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# Constant Vigilance: Maintaining Cartel Deterrence During the Great Recession

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Antitrust authorities around the world have continued to pursue illegal price-fixing throughout the economic crisis, but have also increasingly granted “inability to pay” reductions in fines. While taking ability to pay into account is appropriate, as the overriding policy goal is the promotion of competition, these reductions in fines must be accompanied by other policy changes in order to maintain the expected level of sanction. Granting inability to pay requests for reductions in fines is an ex-post decision on the part of antitrust authorities, and yet it clearly has ex-ante incentive implications for cartel formation. These fine reductions also have the potential to undermine the legitimacy and credibility of the antitrust authorities, and therefore must be implemented with specific, objective, and transparent criteria. To assure the effectiveness of anti-cartel policy, we should design policies that are informed by empirical research. Antitrust authorities should be vigilant in restricting communication that facilitates cooperation among competing firms in highly concentrated industries, especially those with a history of collusion. They should also monitor the behavior of former cartel members, raising standards for mergers and other cooperative agreements for firms with a history of collusion. This paper reviews the implementation of recent cartel “inability-to-pay” reductions in fines and proposes tools for maintaining deterrence without increasing the likelihood of bankruptcy. Our recommendations build on our earlier empirical research on the determinants of cartel stability.

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## I. Introduction

The European Commission recently announced several decisions in which fines to colluding firms were substantially reduced in order to avoid undermining the firms' financial viability.<sup>1</sup> This flexibility is entirely appropriate, as the overriding policy goal is the promotion of competition. Eliminating a competitor, vulnerable because of cyclical fluctuations outside the control of any individual firm, does not promote competition. However, in order to maintain adequate deterrence, this reduction in fines must be accompanied by other policy changes that maintain the expected level of sanction.<sup>2</sup> In fact, it is often noted that cartels seem more likely to form during recessions, suggesting that it is necessary to *strengthen*, not simply maintain, the existing level of deterrence. Such a policy also has the potential to undermine the legitimacy and credibility of the antitrust authorities. This can be addressed with transparency and a clearly delimited scope for the policy in both time and circumstance. This paper reviews the implementation of recent "inability-to-pay" reductions in fines and proposes tools for maintaining deterrence by building on our earlier research on the determinants of cartel stability.

## II. Theory of Collusion and Effective Deterrence Policies

To select anti-cartel policy instruments efficiently and effectively, it is necessary to understand what causes cartel failure. To do this, we begin with the familiar constrained optimization problem faced by firms forming a cartel. In a market with identical price-setting firms, infinitely repeated interaction among these firms, and perfect information, collusion can be sustained if firms are sufficiently patient and if the difference between collusive profits and defection profits is sufficiently high. For the framework behind this statement, see the Appendix.<sup>3</sup>

There are a variety of factors that determine whether this constraint is satisfied in a particular market; these have been discussed at length under the rubric of "facilitating" practices or structural conditions.<sup>4</sup> Many of these structural conditions are not amenable to manipulation by policy makers. For example, neither the homogeneity of a good nor the cost structure is likely to be the basis of new anti-cartel policy instruments.

There are instruments that can be developed by drawing on this framework. When a cartel is formed, its member firms expect the inequality defined in the Appendix (often referred to as the incentive compatibility constraint) to hold; that is, the present discounted value of expected profits is higher under collusion

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than with defection and the competitive aftermath. Cartels dissolve when they find the constraint violated by an unanticipated shock.<sup>5</sup>

The question for regulators is, what policies create effective shocks to disrupt cartels? Such policies would have two effects: (1) When first adopted, they disrupt some ongoing cartels, and (2) When maintained over time, they deter the formation of new cartels. The adoption and refinement of corporate leniency and amnesty policies over the last two decades is an example of a policy that is effective because it is designed to manipulate the structure of the cooperative oligopoly game and increase firms' incentives to defect.

Anti-cartel policies can also learn from empirical research. Our research highlights several key determinants of contemporary cartel breakup:<sup>6</sup>

1. As many would expect, the strengthening of leniency policies has been the primary cause of cartel breakup in the last two decades.
2. Other firms can disrupt cartels when their interests are not aligned with the group. In particular, rising competition has thwarted the best and most sophisticated cartel organizations. A stable fringe is unlikely to disturb collusion, but a *growing* fringe, especially based on a new technology, could. On the other hand, despite theoretical speculation to the contrary, large customers generally do not break up cartels.<sup>7</sup>
3. Communication and organization are important to maintaining collusion. Cartels that rely on trade associations or third-party cartel monitoring are less likely to fall apart than those that do not.
4. Cartels that plan for fluctuations in sales and establish mechanisms to compensate cartel members tend to last longer than those that do not.
5. Cartels with financially unstable members are fragile; firms on the verge of bankruptcy do not make good cartel partners.<sup>8</sup>

Each of these empirical findings contains the seed of an anti-cartel policy, discussed below.

### III. Recent Implementation of "Inability to Pay"

Despite the success of antitrust policy in precipitating the collapse of a large number of cartels over the last fifteen years, many antitrust economists argue that current penalties do not provide sufficient deterrence to undermine the profitability of price-fixing.<sup>9</sup> Thus, reductions in penalties motivated by concerns about the financial viability of cartel conspirators should be undertaken only in extreme cases. Both the U.S. Department of Justice ("DOJ") and the European Commission ("EC") have reduced fines on this basis. Numerous other jurisdictions also take inability to pay into account.<sup>10</sup>

The European Commission's policy on "ability to pay" is established in point 35 of its 2006 Guidelines on the method of setting fines, and the reduction in fine is intended to be granted only "in exceptional cases."<sup>11</sup> The reduction will be analyzed in a "specific social and economic context" and is characterized by a high burden of proof: there must be "objective evidence that imposition of the fine... would irretrievably jeopardize the economic viability of the undertaking concerned and cause its assets to lose all their value."<sup>12</sup> In assessing a company's financial status, the Commission takes into account a variety of factors, including recent financial statements, projections for the subsequent two years, common financial ratios measuring liquidity and solvency, and "relations with banks and shareholders."<sup>13</sup>

In the decade prior to the current recession (1998 – 2007), there were over twenty applications to the EC for fine reductions due to inability to pay. The EC granted only two reductions in fines and gave one firm an extended payment period.<sup>14</sup> Since 2008, the EC has had thirty-two requests by companies charged with price-fixing, of which ten have been granted. The first reduction in this recent period was given to Almamet for its participation in the cartel relating to calcium carbide and magnesium-based reagents for the steel and gas industries. Almamet's fine was reduced by approximately EUR 760,000. This was a twenty percent reduction in the fine for Almamet, but it reduced the overall penalty to the cartel by less than one percent.

Reductions in fines of this magnitude are probably not problematic in the current economic situation. Unfortunately, the EC has chosen to suppress the amounts given in subsequent "inability to pay" fine reductions, so we have no way of knowing the overall impact of these reductions on deterrence. In the July 2010 animal feed phosphates press release, for example, the EC states that two undertakings "have invoked their 'inability to pay'... [and as] a result of this assessment, the Commission accepted one of the applications and granted a reduction of 70% of the fine."<sup>15</sup> The press release does not identify the recipients of the fine reduction or the monetary value of the reduction for inability to pay. Reductions in fines, particularly without transparency, can create the potential for bias. This kind of discretion in enforcement can undermine the incentives provided by *per se* rules against price-fixing.<sup>16</sup>

The decision to suppress this information also creates information asymmetry between the members of the cartel and the general public. It therefore facilitates future collusion by handing firms an instrument with which to demonstrate their trustworthiness to other cartel members. This is similar to a classic "lemons" problem in which uninformed market participants cannot distinguish between

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firms that are in dire financial straits (lemons) and those that are healthy (“plums”). In the classic formulation of the lemons problem, the plums have an incentive to try to reveal their type. When the EC announces that it has given a subset of cartel members a reduction in fines but does not identify which firms have received this subsidy, it is in the narrow economic interest of the financially strong firms to publicly announce that they were not the recipients of such a subsidy. To our knowledge, not a single firm has come forward to reveal this positive news about its financial condition. This choice to remain anonymous, even

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at the cost of lower valuations by outsiders who cannot determine which firms were unable to pay, is a way to earn the good will of its former co-conspirators. There are efficiency-enhancing reasons why a firm might want to maintain positive relations with its competitors, such as

joint research and development or cooperation to increase overall demand. But, especially in a highly concentrated industry with a history of collusion, there are also more nefarious explanations. The observed deference suggests that the EC’s actions may be providing former cartel members with a mechanism for reestablishing trust after the breakup of their cartel.

In the United States, the “inability to pay” reduction in fines falls under §8C3.3 of the Federal Sentencing Guidelines, which provides that the “court shall reduce a fine below that otherwise required” if its imposition would hurt the entity’s ability to provide restitution to victims or “if the court finds that the organization is not able and, even with the use of a reasonable installment schedule, is not likely to become able to pay the minimum fine required...”<sup>17</sup> The DOJ has taken inability to pay into account for many years; when a firm receives an “inability to pay” reduction in its fine, that is indicated in the public plea agreement. In some cases, but not all, these plea agreements indicate the size of the fine reduction. Based on a review of plea agreements listed on the DOJ website, the United States granted thirteen inability to pay reductions in fines to corporations convicted of price-fixing between 1998 and 2006.<sup>18</sup> Since the recession the DOJ has granted two additional fine reductions.

The issues raised by these kinds of discretionary reductions in fines are highlighted by reductions given by the DOJ to one member of the DRAM cartel. Hynix, a Korean semiconductor company which sold DRAM computer memory, pled guilty to criminal antitrust violations in 2005 for cartel activity occurring between 1999 and 2002. The company and the DOJ agreed upon a \$185 million dollar fine.<sup>19</sup> Under the Sentencing Guidelines, Hynix’s activity should have prompted a fine of \$265.5 million, but the DOJ reduced its recommendation due to Hynix’s inability to pay.<sup>20</sup> Hynix’s inability to pay at the time was questioned, as it had reported profits of \$400 million in the final quarter of 2004, and capital surplus of \$500 million dollars.<sup>21</sup> Competition policy should create a level playing field. While regulators balance many competing demands, it is critical that com-

petition policy not be perceived as favoring particular firms or subject to influence as these perceptions undermine the fundamental purpose of the policy.

While a fine reduction policy, appropriately implemented, may be necessary at the current moment, it raises three important issues. Most importantly, it reduces deterrence. We will discuss this at length below. But there are other problems with such a policy that can and should be addressed in any implementation. Regulators may easily become accustomed to making exceptions, so that this type of policy carries with it the classic “slippery slope” concern. This is particularly true because the reduction amounts to a subsidy to one firm in an industry. This may encourage regulators to reduce subsequent fines out of a sense of fairness to other firms. There is also a real concern that a firm’s “ability to pay” is amenable to manipulation by the firm, which always has more information about its own financial state than does the antitrust authority.

The policy must be implemented in a way that avoids establishing new, lower fines as the norm. It may encourage regulators to establish the new lower fine as the “benchmark” or reference point for determining future fines. Behavioral economists have found not only that perception is “reference dependent” but also that this can lead to a “status quo bias.”<sup>22</sup> Although this phenomenon can often work so as to maintain the status quo policies, it is also possible for new reference points to be adopted, which will once again become “sticky.”

We see some evidence of this occurring with the recent EC decisions. The EC remarked that these reductions were unusual in its announcement in the bathroom equipment manufacturers’ cartel, but made no such statement in the reductions that it gave in the pre-stressing steel and animal feed phosphates cartel decisions in the next month. While the first announcement was clearly intended to identify a change in enforcement regime, the choice *not* to highlight the exceptional nature of the subsequent fine reductions helps to establish these kinds of reductions as normal policy. It is critical that this regime be identified as crisis-specific so that it does not extend beyond the current economic downturn.

ONE WAY TO ASSURE THAT THIS DOES NOT BECOME A PERMANENT LOOPHOLE IS TO PROVIDE EXTENDED PAYMENT PERIODS RATHER THAN FINE REDUCTIONS.

One way to assure that this does not become a permanent loophole is to provide extended payment periods rather than fine reductions. Both the EC and the DOJ sentencing guidelines specifically provide for extended payment periods, and such payment plans have been negotiated in a number of instances by both agencies. This approach also better matches the economic challenge of the current period—breakdowns in financial markets—to the legal action. If the problem is that we are in a financial crisis in which firms with positive net present value have limited access to liquidity through the credit markets, then the appropriate remedy is one that provides liquidity, not a reduction in fines. It also maintains the method for determining fines, and therefore the credibility of the antitrust authority.

## IV. Maintaining Deterrence

While granting inability to pay requests for reductions in fines is an *ex-post* decision on the part of antitrust authorities, it clearly has *ex-ante* incentive implications for cartel formation. Simply reducing the expected fine decreases deterrence and will increase the number and effectiveness of cartels. One way to address the need to maintain or increase deterrence is to increase non-pecuniary sanctions, especially prison terms. The number of countries that have recently adopted or are considering adopting criminal sanctions for cartel activity has grown noticeably over recent years.<sup>23</sup> However, this is a relatively blunt instrument. It often has less effect, in practice, than the *de jure* policy suggests in countries without a long tradition of aggressive action toward cartels.<sup>24</sup> Indeed, historically in the United States, this was also the case. Although U.S. law has long permitted jail terms for antitrust violations, these provisions were seldom used in cartel cases until antitrust enforcement against international cartels became more aggressive in the mid-1990s.

There are a variety of other instruments at the disposal of antitrust authorities to increase deterrence without increasing the likelihood of bankruptcy. To assure the effectiveness of anti-cartel policy, we should design policies that are informed by research on the determinants of cartel stability. As indicated above, empirical evidence suggests that antitrust enforcement is the single most important cause of cartel breakup over the past fifteen years. By definition, we are weakening this enforcement by granting fine reductions. We must therefore increase the likelihood of prosecution. This requires maintaining or even increasing resources dedicated to enforcement. It appears that the relevant budgets at the DOJ and the Federal Trade Commission (“FTC”) have kept up with inflation over the last decade.<sup>25</sup> Antitrust authorities are also increasingly tackling this issue with forensic techniques to identify collusion, rather than relying entirely on amnesty applications.<sup>26</sup>

Given the level of antitrust enforcement, the most important tool in destabilizing cartels is active encouragement of competition, especially entry and innovation. Entry and innovation are facilitated by access to finance and other critical resources including customers and suppliers. Antitrust agencies can promote entry by limiting vertical foreclosure and aggressive attention to post-cartel behavior, as discussed further below.

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It is also imperative that antitrust authorities be vigilant in restricting communication that facilitates cooperation among competing firms. In our sample of eighty-one convicted international cartels, every single cartel participated in direct, face-to-face meetings.<sup>27</sup> The continued reliance on meetings in an age of extensive electron-



ic communication technologies suggests that cartels rely on such meetings to build trust.<sup>28</sup>

We also find that cartels with actively involved trade associations—not those simply using trade associations as “cover” but where the association helped with cartel organization—were much less likely to collapse on their own.<sup>29</sup> Competition authorities have been able to target cartels that involved trade associations, suggesting that monitoring trade association activity and other venues where competing firms gather is a useful anti-cartel strategy.

As firms respond to this enforcement, they may develop more subtle methods for communicating and coordinating conduct.<sup>30</sup> It is well documented, for example, that experienced cartels develop hierarchical structures to separate information exchange and bargaining by high-level executives from detailed price and quantity setting by regional or local managers.<sup>31</sup> These examples demonstrate not only the role that communication plays in explicit collusion, but also the likelihood that communication can facilitate tacit collusion or, more generally, result in lessening the intensity of competition.

Cases involving inter-firm communication and the boundaries of acceptable information exchange arise on both sides of the Atlantic. For example, in response to U-Haul’s actions from 2006 through 2008 to raise market prices, including announcements made during a 2008 quarterly earnings conference call, the FTC and U-Haul agreed that U-Haul would refrain from “[c]ommunicating, publicly or privately, to any Person who is not an Insider, that Respondents are ready or willing . . . to raise, fix, maintain, or stabilize prices or price levels, rates or rate levels, conditional upon a Competitor also raising, fixing, maintaining, or stabilizing prices or price levels, rates or rate levels.” The order specifically exempts communication that is primarily directed at customers (i.e., is disseminated “through Web sites or other widely accessible methods of advertising such as newspapers, television, or signage”).<sup>32</sup>

The European Commission tackles these issues in its recent draft Horizontal Guidelines.<sup>33</sup> While these guidelines clearly still reflect the legal and economic ambiguity of many types of communication, they provide an important framework for rules restricting communication that undermines competition. Based on legal frameworks that ban explicit collusion, rules regarding communication often focus on whether or not the communication is evidence of such explicit collusion. This often leads to sharp lines being drawn between private and public communication.

A different distinction tied more closely to the economic impact of information-sharing would focus on whether information is shared in a fashion that allows customers to act on it immediately. If customers can act immediately in response to an announcement, then the announcement has potential significant cost to the firm. If, on the other hand, the information is shared in a way that

allows competitors to respond more quickly than customers, it is much more likely that the information will have an anticompetitive impact. Choosing to share information in a way that allows competitors to respond more quickly than customers is not, in and of itself, evidence of explicit collusion. On the other hand, because of the greater likelihood of anticompetitive effects, this kind of information sharing should be suspect.

Another way to maintain deterrence is to direct more enforcement resources toward firms and industries that have a history of explicit collusion. Recidivism is rampant among price-fixers. Some industries have maintained collusive arrangements on and off over more than a century.<sup>34</sup> Certain firms have been convicted multiple times over many years across different products, suggesting that a single prosecution does not provide sufficient deterrence for long ingrained firm practices.<sup>35</sup>

Once a cartel is uncovered and prosecuted, antitrust authorities should, and often have, provided closer monitoring of behavior in an industry.<sup>36</sup> They also have occasionally imposed behavioral remedies similar in intent to those used to prevent the exercise of market power by dominant firms. In some cases it is not clear what impact these post-conviction restrictions have, as they seem to assert simply that the firms will not violate the law in the future. It may be that making such an assertion reduces the costs of prosecution or shifts the evidentiary burden in future cases.<sup>37</sup> In other cases, however, post-conviction orders restrict specific behaviors that are otherwise legal but that, given the history of the industry, could facilitate collusion.<sup>38</sup> This is a relatively easy way to increase deterrence while relaxing fines because these post-conviction restrictions are both an additional, non-pecuniary punishment, and a deterrent to collusion in the future.

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The U.K. Office of Fair Trade has made use of a policy that prevents individual recidivism by banning executives from acting as company directors after a cartel conviction.<sup>39</sup> This is an additional punishment for those individuals, and it also makes reestablishing cooperation more difficult by changing the faces of the people engaged in inter-firm interactions. Even more expansively, Daniel Sokol has suggested requiring that all executives certify that their firms are *not* participating in collusive activity. This could provide competition authorities with a useful enforcement tool.<sup>40</sup> While promises not to break the law may not increase deterrence directly, this policy could increase the ease of prosecution of individuals for corporate malfeasance.

Two other areas of post-conviction oversight with heightened significance during a recession are merger review and the disposition of bankruptcy proceedings for former cartel member firms. There is a risk of perverse effects if competition authorities pursue vigorous prosecutions of cartels, but have relatively flexible

policies toward mergers. This simply creates an incentive for firms to merge in order to accomplish what would be prohibited for them as independent firms.<sup>41</sup>

For example, Outokumpu Oyj (Finland) and Boliden (Sweden) participated in the copper plumbing tubes cartel from 1988 to 2001. In 2003, the two firms announced their intent to merge. The merger was approved by the European Commission on December 9, 2003, one week before the EC fined Outokumpu for its participation in the industrial copper tubes cartel and nine months before it fined both firms for fixing prices in copper plumbing tubes.<sup>42</sup> Regulators are not unaware of this dilemma, but their response has been inconsistent. Davies et al., analyze merger decisions by the EC in which collective dominance was a serious consideration. They note that the EC intervened in one merger case where there was previous cartel activity but, in another case, did not intervene “despite evidence of previous cartel behaviour in a related market.”<sup>43</sup>

A similar issue arises when a former cartel member enters bankruptcy proceedings. The priority of bankruptcy courts is to take actions that preserve the value of the firm’s assets to its debtors. This presumption can lead to anticompetitive industry reorganization. The DOJ and the FTC have intervened in bankruptcy proceedings with mixed success. For example, in the aftermath of the prosecutions related to the graphite electrodes cartel, the Carbide/Graphite Group filed for Chapter 11 bankruptcy protection. The DOJ filed an antitrust lawsuit to prevent SGL, a co-conspirator in the cartel, from acquiring Carbide/Graphite Group. The bankruptcy court judge awarded the assets of Carbide/Graphite Group to another company and the DOJ dismissed its lawsuit.<sup>44</sup> In a more recent case that did not involve prior collusion, the FTC was unable to convince a bankruptcy judge to slow the march of bankruptcy proceedings sufficiently to protect the interests of consumers.<sup>45</sup>

WE WOULD ADVOCATE FOR AN INCREASED ROLE FOR ANTITRUST AGENCIES IN BANKRUPTCY PROCEEDINGS, ALLOWING BANKRUPTCY COURTS TO CONSIDER THE EASE OF CARTELIZATION WHEN CHOOSING AMONG BIDDERS FOR THE FAILED FIRM’S ASSETS.

We would advocate for an increased role for antitrust agencies in bankruptcy proceedings, allowing bankruptcy courts to consider the ease of cartelization when choosing among bidders for the failed firm’s assets. J. Thomas Rosch of the FTC makes this point more generally:

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“In fact, the Commission has already been faced with not just a failing firm argument, but an actual failing firm in one industry in the last month and a half. The most the agency could do was explain to the bankruptcy court which of two bidders for the failed firms’ assets appeared to be the least anti-competitive (though both appeared anticompetitive). As almost always hap-

pens in these situations, the more anticompetitive firm offered more money for the assets to the bankruptcy court, and the court approved that buyer. The result will probably be reduced output, higher prices, less innovation and fewer jobs, but there is nothing the antitrust enforcement agencies can do about it. This is not a good result, and underscores the need to closely analyze the financial conditions of all firms involved when we review mergers—the resulting merged entity as well as remaining competitors.<sup>746</sup>

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Any discussion of deterrence must consider the role of private litigation. While there are clearly benefits to permitting private action, including basic fairness to harmed consumers, we do not think that this is a particularly effective tool to balance “inability to pay” fine reductions. Private actions create the same potentially anticompetitive impact of large governmental fines—weakening firms to the point that they exit the industry. An additional and, we believe, more fundamental limitation to this approach, is that private cases are a relatively weak device for disrupting cartels. The availability of treble damages in the United States has generally not encouraged large firms to report upstream cartels.<sup>47</sup> While there are many follow-on lawsuits, very few price-fixing cases are initiated by customers. Customers may not have the information necessary to intervene prior to a government investigation; if that is the case, any societal benefit from civil litigation is reduced.

## V. Concluding Remarks

Antitrust authorities have responded to the Great Recession very differently from the response to the Great Depression of the 1930s. Unlike the promotion of collusion endorsed in the National Industrial Recovery Act of 1933, today’s policy makers have focused their efforts on fiscal and monetary policy. Both the DOJ and the EC have continued to pursue illegal price-fixing throughout the crisis. However, policy makers have granted more “inability to pay” reductions when fining cartel members. While this may be necessary given current economic conditions, it reduces the already relatively low deterrence to collusion.

WE NEED TO ASSURE THAT ANY IMPLEMENTATION OF AN “INABILITY TO PAY” POLICY HAS SPECIFIC, OBJECTIVE, AND TRANSPARENT CRITERIA.

We need to assure that any implementation of an “inability to pay” policy has specific, objective, and transparent criteria. Lack of transparency can undermine the credibility of competition policy, creating the appearance of favoritism. When antitrust authorities suppress information about which firms receive “inability to pay” fine reductions, they also provide former co-conspirators with an instrument to demonstrate their continued fealty to one another.

This reduction in the size of fines requires that we find alternative methods to increase deterrence along other dimensions. As the expansion of amnesty and leniency policies over the last decade has shown, the most effective policies in this arena are those that take advantage of cartel vulnerabilities. Our research has shown that cartel stability is particularly weakened by market entry and lack of communication. Encouraging entry and preventing potentially anticompetitive inter-firm communication, as the new EC guidelines propose to do, can limit a cartel's ability to survive.

Antitrust authorities can also use post-conviction behavioral remedies, such as restricting board membership or scrutinizing mergers among former co-conspirators. This would increase non-pecuniary penalties while simultaneously making future collusion more difficult. Ongoing discovery of anticompetitive agreements indicates that, despite aggressive action by competition authorities, the allure of collusive profits continues to seduce firms into illegal activity. Creative and constant vigilance on the part of competition authorities is required. ▼

## Appendix

The following illustrates the familiar constrained optimization problem faced by firms forming a cartel. In a market with identical price-setting firms, infinitely repeated interaction among these firms, and perfect information, collusion can be sustained if:

$$\sum_{t=0}^{\infty} \delta^t \Pi^i(p_{i,t}^M, p_{-i,t}^M) - \theta \Omega > \Pi^i(p_{i,0}^D, p_{-i,0}^M) + \sum_{t=1}^{\infty} \delta^t \Pi^i(p_{i,t}^C, p_{-i,t}^C) - \mathcal{L}$$

where

$p_{i,t}^M$  is the collusive price charged by firm  $i$  in period  $t$ ,

$p_{i,0}^D$  is the price charged by firm  $i$  if it chooses to defect from the collusive agreement in the first period,

$p_{i,t}^C$  is the price charged by firm  $i$  in the continuation equilibrium after a defection by one firm,

$\Pi^i$  is the profit earned by firm  $i$  in a single period,

$-i$  indicates firms other than firm  $i$ ,

$\delta^t$  is the discount factor in period  $t$ , with  $\delta^t = e^{-r\tau}$  where  $r$  is the instantaneous rate of interest and  $\tau$  is the real time between periods,

$\theta$  is the probability that the antitrust authorities detect the cartel,

$\Omega$  is the penalty imposed on a cartel member who does not defect, and

$\mathcal{L}$  is any legal liability associated with a leniency application (which we assume will accompany defection).

We assume that  $\Omega > \mathcal{L}$ ; that is, an application for leniency is associated with a reduction in fines.

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- 1 See Nikki Tait, *EU Softens Antitrust Fine Stance*, FINANCIAL TIMES, June 22, 2010; Press Release, European Commission, Antitrust: Commission Fines 17 Bathroom Equipment Manufacturers EUR 622 million in Price Fixing Cartel (June 23, 2010) (where ten firms claimed inability to pay the fines, and, of these, "the fines of three companies were reduced by 50% and those of another two by 25% given their difficult financial situation"); Press Release, EUROPA, Commission Fines Prestressing Steel Producers EUR 518 million for Two-Decades Long Price Fixing and Market-Sharing Cartel (June 30, 2010); Press Release, EUROPA, Antitrust: European Commission Fines Animal Feed Phosphates Producers EUR 175 647 000 for Price-Fixing and Market-Sharing in First "Hybrid" Cartel Settlement (July 20, 2010) (where two companies applied for a reduction in the fine for inability to pay and one company was granted a seventy percent reduction). In 2009, there was one such decision affecting the calcium carbide and magnesium reagents cartel, where one firm was granted a twenty percent reduction. It is interesting to note that this is not mentioned in the press release, but is mentioned in the EC's summary decision where it states: "Various companies claim their inability to pay the fine. The claims were analysed based on point 35 of the 2006 Guidelines on Fines and were rejected. Outside of the application of point 35 of the 2006 Guidelines on Fines, the company Almamet received a reduction of its fine by 20% based on an evaluation of its special circumstances, its financial position and the required deterrent effect of the fine." Summary of Commission Decision of 22 July 2009, Relating to a Proceeding Under Article 81 of the EC Treaty and Article 53 of the EEA Agreement, Case COMP/39.396 – Calcium Carbide and Magnesium Based Reagents for the Steel and Gas Industries (Nov. 12, 2009).
  - 2 For classic contributions to this literature, see Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169 (1968), and William M. Landes, *Optimal Sanctions for Antitrust Violations*, 50 U. CHI. L. REV. 652 (1983).
  - 3 The notation and presentation of the problem of cartel sustainability rely heavily on JEAN TIROLE, *THE THEORY OF INDUSTRIAL ORGANIZATION* 245-53 (1988).
  - 4 For a textbook presentation of these factors, see DAVID BESANKO, DAVID DRANOVE, MARK SHANLEY & SCOTT SCHAEFER, *ECONOMICS OF STRATEGY* 276-84 (5<sup>th</sup> ed. 2010). For a survey of empirical research, see Margaret C. Levenstein & Valerie Y. Suslow, *What Determines Cartel Success?*, 44 J. ECON. LITERATURE 43 (2006).
  - 5 Joseph E. Harrington, Jr. & Myong-Hun Chang provide a formal model in which firms expect this inequality to hold when a cartel is formed, but find that it can be overturned by future, unanticipated shocks: "Industries are given stochastic opportunities to form a cartel and do so if it is incentive compatible. Because of random market conditions, a cartel may persist or perish because it is no longer incentive compatible to collude; they may also be discovered by the antitrust or competition authorities. Cartel formation and demise is then a stochastic process..." Joseph E. Harrington, Jr. & Myong-Hun Chang, *Modeling the Birth and Death of Cartels with an Application to Evaluating Competition Policy*, 7 J. EUR. ECON. ASS'N 1400, at 1401 (2009).
  - 6 Margaret Levenstein and Valerie Suslow find that firm-specific measures of financial stability cause cartel breakup. Margaret Levenstein & Valerie Suslow, *Breaking Up Is Hard to Do: Determinants of Cartel Duration*, J.L. & ECON. (forthcoming 2011).
  - 7 See George Stigler, *A Theory of Oligopoly*. 72 J. POL. ECON. 44 (1964). For an empirical study of the impact of consumer concentration on export trading companies, see Andrew R. Dick, *When Are Cartels Stable Contracts?*, 39 J. L. & ECON. 241 (1996).

- 8 Levenstein & Suslow (2011), *supra* note 6. Analyzing a sample of 81 international cartels prosecuted by the DOJ and/or EC since 1990, we find that firm-specific measures of financial stability cause cartel breakup.
- 9 See John M. Connor & Robert H. Lande, *The Size of Cartel Overcharges: Implications for U.S. and EU Fining Policies*, 51 ANTITRUST BULL. 983, 1020 (2006).
- 10 The International Competition Network has reported that Switzerland, Turkey, Germany, South Korea, Canada, New Zealand, Serbia, Ireland, Russia, Brazil, and Austria each take inability to pay into account. In general, the ICN finds that: "In the case of authorities which may take into account the ability to pay, there is significant difference in the way how it is done [sic]. While some jurisdictions approach the question from a general legal point of view, applying the legal principle of proportionality, others take an economic approach by stating that the imposition of fine cannot lead to the driving out of the market of the undertaking in question, thus causing an additional harm to competition. (It is also possible that these two approaches are mixed in certain circumstances.)" *Setting of Fines for Cartels in ICN Jurisdictions*, REPORT TO THE 7TH ICN ANNUAL CONFERENCE, KYOTO (International Competition Network, Luxembourg), April 2008, at 26-27.
- 11 Point 35 of the EC guidelines states: "In exceptional cases, the Commission may, upon request, take account of the undertaking's inability to pay in a specific social and economic context. It will not base any reduction granted for this reason in the fine on the mere finding of an adverse or loss-making financial situation. A reduction could be granted solely on the basis of objective evidence that imposition of the fine as provided for in these Guidelines would irretrievably jeopardise the economic viability of the undertaking concerned and cause its assets to lose all their value." *Guidelines on the Method of Setting Fines Imposed Pursuant to Article 23(2)(a) of Regulation No 1/2003*, 2006 O.J. (C 210) 2, 3.
- 12 *Id.* For example, see Press Release, EUROPA, Antitrust: European Commission Fines Animal Feed Phosphates Producers EUR 175 647 000 for Price-fixing and Market-sharing in First "Hybrid" Cartel Settlement (July 20, 2010), available at <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/985&format=HTML&aged=0&language=EN&guiLanguage=en>.
- 13 Press Release, EUROPA, EC Commission Action Against Cartels: Questions and Answers (June 30, 2010), available at <http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/10/290&format=HTML&aged=0&language=EN&guiLanguage=en>.
- 14 Andreas Stephan, *The Bankruptcy Wildcard in Cartel Cases*, 22 (ESRC Centre for Competition Policy & The Norwich Law School, University of East Anglia, CCP Working Paper 06-5, 2006, available at [http://www.uea.ac.uk/polopoly\\_fs/1.104482!ccp06-5.pdf](http://www.uea.ac.uk/polopoly_fs/1.104482!ccp06-5.pdf). We do not count the reductions in fine for the alloy surcharge cartel, which Stephan lists in Table 1. In 1998 the European Commission did reduce fines in the alloy surcharge conspiracy among stainless steel producers. However, these reductions were based on "extenuating circumstances," namely that the cartel was not successful at increasing profits during its early months, not on the inability of the firms to pay the fines at the time they were administered. ("On the other hand, the economic situation in the sector at the end of 1993 was particularly critical. The price of nickel was rising rapidly, while the price of stainless steel was very low. It should be noted that this particular situation applies only to the very beginning of the concerted action." Commission Decision, 98/247/ECSC, Case IV/35.814 (Jan. 21, 1998) ¶83 (relating to a proceeding pursuant to Article 65 of the ECSC Treaty). For more recent EC cases, see [http://ec.europa.eu/competition/antitrust/overview\\_en.html](http://ec.europa.eu/competition/antitrust/overview_en.html).
- 15 Press Release, Animal Feed Phosphates, *supra* note 1. The full statement in the EC press release is as follows: "Two of the undertakings have invoked their 'inability to pay' under point 35 of the 2006 Guidelines on fines. These applications have been thoroughly assessed on the basis of financial statements for recent years, projections for the current and coming years, ratios measuring the financial strength, profitability, solvency, liquidity, and relations with outside financial partners and with shareholders. The Commission also examined the social and economic context of each applicant and assessed whether its assets would be likely to lose significant value if it were to be liquidated as a

result of the fine. As a result of this assessment, the Commission accepted one of the applications and granted a reduction of 70% of the fine.”

- 16 There is a large literature on the different incentives created by rules versus discretion, but this analysis has generally not been applied to discussions of antitrust enforcement. See, e.g., Finn E. Kydland & Edward C. Prescott, *Rules Rather than Discretion: The Inconsistency of Optimal Plans*, 85 J. POL. ECON. 473 (1977).
- 17 U.S. SENTENCING GUIDELINES MANUAL §8C3.3 (2009), available at <http://www.ussc.gov/2009guid/TABCON09.htm>.
- 18 These cases are available at <http://www.justice.gov/atr/cases>.
- 18 Plea Agreement at ¶10, *United States v. Hynix*, No. CR 05-249 PJH (N.D. Cal. May 11, 2005), available at <http://www.justice.gov/atr/cases/f209200/209231.htm>.
- 19 Tefft W. Smith, *Comments for the Antitrust Modernization Commission Hearing on Criminal Antitrust Remedies* 31 (Nov. 3, 2005), available at [http://govinfo.library.unt.edu/amc/commission\\_hearings/pdf/Smith\\_Statement.pdf](http://govinfo.library.unt.edu/amc/commission_hearings/pdf/Smith_Statement.pdf).
- 20 James H. Mutchnik & Christopher T. Casamassima, *United States v. Hynix Semiconductor, Inc.: Opening the Door to the Inability-to-Pay Defense?*, THE ANTITRUST SOURCE, Sept. 2005, at 3 (citing Hynix financial statement).
- 21 See, e.g., Daniel Kahneman, *Maps of Bounded Rationality: Psychology for Behavioral Economics*, 93 AM. ECON. REV. 1449 (2003).
- 22 For example: “Only in recent years have certain EU Member States adopted criminal sanctions for hardcore cartel activity—namely, the UK, Ireland, France, Estonia, Hungary, Romania, the Slovak Republic, and Slovenia. . . . Austria and Germany provide for criminal sanctions for bid-rigging only.” Nicole Kar, Fabio Falconi & Priya Sahathevan, *Recent Developments in Cartel Enforcement at EC and UK Levels: Adjusting the Mix of Carrots and Sticks*, 2 GLOBAL COMPETITION POL'Y 1, 7 (2008).
- 23 The optimal deterrence literature tends to be skeptical of the use of prison sentences. For a summary of recent views on this issue, see Robert H. Lande & Joshua P. Davis, *Comparative Deterrence from Private Enforcement and Criminal Enforcement of the U.S. Antitrust Laws* 6-9, (Univ. of San Francisco Law, Working Paper No. 2010-17, 2010), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1565693](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1565693).
- 24 For the U.S. Department of Justice, Antitrust Division appropriation figures, see Appropriation Figures for the Antitrust Division: Fiscal Years 1903-2010, available at [http://www.justice.gov/atr/public/division\\_operations.htm](http://www.justice.gov/atr/public/division_operations.htm) appropriations (last visited Oct. 10, 2010). For Federal Trade Commission, Bureau of Competition, appropriations, see FTC Appropriation History, available at <http://www.ftc.gov/ftc/oad/fmo/appropriationhistory.shtm> (last visited Oct. 10, 2010), and for the most recent figures through 2009, see FTC Appropriations/ Reauthorization, available at <http://www.ftc.gov/ocr/appropriations.shtm> (last visited Oct. 10, 2010), or the Congressional Budget summaries at Financial Documents, available at <http://www.ftc.gov/ftc/financial.shtm> (last visited Oct. 10, 2010).
- 25 See, e.g., Rosa M. Abrantes-Metz & Patrick Bajari, *Screens for Conspiracies And Their Multiple Applications*, 24 ANTITRUST 66 (2009) (providing a taxonomy and overview of academic work in this area, as well as examples of how antitrust authorities are increasingly using screens as part of their toolkit for detecting collusion); Philip Haile, Kenneth Hendricks, & Robert Porter, *Recent U.S. Offshore Oil and Gas Lease Bidding: A Progress Report*, 28 INT'L J. INDUS. ORG. 390 (2010) (providing an empirical analysis of bidding in this industry and initial thoughts on how their methodology might be used to detect collusion).



- 26 Levenstein & Suslow (2011), *supra* note 6.
- 27 Margaret C. Levenstein & Valerie Y. Suslow, *Cartel Bargaining and Monitoring: The Role of Information Sharing*, in *THE PROS AND CONS OF INFORMATION SHARING* 43 (Mats Bergman ed., 2006) at Table1, 68-78.
- 28 *Id.*
- 29 Andreas Reindl makes this point: "One explanation for the increased interest may be that competition authorities recognize how their persistent enforcement practices against hard-core cartels make it more likely that firms try to find more subtle ways to coordinate their conduct and thus operate in the grey fringe of rules that prohibit rivals from expressly fixing price or output." Andreas Reindl, *Information Exchanges Among Competitors: The Commission Takes a New Look*, 9 *ANTITRUST CHRON.* 1, 2 (2010).
- 30 Levenstein & Suslow (2006), *supra* note 27, at 51.
- 31 *In re U-Haul Int'l Inc.*, No. 081-0157, FTC Decision and Order (July 14, 2010), available at <http://www.ftc.gov/os/caselist/0810157/100720uhauldo.pdf>. See also Edward Wyatt, *U-Haul to Settle With Trade Agency in Case on Truck Rental Price-Fixing*, *N.Y. TIMES*, June 9, 2010, at B3 (stating that the FTC "claimed that U-Haul had invited its closest competitor to fix prices on one-way truck rentals from 2006 to 2008"). The Canadian Competition Bureau recently concluded a consent order which prohibits six auto body repair shops from "directly or indirectly, engaging in any communication or exchange of information of any kind with each other relating to pricing of products or services to customers or insurance companies..." Press Release, Canadian Bureau of Competition, Competition Bureau Settles Case Involving Auto Body Shops (Feb. 16, 2007) (on file with authors).
- 32 See Draft: Guidelines on the Applicability of Article 101 of the Treaty on the Functioning of the European Union to Horizontal Co-operation Agreements, European Commission (May 4, 2010) available at [http://ec.europa.eu/competition/consultations/2010\\_horizontals/index.html](http://ec.europa.eu/competition/consultations/2010_horizontals/index.html). For a brief summary and commentary on the new draft rules on information sharing, see Frank Fine, *Brussels' Antitrust Revolution*, *WALL ST. J.*, Aug. 4, 2010.
- 33 For example, potash producers agreed to restrict output and price competition as early as 1879. H.R. Tosdal, *The German Potash Syndicate: A Typical Kartell*, in *TRUSTS, POOLS, AND CORPORATIONS* 716 (William Z. Ripley, ed., 1916). For an overview of collusion over the twentieth century, see Harm G. Schroter, *The International Potash Syndicate*, in *INTERNATIONAL CARTELS REVISITED* 75 (Dominique Barjot, ed., 1994). For a discussion of the current state of competition in the potash industry, see Frederic Jenny, Letter to the Editor, *Potash Cartel and Double Standards*, *FINANCIAL TIMES*, Aug. 31, 2010, at 8.
- 34 For example, the German company Degussa has been convicted of price-fixing by the EC over the past fifteen years for the Methionine cartel (which, according to the details published by the EC covered the period 1986-1999), Methacrylate cartel (1997-2002), Organic Peroxides cartel (1971-1999), Hydrogen Peroxide and Perborates (1994-2000), and Vitamin B3 (1992-1998). There were additional convictions in the 1980s as well. See Edward Anderson & Gerald Berger, *Commission Fines Four Undertakings a Total of EUR 344.5 Million for Participating in an Acrylic Glass Cartel*, *COMPETITION POL'Y NEWSLETTER* (European Commission, Brussels, Belgium) Autumn 2006, at 34 n.2, available at [http://ec.europa.eu/competition/publications/cpn/2006\\_3\\_33.pdf](http://ec.europa.eu/competition/publications/cpn/2006_3_33.pdf).
- 35 For example, in 1977 General Electric and Westinghouse agreed to refrain from using most-favored customer clauses in contracts for large turbine generators. The DOJ was able to exact this agreement in large part because over a decade before, following their convictions for price-fixing, these two companies had signed a consent decree governing future pricing behavior. See Thomas E. Cooper, *Most-Favored-Customer Pricing and Tacit Collusion*, 17 *RAND J. ECON.* 377, 385-86 (1986).

- 36 See, e.g., *Cartel Settlements*, REPORT TO THE 7<sup>TH</sup> ICN ANNUAL CONFERENCE, KYOTO (International Competition Network, Luxembourg), April 2008, at 34, available at <http://www.internationalcompetitionnetwork.org/uploads/library/doc347.pdf> (“In France, the parties wishing to enter into a settlement agreement must commit themselves to modifying their behavior in the future, and the settlement agreement may include reports to the competition agency or any other measure allowing it to monitor the effective implementation of the compliance program... If effectively monitored, France believes that such steps can bring additional added value, insofar as companies that have already agreed not to challenge the findings of the agency and to settle the case willingly commit themselves, in addition, to some proactive behavior.”).
- 37 Press Release, Federal Trade Commission, FTC Order Settles Charges that FMC Corp. and Japan’s Asahi Chemical Co. Engaged in Illegal Anticompetitive Practices (December 21, 2000), available at <http://www.ftc.gov/opa/2000/12/fmc.shtm> (involving the microcrystalline cellulose cartel, which allocated markets geographically: “Under the terms of the proposed settlement, ... to erase any existing anticompetitive effects of the alleged conspiracy, FMC would be barred for 10 years from acting as the U.S. distributor for any competing manufacturer of MCC (including Asahi Chemical), and for five years would be prohibited from distributing in the United States any other product manufactured by Asahi Chemical.”).
- 38 See Press Release, Office of Fair Trading, OFT Sets Out Revised Approach to Director Disqualifications (June 29, 2010), available at <http://www.ofg.gov.uk/news-and-updates/press/2010/68-10> (stating that a director can be disqualified from acting as a director for up to 15 years if his company is involved in a breach of competition law and the court considers he is unfit to be concerned in the management of a company as a result”).
- 39 D. Daniel Sokol, *Cartels, Corporate Compliance and What Practitioners Really Think About Enforcement*, ANTITRUST LAW J. (forthcoming 2011), recommends such a policy: “A further step would be to make the guidelines themselves de facto enforceable.... Under such an approach, implementation of compliance programs would be required of all firms of a certain size threshold. ... The compliance threshold would be reached by a business’ annual turnover in the United States. Thus, heightened compliance requirements would be mandatory for any company doing a certain amount of business in the United States. Since the largest cartels are global, an increased level of compliance would improve compliance efforts in all countries. Consequently, this would bring antitrust closer to global optimal deterrence.” (footnotes omitted).
- 40 It has been argued that increased concentration between the passage of the Sherman Act in 1890 and the Federal Trade Commission Act in 1914 reflected exactly this paradox created by permissive merger and restrictive price-fixing policies. Levenstein & Suslow (2006), *supra* note 4, at 84.
- 41 *Commission Ignores Bad Past*, GLOBAL COMPETITION REV. (Jan. 16, 2004). See also Press Release, EUROPA, Commission Fines Companies in Copper Plumbing Tubes Cartel (Sept. 3, 2004), available at <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/04/1065&format=HTML&aged=0&language=EN&guiLanguage=en>; *Commission Fines Three Companies in Industrial Copper Tubes Cartel*, COMPETITION POL’Y NEWSLETTER (EUROPA, Brussels, Belgium), Dec. 16, 2003.
- 42 Stephen Davies, Matthew Olczak & Heather Coles, *Tacit Collusion, Firm Asymmetries and Numbers: Evidence from EC Merger Cases 14* (Centre for Competition Policy, Working Paper No. 07-7, 2010).
- 43 Press Release, U.S. Department of Justice, *Department of Justice Dismisses Antitrust Lawsuit Against SGL Carbon* (May 8, 2003), available at [http://www.justice.gov/atr/public/press\\_releases/2003/201003.htm](http://www.justice.gov/atr/public/press_releases/2003/201003.htm).
- 44 See J. Thomas Rosch, Commissioner, Federal Trade Commission, *Implications of the Financial Meltdown for the FTC*, Address at the New York Bar Association Annual Dinner 11 (Jan. 29, 2009) (transcript available at <http://ftc.gov/speeches/rosch/090129financialcrisisnybarspeech.pdf>).

45 *Id.*

46 Sokol, *supra* note 39, at 23, argues that the threat of civil action provides little deterrence: “Both defense and plaintiff side lawyers note that private rights add to the total amount of civil penalties and that the threat of private rights is on the radar of general counsel. Treble damages have an effect of settlements because defense side trial lawyers will not be willing to take on such cases because of the potential for an adverse outcome. In this sense, cases that get litigated out are not representative of all cases. Indeed, the stakes will be higher in such cases. Yet, the threat of private rights seems not to have much of an impact at the firm level. Treble damages are not high enough to trouble the board of directors to push for very serious compliance.”