DETERRENCE AND ANTITRUST PUNISHMENT: FIRMS VERSUS AGENTS

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Deterrence and Antitrust Punishment: Firms versus Agents

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Abstract: Antitrust enforcement regimes rely on two types of penalties for deterrence: penalties against the violating firm and penalties against the agents of the violating firm. In this paper I examine the economics of punishing agents versus firms. My area of application is antitrust, but the argument applies generally to other fields in which the government has the choice between punishing the agent, the firm, or both. This analysis suggests that whenever the firm has an incentive, given existing penalties, to engage in some illegal act that may result in relatively modest punishment for its agents, it can almost always induce its agents to carry out the illegal act. It follows that almost any plausible effort to use penalties against agents to deter price fixing can be undone by the firm's own system of rewards for agents. For deterrence, penalties against the firm sufficient to eliminate the firm's incentive to fix prices are necessary.

Introduction

Antitrust enforcement regimes rely on two types of penalties for deterrence: penalties against the violating firm and penalties against the agents of the violating firm. Probably the main difference between the U.S. and the EU enforcement regimes is that the U.S. tends to rely more on penalties against the agents to deter violations while the EU tends to rely on penalties against the firm.[1] In the U.S., an antitrust violation can result in a fine against the firm and a prison sentence for the agents who carried out the anticompetitive actions. In the EU, a fine against the firm is the sole punishment in the vast majority of cases.[2]

The penalty structure in the U.S. persists even though Gary Becker, in 1968, argued quite forcefully that a policy of using monetary fines against firms would be more efficient than the existing U.S. punishment system.[3] Monetary fines could be imposed with relatively little cost to society, and would amount to a transfer of resources from the convicted firm to the government, and perhaps from there the transfer could be used to compensate victims. Prison sentences, by contrast, impose a cost on society by forfeiting the labor of the convicted agent, and taxing the productive sector of society to pay for the agent's upkeep during incarceration. In addition, at least some of the agents convicted in Sherman Act cases are experienced and productive workers within their industries.[4] Becker suggested that it would be better to let them continue to work, deterred from future antitrust violations, than to lock them up in prison cells for several years.[5]

The question of optimality in punishment has come to the fore recently with discussions around revising the Criminal Sentencing Guidelines.[6] Ginsburg and Wright recently proposed a shift toward greater punishment for the agent, by debarring convicted agents from work in their fields.[7] Connor and Lande argue that the preferable reform would not pile more punishment on agents, but would raise the penalties imposed on firms.[8] They present evidence that penalties in

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[1] Douglas H. Ginsburg & Joshua D. Wright, Antitrust Sanctions, *Antitrust Sanctions*, 6 COMP. POL'Y INT'L 3, 20 (2010); Gregor Erbach, *EU and US competition policies: Similar objectives, different approaches*, (Mar. 27, 2014) http://www.europarl.europa.eu/thinktank/en/document.html?reference=LDM_BRI(2014)140779 Donald I. Baker, *Deterring Cartels – The Criminalization Dimension*, (Mar. 23, 2012), http://www.tca.ie/images/uploaded/documents/2012-03-23%20Baker%20-%20Deterring%20Cartels-%20The%20criminalisation%20dimension%20-%20paper.pdf.

[2] Ginsburg & Wright, *supra* note 1, at 17-19.

[3] Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169, 193-99 (1968).

[4] US v. Andreas, No. 96 CR 762, 1999 WL 515484, at *16 (LCrR. July 15, 1999). The vice chairman of Archer Daniels Midland Corp. and two former executives are sentenced to prison terms after being convicted of price fixing; Press Release, U.S. Dep't of Justice, Denso Corp. Executive Agrees to Plead Guilty to Price Fixing on Automobile Parts Installed in U.S. Cars (June 30, 2014) available at http://www.justice.gov/atr/public/press_releases/2014/306795.htm.

[5] Becker, *supra* note 3, at 193-98.

[6] In June 2014, the United States Sentencing Commission issued a notice in the Federal Register that it is conducting a study of antitrust offenses, including examination of fine provisions governing bid-rigging, price-fixing, and market allocation agreements. See http://www.mondaq.com/unitedstates/x/333024/Cartels+Monopolies/Criminal+Antitrust+Fines+Trends+and+Recent+Developments. For public comments in response to the notice, see http://www.ussc.gov/amendment-process/public-comment/public-comment-july-29-2014.

[7] Ginsburg & Wright, *supra* note 1.

[8] John M. Connor and Robert H. Lande, *Cartels as Rational Business Strategy: Crime Pays*, 34 CARDOZO L. REV. 428, 435-442 (2012).

the U.S. are too low to provide optimal deterrence against cartels.[9] Cartels persist, in their view, because the rewards are greater than the expected penalties.[10]

In this paper I examine the economics of punishing agents versus firms.[11] My area of application is antitrust, but the arguments apply generally to other fields in which the government has the choice between punishing the agent, the firm, or both. The theory that I set out is part normative and part positive. The normative part demonstrates that whenever the firm has an incentive, given existing penalties, to engage in some illegal act that may result in relatively modest punishment for its agents, it can almost always induce its agents to carry out the illegal act. This proposition applies especially to price fixing, with its combination of firm and relatively modest agent-targeted penalties. It follows that almost any plausible effort to use penalties against agents to deter price fixing can be undone by the firm's own system of rewards for agents. Similarly, the firm can almost always eliminate the agent's incentive to price fix whenever it does not have an incentive to fix prices (that is, the firm-level expected penalty is greater than the profit from price fixing). The normative implication of these propositions is that penalties against the firm sufficient to eliminate the incentive to fix prices are necessary in order to deter price fixing. The positive part of the analysis provides an explanation for observed patterns in punishment, such as the plea agreements firms negotiate with the Department of Justice defining which employees are subject to criminal punishment. In particular, the observed tendency to impose prison sentences on mid-level employees may result in part from a rational response on the part of firms in assigning agents to carry out price fixing schemes and later exposing those agents to prosecution in plea negotiations.

Argument

I will start with a simple economic model of crime. The model consists of one firm and one agent. A crime will need the assistance of the agent to be committed. A crime is committed when both the firm and the agent find that it is in their interests.

The firm is assumed to be profit-maximizing and risk-neutral, which means that it will commit the crime whenever the expected net gain from the crime is positive. Thus, whenever the gain to the firm from the crime is greater than the expected penalty (the probability of firm punishment multiplied by the fine imposed on the firm), the firm will commit the crime. This may seem to put too little weight on internalized ethical norms, but competitive markets tend to weaken the internalization of such norms. In the extreme case of a zero-profit, perfectly competitive environment, firms will have to adopt the cost-cutting methods of their rivals in order to survive, even if those methods may be unlawful.

The agent is assumed to be utility-maximizing. Thus, the agent will compare his utility in the state in which he does not commit the crime to his utility in the state in which he does commit

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[9] *Id*. at 429.

[10] *Id*. at 468-476.

[11] Daniel Sokol, *Policing the Firm*, 89 NOTRE DAME L. REV. 785 (2014). 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, 735-737 (2001) (discussing agency costs of cartel enforcement). See Giancarlo Spagnolo, *Managerial Incentives and Collusive Behavior*, 49 Eur. Econ. Rev. 1501, 1515–16 (2005) (incentives of managers to smooth income may enhance cartel stability).

the crime. If his expected utility is lower in the state in which he commits the crime, he will not commit the crime, and the converse holds too. In short, the agent will commit the crime whenever his expected utility from compliance with the law is less than his expected utility form commission of the crime. This generates four incentive scenarios to consider:

	Expected utility from compliance greater than expected utility from commission	*Expected utility from compliance less than expected utility from commission*
Gain to firm from crime less than expected penalty	*Both Firm and Agent comply*	*Firm complies Agent commits*
Gain to firm from crime greater than expected penalty	*Firm commits Agent complies*	*Both Firm and Agent commit*

Table 1: Firm versus agent incentives to commit crime.

Each of the cells in the Table above summarizes the incentives of the firm and the agent. Let's consider the cells in turn.

In the first cell (top left), the firm's gain from the crime is less than the expected penalty, and the agent's expected utility from the crime is less than his expected utility from commission. Both agent and firm comply with the law.

The second cell shows a conflict: the firm prefers to comply with the law and the agent prefers to commit the crime. In other words, the firm expects to suffer a net loss from the crime, while the agent expects to gain in utility. How could this scenario arise? First, it arises because the expected penalty to the firm exceeds its gain from the crime. In addition, it arises because the agent expects a net gain from committing the crime and does not expect the firm to respond by eliminating the gain to the agent. This might occur for several reasons. The firm may have weak internal controls and may be unable to identify and punish the agent who has caused it to suffer a penalty. If the firm is unable to identify the agent, it may be forced to choose between terminating or punishing all or a large group of employees or forgoing any effort to discipline the

responsible agent. If the cost of identifying and punishing the responsible agent exceeds any deterrence gain the firm might get, it may forgo the discipline step, and leave itself exposed to future decisions by agents to commit crimes that harm the firm. A second reason this scenario might arise is that the firm cannot credibly commit to impose a penalty that would deter the agent. The agent may have options to leave, perhaps to rival firms, before the firm can impose the penalty, or the agent may provide services that are so important to the firm that penalizing the agent would leave both the firm and the agent worse off.[12]

The other conflict scenario is where the firm prefers to commit the crime and the agent prefers to comply. The firm needs the agent to commit the crime; the firm can do nothing on its own. Here it seems quite plausible that the firm could rearrange its compensation structure to give the agent an incentive to commit the crime. If the agent prefers not to commit the crime because the expected penalty exceeds any gain he might receive, the firm can just increase the agent's wage conditional on committing the crime. Hence the outcome in which the firm prefers to commit the crime and the agent does not should quickly turn into the outcome in which both firm and agent willingly commit the crime.

Agent Underdeterrence Problem

Let us take a closer look at these scenarios, gradually taking into consideration features of the legal environment in antitrust. Suppose the agent is risk neutral. He therefore commits the crime if and only if his gain from committing the crime is greater than the expected penalty. What is the expected penalty in antitrust? It is the prison term imposed under the Sherman Act, discounted by the probability that the agent will be detected and prosecuted. The average prison sentence for price-fixing defendants is now 25 months – or roughly 2 years.[13] Thus, the penalty that the agent expects to receive, if he is detected and prosecuted, is the loss of wage income for 2 years.

What is the expected gain from price-fixing for the agent? If the firm rewards the agent for the extra profits that his price-fixing brings in, then his gain is the reward given by his firm (or by another firm that hires the agent). If the firm does not reward the agent, then the agent's expected gain from price-fixing is negative, since he takes the risk that he will be imprisoned and gets nothing in return.

Assume that the relevant time frame can be broken into two periods: the period during which the agent would be imprisoned if apprehended (punishment period) and the period after that (post-punishment period). For the average agent, the punishment period lasts two years. The reward for price fixing can be given in both the punishment period and the post-punishment period.

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[12] On the other hand, one suspects that if the agent continually imposes a loss on the firm, eventually the firm will identify him as the source of the loss and discipline him. If the firm sets a penalty that is sufficiently harsh, then punishment much later in the employee's tenure may still be a sufficient deterrent. For now, my point in the text is that a conflict in incentives where the employee commits a crime that harms the firm may be observed at least in the short run.

[13] Antitrust Division 2013 Criminal Enforcement Update. http://www.justice.gov/atr/public/division-update/2013/criminal-program.html.

To examine this question more closely, let z = probability of detection, w_1 = wage during punishment period, w_2 = wage during post-punishment period. Let r represent the effective rate of interest (or discount rate) between the two periods. In addition, let any increase in the wage be represented by Δw. The net gain that the agent gets from commission of the crime is therefore

$$\underbrace{z(-w_1)}_{punishment\ period\ wage\ loss} + \underbrace{(1-z)\Delta w_1}_{gain\ if\ undetected} + \underbrace{\frac{\Delta w_2}{1+r}}_{post\ punishment\ period\ reward} . \qquad (1)$$

The first term reflects the punishment period wage loss suffered by the agent – that is, the wage loss suffered by the agent if detected and punished. The second term reflects the gain if the agent goes undetected and receives a reward from the firm for price fixing (or for the financial returns to the firm resulting from price fixing) during the punishment period. The third term reflects a post-punishment reward provided by the firm. In this expression Δw_1 is the reward in the punishment period and Δw_2 is the reward in the post-punishment period. The firm controls the rewards in both periods. The probability of detection is not under the control of firm; it is determined by antitrust enforcement agencies.

Firm Prefers to Fix Prices

Suppose the firm prefers to fix prices and gives the agent a constant reward percentage in both periods, and let that percentage be represented by λ. Suppose also that wage growth is η percent between the two periods. The agent's gain from price fixing is therefore

$$z(-w_1) + (1-z)\lambda w_1 + \frac{\lambda(1+\eta)}{(1+r)} w_1 \ ,$$

or,[14] equivalently,

$$\left[(1-z)\lambda - z + \frac{\lambda(1+\eta)}{(1+r)} \right] w_1 . \qquad (2)$$

Clearly, if the reward for price-fixing is zero ($\lambda = 0$), the agent's net gain is negative and he will not have an incentive to fix prices. Hence, the reward factor must be positive for the agent to have an incentive to fix prices.

To examine how plausible it is that the agent might prefer to or be induced to engage in price fixing, consider the table below, which calculates the necessary reward percentage for different combinations of the probability of detection, wage growth, and interest rate. I chose detection probabilities that reflect upper (.25) and lower ranges (.15) for cartel detection probabilities in the U.S. and in Europe. The lower estimate (.15) is suggested by the empirical study of Bryant

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[14] The last term of the agent's gain expression follows because Δw_2, in expression (1), is equal to λw_2, because the reward factor is the same in both periods, and λw_2 is equal to $\lambda(1+\eta)w_1$.

and Eckard in 1991.[15] Since then, leniency programs have generated much more information about cartel activity, raising the probability of detection substantially. Ginsburg and Wright argue that the probability of detection may be as high as .25 with leniency taken into account.[16]

Detection probability	Interest rate	Wage growth percentage	Break-even reward percentage
.25	.01	.02	.14
		.12	.13
		.18	.13
.15	.01	.02	.08
		.12	.08
		.18	.07

Table 1: Reward necessary to induce price fixing by the agent.

The numbers in Table 1 indicate that as the probability of detection falls, the reward percentage necessary to induce the agent to fix prices falls too. As wage growth increases relative to the interest rate, the reward necessary to induce the agent to engage in price fixing falls.

Table 1 suggests that it is not difficult for the firm to encourage the agent to commit the crime. In many of the scenarios considered in the table, a modest compensation premium, sometimes on the order of 15 percent, is all that is necessary to induce the agent to commit the crime. The key factors that tend toward the inducement of a violation are the wage reward for the violation, the interest rate (low interest rates make the second period payment more valuable), high wage growth (relatively high wage in the post-punishment period). All that the firm needs to do is credibly communicate these factors to the agent, and the agent will have the incentives, desired by the firm, to violate the law.

This analysis is incomplete because it fails to include the disutility of imprisonment, over and above the loss of wage income. Incorporating such a factor would not be difficult, but it would

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[15] Peter G. Bryant & E. Woodrow Eckard, Jr., *Price Fixing: The Probability of Getting Caught*, 73 REV. ECON. & STAT. 531 (1991) (probability of detection range in the U.S. between 13 and 17 percent); Emannuel Combe, Constance Monnier, & Renaud Legal, *Cartels: The Probability of Getting Caught in the European Union* 21 (Working paper, 2008), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1015061 (estimating a probability of detection in the EU between 12.9 and 13.2 percent); Peter L. Ormosi, *How Big Is a Tip of the Iceberg? A Parsimonious Way to Estimate Cartel Detection Rate* 21 (Ctr. for Competition Pol'y, Working Paper No. 11-6, 2011), available at http://competitionpolicy.ac.uk/en_GB/c/document_library/get_file?uu id=186cc0ec-a536-406d-9792-603f4f6ed95c&groupId=107435 (probability of detection in the EU between 10 and 20 percent).

[16] Ginsburg & Wright, *supra* note 1, at 8. However, a recent empirical study suggests that the probability of detection for pricing fixing is still within the low range of 13 to 17 percent in spite of the introduction of leniency programs. See Alla Golub et al., The Probability of Price Fixing: Have Stronger Antitrust Sanctions Deterred? 5 (Apr. 8, 2008) (unpublished manuscript), *available at* http://ssrn.com/abstract=1188515.

not change the basic message of this analysis, that the firm can easily induce the agent to commit the crime.[17] Offsetting the effect of this omission is the additional omission from this analysis of a payment from the firm to the agent during the period of punishment if he is apprehended. The law does not clearly prevent a firm from compensating an imprisoned employee during his prison term.[18] If the firm continues to compensate the agent during the punishment period while he is imprisoned, the incentive to commit the crime may be considerably greater than this analysis suggests.[19]

Firm Does Not Prefer to Fix Prices

Now, let's consider the other potential conflict scenario, where the firm does not want to fix prices and the agent has an incentive to fix prices. For this to be the case, the agent must perceive a positive net reward from price fixing (which means, using (1), $(1 - z)\lambda - z + \lambda(1+\eta)/(1+r) > 0$). Given the risk of punishment, the firm can easily eliminate the agent's incentive to price fix by eliminating the reward for price fixing. It follows that if the firm sets the reward for price fixing (λ) at zero, the agent will not fix prices.[20]

However, the relationship between the firm and the agent may be more opaque than this analysis suggests. The agent may be employed under a compensation structure that rewards him for any increases in profits to the department in which he works. Thus, if he engages in price fixing, he will be rewarded even if the firm has no incentive to fix prices. In this case, the agent may be induced to fix prices by the within-firm compensation structure, even though the firm suffers as a result of his price fixing.

If the firm can identify the agent who is responsible for the price-fixing penalty that it is forced to pay, the firm will have an incentive to penalize that agent in order to discourage price fixing. If the firm can detect the responsible agent immediately, the firm can terminate the agent. The threat of certain termination would eliminate the agent's incentive to fix prices.

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[17] Incorporating the disutility of punishment would be equivalent to increasing the punishment period wage loss by some multiple greater than one. Suppose that multiple is $k > 1$. Then the agent's incentive to fix price becomes

$$\left[(1-z)\lambda - zk + \frac{\lambda(1+\eta)}{(1+r)} \right] w_1 .$$

It should be clear that the basic issues raised in the preceding analysis remain. The break-even reward percentage is higher in this case, but if the disutility factor k is not too large, the firm will still be able to induce the agent to fix prices with a relatively modest reward.

[18] Connor and Lande, *supra* note 8, at 440-41 n.54

[19] If the firm continues to pay the agent during the period of punishment, the net gain from committing the violation is:

$$\left[(1-z)\lambda + \frac{\lambda(1+\eta)}{(1+r)} \right] w_1$$

which is positive.

[20] This conclusion is not safe if agents switch firms in the post-punishment phase. The second firm might reward the agent for price fixing in the earlier period. Thus, even if the agent's initial firm sets the reward for price fixing at zero, another firm may choose to reward the action, which could give the agent an incentive to fix prices in the first period.

Suppose, however, the firm cannot detect the responsible agent in the first period and can only detect him in the second, post-punishment, period. Now, the firm can only respond to the discovery that the agent engaged in price fixing by imposing a penalty on the agent in the second period. For example, the firm could terminate the agent in the second period. If the firm terminates the agent in the second period with probability s, the agent's incentive to fix prices becomes

$$\left[(1-z)\lambda - z + (1-s)\frac{\lambda(1+\eta)}{(1+r)} - s\frac{(1+\eta)}{(1+r)} \right] w_1 , \tag{3}$$

where the third term reflects the reward the agent receives in the second period if he is not detected by the firm, and the last term reflects the loss the agent suffers if he is detected by the firm and terminated in the second period.[21] The last term reflects the assumption that if the agent had not engaged in price fixing, he would have earned the normal return from his career. By engaging in price fixing, and being caught and terminated, he loses that return in the post-punishment period. If this expression (3) is positive, the agent has an incentive to fix prices. It is easy to show that this incentive condition is positive when the reward for price fixing, λ, is greater than the odds of detection by the enforcement authority, $z/(1-z)$, and also greater than the odds of detection by the firm, $s/(1-s)$.[22]

This condition implies that the termination threat by itself is insufficient to deter the agent from price fixing. However, the firm can reduce the agent's incentive to fix prices by reducing the reward for the agent's impact on current-period profits (λ), increasing the probability of firm detection (s), or by increasing the relative wage in the post-punishment period (η). The lower the reward and the greater the wage growth, the stronger is the disincentive to go against the employer's policy. Thus, consistent with Becker and Stigler,[23] the firm can deter malfeasance (in this case, price fixing) by the agent through a combination of dismissal and a steeper wage profile.

Increasing the Sentence

One response to the underdeterrence problem identified here is to increase the length of the sentence imposed on the agent. If the sentence is increased sufficiently, the agent's incentive to engage in price fixing can be eliminated.

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[21] This formulation assumes that there is no connection between the firm's dismissal policy and the enforcement authority's punishment decision. It may seem more realistic to assume, instead, that the firm will definitely detect and dismiss any agent who is detected and punished by the authority. Under this assumption, the agent's incentive condition is:

$$\left[(1-z)\lambda - z + (1-z)[(1-s)\lambda - s]\frac{(1+\eta)}{(1+r)} \right] w_1 .$$

This expression delivers the same message as the expression in (3) examined in the text.

[22] The reason is that the incentive condition in (3) is equivalent to:

$$\left[(1-z)\lambda - z + [(1-s)\lambda - s]\frac{(1+\eta)}{(1+r)} \right] w_1$$

[23] Gary S. Becker & George J. Stigler, *Law Enforcement, Malfeasance, and Compensation of Enforcers*, 3 J. LEGAL STUD. 1 (1974).

Expand the model to three periods, two periods of punishment and one post-punishment. Now the net reward for the agent becomes

$$\left[(1-z)\lambda - z(2+\eta) + \frac{\lambda(1+\eta)^2}{(1+r)^2} \right] w_1 \qquad (4)$$

As the table below shows, although it is less likely that the agent will have an incentive to fix prices, given the longer prison sentence, the firm can still easily find reward levels that induce the agent to fix prices. The required reward levels necessary to induce price fixing unsurprisingly increase after the sentence length is increased. Still, there appears to be nothing that prevents the employer from completely offsetting the greater deterrence effect, due to the increased sentence, with a greater reward for violating the law. For example, if the detection probability is .25, the interest rate is .01, and wage growth between periods is 2 percent, a compensation reward of 29 percent or more would be sufficient to induce the agent to fix prices.

Detection probability	Interest rate	Wage growth percentage	Break-even reward percentage
0.25	.01	.02	.29
		.12	.27
		.18	.26
0.15	.01	.02	.16
		.12	.15
		.18	.15

Table 2: Reward necessary to induce price fixing, enhanced sentence.

One possible answer to the agent underdeterrence problem is to just keep increasing the expected sentence to the point where it is unlikely that the firm can undo the deterrence effect of the threatened sentence. While increasing the sentence is a possible solution, it runs into several constraints. First, for any plausible increase in the sentence, the firm can probably undo its deterrence effect by increasing the reward to the agent, or by steepening the wage profile. The sentence length would have to be increased by a large amount in order to prevent the firm from undoing its deterrence effect. However, increasing the sentence by a factor of five, say from an average of 2 years in prison for price fixing to an average of 10 years, would be difficult to get courts to accept, after having sentenced within a certain range for many years. Certainly defendants would challenge such sentences as disproportionate, given the nature of the harm caused by price fixing. It would be difficult to defend against proportionality challenges a sentence scheme that puts price fixers in prison just as long as most violent criminal offenders.[24]

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[24] Specifically, defendants would challenge substantially longer sentences for price fixing as unconstitutionally excessive, in violation of the Eighth Amendment. See Weems v. United States, 217 U.S. 349 (1910); Solem v.

The average prison sentence for murder is 149 months (12 years) and the average prison sentence for kidnapping is 104 months (9 years).[25] Increasing the sentence for price fixing to 10 years would result in price fixers serving longer sentences than many convicted murderers.

This suggests that the sentence enhancement proposal is unlikely to be a real solution to the problem of firms being able to undo the deterrent effect of punishment for price fixing. It is too easy for the firm to undo the deterrence effect for reasonable sentence enhancement levels, and to prevent the firm from undoing the effect would require the sort of increase in sentences for price fixing that would invite challenges based on fairness and proportionality in criminal punishment.

Debarment

Doug Ginsburg and Josh Wright propose debarment as a solution to the agent underdeterrence problem.[26] Under the debarment approach, the agent would be barred from returning to work in his industry in the post-punishment period.

Being debarred from returning to the industry, the agent will suffer a loss to the extent that his within industry wage in the post-punishment period, w_2, exceeds his wage level working outside of the industry, w_0. It is plausible that this loss would be substantial, because the agent's within industry wage will reflect the value of his experience in the industry – that is, the market value of industry-specific human capital. The debarment incentive changes the agent's incentives primarily by reducing the value of the promise of a post-punishment reward from the firm (or the industry). Under debarment, the agent's net reward is therefore:

$$\underbrace{z\left(-w_1 - \frac{(w_2 - w_0)}{(1+r)}\right)}_{\substack{\text{if detected you lose first period wage} \\ \text{and premium over outside wage} \\ \text{in later period}}} + \underbrace{(1-z)\left(\Delta w_1 + \frac{\Delta w_2}{(1+r)}\right)}_{\substack{\text{if not detected you get reward} \\ \text{in both periods}}}. \tag{5}$$

Because of the debarment threat, the agent loses his first period wage and the premium over his outside-industry wage in the later (post-punishment) period. However, if the agent is not detected, he gains his reward for price fixing in both periods. Moreover, if the difference between the agent's within-industry and outside-industry wage is trivial, the debarment threat is quite weak.

Debarment, like increasing the sentence, makes it less likely that the agent will commit the crime. However, note that its effect on the agent can be undone by the firm if it makes the reward for price fixing (λ) sufficiently large. In other words, by promising the agent a sufficiently large wage increase if he avoids detection, the firm can largely maintain the agent's incentive to

Helm, 463 U.S. 277 (1983). On comparative excessiveness as a basis for invalidating sentences, see Youngjae Lee, *The Constitutional Right Against Excessive Punishment*, 91 VA. L. REV. 677, 727-730 (2005).
[25] Bureau of Justice Statistics Prison Sentences and Time Served for Violence. http://bjs.gov/content/pub/pdf/PSATSFV.PDF
[26] Douglas H. Ginsburg & Joshua D. Wright, Antitrust Sanctions, 6 Competition Pol'y Int'l 3 (2010).

engage in price fixing after the debarment sanction is adopted under the statute. To see this point in terms of the parameters used earlier, note that (5) can be rewritten as

$$\left[(1-z)\lambda - z\right]\left(w_1 + \frac{w_2}{1+r}\right) + \frac{zw_0}{1+r}, \tag{6}$$

which implies that if the firm can set the reward for price fixing λ greater than the odds of detection, $z/(1-z)$, then it can guarantee that the agent will still have an incentive to engage in price fixing even when facing the threat of debarment.

I have assumed, conservatively, that the firm does not compensate the agent if he is detected and punished, during the punishment phase. However, if the firm compensates the agent while he is under punishment,[27] and in addition provides a reward if he escapes punishment, the deterrent effect of debarment can be largely eliminated.

Some Positive Implications

In addition to revealing the ease with which a firm that has an incentive to fix prices can induce its agents to carry out the acts of price fixing, this framework explains some of the puzzling features noted about prison sentences. Most prison sentences in antitrust are imposed on mid-level employees, well below the top level of management.[28] Carve-out agreements, negotiated plea deals by the firms in which they specify certain employees for prosecution, tend to sacrifice mid-level employees of the firm.[29] What explains this pattern?

Return to the incentive analysis of the preceding part. First, the set of potential agents suitable for prosecution will tend to be either mid-level or senior. Junior employees will seldom be in a position to arrange or direct a price fixing agreement with rival firms. A mid-level agent, unlike a senior agent, can be rewarded by the firm after he completes his (typically two-year) sentence. With the prospect of such a reward in view, the threat of prosecution against mid-level employees can easily be undone by the compensation policies of the firm. Thus, the U.S. sentencing data probably reflect the rational economic response of firms that have incentives to engage in price fixing to the enforcement policies of the Justice Department. The firms can induce mid-level employees to break the law and carve them out for later prosecution in plea deals. To the extent such a strategy reduces the expected sanction against the firm, it could tip the incentives of some firms in favor of price fixing. In other words, if in the absence of a carve-out strategy the firm would not have an incentive to fix prices, the option of a carve-out strategy, coupled with a reduced sanction on the firm, might change the firm's incentives toward preferring price fixing.[30]

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[27] Connor and Lande, *supra* note 8, at 440-41 n.54 (noting reports that some companies continue to pay convicted agents while they are in prison).

[28] *Id.* at 440-441.

[29] *Id.*

[30] In perhaps the most cynical of possibilities, cartel recidivism could be privately optimal for both firms and the enforcement agency. Suppose fines are sufficiently high to deter firms from price fixing, but firms expect to negotiate for lower fines by carving out mid-level agents for prosecution. An equilibrium might arise in which the firm's expected sanctions are too low to deter, largely because the firm anticipates carving out employees for

Conclusion

A statute, such as the Sherman Act, that imposes penalties both on the firm and on the agent generates the possibility of a conflict in which one party will have an incentive to violate the statute while the other party does not. The basic message of this paper is that the conflict scenario in which the firm has an incentive to violate the statute and the agent does not is much more worrisome that the reverse scenario. The firm has many tools at its disposal to discourage the agent from violating the statute when the firm prefers to comply with it. However, if the firm has an incentive to violate the statute, it can almost always induce its agent to violate the statute. This implies that the preferable approach to deterrence is to treat deterrence at the firm level as a higher priority concern than deterrence at the agent level.

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prosecution, and the enforcement agency profits from collecting fines from recidivists. More generally, if the fines are not set sufficiently high to deter the firm from price fixing, one might observe a recidivism equilibrium, where both the firm and the enforcement agency profit from recidivism.