in our calculations the percentage of detected cartels that were only were convicted, but that also received significant sanctions. Because of the subjectivity of classifying fines this way, we did not, however, attempt to make this distinction.

²³⁴ Only the first settlement was in 1996, but to be conservative we assumed that all of the payments in every private case were made in 1996.

We of course can only count settlements known to us through our searches of the legal and general media. We readily acknowledge the existence of secret settlements. However, every class action must be approved by a court, so no class action settlement can be secret. Publicly traded corporations often are required to report significant income or losses on their balance sheets and cannot, for example, simply state in its annual report that it paid or received a significant, but secret, sum in an antitrust case. Still, we surely missed some settlements.

²³⁵ For the analysis of the monetary equivalent of prison sentences see Section II supra.

²³⁶ Depending upon when and how the figures involved are rounded, this range could also be expressed as 37% to 49%.

²³⁷ Specific results available from the authors on request.

imposed sanctions were only 15.7% to 20.7% of their optimal level. If median figures are used, the imposed sanctions averaged only 9 to 12% of optimality.²³⁸

Indeed, no cartel was sanctioned more than the optimal amount. One cartel, Plastic Windows Coverings, was sanctioned at approximately the optimal level (at 87% to 115% of the optimal amount). The other 74 were sanctioned much less than optimally. Moreover, 35 of the 75 were, overall, sanctioned less than 10% of the optimal amount. It certainly is possible that some of the individual firms in the 75 cartels were optimally or excessively sanctioned due to circumstances unique to those firms.²³⁹ From a deterrence perspective, however, would-be

²³⁸ These results might, moreover, be too high for a methodological reason we have not yet discussed. For a variety of reasons, many of our sales figures might be overly small. The correct sales data would tend to lower the calculated ratios.

This is because affected sales figures derived from seemingly reliable sources often are larger than the sum of the affected sales employed by the DOJ in sentencing the members of cartels. There may be quite defensible reasons for this. For example, because of the high degree of reliability of evidence needed to convict corporations for crimes, the DOJ may reduce the time periods, geographic region, or scope of products employed for calculating sales during collusion to that which can be proven "beyond a reasonable doubt." On the other hand, prosecutors sometimes may uncritically accept arguments made by defendants that diminish the scope of the affected market because of time pressures in settling guilty plea agreements, or because the government lacks the resources necessary to disprove defendant assertions.

An example is the *Central Indiana Ready-Mix Concrete* case. Concrete for pouring is a relatively simple product; the counties involved and the time period were not issues in the case. A sales figure of \$680 million for all seven firms involved in the cartel was reported in the local press; all seven paid civil settlements. The sales information purportedly came from transcripts of a jury trial of two executives (they were convicted) and from the testimony of the plaintiffs' class expert in fairness hearings (plaintiffs prevailed).

Sales according to DOJ documents were much less. One participant was granted amnesty; two others were not charged, most likely because of cooperation agreements. The DOJ used a smaller geographic market definition than civil plaintiffs. When one adds up the affected sales from the DOJ sentencing memoranda for the four companies that were criminally convicted of price fixing through plea agreements, the total is \$391 million. Taking into account the fact that two of the smallest cartel members were not convicted because of bankruptcies, the DOJ's total market affected sales is as much as 40% lower than the affected sales proven by the private litigants. See Levin Declarations in E mail from John Connor, August 24, 2011.

²³⁹ Even if individual firms appear to have been sanctioned more than the amount calculated under the overall optimal deterrence approach, this could have been due to a number of factors that make the sanctions not excessive. Fundamentally, every firm in a cartel is jointly responsible for entirety of the cartel's overcharges. For this reason it would be reasonable to attribute the entirety of a cartel's overcharges to an individual cartel member before carrying out the optimal deterrence calculations (although we have not done this in this article). Only if this were done and the optimal deterrence calculations showed that the sanctions were excessive could there be true overdeterrence.

cartelists are unlikely to focus upon outliers rather than the norm. They are much more likely to be guided by what happened on average to the vast majority of cartels that affected the roughly \$1 trillion in affected sales (about \$2 trillion in 2010 dollars) in the cases covered by our study.²⁴⁰

Our analysis is confined to effects within the United States. For each cartel, only United States overcharges, sales, corporate and individual fines, restitution payments, prison and house arrest time, and payouts in private cases were considered. For some of these cartels, particularly the more recent ones, the European Commission's fines have been as large as or larger than those in the United States.²⁴¹ If managers were assessing whether to form an international cartel, their probable overcharges in Europe, as well as the EU's sanctions, should, of course, have been considered in addition to those imposed by the United States. It is indeed unfortunate that, regardless what they might conclude about the expected profitability of operating in Europe or elsewhere, the combined level of United States sanctions are woefully inadequate to deter them from operating in the United States.

VI. Conclusions

-- "If three is the wrong number, it is too small."²⁴² Judge Frank Easterbrook

Moreover, the alleged overdeterrence could result from a cartel not producing profits as high as its instigators had hoped. Perhaps if the cartel had been as profitable as its planners had hoped, the overall penalty level might have been too low. Further, we used reported or provable affected sales in our calculations. As noted in Appendix V, reported or provable sales often are lower than the true amounts.

As we noted in Section I, the overall level of sanctions cannot be set, in advance, for particular individuals or corporations. The best we can do is to set the overall sanctions level for mean or median cartels, not for the outliers.

²⁴⁰ One interesting factor that helped drive these conclusions is the relatively small effect of prison sentences. Their median value per case was a relatively modest \$7.4 million (the median is zero because for the majority of the cartels in the sample (48 out of 75) there was no imprisonment. See note 236 *supra*. Even though we valued the deterrence from a 3 year sentence at \$18 million (which is more than most estimates of the value of an entire life), this pales compared to the possible rewards from cartelization. *Id.* Nevertheless, the absence of a criminal sanction correlates with an exceedingly small overall sanction. Almost all of the 15 cartels with actual sanctions that were less than 2% of optimal penalties had no criminal sanctions imposed. *Id.* The absence of a criminal conviction means that the private sanctions cannot come close to providing optimal sanctions. By contrast, the E Rate cartel case involved 961 months worth of prison, which constituted the vast bulk of the sanctions in that case. *Id.*

²⁴¹ See John M. Connor, Has the European Commission Become More Severe in Punishing Cartels? Effects of the 2006 Guidelines," (2010), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=17378852010

²⁴² See Easterbrook, *supra* note 3,

The primary goal of this article has been to determine whether the overall level of United States anti-cartel sanctions is optimal. This article demonstrates that when the deterrence effects of every measurable sanction are considered (including corporate and individual fines, payments in private cases, restitution payments, and an allowance for incarceration) the overall level of anti-cartel sanctions is far too low.²⁴³ To protect victims optimally, the collective level of existing sanctions should be multiplied by a factor of at least five. Specifically, we find that on average the total value of imposed sanctions have been only 9% to 21% as large as they should have been.²⁴⁴ In other words, only if every cartel sanction were at least five times as large as it is today, and if these higher amounts were imposed by the courts on price fixers,²⁴⁵ would consumers optimally be protected from becoming cartel victims.

To arrive at this conclusion we made many assumptions and estimates. As noted throughout this article, we believe that every time we made necessary assumptions and estimates we chose alternatives that were conservative (i.e., they would tend to increase the relative size of the imposed sanctions relative to their optimal level).²⁴⁶ Similarly, as noted, we have attempted to ascertain every relevant piece of data for every cartel in our study as accurately as possible.²⁴⁷ Nevertheless, even if some of our assumptions or estimates are off, or if some of our cartel data is inaccurate, our conclusion that sanctions should be increased at least fivefold is quite robust. It is unlikely to be wrong by very much. It is very unlikely that the overall existing level of sanctions only should be doubled.²⁴⁸

²⁴³ See text at notes 236-67 *supra*.

²⁴⁴ If mean figures are used, the total value of the imposed sanctions has been only 16 to 21% of the optimal level. If median figures are used, the imposed sanctions averaged only 9 to 12% of optimality.

²⁴⁵ It is possible, however, that some courts might find ways to avoid imposing dramatically higher sanctions. For example, courts might not want to impose prison sentences 5 times as high as the current 10 year maximum sentence for price fixing. As a practical matter courts might be able to find ways not to do so.

²⁴⁶ Similarly, to conservatively assess whether the current overall levels of sanctions are optimal, we used full or high estimates of the sizes of existing sanctions at every opportunity. By contrast, an article dealing with related topics, Lande & Davis, *supra* note 16, made low assumptions about the recoveries from private cases, methodology that tended to understate the magnitude of the benefits from private litigation.

²⁴⁷ Complications include the fact that many of the cartels at issue cover more territory than the United States, and that it is difficult to disentangle U.S. effects from transnational effects.

²⁴⁸ An additional factor must, moreover, be considered whenever a cartel is international in scope. Fines and private damages actions brought under the U.S. antitrust laws reflect only purchases made by buyers in the United States. See *F. Hoffmann LaRoche v Empigram S.A.*, 124 S.Ct. 2359 (2004). If a significant percentage of the cartel's sales and profits are generated outside the United States, sanctions based solely upon what happens in the United States will result in significant underdeterrence.

We did find a single cartel (out of 75 for which we could assemble the necessary information) where the totality of sanctions was approximately optimal.²⁴⁹ But we did not find any for which the sanctions were too large. Concerns about over-deterrence are simply inappropriate. We believe that one reason there currently are so many cartels operating in the United States (and, indeed, the world) is that even though firms don't have the data or analysis presented in this article, prospective cartelists do have a rough appreciation that their chances of getting caught and convicted are relatively small, and that the penalties they would be likely to face if this happened would probably be modest. It seems likely that many corporate managers implicitly compare these low and uncertain probabilities to the relatively high probability they will be able to raise prices by a significant amount for a substantial period, and conclude that the risk is well worth taking. In other words, we believe that many or most prospective cartelists share the intuition behind the opinion voiced by Judge Easterbrook at the beginning of this section. To continue with Judge Posner's analogy, the "cluster bombs" that constitute the current anti-cartel sanctions have been duds.

A. Effects Of Results On Cartel Sanction Levels

The most straightforward policy conclusion that follows from our study is that overall the current U.S. cartel sanctions levels should be increased substantially. Despite our firm belief that doing this would save victimized consumers and businesses billions of dollars per year, we recognize that any decision to increase cartel sanctions is political in nature. Any proposed increase is almost certain to be greeted with strong opposition. This opposition makes us hesitate to discuss at length our full range of recommendations as to how cartel deterrence should be increased.²⁵⁰ Nevertheless, we propose five important steps that would be certain to make the existing levels of sanctions more nearly optimal (although still too low). Each should be viewed as *relatively* non-controversial by those convinced that the nation's antitrust traditions are wise public policy. Only the first would require new legislation.

Congress should enact a law that would add prejudgment interest to both private treble damage actions and criminal fines. This would increase the effective size of the sanctions substantially, especially for durable cartels or cartelists that use delaying tactics during plea

²⁴⁹ See note 238 *supra*.

²⁵⁰ For a more complete series of recommendations concerning how United States anticartel enforcement should be enhanced see John M. Connor, "The United States Department of Justice Antitrust Division's Cartel Enforcement: Appraisal and Proposals," available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1130204.

"The Division has the authority to recommend corporate fines by calculate the base fine using global affected sales, which would significantly increase the fines for members of international cartels. It should use this power in a number of upcoming cases to make its implied threat in past years a reality....." "States actively seek damages to their state agencies, and Congress amended Section 4A of the Clayton Act to permit the Government to obtain trebled damages, but the Division rarely sues under Section 4A to collect for damages incurred by the federal government as a purchaser from the cartel. More such suits would assist deterrence." For an analysis of these and other ways to increase anti-cartel deterrence see *Id*.

bargaining or litigation. It also has the advantage of being a change that intuitively should strike many people, including Judges Easterbrook²⁵¹ and Posner,²⁵² as reasonable.

Second, cartel fines are calculated using a formula promulgated by the U.S. Sentencing Commission.²⁵³ The lynchpin of this formula is its estimate "that the average gain from price-fixing is 10 percent of the selling price."²⁵⁴ However, in Section II(A) we presented the results of two sets of data that show average cartel overcharges of 49% and 31%, and median overcharges of 25% and 22%.²⁵⁵ A conservative yet quite important step the US Sentencing Commission could take would be to double its presumption that cartels raise prices by an average of 10%. In addition, the DOJ could change its administrative practice of awarding fine discounts from the *bottom* of the Guideline's range and start instead from the *top* of the range. We expect that either change would result in corporate fines that are twice as large as their current levels.²⁵⁶

In addition, our admittedly small and preliminary survey showed it is not at all unusual for a corporation to forgive and even reward employees who violate the antitrust laws.²⁵⁷ Approximately half of those who served a prison sentence for their crime were found subsequently to be working for their previous employer or in the same industry.²⁵⁸ Too often the corporate attitude towards price-fixing felons has been that they "took a bullet for the team" and should be rewarded. We submit that such felons ought to be stigmatized, not awarded a badge of honor. The Department of Justice should, as part of its settlement negotiations, require

²⁵¹ As Judge Easterbrook noted in *Fishman v. Estate of Wirtz*, 807 F.2d 520, 583-84 (7th Cir. 1986) (Easterbrook, J., dissenting), "[T]he time value of money works in defendants' favor. Antitrust cases can be long-lived affairs. This one has lasted 14 years, 2 1/2 of which passed between the finding of liability and the award of damages. During all of the time, the defendants held the stakes and earned interest. . . . To deny prejudgment interest is to allow the defendants to profit from their wrong, and because 14 years is a long time the profit may be substantial."

²⁵² See Judge Posner's opinion in *Patton v. Mid-Continent Systems*, 841 F. 2d 751, 752 (1988) (when discussing the appropriateness of contact damages: "the major inadequacies being that pre- and post-judgment interest rates are frequently below market levels....")

²⁵³ United States Sentencing Guidelines Manual §2R1.1 (2005), §2R1.1(d)(1).

²⁵⁴ *Id.* §2R1.1, application n.3. For an explanation how this 10% presumption results in the current fine levels see Connor & Lande, *supra* note 18.

²⁵⁵ See Section 4(A) *supra*, quoting Connor & Lande, *supra* note 18, at 541. For the most recent years the figures were slightly lower - the thirty post-1990 domestic U.S. observations had a mean overcharge of 26.2% and a median overcharge of 24.5%. *Id.*

²⁵⁶ Because fines are almost always a matter of negotiation the fines might not double simply because the US Sentencing Commission's formula indicates they should double.

²⁵⁷ See *supra* notes 62-71.

²⁵⁸ See *supra* note 66.

corporations never to hire people who have ever been convicted of an antitrust violation.²⁵⁹ This means that convicted price fixers will lose their jobs and be prevented from future employment with their employer, a sanction that may be very powerful indeed.²⁶⁰ Similarly, the Department should also require convicted corporations to agree not to pay the fines incurred by their employees, directly or indirectly.²⁶¹ These change could be implemented without the need for new legislation.²⁶²

Because no one had ever before undertaken the analysis carried out by this article, it has been extremely difficult to proposed changes in cartel sanctions with confidence. When the United States last increased criminal anti-cartel sanctions significantly,²⁶³ for example, it encountered opposition from parties who expressed opinions unsupported by empirical studies.²⁶⁴ Perhaps because information was not yet assembled on the sizes of private settlements and individual sanctions, some believed that the 2004 legislation would lead to overdeterrence or make an overdeterrence problem worse.²⁶⁵ This article should dispel these fears.

B. Effects on Other Parts of the Antitrust System

²⁵⁹ This proposal should be extended to prohibiting future service contracts with the former employer lest the convicted employee become an employee in the guise of a “consultant.” For additional compliance related possibilities see <http://www.oft.gov.uk/OFTwork/competition-act-and-cartels/competition-law-compliance>.

²⁶⁰ Some believe that the loss of one's job often can be even a more powerful sanction than imprisonment. See note 85 *supra*. The Department should conduct its own survey as to what happens to convicted price fixers after they leave prison, a survey that would be much more rigorous than the preliminary one we were able to carry out and report in Section I(B).

²⁶¹ This provision would be extremely difficult to police. Since corporations that violate their agreement not to reimburse their employees' fines could be subject to penalties, however, we believe it would be likely to have a beneficial effect.

²⁶² An analogous proposal that goes much further was made by Judge Ginsburg and Professor Wright. They believe negligent corporate officials should be debarred from working for any publicly traded corporation. See Ginsburg & Wright, *supra* note 29. Since their proposal would apply to the negligent corporate officials who should have prevented the antitrust violation, not just to those convicted of the offense, and it would bar them from employment at any publicly traded company, not just the company that employed them when they violated the antitrust laws, their proposal would go much further than simply preventing them from returning to their former employer. It would, however, require new legislation.

²⁶³ See note 4 *supra*.

²⁶⁴ See notes 8-12 *supra*.

²⁶⁵ See notes 8-12 *supra*.

This article's conclusions should have consequences far beyond the basic issue of whether the current levels of cartel sanctions should be raised. For example, in 1977 the U.S. Supreme Court granted standing only to direct purchasers of supracompetitively priced products, in large part because of its fear that suits by indirect purchasers would lead to "duplicative" payments.²⁶⁶ The majority of states reacted by enacting "Illinois Brick Repealers" to permit injured indirect purchasers to sue for damages.²⁶⁷ It often is asserted that these state laws lead to sixfold damages²⁶⁸ (in addition to possible criminal penalties), and therefore to overdeterrence. In light of this article's conclusion that the current overall level of anticartel sanctions - a total that includes payments in indirect purchaser cases - should be increased at least five-fold, the Court's fear is unwarranted. On the contrary, indirect purchaser suits and state indirect purchaser laws should lead to more nearly optimal deterrence.

Moreover, as a general matter many respected scholars believe that judicial fears that the private treble damages remedy is excessive - even before the other cartel sanctions are considered - systematically biases the results of antitrust litigation in defendants' favor.²⁶⁹ Many believe that a fear of overdetering or unduly penalizing defendants often causes judges to favor defendants when they formulate substantive antitrust rules, when they measure ambiguous

²⁶⁶ Illinois Brick Co. v. Illinois, 431 U.S. 720 (1977).

²⁶⁷ See Lande, *supra* note 10.

²⁶⁸ There have been a number of variations of the argument that the combination of "treble" damages for direct purchasers, plus another "three" for indirect purchasers, plus disgorgement, plus fines of two-fold damages, can lead to six-fold, eight-fold, or more overall damages paid by a cartel or monopoly. See, e.g., Michael L. Denger, A New Approach to Cartel Enforcement Remedies Is Needed, 2002 ABA Spring Antitrust Meeting 15 (meeting held Apr. 24- 26, 2002). This fear shaped the ABA's proposal in this area. See A.B.A. Section of Antitrust Law: Report on Remedies 3 (2005), in State Indirect Purchaser Actions: Proposals for Reform: Hearing Before the Antitrust Modernization Comm'n (2005), available at http://www.amc.gov/commission_hearings/pdf/Steuer.pdf (prepared remarks of Richard M. Steuer) (One of the "key features" of their proposal is that "[t]here would be no duplicative recovery under the new cause of action. By consolidating direct and indirect claims in one forum, where both direct and indirect claimants would have an opportunity to prove their respective damages, the proposed statute would eliminate the possibility of duplicative recovery.").

²⁶⁹ As former FTC Chairman William E. Kovacic observed, "[A] court might fear that the US statutory requirement that successful private plaintiffs receive treble damages runs a risk of over-deterrence. A court might seek to correct such perceived infirmities in the anti-trust system by recourse to means directly within its control--namely by modifying doctrine governing liability standards or by devising special doctrinal tests to evaluate the worthiness of private claims.... The courts will "equilibrate" the antitrust system in one of three ways [Judges will]:... construct doctrinal tests under the rubric of "standing" or "injury" that make it harder for the private party to pursue its case; or...adjust evidentiary requirements that must be satisfied to prove violations; or...alter substantive liability rules in ways that make it more difficult for the plaintiff to establish the defendant's liability." See William E. Kovacic, Private Participation in the Enforcement of Public Competition Laws, in 2 Current Competition Law 167, 173-75 (Mads Andenas et al. eds., 2004).

factual situations against these rules, and when they devise appropriate standing rules.²⁷⁰ Similarly, in otherwise close private cases judges might unduly resolve ambiguities in defendants' favor when they compute damages because they believe the resulting award - after the mandatory trebling - will be excessive. A fortiori, a remedy system that includes not only "excessive" private damages but also incarceration and corporate fines could cause virtually every area of antitrust to develop unduly in defendants' favor. This result would be desirable only if the sanctions, when considered together, are indeed excessive. However, this article demonstrates that for cartels, by far the most common and important type of private case, the opposite is true. Courts should resist any temptation to be lenient on lawbreakers out of a fear that they are being sanctioned too heavily.

Although we have cited critics of antitrust who are concerned about overdeterrence, at the same time there are others that exhibit a great deal of complacency -- sometimes tinged with triumphalism -- that U.S enforcement is the oldest, best developed, and most effective in the world. Pride in the antitrust idea, one of our country's most successful peaceful policy export, is understandable. But justified delight in our accomplishments can become prosecutorial hubris tantamount to obliviousness in light of the continuing high rates of cartel detections and the results of this article's analysis. To truly protect American consumers and businesses from tremendous illegal overcharges, vigilance and increased efforts are crucial.

In short, the inquiry undertaken by this article is not just relevant to the crucial issue of whether the overall level of cartel sanctions should be changed. Almost every piece of the extraordinarily complex and interconnected antitrust system is affected by the field's belief as to whether the current level of cartel sanctions is optimal. We believe that almost every portion of the antitrust ecosystem should be re-examined in light of this article's analysis and conclusions.

²⁷⁰ Id. See also Stephen Calkins, *Equilibrating Tendencies in the Antitrust System, with Special Attention to Summary Judgment and to Motions to Dismiss*, in *PRIVATE ANTITRUST LITIGATION*, (Lawrence White Ed.,1988), at 185 and the sources cited therein, particularly the reference to a similar analysis by Areeda and Turner, at 191. Professor Calkins discusses how the law of monopolization, horizontal restraints and vertical restraints might have developed more narrowly because of the effects of damages awards that the courts believed were at the threefold level. Id. at 191-95. He concludes that "class actions probably would be more easily certified were there no trebling." Id. at 197. Professor Calkins also demonstrates why "it seems probable that trebling is a factor" in causing courts to scrutinize damage claims more rigorously than they once did." Id. at 198. "Plaintiffs would find standing rules more hospitable in a single damage world." Id. See also Stephen Calkins, *Summary Judgment, Motions to Dismiss, and Other Examples of Equilibrating Tendencies in the Antitrust System*, 74 *GEO. L.J.* 1065 (1986); Homer Clark, *The Treble Damage Bonanza: New Doctrines of Damages in Private Antitrust Suits*, 52 *MICH. L. REV.* 363, 363 (1954) ("[T]he mandatory trebling of any recovery has generated a natural reluctance in the courts to impose prodigious damages upon violators of the act . . . "); John F. Hart, *Standing Doctrine in Antitrust Damage Suits, 1890-1975*, 59 *TENN. L. REV.* 191, 241-2 (1992).

Appendix 1. Summary of Economic Surveys of Cartel Overcharges

	No. Cartels	Mean %	Median %
1. Mark A. Cohen & David T. Scheffman ^a	5-7	7.7-10.8	7.8-14.0
2. Gregory J. Werden ^b	13	21	18
3. Richard A. Posner ^c	12	49	38
4. Margaret Levenstein & Valerie Suslow ^d	22	43	44.5
5. James M. Griffin ^e	38	46	44
6. OECD (excluding peaks) ^f	12	15.75	12.75
Total, simple average	102-104	30.7	28.1
Total, weighted average	102-104	36.7	34.6

^a Mark A. Cohen & David T. Scheffman, *The Antitrust Sentencing Guideline: is the Punishment Worth the Costs?*, 27 AM. CRIM. L. REV. 331 (1989).

^b Gregory J. Werden, *The Effect of Antitrust Policy on Consumer Welfare: What Crandall and Winston Overlook* 1-9 (Econ. Analysis Group, Antitrust Div., U.S. Dep't of Justice, Discussion Paper EAG 03-2, 2003), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=384100.

^c RICHARD A. POSNER, ANTITRUST LAW (2nd ed. 2001).

^d Margaret Levenstein & Valerie Suslow, *What Determines Cartel Success?* 16 (Univ. of Mich. Bus. Sch., Working Paper 02-001, 2002).

^e 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).

^f *Report on the Nature and Impact of Hard Core Cartels and Sanctions against Cartels under National Competition Laws*, ORG. OF ECON. CO-OPERATION AND DEV., (April 9, 2002), available at <http://www.oecd.org/dataoecd/16/20/2081831.pdf>.

Table 2. Median Average Episodic Overcharges, by Year and Type

Cartel Episode End Date	Membership		Legal Status		Bid Rigging	Classic Price Fixing	All Types
	National	Inter-national	Found Guilty	Legal			
	<i>Median percent^a</i>						
1780-1890	19.3	50.8	16.0	25.0	16.2	21.3	20.3
1891-1919	24.5	57.3	24.8	41.5	39.0	35.0	36.8
1920-1945	4.6	31.6	38.9	27.6	34.0	30.0	30.0
1946-1973	15.0	38.9	14.3	20.4	13.3	19.0	15.2
1974-1989	16.8	37.4	23.0	7.5	21.8	16.9	20.0
1990-1999	14.9	24.8	22.8	11.7	16.0	23.0	22.2
2000-2009	20.0	25.8	23.3	17.5	18.5	24.1	22.5
ALL YEARS	17.2	30.0	22.8	26.0	18.6	25.0	23.3
Sources: Appendix Tables 1 and 2, summarized in J. Connor, <i>Price Fixing Overcharges Master Data Set</i> , spreadsheet dated July 2009.							
a) Medians of the point estimates or, where appropriate, of the midpoint of range estimates. Includes many zero estimates. See Table 4 for the numbers of observations in each cell.							

Appendix 3: Studies and Opinions as to the Probability of Cartel Detection

Source	Probability	Comment
Alan R. Beckstein & Gabel H. Landis ^a	Less than 0.50	A large anonymous survey of antitrust lawyers in the ABA, most working in the USA; the mean response was 3.6, where 5=strongly agree, 4=agree, and 3=neither agree nor disagree.
William M. Landes ^b	0.33	Merely an illustration, but a seminal work on optimal deterrence that may influences many adherents of optimal deterrence theory.
R.M. Feinberg ^c	Less than 0.50	An anonymous confidential survey of antitrust lawyers working in Brussels and observing the EC; the mean response was 4.4, where 5=strongly agree and 3=neither agree nor disagree.
United States Sentencing Commission ^d	0.10	Contains the transcript of 1987 testimony of DAAG for Antitrust Ginsburg; probably refers to domestic cartels of 1970s and 1980s.
Gregory J. Werden & Marilyn J. Simon ^e	Less than 0.10	Appears to be a general, subjective opinion of Antitrust Division professional prosecutors.
Mark A. Cohen & David T. Scheffman ^f	0.33	No hint as to the source, but may have been influenced by Landes (1983).
Jean-Claude Bosch & E. Woodrow Eckard Jr. ^g	0.13-0.17	A quantitative estimate derived from an event study of U.S. prosecuted cartels 1961-1988.
Mitchell A. Polinsky & Steven Shavell ^h	0.138- 0.165	Refers to U.S. arrest rates for some of the most common felonious property crimes (burglary, auto theft, and arson); may be overstated if victims of such crimes fail to report some occurrences.
Office of Fair Trading ⁱ	0.30	An anonymous survey of U.S. antitrust lawyers in private practice (with a “low response rate”) asked about the increase in cartel activity “if the Division stopped enforcing Section 1 of the Sherman Act.” Results were originally summarized in the FY2001 DOJ report to Congress.
Richard A. Posner ^j	0.25	An illustration of an optimal deterrence calculation by a leading antitrust jurist.
Organization of Economic	0.13-0.17	OECD accepts Bosch and Eckard (1991).

Co-Operation and Development ^k		
Emmanuel Combe et. al. ^l	0.129-0.133	Replicate Bosch and Eckard's (1991) method using data from EU-prosecuted cartels from 1969 to 2002.
Bush et al. ^m	0.10 to 0.33	A summary of most of the sources in this table above.
Alla Golub et. al. ⁿ	0.13-0.17	This paper replicates the Bosch and Eckard (1991) model using U.S. cartels from a later period and finds few differences in deterrence.
Terry Calvani ^o	0.13-0.17	In an article on cartel enforcement an experienced antitrust official cites Bosch and Eckard (1991) with approval.
Wouter P.J. Wils ^p	Less than 0.33	Cites with approval Bosch and Eckard (1991), but author believes that the U.S. probability has increased since 1961-1988 and that it is lower in the EU than the U.S.; this is a "conservative" upper limit for the EU.
Maarten Pieter Schinkel ^q	0.15	Cites only Bosch and Eckard (1991), but considers it "controversial as well as dated"
Maurice E. Stucke ^r	Unknown, but possibly 0.13-0.17	"Nobody knows". However, the author also favorably cites USSG (1986), OECD (2002), and Bosch and Eckard (1991).
Paolo Buccirossi & Giancarlo Spagnolo ^s	0.15	The author's "prudent" assumption for their simulation analysis.
J. Chen & J.E. Harrington ^t	0.1 – 0.3	In illustrating the effect of detection probability of cartel formation, the authors chose this range.
Office of Fair Trading ^u	21.7% caught of those seeking advice	Results of a survey of 234 competition-law lawyers in UK and Brussels for the years 2004-06 asking what proportion of their clients were convicted of illegal cartel conduct (295) by the UK's OFT compared to the 1361 instances where a client abandoned or changed a possible cartel agreement "because of the risk of OFT investigation."

Nathan H. Miller ^v	0.21-27.5	An empirical study of U.S. cartel prosecutions shows that detection rates rose 62% because of the revised 1993 Leniency Program; this increase is applied to Bosch and Eckard's estimate of p.
Renato Nazzini & Ali Nikpay ^w	Less than 0.20	"The authors' own anecdotal observations suggest that the OFT fully investigates less than 20 percent of all cases in which it has a reasonable suspicion that the competition rules have been breached."
Gregory J. Werden ^x	0.25	Part of an illustration of optimal fines for typical EU cartels.
Peter Ormosi ^y	10-20%	Calculations for Europe based on a large number of factors.

^a Alan R. Beckstein & Gabel H. Landis, *Antitrust Compliance: Results of a Survey of Legal Opinion*, 52 ANTITRUST L. J. 459, 487-516 (1982).

^b William M. Landes, *Optimal Sanctions for Antitrust Violation*, 50 U. CHI. L. REV. 652, 657 (1983).

^c R.M. Feinberg, *The Enforcement and Effects of European Antitrust Policy: A Survey of Legal Opinion*, 23 J. COMMON MARKET STUD. 373, 379 (1985).

^d *Sentencing Options: Hearing Before the United States Sentencing Commission*, 15 (July 15, 1986).

^e Werden & Simon, *supra* note 141 at 926.

^f Mark A. Cohen & David T. Scheffman, *The Antitrust Sentencing Guideline: is the Punishment Worth the Costs?*, 27 AM. CRIM. L. REV. 331 (1989).

^g Bosch & Eckard, *supra* note 132.

^h Mitchell A. Polinsky & Steven Shavell, *The Economic Theory of Public Enforcement of the Law*, 38 J. ECON. LITERATURE 45, 70 (2000).

ⁱ Office of Fair Trading, *supra* note 137, at 20.

^j RICHARD A. POSNER, ANTITRUST LAW, 47 (2nd ed. 2001).

^k *Report on the Nature and Impact of Hard Core Cartels and Sanctions against Cartels under National Competition Laws*, ORG. OF ECON. CO-OPERATION AND DEV. 18-19 (April 9, 2002), available at <http://www.oecd.org/dataoecd/16/20/2081831.pdf>.

^l Combe et. al., *supra* note 134.

^m Brief for Bush et. al. as Amici Curia Supporting Respondents, *F. Hoffman-LaRoche et. al. v. Empagran et. al.*, 542 U.S. 155 (2004) (No. 03-724).

ⁿ Golub et. al., *supra* note 133.

^o Terry Calvani, *Enforcement of Cartel Law in Ireland*, in 6 CAMBRIDGE YEARBOOK OF EUROPEAN LEGAL STUDIES ch. 4, 77 (John Bell & Claire Kilpatrick eds., 2005).

^p Wouter P.J. Wils, *Is Criminalization of EU Competition Law The Answer?*, 28 WORLD COMPETITION 117, 130 (2005).

^q Maarten Pieter Schinkel, *Effective Cartel Enforcement in Europe 25* (Amsterdam Ctr. of Law & Econ. Working Paper No. 2006-14, 2006), *World Competition: Law and Economics Review*, Vol. 30, pp. 539-572, 2007, available at <http://www.ssrn.com/paper=948641>.

^r Maurice E. Stucke, *Morality and Antitrust*, 2006 COLUM. BUS. L. REV. 443, 457.

^s Paolo Buccirossi & Giancarlo Spagnolo, *Optimal Fines in the Era of Whistleblowers: Should Price Fixers still Go to Prison?*, in THE POLITICAL ECONOMY OF ANTITRUST ch. 4, 95 (Vivek Ghosal & Johan Stennek eds., 2007).

^t J. Chen & J.E. Harrington, *The Impact of Corporate Leniency on Cartel Formation and the Cartel Price Path*, in THE POLITICAL ECONOMY OF ANTITRUST ch. 3, 76 (Vivek Ghosal & John Stennek eds., 2007).

^u Office of Fair Trading, *supra* note 137 at 50-54.

^v Miller, *supra* note 135.

^w Renato Nazzini & Ali Nikpay, *Private Actions in EC Competition Law*, 4 COMPETITION INT'L POL'Y 111, 111 (2008).

^x Gregory J. Werden, *Sanction Cartel Activity: Let the Punishment Fit the Crime*, 5 EUR. COMPETITION J. 19, 27-29 (2009).

^y Peter L. Ormosi, *How Big is a Tip of the Iceberg? A Parsimonious Way to Estimate Cartel Detection Rate* (2011), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1851309